

Wind Energy Workforce Report FINAL

August 2020

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INTRODUCTION

BW Research Partnership, Inc. (BW Research) partnered with the National Renewable Energy Laboratory (NREL) to complete a study of the wind energy workforce. The research was completed by developing and completing surveys of wind energy employers and current and recently graduated students at institutions either participating in wind energy courses and programs or working towards a degree in an area of study relevant to wind energy. The study was also built upon recent research findings from sources such as the United States Energy Employment Report (USEER). The research had three primary objectives, including:

1. First, to better understand and quantify the employment priorities and behaviors of wind energy employers. These findings are encapsulated in part 1 of the report, *Wind Energy Employers*.
2. Second, to assess and measure the employment priorities and behaviors of students and recent graduates as it relates to opportunities in the wind energy industry. These findings are encapsulated in part 2 of the report, *Current and Potential Wind Energy Employees*.
3. Lastly, to identify gaps and opportunities for wind energy workforce development and ways to improve connectivity between wind energy training, educational programs, and employment opportunities.

DATA COLLECTION METHODOLOGY

The primary research components of this study included two distinct survey efforts. These two survey research components include the following:

- **Survey of wind energy employers**, that has a comparable methodology to a survey of wind energy employers completed by NREL and BW Research in 2019¹. The current survey of wind energy employers was completed by 296 employers through online and telephone survey instruments.
- **Survey of current students and recent graduates**² from institutions that offer wind energy programs *or* current students and recent graduates in areas of study relevant to wind energy. The areas of study include engineering, applied or field sciences, finance, accounting or business majors, and wind energy-related vocational trades.

¹ <https://www.nrel.gov/docs/fy19osti/73908.pdf>

² Recent graduates are defined as individuals who have earned their degree or certification within the last 36 months.

COVID-19 Impacts

The planning and organization for this project occurred in December of 2019 and January of 2020, before the majority of Americans were largely aware of the Coronavirus and before it impacted the national economy. Data collection for the employer survey began on March 20, 2020, right before many state quarantine measures began and unemployment increased nationally. Data collection for the employer survey was completed on June 3, 2020. The employer data collection included feedback from employers that were facing a volatile national employment environment. Data collection for the survey of current students and recent graduates began on April 22, 2020 after the Coronavirus had already started to impact the national economy and data collection was completed on May 29, 2020.

KEY FINDINGS & CONCLUSIONS

BW Research presents the following key findings and conclusion for the 2020 Wind Energy Workforce Report.

Wind Energy Employers

Wind energy firms in the U.S. employed approximately 114,774 workers in 2019. Total employment in wind energy increased by 3,600 workers between 2018 and 2019, representing a 3.2% year-over-year growth. From 2016 to 2019, the sector has undergone nearly 13 percent employment growth (13,000 additional workers), compared to the overall U.S. labor market growth of 4.5%.

Some of the key findings from the survey of wind energy employers include:

- More than four out of ten wind energy employers (43%) expect to increase wind-related employment at their firms over the next 12 months. A further 45% indicated that their firms intend to maintain the current level of employment over the next year.
- Nearly two-thirds of employers indicated at least some difficulty finding qualified entry-level or non-entry-level wind applicants who meet their organization's hiring standards. Firms with 10 or more employees were considerably more likely to have difficulties finding qualified job applicants, either entry-level or non-entry-level, compared to those firms with less than 10 employees.
- The top two reasons employers indicated difficulty finding qualified *entry-level* applicants include the following: "applicants do not have the training or education needed for the job" (30%) and "applicants do not have the experience needed for the job (28%)".
- The top two reasons employers indicated difficulty finding qualified *non-entry-level* applicants include the following: "applicants do not have the experience needed for the job (33%)" and "there are not enough applicants for the positions (23%)".

- Nine in ten employers indicated that strong interpersonal skills are either required or preferred for entry-level wind energy positions, followed by strong writing skills (81%) and wind energy specific training (78%). While strong interpersonal skills were a priority for most wind energy employers, there were some skills that were particularly important for specific wind energy sectors as they considered entry-level job applicants.
 - **Operations and asset management:** Over 80 percent of employers in this sector indicated wind energy specific training was either required (43%) or preferred (39%).
 - **Research and development:** Nine out of ten employers in this sector indicated strong writing skills were either required (49%) or preferred (41%).
 - **Development and siting:** Nine out of ten employers in this sector indicated strong writing skills were either required (40%) or preferred (50%).
 - **Manufacturing:** Almost 90 percent of employers in this sector indicated previous experience (internship or apprenticeship) with a wind energy focus was either required (25%) or preferred (63%).

Current & Potential Wind Energy Employees

For this report current and potential workers are not meant to reflect the entire current and potential wind energy workforce universe, instead for this study current and potential wind energy workers represent those students and recent graduates that currently work in the wind energy (current) or all the other students and recent graduates that qualified to take the survey and could in the future work in wind energy (potential).

Some of the key findings from the survey of current and potential wind energy employees include the following:

- Approximately 3% of respondents identified as primary wind energy workers when asked an unaided question. An additional 18% of respondents are secondary wind energy workers, as they identified as part of a different industry sector initially before reporting that they spent some time on work related to the wind energy industry.
- Seven-in-ten respondents, that indicated they are currently working, were satisfied (34% “very satisfied” and 36% “somewhat satisfied”) with their current industry as a place to build a career. Approximately 17% of respondents were either “very dissatisfied” (8%) or “somewhat dissatisfied” (10%).
- More than nine out of ten students are satisfied with their primary area of study, with 94% reporting that they are either “very satisfied” (60%) or “somewhat satisfied” (34%). Less than three percent indicated that they were “very dissatisfied” (0.4%) or “somewhat dissatisfied” (2%) with their current primary area of study.

- More than two-fifths of all students had participated in courses or seminars specific to wind energy (44%). Out of the Department of Energy (DOE) sponsored programs, the Collegiate Wind Competition (CWC) had the highest participation rate (21%) among respondents.
- Approximately 40% of currently employed respondents indicated that their education prepared them both generally and in the specific work that they perform day-to-day. More than a third (35%) felt that their education prepared them generally but not for the specific work that they do day-to-day. One in ten respondents felt that their education did not prepare them for their current job.
- When tested against other industry sectors, total interest (very interested + interested) in building a career in wind energy (91%) was nearly identical to solar energy (91%); both were at the top of the list. Comparable industries such as life sciences and biotechnology (44%), construction (35%), and healthcare (34%) had considerably lower levels of interest as career options among respondents.

Gaps & Opportunities for Wind Energy Training, Education, and Outreach

This component of the research synthesizes the findings from wind energy employers as well as current and potential employees to better understand the challenges and opportunities for wind energy workforce development.

WIND ENERGY EMPLOYMENT

Almost two-thirds of wind energy employers indicated they had some or great difficulty finding qualified job applicants, whether they were looking for entry-level (64% indicated some or great difficulty) or non-entry-level (66% indicated some or great difficulty) positions. The difficulty employers indicated finding qualified applicants in the 2020 wind energy workforce survey are noteworthy for the following reasons:

- ***A broad spectrum of workforce challenges according to employers:*** Employers indicated relatively high levels of difficulty finding both entry-level and non-entry-level employees. Sixty percent or more of wind energy employers from manufacturing (81% difficulty³), construction (71% difficulty) and research and development (68% difficulty) indicated difficulty finding qualified applicants. Employers also indicated that applicants often did not have the right training and education and/or industry experience.
- ***Larger employers are having more difficulty finding qualified wind energy workers than their smaller counterparts:*** Over 80 percent of wind energy employers with more than 10 employees indicated they had difficulty finding qualified applicants, approximately 30 percent higher than those smaller firms with less than 10 employees.

³ Difficulty percentages are combined entry-level and non-entry-level for each industry sector.

Larger employers with more workers will often have deeper and more specialized workforce needs and more hiring requirements than their smaller counterparts.

- **Most current and potential workers are interested in building a career in wind energy:** Over 70% of current and potential workers indicated they were either “very interested” or at least “interested” in a wind energy career; this was the highest of the eight industries tested, except for solar energy, which was within a percentage point or two.
- **Current and potential workers who searched for employment in the wind energy industry indicated difficulty finding opportunities:** Eighty-three percent of current and potential workers who had experience looking for employment opportunities in the wind energy industry indicated they had either “great difficulty” or at least “some difficulty” finding those opportunities. This was a higher level of difficulty for finding employment opportunities when compared to renewable energy other than wind (77% difficulty) or the energy industry other than renewables (66% difficulty).

These results indicate that the pipeline for the wind energy workforce could be expanded to increase both the quantity and the depth of training and education of workers that are being developed for the wind energy industry. The results also show that students and job-seekers are likely willing to develop their education and skills for employment and a career in wind energy but also need assistance connecting to wind energy employers, which should facilitate expanding the wind energy workforce pipeline.

WIND ENERGY TRAINING & EDUCATION

Current students who were defined for this research as a current or potential employee are largely satisfied with their current area of study. Over 90% indicated satisfaction (either very or somewhat) with their primary area of study.

This group of current students and can be split into the following three categories:

- **Currently working in the wind energy industry and going to school** – This category includes those individuals that are working full-time or part-time in wind energy related work and going to school.
- **Experience with courses, classes, or programs in wind energy** – This category includes those students that are not working in wind energy related work but have taken or are participating in wind energy courses, classes, or programs.
- **No experience with courses, classes, or programs in wind energy** – This category includes those students that are not working in wind energy related work *and* have not taken or participated in any wind energy courses, classes, or programs.

When results of the current and potential employee survey were examined by these three groups, two important trends emerged. **First, students that are working in wind energy or at least have some experience with wind energy courses, classes, or programs are more likely to be very satisfied in their current area of study.** Two-thirds (66%) of those students that are currently working in wind energy are “very satisfied” with their current area of study, compared

to 61 percent of those that have experience with wind energy courses, classes, or programs and only 55 percent of those that have no experience with wind energy courses, classes, or programs. ***Secondly, those students that are working in wind energy or at least have experience with wind energy courses, classes, or programs are more likely to indicate their education prepared them for the work they are doing today both generally and specifically.*** Approximately three out of five (59%) current students who are working in wind energy related work indicated their education prepared them both generally and specifically for the work they are doing, 38 percent of those that had experience with wind energy courses, classes, and programs indicated the same, and only 30 percent of those that did not have experience with wind energy courses, classes, or programs indicated their education prepared them both generally and specifically for the work they are doing today.

These results indicate a few things. First, individuals that are working in wind energy related work and going to school are largely very satisfied with what they are studying and feel their studies are preparing them for the world of work, both generally and specifically. Second, these results also indicate, even when individuals are not working in wind energy related work but have taken wind energy courses, classes, or programs that they have higher levels of satisfaction with their education and confidence in their preparation for the world of work compared to those students that have no experience with comparable wind energy courses, classes, and programs.

WIND ENERGY INDUSTRY PERCEPTIONS

Just over nine in ten current and potential employees are at least somewhat interested in building a career in the wind industry and about two in five are very interested. These overall results indicate that among students and recent graduates at educational institutions that offer wind energy courses, classes, and programs as well as students and recent graduates that are/were in degree or certificate programs relevant to wind energy, almost all would consider a career in the wind energy industry. This is valuable general context to better understand some of the more specific opportunities and challenges associated with how the wind energy industry is perceived among current and potential employees.

- ***Promising career pathways and work that aligns with environmental priorities are perceived strengths of the Wind Energy Industry:*** Over forty percent and a plurality of potential and current employees indicated that the wind energy industry was better than average as an “opportunity to learn new skills and move up a promising career pathway” and as an “opportunity to do work that fits with my environmental priorities”. These two characteristics ranked highest for the wind industry employment opportunities of the six that were evaluated. A ratio of approximately 8 to 1 respondents indicated the wind industry was better than average compared to worse than average.
- ***Finding employment opportunities, getting relevant work experience, and hands-on training are all perceived challenges for potential wind energy employees:*** More than eight out of ten (83%) of current and potential employees that had experience looking for employment in the wind energy industry indicated they had difficulty finding

employment opportunities. Of those that had experience looking for employment in the wind energy industry, other than the location of the work (see below), the biggest challenge of the eight issues examined were getting relevant industry experience (67% considerable or somewhat of a challenge) and getting hands-on training specific to the wind energy industry (62% considerable or somewhat of a challenge).

- ***Working or finding work in a location where you want to live could be a challenge for potential wind energy employees:*** This was the only item of six tested that almost one in five (18%) indicated was worse than average when compared to other industries. It was also the issue that was identified most often as a challenge (67% either considerable or somewhat) for those that have looked for employment opportunities in the wind energy industry. Those respondents located in urban and suburban areas indicated that finding employment opportunities where they live or are willing to live is a considerable challenge (26%) at a higher rate than those that live in rural areas (19%).

These results indicate that the potential wind energy workforce is generally receptive and willing to consider employment opportunities in wind energy. There are some perceived challenges finding employment opportunities in the industry and getting the relevant experience and hands-on training needed to be successful in those employment opportunities. The results also indicate that wind energy is considered a promising field with strong career opportunities and environmental priorities that align with most potential workers, but the location of the work could be an obstacle for a sizeable portion of the potential workforce.

PART 1: WIND ENERGY EMPLOYERS

This component of the research describes the wind energy industry from the employer perspective and their priorities and expectations associated with hiring and their workforce. The research in this part is delineated into the following three sections:

1. **Wind Energy Industry Universe:** This section identifies the industries that make up the wind energy universe and the size of the wind energy workforce associated with each industry.
2. **Wind Energy Employer Profile:** This section describes the employment expectations and experiences of wind energy employers and their priorities for hiring and staff development.
3. **Wind Energy Occupational Profile:** This section examines the occupations that employers have at their firm and how many currently work at or from their business location or locations.

Appendix A provides the aggregated topline to the wind energy workforce survey of employers completed in March-June of 2020.

1. WIND ENERGY INDUSTRY UNIVERSE

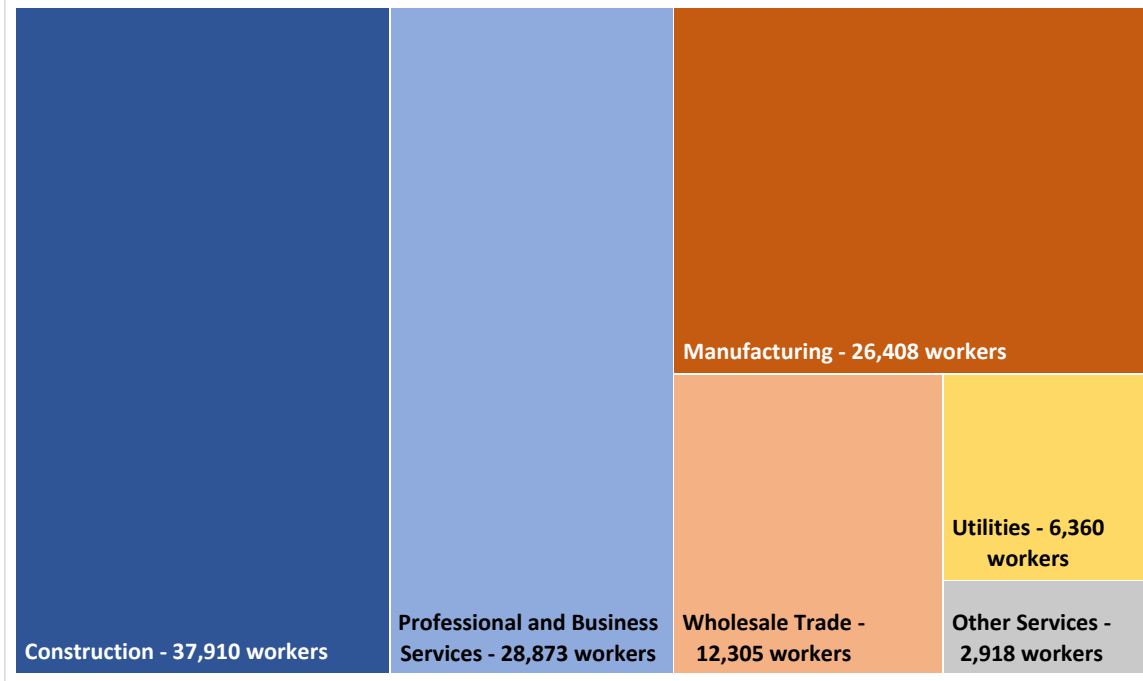
Wind energy firms in the U.S. employed approximately 114,774 workers in 2019.⁴ Total employment in wind energy increased by 3,600 workers between 2018 and 2019, representing 3.2% year-over-year growth. From 2016 to 2019, the sector has undergone nearly 13 percent employment growth (13,000 additional workers), compared to overall U.S. economy growth of 4.5%.⁵

Approximately a third (33.0%) of all employment in the wind energy industry is situated in construction, the largest industry sector. Professional and business services (research and design, finance, legal, insurance, etc.) represents more than a quarter of all employment (25.2%), followed by manufacturing (23.0%).

⁴ 2019 U.S. Energy and Employment Report (2019 USEER), produced by the Energy Futures Initiative (EFI) in partnership with the National Association of State Energy Officials (NASEO) and collected and analyzed by BW Research Partnership (BWRP).

⁵ Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) All Ownerships Q2 2016 – Q2 2019

Figure 1: Wind Energy Employment by Value Chain - 2019



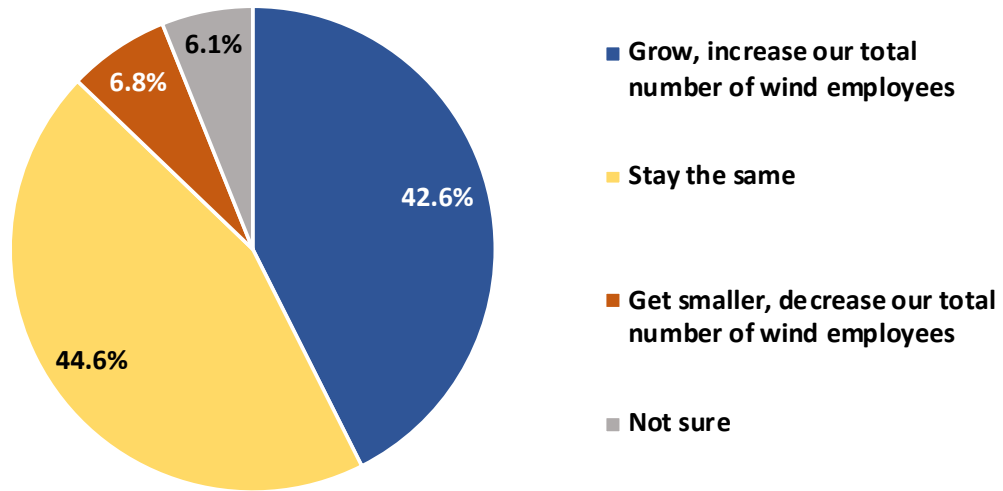
Wind energy employers are situated in all 50 states, including the District of Columbia. The five states with the largest number of wind energy employees are as follows:

- Texas – 25,500 wind energy workers
- Illinois – 8,800 wind energy workers
- Colorado – 7,500 wind energy workers
- Indiana – 6,400 wind energy workers
- California – 6,300 wind energy workers

2. WIND ENERGY EMPLOYER PROFILE

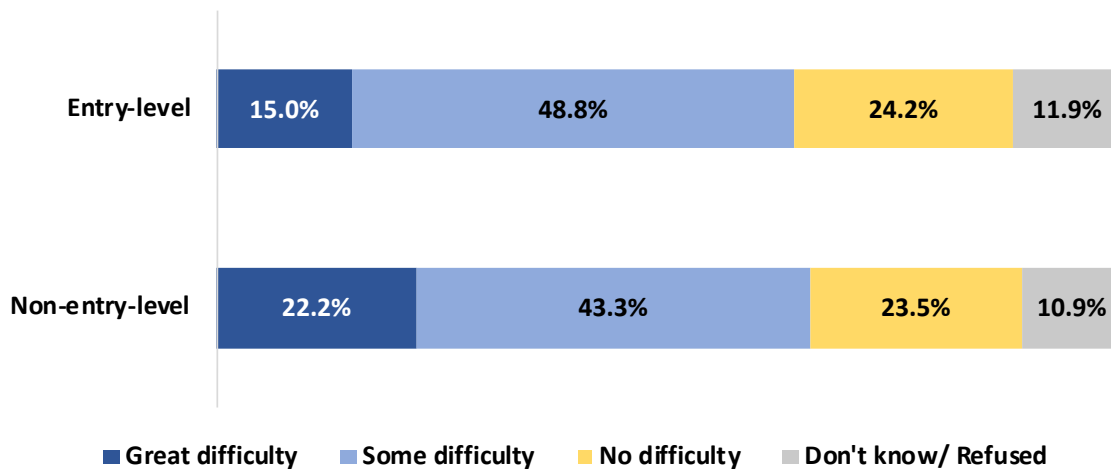
More than four out of ten wind energy employers (42.6%) expect to increase wind-related employment at their firms over the next 12 months. A further 44.6% indicated that their firms intend to maintain the current level of employment over the next year. This is despite disruptions created by the global COVID-19 pandemic beginning in March. When reviewing dates of completion, employers were more pessimistic in April than March; nearly one-in-ten (9.6%) expected to decrease their wind-related workforce over the next 12 months, with 28.9% planning to increase overall employment. This is compared to a very small proportion (1.7%) planning to decrease the total number of wind employees in March. Wind energy employers were more optimistic in May and early June, as nearly half of respondents (49.7%) expected to increase the total amount of wind employees over the coming year. Small firms (1 to 9 employees) in the South/Southeast United states were the most likely to indicate that they anticipated growth over the coming year (83.3%).

Figure 2: Employer Hiring Expectations Over Next 12 Months



Nearly two-thirds of employers indicated at least some difficulty finding qualified entry-level (15.0% “great difficulty” and 48.8% “some difficulty”) or non-entry-level (22.2% “great difficulty” and 43.3% “some difficulty”) wind applicants who meet their organization’s hiring standards.

Figure 3: Hiring Difficulty in Finding Qualified Wind Applicants



Firms that identified as primarily involved in manufacturing reported the highest overall difficulty finding entry-level candidates that meet their organization’s hiring standards (26.9% “great difficulty” and 53.8% “some difficulty”).

Table 1: Hiring Difficulty by Industry Sector – Entry-level Wind Applicants⁶

	Entry-Level		Total difficulty
	Great difficulty	Some difficulty	
Manufacturing, including component parts manufacturing	26.9%	53.8%	80.8%
Research and development	12.8%	59.0%	71.8%
Construction	9.3%	53.5%	62.8%
Education/Training/Advocacy	16.7%	43.3%	60.0%
Operations and asset management	14.3%	39.3%	53.6%
Development and siting	15.0%	37.5%	52.5%

More than four-in-five manufacturing firms reported difficulty finding qualified non-entry-level candidates that meet their organization’s hiring standards (38.5% “great difficulty” and 44.2% “some difficulty”).

Table 2: Hiring Difficulty by Industry Sector – Non-Entry-level Wind Applicants

	Non-Entry-Level		Total difficulty
	Great difficulty	Some difficulty	
Manufacturing, including component parts manufacturing	38.5%	44.2%	82.7%
Construction	23.3%	55.8%	79.1%
Research and development	17.9%	46.2%	64.1%
Operations and asset management	17.9%	42.9%	60.7%
Education/Training/Advocacy	10.0%	46.7%	56.7%
Development and siting	12.5%	37.5%	50.0%

Approximately four-in-five medium-sized (10-49 employees) and large (50 employees or more) firms expressed at difficulty hiring entry-level candidates (79.7% and 81.6% respectively) and non-entry-level candidates (82.6% and 81.6% respectively).

Table 3: Hiring Difficulty by Firm Size – Entry-level Wind Applicants

	Entry-Level		Total difficulty
	Great difficulty	Some difficulty	
1 to 9 employees	15.7%	32.1%	47.8%
10 to 49 employees	14.5%	65.2%	79.7%
50 or more employees	15.8%	65.8%	81.6%

⁶ Government/regulatory, transportation and logistics, and finance/legal/insurance respondents are excluded from crosstab analyses as sample sizes are low.

Table 4: Hiring Difficulty by Firm Size – Non-Entry-level Wind Applicants

	Non-Entry-Level		Total difficulty
	Great difficulty	Some difficulty	
1 to 9 employees	23.1%	29.1%	52.2%
10 to 49 employees	27.5%	55.1%	82.6%
50 or more employees	13.2%	68.4%	81.6%

Wind energy firms in the South or Southeast United States reported the highest level of difficulty finding entry-level wind applicants (15.1% “great difficulty” and 62.8% “some difficulty”) when compared to firms in other regions of the country. Seventy-one percent of firms in the Midwest reported “great difficulty” (26.7%) or “some difficulty” finding qualified applicants.

Table 5: Hiring Difficulty by Region – Entry-level Wind Applicants

	Entry-Level		Total difficulty
	Great difficulty	Some difficulty	
South/ Southeast	15.1%	62.8%	77.9%
Northeast/ Mid-Atlantic	18.2%	52.3%	70.5%
Midwest	19.4%	43.5%	62.9%
West	10.9%	38.6%	49.5%

Table 6: Hiring Difficulty by Region – Non-Entry-level Wind Applicants

	Non-Entry-Level		Total difficulty
	Great difficulty	Some difficulty	
Midwest	26.7%	44.2%	70.9%
Northeast/ Mid-Atlantic	25.8%	40.3%	66.1%
South/ Southeast	15.8%	48.5%	64.4%
West	22.7%	34.1%	56.8%

More than a quarter of responding firms indicated that “there are enough applicants, but too many applicants do not have the training or education needed for the job” (29.7%) or “there are enough applicants, but too many applicants do not have the experience needed for the job” (27.6%) when asked about reasons for hiring difficulty related to hiring process for qualified entry-level wind applicants.

