Connective Actions for Educational Institutions and Wind Industry Firms

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Photo by Dennis Schroeder, NREL 55200

Acknowledgments

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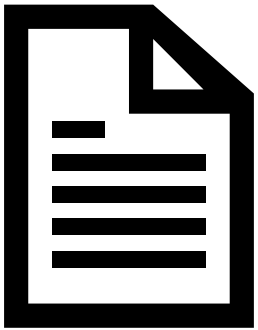
How To Use

1 Read the presentation like a report



OR

2 Use the “Overview: Quick Click” slide to navigate through the presentation

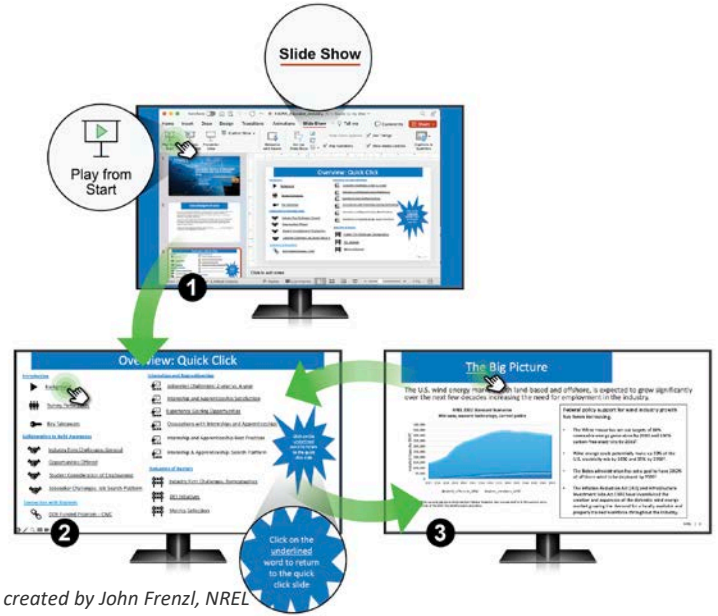


Image created by John Frenzl, NREL

Overview: Quick Click

Introduction

- Background
- Survey Participants
- Key Takeaways

Collaboration to Build Awareness

- Industry Firm Challenges: General
- Opportunities Offered
- Student Consideration of Employment
- Job Seeker Challenges: Job Search Platform

Connection with Students

- DOE Funded Program – CWC

Internships and Apprenticeships

- Job Seeker Challenges: 2-year vs. 4-year
- Internship and Apprenticeship Satisfaction
- Experience Gaining Opportunities
- Occupations With Internships and Apprenticeships

Reduction of Barriers

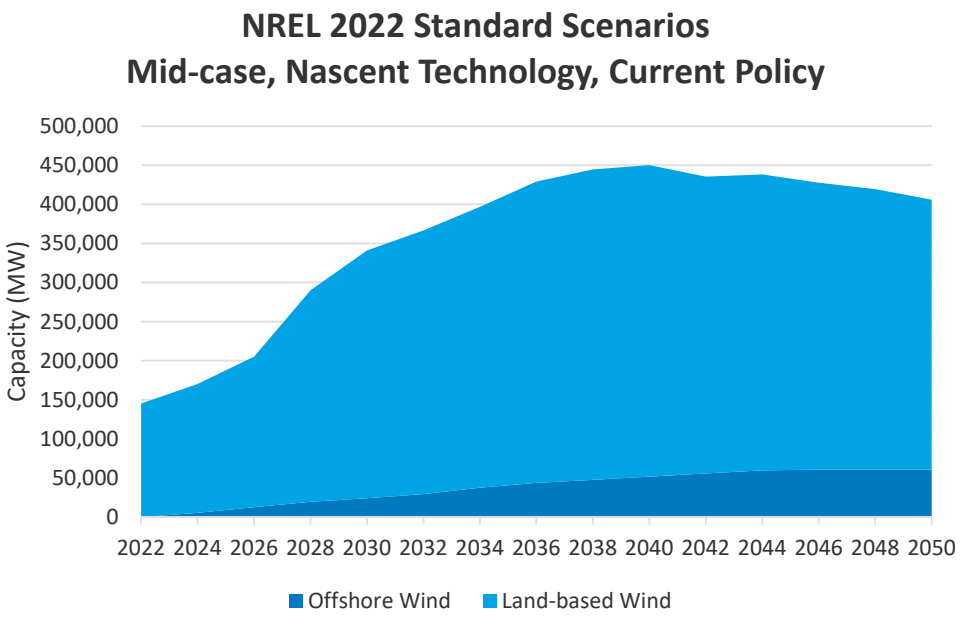
- Industry Firm Challenges: Demographics
- DEI Initiatives
- Metrics Collection

Click on the underlined word throughout presentation to return to the quick click slide.

Introduction

The Big Picture

The U.S. wind energy market, both land-based and offshore, is expected to grow significantly over the next few decades, increasing the need for employment in the industry.



The capacity additions driven by the Inflation Reduction Act are accounted for in the current policy scenarios of the 2022 Standard Scenarios projection.

Federal policy support for wind industry growth has been increasing.

- The White House has set targets of 80% renewable energy generation by 2030 and 100% carbon-free electricity by 2035 (White House 2021a).
- Wind energy could potentially make up 20% of the U.S. electricity mix by 2030 and 35% by 2050 (DOE-WETO 2017).
- The Biden administration has set a goal to have 30 GW of offshore wind be deployed by 2030 (White House 2021b).
- The Inflation Reduction Act and Infrastructure Investment Jobs Act have incentivized the creation and expansion of the domestic wind energy market, growing the demand for a locally available and properly trained workforce throughout the industry.

National Wind Workforce Assessment in Context

An **available** and **properly trained** workforce is needed for the success of the wind industry. However, past research has indicated that there is a **disconnect** between wind industry employers, the workforce, and educational institutions, which has been referred to as **the wind workforce gap**.

Wind workforce gap: Wind energy employers report having difficulty finding qualified candidates, while the potential wind energy workforce (e.g., students and recent graduates who are not yet working in the wind energy industry) report difficulty finding jobs, and educational institutions report having difficulty placing students in jobs (Stefek 2022).

Narrowing the gap could simultaneously (Keyser & Tegen 2019).

- Reduce recruitment costs for employers
- Help educational institutions fill classrooms
- Grow the domestic wind workforce by properly communicating wind industry careers to the potential workforce.

Previous Findings

Defining the Wind Energy Workforce Gap (Stefek 2022) indicated that the top three reasons for the workforce gap include experience, education and training qualifications, and geographic locations of jobs. This report expands on these findings.

	Experience	Education and Training	Geographic Location of Jobs
Industry	Experience was noted as a challenge for more than one-quarter of all wind industry firms looking for entry- (27.6%) and non-entry-level (33%) job applicants.	More than one-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%).	The third highest reason among wind firms searching for both entry- and non-entry-level applicants was that there are not enough applicants for available positions in areas where wind is being developed.
Employee	Members of the total workforce (68%) responded that gaining applicable work experience is somewhat of a challenge or a considerable challenge when trying to find work opportunities in the wind industry.	Current and potential workers identified getting hands-on training (62%) or technical training (61%) to develop skills and expertise as a challenge or obstacle when searching for relevant opportunities in the wind industry.	Finding employment opportunities where one lives or is willing to live was ranked the second highest challenge for the total and potential workforce (67%) and the top challenge for the current workforce (64%).

Intended Audience + Contents

This report presentation is intended for use by wind industry firms and educational institutions looking to gain insight into key levers and actionable steps that can be taken to help narrow the workforce gap. More information can be found in complementary resources.

This presentation includes:

- Modeled scenario of Wind Workforce through 2050 based on Business-as-Usual
- Opportunities to increase student awareness of wind
- The effectiveness of internships and apprenticeships
- Reducing barriers for potential workforce members.

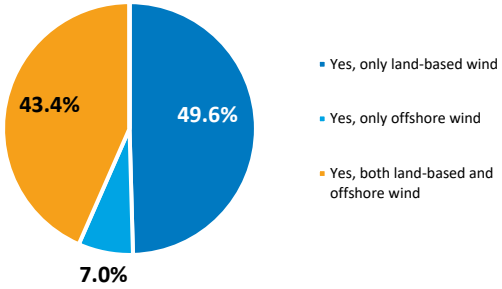
The information presented in the report originates from the FY22 survey effort conducted in partnership between NREL and BW Research Partnership, in addition to various other resources such as the 2022 USEER Report, U.S. Department of Labor, and U.S. Department of Education. To learn more about the methodology behind data collection and workforce modeling, please refer to the *National Wind Energy Workforce Assessment Methods Report: Surveys and System Dynamics Model* (McDowell and Stefek 2023).

Who Took the Survey?

