



Advancing Wind Power in Illinois Conference 2011

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University of Illinois

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Illinois Green Economy Network

Wind Energy Educational Programs

Breakout Seminar

Thursday, July 21, 2011, 2:45 PM



Survey of Higher Education Wind Energy Programs in Illinois

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*Co-Chairs, Green Universities and Colleges Subcommittee,
Green Government Coordinating Council*
Megan Roberts, Graduate Student, Illinois Institute of Technology



UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Green Government Coordinating Council (GGCC)

- Helps state agencies, units of local government, and educational institutions improve the sustainability of their operations and policies
- Established October 2007 under Green Governments Illinois Act
- Chaired by Governor Pat Quinn
- The GGCC consists of members from 15 state agencies
- Subcommittees include Energy Efficiency, Green IT, Green Schools (K-12), Procurement, Recycling, Transportation and Universities



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Green Universities and Colleges Subcommittee

ILLINOIS CAMPUS SUSTAINABILITY COMPACT

- Outlines environmental goals that public and private colleges and universities may adopt
- Includes objectives such as:
 - purchasing renewable energy
 - implementing green building practices
 - developing sustainable transportation options
 - improving water conservation, and
 - incorporating sustainable dining practices



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Green Universities and Colleges Subcommittee

- Policy and Legislation Work Group
- Monthly Webinars – variety of special speakers and topics addressed
- Annual Symposium
- Partnership with Illinois Green Economy Network



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Prairie Research Institute

- Comprises the Illinois scientific surveys: Natural History, Archaeological, Water, Geological and Illinois Sustainable Technology Center
- Mission: to provide objective, integrated scientific research and service...that allow citizens and decision-makers to make choices that ensure sustainable economic development, enduring environmental quality, and cultural resource preservation for the people, businesses, and governments of Illinois.



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Illinois Green Economy Network

- President-led consortium of all 48 Illinois community colleges
- Provides platform for collaboration among all colleges to identify, establish, share best practices, and promote sustainability projects and initiatives
- Financial support from IL Governor's Office, IL DCEO, and U.S. Departments of Education and Energy



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Illinois Green Economy Network

To enable the Illinois community college sector to drive the green economy we are fostering collaborations across our 48 colleges to advance in four strategic areas:

Workforce Development

Developing quality green job/career training for students and workers, effectively informed by community and employer partnerships (balancing demand and supply)

Sustainability Education

Integrating sustainability into existing curriculum across most disciplines and in general education

Community Engagement

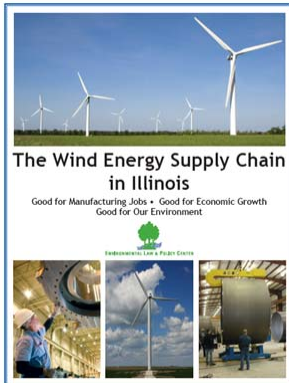
Serve as regional and sector platforms for mobilizing community and employer engagement & fostering community education and action for sustainability

Campus Sustainability

Make sustainability a guiding principle for all institutional practices, providing demonstration for teaching & community engagement



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**Published by
Environmental Law
& Policy Center
October 2010**

- **About 17 manufacturing jobs are created for every megawatt of power developed, translating into over 2,500 jobs for a 150 megawatt wind farm**
- More than 80% of the 140 + current and prospective Illinois companies in the wind industry supply chain are small businesses – machine shops, welders and metal fabricators
- The wind industry produces jobs for turbine component manufacturers, tower manufacturers, cement mixers and the support services all of these industries need (legal , banking, engineering, accounting , etc.)



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Wind Powering America

Education A Key Part of Unlocking Wind Energy Future
 Date: 10/12/2010
 Source: Stacia Cudd, National Association of Farm Broadcasting News Service.
 Audio with Dave Loomis, Illinois State University Professor of Economics and Center for Renewable Energy Director (MP3 3.4 MB)
 Download Windows Media Player, Time: 00:03:40

Illinois has more than 1800 megawatts of installed wind power capacity today. That ranks sixth in the U.S. The state's nearly seven-thousand megawatts of potential capacity ranks 16th in the country.

