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UTILITIES AND ENERGY COORDINATION NETWORK YEAR 4 EVALUATION REPORT

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EXECUTIVE SUMMARY

Northeast Wisconsin Technical College (NWTC) aimed to address workforce shortages in the energy and utilities sector through the development of the Utilities and Energy Coordination Network. This project was designed to expand training opportunities, create new programs, and develop curricula for high-demand energy-related roles across the nation by creating a platform for industry, higher education institutions, and other stakeholders to share resources and generate partnerships in gas, electrical power, and utilities engineering to address workforce shortages.

Specific project objectives were to:

1. Leverage the knowledge base of the NWTC Program Advisory Committees to cultivate a core leadership group consisting of stakeholders representing national and regional employers from across the electrical power, gas, solar technology, energy management, and telecommunications industry, academia, energy apprenticeships, and workforce development sectors to lead the formation of the Utilities and Energy Coordination Network (the Network);
2. Create a clear, shared vision that guides the evolution of the Network; and
3. Establish the structure and norms of the Network to build relationships and trust among members.

Findings

Evaluation Question #1: How effectively is the project team bringing together key individuals in the network?

The UECN project faced early challenges in building the Network due to limitations resulting from the COVID-19 pandemic. However, consistent outreach and recruitment efforts created a strong membership in Year 2 and then more steady increases in Years 3 and 4. A substantive increase was also seen in the number of educational institutions in the Network, with only three educational institutions in Year 1 compared to 21 in Year 4.



Evaluation Question #2: To what extent do the curricula offered by community colleges in the Network align with industry needs?

Employer feedback on existing knowledge, skills, and abilities (KSAs) led to some curricular modifications, particularly in the area of communication, which was consistently reported as an important professional skill. The project team's process highlights the importance of engaging with advisory boards to review survey results and discuss needed changes.

Evaluation Question #3: What information, best practices, and/or resources are flowing through the Network? How does this information bring value to the Network?

Over the course of the grant, the UECN project team identified and developed effective communication tools that have provided valuable information for curricular development and partner engagement. Newsletter access increased in Year 4, but use of the ATE microsite remains limited.

Evaluation Question #4: How and to what extent is the cross-sector network ready to set and execute strategies, including implementing solutions for workforce issues?

The most connected industry organizations have self-identified their partnerships with educational institutions, while the two most connected educational institutions have connections that are both self-identified and reported by employers. Educational institutions reported a decrease in each type of connection while industry reported increases. This may suggest that respondents from educational institutions are less aware of the relationships that are in place with industry. The number of other Network resources, such as professional organizations, has increased over the course of the grant, creating additional value. Further emphasizing the regional nature of the Network, Network members are most active with organizations based in the Midwest.

Recommendations

1. Across four years of the UECN project, Network survey respondents consistently highlighted potential changes in curricula, which speaks to a need for gathering feedback systematically to ensure that the curriculum remains up-to-date and relevant for employer needs. NWTC and other educational institutions should continue to **gather systematic feedback from employers**, either through annual, rotating surveys or other means that are sustainable and accessible. **Consider sharing tools developed** to gather employer feedback with other educational institutions. Findings from data-gathering efforts should be shared with advisory boards or other groups of employers to discuss changes that are needed to ensure that curricula remain relevant to employer needs.
2. Although the UECN project is ending, its website will remain active, supporting the sustainability of the project. To ensure that the NWTC website is easy to navigate for those looking for information regarding the UECN, we recommend **considering the following website design elements**:
 - a. Leverage the use of headings and sections on the main landing page to help provide clarity on the goal of the website and its intended audience.
 - b. Emphasize the resources created by the grant and the call to start an energy program while reducing the amount of text explaining the Network and the grant funding.
 - c. Use text to introduce sections such as "focus areas" and the evaluation report, indicating what it is and how it relates to the overall purpose of the website, as well as how these resources

can be leveraged. Similarly, include a description of the Training Opportunities page in addition to the link to provide a stronger prompt for visitors to explore.

3. The Utilities and Energy Coordination Network was created to provide a formal platform for industry, academia, and other stakeholders to engage, share resources, and form partnerships that would lead to expanded training opportunities across the nation. Over four years, the project team made significant progress in developing the Network, and as the grant period comes to an end, the team should **consider how the network and the progress made over four years will be maintained**. One mechanism to consider may be leveraging the position of energy and utilities-related professional organizations. These organizations are those that both educational and industry partners are aware of and may look to for information in the future. Sharing resources related to the Network with these organizations could help ensure that network members continue to have a place to seek out information and a common place to collaborate.
4. As members of NWTC's project team continue to attend and participate in regional and national conferences, they should **share key lessons and resources from this project**, including the methods for and value of gathering employer feedback and guidance on developing regional partnerships.