Employer Survey (n=228)

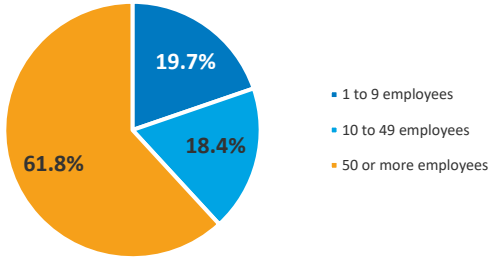
Involvement in Wind Energy Industry, 2022 (n=228)

Graph courtesy of BW Research Partnership



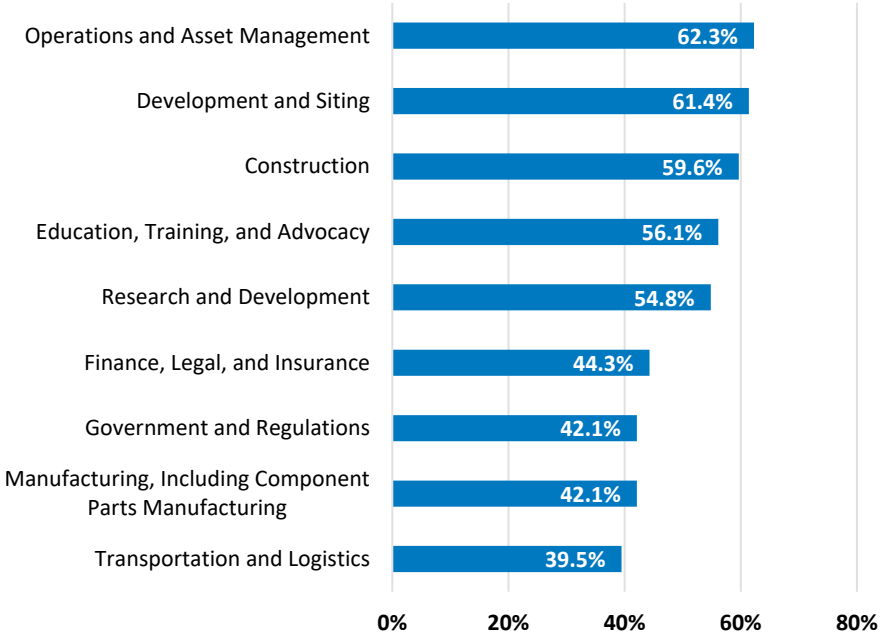
Number of Employees at Wind Energy Firms, 2022 (n=142)

Graph courtesy of BW Research Partnership



Involvement in Wind Industry Segments, 2022 (n=228)

Graph courtesy of BW Research Partnership

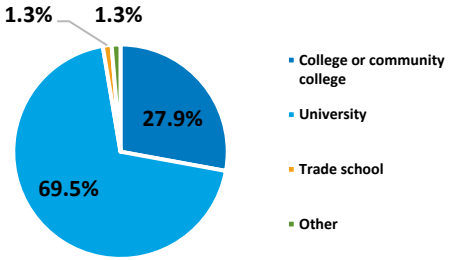


Who Took the Survey?

Student and Recent Graduate Survey (n=346)

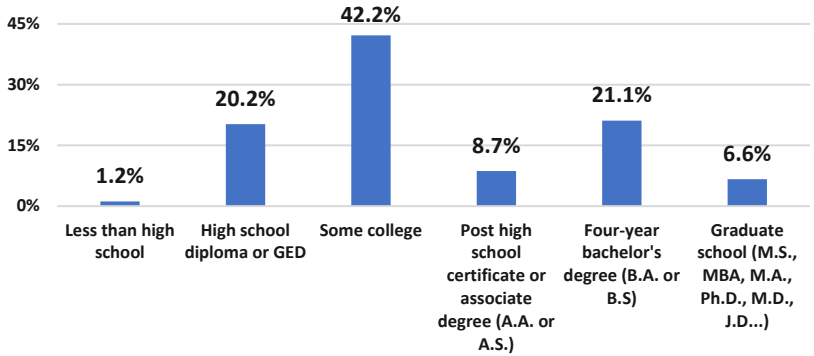
Type of School Attended, 2022 (n=226)

Graph courtesy of BW Research Partnership



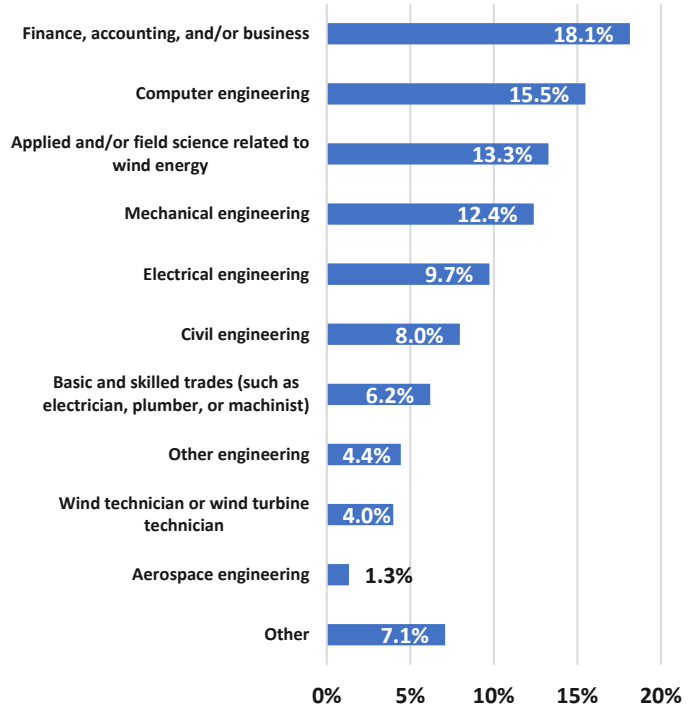
Last Educational Level Completed, 2022 (n=346)

Graph courtesy of BW Research Partnership



Degree Students and Recent Graduates were/are Working Toward, 2022 (n=226)

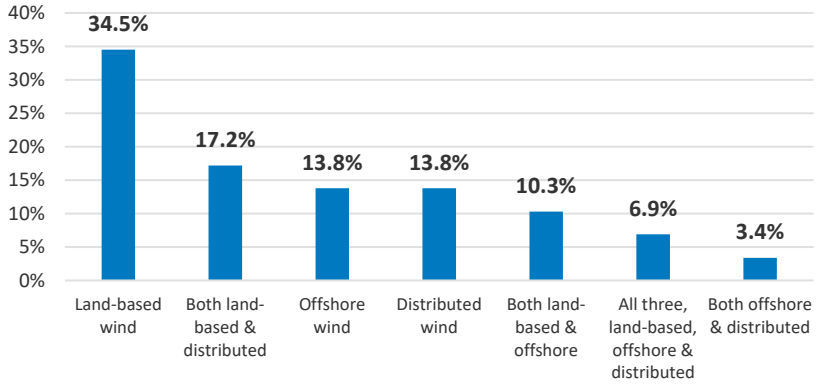
Graph courtesy of BW Research Partnership



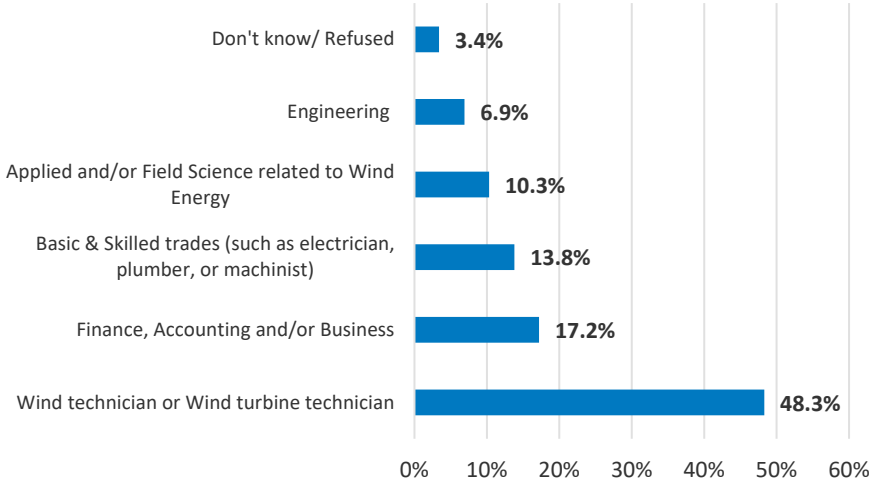
Who Took the Survey?

Current Worker Survey (n=29)

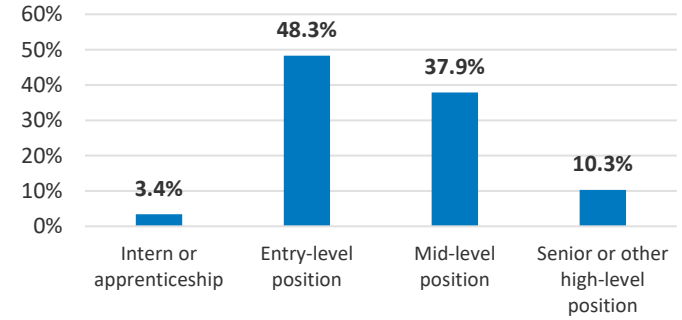
Primary Sector of Work in the Wind Industry (n=29)



Area of Study (n=29)



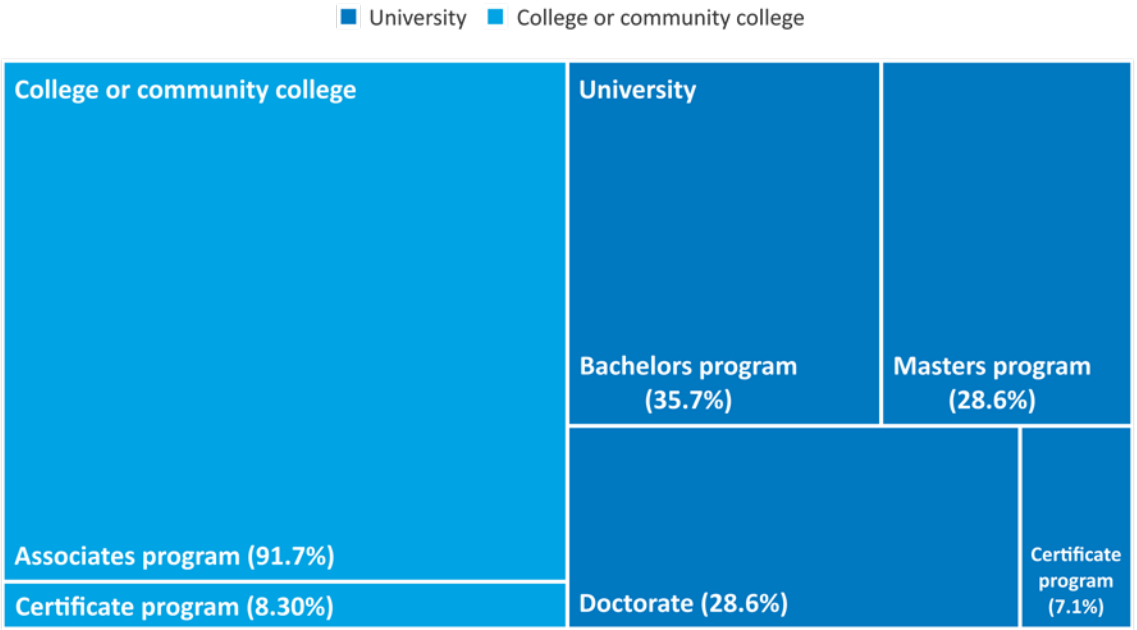
Most Recent Employment Level in the Wind Industry (n=29)



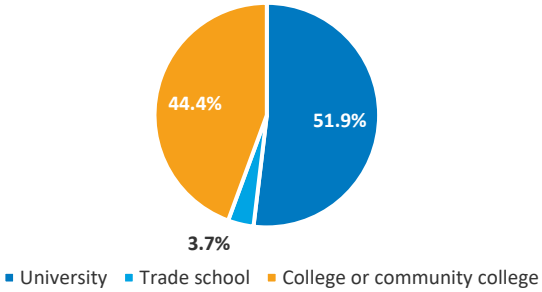
Who Took the Survey?