When reviewing responses by location size, medium-sized (10-49 employees) and large (50 or more employees) firms indicated that “there are not enough applicants for the positions” as the top reason for difficulty finding qualified entry-level applicants. Small firms’ (1-9 employees) top reason for difficulty as selected by respondents was “there are enough applicants, but too many applicants do not have the experience needed for the job”.

Figure 4: Reasons for Hiring Difficulty for Entry-Level Wind Applicants

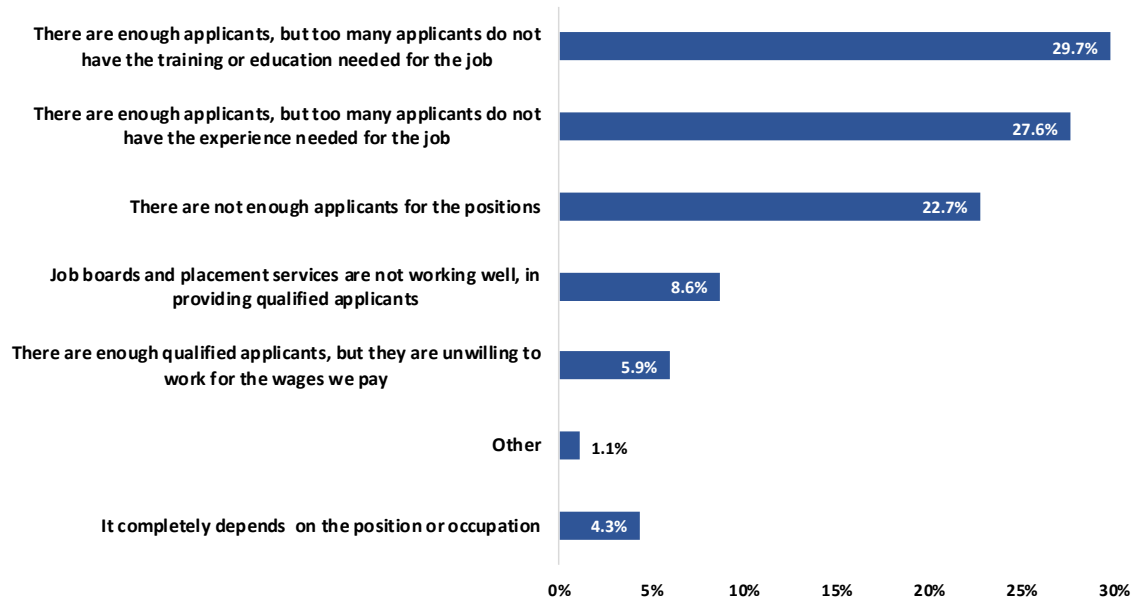


Table 7 lists the top reported reasons for hiring difficulty by wind industry segment for entry-level wind applicants.

Table 7: Top Reasons for Hiring Difficulty for Entry-Level Wind Applicants - Industry Sector

	Top Reason for Hiring Difficulty –Entry-Level
Manufacturing, including component parts manufacturing	There are enough applicants, but too many applicants do not have the training or education needed for the job
Research and development	There are enough applicants, but too many applicants do not have the training or education needed for the job
Education/Training/Advocacy	There are not enough applicants for the positions
Construction	There are not enough applicants for the positions
Development and siting	There are enough applicants, but too many applicants do not have the training or education needed for the job
Operations and asset management	There are enough applicants, but too many applicants do not have the experience needed for the job

One-third of all wind firms cited “there are enough applicants, but too many applicants do not have the experience needed for the job” when referring to the difficulty faced finding or recruiting qualified non-entry-level wind positions at their firm.

Small and medium-sized firms list the availability of non-entry-level applicants without experience as their top reason for hiring difficulty, while large firms recognize that there are enough applicants, however applicants for open wind-related positions do not have the training or education needed for the job.

Figure 5: Reasons for Hiring Difficulty for Non-Entry-Level Wind Applicants

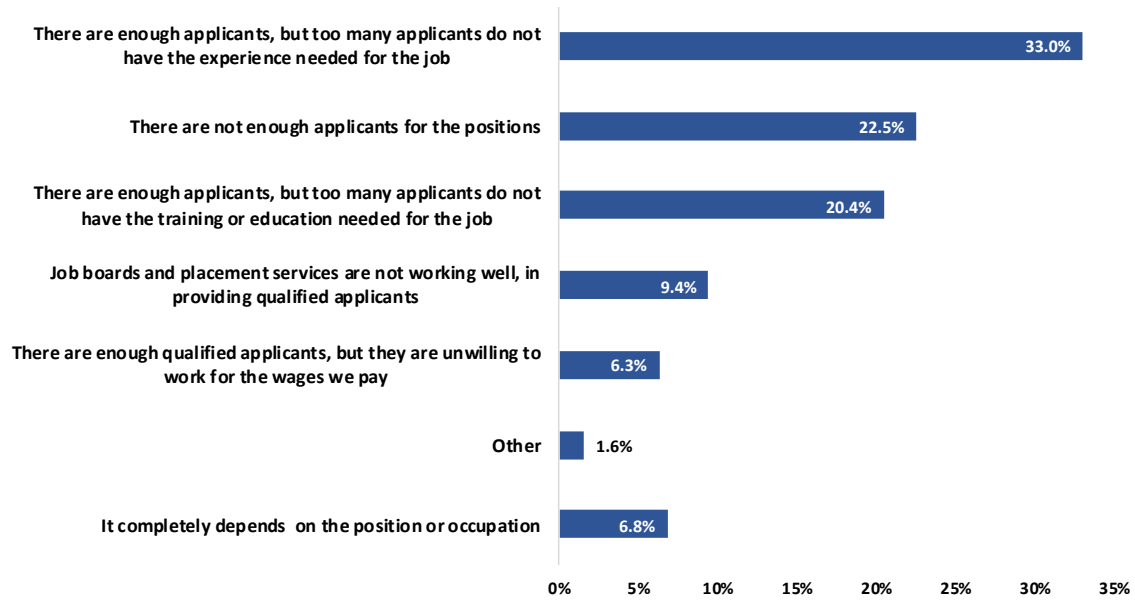


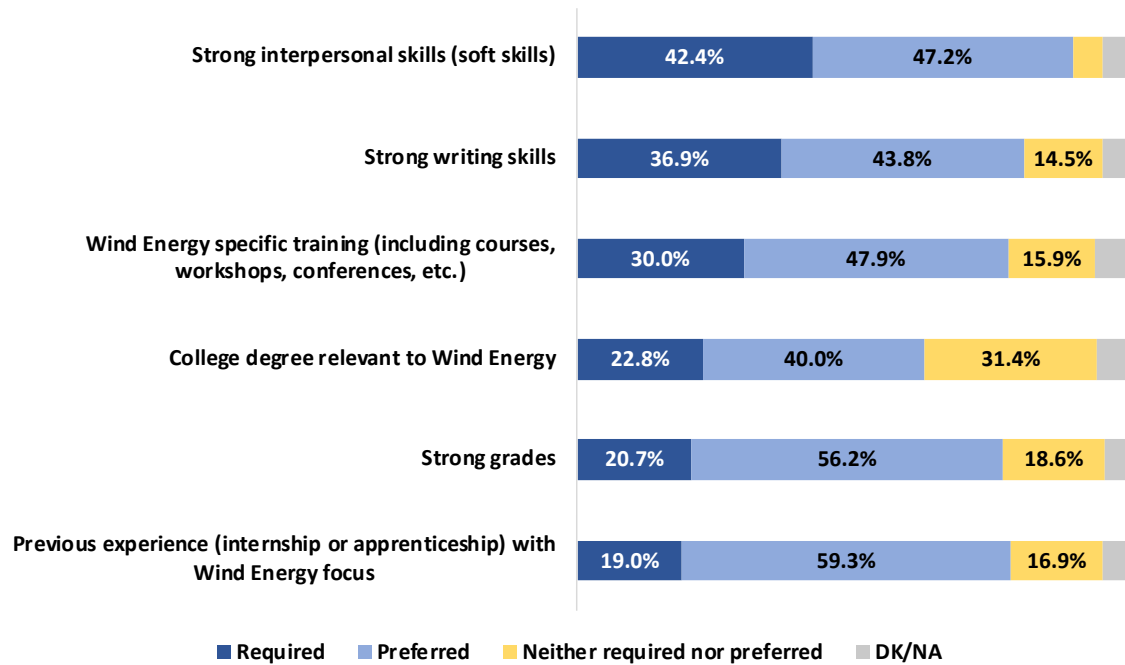
Table 8 lists the top reported reasons for hiring difficulty by wind industry segment for non-entry-level wind applicants.

Table 8: Top Reasons for Hiring Difficulty for Non-Entry-Level Wind Applicants - Industry Sector

	Top Reason for Hiring Difficulty – Non-Entry-Level
Manufacturing, including component parts manufacturing	There are enough applicants, but too many applicants do not have the experience needed for the job
Research and development	There are enough applicants, but too many applicants do not have the training or education needed for the job
Education/Training/Advocacy	There are enough applicants, but too many applicants do not have the experience needed for the job
Construction	There are not enough applicants for the positions
Development and siting	There are enough applicants, but too many applicants do not have the experience needed for the job
Operations and asset management	There are enough applicants, but too many applicants do not have the training or education needed for the job

Strong interpersonal skills, sometimes referred to as “soft skills,” are required for entry-level wind applicants at more than two-out-of-five (42%) U.S. wind energy firms. Strong writing skills are required by more than one-third of firms (37%). More than sixty percent of all respondents to the survey require or prefer each of the attributes in Figure 6 below.

Figure 6: Hiring Priorities and Requirements for Entry-Level Wind Applicants



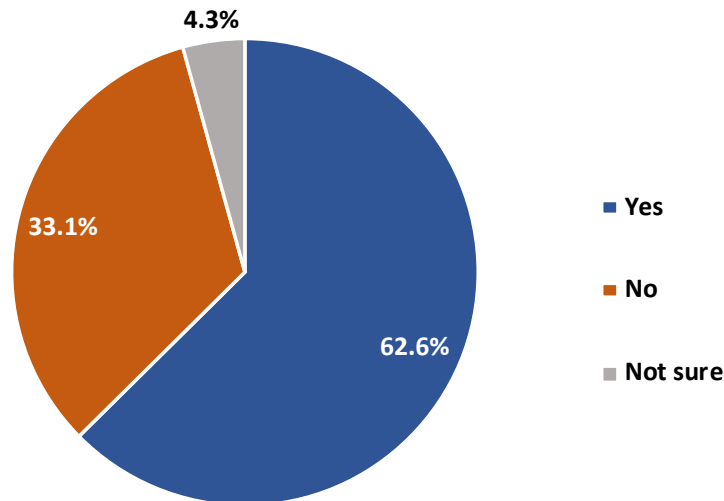
Hiring Requirements & Priorities by Industry Sector

It is not surprising that approximately nine out of ten wind energy employers indicated that entry-level wind applicants are either required or it is preferred that they have strong interpersonal skills (soft skills) this is a consistent need of employers in most industries and it was one that was a higher priority skill set for each of the wind energy industry's key sectors. Skills that had higher requirements and/or preferences for entry-level wind energy applicants by industry sector included the following:

- **Operations and asset management:** Over 80 percent of employers in this sector indicated wind energy specific training was either required (43%) or preferred (39%).
- **Research and development:** Nine out of ten employers in this sector indicated strong writing skills were either required (49%) or preferred (41%).
- **Development and siting:** Nine out of ten employers in this sector indicated strong writing skills were either required (40%) or preferred (50%).
- **Manufacturing:** Almost 90 percent of employers in this sector indicated previous experience (internship or apprenticeship) with a wind energy focus was either required (25%) or preferred (63%).

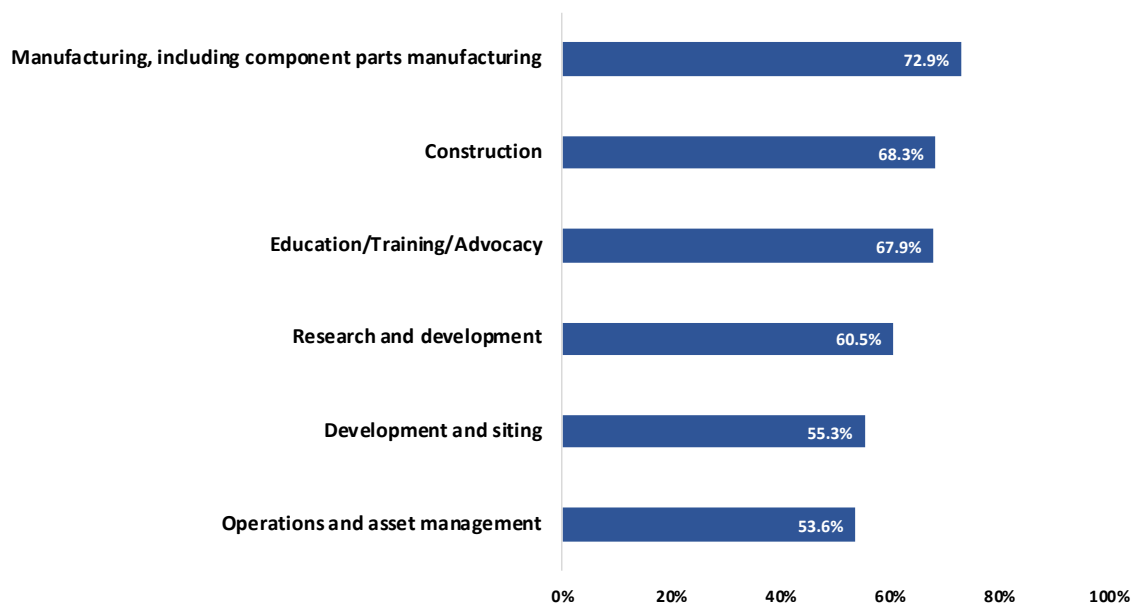
Nearly sixty-three percent (62.6%) of U.S. wind energy firms offer in-house training courses or programs that are specific to wind energy related work. The majority of medium-sized (69.2%) and large firms (85.7%) offer in-house training for wind energy related work, while more small firms indicated that they do not (48.4% “no” vs. 46.1% “yes”). Medium to large firms (10+ employees) in the South/Southeast United States were most likely to indicate that they offered in-house training courses or programs (86.7%).

Figure 7: Offer In-House Training for Wind Energy Work



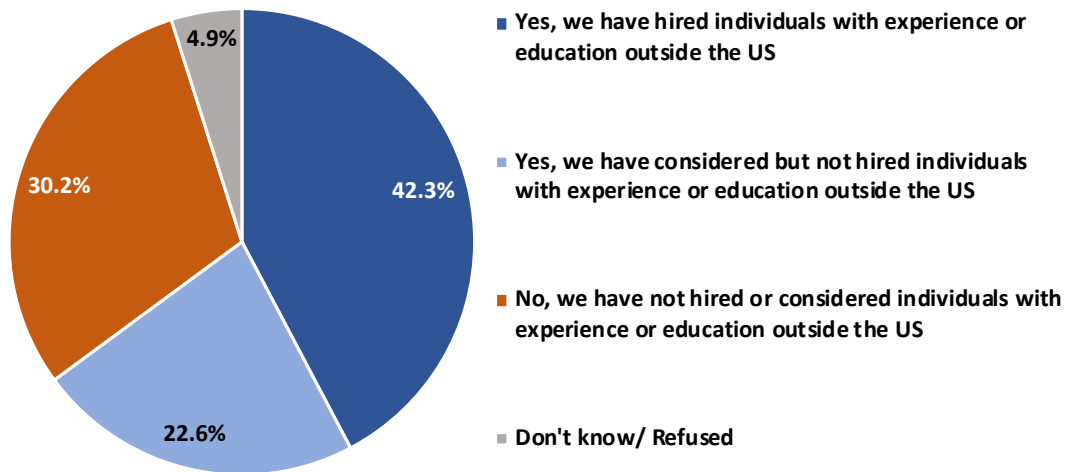
The following figure (Figure 8) includes the percentage of responding U.S. firms by industry sector that offer in-house training for wind energy work.

Figure 8: Offer In-House Training for Wind Energy Work by Industry Sector



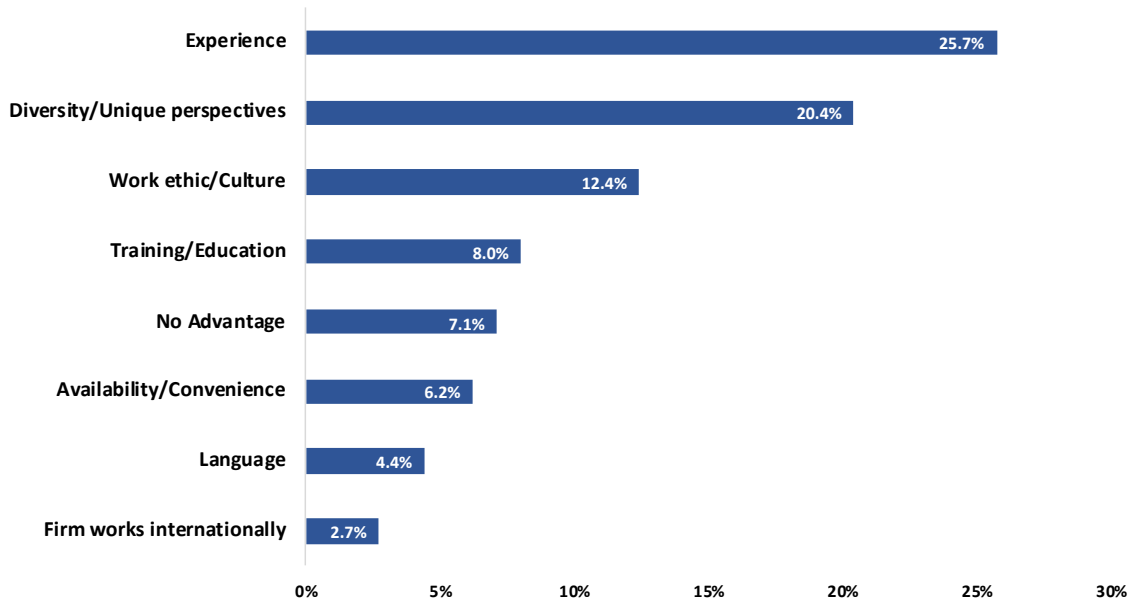
Nearly two-thirds of wind energy firms have either hired individuals with experience or education outside the U.S. (42.3%) or have considered but not hired individuals with experience or education outside the U.S. (22.6%). Medium firms (52.4%) and large firms (55.9%) were most likely to have hired these workers compared to small firms (25.2%). At least half of wind energy manufacturers (55.6%), research and development firms (52.6%), and construction firms (50.0%) had hired individuals with experience or education outside of the country. Small firms (1 to 9 employees) in the Midwest were most likely to answer “no” the question (65.4%).

Figure 9: Considered Hiring Applicants for Wind Energy Positions with Experience or Education Outside the U.S.



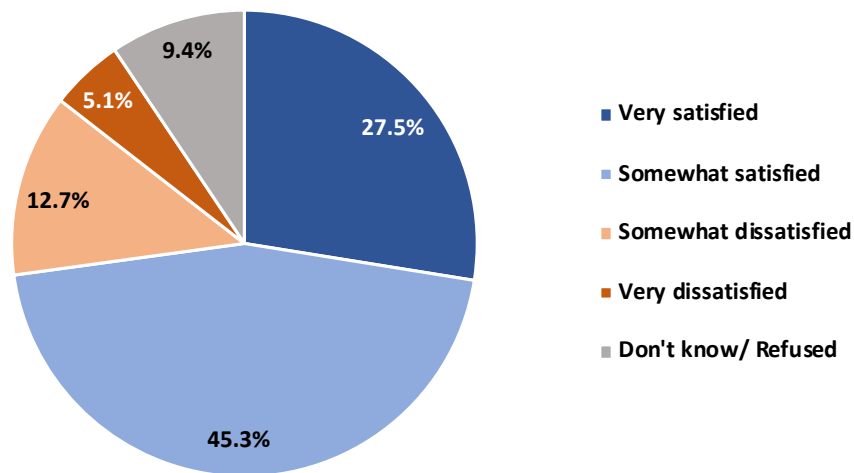
For those firms that had hired individuals from outside the U.S., more than a quarter cited experience as the primary advantage to finding and recruiting workers from outside the country.

Figure 10: Primary Advantage of Hiring Wind Energy Individuals with Experience or Education Outside the U.S.



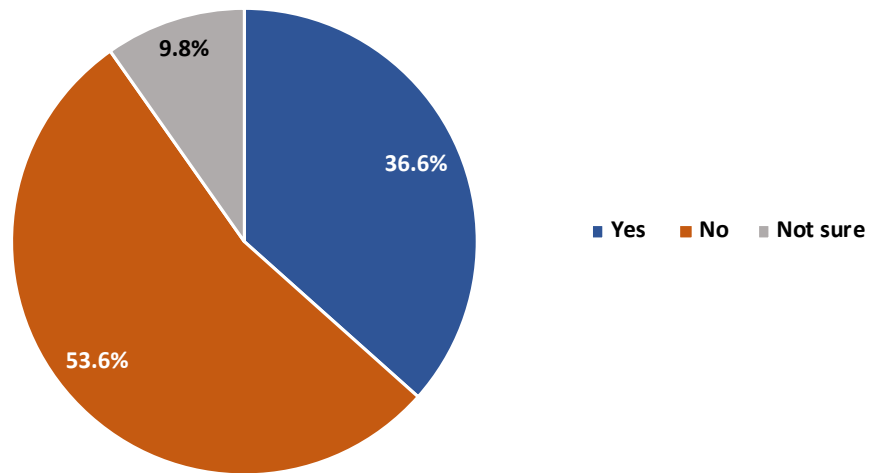
Overall, U.S. wind energy firms indicated that they were satisfied with U.S. educational institutions and universities focused on preparing people to work in the wind industry and their ability to provide qualified workers. More than a quarter of responding employers said they were “very satisfied” (27.5%) while more than two-fifths indicated that they were “somewhat satisfied” (45.3%). Less than one-in-five wind firms expressed dissatisfaction with U.S. educational institutions and universities (5.1% “very dissatisfied” and 12.7% “somewhat dissatisfied”).

Figure 11: Satisfaction with Preparation of Wind Industry Workers by U.S. Educational Institutions



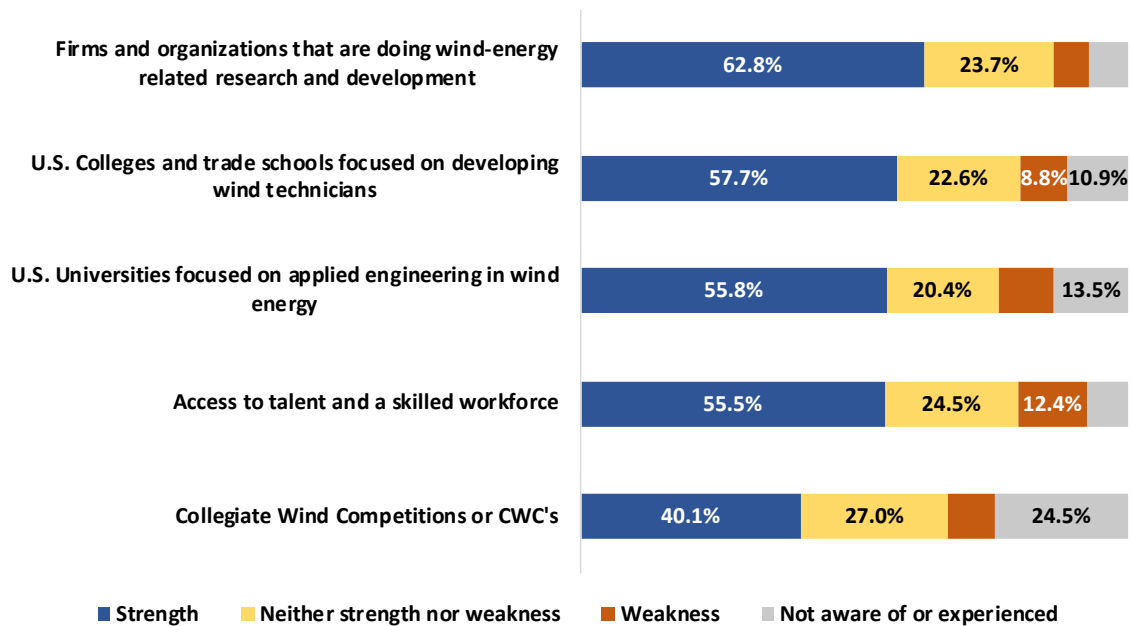
Over a third (36.6%) of wind firms surveyed said that they worked with or contacted U.S. universities, colleges, community colleges, technical schools, or other educational institutions about finding or developing qualified job candidates, while more than half (53.6%) had not been engaged with any U.S. institutions.