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BACKGROUND

Funded by the National Science Foundation's Advanced Technical Education program (NSF ATE) in 2020, the purpose of NWTC's Utilities and Energy Coordination Network (UECN) grant is to create a platform for industry, higher education institutions and other stakeholders to share resources and collaborate to expand training opportunities, create new programs, and develop curricula for high-demand energy-related roles across the nation. The UECN project, also referred to as "the Network" in this report, leveraged relationships developed through prior grants, including UPDATE: Utilities Pipeline Development for Advanced Technological Education (DUE#1304726) and the Planning Grant for a Utilities and Energy Regional Center of Excellence (DUE#1700673) to create a formal utilities and energy coordination network.

Northeast Wisconsin Technical College (NWTC) is a two-year technical college located in Green Bay, WI, that offers one of the widest varieties of utility-related associate degrees, technical diplomas, and certificates in the Midwest and has partnered with local employers to meet regional economic needs for over 100 years. NWTC is also home to the Great Lakes Energy Education Center, a "living energy" laboratory featuring the latest technologies and serving as a model of sustainable building practices. NWTC's expertise and experience put the College in an excellent position to form and facilitate a network of industry and educational partners.

The needs of industry outweigh the ability of a single entity to fill the workforce pipeline. For example, the energy industry is suffering from shortages of key engineering and technical skills due to an aging workforce approaching retirement, changing technologies and fewer qualified, younger candidates. While NWTC has seen an increase in enrollment overall and in trades following the pandemic, the needs of industry outweigh the ability of a single entity to fill the workforce pipeline.

Matching industry partners to community colleges with expertise to train future technicians is critical to addressing pipeline shortages. Such partnerships will help industry gain access to students, training expertise, and graduates who want to work close to home. Higher education institutions will benefit from industry partners who can provide input and feedback on program competencies and access to resources such as equipment, tools, and field experiences. The Network aims to provide a platform to cultivate and generate partnerships that can expand training opportunities in gas, electrical power, solar energy, energy management, and apprenticeships to address workforce shortages across the nation.

The project objectives of the Network were to:

1. Leverage the knowledge base of the NWTC Program Advisory Committees to cultivate a core leadership group consisting of stakeholders representing national and regional employers from across the electrical power, gas, solar technology, energy management, and telecommunications (energy apprentices?) industry, academia, and workforce development sectors to lead the formation of the Utilities and Energy Coordination Network (the Network);
2. Create a clear, shared vision that guides the evolution of the Network; and
3. Establish the structure and norms of the Network to build relationships and trust among members.

This document details the Network's progress in its fourth and final year of funding.



PURPOSE AND DESIGN OF THE EVALUATION

The Rucks Group, LLC (see Appendix A for author biographies) was contracted at project initiation to provide external evaluation services for the Network and has worked collaboratively with project leadership to determine the evaluation methods. The project's theory of change hypothesizes that bringing industry, academia, and other stakeholders together with a shared purpose will lead to resource sharing and collaborations focused on addressing current and anticipated industry workforce and training needs through new programs and curriculum development. Guided by the logic model (see Appendix B), the evaluation design includes formative evaluation for project improvement and summative evaluation to continually gather evidence of impact.

Evaluation Questions

Driving the evaluation were four questions:

1. How effectively is the project team bringing together key organizations in the Network?
2. To what extent do the curricula offered by community colleges in the Network align with industry needs?
3. What information, best practices, and/or resources are flowing through the Network? How does this information bring value to the Network?
4. How and to what extent is the cross-sector Network ready to set and execute strategies, including implementing workforce issues solutions?

All four evaluation questions are addressed in this report.

Data Gathering Approaches

The evaluation used a mixed-methodological approach, collecting both qualitative and quantitative evidence of the completion of deliverables (e.g., outputs) and short-term project outcomes. Data collection in the third year relied on reviews of project-level documents (e.g., meeting notes, communication activity, outreach activity), regular meetings with the project team to understand project progress and planning, a listening session with project team members (see Appendix C for protocol), employer surveys (Appendices D and E) to gather feedback about the skills they need in their workforces, and a Network member survey (Appendix F) to understand expectations and communication preferences.

The UECN Network Survey was distributed three times over the project's four years – in Spring 2021, Fall 2022, and Spring 2024 – to individuals from industry organizations and educational institutions. The data from these surveys are used throughout this report to identify how connections and the types of relationships between industry and education using descriptive statistics have changed over the life of the project.



The Spring 2024 iteration of the UECN Network Survey was distributed to 574 individuals who were identified as being a part of the Network. The initial invitation to participate in the survey was sent through the survey platform Qualtrics. In the initial distribution, 70 emails bounced, indicating that the individuals did not receive the invitation. To reach these individuals, an email was sent from a project team member using a mail merge that included their personal survey link. One reminder was sent through Qualtrics approximately one week after the initial invitation. Due to a low response rate, two final emails were sent from a project team member. The Network Survey was closed after three weeks, with 106 individual responses (18%). Below is a summary of the distribution of the Network Survey in Years 1, 3, and 4 ([Table 1](#)). Notably, the number of recipients has increased while the response rate has decreased.

	Year 1 Network Survey	Year 3 Network Survey	Year 4 Network Survey
Number of individuals who received the survey	174	434	574
Response Rate	39%	20%	18%

Table 1. Network Survey Distribution and Response Rates Over Three Years

FINDINGS

Evaluation Question #1: How effectively is the project team bringing together key individuals in the network?