Illinois State University Professor of Economics Dave Loomis wants to see the state reach that potential. He says it would mean big economic development benefits for the state — not just on the development side itself — but in the supply chain. Loomis notes the Illinois Wind Working Group — a collaboration of entities interested in seeing wind energy advance in the state — has conducted a research report on the economic impact of the supply chain and found wind energy development would create jobs for Illinois manufacturers.

"We took the wind turbine capacity that's predicted to be installed in Illinois over a five year period from 2011 to 2015 and we said, 'what if all the parts were to be made here in Illinois?' If they made all of the parts for all the turbines that would be produced in Illinois, we found that there would be between 15.3 and 16.8 thousand jobs created, and those would be additional jobs on top of the other things that they'd be manufacturing. So almost 17,000 jobs potential and that would produce over a billion dollars in income and almost four-billion dollars in total output."

As a result, Loomis says it's clear wind energy is a win for both rural and urban areas. And by creating power in a greener and more sustainable way, he says it provides a better and cleaner environment for everyone to live in. That's why he says it's important to educate all stakeholders and the next generation. The Illinois Wind Working Group and the Renewable Energy Center at Illinois State University are doing just that. In five years the working group has done more than research; they've held four annual conferences that cover all aspects of wind energy, a specialized conference focused on the siting, zoning and taxation issues associated with wind farms, and landowner forums. After all, landowners are a key part of moving wind energy development forward.

"These would oftentimes happen when a wind developer would come to a new area and start talking with landowners about leasing their land and then they would have lots of questions. So we'll come into an area and we have somebody from the ag extension offices, I would oftentimes speak and kind of give an overview of wind energy and then we'd have a lawyer that would talk about the legal aspects of a lease and how to protect their rights."

The Renewable Energy Center Loomis helped start at Illinois State has three major goals. Loomis says one is supplying a workforce for the wind industry. That's made possible by the development of a renewable energy major at the college.

"We have a renewable energy undergraduate major that's interdisciplinary between the departments of economics, agriculture and technology. So we're really working to supply that skilled workforce that not just wind but all renewables are going to need as we move forward down this path. And so, we found a real need for undergraduate students that have a more interdisciplinary look at renewable energy as opposed to say an engineering degree with maybe just a couple of courses in renewable energy."

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AWEA Publication, May 2011

Illinois is a leader in wind energy capacity and manufacturing

Illinois is a national leader both in terms of installed capacity of wind power and wind turbine manufacturing. The state ranks sixth for overall installed wind capacity in the U.S., with great potential to increase the amount of electricity produced from wind. Investment in wind energy has brought jobs to the state and attracted major wind energy manufacturers to locate in Illinois.

WIND PROJECTS AND GENERATION

Currently online:	2,266 megawatts (MW)
Added in 2011:	239.4 MW
Added in 2010:	408 MW
Under construction:	821 MW
Wind projects in queue:	16,264 MW

Illinois ranked second in 2010 for most new wind added.
 Percentage of Illinois power provided by wind in 2010: 2.2%
 Equivalent number of homes Illinois wind farms now power: 100,000

WIND RESOURCE

Daily wind resource: 249,882 MW at 90 meters hub heights
 Illinois wind resource is ranked fifth in the U.S. and according to a resource assessment from the National Renewable Energy Lab, Illinois wind resource could provide over 125 percent of the state's current electricity needs.

FOR MORE INFORMATION, PLEASE CONTACT: windmail@awea.org
 AMERICAN WIND ENERGY ASSOCIATION
 WWW.AWEA.ORG | 202.362.2200 | 101 9th St, Suite 1000, Washington, DC

Investment in wind power is an investment in jobs, including jobs in operations and maintenance, construction, manufacturing and many support sectors. **Total direct and indirect jobs supported in 2010: 5,000-10,000**

Illinois has attracted investment from tower manufacturer Trinity Structural Towers and gearbox manufacturer Winergy, allowing many smaller manufacturers to get involved in the wind energy supply chain. At least 28 facilities in Illinois currently manufacture components for the wind energy industry. **Over one thousand workers in Illinois are employed in the wind energy manufacturing sector.**

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Potential Student – How Do I Find A Wind Energy Program?