Figure 12: Engaged with U.S. Educational Institutions to Find or Develop Qualified Job Candidates



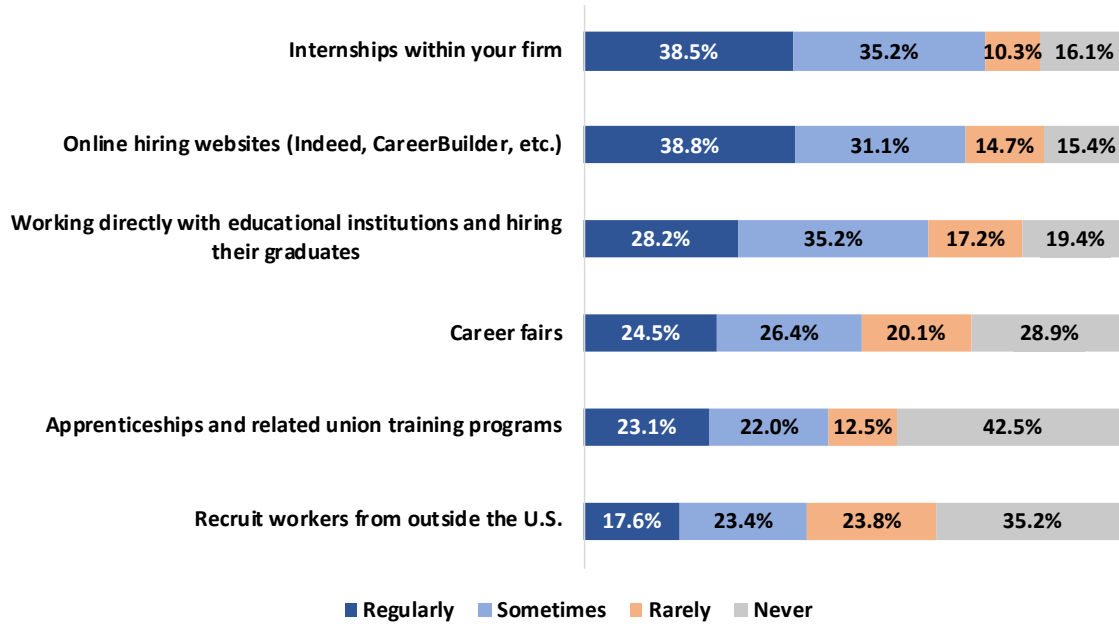
More than half of responding firms assessed each of the resources, programs, or institutions in Figure 13 as a strength except for Collegiate Wind Competitions (CWC's). However, if respondents that were not aware of or experienced CWC's (24.5%) are removed, more than half of the remaining respondents identify CWC's as a strength (53.1%).

Figure 13: Awareness and Assessment of Resources, Programs, or Institutions in the U.S.



Nearly 74 percent of wind energy firms use internships within their firms “regularly” (38.5%) or “sometimes” (35.2%) when looking to find qualified job applicants. At least 70 percent of firms use online hiring websites such as Indeed and CareerBuilder when searching for qualified job applicants (38.8% “regularly” and 31.1% “sometimes”).

Figure 14: Use of Programs and Resources When Searching for Qualified Job Applicants



3. WIND ENERGY OCCUPATIONAL PROFILE

The following table (

Table 9) displays incidence of occupational employment as reported by industry sector respondents. For example, 78.8% of wind energy manufacturers employ product designers and design engineers and 78.6% of construction firms employ trade workers at their location.

Table 9: Occupational Employment Incidence by Industry Sector

Occupation	Mfg.	R & D	Edu/ Training/ Adv.	Const.	Dev & siting	Ops & asset mgmt
Professors and teachers	--	52.60%	53.60%	--	--	--
Product designers and design engineers	78.80%	68.40%	--	--	--	--
Wind technicians	--	--	--	--	--	60.70%
Professional trainers and industry educators	42.30%	--	60.70%	--	--	42.90%
Trade workers	75.00%	--	32.10%	78.60%	--	25.00%
Developers	--	--	--	--	60.00%	--
Engineers - Civil	50.00%	50.00%	--	69.00%	47.50%	39.30%
Engineers - Electrical or mechanical	71.20%	76.30%	--	76.20%	62.50%	64.30%
Engineers - Power systems/Transmission	53.80%	55.30%	--	52.40%	42.50%	53.60%
Engineers - Other	59.60%	47.40%	--	52.40%	62.50%	64.30%
Economists and policy experts (government relations)	26.90%	50.00%	53.60%	--	22.50%	--
Applied/Field scientists (biologists, environmental archaeologists, meteorologists, etc.)	--	52.60%	28.60%	35.70%	50.00%	--
Research scientists and research engineers	59.60%	71.10%	53.60%	--	--	--
Programmers and computer scientists	61.50%	52.60%	25.00%	40.50%	37.50%	39.30%
Attorneys	38.50%	39.50%	17.90%	28.60%	37.50%	32.10%
Transportation/Logistics workers	50.00%	--	--	52.40%	--	--
Resource assessors and surveyors	--	34.20%	--	--	42.50%	--
Construction laborers (other than skilled trade workers)	--	--	--	66.70%	--	--
Sales/Marketing	63.50%	44.70%	28.60%	50.00%	47.50%	39.30%
Communications/PR	46.20%	36.80%	46.40%	35.70%	40.00%	57.10%
Admin/Clerical	57.70%	55.30%	53.60%	61.90%	52.50%	67.90%
Paralegals	--	--	--	--	--	--
Government employees - regulatory workers	--	31.60%	21.40%	--	--	--
Accountants/Bookkeepers/Finance	53.80%	44.70%	32.10%	47.60%	55.00%	75.00%
Assembly workers	57.70%	--	--	--	--	--

Table 10 includes the distribution of total occupational employment by industry sector. For instance, operations and asset management firms report that approximately 59.3% of employees are wind technicians and manufacturers report that assembly workers make up 37.4% of their industry sector workforce.

Table 10: Distribution of Occupational Employment by Industry Sector

Occupation	Mfg.	R & D	Edu/ Training/ Adv.	Const.	Dev & siting	Ops & asset mgmt
Professors and teachers	--	3.00%	9.60%	--	--	--
Product designers and design engineers	7.00%	10.30%	--	--	--	--
Wind technicians	--	--	--	--	--	59.30%
Professional trainers and industry educators	2.90%	--	14.30%	--	--	1.70%
Trade workers	23.20%	--	14.50%	8.30%	--	4.10%
Developers	--	--	--	--	0.50%	--
Engineers - Civil	2.40%	9.10%	--	10.70%	0.50%	3.30%
Engineers - Electrical or mechanical	2.90%	4.60%	--	6.40%	1.30%	4.60%
Engineers - Power systems/Transmission	1.70%	3.90%	--	4.30%	0.70%	2.70%
Engineers - Other	2.20%	8.60%	--	9.10%	0.40%	3.30%
Economists and policy experts (government relations)	1.40%	3.80%	5.00%	--	0.10%	--
Applied/Field scientists (biologists, environmental archaeologists, meteorologists, etc.)	--	6.10%	4.90%	4.60%	3.50%	--
Research scientists and research engineers	2.50%	10.20%	8.00%	--	--	--
Programmers and computer scientists	2.80%	2.90%	8.60%	12.90%	45.70%	1.40%
Attorneys	1.00%	2.00%	1.20%	2.50%	0.20%	1.20%
Transportation/Logistics workers	2.30%	--	--	4.60%	--	--
Resource assessors and surveyors	--	3.30%	--	--	0.40%	--
Construction laborers (other than skilled trade workers)	--	--	--	24.80%	--	--
Sales/Marketing	2.70%	17.80%	7.50%	4.40%	0.40%	3.50%
Communications/PR	2.70%	1.30%	8.40%	2.50%	2.10%	1.10%
Admin/Clerical	2.90%	7.90%	15.20%	2.80%	0.30%	6.40%
Paralegals	--	--	--	--	--	--
Government employees - regulatory workers	--	2.50%	0.90%	--	--	--
Accountants/Bookkeepers/Finance	2.00%	2.70%	2.10%	2.20%	43.90%	7.30%
Assembly workers	37.40%	--	--	--	--	--

PART II: CURRENT & POTENTIAL WIND ENERGY EMPLOYEES

This component of the research describes the wind energy industry from the perspective of current and potential employees who are currently students or recent graduates and their priorities and expectations associated with employment and additional training and education. The research in this part of the study is delineated into four sections:

1. **Current & Potential Wind Energy Employee Universe:** This section describes the current and potential wind energy employee universe and the type of current students and recent graduates that represent this part of the research.
2. **Employment Profile of Current & Potential Wind Energy Employees:** This section examines the employment expectations and experiences of wind energy employers and their priorities for hiring and staff development.
3. **Educational Profile of Current & Potential Wind Energy Employees:** This section describes the employment expectations and experiences of wind energy employers and their priorities for hiring and staff development.
4. **Industry & Employment Priorities for Current & Potential Wind Energy Employees:** This section examines the occupations that employers have at their firm and how many currently work at or from their business location or locations.

For this report current and potential workers are not meant to reflect the entire current and potential wind energy workforce universe, instead for this study current and potential wind energy workers represent those students and recent graduates that currently work in the wind energy (current) or all the other students and recent graduates that qualified to take the survey and could in the future work in wind energy (potential).

Appendix B provides the aggregated topline to the current and potential employee survey of current students and recent graduates completed in March-June of 2020.

1. CURRENT & POTENTIAL WIND ENERGY EMPLOYEE UNIVERSE

Institutions (universities, community colleges, etc.) that participate in Department of Energy (DOE) sponsored wind programs or include wind programs in general enrolled a total of approximately 1.27 million students across the United States at the beginning of the 2019-2020 school year.⁷ The 57 identified institutions are spread throughout 29 states and were responsible for 309,902 total program completions in 2018, or six percent of the national total.⁸

The following list includes relevant degree or training programs to the wind energy industry and the total completions nationwide⁹;

- **Mechanical Engineering** – 53,157 program completions in 2018
- **Electrical Engineering** – 41,175 program completions in 2018
- **Civil Engineering** – 22,655 program completions in 2018
- **Computer Engineering** – 19,521 program completions in 2018
- **Finance, Accounting, and/or Business** – 650,811 program completions in 2018
- **Wind Technician or Wind Turbine Technician**¹⁰
- **Electrician** – 15,629 program completions in 2018
- **Plumbing** – 2,309 program completions in 2018
- **Machinist** – 5,979 program completions in 2018
- **Applied Science or Field Science related to Wind Energy** – 6,533 program completions in 2018

The 817,769 program completions for the preceding degree or training programs represented 15.8% of the total 5,173,251 completions in 2018 in the United States.

⁷ United States Department of Education

⁸ Economic Modeling Specialists, Intl. (EMSI)

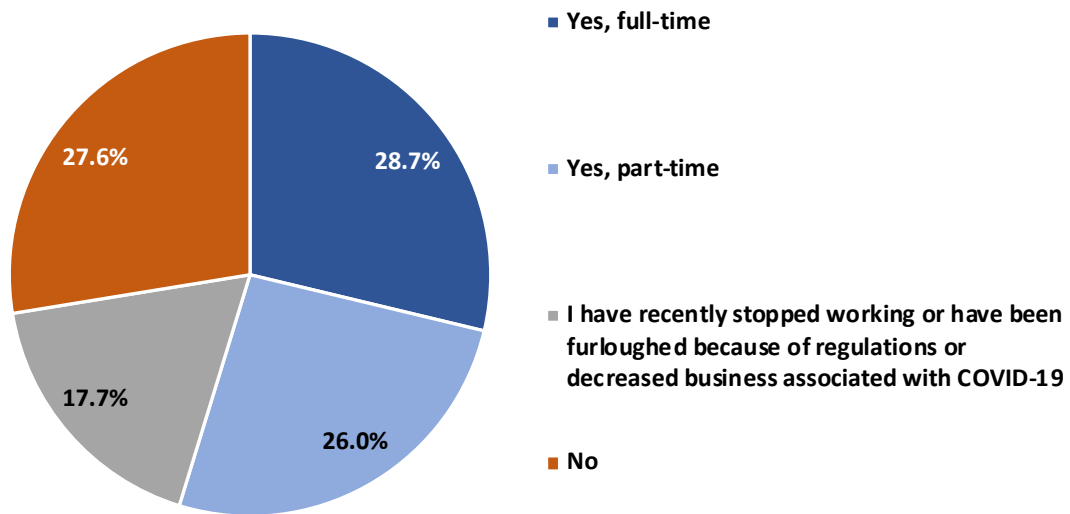
⁹ Economic Modeling Specialists, Intl. (EMSI)

¹⁰ Program completions are not available specific to this category.

2. EMPLOYMENT PROFILE OF CURRENT & POTENTIAL WIND ENERGY EMPLOYEES

Over half (55%) of current and potential wind energy employees are employed, either full-time (29%), or part-time (26%), with another 18% that have recently stopped working because of COVID-19. Less than three in ten (28%) current and potential wind energy employees either do not currently work and have not recently stopped working due to COVID-19.

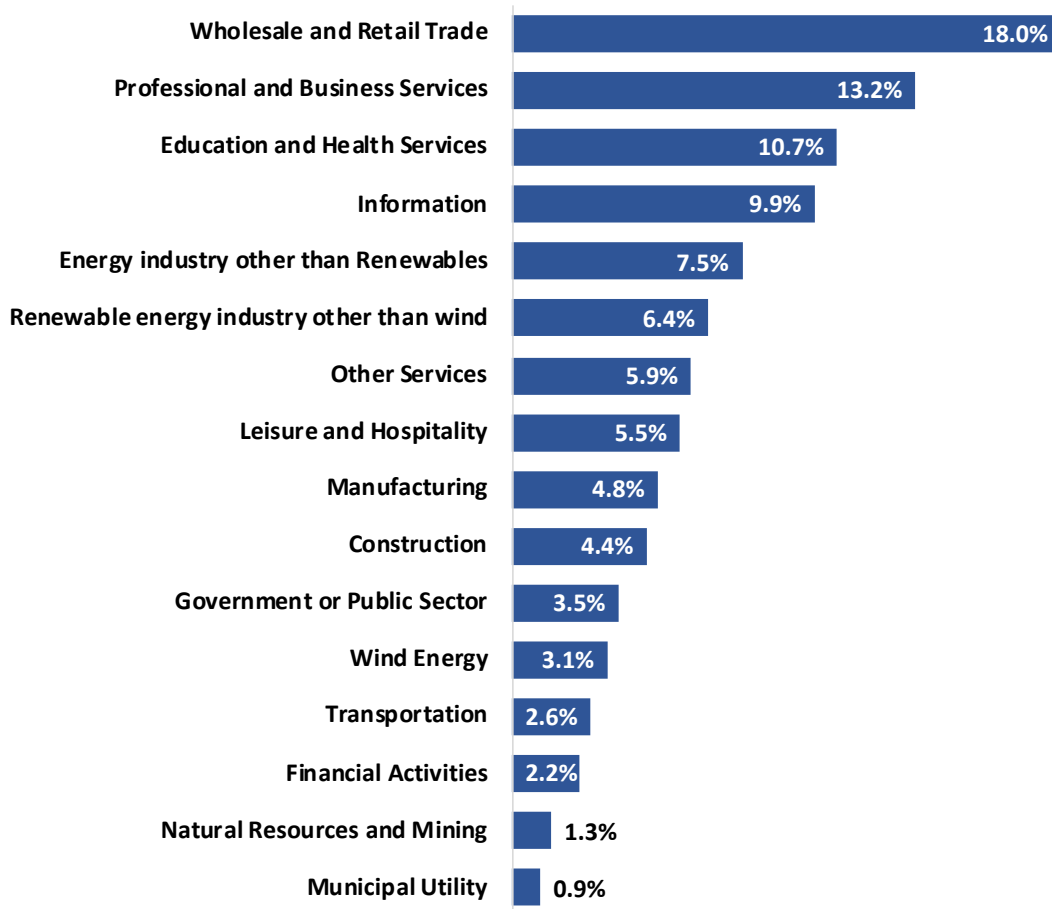
Figure 15: Current Employment Status



Those current and potential wind employees that are not working and not recently furloughed (27.6%) by COVID-19 were not asked any of the remaining questions about their current employment status, therefore the percentages in those questions regarding employment profiles only reflect the 72 percent of participants that are currently employed or recently stopped working.

Participants that indicated they are currently working either full-time or part-time or those individuals that have recently stopped working due to COVID-19, were then asked which industry they primarily work or worked in. As the figure below shows, the largest percentage of current and potential employees indicated they are primarily currently or recently working in wholesale & retail trade (18%), professional & business services (13%), education and health services (11%) and information (10%). Eight percent indicated they primarily currently or recently worked in the energy industry, other than renewables, six percent in the renewable energy industry, other than wind energy, and three percent in the wind energy industry.

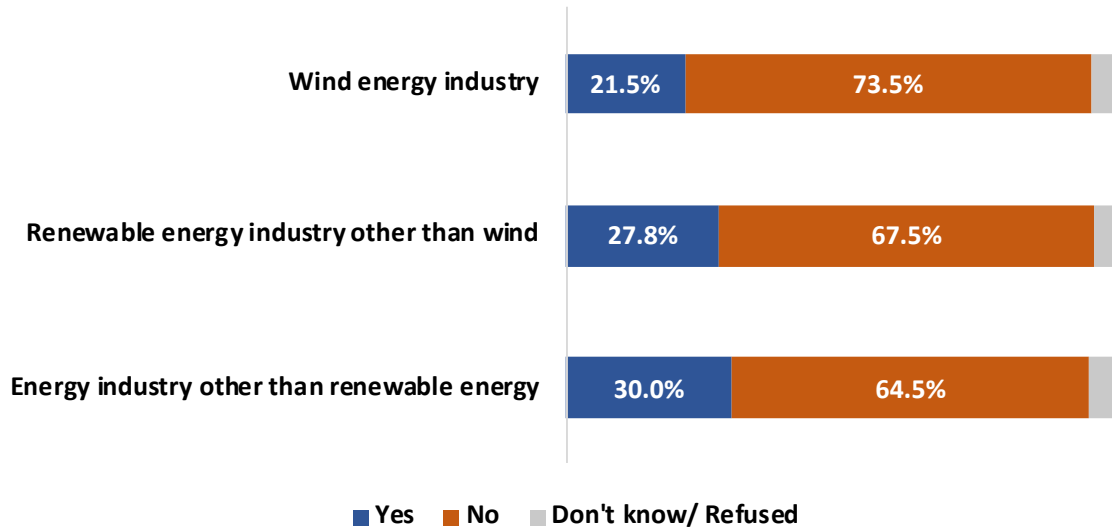
Figure 16: Industry Employment



After asking participants which industry they primarily worked in, a follow-up question asked if their job included work in the following energy industries.

Respondents that work or had worked in financial activities were most likely to indicate that their job includes work in the wind energy industry (41.7%) followed by those that work or had worked in the information sector (25.9%).

Figure 17: Energy-Related Work



The United States Energy and Employment Report (USEER) estimates 114,774 wind energy employees in the United States in 2019. Renewable energy¹¹ (or renewable generation) other than wind employed 451,201 workers, while traditional energy¹² employed 2,734,142 individuals in 2019.¹³

For this survey, approximately 3.1% of respondents identified as primary wind energy workers when asked an unaided question. An additional 18.4% of respondents are secondary wind energy workers, as they identified as part of a different industry sector initially before reporting that they spent some time on work related to the wind energy industry.

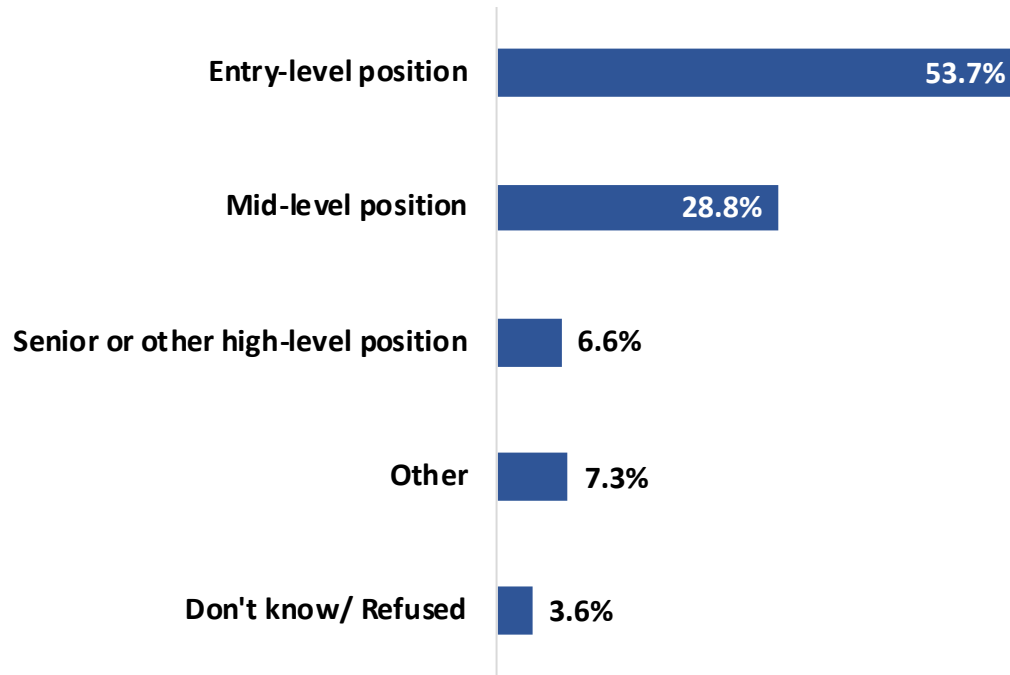
¹¹ Solar electric power generation, geothermal electric power generation, bioenergy electric power generation, combined heat and power, and hydroelectric power generation.

¹² Other electric power generation, fuels, and transmission distribution and storage. This excludes energy efficiency and motor vehicles.

¹³ 2019 U.S. Energy and Employment Report (2019 USEER), produced by the Energy Futures Initiative (EFI) in partnership with the National Association of State Energy Officials (NASEO) and collected and analyzed by BW Research Partnership (BWRP).

Not surprisingly, over half (54%) of those currently employed or recently furloughed indicated they worked in an entry-level position.

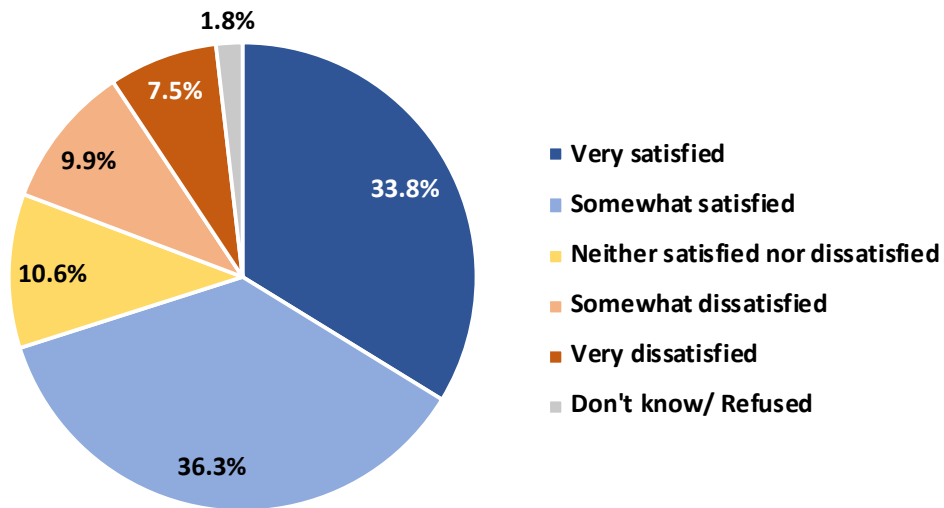
Figure 18: Current Position



Seven-in-ten working respondents were satisfied (33.8% “very satisfied” and 36.3% “somewhat satisfied”) with their current industry as a place to build a career. Approximately 17.4% of respondents were either “very dissatisfied” (7.5%) or “somewhat dissatisfied” (9.9%).

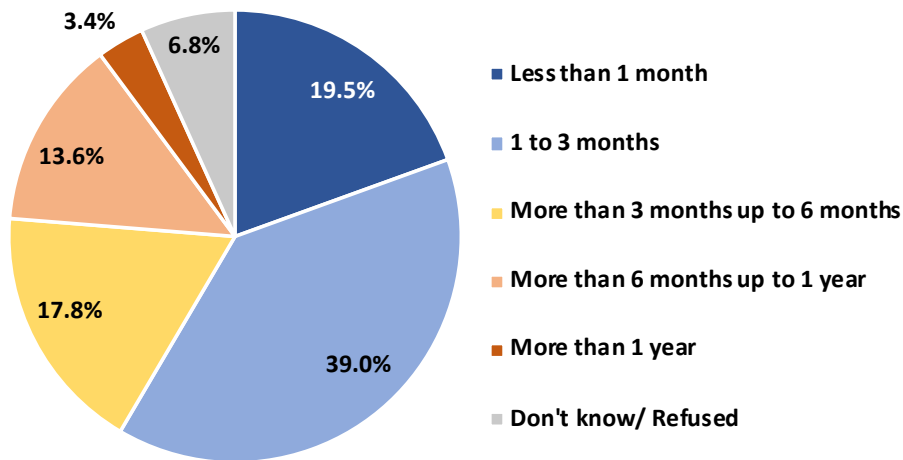
Respondents that were 18 to 35 years old were less likely to report overall satisfaction (66.8%) with their current industry as a place to build a career when compared to those aged 46 to 64 years old (78.6%).

