U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

WIND AND WATER POWER TECHNOLOGIES OFFICE

U.S. Department of Energy's Wind Program Funding in the United States:

Workforce Development Projects Report

Fiscal Years 2008 - 2014

Introduction

Wind and Water Power Technologies Office

The Wind and Water Power Technologies Office (WWPTO), within the U.S. Department of Energy's (DOE's) Office of Energy Efficiency and Renewable Energy (EERE), supports the development, deployment, and commercialization of wind and water power technologies. WWPTO works with a variety of stakeholders to identify and support research and development (R&D) efforts that improve technology performance, lower costs, and—ultimately—deploy technologies that efficiently capture the abundant wind and water energy resources in the United States. WWPTO is one office that contains two distinct focus programs: wind and water. The Wind Program and the Water Power Program operate as integrated, but separate entities within WWPTO.

The Wind Program is committed to developing and deploying a portfolio of innovative technologies for clean, domestic power generation to support an ever-growing industry.

The Wind Program provides R&D funding across six broad areas:

1. Offshore Wind Projects
2. Testing, Manufacturing, and Component Development Projects
3. Integration, Transmission, and Resource Assessment and Characterization Projects
4. Environmental Impacts Projects
5. Market Acceptance Projects
6. Workforce Development Projects.

The breakdown of Wind Program funding is presented in a series of reports that showcase the projects funded in each of the six abovementioned areas.

Photo from University of Minnesota

Photo from University of Minnesota

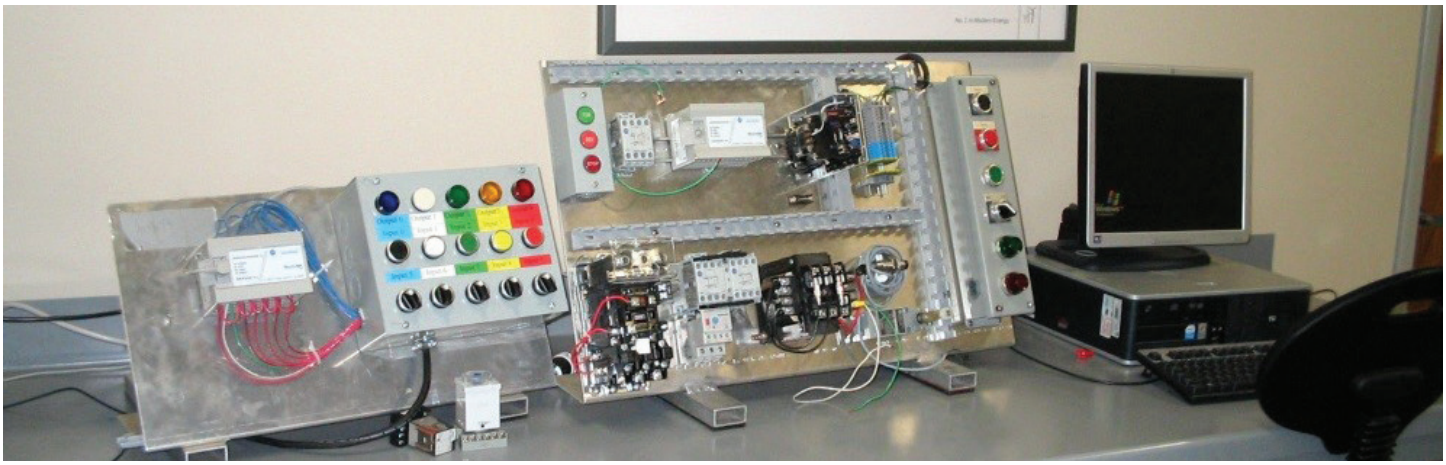

Photo from Iowa Lakes Community College

Workforce Development

The strong, consistent, and abundant winds within the United States are providing a clean, domestic, and renewable source of power for the nation. As of the end of 2012, the United States had more wind turbine generating capacity installed on land than almost any other country, with an installed capacity of more than 60,000 megawatts. In 2012, wind energy became the number one source of new U.S. electricity generating capacity for the first time—providing approximately 43% of new generation—and represents the second largest renewable contribution to overall electricity generation in the United States (behind hydropower), providing 3.6% of the nation's electricity in 2012 and nearly 5% for the first half of 2013. Greater use of the nation's abundant wind resources for electric power generation will help the United States reduce its emissions of greenhouse gases and other air pollutants, diversity its energy supply, provide cost-competitive electricity to key regions across the country, and reduce water usage for power generation. In addition, wind energy deployment will help revitalize key sectors of the economy by investing in manufacturing and infrastructure and creating long-term, sustainable jobs.

