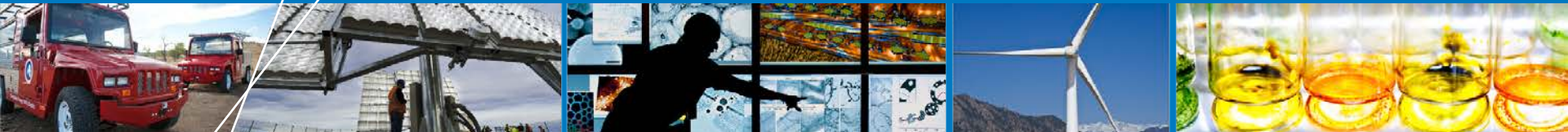


# The National Wind Energy Skills Assessment



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**DOE Stakeholder Engagement and Outreach  
Webinar**

**January 15, 2014**

**NREL/PR-5000-61097**

# Background

A robust workforce is essential to growing domestic wind manufacturing capabilities. The purpose of this research is to better understand today's domestic wind workforce, projected needs for the future, and how existing and new education and training programs can meet future needs. Our literature review showed that a U.S. wind workforce assessment has not been performed on a national scale. Our research, report, and career map contribute to workforce needs knowledge, including education and training.



# Purpose and Overview

The purpose of this research is to:

1. Survey the current wind-focused education and training programs at American colleges and universities
2. Determine which jobs are available in the wind industry today and which types of training employers prefer
3. Estimate the need for new or expanded wind-focused education and training programs to reach future goals.

## Overview

- **Background: two projects in one**
- **Education and training database**
  - Methods & results
  - Industry survey
  - Methods & results
  - Research results and future work

# Two Projects in One

## Education and Training Database

**Community college outreach**

**University outreach**

- Number of current students
- Number of graduates
- Percentage in the wind industry.

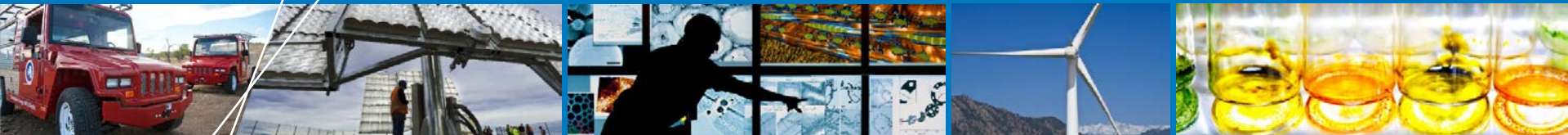
## Industry Survey

A survey of more than 400 wind industry companies

- Number of workers
- Categories of jobs
- Employee skills
- Employee training.



National Wind Energy Skills Assessment Analysis and Report



# Education and Training Database

# Method: Our School Response Dataset

## Response Rate (Number of Schools)

Schools queried	49		
Responses returned	31	63% of queried	
Quality data	20	65% of responses	41% of mail sent

Quality, usable data from 20 schools, 40 programs

## Distribution of Degree Program Levels in Response Set

Program Count	
8	Post-secondary certificate
10	Associate's degree
4	Undergraduate certificate
8	Bachelor's degree
1	Graduate certificate
8	Master's degree
4	Ph.D.
43	Total

Average of two to three programs per school

For report, data were sorted by:

- Community & tech colleges
- University programs

# Example of Quality Feedback

School or Program Name	Website	Degree Level	Name of Program/ Concentration	Additional info	Grads Per Year	# entering Wind Industry
Texas State Technical College West Texas, TX	<a href="http://www.tstc.edu/westtexaswet/wet_degreesandcertificates">http://www.tstc.edu/westtexaswet/wet_degreesandcertificates</a>	Associate	Wind Energy Technology	TSTC's Associate of Applied Science degree program requires five semesters to complete. According to a report by the Department of Energy, approximately 175,000 employees in Construction, Operations, Maintenance and Manufacturing are required in order to meet the 20% Wind Energy by 2020 goal. Wind Energy Technicians are a key component to meet that goal. Additionally, Wind Energy Technicians have a core skill set that can be transferable across other areas related to energy production. Potential career positions include operations and maintenance, traveling technicians and construction.	50	Approximately 82% placement rate
Texas State Technical College West Texas, TX	<a href="http://www.tstc.edu/westtexaswet/wet_degreesandcertificates">http://www.tstc.edu/westtexaswet/wet_degreesandcertificates</a>	Certificate II	Wind Energy Technology	The Certificate of Completion II is offered to those individuals that only desire to obtain the necessary technical training for a wind technician without the additional general education requirements necessary to obtain an Associate of Applied Science (AAS) degree. The certificate program is identical to the AAS without twelve hours of general education requirements (College Algebra is still required). This certificate program takes approximately five semesters and is comparable to the AAS in Wind Energy and Turbine Technology with a lighter course load each semester.	10	Approximately 95% placement rate



# Creating a Wind Energy Training Programs Database

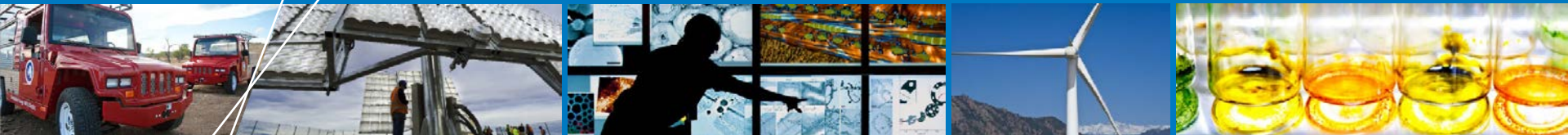
## Sample of a Masters Certificate Program

Program Group	Universities
School or Program Name	University of Massachusetts, MA – Wind Energy Center (general wind turbine technology curriculum and model for basic entry-level engineering program, wind resource assessment)
Website	<a href="http://www.umass.edu/windenergy/study.requirements.php">http://www.umass.edu/windenergy/study.requirements.php</a>
Validation Date	July 6, 2012
Contact Name	Jody Lally
Title/Position	
Phone	413-577-0887
Email	<a href="mailto:lally@ecs.umass.edu">lally@ecs.umass.edu</a>
Extent of Wind Focus (Credential, Courses, Research, Resource)	Credential
Program (Phd, Master, Bachelor, Associate, Certificate)	Certificate (Masters Level)
Name of Program/Concentration	Graduate Certificate in Wind Power Engineering
Additional Info	The Wind Energy Certificate is a new 15 credit graduate certificate program which will be offered starting in the Fall semester, 2011. The 15 credits will also be applicable to the 30 credit M.S. requirements, so if you decide to pursue an M.S. as well you will only need to take 15 more credits.
Department	Mechanical and Industrial Engineering (MIE)
Grads per Year	
# Entering Wind Industry (Only for Credentials)	

1. A search of institution's website is used to catalog all credential programs, courses, research, and wind resources *specific to wind energy*.
2. Item must include reference to wind in its description (in title or details).

Upon completion of search of institution's website, we emailed contacts to confirm program; they specify graduates per year and estimate the number entering the wind industry.





# Industry Survey

# The Wind Industry Employer Survey

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- NREL subcontracted with BW Research for the survey
- NREL's wind employer online and phone survey began August 2012
- Large wind sample included 418 companies. Data from a secondary and separate sample of small wind (18 companies)

This particular research focuses on large wind (per DOE and due to the smaller sample size). We have retained the small wind data for potential future research.