Figure 19: Satisfaction with Current Industry as a Place to Build a Career



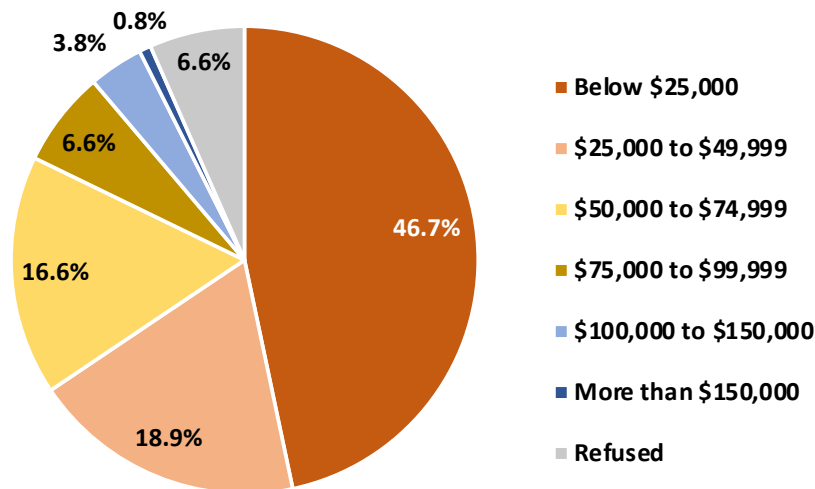
For those respondents that are employed or were recently employed in a role that includes or included work related to the wind energy industry, nearly three-in-five (58.5%) reported that it took three months or less until they were hired for the position. More than a third (34.7%) spent more than three months searching for employment before being hired.

Figure 20: Wind Energy Industry Employment Search



Nearly forty-seven percent (46.7%) of respondents indicated that they make less than \$25,000 a year in annual salary. Almost one-in-five (18.9%) make between \$25,000 and \$49,999 a year and 16.6% reported an annual salary of between \$50,000 and \$74,999. More than one-tenth of respondents generate \$75,000 or more in annual salary.

Figure 21: Current Annual Salary

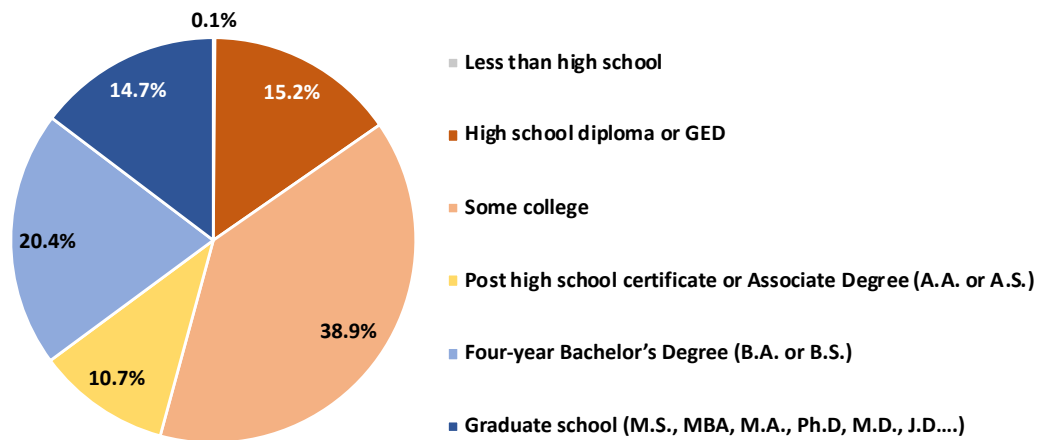


3. EDUCATIONAL PROFILE OF CURRENT & POTENTIAL WIND ENERGY EMPLOYEES

More than a third of survey respondents (35.1%) hold a Bachelor’s degree or more, while nearly half (49.5%) had completed some college or a post high school certificate or Associate degree. Approximately 15.3% of respondents had completed high school or less.

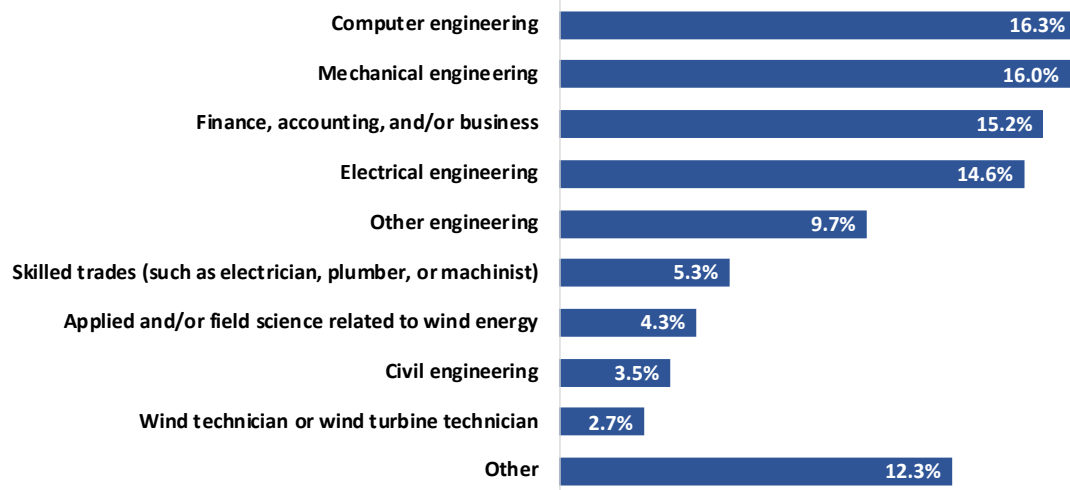
Respondents with a high school degree were more likely to indicate that they had never considered working in the wind energy industry (57.1%) when compared to those with a post high school certificate or more (36.1%).

Figure 22: Educational Attainment



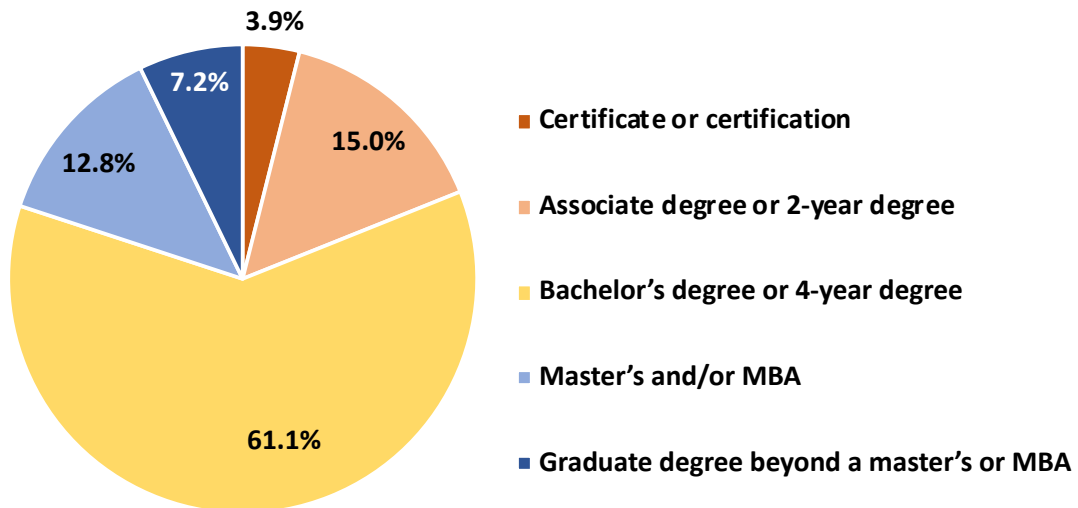
Three-in-five current students (60.1%) indicated that they are working towards an engineering degree—computer, mechanical, electrical, civil, or any other engineering-related field of study. A relatively small percentage of respondents are currently pursuing wind energy focused programs such as applied and/or field science related to wind energy (4.3%) and wind technician or wind turbine technician (2.7%).

Figure 23: Current Degree Program



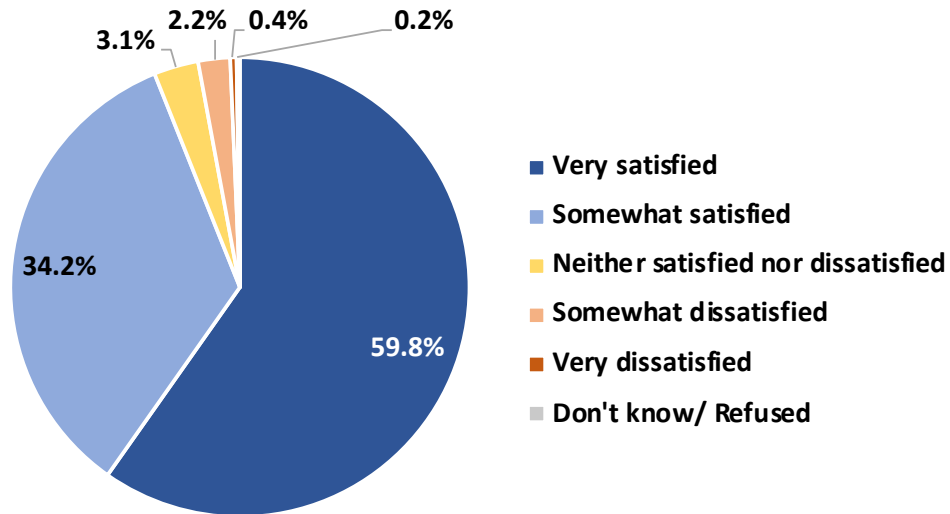
The majority of current students are working towards a bachelor’s degree or 4-year degree (61.1%). More than one out of ten respondents are pursuing an associate degree or 2-year degree (15.0%) or a master’s and/or MBA degree (12.8%).

Figure 24: Current Degree Type



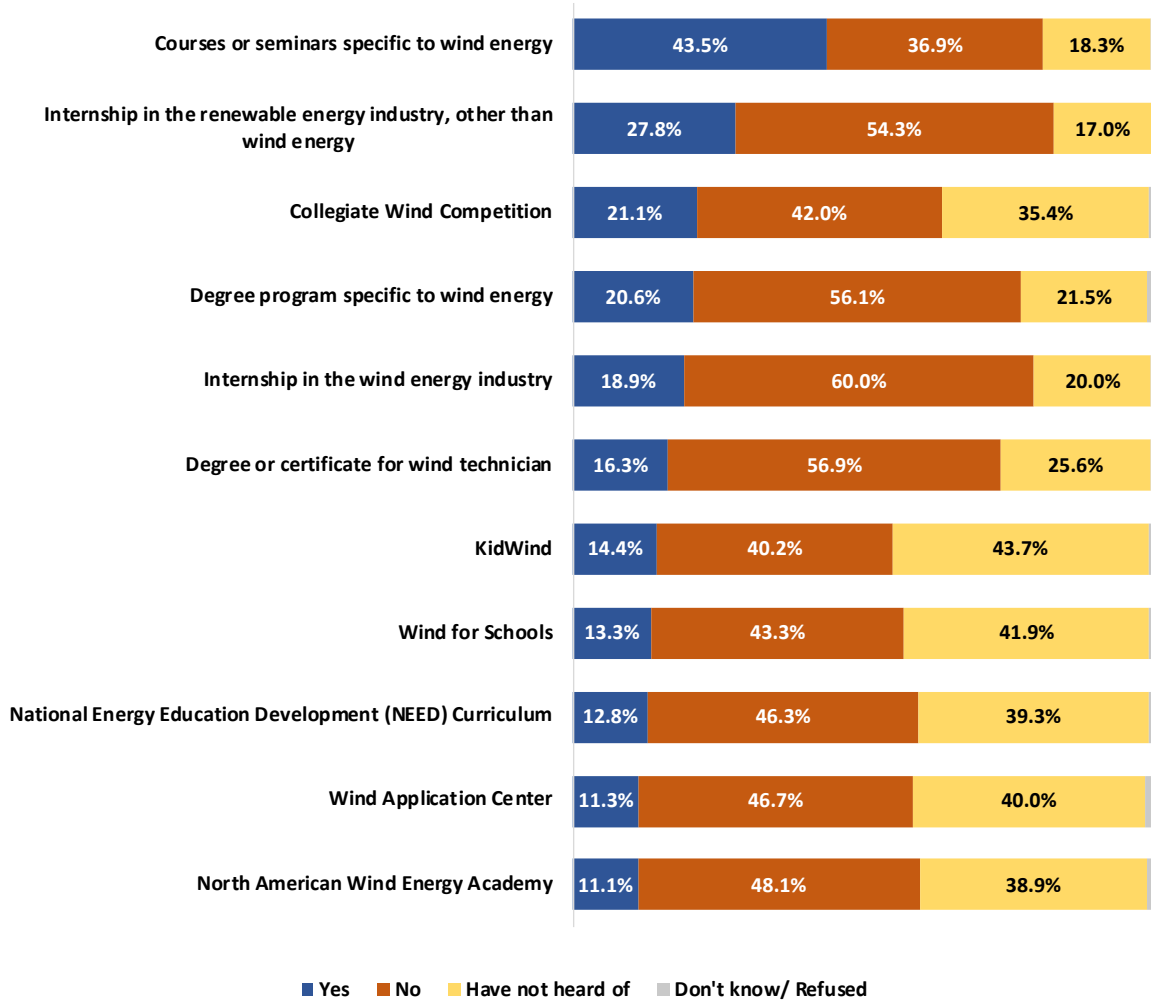
The vast majority of students are satisfied with their primary area of study, with 93.9% reporting that they are either “very satisfied” (59.8%) or “somewhat satisfied” (34.2%). Less than three percent indicated that they were “very dissatisfied” (0.4%) or “somewhat dissatisfied” (2.2%).

Figure 25: Satisfaction with Primary Area of Study



More than two-fifths of all students had participated in courses or seminars specific to wind energy (43.5%). Out of the Department of Energy (DOE) sponsored programs, the Collegiate Wind Competition (CWC) had the highest participation rate (21.1%) among respondents.

Figure 26: Participation in Training, Educational Courses, or Competitions



Figures Figure 27Figure 31 illustrate the level of agreement participating students had with specific Department of Energy (DOE) sponsored wind energy programs.

Figure 27: Agreement with Experience: College Wind Competition (CWC)

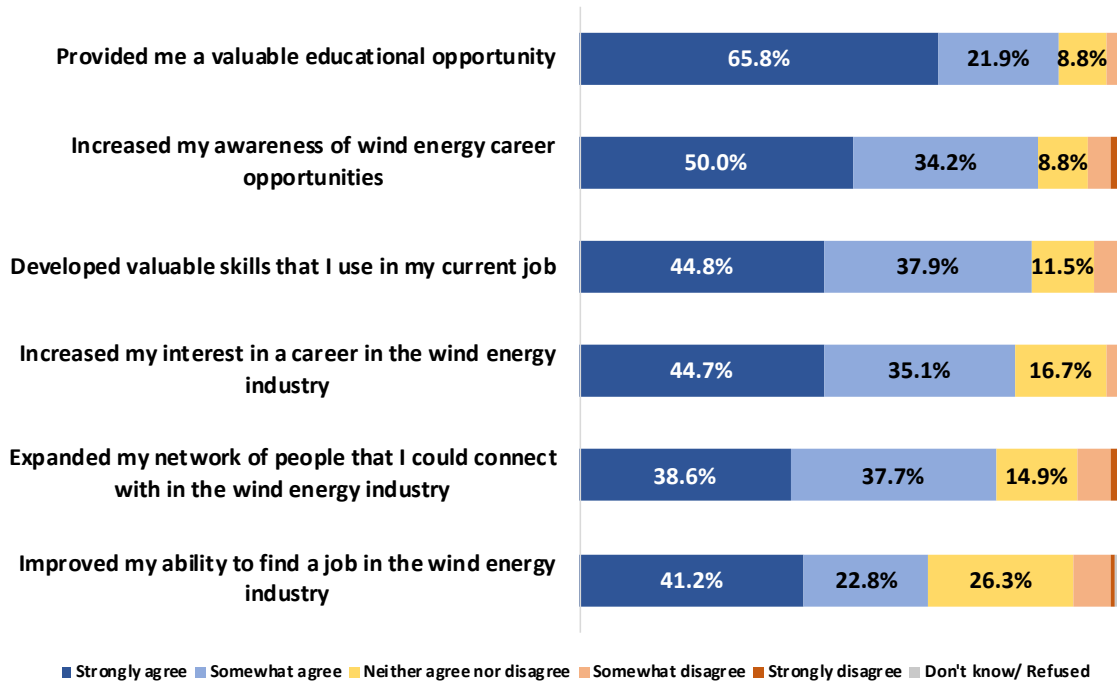


Figure 28: Agreement with Experience: North American Wind Energy Academy (NAWEA)

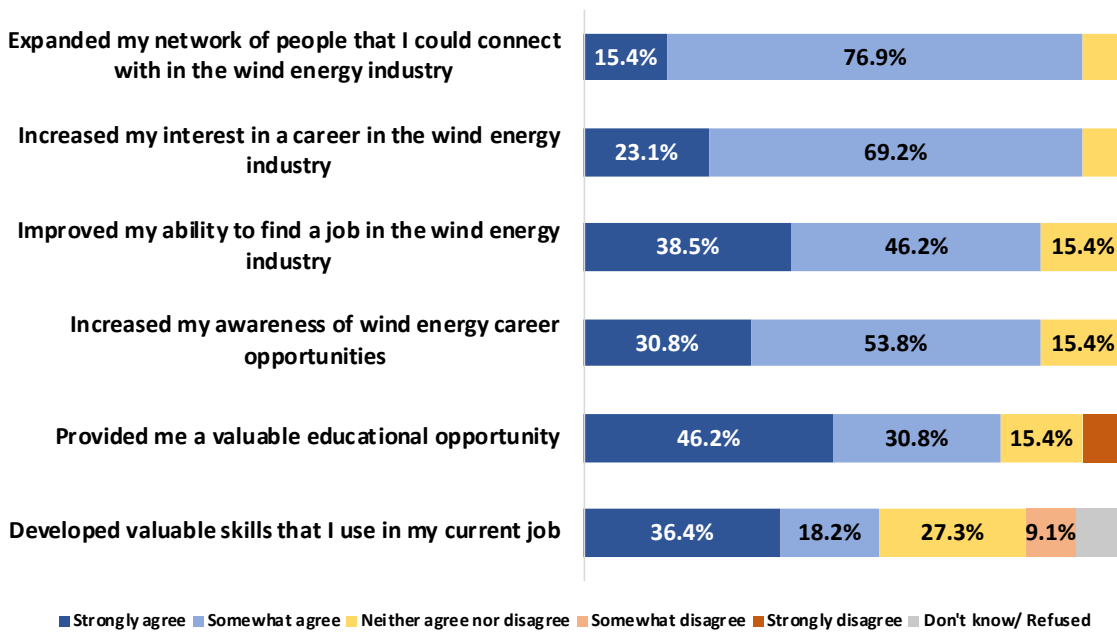


Figure 29: Agreement with Experience: KidWind

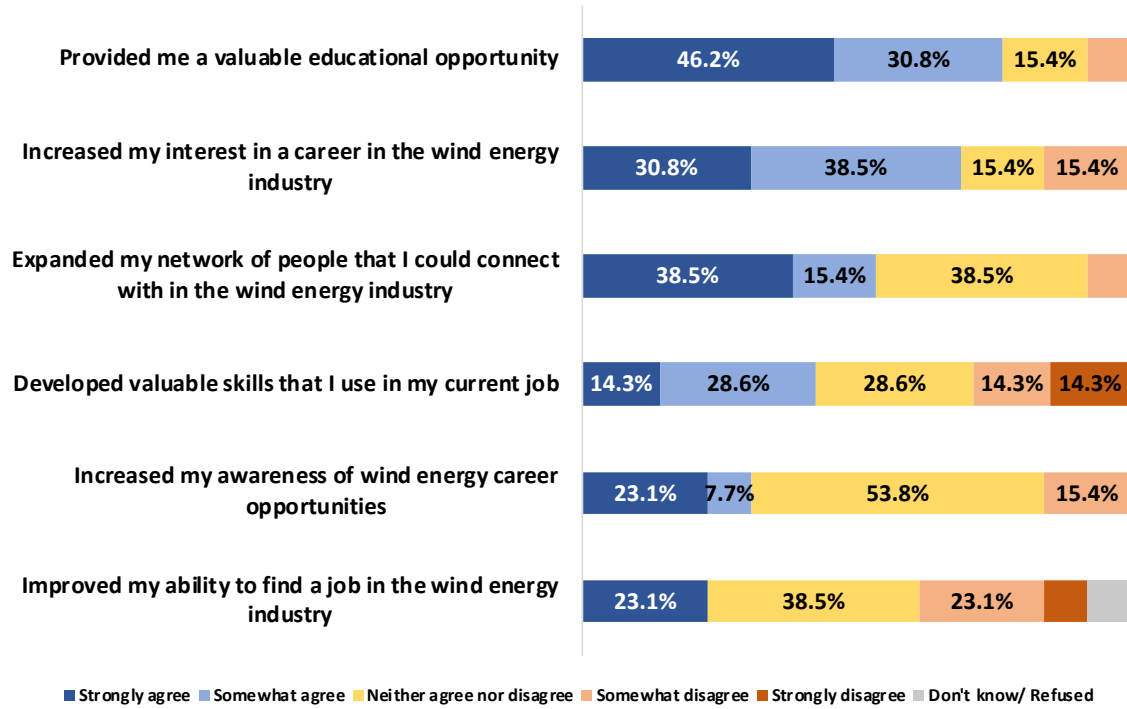


Figure 30: Agreement with Experience: Wind for Schools

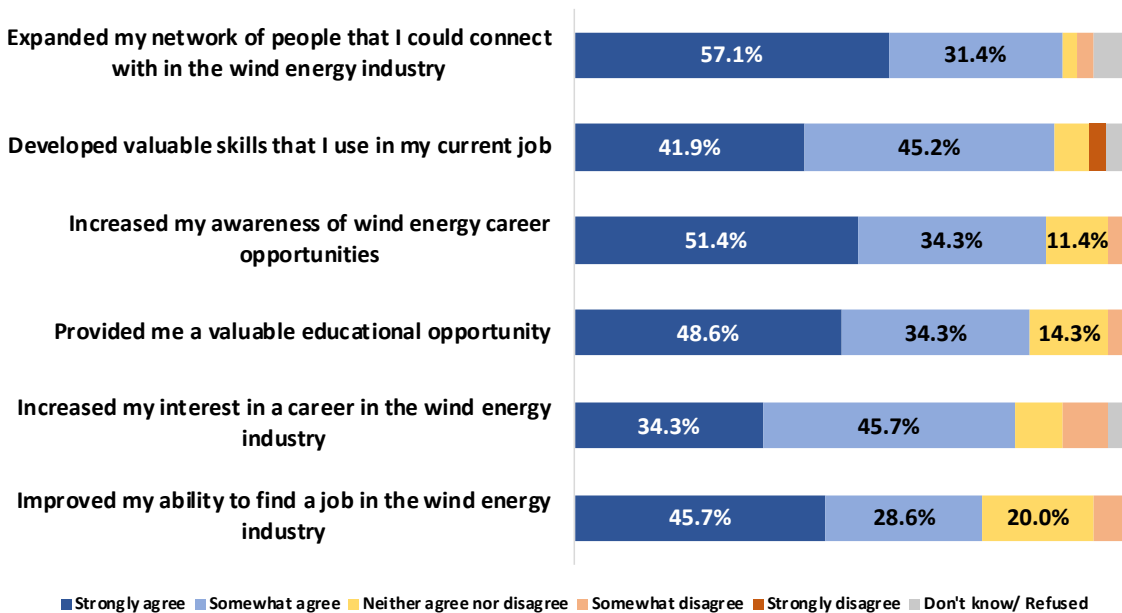
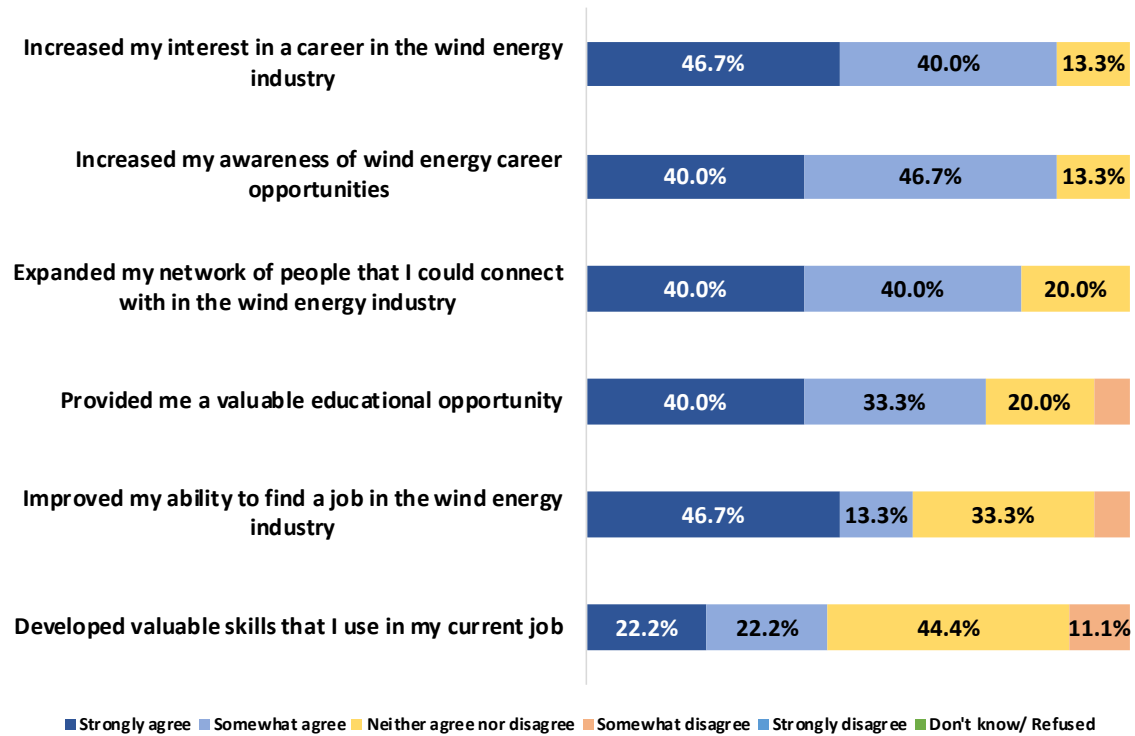
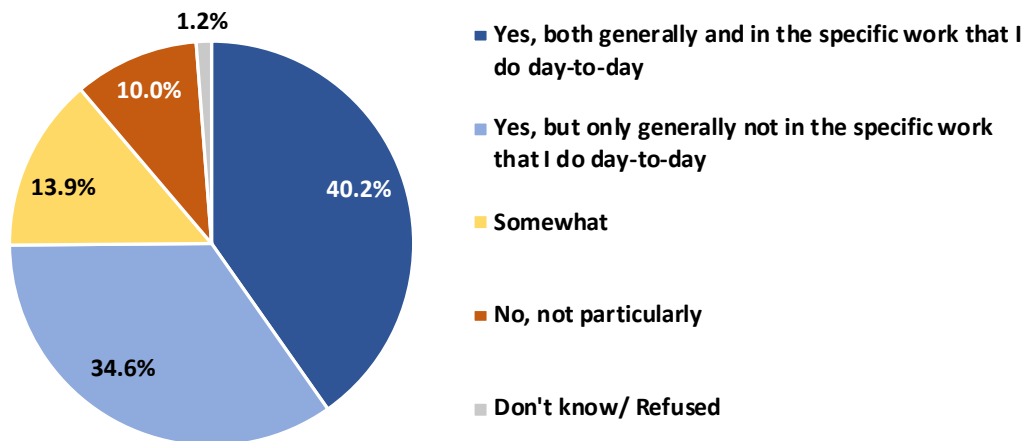


Figure 31: Agreement with Experience: Wind Application Center



Approximately forty percent (40.2%) currently employed respondents indicated that their education prepared them both generally and in the specific work that they perform day-to-day. More than a third (34.6%) felt that their education prepared them generally but not for the specific work that they do day-to-day. One-in-ten respondents felt that their education did not prepare them for their current job.