Continued growth of the U.S. wind industry requires trained and qualified workers to manufacture, construct, operate, and maintain wind turbines. Additionally, the nation will continue to need skilled scientists and engineers who can develop the next generation of wind power technologies. The Wind Program works to address the wind industry's workforce needs through various investments to develop programs, curriculum, and career pathways that produce educated and trained wind energy researchers and professionals.

From 2008 to 2014, DOE's Wind Program announced awards totaling $38,982,803 for 36 projects focused on workforce development. Table 1 provides a brief description of each of these projects. There are three sources of funding for workforce development projects covered in this report: competitive Funding Opportunity Announcements (funded by Congressional Appropriations), Congressionally Directed Projects (CDPs), and the American Recovery and Reinvestment Act of 2009 (ARRA/Recovery Act). See "Types of Funding Sources" on the next page for more information.

Types of Funding Sources

WWPTO's research and development (R&D) projects are financed through two primary sources of funding: Congressional Appropriations and Congressionally Directed Projects (CDPs). Congressional Appropriations determine the operating budgets for each EERE office. WWPTO-funded R&D projects are typically awarded to recipients as cooperative agreements through competitive Funding Opportunity Announcements (FOAs) that are dedicated to specific topic areas. CDPs are also funded by Congress, but are outside of the annual federal budget process. Frequently, there is a cost-share requirement for recipients of both competitive cooperative agreements resulting from FOAs and CDPs.

In addition to these two primary funding sources, WWPTO may be financed directly through specific legislation passed by Congress. In Fiscal Year 2009, for example, Congress passed the American Recovery and Reinvestment Act of 2009 (ARRA/Recovery Act). A portion of Recovery Act funding was dedicated to WWPTO's R&D projects.

WWPTO also funds research projects at DOE's national laboratories through the laboratories' annual operating plans. This funding is not detailed in this report. However, a national laboratory may be a lead or a partner on a competitively awarded project covered in this report. In these cases, the national laboratory is identified as the lead or partner in the appropriate project descriptions.

The Small Business Innovation Research (SBIR) program in DOE's Office of Science provides competitive awards-based funding for domestic small businesses engaging in R&D of innovative technology. SBIR has funded several projects with relevance to the wind industry; however, these projects are not covered in this report.

Table 1: FY 2008 – FY 2014 Workforce Development Project Descriptions

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Arizona State University	Power System Operation and Planning for Enhanced Wind Generation Penetration—Collaborative for Workforce Development	$400,000	FY09: 20% Wind by 2030 FOA	Arizona
Project Description				
Arizona State University, in collaboration with Iowa State and California ISO, addressed the workforce development needs of the electric energy industry, specifically dealing with the training of power system engineers to enable power system operation and planning for enhanced wind generation penetration. This project took a multipronged approach to addressing the issue of attracting new interest into the discipline—at the K–12, undergraduate, and graduate levels—as well as the need for ensuring that the continued education offered to the existing workforce is relevant, up to date, and addresses the needs of the industry. Products resulting from this project include Web-based modules to attract high school students, curriculum for undergraduate and graduate students, online video streamed courses, and short course development for professionals.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Casper College	Casper College Renewable Energy Program	$295,200	FY08: CDP	Wyoming
Project Description				
Casper College demonstrated the feasibility of utilizing wind generated electric power in industrial, agricultural and rural applications. This project designed and implemented education and training programs for technicians to work in renewable energy fields. Casper College installed a 6kw grid connect turbine on the Rocky Mountain Oil Field testing site and a training tower on its campus for more accessible use by students.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Cloud County Community College	Cloud County Community College Wind Turbine	$1,734,000	FY08: CDP	Kansas
Project Description				
Cloud County Community College updated its wind energy technology program through continual evaluation and revision of on-campus, online and distance learning, land-lab, and field training opportunities for traditional and non-traditional students in the renewable energy industry. Students graduating from this program will be able to address a critical shortfall of qualified workers in the wind energy industry.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Columbia Gorge Community College	Columbia Gorge Community College Wind Energy Workforce Training Nacelle	$237,346	FY09: CDP	Oregon
Project Description				
Columbia Gorge Community College purchased a nacelle, which it installed in a laboratory facility on campus for use in the college's Renewable Energy Technology workforce training program. The program emphasizes wind technician training, but also provides foundational skills for other renewable energy sectors.				