# Result: Level of Difficulty in Finding Qualified Applicants by Occupation

Occupation	Some Difficulty	Great Difficulty	Some or Great Difficulty
Professors & teachers	41%	43%	84%
Product designers	40%	35%	75%
Trade workers	40%	31%	71%
Manufacturing salespeople	33%	31%	64%
Wind technicians	50%	29%	79%
Construction managers	44%	28%	72%
Professional trainers	50%	27%	77%
Development technical specialists	47%	26%	74%
Engineers	42%	25%	66%
Scientists	48%	24%	71%
Research engineers	47%	22%	69%
Managers of sales, operations and training	40%	22%	61%
Attorneys	26%	18%	44%
Transportation/logistics workers	24%	18%	41%
Land-leasing agents	31%	15%	46%
Development managers	37%	15%	52%
Paralegals	33%	11%	44%
Supply chain & purchasing managers	44%	10%	54%
Construction laborers	67%	7%	73%
Resource assessors & surveyors	39%	6%	44%
Development finance	35%	5%	40%
Admin/clerical	31%	4%	35%
Manufacturing managers	72%	2%	74%
Government regulatory workers	73%	0%	73%
O&M Accountants & bookkeepers	60%	0%	60%
Assembly workers	67%	0%	67%

- Responses greater than 25% for “Great Difficulty” are highlighted in green, while 70% responses for the sum of “Some or Great Difficulty” are highlighted in yellow.
- The seven occupations highlighted in orange are those exceeding the threshold on both 25% “Great Difficulty” and 70% “Some Difficulty” or “Great Difficulty.”

Response Scale	No Difficulty	Some Difficulty	Great Difficulty
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# Result: Preferred Educational Attainment for New Hires

	High School Diploma or Less	Post Secondary Professional Certificate (Journeyman, Trade/Technical Programs)	Associate Degree	Bachelor Degree	Post Bachelor Professional Certification (Examples: CPA, PE, LEED)	Master Degree, PhD or Law
Attorneys	0%	0%	0%	6%	21%	74%
Research engineers	0%	0%	0%	17%	11%	71%
Scientists	0%	0%	0%	19%	10%	71%
Government regulatory workers	0%	0%	0%	42%	0%	58%
Professors & teachers	0%	5%	15%	10%	7%	63%
Development managers	0%	3%	0%	39%	29%	29%
Engineers	0%	2%	0%	54%	15%	29%
Managers of sales, operations and training	1%	2%	5%	42%	16%	34%
Development finance	0%	0%	5%	50%	23%	23%
Development technical specialists	5%	5%	0%	47%	11%	32%
Product designers	3%	3%	0%	63%	10%	23%
Resource assessors & surveyors	6%	6%	22%	33%	0%	33%
Professional trainers	3%	16%	10%	32%	10%	29%
O&M Accountants & bookkeepers	7%	0%	13%	60%	13%	7%
Manufacturing salespeople	3%	3%	10%	79%	3%	3%
Construction managers	4%	12%	8%	58%	12%	8%
Manufacturing managers	2%	9%	13%	69%	7%	0%
Supply chain & purchasing managers	2%	4%	25%	68%	2%	0%
Paralegals	0%	0%	38%	63%	0%	0%
Land-leasing agents	0%	21%	7%	71%	0%	0%
Admin/clerical	18%	13%	28%	36%	1%	4%
Transportation/logistics workers	28%	11%	22%	33%	6%	0%
Trade workers	27%	62%	7%	5%	0%	0%
Wind technicians	25%	58%	17%	0%	0%	0%
Assembly workers	33%	44%	22%	0%	0%	0%
Construction laborers	56%	44%	0%	0%	0%	0%

- Green highlighting represents most common response per occupation. Yellow represents a second response that reached levels of 20%.
- Wind industry employers require a wide range of educational levels for their new hires.
- Most common educational achievement required was a bachelor's degree; several occupations required an advanced degree.
- Trade workers and technicians required some form of post high school professional training.