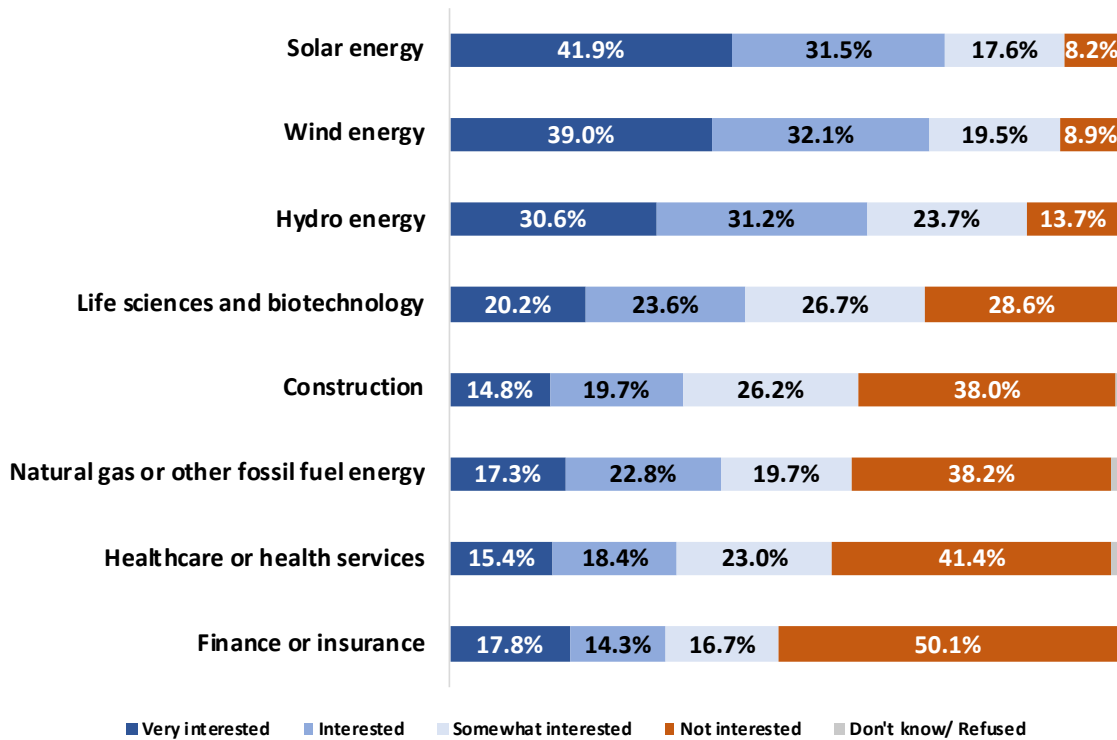
Figure 32: Did Their Education Prepare Them for Work They Are Doing Today?



4. INDUSTRY & EMPLOYMENT PRIORITIES OF CURRENT & POTENTIAL WIND ENERGY EMPLOYEES

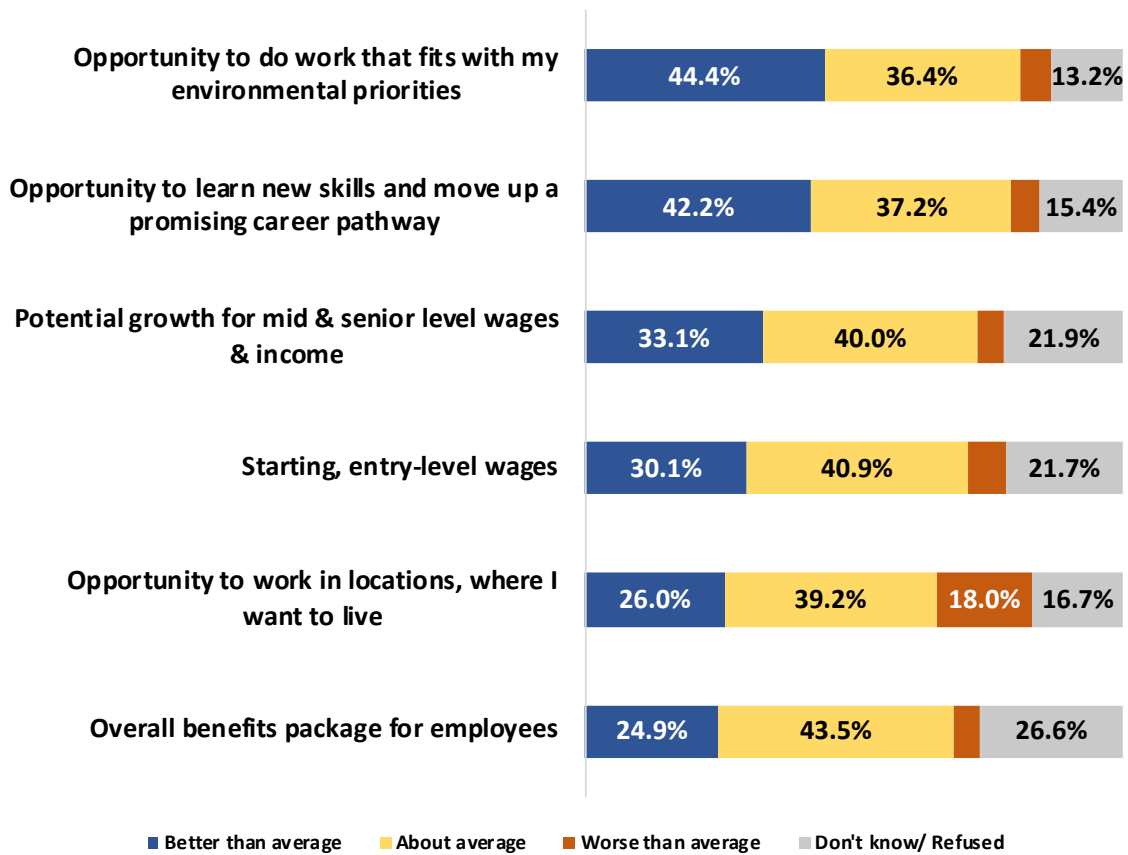
When tested against other industry sectors, total interest in building a career in wind energy (90.5%) was nearly identical to solar energy (91.1%) at the top of the list. Those respondents that indicated they were “very interested” in wind energy trailed only solar energy (39.0% vs. 41.9% respectively).

Figure 33: Interest in Building a Career in Different Industries



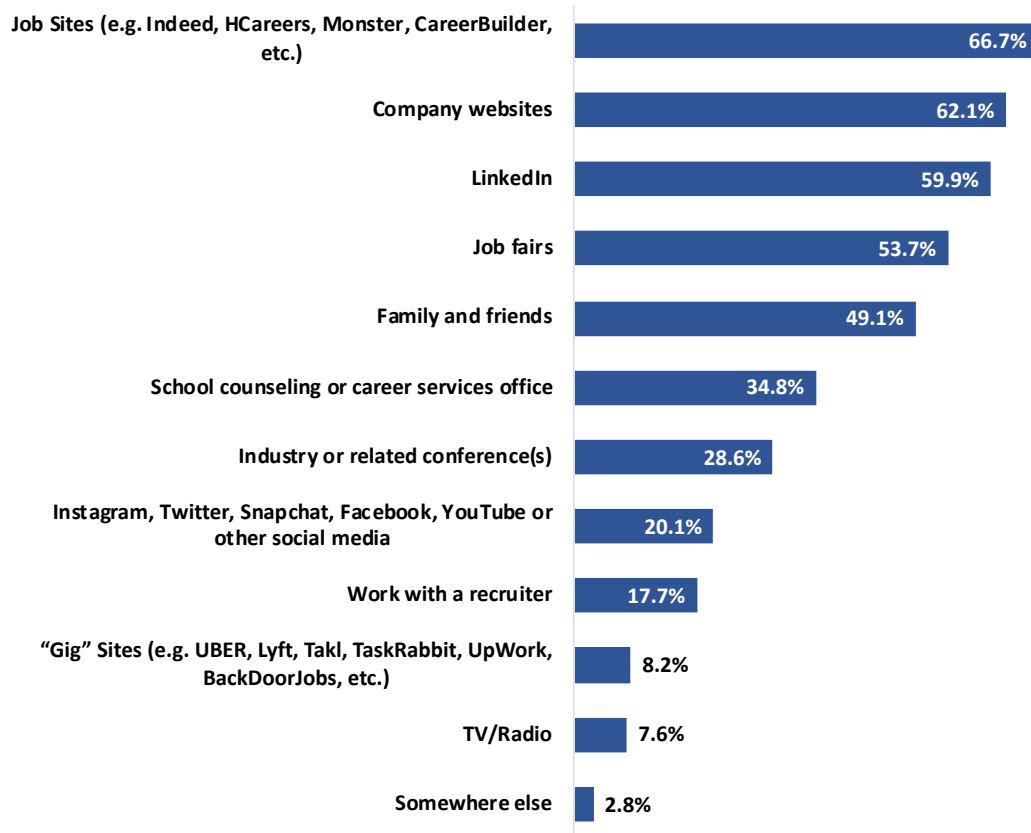
More than two-fifths of all respondents felt that the “opportunity to do work that fits with my environmental priorities” (44.4%) and the “opportunity to learn new skills and move up a promising career pathway” (42.2%) were better than average in the wind industry. Eighteen percent of survey respondents felt that the “opportunity to work in locations, where I want to live” was worse than average.

Figure 34: Perceptions About Different Attributes of Employment in Relation to the Wind Energy Industry



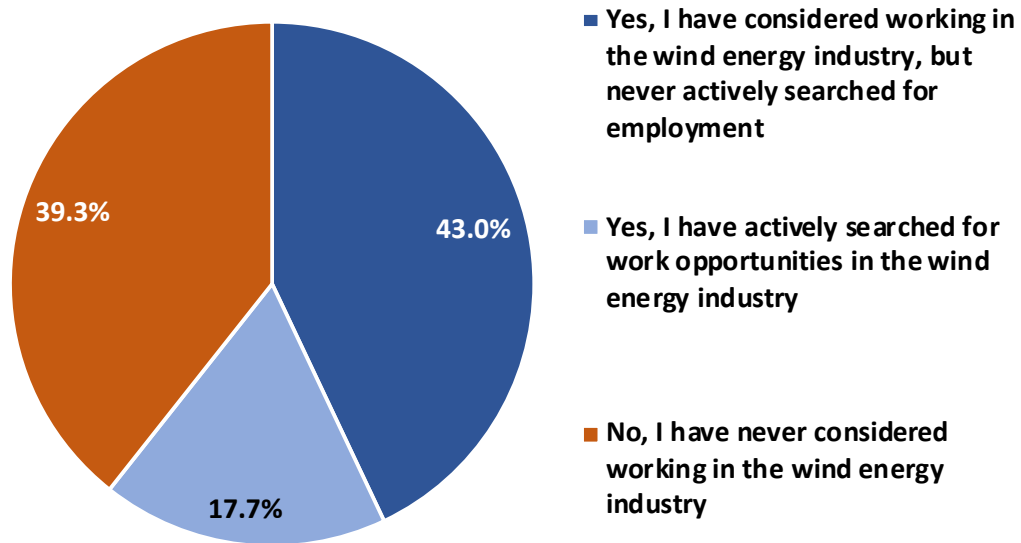
When searching for jobs, the majority of all respondents reported using general online job sites, such as Indeed or Monster (66.7%), company websites (62.1%), LinkedIn (59.9%), and job fairs (53.7%).

Figure 35: Job Search Channels



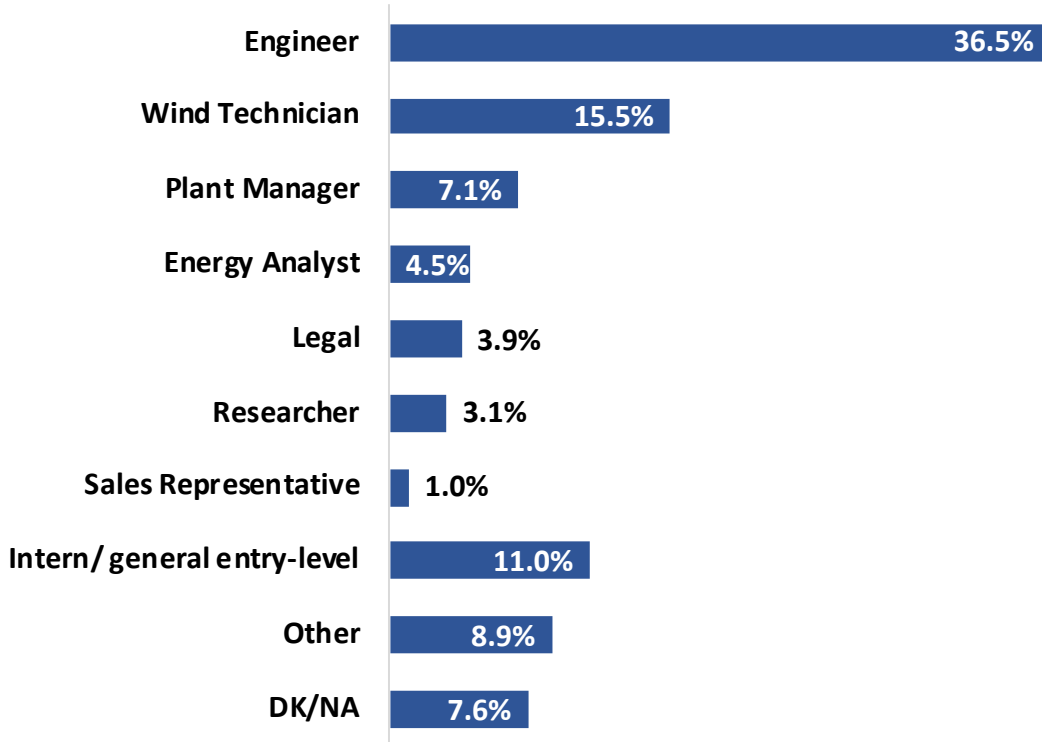
Among respondents that did not currently have a career in the wind energy industry, 17.7% reported that they had actively searched for work opportunities in the wind energy industry, while 43.0% indicated that they had considered working in the industry, but had not actively searched for employment. Just under forty percent (39.3%) had never considered working in the wind energy industry.

Figure 36: Considered and/or Looked for Employment in the Wind Energy Industry



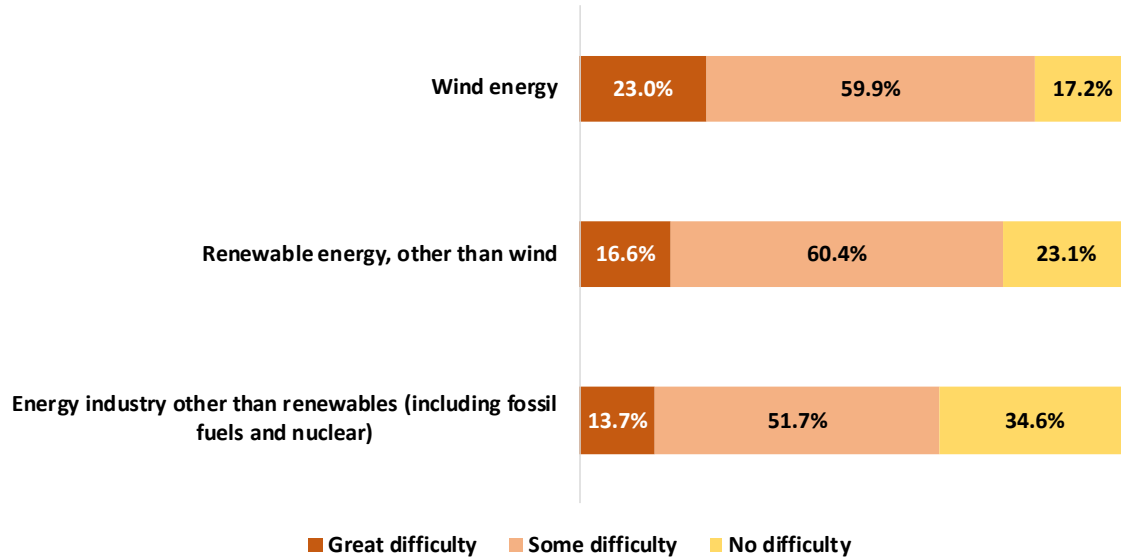
Of the respondents that had actively searched for a job in wind energy, more than a third considered an engineering position (36.5%) while more than one-in-seven considered a job as a wind technician.

Figure 37: Positions Considered Within the Wind Energy Industry



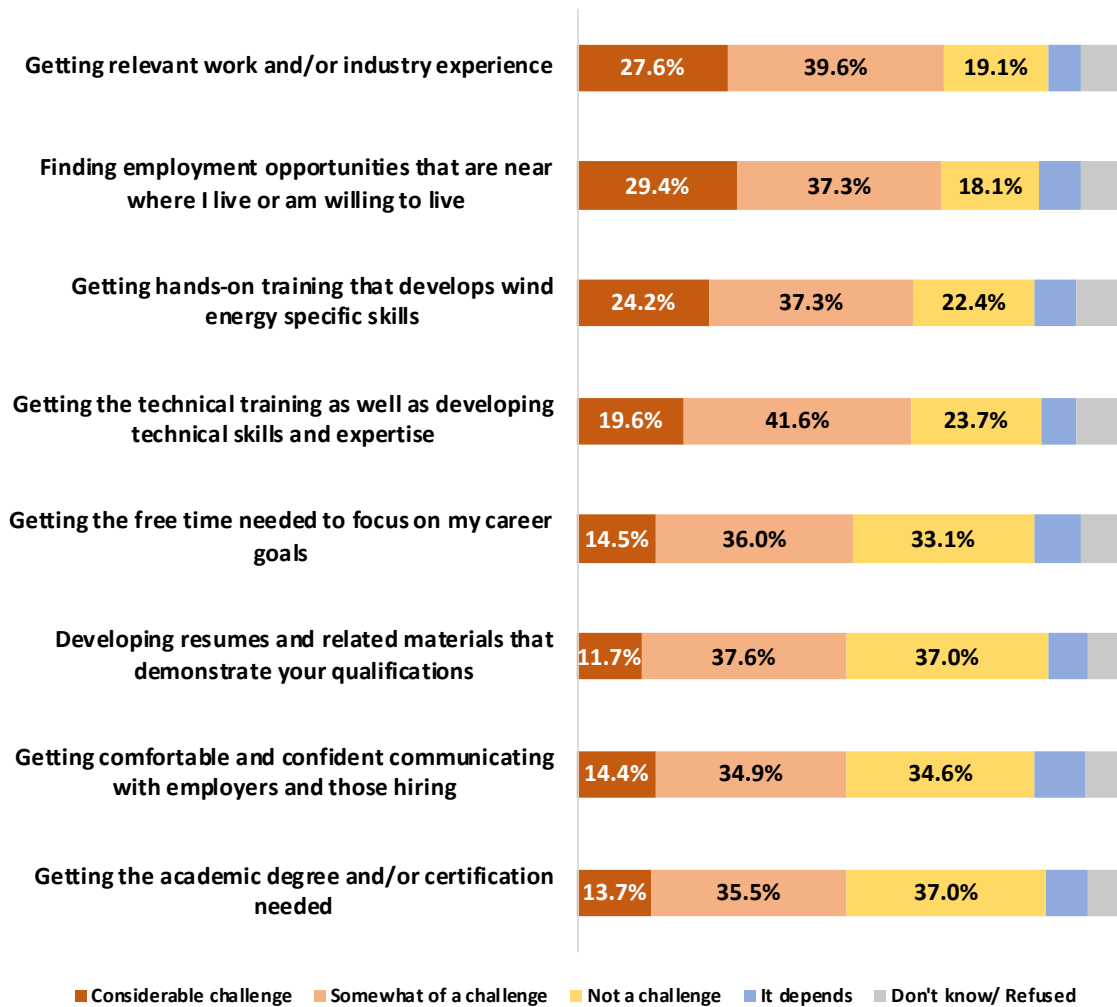
Of respondents to the survey that had experience finding employment opportunities in various energy industry sectors, those that had searched for a career in wind energy reported the highest overall difficulty (82.8%; 23.0% “great difficulty” and 59.9% “some difficulty”).

Figure 38: Difficulty Finding Employment Opportunities by Energy Industry



The top two obstacles in terms of overall challenge for those that had actively sought out a career in the wind energy industry were “getting relevant work and/or industry experience” (67.2%; 27.6% “considerable challenge” and 39.6% “somewhat of a challenge”) and “finding employment opportunities that are near where I live or am willing to live” (66.7%; 29.4% “considerable challenge” and 37.3% “somewhat of a challenge”).

Figure 39: Challenges or Obstacles Faced Finding Relevant Work Opportunities in the Wind Energy Industry



Among all respondents to the survey, “interdisciplinary coursework covering a range of wind energy topics” garnered the most overall interest (83.1%; 39.3% “very interested” and 43.9% “somewhat interested”) among programs and courses related to wind energy.