- Training is needed for the growing wind sector in the state of Illinois
- IL Board of Higher Education, IL workNet
- Web Search Topics:
 - Illinois
 - Wind energy degree programs
 - Wind energy certificate programs
 - Turbine technician training
 - Wind energy manufacturing education
 - Homeowner wind power training



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Illinois Board of Higher Education – searched “wind”, “renewable energy” and “electrical” in all databases (7-17-11) – very difficult or nonexistent

http://www.ihbe.state.il.us/ihbe/ProgramInventory/Default.htm

Most Visited: Get Started, ISU CU, HCC Junk Mail, Metcalf, Metcalf blog, SignUpGenius, Energy, Movie Blog, Green Investing, AlterNet, Sky News, MyFitnessPal

ILLINOIS BOARD OF HIGHER EDUCATION

Home | Governor Pat Quinn | Chairwoman Carrie J. Hightman | Executive Director G. W. Reid | Search

Illinois Board of Higher Education Degree Program Inventory
Ten Years of Fall Enrollment and Degrees Conferred by Illinois Colleges and Universities in Active Degree Programs

Welcome to the Illinois Board of Higher Education searchable Degree Program Inventory Database.

The database is searchable by completing as many fields as needed. A table resulting from each search can be as small or extensive depending on the fields selected. The result can be exported into Microsoft Excel by clicking the Export button.

The database has a lot of information, including types of institutions and institution names, Degree Level, 10 Years of Fall Enrollments, 10 Years of Degrees Awarded by Fiscal Year, Race and Gender, and Fields of Study. Over 7000 active degree programs are in the database.

Please note that the database does not include programs offered by approved out-of-state colleges and universities and Illinois Community Colleges.

For Academic Degree Program Inventory Database, go to

For Community College Programs, go to

For Online Academic Degree Programs, go to

NOTE: IHBE Degree Program Inventory CIP Codes were updated from IPEDS CIP2000 CIP Codes to CIP2010 CIP Codes. If you would like to see more information about CIP2010 CIP Code list, resources, and crosswalk, please visit [IPEDS CIP User Site](#).

If you have any questions about a search or the database, contact the Board of Higher Education at webmaster@ihbe.org.

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ISEN
A Community College Partnership

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Illinois workNet website – Wind Turbine Technician training programs (7-16-11)

Wind Turbine Technicians (Emerging)

Preparation

To work as a wind turbine technician, you must

- have a high school diploma or GED; and
- have work experience in a related occupation or have a combination of education and experience.

Education after high school

A college degree is not required to become a wind turbine technician. However, many technicians have an associate degree or a certificate from a training program. A background and understanding of mechanical and electrical principles are good preparation.

A small number of colleges and universities offer training or continuing education programs in wind energy. A list of training programs within the United States is available at: http://www.windpoweramerica.gov/schools/education_training.asp

Be careful when enrolling in programs in this area. Because this is an emerging area of study, the industry does not yet have training requirements. As a result, the quality and depth of information provided by programs vary widely. You should investigate the schools you are interested in. Click [here](#) for information about what to look for in a school.

Work experience

Wind farming is an emerging industry so there is currently no U.S. accepted standard for wind turbine technicians. Generally, those with work experience in a related occupation are able to find jobs as technicians. You should have a strong technical background. You may need training in safety requirements specific to wind turbine technology.

On-the-job training

Graduates of certificate programs generally need on-the-job training to become wind turbine technicians. The length of training varies by employer and your skills.

Information Technology

Wind Turbine Technicians (Emerging)

- Overview
- Training Programs
- Things to Know
- Preparation
- Resources
- View Similar Jobs

Remove Wind Turbine Technicians (Emerging) menu

Regional Economic Snapshot

Click on one of the map regions to view industry specific economic information.

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Wind & Water Power Program

Wind Energy Educational Programs and Training

This page shows the location of wind energy educational programs and training in the United States. Find programs at community colleges, universities, and other institutions. Read more information about [how to use the Google Map](#) and [how to add your educational program and training](#) to the map.

Country: United States | State: Illinois | Project Status: All | Project Type: All

Project Name	City	State	Cntry	Size (kW)	Status	Type
Gemini Energy Services	Downers Grove	IL	US		In Development	Other Education
Highland Community College	Freeport	IL	US		Operating	Community College
Highland Community College West	Elizabeth	IL	US		Operating	Community College
Illinois Institute of Technology	Chicago	IL	US		In Development	University
Illinois State University	Normal	IL	US		Operating	University

To add your wind energy program or training class to this list, e-mail Wind Powering America the Web address of your program.