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Table 1: FY 2008 – FY 2014 Workforce Development Project Descriptions

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
DNV Global Energy Concepts Inc.	Knowledge-Boosting Program for New Wind Industry Professionals	$269,691	FY09: 20% Wind by 2030 FOA	Washington
Project Description				
DNV Global Energy Concepts Inc. developed a 'knowledge-boosting' curriculum targeted at professionals working in or entering the wind industry, created and distributed a guidance document for implementing the curriculum, and outlined a certification framework through which other programs can be evaluated against the guidance document.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
George Washington University	Wind Curriculum Development at George Washington University	$65,000	FY09: 20% Wind by 2030 FOA	Washington D.C.
Project Description				
The George Washington University developed a wind energy curriculum in its School of Engineering. The curriculum develops wind energy professionals to meet local and national needs and prepares students for degrees leading to advanced masters- and doctorate-level training.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Hudson Valley Community College	Large-Scale Wind Training Program	$300,000	FY10: CDP	New York
Project Description				
Hudson Valley Community College offers a large-scale wind certification program that adheres to international standards. The program has provided large wind safety equipment and curriculum and professional development. The Training and Education Center for Semiconductor Manufacturing and Alternative and Renewable Technologies Faculty are internationally certified to train other trainers and students in the United States.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Illinois Institute of Technology	A World-Class University-Industry Consortium for Wind Energy Research, Education, and Workforce Development	$7,900,000	FY09: American Recovery and Reinvestment Act (part of the Wind University Consortia FOA)	Illinois
Project Description				
A university-industry consortium procured a utility-scale wind turbine at Invenergy's Grand Ridge wind farm in Illinois and installed a small wind turbine at the Illinois Institute of Technology for academic use. Consortium members performed research on the wind turbine reliability to facilitate the integration of wind into the electric power grid system.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Iowa Lakes Community College	Iowa Lakes Community College Sustainable Energy Education Center	$475,750	FY09: CDP	Iowa
Project Description				
Iowa Lakes Community College constructed two state-of-the-art instructional laboratories—a non-energized electrical substation and a Gamesa Nacelle laboratory—with equipment used to train professionals in wind energy. These facilities provide eco-friendly demonstration sites that will increase economic development opportunities for Iowa in terms of both manufacturing and retail by training consumers and incumbent workers in sustainable energy practices.				

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Table 1: FY 2008 – FY 2014 Workforce Development Project Descriptions

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Iowa State University	An Undergraduate Minor in Wind Energy Science, Engineering, and Policy at Iowa State University	$65,000	FY09: 20% Wind by 2030 FOA	Iowa
Project Description				
This project identified innovative and cost-effective approaches to alleviate the most limiting constraints to increasing wind energy penetration in U.S. electric systems. Iowa State University developed college-level educational materials, courses, and programs; constructed a wind turbine research and educational facility; and provided stimulus to the U.S. economy. The work was performed by the Power System Engineering Research Center Wind Consortium, a group of six universities in collaboration with a large industrial group. The universities included Iowa State University (the lead institution), Washington State University, Georgia Tech, Howard University, Arizona State University, and the University of California–Berkeley.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Kansas State University	Curriculum Development in Sustainable Electric Power Generation	$65,000	FY09: 20% Wind by 2030 FOA	Kansas
Project Description				
The Electrical and Computer Engineering Department at Kansas State University developed renewable energy and sustainability course-work in the electrical and computer engineering curricula. Specifically, this project has increased the percentage of renewable energy and sustainability concepts and design projects in upper-level classes; developed fixed and portable laboratory teaching systems to teach generation of electricity from solar and wind to students, as well as to the general public; and continued development of websites for the project to make wind and solar energy data accessible for teaching.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Lakeshore Technical College	POWER -Purposeful Partnerships Coordinating Wind Education Resources	$199,236	FY09: 20% Wind by 2030 FOA	Wisconsin
Project Description				
Lakeshore Technical College has created a career pathway to access wind energy technology programs at technical colleges statewide, provide opportunity for credentialing, and conduct comprehensive career outreach. The wind energy technology program at Lakeshore Technical College prepares students to install, test, service, and repair wind turbine components.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Laramie County Community College	Utility-Scale Wind Technician Training Program Development	$198,594	FY09: 20% Wind by 2030 FOA	Wyoming
Project Description				
Building on Laramie County Community College's curriculum design work, this project met current technician workforce needs, as well as anticipated long-term growth needs, such as those outlined in the 20% Wind Energy by 2030 report. Capacity was increased to fully implement the curriculum through the expansion of lab facilities, as well as an increase in the number of students enrolled.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Montana State University	Wind Turbine Development	$1,000,000	FY10: CDP	Montana
Project Description				
Montana State University is performing research in wind turbine systems, with a focus on manufacturing research, outreach, and training for effective construction of wind turbine components, with a goal of creating jobs in the state of Montana. This research involves meet-ings, workshops, and educational initiatives with wind turbine component manufacturers that have the potential to create jobs in-state, as well as with other universities to establish similar programs.				