Figure 40: Interest in Programs and Courses Related to the Wind Energy Industry

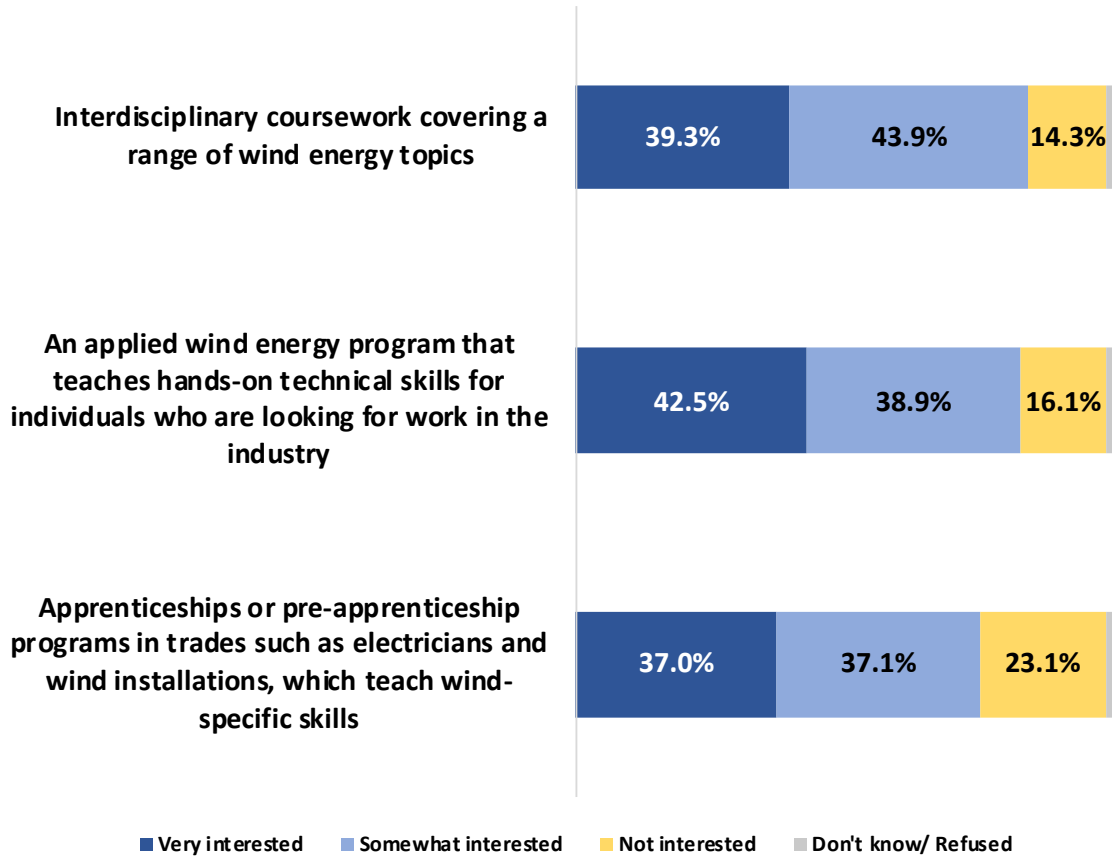
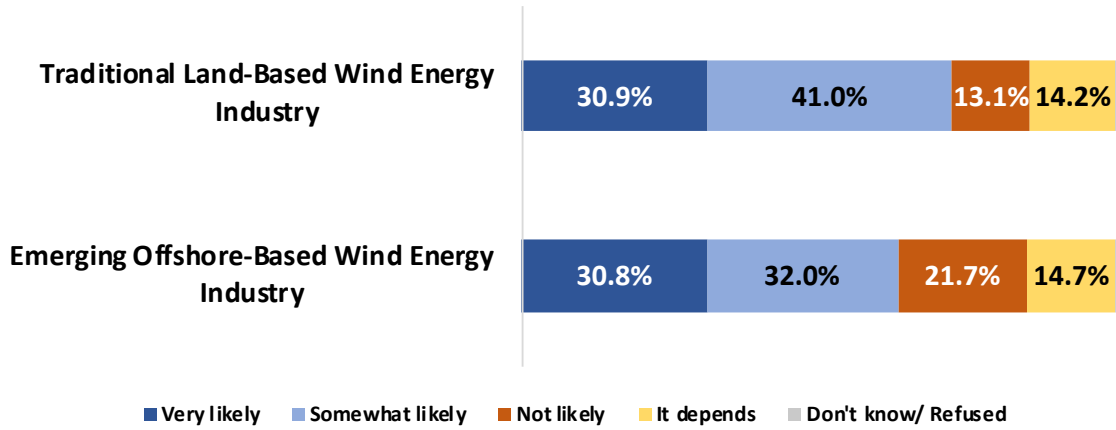


Figure 41: Likelihood of Applying to an Open Position in the Wind Energy Industry



PART III: GAPS & OPPORTUNITIES FOR WIND ENERGY TRAINING & EDUCATION & OUTREACH

This component of the research synthesizes the findings from wind energy employers as well as current and potential employees to better understand the challenges and opportunities for wind energy workforce development. The research in this part is delineated into the following three sections:

1. **Wind Energy Employment:** This section examines how employers and employees, both current and potential, perceive employment in the wind energy industry and the challenges and opportunities it creates for the workforce pipeline.
2. **Wind Energy Training & Education:** This section analyzes the role education and training has had on the wind energy workforce and how those perceptions could impact the industry's ability to develop a productive workforce in the future.
3. **Wind Energy Industry Perceptions:** This section investigates how current and potential employees perceive the wind energy industry and how that could impact employer's ability to find, recruit, and develop workers in the future.

WIND ENERGY EMPLOYMENT

Almost two-thirds of wind energy employers indicated they had great or some difficulty finding qualified job applicants, whether they were looking for entry-level (64% indicated great or some difficulty) or non-entry-level (66% indicated great or some difficulty) positions. BW Research has completed numerous workforce survey research efforts with employers and we interpret results in an industry or region where over 50 percent of employers indicate at least some difficulty finding qualified applicants as an initial indicator of a challenging workforce environment and anything over 60 percent is a more prominent immediate barrier for employment growth. Recent survey results from other employers from other industries (such as healthcare, biotechnology, nuclear power, and digital entertainment and media), have shown employer difficulty finding qualified applicants ranging between 35 and 70 percent. The difficulty employers indicated finding qualified applicants in the 2020 wind energy workforce survey are noteworthy for the following reasons:

- ***A broad spectrum of workforce challenges according to employers:*** Employers indicated relatively high levels of difficulty finding both entry-level and non-entry-level employees. Sixty percent or more of wind energy employers from manufacturing (81% difficulty¹⁴), construction (71% difficulty), and research and development (68% difficulty) indicated difficulty finding qualified applicants. Employers also indicated that applicants often did not have the right training and education and/or industry experience. The difficulty finding qualified job applicants for the wind energy workforce was not specific to a single type of employer or a deficiency in a single type of job applicant but appears

¹⁴ Difficulty percentages are combined entry-level and non-entry-level for each industry sector.

to be a broader challenge with workforce needs for most employers in most wind energy industries.

- **Larger employers are having more difficulty finding qualified wind energy workers than their smaller counterparts:** Over 80 percent of wind energy employers with more than 10 employees indicated they had difficulty finding qualified applicants, approximately 30 percent higher than those smaller firms with less than 10 employees. Larger employers (with more employees), will often have deeper and more specialized workforce needs and will often have more hiring requirements than their smaller counterparts.
- **Most current and potential workers are interested in building a career in Wind Energy:** Over 70 percent of current and potential workers indicated they were either very interested or at least interested in a wind energy career; this was the highest of the eight industries tested, except for solar energy, which was within a percentage point or two. An additional 20 percent indicated they were somewhat interested in a career in wind energy and only nine percent of current and potential workers that participated in the survey indicated they were not interested in a career in wind energy. The overall level of interest in a career in wind or solar energy was considerably higher than comparable industries, such as life sciences or biotechnology (44% very interested or interested), natural gas or other fossil fuel energy (40% very interested or interested) or construction (34% very interested or interested).
- **Current and potential workers who searched for employment in the wind energy industry indicated difficulty finding opportunities:** Eighty-three percent of current and potential workers who had experience looking for employment opportunities in the wind energy industry indicated they had either great difficulty or at least some difficulty finding those opportunities. This was a higher level of difficulty for finding employment opportunities when compared to renewable energy, other than wind (77% difficulty) or the energy industry other than renewables (66% difficulty).

These results indicate that the pipeline for the wind energy workforce could be expanded to increase both the quantity and the depth of training and education of workers that are being developed for the wind energy industry. The results also show that students and job-seekers are likely willing to develop their education and skills for employment and a career in wind energy but also need assistance connecting to wind energy employers, which should facilitate expanding the wind energy workforce pipeline.

WIND ENERGY TRAINING & EDUCATION

Current students who were defined for this research as a current or potential employee are largely satisfied with their current area of study. Over 90% indicated satisfaction (either very or somewhat) with their primary area of study.

This group of current students and can be split into the following three categories:

- **Currently working in the wind energy industry and going to school**– This category includes those individuals that are working full-time or part-time in wind energy related work and going to school.
- **Experience with courses, classes, or programs in wind energy** – This category includes those students that are not working in wind energy related work but have taken or are participating in wind energy courses, classes, or programs.
- **No experience with courses, classes, or programs in wind energy** – This category includes those students that are not working in wind energy related work *and* have not taken or participated in any wind energy courses, classes, or programs.

When we examined the results of the current and potential employees survey by these three groups, two important trends emerged. ***First, students that are working in wind energy or at least have some experience with wind energy courses, classes or programs are more likely to be very satisfied in their current area of study.*** Two-thirds (66%) of those students that are currently working in wind energy are “very satisfied” with their current area of study, compared to 61 percent of those that have experience with wind energy courses, classes or programs and only 55 percent of those that have no experience with wind energy courses, classes or program. ***Secondly, and potentially more important, those students that are working in wind energy or at least have experience with wind energy courses, classes or programs are more likely to indicate their education prepared them for the work they are doing today both generally and specifically.*** Approximately three out of five (59%) current students who are working in wind energy related work indicated their education prepared them both generally and specifically for the work they are doing, 38 percent of those that had experience with wind energy courses, classes and programs, indicated the same, and only 30 percent of those that did not have experience with wind energy courses, classes or programs indicated their education prepared them both generally and specifically.

These results indicate a few things, first individuals that are working in wind energy related work and going to school are largely very satisfied with what they are studying and feel their studies are preparing them for the world of work, both generally and specifically. Second, these results also indicate, even when individuals are not working in wind energy related work but have taken wind energy courses, classes or programs they have higher levels of satisfaction with their education and confidence in their preparation for the world of work, than those students that have no experience with comparable wind energy courses, classes, and programs.

WIND ENERGY INDUSTRY PERCEPTIONS

Just over nine in ten current and potential employees are at least somewhat interested in building a career in the wind industry and about two in five are very interested. These overall results indicate that among students and recent graduates at educational institutions that offer wind energy courses, classes and programs and students that are in degree or certificate programs relevant to wind energy, almost all would consider a career in the wind energy industry. This is a valuable general context to better understand some of the more specific

opportunities and challenges associated with how the wind energy industry is perceived among current and potential employees.

- ***Promising career pathways and work that aligns with environmental priorities are perceived strengths of the Wind Energy Industry:*** Over forty percent and a plurality of potential and current employees indicated that the wind energy industry was better than average as an ‘opportunity to learn new skills and move up a promising career pathway’ and as an ‘opportunity to do work that fits with my environmental priorities’. These two characteristics ranked highest for the wind industry employment opportunities of the six that were evaluated and by a ratio of approximately 8 to 1, had respondents indicate the wind industry was better than average compared to worse than average.
- ***Finding employment opportunities, getting relevant work experience, and hands-on training are all perceived challenges for potential wind energy employees:*** More than eight out of ten (83%) of current and potential employees that had experience looking for employment in the wind energy industry indicated they had difficulty finding employment opportunities. Of those that had experience looking for employment in the wind energy industry, other than the location of the work (see below), the biggest challenge of the eight issues examined were getting relevant industry experience (67% considerable or somewhat of a challenge) and getting hands-on training specific to the wind energy industry (62% considerable or somewhat of a challenge).
- ***Working or finding work in a location where you want to live could be a challenge for potential wind energy employees:*** This issue arose as both a general assessment of the wind energy industry, it was the only item of six tested, that almost one in five (18%) indicated was worse than average, when compared to other industries. It was also the issue that was identified most often as a challenge (67% either considerable or somewhat) for those that have looked for employment opportunities in the wind energy industry. Those respondents located in urban and suburban areas indicated that finding employment opportunities where they live or are willing to live is a considerable challenge (26%) at a higher rate than those that live in rural areas (19%).

These results indicate that the potential wind energy workforce is generally receptive and willing to consider employment opportunities in wind energy. There are some perceived challenges finding employment opportunities in the industry and getting the relevant experience and hands-on training needed to be successful in those employment opportunities. The results also indicate that wind energy is considered a promising employer with strong career opportunities and environmental priorities that align with most potential workers, but the location of the work could be an obstacle for a sizeable portion of the potential workforce.

METHODOLOGY

Total wind energy employment reported was provided by the 2020 United States Energy and Employment Report (USEER). State level employment was also pulled from the USEER. The 2020 USEER was produced by the Energy Futures Initiative (EFI) in partnership with the National Association of State Energy Officials (NASEO) and collected and analyzed by BW Research Partnership. Growth figures were derived using previous year estimates from USEER efforts. Overall employment comparisons were derived from public data (2019 Q2) from the Bureau of Labor Statistics.

The estimates for total enrollment and program completions by degree or training category was provided by Economic Modeling Specialists Intl. (EMSI) using Classification of Instructional Programs (CIP) data from the National Center for Education Statistics (NCES) for 2018 completions and 2019-2020 initial enrollment.

WIND EMPLOYER SURVEY

A survey was completed with the wind energy employers with locations in the United States. The audience for the employer survey included a recontact sample from the United States Energy and Employment Report (USEER) of wind energy employers (industries: utilities, construction, manufacturing, wholesale trade, professional and business services, and other services including repair and maintenance), a recontact sample from the prior National Renewable Energy Laboratory (NREL) wind energy workforce survey from 2016, a sample of American Wind Energy Association (AWEA) members, and an online panel of employers that met all screener qualifications for wind energy. The surveys were conducted between March 20, 2020 and June 3, 2020 and averaged 14 minutes in length. The combined effort was completed by 296 wind energy employers. The margin of error for responses in the report is +/- 5.69% at a 95 percent confidence interval.

CURRENT STUDENT AND RECENT GRADUATES AT PARTICIPATING INSTITUTIONS

A survey of current students or recent graduates (within the last three years) at institutions that participate in the Department of Energy's (DOE) Collegiate Wind Competition (CWC), are home to DOE's Wind Application Centers, or otherwise house wind energy programs or wind energy courses were recruited to take the survey. Students and recent graduates were contacted directly based on participant lists provided by NREL or were directed to the survey via professors or instructors that were contacted to share the survey. The survey was conducted between April 22, 2020 and May 29, 2020. The survey averaged 12 minutes in length and was completed by 563 students and recent graduates.

CURRENT STUDENTS AND RECENT GRADUATES WITH RELEVANT DEGREES

A survey of current students or recent graduates (within the last three years) at educational institutions were recruited to take the survey. Students and recent graduates were recruited

from online panels and had to meet a set of criteria (current or recent graduates for relevant degrees) in order to participate in the survey. The survey was conducted between April 22, 2020 and May 29, 2020. The survey averaged 11 minutes in length and was completed by 206 students and recent graduates.

APPENDIX A: EMPLOYER TOPLINES



NREL
Employer Survey Toplines – June 2020

Employer Survey Toplines (n=296)

.....
Introduction:

[FIRMS WITH LESS THAN 25 EMPLOYEES]

Hello, my name is _____. May I please speak to a senior manager or someone involved with staffing at [organization]?

[IF NEITHER A MANAGER OR SOMEONE WITH STAFFING IS AVAILABLE] Can I speak to a decision maker at your location?

[FIRMS WITH MORE THAN 25 EMPLOYEES]

Hello, my name is _____. May I please speak to someone involved in Human Resources or staffing at [organization]?

[IF NEITHER A MANAGER OR SOMEONE WITH STAFFING IS AVAILABLE] Can I speak to a decision maker at your location?

Hello, my name is _____ and I'm calling on behalf of the **National Renewable Energy Laboratory, or NREL**, who would value your participation in a brief survey about the nation's wind industry workforce.

Your help in this project is the best way that we can arrive at a meaningful understanding of the workforce needs of this industry.

(If needed): This survey has been commissioned by the National Renewable Energy Lab or NREL. They are trying to better understand how to support your industry.

(If needed): The survey is being conducted by BW Research, an independent research organization, and should take approximately 10 to 15 minutes of your time.