As of 7-16-11

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The screenshot shows the Windustry website with a search bar and results for 'Where can I find a school or training program specific to renewable energy?'. The results list several programs, including Degree Programs and Certificate and other Training Programs. A blue callout box highlights the following institutions for Illinois:

- Danville Community College (degree)
- Highland Community College (degree)
- Sauk Valley Community College (certificate)

At the bottom of the page, there is a logo for 'Green' and a copyright notice: ©2011 University of Illinois Board of Trustees. All rights reserved. For permissions information, contact the Prairie Research Institute.

The screenshot shows the American Wind Energy Association (AWEA) website. The 'EDUCATION PROGRAMS DATABASE' section is active, displaying search results for 'Country: US'. A blue callout box lists the following Illinois institutions that list wind energy programs:

- Danville Community College
- Highland Community College
- Illinois State University
- Sauk Valley Community College

The page also includes a search bar, navigation links, and a footer with the AWEA logo and copyright notice: ©2011 University of Illinois Board of Trustees. All rights reserved. For permissions information, contact the Prairie Research Institute. The date and time shown in the browser window are 11:31 PM 7/16/2011. A blue arrow points to the date 'As of 7-16-11'.

The Illinois Wind Energy Association

Home | Membership | Illinois Wind Facts | Illinois Wind Daily | Events | Small Wind | About IWEA

About IWEA

The Illinois Wind Energy Association was founded in early 2007 to represent the needs of the growing wind energy industry in Illinois. Until mid-2009, we operated as "Wind for Illinois." We changed our name to best reflect our core mission and goals as the only trade association for the wind energy industry in Illinois.

IWEA is not a "chapter" of the American Wind Energy Association, but our work complements the efforts of AWEA, and we work closely together on policy, public outreach and other issues. But most importantly, we provide a level of attention to Illinois issues that AWEA cannot provide in every state.

IWEA is also a valuable business network for the industry in Illinois. In recent years, Chicago has become the de-facto home of the wind industry in North America, and IWEA plays a vital role as a business and media liaison to many of these companies. For more information on what IWEA can do for your company, please visit our [Membership Page](#).

Contact Us

General Inquiries
Info@WindForIllinois.org

Telephone
(773) 878-WIND (9463)

Of all the forces of nature, I should think the wind contains the largest amount of motive power... Take any given space of the earth's surface -- for instance, Illinois; and all the power exerted by all the men, and beasts, and running water, and steam, over and upon it, shall not equal the one hundredth part of what is exerted by the blowing of the wind over and upon the same space.
- Abraham Lincoln

IWEA is a trade organization for the Illinois wind industry. The website does not list educational or training programs (only a few newspaper "clippings" from PR when programs began)

Illinois Wind

A project of the Illinois Institute for Rural Affairs

Home | About Us | Wind Monitoring Program | Resource Maps | Online Resources | Publications | Small Wind Toolbox | [Link](#) | [DCOE Grant Portal](#)

Wind and Your Community
Organizations & Government Agencies
Wind Energy News
Small Wind

About Illinois Wind

Located at Western Illinois University, the Illinois Institute for Rural Affairs promotes improvement of the quality of life in rural areas by developing public-private partnerships with local agencies concerning small business development and community development projects. Institute supported programs include rural economic and community development (including value-added agriculture), health care, education, public transportation, public management policies, housing, and technology.

As part of its work, the Institute is committed to assisting rural residents and communities of Illinois in building knowledge of wind power. This knowledge will lead to sound decision making regarding the development of wind energy and facilitate development where it is feasible to do so. This work is made possible by a grant from the Energy Foundation and a grant by the Illinois Clean Energy Community Foundation, which is the sole funding source of the statewide wind-monitoring program.

Illinois Institute for Rural Affairs
Phone: 800/526-9943
Fax: 309/298-2142
E-mail: JL.Willis@iira.edu

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Illinois Institute for Rural Affairs © 2011

Illinois Wind is a public education project. IIRA does not list other wind energy educational or training programs.

Wind Energy Education Programs

- Conclusion: Difficult to find information about the quantity and variety of wind energy education programs at higher education institutions in Illinois
 - Degree programs
 - Certificate programs
 - Workforce training programs
 - General workshops



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Let's Conduct A Survey!