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Table 1: FY 2008 – FY 2014 Workforce Development Project Descriptions

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Oklahoma Department of Commerce	Development of a National Safety Standard for Wind Turbine Maintenance Technicians	$95,571	FY09: 20% Wind by 2030 FOA	Oklahoma
Project Description				
The Oklahoma Department of Commerce used a collaborative approach to develop a standardized safety curriculum that establishes standards for safety training and a training delivery model for wind industry technicians. Before development of this safety curriculum, there were no federal or state standards on safety training and certification of wind turbine and balance-of-plant maintenance technicians.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Orion ICS	Gemini Energy Services: Military Veteran Wind Training Program	$200,000	FY09: 20% Wind by 2030 FOA	Illinois
Project Description				
Orion ICS funded a workforce development program that caters to former military technicians and veterans as they transition from active duty military to the civilian sector. In addition to serving as an aid to transitioning veterans, the program harnesses the established skills of the veterans for use within the private wind industry.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Pennsylvania State University	Wind Energy Workforce Development: Engineering, Science, and Technology Meeting the Needs of the Future, Now	$373,048	FY09: 20% Wind by 2030 FOA	Pennsylvania
Project Description				
The Pennsylvania State University developed interdisciplinary courses and curricula that provide graduates with the knowledge and skills needed to sustain continuing rapid growth of the wind energy enterprise. The university shared these courses and curricula with other educational institutions in order to multiply contribution to the continued growth and success of the wind energy industry.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Purdue University	Midwest Consortium for Wind Turbine Reliability and Optimization	$64,133	FY09: Wind University Consortia FOA	Indiana
Project Description				
Purdue University has created U.S. jobs and education/training programs that will continue to fuel job growth in the green economy. This project established a student-focused laboratory apparatus that will enable educational institutions in the State of Indiana, including Purdue University and Indiana University, to recruit and train students in cross-disciplinary topics related to the science, engineering, economics, and policy of wind energy. The apparatus is portable and possesses instrumentation with which students can demonstrate the key operational principles of wind turbines.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Purdue University, Calumet	Establishing a Comprehensive Wind Energy Program	$500,000	FY10: CDP	Indiana
Project Description				
Purdue University, Calumet established a comprehensive wind energy program in Indiana with both educational and research components. These components include the establishment of a micro wind farm and visualization lab for virtual wind turbine and wind farm simulation.				

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Table 1: FY 2008 – FY 2014 Workforce Development Project Descriptions

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Rural Learning Center	Rural Learning Center	$197,430	FY09: 20% Wind by 2030 FOA	South Dakota
Project Description				
The Rural Learning Center, formerly the National Wind Distance Learning Collaborative, created a national model for distance learning training applications appropriate for the wind industry. The program model involves establishing a collaborative of distance learning expertise and wind industry training providers and stakeholders. This work group identified the unique challenges and needs present in the emerging wind industry and created a distance learning response. This project identified higher-level training needs that can utilize distance learning applications and created an action plan devoted to expanding the number of trainers and developing their capacity to utilize distance learning.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Southwest Applied Technology College	Southern Utah Wind Power Educational Consortium for Workforce Development	$50,000	FY09: 20% Wind by 2030 FOA	Utah
Project Description				
Southwest Applied Technology College provided students with the practical or applied components of wind energy jobs by replicating actual on-the-job scenarios. This project succeeded in training competent and confident wind energy technicians while providing the dual benefit of attracting more projects and bringing more jobs and economic development to Utah.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
St. Francis University	Renewable Energy Certificate Program	$150,000	FY09: 20% Wind by 2030 FOA	Pennsylvania
Project Description				
St. Francis University created an online renewable energy certificate program at the graduate level as part of the Master of Business Administration educational program. This certificate program focuses on the business aspects of renewable energy technologies, but it is supplemented with a focus on the science, ethics, economics, and social impact of renewable energy.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Texas State Technical College West Texas	Valley Wind Program	$198,206	FY09: 20% Wind by 2030 FOA	Texas
Project Description				
Texas State Technical College West Texas transferred an online course to its sister campus, Texas State Technical College Harlingen, so that it can begin serving the industry in the Texas Gulf Coast wind corridor. The Valley Wind Program is a one-year course in which 30 students receive instruction on the basics of wind energy and the operation and maintenance of wind turbines.				

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Table 1: FY 2008 – FY 2014 Workforce Development Project Descriptions