Educator Survey (n=27)

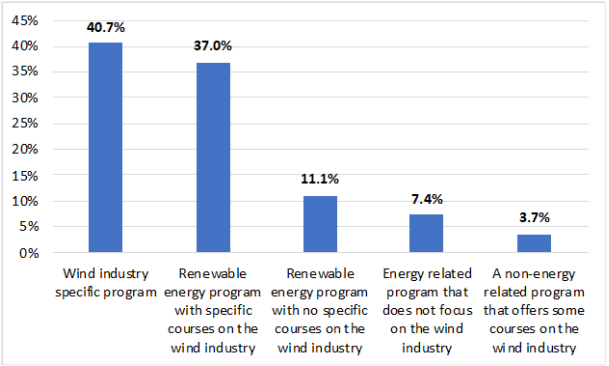
Type of Program in the School Employed (n=14, n=12)



Type of School Currently Employed (n=27)



Program Involvement With the Wind Industry (n=27)



Key Takeaways

Workforce Estimation

According to model projections under a business-as-usual (BAU) scenario, if the wind energy industry is to progress in line with NREL 2022 Standards Scenario Mid-case with nascent technology and current policy—one potential path for expansion—a larger supply of qualified and adequately trained workers will be needed to support overall workforce demand.

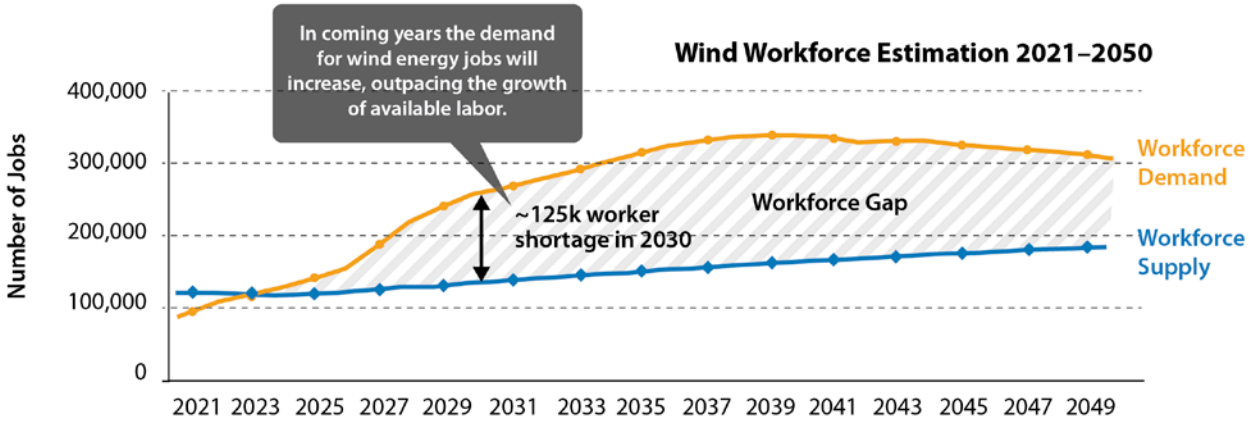


Image created by John Frenzl, NREL

2030: 134,364 FTE Supply

2030: 124,095 FTE Deficit

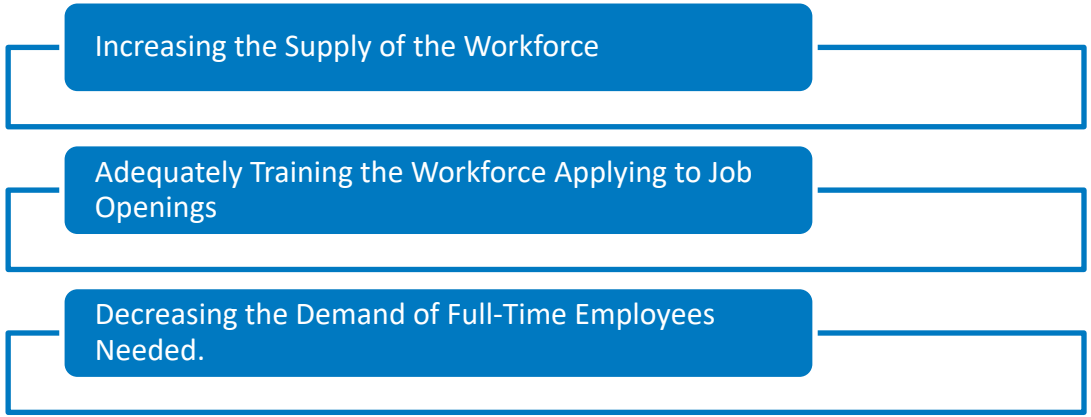
2030: 258,459 FTE Demand

Under current assumptions, the wind industry supply is expected to increase steadily through 2050; however, it is not predicted to be at the rate that is needed to meet 2030 or 2050 wind workforce demand. The workforce supply estimations are informed by current wind industry perceptions and baseline data collected through the 2022 survey effort, and results vary depending on the qualitative inputs.

Note: Information about the assumptions and data used is in the Methodology report. These projections are highly dependent on the assumption of the model and data gathered through the 2022 survey effort and should be used as a high-level estimate of scale and trend as opposed to a point projection.

Key Takeaways

Closing the gap between the workforce that is needed to meet deployment goals and the supply that is possible in the wind workforce under current assumptions will require:



This presentation will address how **educational and training institutions and wind energy firms can work together to increase the quality and supply of applicants to wind industry job opportunities.**

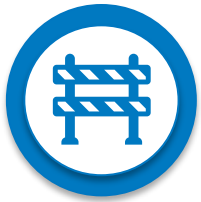
Key Takeaways

Industry could create **more partnerships** with educational/training institutions and participate in experience gaining opportunities that these institutions already offer. This will help to **increase interest and awareness of wind industry job opportunities** to students. Industry and educational/training institutions could also **align on where students should be instructed to look for job postings**. This can help to ensure qualified applicants are connected to the opportunities being offered.

Industry and educational/training institutions could **participate in programs such as the Collegiate Wind Competition (CWC).** Students who participate in CWC reported entering the wind industry at a higher rate and being more satisfied in their careers. Participation in CWC can help to connect interested students with industry partners.

Key Takeaways

Internships and apprenticeships are important pathways for students to gain the **technical skills** needed successfully enter the wind industry. Following the best practices listed in the slide deck can help to ensure programs created or further developed are effective in recruitment and structure.



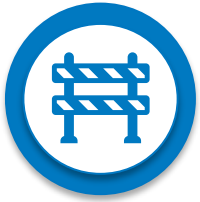
Reduction of barriers into the wind industry—whether through **hiring programs and initiatives, employee resources groups, and/or wrap-around services**—will be essential in mitigating the further emergence of historical inequities, while also ensuring **local benefits**, such as job creation, are allocated to the community where development occurs. **Proper data collection, partnerships with DEI-focused community-based organizations, and effective development of inclusivity programs** are needed actions for both educational/training institutions and wind industry firms alike.

From the survey data, it was reported that wind industry firms and wind educational institutions can work together to increase the number of adequately trained applicants being hired into wind by:

Collaborating with educational institutions to build awareness of wind industry opportunities

Connecting with students through outreach and programs such as the Collegiate Wind Competition (CWC)

Establishing effective internship and apprenticeship programs and pipelines

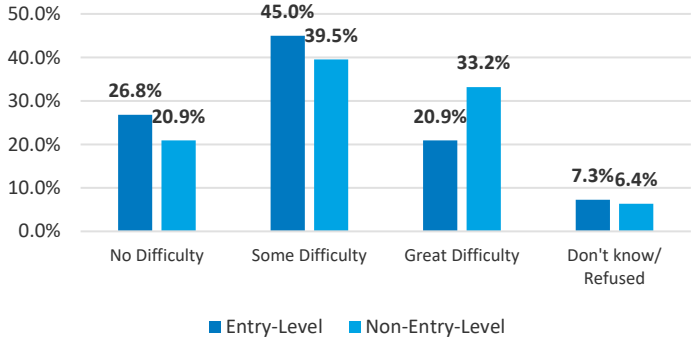


Reducing barriers for historically underrepresented populations and transitioning workers.

Collaborating with educational institutions to build awareness of wind industry opportunities

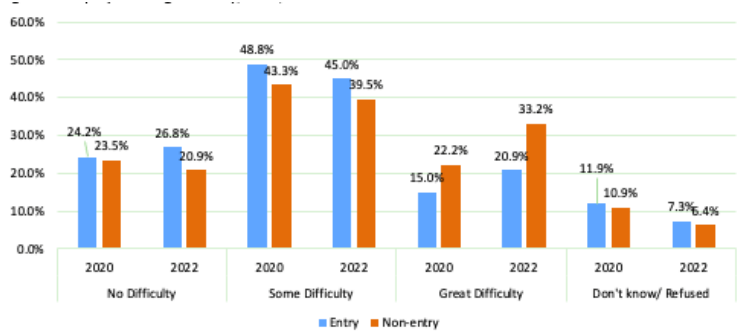
Overall, difficulty remains high for finding and hiring employees who are qualified for entry-level and non-entry-level positions at wind energy firms. Employers surveyed in 2022 reported greater hiring difficulty for entry- and non-entry-level employees than in 2020.