In Years 1 and 2, the global pandemic hindered the project team's outreach and recruitment efforts. While their original intent was to attend multiple conferences and host adjacent sessions to share information about the Network and hear firsthand what potential members needed, many activities in Years 1 and 2 became virtual. As more professional events returned to in-person formats in Years 3 and 4, the project team was able to participate in over a dozen regional and national conferences and events over two years. In Year 3, the team participated in 14 unique conferences, including seven (50%) regional and seven (50%) national conferences. In Year 4 (NCE), the team attended two national and four regional conferences.

The team also attended several conferences in both Year 3 and Year 4, including the HI-TEC conference, the ATE PI conference, the RENEW WI Energy Summit, and the Wisconsin Energy Efficiency Exposition (WEEE). The project team believes that being part of the ATE community and having opportunities to interact with other organizations has helped them to create connections through their participation in the ATE PI and HI-TEC conferences. These convenings have provided forums for sharing information about the Network project and connecting with current and potential members. A complete list of the conferences attended in Years 3 and 4 can be found in Appendix D.

Despite the challenges they faced at the start of the grant, the project team identified most of the Network partners in Year 2 (Figure 1). Network expansion continued steadily through Years 3 and 4, with 92

organizations now identified as members¹. The largest increase has been the number of educational institutions joining the Network, with six new educational members added in Year 4.

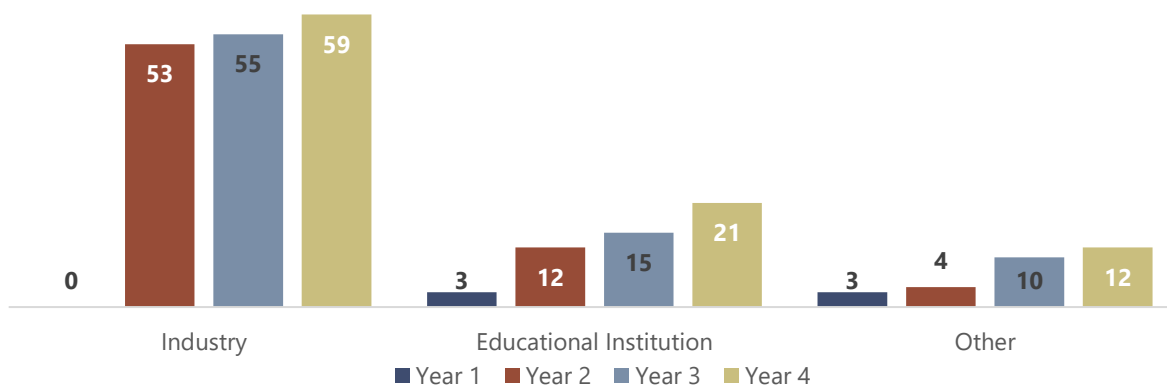


Figure 1. UECN organization membership.

Conclusions

The UECN project faced early challenges in building the Network due to limitations resulting from the COVID-19 pandemic. However, consistent outreach and recruitment efforts created a strong membership in Year 2 and then more steady increases in Years 3 and 4. A substantive increase was also seen in the number of educational institutions in the Network, with only three educational institutions in Year 1 compared to 21 in Year 4.

Evaluation Question #2: To what extent do the curricula offered by community colleges in the Network align with industry needs?

A key objective of the UECN project is to understand the extent to which the curricula offered by colleges in the Network align with industry needs. During each year of the project, the project team monitored the existence of specific educational programs at member colleges and systematically sought feedback from employers on the technical and professional skills they consider when hiring. This information was used to review and modify NWTC's college curricula to ensure that they reflect employer needs and are shared more broadly with the Network.

Academic Programs

The number of utilities- and energy-related programs offered by colleges in the Network varies (Figure 2). Across three years, the most commonly offered programs were those in Solar Energy and Electrical Power Distribution/Lineman, although it should be noted that increases could, in part, be due to the differing number of educational institutions responding to the Network survey across the three years. Despite a drop in the response rate, in the most recent iteration of the Network Survey, there was a slight increase in the number of educational institutions respondents (33%) compared to Year 1 (24%) and Year 3 (31%).

¹ <https://www.nwtc.edu/about-nwtc/nwtc-locations/green-bay/great-lakes-energy-education-center/utilities-and-energy-coordination-network/utilities-and-energy-coordination-network-resources>