(If needed): Your individual responses will **not** be published; only aggregate information will be used in the reporting of the survey results.

~~~~~  
 **Screener Questions**

A. What is the zip code of your current location?

\_\_\_\_\_ (Accept all five-digit responses)

(Don't Read) Refused [TERMINATE]

B. Is your company involved with an activity related to the wind energy industry? We define this as being directly involved with researching, developing, producing, manufacturing, distributing or implementing components, goods or services related to wind energy.

- 100.0% Yes [CONTINUE]**
- 0.0% No [TERMINATE]**
- 0.0% Not sure [TERMINATE]**

C. Please tell me if your organization participates in each of the following wind industry segments. 1=Yes, 2=No, 3=(Don't Read) Don't know/ Refused for each.

|                                                               | <u>Yes</u>   | <u>No</u>    | <u>(Don't Read)<br/>Don't know/<br/>Refused</u> |
|---------------------------------------------------------------|--------------|--------------|-------------------------------------------------|
| <b>Manufacturing, including component parts manufacturing</b> | <b>40.5%</b> | <b>58.8%</b> | <b>0.7%</b>                                     |
| <b>Research and Development</b>                               | <b>55.4%</b> | <b>43.2%</b> | <b>1.4%</b>                                     |
| <b>Education/Training/Advocacy</b>                            | <b>47.6%</b> | <b>50.3%</b> | <b>2.0%</b>                                     |
| <b>Government/Regulatory</b>                                  | <b>31.1%</b> | <b>66.9%</b> | <b>2.0%</b>                                     |
| <b>Construction</b>                                           | <b>49.3%</b> | <b>49.3%</b> | <b>1.4%</b>                                     |
| <b>Development &amp; Siting</b>                               | <b>55.1%</b> | <b>43.6%</b> | <b>1.4%</b>                                     |
| <b>Transportation &amp; Logistics</b>                         | <b>27.7%</b> | <b>69.9%</b> | <b>2.4%</b>                                     |
| <b>Finance/Legal/Insurance</b>                                | <b>31.8%</b> | <b>65.2%</b> | <b>3.0%</b>                                     |
| <b>Operations &amp; Asset Management</b>                      | <b>49.7%</b> | <b>47.6%</b> | <b>2.7%</b>                                     |

If no to 1-9, ask:

What wind industry segment does your firm participate in?

Other (specify: \_\_\_\_\_)

[ASK SCREENER D IF MORE THAN ONE YES AT SCREENER C]

D. Which do you consider your organization's **primary** focus as it relates to the wind industry?  
[PIPE IN YES RESPONSES FROM SCREENER C, ACCEPT ONE]

- 19.6% Manufacturing, including component parts manufacturing**
- 19.6% Construction**
- 14.9% Development and siting**
- 13.2% Research and development**
- 12.5% Operations and asset management**
- 11.5% Education/Training/Advocacy**
- 4.4% Finance/Legal/Insurance**
- 2.4% Government/Regulatory**
- 1.0% Transportation and logistics**
- 1.0% Other**

[SET SDPRIME FROM SC IF SC COUNT=1, OTHERWISE SET FROM SD]

E. How many business locations does your firm have in the U.S. that conduct wind activities?

\_\_\_\_\_

- 40.9% One location**
- 25.3% 2 to 4 locations**
- 30.7% 5 or more locations**
- 3.0% Don't know/ Refused**

IF Screener E > 1 or Refused, ask Screener F

F. Do you feel comfortable answering questions about the hiring and staffing needs of all of your firm's locations or just your current location?

- 77.7% All locations**
- 22.3% Only my location**

IF Screener F = 1 , state: "For the purposes of this survey, the term "firm" shall refer to all of your U.S. business locations.

If Screener F = 2 or Screener E=1, state "For the purposes of this survey, the term "firm" shall refer to your current business location only"

If Screener F = 3, terminate

.....

## SECTION 1 – Firm Profile

For this survey, we will just be asking about the employees that work [SG1 OR SG2].

I'd like to begin by asking you a few general questions about your firm and your current employees. [EMPHASIZE OPTION 1 – ALL LOCATIONS OR OPTION 2 CURRENT LOCATION]

1. Including all full-time and part-time employees, how many **permanent** employees work at or from your business location(s) that OPTION 1/OPTION 2? [DO NOT ACCEPT 0 AS A RESPONSE] (Percentages below are for location employment DK/NA Removed n=243)

**38.5%** 1 to 4 employees  
**14.7%** 5 to 9 employees  
**15.6%** 10 to 24 employees  
**15.6%** 25 to 49 employees  
**9.6%** 50 to 99 employees  
**5.9%** 100 or more employees

2. Over the next 12 months, do you expect to increase the total numbers of workers at your business location(s), stay the same, decrease or are you not sure.

**42.6%** Grow, increase our total number of wind employees  
**44.6%** Stay the same  
**6.8%** Get smaller, decrease our total number of wind employees  
**6.1%** Not sure  
**0.0%** Don't know/ Refused

## SECTION 2 –Workforce Needs and Occupational Profile

Next, I want to ask about your firm's talent and workforce needs.

3. How many **entry-level** workers have you hired over the last 12 months, either for new positions or to replace former workers? (n=263)

**2.00** Median  
**8319.00** Sum

4. How many **non-entry-level** workers have you hired over the last 12 months, either for new positions or to replace former workers? (n=262)

2.00 Median  
7489.00 Sum

5. Please indicate the level of difficulty your firm has in finding qualified \_\_\_\_\_ applicants who meet the organization’s hiring standards. (n=293)

|                           | <u>No difficulty</u> | <u>Some difficulty</u> | <u>Great difficulty</u> | <u>(Don't Read) Don't know/ Refused</u> |
|---------------------------|----------------------|------------------------|-------------------------|-----------------------------------------|
| <b>A. Entry-level</b>     | <b>24.2%</b>         | <b>48.8%</b>           | <b>15.0%</b>            | <b>11.9%</b>                            |
| <b>B. Non entry-level</b> | <b>23.5%</b>         | <b>43.3%</b>           | <b>22.2%</b>            | <b>10.9%</b>                            |

IF Q5A OR B = 2 or 3 ask Q6, otherwise SKIP

[ASK FOR Q5A AND Q5B SEPARATELY IF Q5 =’s 2 OR 3]

6. Please select the statement which best describes the reason for your difficulty finding qualified \_[ENTRY-LEVEL AND/OR NON]\_ job applicants. [SELECT ONE] [IF NEEDED: Please choose the statement that is most relevant regarding the difficulty you have had finding qualified job applicants the last 12 months]

|                                   | <u>There are not enough applicants for the positions</u> | <u>Job boards and placement services are not working well, in providing qualified applicants</u> | <u>There are enough applicants, but too many do not have the training or education needed for the job</u> | <u>There are enough applicants, but too many applicants do not have the experience needed for the job</u> | <u>There are enough qualified applicants, but they are unwilling to work for the wages we pay</u> | <u>Other</u> | <u>It completely depends on the position or occupation</u> |
|-----------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------|------------------------------------------------------------|
| <b>A. Entry-level (n=185)</b>     | <b>22.7%</b>                                             | <b>8.6%</b>                                                                                      | <b>29.7%</b>                                                                                              | <b>27.6%</b>                                                                                              | <b>5.9%</b>                                                                                       | <b>1.1%</b>  | <b>4.3%</b>                                                |
| <b>B. Non entry-level (n=191)</b> | <b>22.5%</b>                                             | <b>9.4%</b>                                                                                      | <b>20.4%</b>                                                                                              | <b>33.0%</b>                                                                                              | <b>6.3%</b>                                                                                       | <b>1.6%</b>  | <b>6.8%</b>                                                |

7. Thinking about the different types of *entry-level* positions that work in the **wind energy portions of your business**, do any of these individuals need or benefit from the following skills sets or educational certifications, and if so are they required or preferred? (n=290)

RANDOMIZE

|                                                                                           | <u>Required</u> | <u>Preferred</u> | <u>Neither required nor preferred</u> | <u>(Don't Read) Don't know/Refused</u> |
|-------------------------------------------------------------------------------------------|-----------------|------------------|---------------------------------------|----------------------------------------|
| <b>A. Wind Energy specific training (including courses, workshops, conferences, etc.)</b> | 30.0%           | 47.9%            | 15.9%                                 | 6.2%                                   |
| <b>B. Strong grades</b>                                                                   | 20.7%           | 56.2%            | 18.6%                                 | 4.5%                                   |
| <b>C. Strong writing skills</b>                                                           | 36.9%           | 43.8%            | 14.5%                                 | 4.8%                                   |
| <b>D. College degree relevant to Wind Energy</b>                                          | 22.8%           | 40.0%            | 31.4%                                 | 5.9%                                   |
| <b>E. Previous experience (internship or apprenticeship) with Wind Energy focus</b>       | 19.0%           | 59.3%            | 16.9%                                 | 4.8%                                   |
| <b>F. Strong interpersonal skills (soft skills)</b>                                       | 42.4%           | 47.2%            | 5.5%                                  | 4.8%                                   |

**NOTE - PLEASE COMMUNICATE TO RESPONDENT THAT WE WILL BE USING GENERAL OCCUPATIONAL TITLES RATHER THAN SPECIFIC JOB TITLES THAT MAY BE USED WITHIN EACH ORGANIZATION]**

The next section of the survey will ask about the occupations within your organization. The occupational titles we are using may differ from the specific position titles used in your organization. For these questions, please try to equate your organization's specific position titles with the more general ones we will use here.

Please only assign one occupation to each employee. If they fall into more than one category, please assign them to the occupation in which they devote more of their time.

8. Please tell me if your firm employs individuals in positions matching the following general occupational titles: (1 = Yes, 2 = No, 3 =DK/NA)

\*\*\*Occupations are listed in order of priority - ask occupations in order of priority 1-25\*\*\*

|                                                                  | <u>Yes</u> | <u>No</u> | <u>(Don't Read) Don't know/Refused</u> |
|------------------------------------------------------------------|------------|-----------|----------------------------------------|
| <b>1. Professors &amp; teachers (n=70)</b>                       | 54.3%      | 45.7%     | 0.0%                                   |
| <b>2. Product designers &amp; design engineers (n=96)</b>        | 71.9%      | 26.0%     | 2.1%                                   |
| <b>3. Wind technicians (n=35)</b>                                | 62.9%      | 37.1%     | 0.0%                                   |
| <b>4. Professional trainers &amp; industry educators (n=125)</b> | 46.4%      | 52.0%     | 1.6%                                   |
| <b>5. Trade workers (electricians, welders) (n=183)</b>          | 58.5%      | 40.4%     | 1.1%                                   |
| <b>6. Developer (n=43)</b>                                       | 58.1%      | 41.9%     | 0.0%                                   |
| <b>7. Engineer – Civil (n=235)</b>                               | 48.9%      | 48.9%     | 2.1%                                   |
| <b>8. Engineer – Electrical or Mechanical (n=235)</b>            | 66.4%      | 30.6%     | 3.0%                                   |

|                                                                                                                  |       |       |      |
|------------------------------------------------------------------------------------------------------------------|-------|-------|------|
| 9. Engineer – Power Systems/ Transmission (n=235)                                                                | 48.9% | 47.2% | 3.8% |
| 10. Engineer - Other (n=235)                                                                                     | 52.3% | 44.3% | 3.4% |
| 11. Economists and Policy Experts (Government relations) (n=190)                                                 | 36.8% | 57.4% | 5.8% |
| 12. Applied/field scientists (break down: Biologist, Environmental, Archaeologist, Meteorologist, Other) (n=174) | 40.8% | 55.7% | 3.4% |
| 13. Research scientists and research engineers (n=134)                                                           | 56.7% | 39.6% | 3.7% |
| 14. Programmers and computer scientists (n=286)                                                                  | 41.3% | 55.6% | 3.1% |
| 15. Attorneys (n=286)                                                                                            | 33.2% | 63.6% | 3.1% |
| 16. Transportation/logistics workers (n=116)                                                                     | 45.7% | 49.1% | 5.2% |
| 17. Resource assessors & surveyors (n=81)                                                                        | 38.3% | 53.1% | 8.6% |
| 18. Construction laborers (other than skilled trade workers) (n=55)                                              | 72.7% | 25.5% | 1.8% |
| 19. Sales/Marketing (n=286)                                                                                      | 45.8% | 49.7% | 4.5% |
| 20. Communications/PR (n=286)                                                                                    | 39.9% | 55.9% | 4.2% |
| 21. Admin/clerical (n=286)                                                                                       | 54.2% | 43.4% | 2.4% |
| 22. Paralegals (n=283)                                                                                           | 38.5% | 61.5% | 0.0% |
| 23. Government employees - regulatory workers (n=89)                                                             | 28.1% | 66.3% | 5.6% |
| 24. Accountants/bookkeepers/finance (n=286)                                                                      | 50.3% | 46.2% | 3.5% |
| 25. Assembly workers (n=58)                                                                                      | 55.2% | 43.1% | 1.7% |

9. Thinking of the [PIPE IN Q1] total permanent employees at your business location(s), how many are employed in the following occupational titles?

[PIPE IN “YES” RESPONSES FROM Q8]

|                                                                                                                 | <u>Median</u> |
|-----------------------------------------------------------------------------------------------------------------|---------------|
| 1. Professors & teachers (n=32)                                                                                 | 3.00          |
| 2. Product designers & design engineers (n=55)                                                                  | 6.00          |
| 3. Wind technicians (n=19)                                                                                      | 5.00          |
| 4. Professional trainers & industry educators (n=46)                                                            | 4.00          |
| 5. Trade workers (electricians, welders) (n=87)                                                                 | 8.00          |
| 6. Developer (n=21)                                                                                             | 1.00          |
| 7. Engineer – Civil (n=92)                                                                                      | 5.00          |
| 8. Engineer – Electrical or Mechanical (n=128)                                                                  | 3.00          |
| 9. Engineer – Power Systems/ Transmission (n=91)                                                                | 2.00          |
| 10. Engineer - Other (n=108)                                                                                    | 1.50          |
| 11. Economists and Policy Experts (Government relations) (n=59)                                                 | 1.00          |
| 12. Applied/field scientists (break down: Biologist, Environmental, Archaeologist, Meteorologist, Other) (n=61) | 3.00          |
| 13. Research scientists and research engineers (n=61)                                                           | 4.00          |
| 14. Programmers and computer scientists (n=94)                                                                  | 4.00          |
| 15. Attorneys (n=75)                                                                                            | 2.00          |
| 16. Transportation/logistics workers (n=41)                                                                     | 5.00          |
| 17. Resource assessors & surveyors (n=23)                                                                       | 3.00          |



|                                                                     |       |
|---------------------------------------------------------------------|-------|
| 18. Construction laborers (other than skilled trade workers) (n=36) | 10.50 |
| 19. Sales/Marketing (n=112)                                         | 2.00  |
| 20. Communications/PR (n=91)                                        | 1.00  |
| 21. Admin/clerical (n=131)                                          | 2.00  |
| 22. Paralegals (n=5)                                                | 3.00  |
| 23. Government employees - regulatory workers (n=20)                | 2.00  |
| 24. Accountants/bookkeepers/finance (n=120)                         | 2.00  |
| 25. Assembly workers (n=26)                                         | 10.00 |

[IF Q9\_5>0 (trade workers), ASK Q10]

10. What types of trade workers and specialists do you have at your company? Please include the number of each type that you have at your company. (Multiple Response)

|                                                      | <u>Median</u> |
|------------------------------------------------------|---------------|
| 1. Electricians (n=64)                               | 4.00          |
| 2. Plumbers and pipefitters (n=60)                   | 1.00          |
| 3. Iron and steel workers (n=61)                     | 4.00          |
| 4. Carpenters (n=61)                                 | 1.00          |
| 5. Sheet metal workers (n=61)                        | 1.00          |
| 6. Machinists (n=60)                                 | 2.00          |
| 7. Computer controlled machine tool operators (n=58) | 1.00          |
| 8. Welders (n=62)                                    | 2.50          |
| 9. Construction equipment operators (n=61)           | 3.00          |
| 10. Masons                                           | -             |
| 11. Other                                            | -             |

11. Does your firm provide in-house training courses or programs that are specific to wind energy related work? (n=278)

- 62.6% Yes
- 33.1% No
- 4.3% Not sure

(ASK Q12 & Q13 IF Q8=1-4, 6-15, 17, 19, 20, or 22-24)

12. Has your firm hired or considered hiring applicants for wind-energy positions who have received education or industry experience outside of the United States for your U.S.-based wind positions? (n=265)

- 42.3%** Yes, we have hired individuals with experience or education outside the US
- 22.6%** Yes, we have considered but not hired individuals with experience or education outside the US
- 30.2%** No, we have not hired or considered individuals with experience or education outside the US
- 4.9%** Don't know/ Refused

[IF Q12= "Yes, we have hired individuals with experience or education outside the US", ask Q13 otherwise SKIP to Q14]

13. What is the primary advantage or advantages of hiring individuals for wind-energy positions with experience or education outside the US? (DO NOT READ, RECORD UP TO TWO RESPONSES) (n=113)

- 25.7%** Experience
- 20.4%** Diversity/Unique perspectives
- 12.4%** Work ethic/Culture
- 8.0%** Training/Education
- 7.1%** No Advantage
- 6.2%** Availability/Convenience
- 4.4%** Language
- 2.7%** Firm works internationally
- 20.4%** Other

#### SECTION 4 - Employer Hiring Priorities

Next, I want to ask you about your hiring priorities and your employment needs

14. How satisfied are you with the US (IF NEEDED UNITED STATES) educational institutions and universities focused on preparing people to work in the wind industry and their ability to provide qualified workers for your firm? (n=276)

- 27.5%** Very satisfied
- 45.3%** Somewhat satisfied
- 12.7%** Somewhat dissatisfied

- 5.1% **Very dissatisfied**
- 9.4% **Don't know/ Refused**

15. Has your firm worked with or contacted any U.S. universities, colleges, community colleges, technical schools, or other educational institutions about finding or developing qualified job candidates at your firm? If yes, could you specify the institution or institutions you have worked with or contacted? (n=276)

- 36.6% **Yes (Specify) – Verbatim responses to be provided**
- 53.6% **No**
- 9.8% **Not sure**

Next, I want to ask a few quick questions about the resources, programs and institutions that are focused on training and developing people to work in the wind energy industry.

16. Please tell me if you think the following resources, programs or institutions in the U.S. are a strength of the nation’s wind energy industry, a weakness, neither or something you have not heard of or have any experience with.

Are \_\_\_\_\_ a strength, a weakness, neither a strength nor weakness or are you not aware of them in the U.S. wind energy industry? (n=274)

RANDOMIZE

|                                                                                               | <u>Strength</u> | <u>Neither strength nor weakness</u> | <u>Weakness</u> | <u>Not aware of or experienced</u> |
|-----------------------------------------------------------------------------------------------|-----------------|--------------------------------------|-----------------|------------------------------------|
| <b>A. Collegiate Wind Competitions or CWC's</b>                                               | 40.1%           | 27.0%                                | 8.4%            | 24.5%                              |
| <b>B. U.S. Universities focused on applied engineering in wind energy</b>                     | 55.8%           | 20.4%                                | 10.2%           | 13.5%                              |
| <b>C. U.S. Colleges and trade schools focused on developing wind technicians</b>              | 57.7%           | 22.6%                                | 8.8%            | 10.9%                              |
| <b>D. Access to talent and a skilled workforce</b>                                            | 55.5%           | 24.5%                                | 12.4%           | 7.7%                               |
| <b>E. Firms and organizations that are doing wind-energy related research and development</b> | 62.8%           | 23.7%                                | 6.2%            | 7.3%                               |

## SECTION 5 - Employer Hiring Priorities

Next, I want to ask you about where you look to recruit and find qualified job applicants.

17. As I read each of the following programs or resources, please tell me whether your firm uses the following programs or resources to find qualified job applicants.  
(n=273)

RANDOMIZE

|                                                                              | <u>Regularly</u> | <u>Sometimes</u> | <u>Rarely</u> | <u>Never</u> |
|------------------------------------------------------------------------------|------------------|------------------|---------------|--------------|
| A. Career fairs                                                              | 24.5%            | 26.4%            | 20.1%         | 28.9%        |
| B. Internships within your firm                                              | 38.5%            | 35.2%            | 10.3%         | 16.1%        |
| C. Online hiring websites (Indeed, CareerBuilder, etc.)                      | 38.8%            | 31.1%            | 14.7%         | 15.4%        |
| D. Apprenticeships and related union training programs                       | 23.1%            | 22.0%            | 12.5%         | 42.5%        |
| E. Working directly with educational institutions and hiring their graduates | 28.2%            | 35.2%            | 17.2%         | 19.4%        |
| F. Recruit workers from outside the U.S.                                     | 17.6%            | 23.4%            | 23.8%         | 35.2%        |

SECTION 6 - Revenue & Permission Questions

Before we finish, we have a few questions for comparison purposes.

18. Approximately how much of your firm's work, in terms of total revenue, is related to wind energy products or services? (n=273)

- 16.8% All of it (100%)
- 37.7% Half to most of it (50% to 99%)
- 16.1% A quarter but less than half of it (25% to 49%)
- 27.5% Less than a quarter (1% to 24%)

19. Are you interested in receiving future information about the findings of this research? (n=273)

- 66.3% Yes
- 33.7% No

20. Would you be willing to be contacted by educators and researchers to participate in a follow-up interview regarding this research? (n=272)

- 47.1% Yes
- 52.9% No

**Thank you for completing the survey. Since it sometimes becomes necessary for the project manager to confirm responses for certain questions, please verify your contact information.**

**(Web only) This information will also be used to ensure that we do not call you as part of our telephone survey effort for this project.**

- A. First and Last Name \_\_\_\_\_
- B. Position \_\_\_\_\_
- C. Phone \_\_\_\_\_
- D. Email \_\_\_\_\_
- E. Firm Name \_\_\_\_\_
- F. Firm Address \_\_\_\_\_
- G. Firm City \_\_\_\_\_
- H. Firm State \_\_\_\_\_
- J. Firm Zip \_\_\_\_\_

**Those are all of the questions we have for you. Thank you very much for participating!**

First Name of Respondent \_\_\_\_\_

Date of Interview \_\_\_\_\_

Name of Interviewer \_\_\_\_\_

Time of Interview \_\_\_\_\_

Type of Interview

- 1 Online Panel
- 2 Online email-invite
- 3 Phone

## APPENDIX B: CURRENT STUDENT & RECENT GRADUATE TOPLINES

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NREL  
Supply-Side Survey  
June 2020

### Supply-Side Survey (Year 1) Preliminary Toplines (n=769)

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#### Introduction:

Hello, may I please speak to \_\_\_\_\_. (IF NAME KNOWN)

Hi, my name is \_\_\_\_\_ and I'm with an independent research firm calling on behalf of **NREL or the National Renewable Energy Laboratory** to conduct a survey on how to better understand the needs of students and job-seekers.

(If needed): This should only take a few minutes of your time.

(If needed): I assure you that we are an independent research agency and that all of your responses will remain strictly confidential.

(If needed): This is a study about issues of importance in your community – it is a survey only and we are not selling anything.

(If needed): This survey should only take a few minutes of your time.

(If the individual mentions the national do not call list, respond according to American Marketing Association guidelines): "Most types of opinion and marketing research studies are exempt under the law that congress recently passed. That law was passed to regulate the activities of the telemarketing industry. This is a legitimate research call. Your opinions count!")

.....

#### Screener Questions

SA. What is the zip code of your current residence? (n=769)

- 100.0% Enter zip code
- 0.0% Don't Know/ Refused [TERMINATE]

SB. In what year were you born\_\_\_\_\_? (n=769)

- 0.5% 18 to 21 years old
- 28.7% 22 to 25 years old
- 43.4% 26 to 35 years old
- 22.9% 36 to 45 years old
- 2.9% 46 to 64 years old
- 1.0% 65 years or older
- 0.5% DK/NA

SC. Are you currently enrolled in school or taking online courses, and if so which one (school)? (n=769)

- 74.6% Yes, currently enrolled in school (Enter name of school)
- 9.4% Yes, currently taking online courses (Enter name of school or program)
- 16.0% No, not currently enrolled or taking online courses

[IF SC=1 OR 2 AND SCHOOL/PROGRAM IS LEFT BLANK PLEASE ASK]

SCA. What type of school are you enrolled in? (n=8)

- 62.5% College or community college
- 37.5% University
- 0.0% Trade school
- 0.0% Other (Specify)

SD. What is the last grade you completed in school? (n=769)

- 0.1% Less than high school
- 15.2% High school diploma or GED
- 38.9% Some college
- 10.7% Post high school certificate or Associate Degree (A.A. or A.S.)
- 20.4% Four-year Bachelor's Degree (B.A. or B.S.)
- 14.7% Graduate school (M.S., MBA, M.A., Ph.D, M.D., J.D....)

[IF SD=5 OR 6 ASK SE OTHERWISE SKIP]

SE. When did you complete your last degree? (n=272)

- 51.1% In the last 12 months
- 32.7% More than 12 months ago up to 3 years ago
- 15.8% More than 3 years ago

0.4% Don't know/ Refused

.....

## I. Employment Profile (BASELINE & TRACKER)

Now, I would like to ask you about work.

1. Are you currently working, either part-time or full-time for pay? (n=769)

28.7% Yes, full-time

26.0% Yes, part-time

17.7% I have recently stopped working or have been furloughed because of regulations or decreased business associated with COVID-19

27.6% No

[IF Q1=1, 2 OR 3 ASK Q2 OTHERWISE SKIP TO Q0]

2. Which industry do you or did you primarily work in? (n=544)

18.0% Wholesale and Retail Trade

13.2% Professional and Business Services

10.7% Education and Health Services

9.9% Information

7.5% Energy industry other than Renewables

6.4% Renewable energy industry other than wind

5.9% Other Services

5.5% Leisure and Hospitality

4.8% Manufacturing

4.4% Construction

3.5% Government or Public Sector

3.1% Wind Energy

2.6% Transportation

2.2% Financial Activities

1.3% Natural Resources and Mining

0.9% Municipal Utility

0.0% DK/NA

3. Now, I want to ask you specifically about the work you do (IF Q1=3 REPLACE "DO" WITH "DID") on a day to day basis. Does your job include work in the following energy industries? (n=550)



|                                                       | <u>Yes</u>   | <u>No</u>    | <u>Don't know/Refused</u> |
|-------------------------------------------------------|--------------|--------------|---------------------------|
| <b>A. Wind energy industry</b>                        | <b>21.5%</b> | <b>73.5%</b> | <b>5.1%</b>               |
| <b>B. Renewable energy industry other than wind</b>   | <b>27.8%</b> | <b>67.5%</b> | <b>4.7%</b>               |
| <b>C. Energy industry other than renewable energy</b> | <b>30.0%</b> | <b>64.5%</b> | <b>5.5%</b>               |

4. Which of the following descriptions is closest to your current job and the opportunities for growth? (n=549)

- 53.7% **Entry-level position**
- 28.8% **Mid-level position**
- 6.6% **Senior or other high-level position**
- 7.3% **Other (Specify)**
- 3.6% **Don't know/ Refused**

5. What is your occupation or positional title? (n=542)

- 15.5% **Associate/Cashier/Server**
- 14.4% **Construction Worker/Tradesman**
- 13.7% **Student/Intern**
- 13.5% **Engineer**
- 12.0% **Manager/Supervisor**
- 8.1% **Researcher**
- 5.7% **Educator**
- 2.8% **Chief Executive**
- 2.0% **IT Tech**
- 0.9% **Freelancer**
- 10.0% **Other**
- 1.5% **DK/NA**

6. How satisfied are you with your current industry as a place to build a career? (n=545)

- 33.8% **Very satisfied**
- 36.3% **Somewhat satisfied**
- 10.6% **Neither satisfied nor dissatisfied**
- 9.9% **Somewhat dissatisfied**
- 7.5% **Very dissatisfied**
- 1.8% **Don't know/ Refused**

[IF Q3A="Yes" ASK Q7 OTHERWISE SKIP]

7. How long did you look for your job? (n=118)

- 19.5% Less than 1 month
- 39.0% 1 to 3 months
- 17.8% More than 3 months up to 6 months
- 13.6% More than 6 months up to 1 year
- 3.4% More than 1 year
- 6.8% Don't know/ Refused

## II. Educational Profile (BASELINE & TRACK)

Next, I would like to ask about your education and training for work.

IF SC=1 OR 2 ASK Q0 & Q0 OTHERWISE SKIP TO Q0

8. What degree are you working towards, both the area of study (for example, engineering, finance, business administration...) and the degree type (for example, a 2 year Associate degree, 4 year Bachelor's degree,..)? (n=486)

- 16.3% Computer engineering
- 16.0% Mechanical engineering
- 15.2% Finance, accounting, and/or business
- 14.6% Electrical engineering
- 9.7% Other engineering (Specify)
- 5.3% Skilled trades (such as electrician, plumber, or machinist)
- 4.3% Applied and/or field science related to wind energy
- 3.5% Civil engineering
- 2.7% Wind technician or wind turbine technician
- 12.3% Other (Specify)
  
- 61.1% Bachelor's degree or 4-year degree
- 15.0% Associate degree or 2-year degree
- 12.8% Master's and/or MBA
- 7.2% Graduate degree beyond a master's or MBA
- 3.9% Certificate or certification

9. Are you satisfied or dissatisfied with your primary area of study? (GET ANSWER, THEN ASK:) Would that be very (satisfied/dissatisfied) or somewhat (satisfied/dissatisfied)? (n=445)

- 59.8% Very satisfied
- 34.2% Somewhat satisfied
- 3.1% Neither satisfied nor dissatisfied
- 2.2% Somewhat dissatisfied
- 0.4% Very dissatisfied
- 0.2% Don't know/ Refused

10. Now, I want to ask you about different training, educational courses or competitions specific to a given industry or program.

For each of the following courses, programs or competitions, please tell me if you are or have ever participated in the program or not, or if you have never heard of it? (n=540)

**RANDOMIZE**

[FOR A-F BELOW, NOTE “Department of Energy Sponsored”]

|                                                                             | <u>Yes</u> | <u>No</u> | <u>Have not heard of</u> | <u>Don't know/ Refused</u> |
|-----------------------------------------------------------------------------|------------|-----------|--------------------------|----------------------------|
| A. Collegiate Wind Competition                                              | 21.1%      | 42.0%     | 35.4%                    | 1.5%                       |
| B. North American Wind Energy Academy                                       | 11.1%      | 48.1%     | 38.9%                    | 1.9%                       |
| C. KidWind                                                                  | 14.4%      | 40.2%     | 43.7%                    | 1.7%                       |
| D. National Energy Education Development (NEED) Curriculum                  | 12.8%      | 46.3%     | 39.3%                    | 1.7%                       |
| E. Wind for Schools                                                         | 13.3%      | 43.3%     | 41.9%                    | 1.5%                       |
| F. Wind Application Center                                                  | 11.3%      | 46.7%     | 40.0%                    | 2.0%                       |
| G. Degree program specific to wind energy                                   | 20.6%      | 56.1%     | 21.5%                    | 1.9%                       |
| H. Degree or certificate for wind technician                                | 16.3%      | 56.9%     | 25.6%                    | 1.3%                       |
| I. Courses or seminars specific to wind energy                              | 43.5%      | 36.9%     | 18.3%                    | 1.3%                       |
| J. Internship in the wind energy industry                                   | 18.9%      | 60.0%     | 20.0%                    | 1.1%                       |
| K. Internship in the renewable energy industry, other than wind energy (11) | 27.8%      | 54.3%     | 17.0%                    | 0.9%                       |

[IF Q0A-F =1 ASK 11 AS (1)

IF Q0G-I=1 ASK 11 AS (2)

IF Q0I-K = 1 ASK 11 AS (3)

[IF Q0A-K=1 ASK Q11 IF MORE THAN 1 CHOSEN WITH 1 - TAKE THE HIGHEST PRIORITY CHOSEN- PRIORITY OF THE PROGRAM IS IN PARENTHESES NEXT TO IT – THE LOWER THE NUMBER THE HIGHER THE PRIORITY.]

- (1) Department of Energy (DOE) sponsored programs