Level of difficulty firms have in finding qualified job applicants, 2022 (n=220)



Employer Hiring Difficulty, 2020, 2022

Graph courtesy of BW Research Partnership

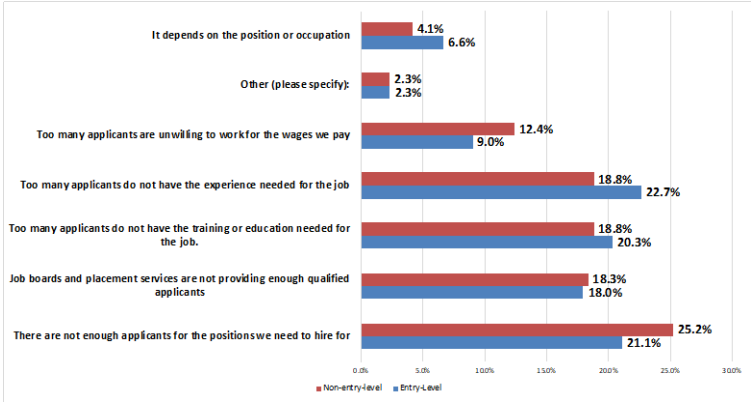


Reported Reasons for Hiring Difficulties Entry-Level vs. Non-Entry-Level

*The top reason reported for hiring difficulty of entry-level workers is a **lack of experience** needed for the job.*

*The top reason reported for hiring difficulty of non-entry-level workers is a **lack of applicants** for the position.*

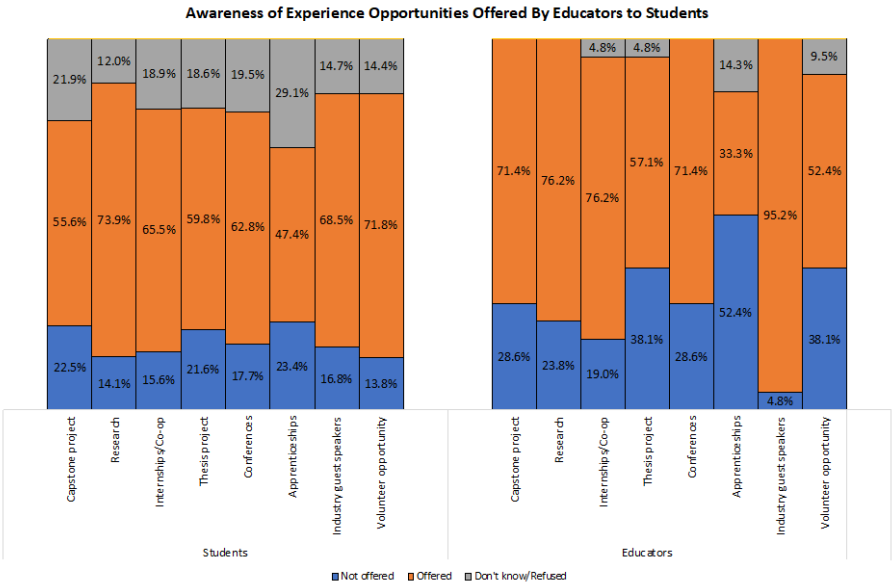
Reasons for Hiring Difficulty of Entry- (n=256) and Non-Entry-Level Employees (n=218)



Note: These numbers are the sum of employer respondents who reported "some difficulty" + "great difficulty."

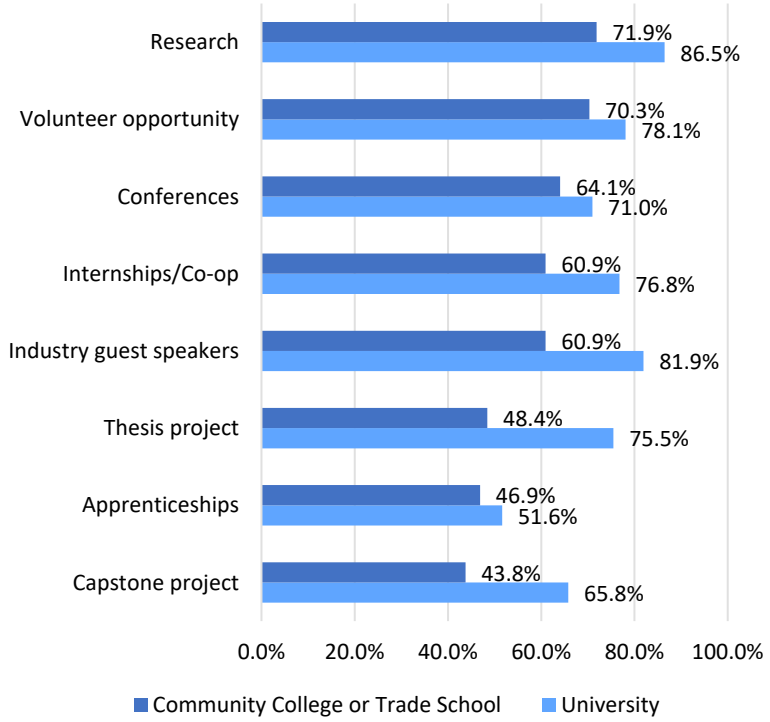
Experience remained a top barrier for hiring as reported by wind industry employers. Conversely, educational institutions reported offering a range of experience gaining opportunities, and students reported being aware of them. On average, students attending community colleges or trade schools were less aware of experience gaining opportunities than students attending universities.

- Apprenticeship opportunities were the least abundant experience gaining opportunity offered by educators who took the survey (33%).
- Industry guest speakers were the most prevalent experience gaining opportunity offered by educational institutions who took the survey (95.2%), followed by internships (76.2%) and research (76.2%).
- The majority of students, especially university students, reported being aware of these specific opportunities.



Experiences Offered at Community College or Trade School or University, 2022 (n=220)

Graph courtesy of BW Research Partnership



Wind industry employers also indicated that a top barrier to hiring was a lack of applicants. Educators reported that less than half of their students who have jobs after 6 months go into the wind industry. Additionally, 37.5% of students reported they have never considered working in the wind industry.

Educators reported that 89.19% of students had jobs 6 months after graduation. Further, educators reported that 47.95% of students with jobs after 6 months had them within the wind industry.

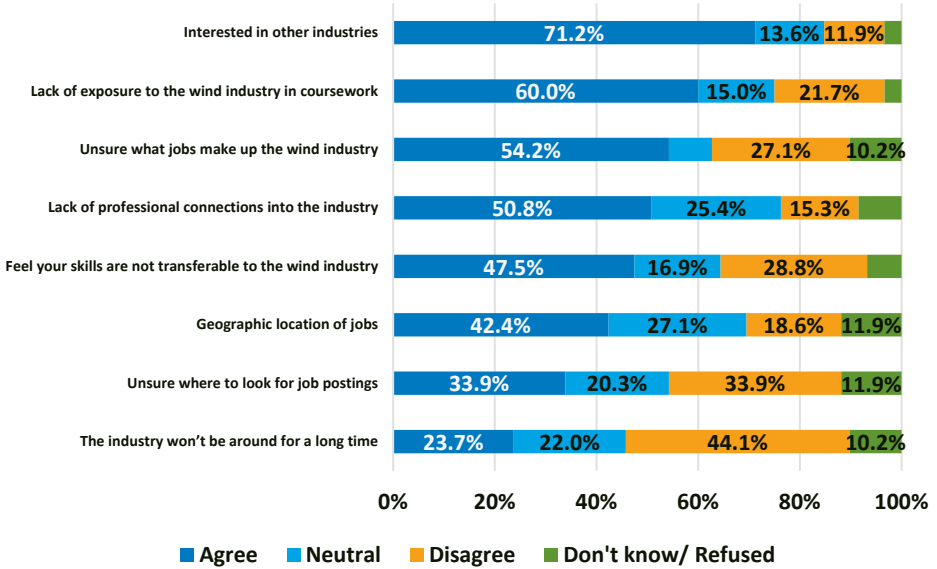
37.5% of students and recent graduate respondents have **not considered** working in the wind energy industry. 24.4% have **actively searched** for work opportunities, and 33.8% have **considered but not actively searched** for wind industry employment.

Top Three Reasons for Lack of Consideration of Employment in Wind Energy

1) Interest in other industries (71.2%)
2) Lack of exposure to the wind industry in coursework (60.0%)
3) Unsure what jobs make up the wind industry (54.2%).

Reasons for Lack of Consideration of Employment in Wind Energy, 2022 (n=33–60)

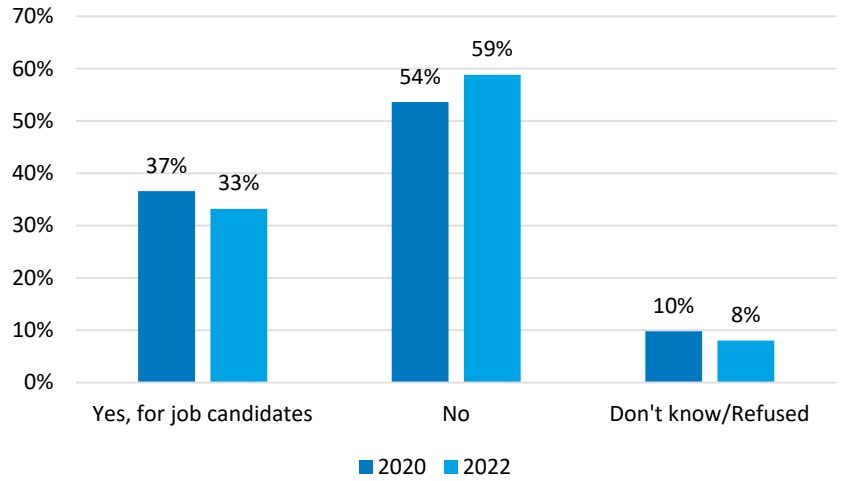
Graph courtesy of BW Research Partnership



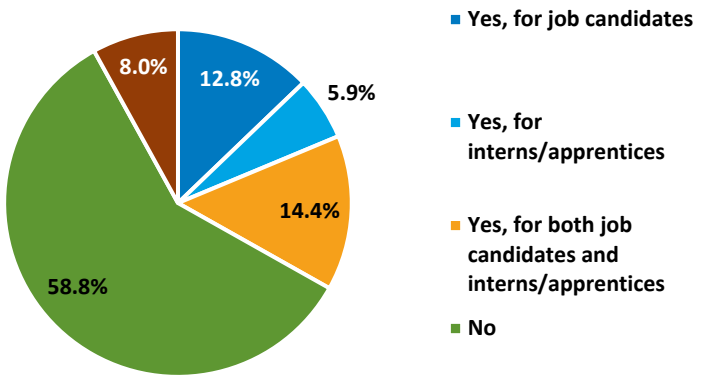
The survey results show a disconnect between educational institutions and wind industry employers in terms of what experience opportunities are offered through education and what experience is needed for students to enter the workforce successfully. Additionally, students report a lack of awareness of employment opportunities in the wind industry, which decreases their consideration to enter the sector. Fostering more collaboration between educational institutions and wind energy firms is needed to help build up a sustainable and properly trained workforce. To increase collaboration and awareness of wind opportunities, partnerships could be established through opportunities offered at educational and training programs.