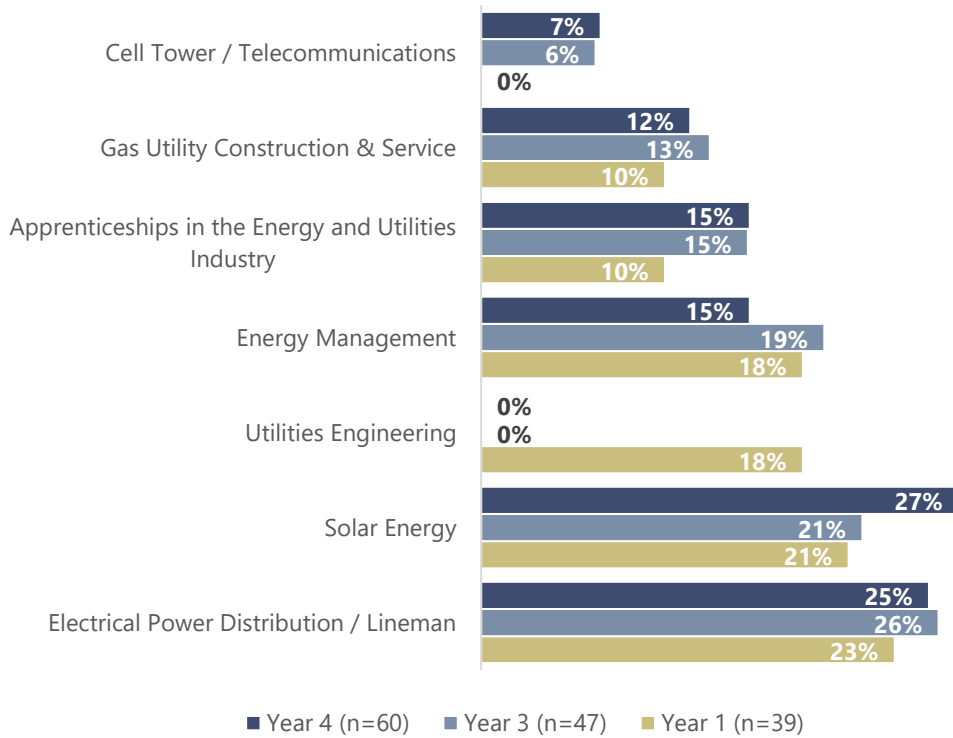


Figure 2. Programs currently offered by responding educational institutions.

Respondents were also asked to indicate which programs they may implement in the future. As shown in [Figure 3](#), the number of institutions reporting that they are considering implementing Apprenticeships in the Energy and Utilities Industry and Energy Management have increased, while the number of institutions reporting that they are considering implementing programs in Gas Utility has decreased.