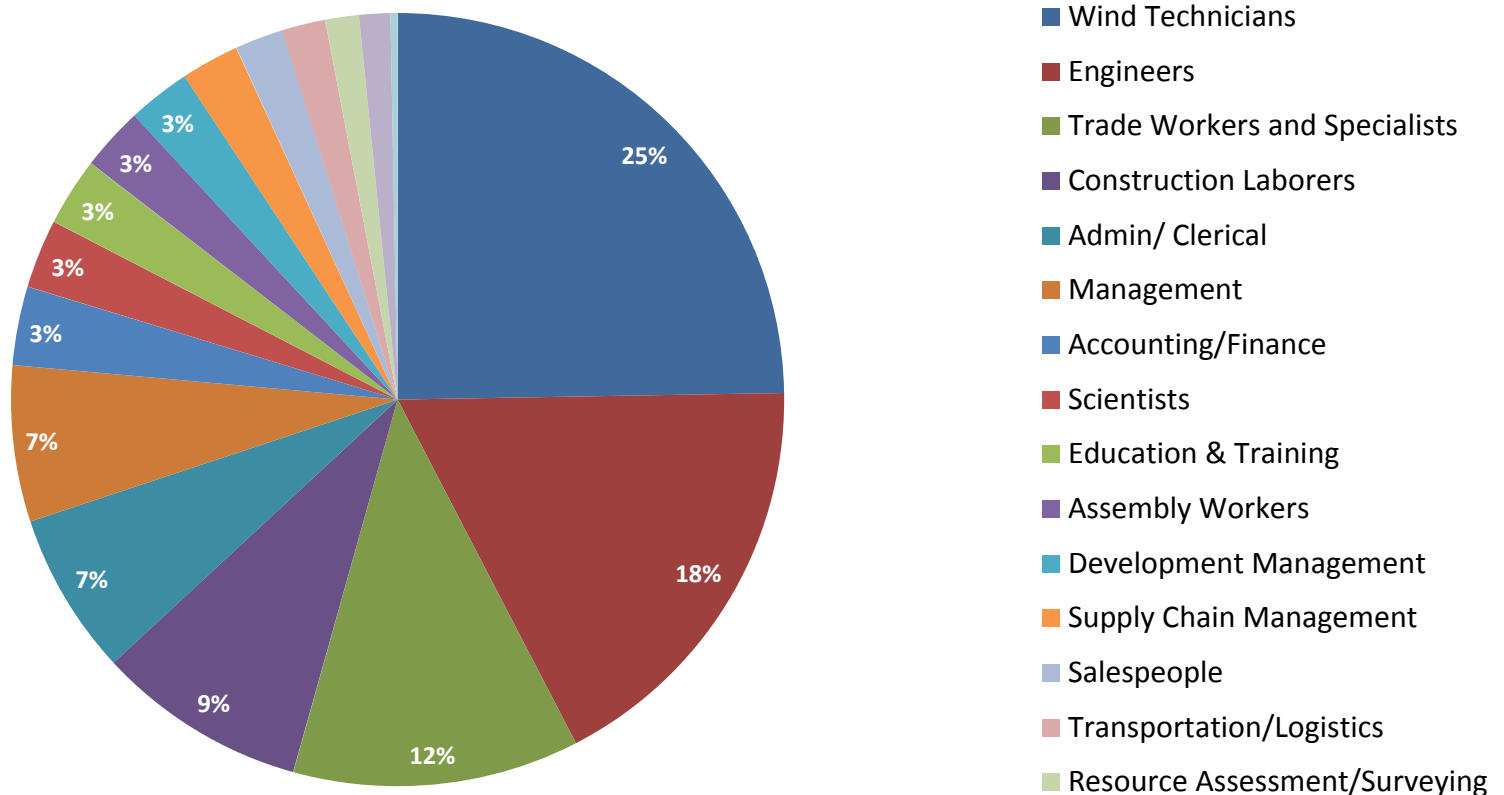
# Result: Importance of Wind-Specific Degree