58.8% of wind energy firms reported underutilizing educational institutions to find job candidates. The underutilization of connections with educational institutions has increased from 2020 respondents (54%).

Utilization of U.S.-Based Educational Institutions by Wind Employers, 2020, 2022

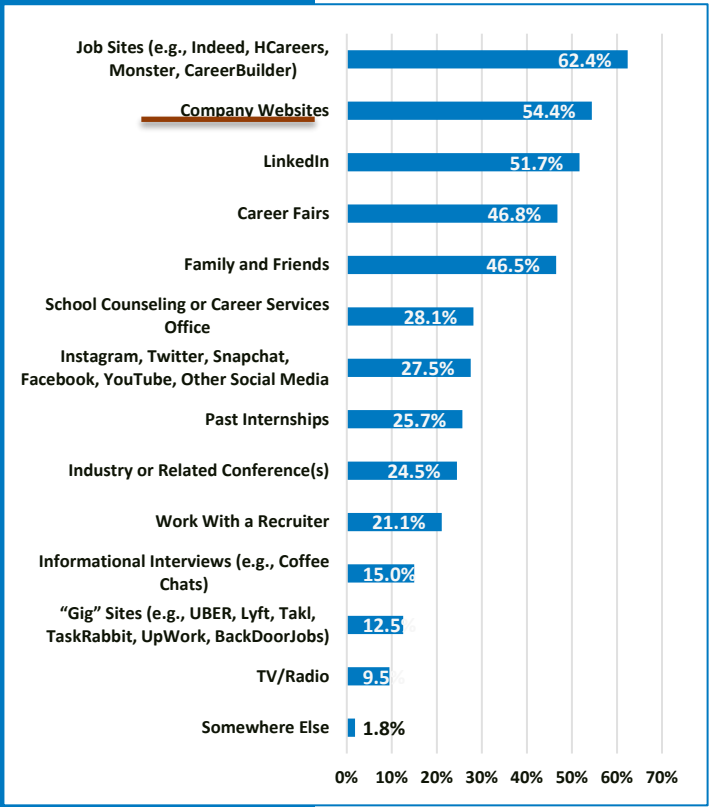


Utilization of Educational Institutions by Wind Energy Firms, 2022 (n=187)



There is also a reported disconnect between where students search for jobs and where industry employers look for applicants.

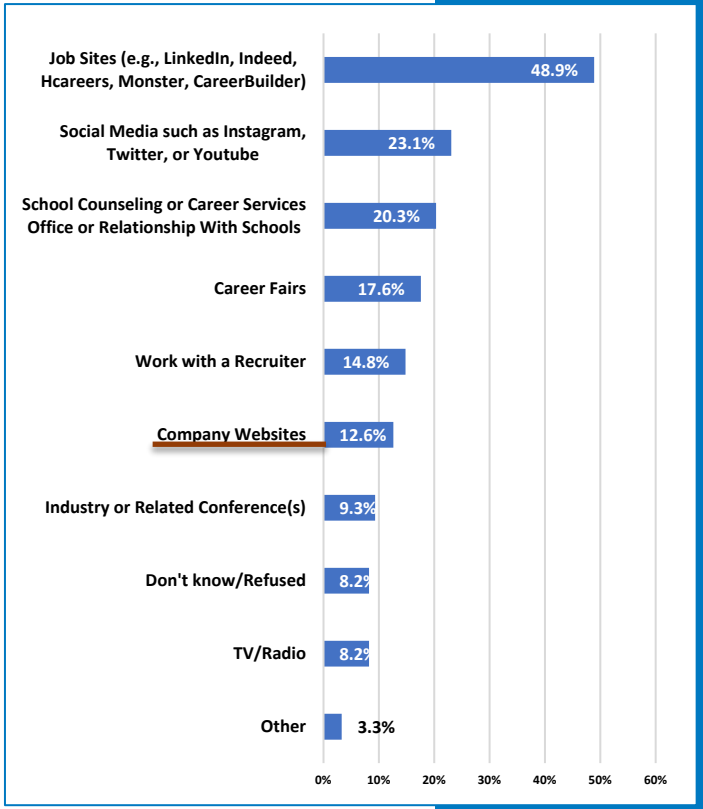
Students



Graph courtesy of BW Research Partnership

- Job sites were most utilized for finding applicants by wind firms (48.9%) and finding jobs by students and recent graduates (62.4%).
- Alignment between where students look for jobs and where industry looks for applicants is beneficial to connecting qualified job seekers with wind employment opportunities.
- Educational institutions should be made aware of the platforms used by industry to better inform students.

Industry Employers



Graph courtesy of BW Research Partnership

Connecting with students through outreach and programs such as the Collegiate Wind Competition (CWC)

Another way to increase collaboration between wind energy firms and educational institutions is through programs such as the Collegiate Wind Competition (CWC). CWC is a program developed by the U. S. Department of Energy (DOE) and the National Renewable Energy Lab (NREL) to provide undergraduate students with real-world experience through partnerships between educators and students and wind energy firms.

55% of employers reported that CWC was a **strength** of the wind industry.

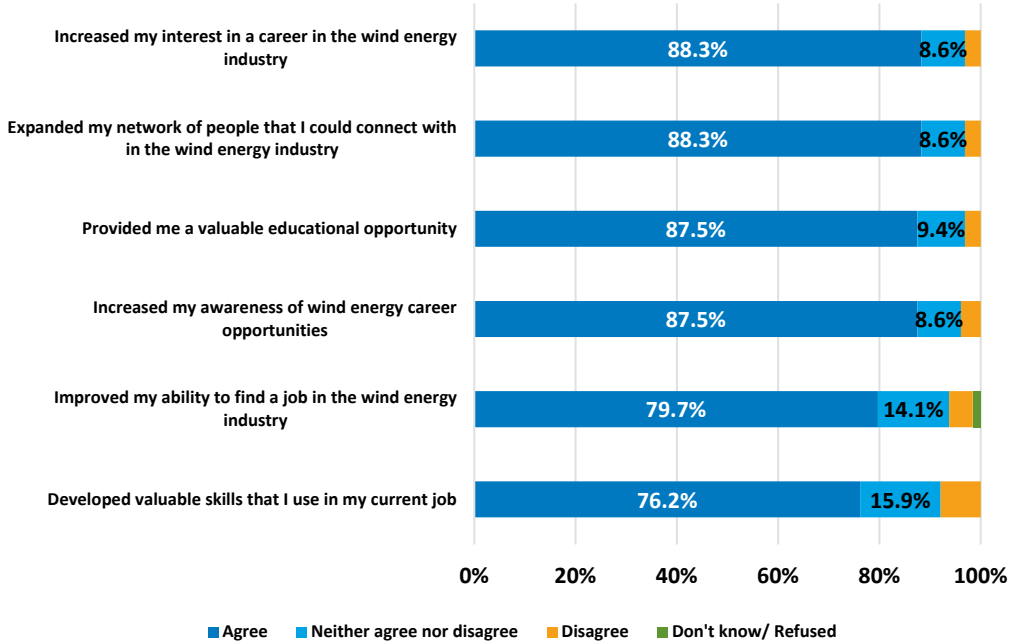
Recent CWC participants were between **1.42 and 1.50 times more likely** to be interested in building a career across the wind industry than non-CWC participants.

Currently employed workers who participated in CWC were:

- **1.57 times** more likely than non-CWC participants to be employed **in Land-Based Wind Industry.**
- **1.68 times** more likely than non-CWC participants to be **employed in Offshore Wind Industry**.

Agreement with Experience with the Collegiate Wind Competition (CWC)

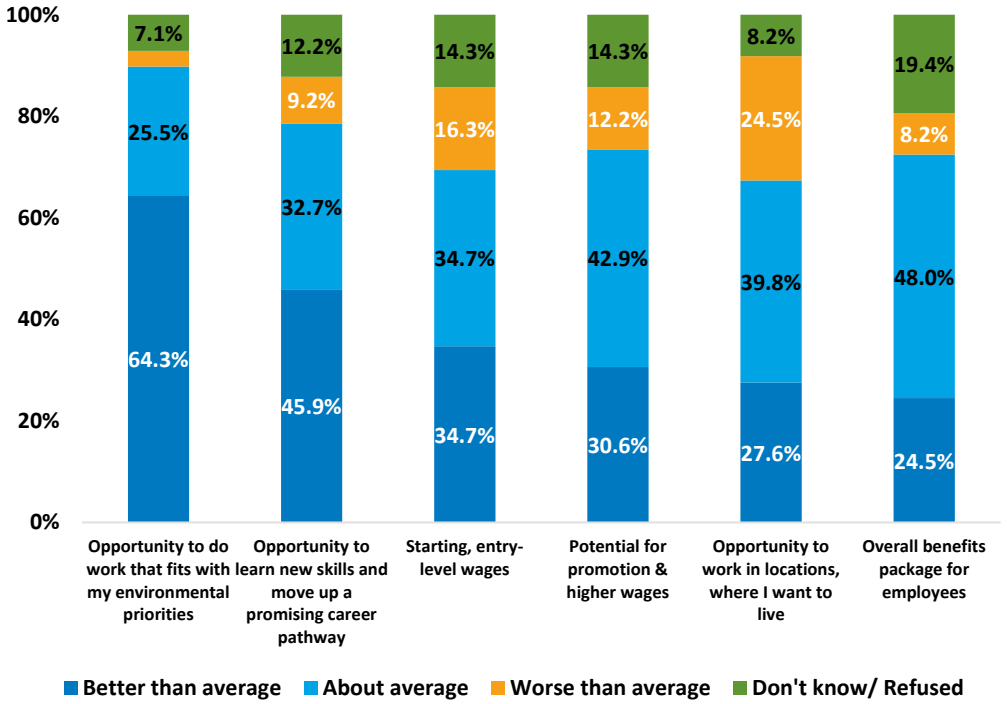
Graph courtesy of BW Research Partnership



Additionally, CWC participants reported being more satisfied when working in the wind industry than non-CWC participants, displaying the lasting effects of this collaborative program.