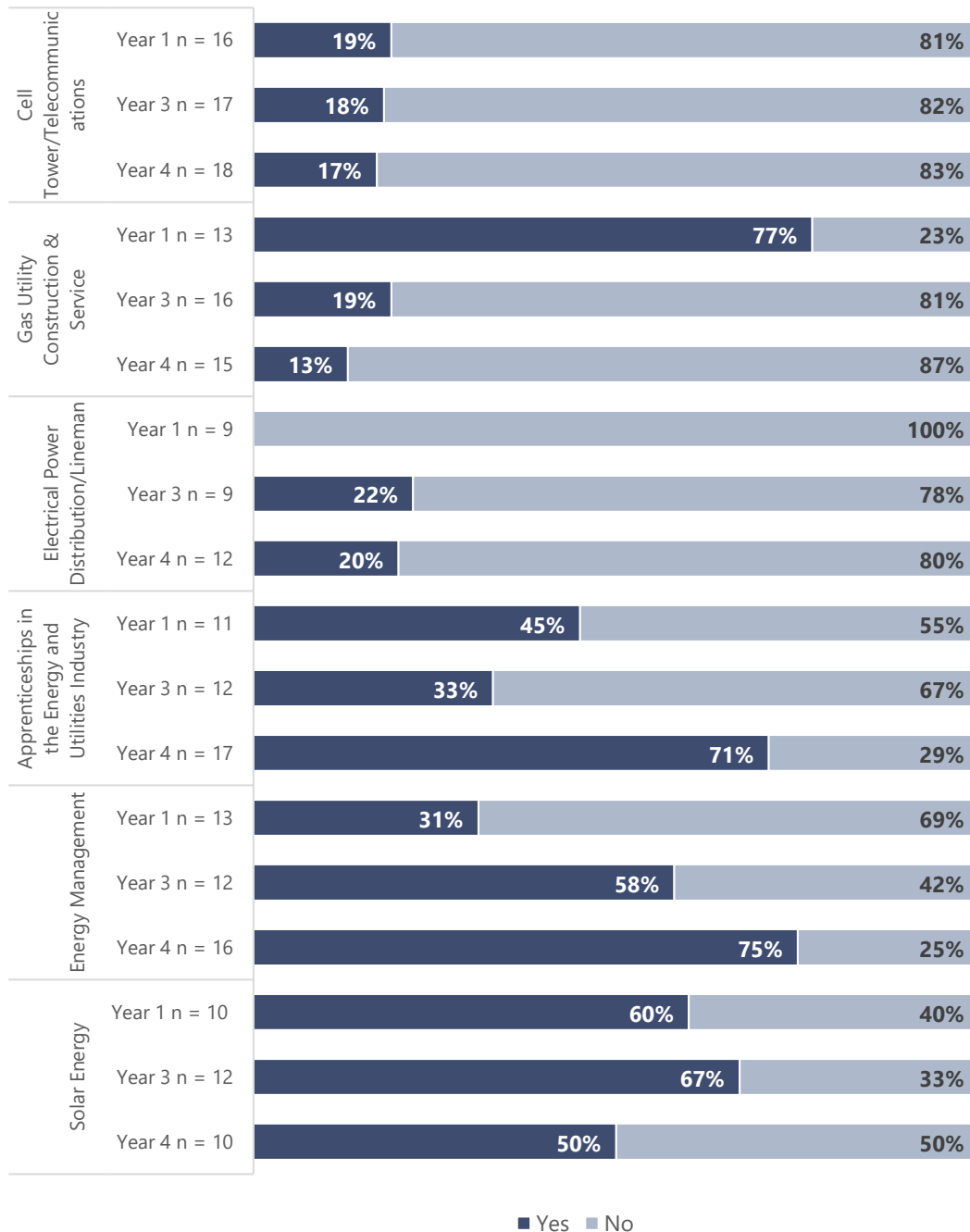


Figure 3. Programs being considered for implementation by responding educational institutions.

Employer Feedback

The UECN project team also sought employer feedback through industry-focused surveys to inform curricular modifications. In each survey, industry employers were asked to indicate the extent to which specific knowledge, skills, and abilities (KSAs) represented in the Wisconsin Technical College System curriculum are important to their company when they are hiring, as well as the training opportunities they offer. Over four

years, five groups were surveyed – Gas Utility (Year 2), Energy Management (Year 3), Electrical Power Distribution (Year 3), Telecommunications (Year 3), and Solar Energy (Year 4).

Gas Industry

In February 2022, 157 employers in the Gas Utility and Construction and Service industry were invited to participate in a survey, with 17 (11%) doing so. The NWTC Gas Utility Construction and Service team reviewed the results of the Year 2 survey and discussed possible changes to the existing curriculum. In Year 3, proposed changes based on employer feedback were shared with their Advisory Committee: 1) replacing some courses to provide more options for students, 2) adding and removing competencies in specific courses, 3) combining courses to meet needed competencies, and 4) creating new courses focused on safety and communication. A notable change in the curriculum was the discontinuation of *Communication Writing* and *Communicating Effectively*, which was replaced with a more industry-aligned course on *Utility Workplace Communication*. These changes lowered the number of credits required from 34 to 31, reducing the cost of the program while aligning competencies with industry needs. The Advisory Committee voted on and approved these changes.

Energy Management

A survey was sent to 46 Energy Management employers in Fall 2022, and 17 responses were received (37%). The NWTC Energy Management instructor noted that the results were well-aligned with the NWTC curriculum: *"We have been orienting the program towards building automation training, and those skills were emphasized [by employers]."* These survey data were shared with the Energy Management Advisory Committee, and no curricular changes were proposed.

Electrical Power Distribution

In Spring 2023, 165 employers in the Electrical Power Distribution industry were surveyed. Results from 27 respondents (16%) were presented to the Advisory Committee in March 2023. Similar to the Gas Industry curriculum, *Communicating Writing* and *Communicating Effectively* are being replaced with *Utility Workplace Communication*, which is tailored to utility industry communication. The Advisory Committee voted on and approved these proposed changes.

Telecommunications

In the Summer of 2023, 108 employers in the Telecommunications field were surveyed, and 17 responses were received (16%). These survey data were shared with the Telecommunications Advisory Committee, but no curricular changes were proposed.

Solar Energy

A survey was sent to 47 Solar Energy employers in Fall 2023, and 11 responses were received (23%). These survey data were shared with the Solar Energy Technology Advisory Committee in April 2024, with the committee noting that the survey indicated that the program appropriately aligns with industry needs. At the time of the meeting, the addition of a drone certificate was considered; however, this modification was not based on the results of the employer survey.

Professional Skills

Across the five completed employer surveys – Gas Utility, Energy Management, Electrical Power Distribution, Telecommunications, and Solar Energy – the emphasis on certain professional skills varies slightly. For example,



Gas Utility employers place less emphasis on computer skills and more emphasis on teamwork than those in the Energy Management field. Similarly, Electrical Power Distribution and Gas Utility employers place less emphasis on computer skills than employers in Solar Energy. In the aggregate, skills in verbal and written communication, customer service, problem-solving, and teamwork are most important to employers across all five industries (Table 2).

Ranking	Professional Skill
1	Verbal and written communication skills
2	Customer service
3	Problem-solving
4	Teamwork
5	Computer Skills
6	Conflict Resolution
7	Handling feedback
8	Diversity, equity, and inclusion

Table 2. Average employer ranking of importance of professional skills when hiring.

Industry Needs

When asked about the needs they see in the Energy and Utilities industry, responses were similar to those seen in the Year 3 survey, with comments falling into themes around workforce development, education and training, and program/career awareness (Table 3). Additional themes that emerged in Year 4 included technology and innovation, collaboration and coordination, and professional skills development.