% Rating "Very" or "Somewhat" Important	College Degree	Wind Energy-Specific College Degree	Ratio of Importance of Wind Energy-Specific College Degree vs. Degree Not Specific to Wind
Assembly workers	29%	29%	100%
Wind technicians	40%	40%	100%
Development technical specialists	84%	47%	56%
Research engineers	97%	48%	50%
Professors & teachers	100%	47%	47%
Trade workers	19%	7%	38%
Engineers	100%	36%	36%
Development managers	94%	28%	30%
Resource assessors & surveyors	88%	24%	27%
Managers of sales, operations, & training	95%	24%	25%
Transportation/logistics workers	53%	13%	25%
Land-leasing agents	62%	15%	25%
Professional trainers	91%	22%	24%
Construction managers	77%	18%	24%
Scientists	100%	20%	20%
Paralegals	100%	17%	17%
Product designers	93%	15%	16%
Manufacturing salespeople	86%	11%	13%
Admin/clerical	61%	8%	13%
Manufacturing managers	80%	10%	13%
O&M accountants & bookkeepers	93%	7%	8%
Supply chain & purchasing managers	79%	6%	7%
Attorneys	100%	7%	7%
Development finance	85%	5%	6%
Construction laborers	9%	0%	0%
Government regulatory workers	100%	0%	0%
<b>Average</b>	<b>77%</b>	<b>19%</b>	<b>28%</b>
Response scale:	Not Needed	Somewhat Important	Very Important

# Survey Results: One Segment of Jobs in Today's Wind Industry

## *Subset of the Workforce Captured in Our Survey*

(~46,000 Workers)



Manufacturing jobs include some from the following categories: trade workers, assembly workers, supply chain management, salespeople, transportation, and some admin/ clerical-- approximately ~25%.



# Overall Project Results



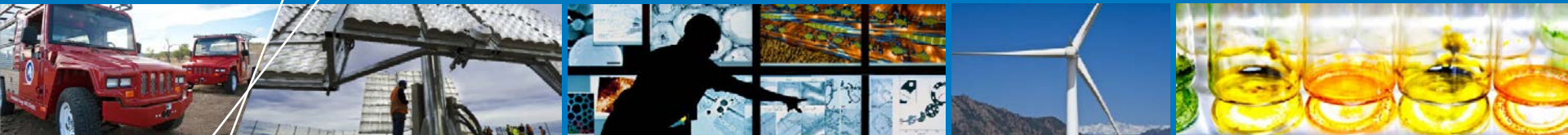
# Wind Workforce Projection

- Used primary survey data to assess current employment
- Anchored employment results to report: **20% *Wind Energy by 2030*** (U.S. Department of Energy 2008) **which estimated industry growth rates.**
  - ✓ Anchored O&M jobs to cumulative installed capacity
  - ✓ Anchored construction and development jobs to annual installed capacity.
- **Built in:**
  - ✓ Retirement rates
  - ✓ Labor efficiency gains.

# Results: Final Estimate of Education & Training Gap

To meet predicted wind industry growth over the next 20 years, we need to increase the number of *wind-energy-specific* education and training programs offered at the community college and university levels.