Feelings Toward Statements about Working in the Wind Energy Industry, CWC Participants

Graph courtesy of BW Research Partnership



Two reported weaknesses of the wind industry were a lack of desirable locations for jobs, and to a lesser extent, starting entry-level wages.

CWC participants were **1.37 times more likely** to indicate that the wind industry is better than average for "**starting, entry-level wages**."

Additionally, CWC participants were 1.17 times more likely to indicate that the wind industry is better than average at providing an "**opportunity to work in locations where I want to live**."

Establishing effective internship and apprenticeship programs and pipelines

Students and recent graduates who attended 2-year and 4-year degree programs reported that getting technical training was their top challenge when trying to find employment in the wind industry. Getting free time to focus on career goals and relevant experience were also reported as challenges by both. 4-year degree program students reported finding employment where they live or are willing to live and getting assistance from career services as challenges to finding employment in the wind industry.

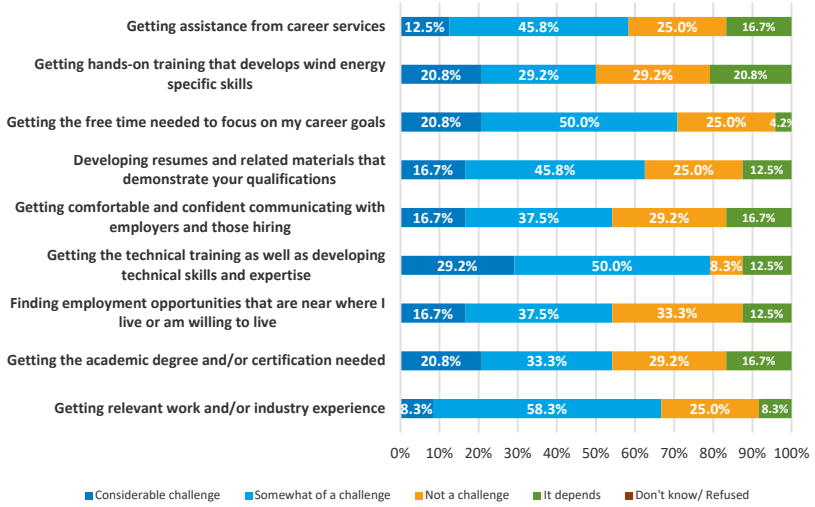
Top Three Reasons Reported For Hiring Difficulty by 2-year degree program students:

1) Getting **technical training,** developing technical skills and expertise
2) Getting the **free time** needed to focus on career goals
3) Getting relevant work and/or industry **experience**.

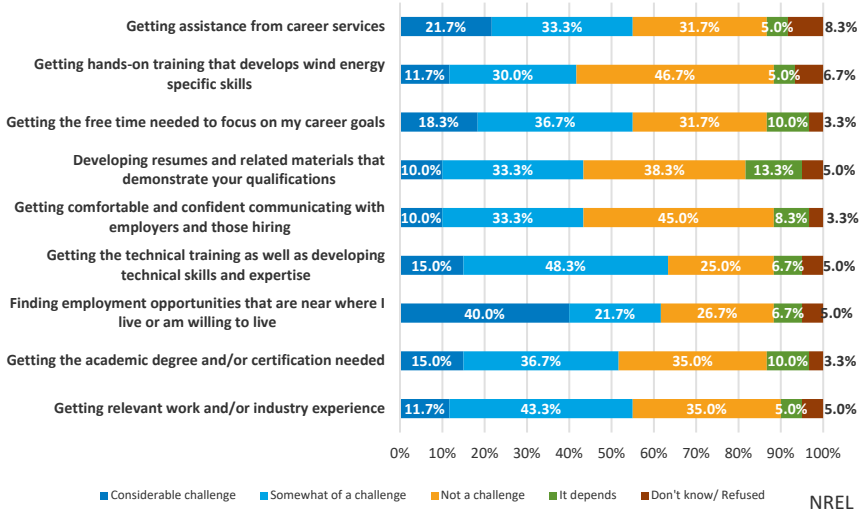
Top Reasons Reported For Hiring Difficulty by 4-year degree program students:

1) Getting **technical training,** developing technical skills and expertise
2) Finding employment opportunities near **where I live or am willing to work**
3) Tie for getting **experience, free time, and assistance from career services.**

Wind Industry Hiring Challenges: 2-year Certification or Degree Program Students



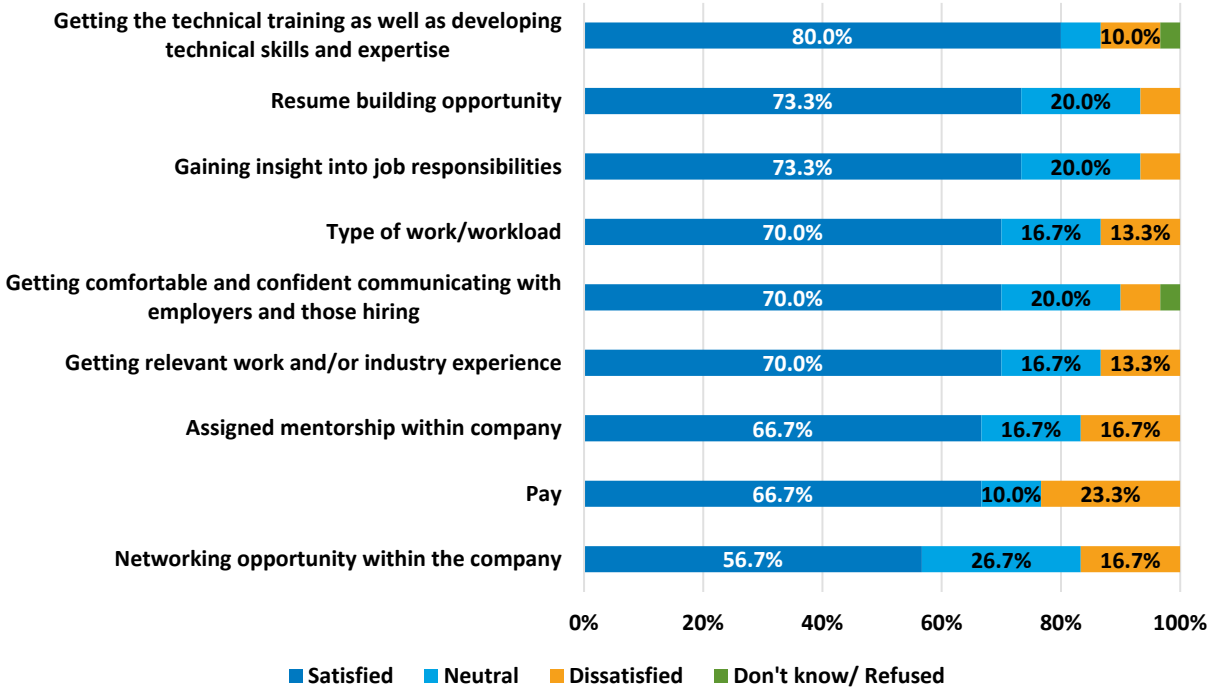
Wind Industry Hiring Challenges: 4-year Certification or Degree Program Students



Internships and apprenticeships offer a pathway for students and recent graduates to gain technical skills and expertise, and for wind industry firms to enhance the experience level of the future workforce. Student respondents who participated in internships and/or apprenticeships and were highly satisfied with their experiences.

Level of Satisfaction with Components to Internship and Apprenticeship Experiences, 2022 (n=30)

Graph courtesy of BW Research Partnership



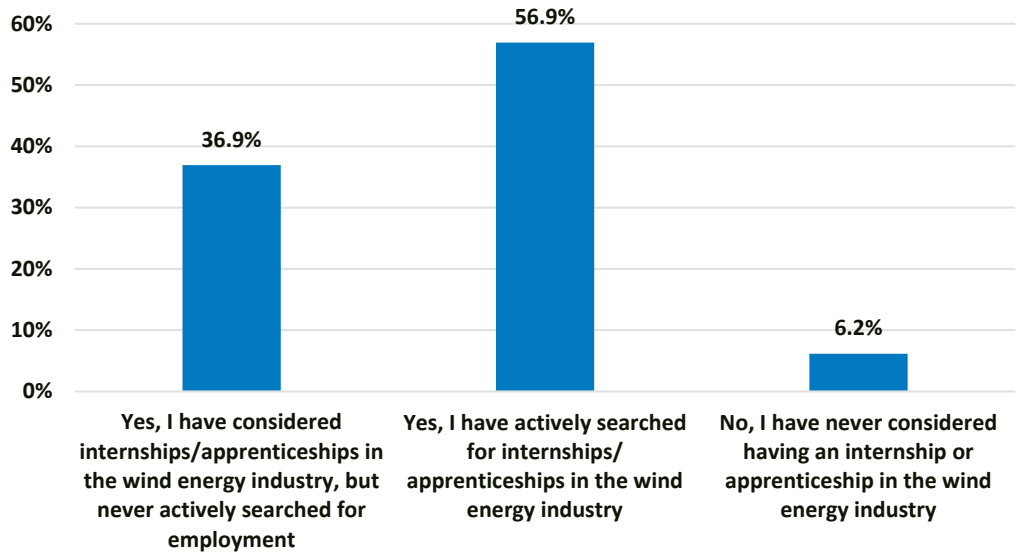
Student respondents were **most** satisfied with their ability to get **technical training and develop technical skills and expertise,** which was also reported as **the top challenge** to being hired into the wind industry.

Additionally, students are recognizing the importance of gaining internship and apprenticeship experience for entering the wind workforce.

93.8% of student respondents have considered or actively searched for internship/apprenticeship employment in the wind industry.