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
University of Delaware	Advanced Offshore Wind Energy: Atlantic Consortium	$747,540	FY09: Wind University Consortia FOA	Delaware
Project Description				
The University of Delaware is focused on establishing the design requirements for the offshore wind industry in the United States. Research includes: resistance to extreme weather and corrosion; top-to-bottom redesign of offshore turbines to meet unique requirements; including engineering of underwater mounting, gearbox improvement, and corrosion characterization; development of educational programs; and a university program to train design professionals and managers.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
University of Houston	National Wind Energy Center	$4,378,750	Multi-Year CDP	Texas
Project Description				
The University of Houston is establishing an advanced testing facility known as the National Wind Energy Center. The center will be used for research, development, and testing of composite materials and components for larger offshore wind turbines. In the first phase of the project, students and faculty at the university developed test methodologies that will be employed at the center. In the second phase, additional research is being performed to develop advanced materials that can be used for blade manufacturing. These blades will be constructed and tested upon completion of the National Wind Energy Center facility.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
University of Maine	DeepCWind - Deepwater Offshore Wind Consortium	$7,100,000	FY09: American Recovery and Reinvestment Act (part of the Wind University Consortia FOA)	Maine
Project Description				
The University of Maine is developing floating offshore wind farm technologies for deep water development. The project will partially validate computer models for designing and analyzing floating offshore wind turbines and research integrating more durable, lighter, hybrid composite materials into offshore wind floating platforms and towers. The University of Maine-led consortium includes universities, non-profits, and utilities; firms with expertise in wind project siting and environmental siting; and industry organizations to assist with education and tech transfer activities.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
University of Massachusetts	Offshore Wind Energy Systems Engineering Course Development	$252,687	FY09: 20% Wind by 2030 FOA	Massachusetts
Project Description				
The University of Massachusetts developed a formal course entitled “Offshore Wind Energy Systems Engineering” and will disseminate the course content and materials for use across the United States. The university plans to make continued updates to the Web-based course material in the future.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
University of Massachusetts	Wind Energy Science, Technology, and Research (WindSTAR) Consortium: Curriculum, Workforce Development, and Education Plan	$130,000	FY09: 20% Wind by 2030 FOA	Massachusetts
Project Description				
The University of Massachusetts created an introductory wind course and enhanced its wind curriculum.				

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Table 1: FY 2008 – FY 2014 Workforce Development Project Descriptions

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
University of Minnesota	An Industry/Academic Consortium through Cutting-Edge Research and Workforce Training	$7,981,677	FY09: American Recovery and Reinvestment Act (part of the Wind University Consortia FOA)	Minnesota
Project Description				
The University of Minnesota developed full-scale and laboratory-scale wind energy research facilities that allow cost-effective development and real-world testing and demonstration of a wide range of wind turbine technologies, as well as the related collection of field-scale data sets for validating computational models. The University of Minnesota utilizes these facilities to develop a research agenda driven by industry's need for more efficient and reliable wind turbines.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
University of Toledo	Advanced Offshore Wind Turbine/ Foundation Concept for the Great Lakes	$750,000	FY09: Wind University Consortia FOA	Ohio
Project Description				
The University of Toledo is developing computer modeling for a two-bladed downwind offshore turbine and foundation design. The project is also creating curriculum for offshore wind turbine design at the University of Toledo to enhnace training for wind turbine engineers and developers.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
University of Wisconsin-Madison	Integration of Wind Energy Systems into Power Engineering Education Program	$399,931	FY09: 20% Wind by 2030 FOA	Wisconsin
Project Description				
The University of Wisconsin–Madison has provided graduate students with a renewable energy systems course that allows students to learn about the state-of-the-art in renewable applications. Course work includes engineering calculations of power and energy availability of renewable energy sources and requirements for integrating renewable energy sources into production.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
University of Wisconsin, Board of Regents	Continuation Education Short Course and Engineering Curriculum to Accelerate Workforce Development in Wind Power Plant Design, Construction, and Operations	$199,135	FY09: Wind University Consortia FOA	Wisconsin
Project Description				
The University of Wisconsin's Board of Regents furthered the academic institution's workforce development activities by developing an integrated wind energy curriculum aimed toward students in the engineering and construction disciplines. The program of study ranges from wind resource forecasting to wind integration with electric utilities, supported by elective courses in economics and policies. This project developed proposed courses for the University of Wisconsin–Madison, courses for distance delivery, a monthly seminar series, an annual professional conference, and a certificate program.				

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Table 1: FY 2008 – FY 2014 Workforce Development Project Descriptions

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
University of Wisconsin–Milwaukee	Southeast Wisconsin Wind Energy Educational Collaborative	$330,175	FY09: 20% Wind by 2030 FOA	Wisconsin
Project Description				
The University of Wisconsin–Milwaukee developed a wind energy curriculum that creates a career ladder for southeastern Wisconsin graduates to enter or advance in the wind industry.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
University of Wyoming	Fellowships for Students Pursuing Interdisciplinary Master of Science with a Focus in Wind Energy	$195,703	FY09: 20% Wind by 2030 FOA	Wyoming
Project Description				
The University of Wyoming has developed well-trained students with enough breadth and depth in the wind energy field to advance wind turbine technology, contribute to the development of wind plants, manage wind energy projects, and integrate wind energy generated electricity with the grid, among other capabilities.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Western Iowa Tech Community College	Western Iowa Tech Community College Renewable Energy Economy Corridor	$500,000	FY10: CDP	Iowa
Project Description				
Western Iowa Tech Community College has provided a well-equipped, state-of-the-science, technologically advanced training lab for career technical students enrolled in the wind energy program and other energy-related training programs. The lab includes energy wind turbine troubleshooting workstations, multimeters, lifting and rigging simulation equipment, and a 10-kilowatt turbine for lab use.				