- (2) Wind energy education opportunities
- (3) Internships

11. For each of the following statements, please indicate if you agree, disagree or neither as they relate to your experience with *the Collegiate Wind Competition?* (n=87 to 114)

**RANDOMIZE**

|                                                                                        | <u>Strongly Agree</u> | <u>Somewhat Agree</u> | <u>Neither Agree nor Disagree</u> | <u>Somewhat Disagree</u> | <u>Strongly Disagree</u> | <u>Don't Know/Refused</u> |
|----------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|
| A. Increased my interest in a career in the wind energy industry                       | 44.7%                 | 35.1%                 | 16.7%                             | 2.6%                     | 0.0%                     | 0.9%                      |
| B. Improved my ability to find a job in the wind energy industry                       | 41.2%                 | 22.8%                 | 26.3%                             | 7.0%                     | 0.9%                     | 1.8%                      |
| C. Expanded my network of people that I could connect with in the wind energy industry | 38.6%                 | 37.7%                 | 14.9%                             | 6.1%                     | 1.8%                     | 0.9%                      |
| D. Developed valuable skills that I use in my current job [SKIP IF Q1=4]               | 44.8%                 | 37.9%                 | 11.5%                             | 4.6%                     | 0.0%                     | 1.1%                      |
| E. Provided me a valuable educational opportunity                                      | 65.8%                 | 21.9%                 | 8.8%                              | 2.6%                     | 0.0%                     | 0.9%                      |
| F. Increased my awareness of wind energy career opportunities                          | 50.0%                 | 34.2%                 | 8.8%                              | 4.4%                     | 1.8%                     | 0.9%                      |

For each of the following statements, please indicate if you agree, disagree or neither as they relate to your experience with *the North American Wind Energy Academy?* (n=11 to 13)

**RANDOMIZE**

|                                                                                        | <u>Strongly Agree</u> | <u>Somewhat Agree</u> | <u>Neither Agree nor Disagree</u> | <u>Somewhat Disagree</u> | <u>Strongly Disagree</u> | <u>Don't Know/Refused</u> |
|----------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|
| A. Increased my interest in a career in the wind energy industry                       | 23.1%                 | 69.2%                 | 7.7%                              | 0.0%                     | 0.0%                     | 0.0%                      |
| B. Improved my ability to find a job in the wind energy industry                       | 38.5%                 | 46.2%                 | 15.4%                             | 0.0%                     | 0.0%                     | 0.0%                      |
| C. Expanded my network of people that I could connect with in the wind energy industry | 15.4%                 | 76.9%                 | 7.7%                              | 0.0%                     | 0.0%                     | 0.0%                      |
| D. Developed valuable skills that I use in my current job [SKIP IF Q1=4]               | 36.4%                 | 18.2%                 | 27.3%                             | 9.1%                     | 0.0%                     | 9.1%                      |
| E. Provided me a valuable educational opportunity                                      | 46.2%                 | 30.8%                 | 15.4%                             | 0.0%                     | 7.7%                     | 0.0%                      |
| F. Increased my awareness of wind energy career opportunities                          | 30.8%                 | 53.8%                 | 15.4%                             | 0.0%                     | 0.0%                     | 0.0%                      |

For each of the following statements, please indicate if you agree, disagree or neither as they relate to your experience with *KidWind?* (n=7 to 13)

**RANDOMIZE**

|                                                                                        | <u>Strongly Agree</u> | <u>Somewhat Agree</u> | <u>Neither Agree nor Disagree</u> | <u>Somewhat Disagree</u> | <u>Strongly Disagree</u> | <u>Don't Know/Refused</u> |
|----------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|
| A. Increased my interest in a career in the wind energy industry                       | 30.8%                 | 38.5%                 | 15.4%                             | 15.4%                    | 0.0%                     | 0.0%                      |
| B. Improved my ability to find a job in the wind energy industry                       | 23.1%                 | 0.0%                  | 38.5%                             | 23.1%                    | 7.7%                     | 7.7%                      |
| C. Expanded my network of people that I could connect with in the wind energy industry | 38.5%                 | 15.4%                 | 38.5%                             | 7.7%                     | 0.0%                     | 0.0%                      |
| D. Developed valuable skills that I use in my current job [SKIP IF Q1=4]               | 14.3%                 | 28.6%                 | 28.6%                             | 14.3%                    | 14.3%                    | 0.0%                      |
| E. Provided me a valuable educational opportunity                                      | 46.2%                 | 30.8%                 | 15.4%                             | 7.7%                     | 0.0%                     | 0.0%                      |
| F. Increased my awareness of wind energy career opportunities                          | 23.1%                 | 7.7%                  | 53.8%                             | 15.4%                    | 0.0%                     | 0.0%                      |

For each of the following statements, please indicate if you agree, disagree or neither as they relate to your experience with *the National Energy Education Development (NEED) Curriculum?* (n=1)

**RANDOMIZE**

|                                                                                        | <u>Strongly Agree</u> | <u>Somewhat Agree</u> | <u>Neither Agree nor Disagree</u> | <u>Somewhat Disagree</u> | <u>Strongly Disagree</u> | <u>Don't Know/Refused</u> |
|----------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|
| A. Increased my interest in a career in the wind energy industry                       | 0.0%                  | 100.0%                | 0.0%                              | 0.0%                     | 0.0%                     | 0.0%                      |
| B. Improved my ability to find a job in the wind energy industry                       | 0.0%                  | 100.0%                | 0.0%                              | 0.0%                     | 0.0%                     | 0.0%                      |
| C. Expanded my network of people that I could connect with in the wind energy industry | 0.0%                  | 0.0%                  | 100.0%                            | 0.0%                     | 0.0%                     | 0.0%                      |
| D. Developed valuable skills that I use in my current job [SKIP IF Q1=4]               | 0.0%                  | 100.0%                | 0.0%                              | 0.0%                     | 0.0%                     | 0.0%                      |
| E. Provided me a valuable educational opportunity                                      | 0.0%                  | 100.0%                | 0.0%                              | 0.0%                     | 0.0%                     | 0.0%                      |
| F. Increased my awareness of wind energy career opportunities                          | 0.0%                  | 100.0%                | 0.0%                              | 0.0%                     | 0.0%                     | 0.0%                      |

For each of the following statements, please indicate if you agree, disagree or neither as they relate to your experience with *Wind for Schools?* (n=31 to 35)

**RANDOMIZE**

|                                                                                        | <u>Strongly Agree</u> | <u>Somewhat Agree</u> | <u>Neither Agree nor Disagree</u> | <u>Somewhat Disagree</u> | <u>Strongly Disagree</u> | <u>Don't Know/Refused</u> |
|----------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|
| A. Increased my interest in a career in the wind energy industry                       | 34.3%                 | 45.7%                 | 8.6%                              | 8.6%                     | 0.0%                     | 2.9%                      |
| B. Improved my ability to find a job in the wind energy industry                       | 45.7%                 | 28.6%                 | 20.0%                             | 5.7%                     | 0.0%                     | 0.0%                      |
| C. Expanded my network of people that I could connect with in the wind energy industry | 57.1%                 | 31.4%                 | 2.9%                              | 2.9%                     | 0.0%                     | 5.7%                      |
| D. Developed valuable skills that I use in my current job [SKIP IF Q1=4]               | 41.9%                 | 45.2%                 | 6.5%                              | 0.0%                     | 3.2%                     | 3.2%                      |
| E. Provided me a valuable educational opportunity                                      | 48.6%                 | 34.3%                 | 14.3%                             | 2.9%                     | 0.0%                     | 0.0%                      |
| F. Increased my awareness of wind energy career opportunities                          | 51.4%                 | 34.3%                 | 11.4%                             | 2.9%                     | 0.0%                     | 0.0%                      |

For each of the following statements, please indicate if you agree, disagree or neither as they relate to your experience with *the Wind Application Center?* (n=9 to 15)

**RANDOMIZE**

|                                                                                        | <u>Strongly Agree</u> | <u>Somewhat Agree</u> | <u>Neither Agree nor Disagree</u> | <u>Somewhat Disagree</u> | <u>Strongly Disagree</u> | <u>Don't Know/Refused</u> |
|----------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|
| A. Increased my interest in a career in the wind energy industry                       | 46.7%                 | 40.0%                 | 13.3%                             | 0.0%                     | 0.0%                     | 0.0%                      |
| B. Improved my ability to find a job in the wind energy industry                       | 46.7%                 | 13.3%                 | 33.3%                             | 6.7%                     | 0.0%                     | 0.0%                      |
| C. Expanded my network of people that I could connect with in the wind energy industry | 40.0%                 | 40.0%                 | 20.0%                             | 0.0%                     | 0.0%                     | 0.0%                      |
| D. Developed valuable skills that I use in my current job [SKIP IF Q1=4]               | 22.2%                 | 22.2%                 | 44.4%                             | 11.1%                    | 0.0%                     | 0.0%                      |
| E. Provided me a valuable educational opportunity                                      | 40.0%                 | 33.3%                 | 20.0%                             | 6.7%                     | 0.0%                     | 0.0%                      |
| F. Increased my awareness of wind energy career opportunities                          | 40.0%                 | 46.7%                 | 13.3%                             | 0.0%                     | 0.0%                     | 0.0%                      |

For each of the following statements, please indicate if you agree, disagree or neither as they relate to your experience *a degree program specific to wind energy?* (n=30 to 34)

**RANDOMIZE**

|                                                                                        | <u>Strongly Agree</u> | <u>Somewhat Agree</u> | <u>Neither Agree nor Disagree</u> | <u>Somewhat Disagree</u> | <u>Strongly Disagree</u> | <u>Don't Know/Refused</u> |
|----------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|
| A. Increased my interest in a career in the wind energy industry                       | 55.9%                 | 35.3%                 | 5.9%                              | 2.9%                     | 0.0%                     | 0.0%                      |
| B. Improved my ability to find a job in the wind energy industry                       | 44.1%                 | 23.5%                 | 23.5%                             | 8.8%                     | 0.0%                     | 0.0%                      |
| C. Expanded my network of people that I could connect with in the wind energy industry | 50.0%                 | 29.4%                 | 11.8%                             | 0.0%                     | 8.8%                     | 0.0%                      |
| D. Developed valuable skills that I use in my current job [SKIP IF Q1=4]               | 56.7%                 | 30.0%                 | 6.7%                              | 3.3%                     | 3.3%                     | 0.0%                      |
| E. Provided me a valuable educational opportunity                                      | 55.9%                 | 35.3%                 | 2.9%                              | 2.9%                     | 2.9%                     | 0.0%                      |
| F. Increased my awareness of wind energy career opportunities                          | 61.8%                 | 23.5%                 | 8.8%                              | 2.9%                     | 2.9%                     | 0.0%                      |

For each of the following statements, please indicate if you agree, disagree or neither as they relate to your experience *a degree or certificate for wind technician?* (n=5 to 6)

**RANDOMIZE**

|                                                                                        | <u>Strongly Agree</u> | <u>Somewhat Agree</u> | <u>Neither Agree nor Disagree</u> | <u>Somewhat Disagree</u> | <u>Strongly Disagree</u> | <u>Don't Know/Refused</u> |
|----------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|
| A. Increased my interest in a career in the wind energy industry                       | 16.7%                 | 33.3%                 | 50.0%                             | 0.0%                     | 0.0%                     | 0.0%                      |
| B. Improved my ability to find a job in the wind energy industry                       | 33.3%                 | 66.7%                 | 0.0%                              | 0.0%                     | 0.0%                     | 0.0%                      |
| C. Expanded my network of people that I could connect with in the wind energy industry | 50.0%                 | 33.3%                 | 0.0%                              | 16.7%                    | 0.0%                     | 0.0%                      |
| D. Developed valuable skills that I use in my current job [SKIP IF Q1=4]               | 40.0%                 | 40.0%                 | 20.0%                             | 0.0%                     | 0.0%                     | 0.0%                      |
| E. Provided me a valuable educational opportunity                                      | 50.0%                 | 33.3%                 | 16.7%                             | 0.0%                     | 0.0%                     | 0.0%                      |
| F. Increased my awareness of wind energy career opportunities                          | 33.3%                 | 66.7%                 | 0.0%                              | 0.0%                     | 0.0%                     | 0.0%                      |

For each of the following statements, please indicate if you agree, disagree or neither as they relate to your experience with *internships in the wind energy industry?* (n=11 to 14)

#### RANDOMIZE

|                                                                                        | <u>Strongly Agree</u> | <u>Somewhat Agree</u> | <u>Neither Agree nor Disagree</u> | <u>Somewhat Disagree</u> | <u>Strongly Disagree</u> | <u>Don't Know/Refused</u> |
|----------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|
| A. Increased my interest in a career in the wind energy industry                       | 50.0%                 | 42.9%                 | 7.1%                              | 0.0%                     | 0.0%                     | 0.0%                      |
| B. Improved my ability to find a job in the wind energy industry                       | 28.6%                 | 42.9%                 | 21.4%                             | 7.1%                     | 0.0%                     | 0.0%                      |
| C. Expanded my network of people that I could connect with in the wind energy industry | 35.7%                 | 57.1%                 | 0.0%                              | 7.1%                     | 0.0%                     | 0.0%                      |
| D. Developed valuable skills that I use in my current job [SKIP IF Q1=4]               | 9.1%                  | 72.7%                 | 18.2%                             | 0.0%                     | 0.0%                     | 0.0%                      |
| E. Provided me a valuable educational opportunity                                      | 57.1%                 | 35.7%                 | 7.1%                              | 0.0%                     | 0.0%                     | 0.0%                      |
| F. Increased my awareness of wind energy career opportunities                          | 50.0%                 | 35.7%                 | 14.3%                             | 0.0%                     | 0.0%                     | 0.0%                      |

For each of the following statements, please indicate if you agree, disagree or neither as they relate to your experience with *courses or seminars specific to wind energy?* (n=53 to 75)

#### RANDOMIZE

|  | <u>Strongly Agree</u> | <u>Somewhat Agree</u> | <u>Neither Agree nor Disagree</u> | <u>Somewhat Disagree</u> | <u>Strongly Disagree</u> | <u>Don't Know/Refused</u> |
|--|-----------------------|-----------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|
|--|-----------------------|-----------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|



|    |                                                                                     |       |       |       |       |      |      |
|----|-------------------------------------------------------------------------------------|-------|-------|-------|-------|------|------|
| A. | Increased my interest in a career in the wind energy industry                       | 42.7% | 40.0% | 13.3% | 2.7%  | 1.3% | 0.0% |
| B. | Improved my ability to find a job in the wind energy industry                       | 18.7% | 29.3% | 36.0% | 10.7% | 5.3% | 0.0% |
| C. | Expanded my network of people that I could connect with in the wind energy industry | 21.3% | 34.7% | 21.3% | 17.3% | 5.3% | 0.0% |
| D. | Developed valuable skills that I use in my current job [SKIP IF Q1=4]               | 18.9% | 30.2% | 30.2% | 13.2% | 5.7% | 1.9% |
| E. | Provided me a valuable educational opportunity                                      | 53.3% | 41.3% | 4.0%  | 1.3%  | 0.0% | 0.0% |
| F. | Increased my awareness of wind energy career opportunities                          | 42.7% | 34.7% | 18.7% | 4.0%  | 0.0% | 0.0% |

For each of the following statements, please indicate if you agree, disagree or neither as they relate to your experience with *internships in the renewable energy industry, other than wind energy?* (n=0)

#### RANDOMIZE

|    | <u>Strongly Agree</u>                                                               | <u>Somewhat Agree</u> | <u>Neither Agree nor Disagree</u> | <u>Somewhat Disagree</u> | <u>Strongly Disagree</u> | <u>Don't Know/ Refused</u> |
|----|-------------------------------------------------------------------------------------|-----------------------|-----------------------------------|--------------------------|--------------------------|----------------------------|
| A. | Increased my interest in a career in the wind energy industry                       |                       |                                   |                          |                          |                            |
| B. | Improved my ability to find a job in the wind energy industry                       |                       |                                   |                          |                          |                            |
| C. | Expanded my network of people that I could connect with in the wind energy industry |                       |                                   |                          |                          |                            |
| D. | Developed valuable skills that I use in my current job [SKIP IF Q1=4]               |                       |                                   |                          |                          |                            |
| E. | Provided me a valuable educational opportunity                                      |                       |                                   |                          |                          |                            |
| F. | Increased my awareness of wind energy career opportunities                          |                       |                                   |                          |                          |                            |

[ASK Q12 IF Q1=1 OR 2 OTHERWISE SKIP]

12. Did your education prepare you for the work you are doing today? (n=410)

- 40.2% Yes, both generally and in the specific work that I do day-to-day
- 34.6% Yes, but only generally not in the specific work that I do day-to-day
- 13.9% Somewhat
- 10.0% No, not particularly
- 1.2% Don't know/ Refused

### III. Industry & Employment Perceptions & Priorities (ADDITIONAL WORKFORCE)

Next, I want to ask you about different industries you could work in.

13. How interested would you be in building a career in any of the following industries? (n=539)

#### RANDOMIZE ORDER

|                                            | <u>Very Interested</u> | <u>Interested</u> | <u>Somewhat Interested</u> | <u>Not Interested</u> | <u>Don't Know/Refused</u> |
|--------------------------------------------|------------------------|-------------------|----------------------------|-----------------------|---------------------------|
| A. Wind Energy                             | 39.0%                  | 32.1%             | 19.5%                      | 8.9%                  | 0.6%                      |
| B. Solar Energy                            | 41.9%                  | 31.5%             | 17.6%                      | 8.2%                  | 0.7%                      |
| C. Hydro Energy                            | 30.6%                  | 31.2%             | 23.7%                      | 13.7%                 | 0.7%                      |
| D. Natural Gas or other fossil fuel energy | 17.3%                  | 22.8%             | 19.7%                      | 38.2%                 | 2.0%                      |
| E. Finance or Insurance                    | 17.8%                  | 14.3%             | 16.7%                      | 50.1%                 | 1.1%                      |
| E. Life Sciences & Biotechnology           | 20.2%                  | 23.6%             | 26.7%                      | 28.6%                 | 0.9%                      |
| F. Construction                            | 14.8%                  | 19.7%             | 26.2%                      | 38.0%                 | 1.3%                      |
| G. Healthcare or Health Services           | 15.4%                  | 18.4%             | 23.0%                      | 41.4%                 | 1.9%                      |

14. Now, I want to ask you specifically about the wind energy industry.

For each of the following attributes of employment, please indicate if you feel the wind energy industry is better than average, about average, or worse than average when you compare it to working in other comparable industries? (n=538)

RANDOMIZE

|                                                                                  | <u>Better than Average</u> | <u>About Average</u> | <u>Worse than Average</u> | <u>Don't Know/Refused</u> |
|----------------------------------------------------------------------------------|----------------------------|----------------------|---------------------------|---------------------------|
| <b>A. Starting, entry-level wages</b>                                            | 30.1%                      | 40.9%                | 7.2%                      | 21.7%                     |
| <b>B. Potential for promotion &amp; higher wages</b>                             | 33.1%                      | 40.0%                | 5.0%                      | 21.9%                     |
| <b>C. Overall benefits package for employees</b>                                 | 24.9%                      | 43.5%                | 5.0%                      | 26.6%                     |
| <b>D. Opportunity to learn new skills and move up a promising career pathway</b> | 42.2%                      | 37.2%                | 5.2%                      | 15.4%                     |
| <b>E. Opportunity to do work that fits with my environmental priorities</b>      | 44.4%                      | 36.4%                | 5.9%                      | 13.2%                     |
| <b>F. Opportunity to work in locations, where I want to live</b>                 | 26.0%                      | 39.2%                | 18.0%                     | 16.7%                     |

15. Where do you look for jobs to find out who's hiring (select all that apply)? (n=538)

- 66.7% Job Sites (e.g. Indeed, HCareers, Monster, CareerBuilder, etc.)
- 62.1% Company websites
- 59.9% LinkedIn
- 53.7% Job fairs
- 49.1% Family and friends
- 34.8% School counseling or career services office
- 28.6% Industry or related conference(s)
- 20.1% Instagram, Twitter, Snapchat, Facebook, YouTube or other social media
- 17.7% Work with a recruiter
- 8.2% "Gig" Sites (e.g. UBER, Lyft, Takl, TaskRabbit, UpWork, BackDoorJobs, etc.)
- 7.6% TV/Radio
- 2.8% Somewhere else (Specify)

Now, I would like to ask a few brief questions about employment opportunities in the wind energy industry

SKIP Q0 IF Q3A=1

16. Have you ever considered and/or looked for employment in the wind energy industry? (n=633)

- 43.0% Yes, I have considered working in the wind energy industry, but never actively searched for employment
- 17.7% Yes, I have actively searched for work opportunities in the wind energy industry
- 39.3% No, I have never considered working in the wind energy industry

IF Q0=1 OR 2 ASK Q17 OTHERWISE SKIP

17. What type of position did you consider or search for in the wind energy industry? (n=381)

- 36.5% Engineer
- 15.5% Wind Technician
- 11.0% Intern/ general entry-level
- 8.9% Other
- 7.1% Plant Manager
- 4.5% Energy Analyst
- 3.9% Legal
- 3.1% Researcher
- 1.0% Sales Representative
- 0.8% Cybersecurity
- 7.6% DK/NA

18. Now, I want to ask the difficulty you had finding employment opportunities in the following industries.

For each of the following industries, please indicate if you feel finding employment opportunities is a great difficulty, some difficulty or no difficulty OR do you not have any experience looking for work in that industry? (n=745)

|                                                                               | <u>Great Difficulty</u> | <u>Some Difficulty</u> | <u>No Difficulty</u> | <u>No experience</u> |
|-------------------------------------------------------------------------------|-------------------------|------------------------|----------------------|----------------------|
| A. Wind energy                                                                | 15.4%                   | 40.3%                  | 11.5%                | 32.8%                |
| B. Renewable energy, other than wind                                          | 11.3%                   | 41.1%                  | 15.7%                | 31.9%                |
| C. Energy industry other than renewables (including Fossil fuels and Nuclear) | 9.0%                    | 34.0%                  | 22.7%                | 34.4%                |

ASK Q0 AND Q20 IF Q3A=1 OR Q0=1 OR 2 OR Q0A=1, 2 OR 3

19. What have been the **challenges or obstacles** you faced finding relevant work opportunities in the **wind energy industry**? (n=598)

**RANDOMIZE**

|                                                                                               | <u>Considerable<br/>Challenge</u> | <u>Somewhat<br/>of a<br/>Challenge</u> | <u>Not a<br/>Challenge</u> | <u>It<br/>Depends</u> | <u>Don't<br/>Know/<br/>Refused</u> |
|-----------------------------------------------------------------------------------------------|-----------------------------------|----------------------------------------|----------------------------|-----------------------|------------------------------------|
| <b>A.</b> Getting relevant work and/or industry experience                                    | 27.6%                             | 39.6%                                  | 19.1%                      | 5.9%                  | 7.9%                               |
| <b>B.</b> Getting the academic degree and/or certification needed                             | 13.7%                             | 35.5%                                  | 37.0%                      | 7.7%                  | 6.2%                               |
| <b>C.</b> Finding employment opportunities that are near where I live or am willing to live   | 29.4%                             | 37.3%                                  | 18.1%                      | 7.7%                  | 7.5%                               |
| <b>D.</b> Getting the technical training as well as developing technical skills and expertise | 19.6%                             | 41.6%                                  | 23.7%                      | 6.7%                  | 8.4%                               |
| <b>E.</b> Getting comfortable and confident communicating with employers and those hiring     | 14.4%                             | 34.9%                                  | 34.6%                      | 9.0%                  | 7.0%                               |
| <b>F.</b> Developing resumes and related materials that demonstrate your qualifications       | 11.7%                             | 37.6%                                  | 37.0%                      | 7.5%                  | 6.2%                               |
| <b>G.</b> Getting the free time needed to focus on my career goals                            | 14.5%                             | 36.0%                                  | 33.1%                      | 8.9%                  | 7.5%                               |
| <b>H.</b> Getting hands-on training that develops wind energy specific skills                 | 24.2%                             | 37.3%                                  | 22.4%                      | 7.4%                  | 8.7%                               |

20. Are there any other obstacles or barriers to finding employment in the wind energy industry that we have not discussed? - YES / NO (IF YES, Please Describe)

*Verbatim Responses to be Provided*

21. Next, I am going to ask you about different programs and courses that could be offered to help you prepare for or find employment in the wind energy industry.

For each of the following programs or courses that could be offered at a **college, university or training facility**, please tell me if you are very interested, somewhat interested or not interested in that program or coursework for you? (n=741)

**RANDOMIZE**

|                                                                                                                                                  | <u>Very Interested</u> | <u>Somewhat Interested</u> | <u>Not Interested</u> | <u>Don't Know/ Refused</u> |
|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------|-----------------------|----------------------------|
| <b>A. An applied wind energy program that teaches hands-on technical skills for individuals who are looking for work in the industry</b>         | 42.5%                  | 38.9%                      | 16.1%                 | 2.6%                       |
| <b>B. Interdisciplinary coursework covering a range of wind energy topics</b>                                                                    | 39.3%                  | 43.9%                      | 14.3%                 | 2.6%                       |
| <b>C. Apprenticeships or pre-apprenticeship programs in trades such as electricians and wind installations, which teach wind-specific skills</b> | 37.0%                  | 37.1%                      | 23.1%                 | 2.8%                       |

22. If you were looking for a new employment opportunity and you saw a position in the traditional land-based wind energy industry, how likely are you to apply for it? (n=741)

- 30.9% Very likely
- 41.0% Somewhat likely
- 13.1% Not likely
- 14.2% It depends
- 0.8% Don't know/ Refused

23. If you were looking for a new employment opportunity and you saw a position in the emerging off-shore wind energy industry, how likely are you to apply for it? (n=741)

|       |                     |
|-------|---------------------|
| 30.8% | Very likely         |
| 32.0% | Somewhat likely     |
| 21.7% | Not likely          |
| 14.7% | It depends          |
| 0.8%  | Don't know/ Refused |

#### PART IV

To wrap things up, I just have a few background questions for statistical purposes only.

A. Do you own or rent the unit in which you live? (n=741)

|       |                      |
|-------|----------------------|
| 60.2% | Rent                 |
| 22.9% | Own                  |
| 16.2% | Neither rent nor own |
| 0.7%  | Don't know/ Refused  |

B. What is your ethnicity? (n=741)

|       |                        |
|-------|------------------------|
| 11.3% | Hispanic or Latinx     |
| 83.5% | Not Hispanic or Latinx |
| 5.1%  | Refused                |

C. What is your race? (n=741)

|       |                                           |
|-------|-------------------------------------------|
| 2.3%  | American Indian or Alaskan Native         |
| 17.4% | Asian                                     |
| 9.4%  | Black or African American                 |
| 0.9%  | Native Hawaiian or other Pacific Islander |
| 63.7% | White                                     |
| 6.2%  | Two or more races                         |

D. Are you a veteran of the US military forces, or in the reserves? (n=741)

95.8% No  
3.2% Yes, a veteran  
0.9% Yes, in the reserves

E. What is your Gender? (n=741)

67.5% Male  
31.8% Female  
0.7% Non-Binary

F. What is **your annual wage or salary**, the amount you make now over the next 12 months? (IF NEEDED: Please note this does not include income from a spouse or other individual from your household and if you have more than one job, this would be the wage or salary from the highest paying position) (IF PAID HOURLY USE SECOND OPTION GROUP) (n=741)

46.7% Below \$25,000  
18.9% \$25,000 to \$49,999  
16.6% \$50,000 to \$74,999  
6.6% \$75,000 to \$99,999  
3.8% \$100,000 to \$150,000  
0.8% More than \$150,000  
6.6% I don't know

(n=49)

16.3% Below \$12 an hour  
18.4% \$12 to \$24.99 an hour  
2.0% \$25 to \$37.99 an hour  
2.0% \$38 to \$49.99 an hour  
0.0% \$50 to \$75 an hour  
0.0% More than \$75 an hour  
61.2% I don't know



G. This survey is part of a multi-year research study by the National Renewable Energy Laboratory (NREL). We are recruiting individuals to be included in a panel of students and recent graduates. For your participation each year, we will provide you with a \$50 Amazon Gift Card. You will only be required to complete one survey per year. Your responses will remain **strictly confidential**. Would you be willing to be contacted by the research team in following years for additional surveys? If yes, please include the best email and phone number to contact you moving forward. (n=736)

85.9% Yes (Enter email and/or phone #)  
14.1% No

**Those are all the questions we have for you. Thank you very much for participating!**