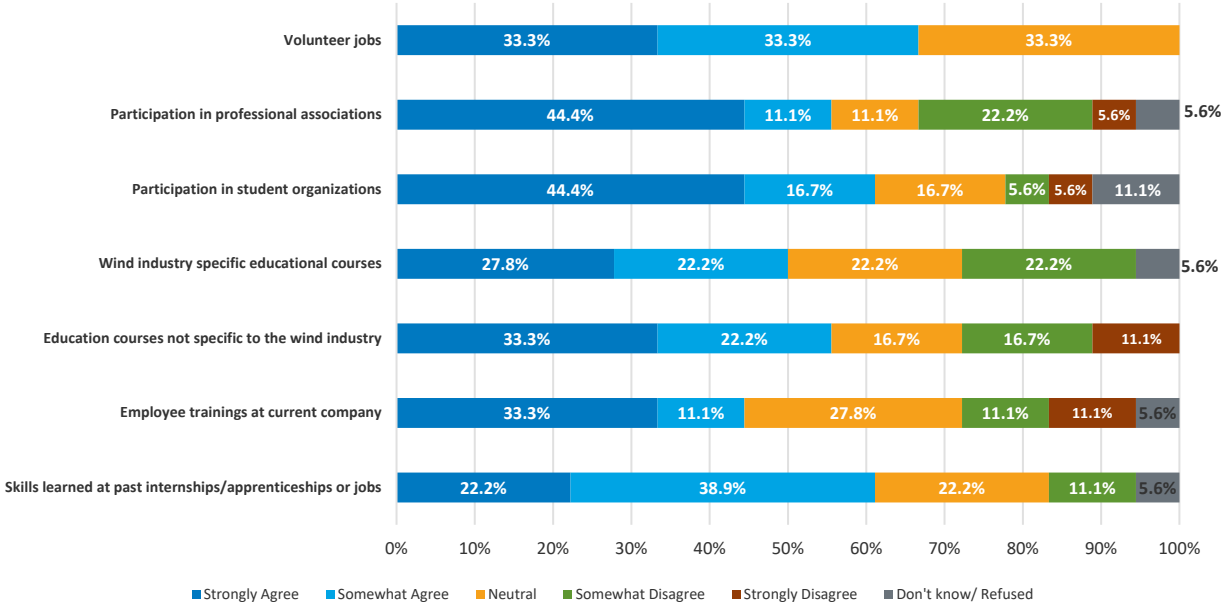
Action on Internships/Apprenticeships by Students and Recent Graduates Working in the Wind Industry, 2022 (n=65)

Graph courtesy of BW Research Partnership



Current wind industry employees reported that volunteer jobs, skills learned at past internships/apprenticeships, and participation in student organizations helped prepare them the most for their careers in wind.

Agreement with experience gaining opportunity preparation for a career in wind industry (n=18)



Top three reported valuable experience gaining opportunities:

1) Volunteer jobs (66.6%)
2) Skills learned at past internships/apprenticeships (61.1%)
3) Participation in student organizations (61.1%).

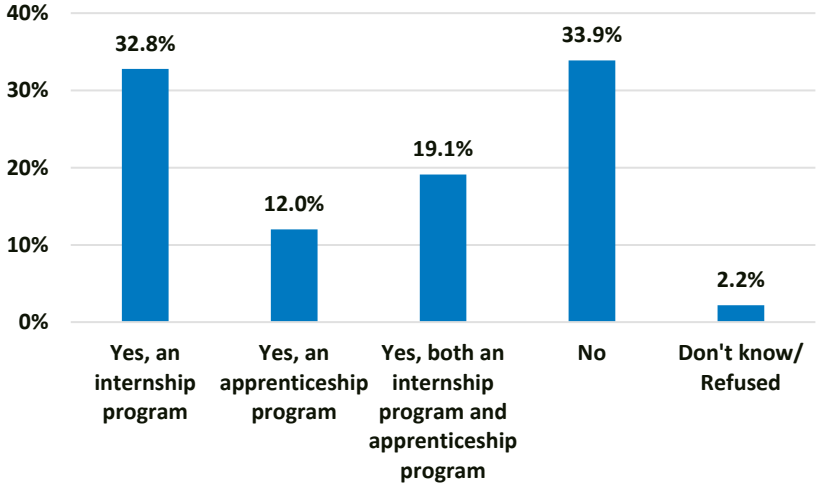
Note: These numbers are the sum of current employee respondents who reported “Somewhat agree” + “Strongly agree.”

75% of current or recent wind employees surveyed participated in an internship or apprenticeship before entering the wind industry.

According to responses of the 2022 survey effort, internship and apprenticeship program development is an opportunity for improvement among wind energy industry members. Of wind energy firm respondents, 32.8% reported having an internship program, 12.0% reported having an apprenticeship program, 19.1% reported having both an internship and apprenticeship program, and 33.9% reported having neither.

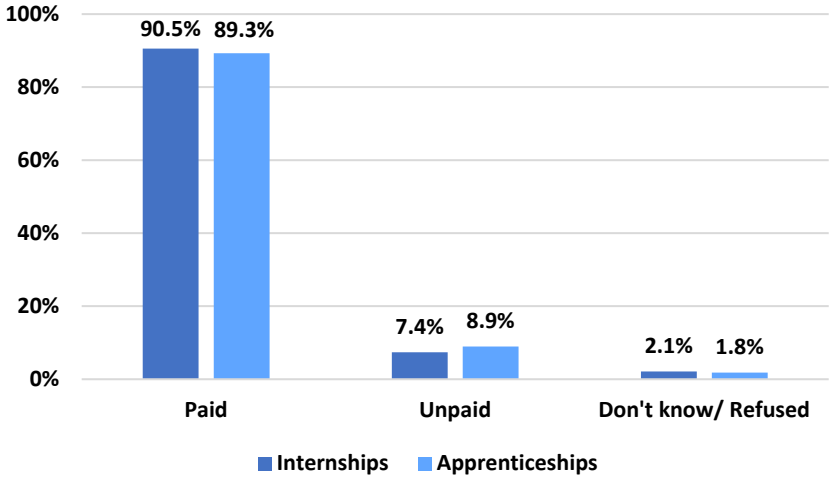
Wind Energy Firms with Established Internship or Apprenticeship Programs, 2022 (n=183)

Graph courtesy of BW Research Partnership



Paid/Unpaid Internships and Apprenticeships at Wind Energy Firms, 2022 (n=95, n=56)

Graph courtesy of BW Research Partnership

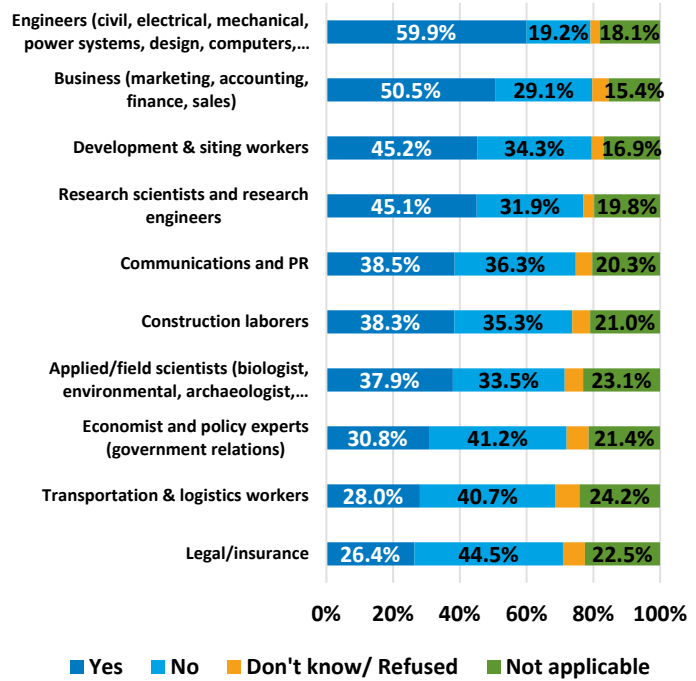


Of the wind industry firm respondents who replied that they had an internship and/or apprenticeship program, the majority reported that they were **paid** experiences.

Additionally, it was reported that there are a range of occupations with offered internships and apprenticeship programs. Engineering (59.9%) and business (50.5%) were the occupations with the most reported internships. Construction equipment operators (72.2%) and electricians (67.0%) were the occupations with the most reported apprenticeships.

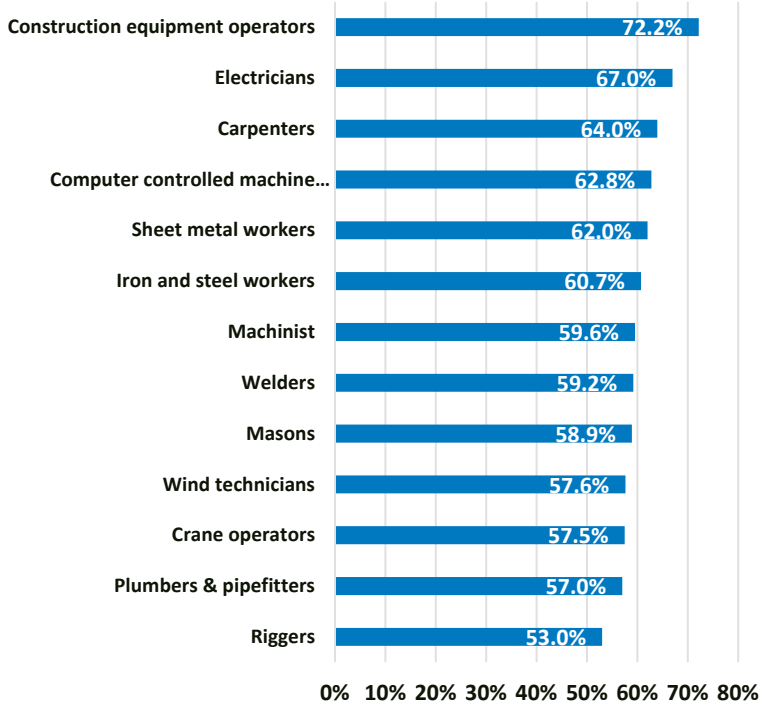
Occupations with Internships at Wind Energy Firms, 2022 (n=166–182)