Project Recipient	Project Title	DOE Funding Amount	Funding Source	Project Location
Wichita State University	Sustainable Energy Solutions	$984,000	FY08: CDP	Kansas
Project Description				
Wichita State University created a multidisciplinary research and student training effort to address impediments and technology barriers to wind energy commercialization. The university's College of Engineering created a consortium of wind energy researchers to provide advice to industry and policy makers, educate students, and offer a portal for information exchange.				

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Workforce Development Funding Distribution

DOE funded 36 workforce development projects through the Wind Program from Fiscal Year (FY) 2008 to FY 2014. These projects are categorized in the following sections by topic area, geographic region and division, state, recipient type, and funding source.

Funding by Topic Area

This Wind Program's workforce development efforts between FY 2008 and FY 2014 fall under three topic areas: Demonstration, Wind Energy/Power Engineering Curriculum Development, and Wind Energy Technician Training. Projects in these topic areas support the continued growth of the U.S. wind industry by developing trained and qualified workers to manufacture, construct, operate, and maintain wind turbines.

More than half of the Wind Program's funding for workforce development went to demonstration projects. Wind energy technician training represents more than one quarter of funding and a diverse set of innovative projects. Table 2 provides details on the workforce development projects within the three topic areas listed above.

manufacturing, and component development projects within the five topic areas listed above.

Photo from Iowa Lakes Community College

Table 2: FY 2008 – FY 2014 Workforce Development Funding Distribution by Topic Area

Topic Area	Total Funding	Percent of Total
Demonstration	$9,832,958	25%
Wind Energy/Power Engineering Curriculum Development	$14,270,714	37%
Wind Energy Technician Training	14,879,131	38%
Total	$38,982,803	

Photo from University of Minnesota

Funding by Geographic Region & Division

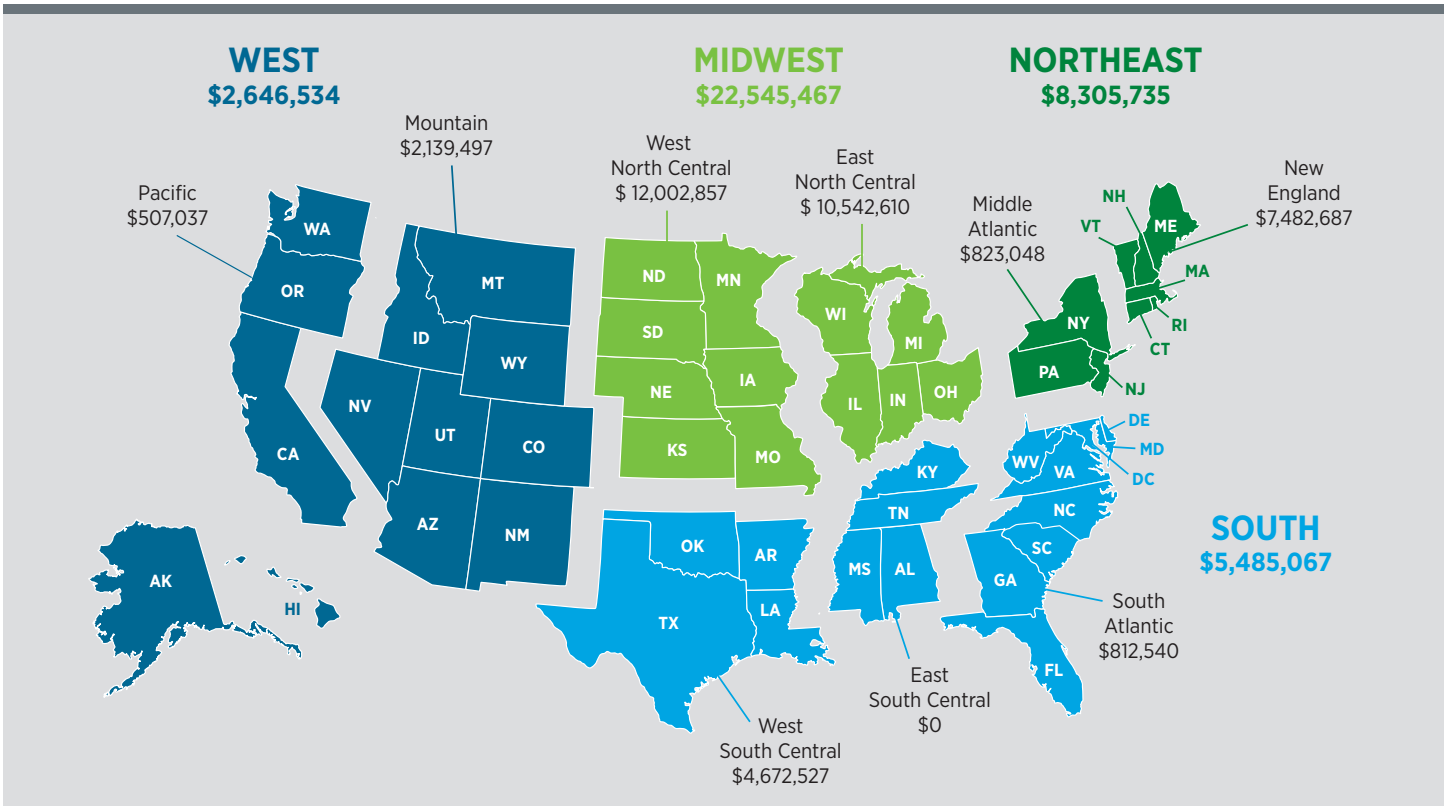
Workforce development project funding was awarded in each of the nation's four geographic regions, with the Midwest and Northeast regions receiving the largest share of funding due to FOA and ARRA funding for demonstration and research in Illinois, Minnesota, and Maine. The remaining funding was distributed to the West and South, with the West receiving a smaller amount. Table 3 provides details on how the Wind Program's funding was distributed within regions and divisions. The geographic regions and divisions used to present the distribution of the Wind Program's funding are based on the U.S. Census Regions and Divisions.[1]