Themes	Example Comments
Workforce Development and Recruitment	<ul style="list-style-type: none"> • Workforce development, both recruitment and retention strategies • Finding qualified, drug-free employees with Class A licenses who desire to work and learn. • More people to be interested in pursuing careers in these fields. • More training opportunities to help with education. • More well-trained employees.
Education and Training	<ul style="list-style-type: none"> • Educational opportunities for all utility staff or assisting career opportunities for those seeking a career in utilities - water, wastewater, billing, etc. • A public grade school system that teaches shop classes in woods and metals through middle school. A public high school system that teaches metals shops, including welding and fabricating, wood shop, automotive shop, electronics classes, and even pre-power line apprenticeship programs. • More feedback about training, requested by apprenticeship programs, from employers. • More collaboration and opportunities for on-the-job training for students. • Qualified candidates who possess drafting and engineering skills. It's too far-segmented; it's either one or the other.

Technology and Innovation

- Integration of more technology to streamline & make work safer.
- Climate change resilience.
- Electric demand is growing – potentially at an exponential rate, and the industry is becoming more and more complex. High-quality, well-trained, and competent people will be in high demand as this workforce continues to evolve.

Collaboration and Coordination

- Improved collaboration.
- A central clearinghouse of information describing each of the groups in your earlier list.
- Stronger regional education partner collaboration outside of WI to develop a roadmap to meet regional needs. Having every school replicate training is redundant, and resources should shift to supporting educational training centers of excellence.

Specific Skill Needs

- Telecom engineers
- Fuser and CDL License
- HVAC installers and building automation technicians

Professional Skills Development

- People skills
- Workers with a good work ethic. We incorporate this attitude adjustment in our program!
- Communication.

Table 3. Responses to "A need I see in the Energy and Utilities industry is:..".

Conclusions

Employer feedback on existing KSAs led to some curricular modifications, particularly in the area of communication, which was consistently reported as an important professional skill. The project team's process highlights the importance of engaging with advisory boards to review survey results and discuss needed changes.

Evaluation Question #3: What information, best practices, and/or resources are flowing through the Network? How does this information bring value to the Network?

Information and resources are being made available to the Network through communication tools that have evolved over the course of the grant. Early experiments with the Microsoft™ Teams platform were discarded as it was not an accessible tool for communication or information sharing with individuals outside of NWTC. The project team has since relied on a newsletter, a campus-based website, and an ATE microsite to share information.

UECN Newsletter

The project team published four newsletters during Year 4 – in September 2023, January 2024, March 2024, and July 2024². These newsletters contained updates on grant activities, information about partnerships and training opportunities, available funding, highlights from NWTC programs, a link to the Network microsite, and contact information for each project team member. Contact information for newsletter recipients was gathered from various sources, including a list of organizations that had connections to energy programs from NWTC’s research librarian and the Brown County library list, a list of contacts from a partner, and organizations or individuals that others may have added or invited to the newsletter distribution list. While Network members also received the newsletter, the number of newsletter recipients was more expansive, as recipients were gathered from a wider array of sources, rather than just from organizations who requested to become a part of the Network. While the delivery rate remained consistent across Year 4, there was an increase in the number of individuals receiving the newsletter, as well as the percentage of recipients opening the newsletter (Figure 4). At the end of Year 3 (June 2023), 391 individuals received the newsletter, with 27% of recipients opening it. Comparatively, in March 2024, 451 individuals received the newsletter, with 53% of recipients opening it.