- Assess which programs exist
 - to compile information on existing wind power-related education programs at all levels of higher education in IL
 - to identify goals, needs barriers and gaps
- Assess and characterize breadth of programs
 - to solicit suggestions on what can be done by the IL Board of Higher Education or IL Community College Board to support wind power education programs



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Wind Energy Programs Survey

- 17 questions distributed via Survey Monkey
- Higher education only:
 - all 48 public community colleges
 - 32 public and private universities
- 35 Respondents
 - 10 Vice Presidents or Chancellors
 - 6 Deans
 - 6 Faculty
 - 6 Program Director, Manager, Coordinator or Assistant
 - 5 Sustainability Professionals
 - 2 unknown positions
- 2 Removed (contact info only)



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Survey Participants Demographics

- 33 Responses
 - 3 unknown institutions (1 university; 2 colleges)
 - 25 different known institutions
 - 5 institutions had 2 different respondents
 - UIUC offers wind programs in two separate departments (2)
 - Four community college duplications were combined (4)
 - 6 institutions do not offer wind programs
 - 4 universities; 2 colleges
 - 23 different wind programs from the survey
 - (33 responses – 4 duplications – 6 no = 23)



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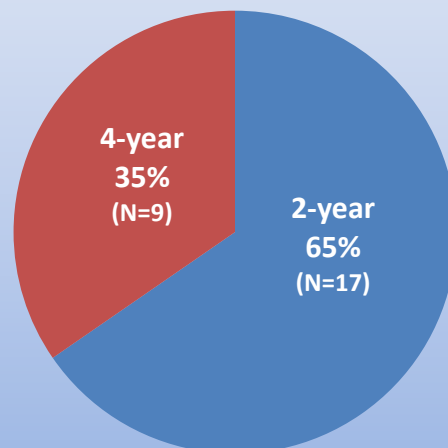
Wind Programs Added to Survey

- Added 3 institutions that did not respond to survey, but are known to have wind energy programs (2 universities; 1 college)
- Therefore, 26 different wind programs were analyzed for this survey (N=26)



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Higher Education Institutions with Wind Energy Programs



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Wind Energy Education Programs

- **4-YEAR (9):** Augustana University, Illinois Institute of Technology, Illinois State University, Northwestern University, Southern Illinois University Edwardsville, University of Illinois Chicago, University of Illinois Urbana-Champaign (2) and Western Illinois University
- **2-YEAR (17):** Danville Area CC, Elgin CC, Heartland CC, Highland CC, IL Valley CC, John A. Logan CC, Kankakee CC, Lake Land CC, Lincoln Land CC Moraine Valley CC, Sauk Valley CC, Southwestern IL College, Triton CC, Waubensee CC and Wilbur Wright CC



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Wind Energy Education Programs

- In many of the institutions that participated in this survey, wind curriculum is still under development
- New field of study - no programs before 2007
- Rapid development in past 5 years
- In 2009, Highland Community College started the Wind Turbine Technology Program, the first accredited associates' degree program offered in IL



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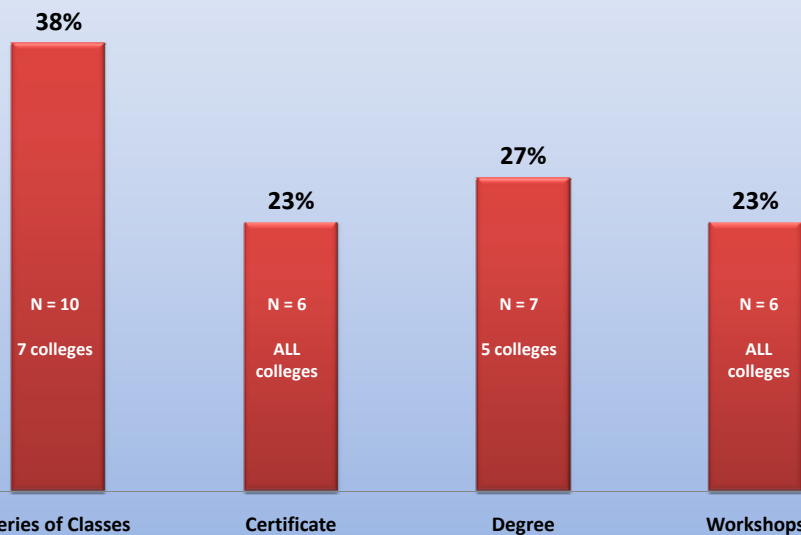
General Comparisons 2-Year versus 4-Year