Exhibit 1 provides a map that shows how the Wind Program's funding for these projects was distributed throughout the United States.

Table 3: FY 2008 – FY 2014 Workforce Development Funding by Geographic Region & Division

Region	Region Total Funding	Division	Division Total Funding
West	$2,646,534	Mountain	$2,139,497
		Pacific	$507,037
South	$5,485,067	South Atlantic	$812,540
		West South Central	$4,672,527
		East South Central	$0
Northeast	$8,305,735	Middle Atlantic	$823,048
		New England	$7,482,687
Midwest	$22,545,467	East North Central	$10,542,610
		West North Central	$12,002,857
		Total	**$38,982,803**

Exhibit 1: FY 2008 – FY 2014 Workforce Development Funding by Geographic Region & Division



Funding by State

Wind Program funding for the 36 workforce development projects was broadly distributed to organizations in 21 states and the District of Columbia. Table 4 outlines funding by state.

Combined, Illinois, Minnesota, Maine, and Texas received more than half of total funding for workforce development projects. All four states had large demonstration and testing facility projects.

Table 4: FY 2008 – FY 2014 Workforce Development Funding Distribution by State

State	Total Funding
Arizona	$400,000
Delaware	$747,540
District of Columbia	$65,000
Illinois	$8,100,000
Indiana	$564,133
Iowa	$1,040,750
Kansas	$2,783,000
Maine	$7,100,000
Massachusetts	$382,687
Minnesota	$7,981,677
Montana	$1,000,000
New York	$300,000
Ohio	$750,000
Oklahoma	$95,571
Oregon	$237,346
Pennsylvania	$523,048
South Dakota	$197,430
Texas	$4,576,956
Utah	$50,000
Washington	$269,691
Wisconsin	$1,128,477
Wyoming	$689,497
Total	**$38,982,803**

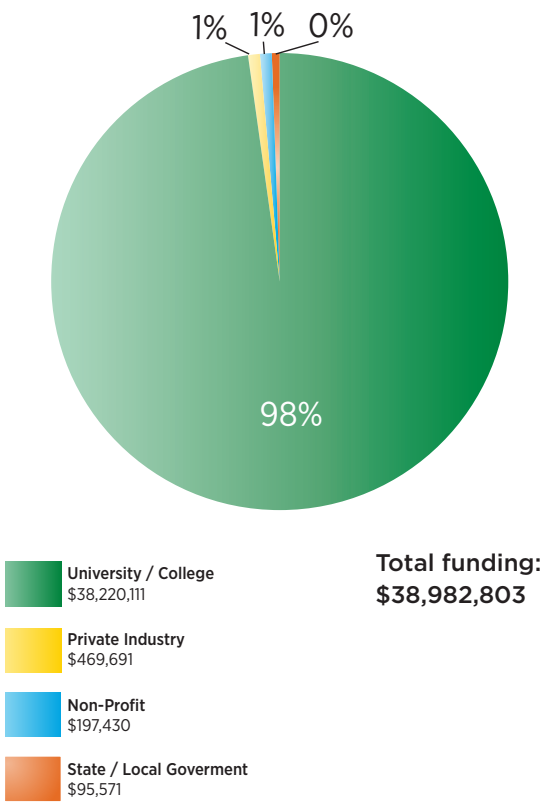
Funding by Recipient Type

DOE funds a variety of recipient types, including private industry, nonprofit organizations, universities and community colleges, investor-owned utilities and public utilities, local and state governments, as well as DOE national laboratories, federal agencies, and interstate government agencies.