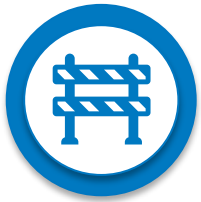
Graph courtesy of BW Research Partnership



Occupations with Apprenticeships at Wind Energy Firms, 2022 (n=73–118)

Graph courtesy of BW Research Partnership

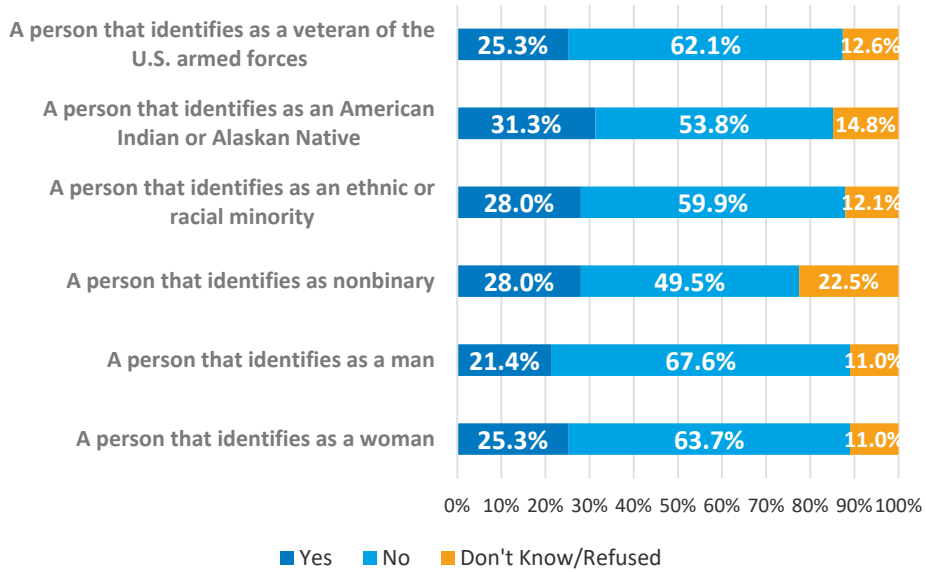




Reducing barriers for historically underrepresented populations and transitioning workers

Wind firms reported some hiring difficulty across all demographic groups. Reducing barriers into wind industry educational programs and employment is essential to improving the workforce gap. While the wind workforce continues to increase, intentional inclusivity and equity practices will be needed to not only mitigate the further emergence of historical inequities, but also ensure local benefits, such as job creation, are allocated to the communities where development is occurring.

Difficulty Hiring Specific Demographics (n = 182)

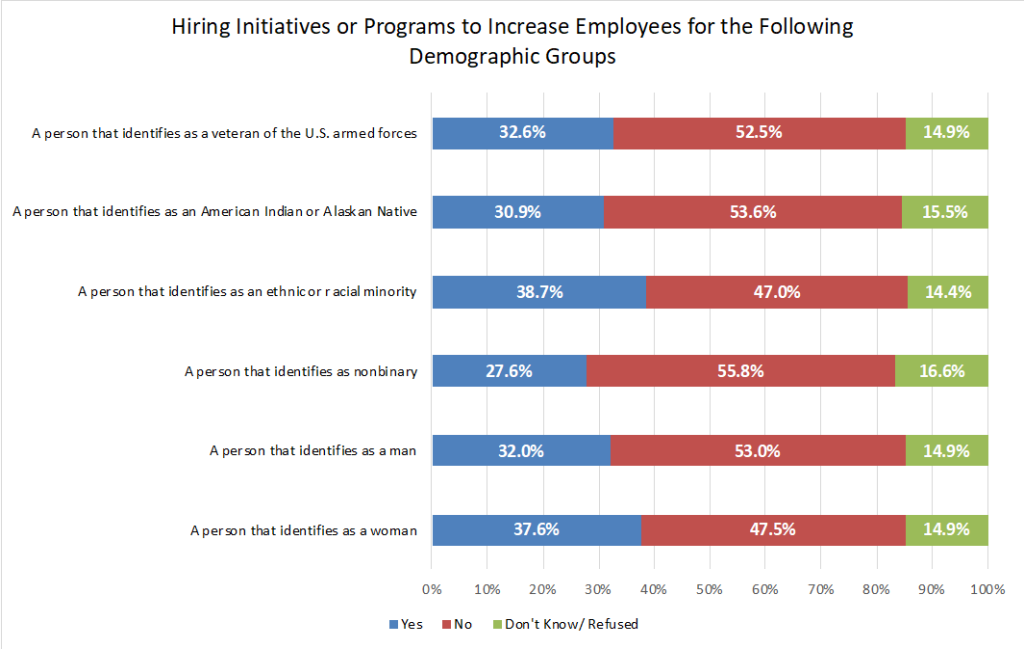


Wind firms reported the highest difficulty with hiring people who identify as:

1. American Indian or Alaskan Native (31.3%)
2. An ethnic or racial minority (28.0%)
3. Nonbinary(28.0%)*
4. Woman (25.3%)
5. Veteran (25.3%).

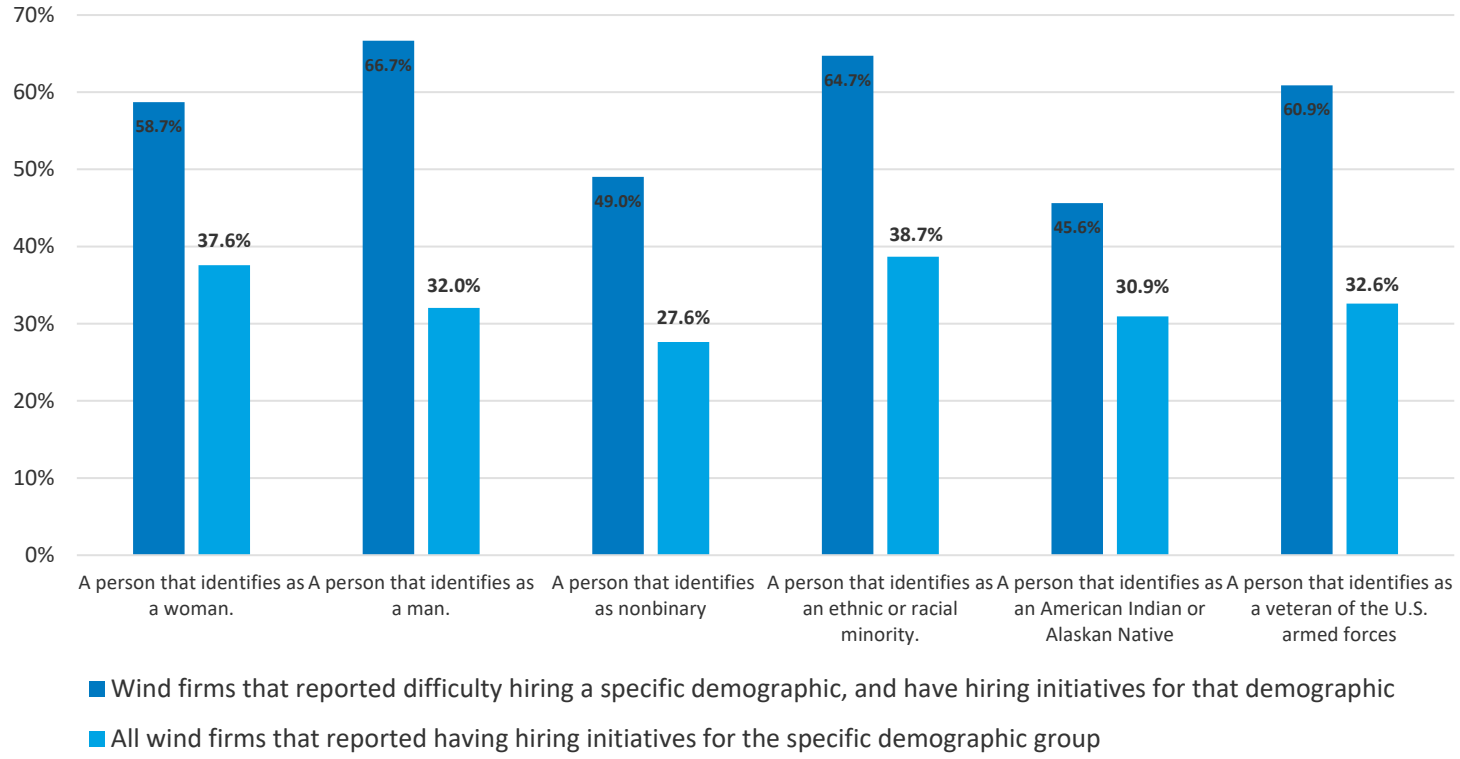
*Of the employers who responded, 22.5% were unsure or refused to answer if there was difficulty when trying to hire a person who identifies as nonbinary.

The majority of firms who participated in the survey also reported that they did not have hiring initiatives or programs to increase the number of employees for specific demographic groups (n =181).



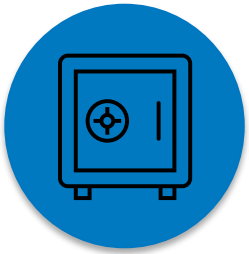
People who identify as ethnic or racial minorities, women, or veterans of the U.S. armed forces were reported to have the most hiring programs or initiatives developed for them at 38.7%, 37.6%, and 32.6%, respectively.

Wind firms that reported difficulty hiring employees from specific demographic groups also had more initiatives and programs to increase recruitment numbers as compared to all wind firms. This distribution could potentially be attributed to awareness of DEI practices and tracking of metrics within the specific wind energy firms.



Collection of meaningful wind energy workforce data and metrics is one of the first steps to ensuring progress is being made by the programs created. Through internal NREL analysis, several challenges to collecting meaningful wind energy workforce data have emerged that could hinder the creation and development of DEI programs and initiatives (Stefek 2023).

Some of the data collection challenges include:



Financial and Logistical Limitations of Scale

Dependence on Voluntary Reporting

Employee Privacy and Data Collection Practices

Low Response Rate on DEI Topics

Limited Federal Engagement

Resources

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Thank You

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