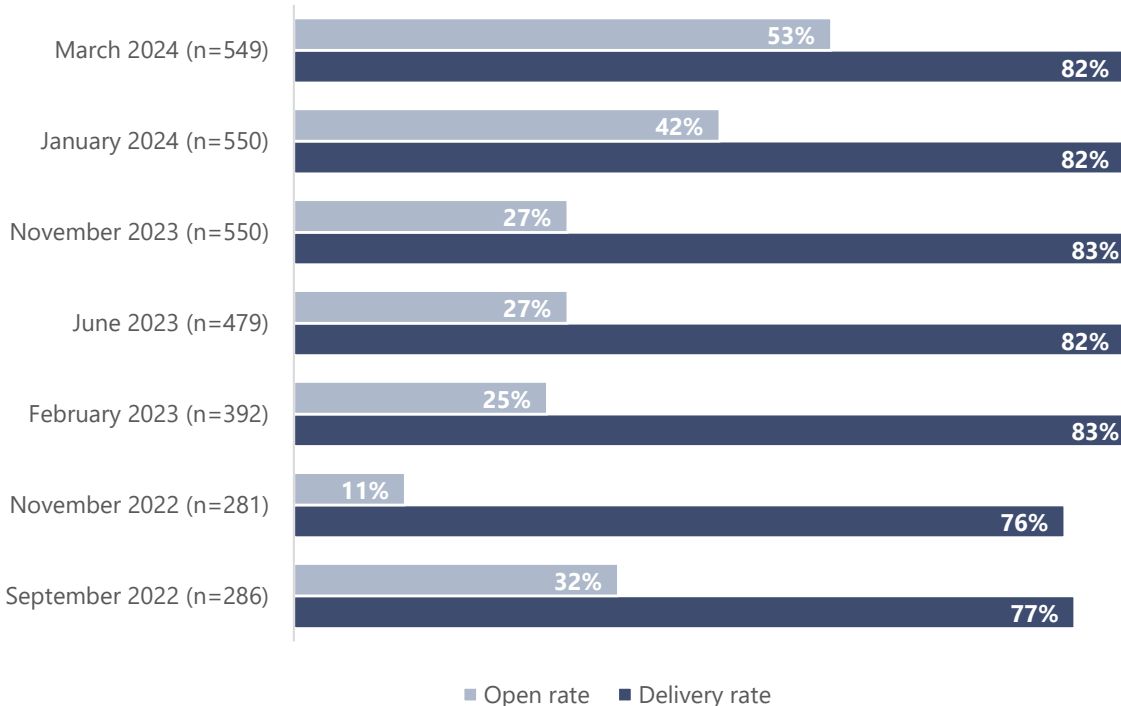


Figure 4. UECN Newsletter analytics.

As the grant has ended, the UECN newsletter will not be continued.

UECN Website and Microsite

While the Network maintains a presence on the NWTC website, in Year 2, the project coordinator built a microsite hosted by ATE Central. The ATE Microsite Service helps projects create a mini-website as a platform to

² Newsletters available at <https://atecentral.net/msites/UECN/newsletters>

share documents, publish curriculum materials, announce events and publications, and disseminate the products and progress of their grant project. Unlike many campus-hosted sites, the microsite allows project teams to update content themselves and removes limitations related to campus website traffic.

The project team ensured that key information about the Network was available on the microsite, including access to curricular resources (e.g., course descriptions, sample student schedules, instructor job descriptions, and sample budgets), information on training and development opportunities from NWTC and other Network partners, and access to the Network newsletter. Analytics became available for the microsite midway through Year 2 in 2022. In the latter half of Year 2, the microsite received 108 unique views. In Year 3, the first year microsite data was available for the entirety of the year; the microsite received 346 unique page views, although 76% of Network survey respondents reported that they were not aware of it. In Year 4, the microsite received 148 unique views, while 67% of respondents on the Year 4 Network survey reported that they were not aware of the microsite (Figure 5).

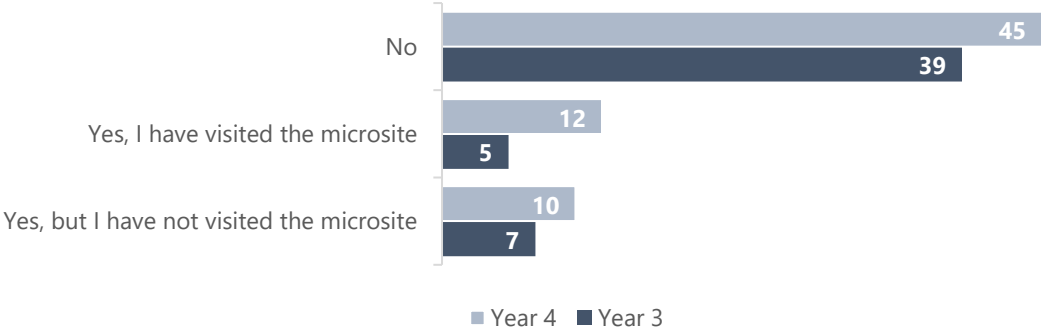


Figure 5. Respondents’ awareness of the Network microsite at <https://atecentral.net/msites/UECN>.

Similar to Year 3, most visitors to the microsite went no further than the home page (Figure 6).

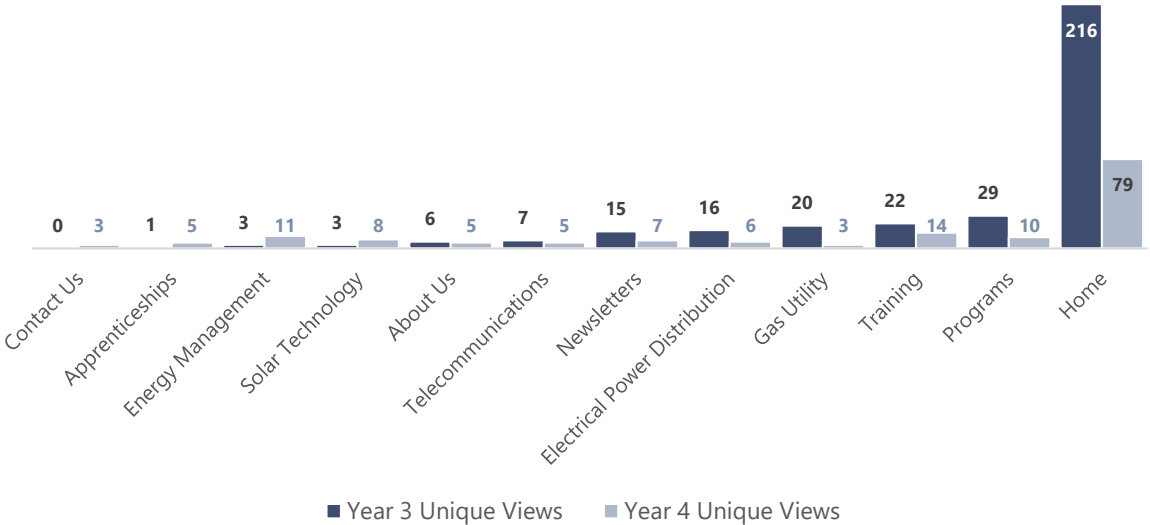


Figure 6. Unique views of microsite pages.