The majority of the total workforce development funding from FY 2008 to FY 2014 was awarded to universities or colleges. The remaining funds were distributed to private industry, state/local government, and nonprofit organizations.

Exhibit 2 outlines funding by recipient type.

Exhibit 2: FY 2008 - FY 2014 Workforce Development Projects by Recipient Type



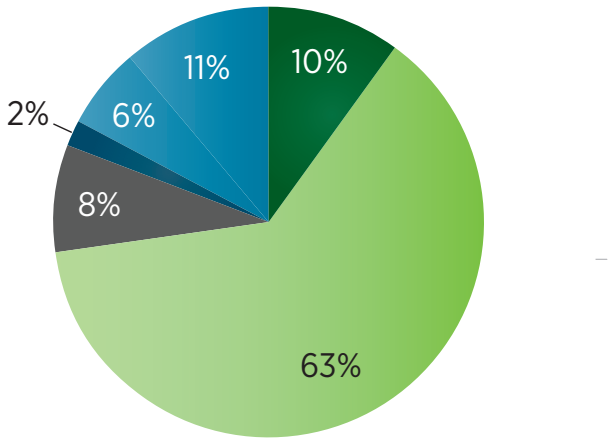
Project funds awarded to universities and colleges dominate the Program's workforce development funding portfolio, representing 98%—or more than $38 million—of total funding.

Funding Sources

Exhibit 3 below provides details on the sources of funding for the Wind Program's 36 workforce development projects awarded from FY 2008 to FY 2014.

Between FY 2008 to FY 2014, the Wind Program issued numerous competitive FOAs; two of these FOAs are represented in this report, receiving approximately $28 million of the total funding for 26 projects. An additional $10 million was awarded to 10 projects through Congressionally Directed funds. The American Recovery and Reinvestment Act did not directly fund projects in this area. More than $15 million in ARRA funds were directed through competitive FOAs.

Exhibit 3: FY 2008 - FY 2014 Workforce Development Projects



Total funding: $38,982,803 | Total number of projects: 36

CDP 27%

- **FY08: CDP** $3,013,200 Number of Projects: 3
- **FY09: CDP** $713,096 Number of Projects: 2
- **FY10: CDP** $2,300,000 Number of Projects: 4
- **Multi-Year CDP** $4,378,750 Number of Projects: 1

FOA 73%

- **FY09: 20% Wind by 2030 FOA** $4,034,407 Number of Projects: 20
- **FY09 Wind University Consortia FOA** $24,543,350 Number of Projects: 6

* The FY09: Wind University Consortia FOA received partial funds through the American Recovery and Reinvestment Act. In the Wind Consortia FOA, three of six projects were funded by the Recovery Act. These totals are reflected in the FOA category in this chart.

Accomplishments

The Wind Program provided more than $38 million in funding for 36 workforce development projects from FY 2008 to FY 2014, with numerous projects operating over multiple years. The Wind Program has already realized significant return on the federal investment to date and anticipates significant key accomplishments in the years to come.

A few of the program's project accomplishments include the following:

- In 2013, the **University of Minnesota** constructed full-scale and laboratory-scale wind energy research facilities to develop a research agenda driven by the industry's need for more efficient and reliable wind turbines. This project established new curricula and educational initiatives for training the next generation of wind industry technical support staff and engineering leaders.
- In 2013, a university-industry consortium procured a utility-scale wind turbine at a wind farm and installed a small wind turbine at the **Illinois Institute of Technology** for academic use. Consortium members used the turbines to perform research on the reliability of the wind turbines and collaborate on workforce development efforts—such as enhancing core curricula—for wind energy research, design, and integration.
- In 2012, **Hudson Valley Community College** started offering a large-scale wind certification program that adheres to international standards. This program addresses the shortage of wind technicians in the United States. Previously, wind turbine manufacturers had to develop their own training centers, preventing them from keeping up with the demand for technicians. Students completing Hudson Valley's certification program will be employable by leading wind turbine companies currently doing business in the United States.
- In 2012, **Orion ICS** established a tailored wind curriculum specifically for transitioning military technicians and veterans from active duty military to the civilian sector. DOE expects the wind industry to contribute up to 500,000 new American jobs by the year 2030, and 250,000 military service members transition to the civilian sector each year. Consequently, there are two gaps that can be bridged through a wind-specific training program for veterans.

For more information, including updates and results from national laboratory research not detailed in this report, see energy.gov/eere/wind/workforce_development_and_education.

End Notes

[1] Energy Information Administration, U.S. Census Regions and Divisions. June 14, 2000. http://www.eia.gov/emeu/recs/census_map.html

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