- Two-year institutions tend to offer:
 - Technical applied training (hands-on, controls)
 - Certificates, degrees and short courses (workshops)
- Four-year institutions tend to offer:
 - Wind courses in multiple departments as part of a different degree program (RE, Engineering, Agriculture)
 - Theoretical training (research, policy, economics)
 - Only 2 degree programs, no certificates, no workshops



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Types of Wind Energy Programs Offered



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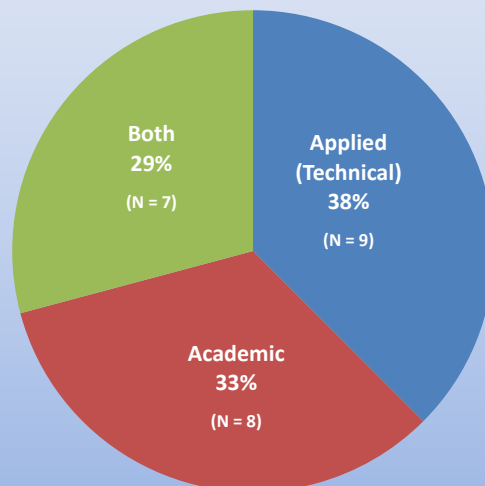
Wind Energy Education Programs

- Examples of Certificates titles:
 - *Basic Wind Energy Technician, Advanced Wind Energy Technician, Entry-Level Small-Wind Technology, Renewable Energy Workforce*
- Examples of Degrees titles:
 - *Wind Energy Technician Associate, Renewable Energy Technology, Renewable Energy Applied Associate*
- Examples of Short Course titles:
 - *Introduction to Renewable Energy, Wind Energy and Technology*