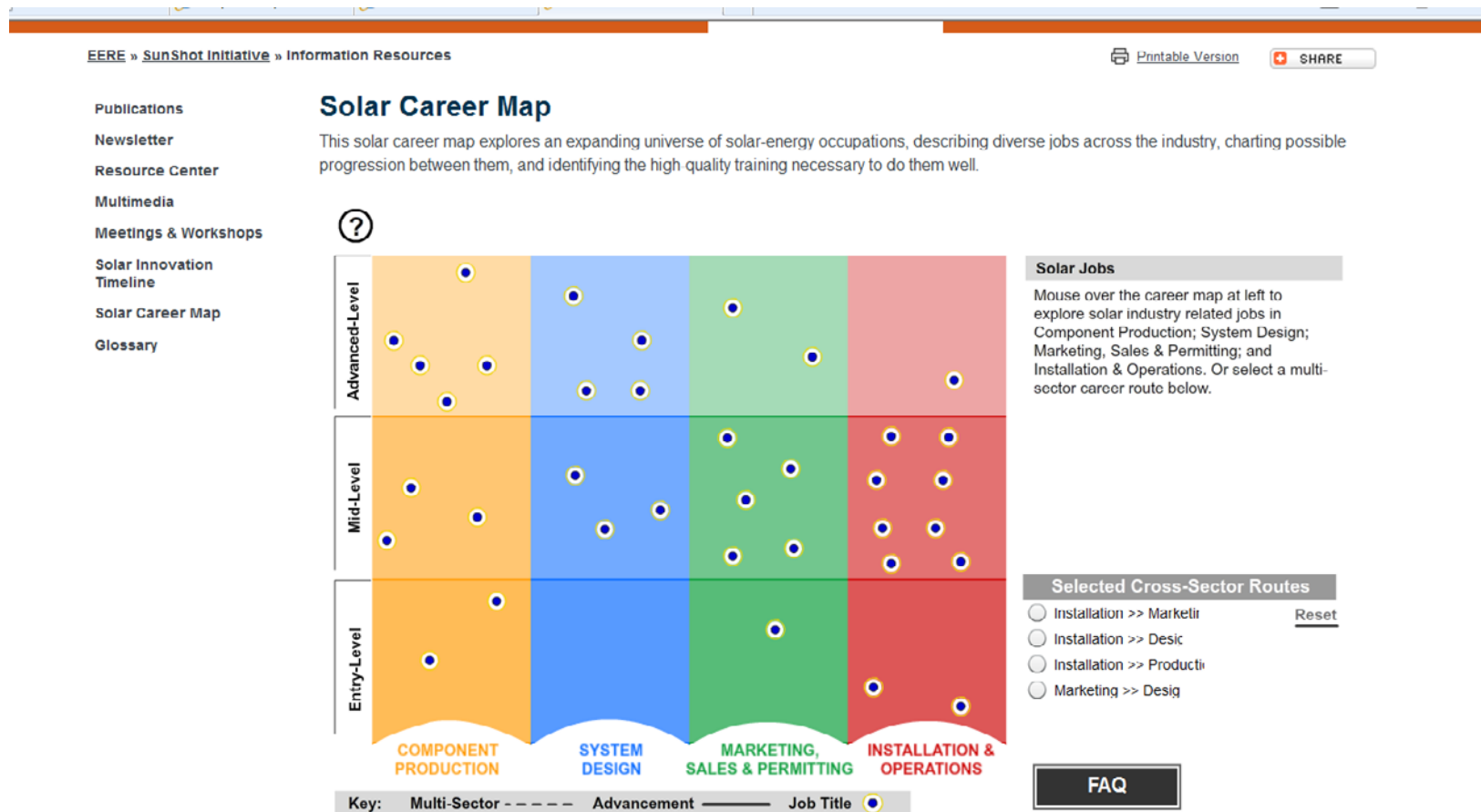
Degree/ Certificate	Maximum New Hires Needed with Wind-Specific Degrees/ Certificates	Type of Institution Offering	Estimated Percent of Graduates Entering Wind Industry	Number Needed to Graduate in Max Year	Estimated Graduates Per Program Per Year	Number of Programs Needed in US	Number of Programs Currently Available	Difference
Post-secondary professional certificate (journeyman, trade/technical programs)	2,750	Community & tech colleges	83%	3,310	21	160	70	90
Associate's degree	1,000	Community & tech colleges		1,200		60	90	0
Bachelor's degree	800	University	48%	1,660	34	50	20	30
Post-bachelor's professional certification (e.g., CPA, PE, LEED)	210	University		440		10	NA	0-10
Master's degree, Ph.D., or Law	550	University		1,150		30	20	10



# Future for Wind Workforce

# Wind Workforce – Future Work

See the Sunshot Initiative: [www1.eere.energy.gov/solar/careermap/](http://www1.eere.energy.gov/solar/careermap/)



# Wind Workforce – Future Work

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*A National Skills Assessment of the U.S.  
Wind Industry in 2012*

Michael Leventhal and Suzanne Tegen

[www.nrel.gov/docs/fy13osti/57512.pdf](http://www.nrel.gov/docs/fy13osti/57512.pdf)

Thank you.

Questions?

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