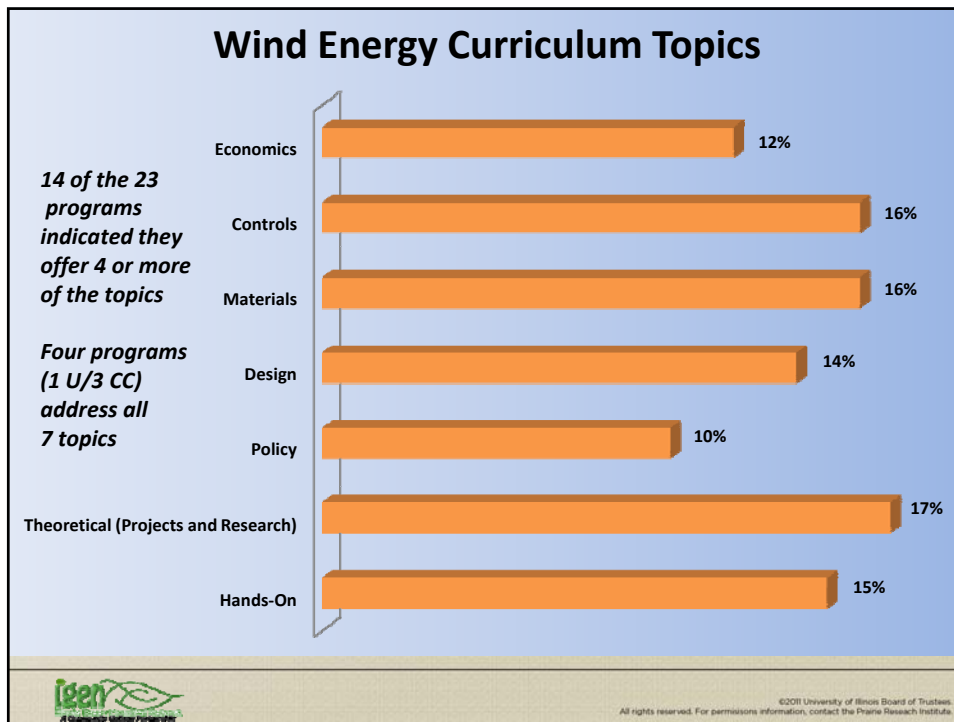


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Wind Energy Program Focus



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- ### Examples of Course Titles
- *Introduction to Wind and Solar Power*
 - *Introduction to Energy Analysis*
 - *Emerging and Renewable Power Generation*
 - *Alternative Energy Operation*
 - *Renewable & Alternative Energy*
 - *Green Electric Energy*
 - *Renewable Electric Energy Systems*
 - *Industrial Maintenance and Alternative Technology*
 - *Wind Energy Concepts*
 - *Wind Turbine Control, Operation and Maintenance*
 - *OSHA & Wind Turbine Safety*
 - *Wind Power Delivery Systems*
 - *Advanced Topics in Atmospheric Science: Applied Meteorology*
 - *Wind Turbine Troubleshooting*
- iSEN**
A Community College Partnership
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Resources for Course Development

- Did your institution use in-house resources for the development of course content? If so, please specify what departments.
 - Of the 17 responses to this question, 16 (94%) used in-house resources from a range of departments – electrical engineering, mechanical engineering, applied technology, atmospheric sciences, computer engineering, environmental technology



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Resources for Course Development

- Did your institution use textbook resources for the development of course content? If so, please provide citations.
 - Of the 16 responses to this question, 14 (88%) used text book resources



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Most Commonly Used Text Books



- ***Wind Energy Basics: A Guide to Small and Micro Wind Systems** by Paul Gipe (2008, Chelsea Green Publishing)



- **Renewable Energy** by Godfrey Boyle (2004, 2nd edition, Oxford University Press)



- **Introduction to Wind Principles** by Thomas Kissell (2011, 1st edition, Prentice Hall)



- **Wind Turbine Technology** by Ahmad Hemami (2011, Delmar Cengage Learning)



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Resources for Course Development

- Did your institution adopt concepts from other materials for the development of course content? If so, please provide citations.
 - Of the 13 responses to this question, 9 (69%) use “other” resources:
 - Manufactures Information
 - Materials provided with wind training equipment
 - Published Technical Papers; Home Power Magazine
 - Texas State Technical College; Iowa Lake Community College; other community colleges
 - Input from Advisory Board
 - Illinois Solar Energy Association workshop materials



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Resources for Course Development

- Did your institution develop course content in partnership with businesses and/or industry? If so, please provide names.
 - Of the 14 responses to this question, 10 (71%) partnered with various:
 - Municipalities; Utility Companies
 - Certification Organizations
 - North American Board of Certified Energy Practitioners (NABCEP)
 - Communications Industry Training and Certification Academy (CITGA)
 - Trade and Labor Organizations
 - International Brotherhood of Electrical Workers (IBEW)
 - National Electrical Contractors Association (NECA)
 - Manufacturers, Industry Companies and Potential Employers



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Enrollment Observations

- Enrollment question was open-ended and responses were difficult to tabulate
- Short courses (1 day) appear to be popular
- Certificate programs and technician training classes generally are full
- Many classes are in development or have been offered once
- Enrollment appears to be increasing steadily for programs that are 3 or more years old.
- Some indicated that students are in high demand by employers
- At least 350 students are taking wind power courses or training in Illinois in 2011



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Future Plans

- Increasing enrollment in existing programs
- 57% of institutions do not plan to make any wind power curriculum additions or modifications
- Of those that do, considerations included:
 - Installing wind energy equipment to campus
 - Incorporating Smart Grid technologies on campus
 - Development and modification of wind/alternative energy courses, certificates, and degrees. Including ISPQ, NABCEP, SKALA, and other third party certifications for coursework



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Needs Identified

- Assistance with curriculum development, equipment choices, existing certifications
- Articulation agreements for certificates and AAS degree programs to 4-year related degrees
- Better communication about industry needs
- Employment data and skills analysis for wind power jobs
- Better understanding of local wind industry markets
- Information to raise public awareness about the importance of wind technology and the wind industry
- Funding for equipment, trainers, and curriculum development (identification of grants and help writing them)
- Space on campus for the equipment



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Observations

- Not a complete, comprehensive survey
- Snap shot in the summer 2011
- Programs are generally growing in enrollment and offerings
- Private sector partnerships are an important components of content and training
- Student employment tracking was not covered



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What We Learned

- Increased knowledge of amount and variety of wind energy programs being developed, but not a complete picture
- Good exercise that should be done for other green job training programs in IL
- Information useful for employers, potential and existing employees, and higher education



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