Comparatively, the college-based website³ saw an increase in views between Years 3 and 4. Between July 2022 and February 2023, the website saw only 86 page views, while in Year 4, between July 2023 and June 2024, the college-based website saw 251 new users. The most frequently visited page was the 'About' page, with 226 views.

At the end of the grant, the microsite will still be available through ATE. The NWTC UECN web page has been consolidated and will remain active. On the "Training Opportunities" page, NWTC's energy events will appear after those updates are finalized.

Conclusions

Over the course of the grant, the UECN project team identified and developed communication tools that have provided valuable information for curricular development and partner engagement. Year 4 has seen an increase in newsletter access, but use of the microsite remains limited.

Evaluation Question #4: How and to what extent is the cross-sector Network ready to set and execute strategies, including implementing workforce issues solutions?

The UECN project aimed to bring industry, academia, and workforce development entities together with a shared purpose that would lead to resource sharing and collaborations focused on addressing current and anticipated industry workforce and training needs through new programs and curriculum development. Network survey results suggest that there are some connections among these organizations, but there are still opportunities to develop meaningful and mutually beneficial collaborations.

Network Characteristics

The Network survey provided some insight into the extent of connections between industry employers and educational institutions. However, one limitation of these data is that they do not include all current or potential Network members, only those that responded to the survey, so the true number of connections among members is not known.

Among employers, the top five connected industry organizations in Year 4 are shown in Table 4. Almost all of these reported connections are one-way, with industry members identifying connections to educational institutions but not reciprocated by educational institutions. This may be due to the limited number of educational institutions responding to the survey.

Industry Organization	# of connections	# of reciprocal connections	# educator-identified connections	# employer-identified connections
Missouri Valley Line Constructors Apprenticeship - NECA & IBEW	10	0	0	10

³ See <https://www.nwtc.edu/about-nwtc/nwtc-locations/green-bay/great-lakes-energy-education-center/utilities-and-energy-coordination-network>

HGA	8	0	0	8
Nsight Telecommunications	7	1	1	7
NATE: The Communications Infrastructure Contractors Association	7	0	0	7
Magnolia River	6	0	0	6

Table 4. Top five connected industry organizations (Year 4).

Across the three iterations of the Network Survey, NATE was the only organization that was one of the top five connected industry organizations more than once (Year 3 and Year 4) (Table 5). While Magnolia River and Missouri Valley Line Constructors Apprenticeship were in the top five for the first time in Year 4, these organizations were mentioned in previous iterations of the Network Survey, albeit less frequently than organizations listed in the top five, suggesting that there is more awareness of their relationships with educational institutions and/or that the number of relationships has increased.

Industry Organization	Top 5 Connected Industry Organizations Year 1	Top 5 Connected Industry Organizations Year 3	Top 5 Connected Industry Organizations Year 4
Alliant Energy	Eight connections		
Centuri Group, Inc.		Six connections	
HGA			Eight connections
Holtger Bros. Inc.	Seven connections		
IBEW Local 2150		Five connections	
Magnolia River			Six connections
Midwest Tribal Energy Resources Association	Seven connections		
Missouri Valley Line Constructors Apprenticeship – NECA & IBEW			Ten connections
NATE: The Communications Infrastructure Contractors Association		Nine connections	Seven connections
Nsight Telecommunications			Seven connections
Slipstream	13 connections		
WEC Energy Group – We Energies & WPS		12 connections	
Wisconsin Public Service	13 connections		
WPPI Energy		13 connections	

Table 5. Top Connected Industry Organizations Over Three Iterations of the Network Survey (Year 4)

Among educational institutions, the top five connected institutions were NWTC, Chippewa Valley Technical College, SUNY Canton, Danville Community College, and CT State Community College (Table 6). NWTC was the only educational institution with reciprocal connections, meaning there were instances in which NWTC listed an employer who also listed NWTC as an educational partner. There were five instances in which this was the case. This can be seen in Table 5 below, as there were 28 employers that listed NWTC as a connection and 37 employers that NWTC listed as a connection. When taken in sum, this would come to 65 connections; however,

because there were five instances where the connection was reciprocal, there are only 60 connections listed, as the connection would only be counted once in instances where both entities identified the connection.

Educational Institution	# of overall connections	# of reciprocal connections	# employer-identified connections	# educator-identified connections
Northeast Wisconsin Technical College	60	5	28	37
Chippewa Valley Technical College	25	0	6	19
SUNY Canton	7	0	0	7
Danville Community College	4	0	0	4
CT State Community College	4	0	0	4

Table 6. Top five connected educational programs.

As shown in the bolded rows in Table 7, NWTC, Chippewa Valley Technical College, and Danville Community College have consistently been identified as highly connected in the Network Survey. (Year 4)

Educational Institution	Top 5 Connected Educational Institutions	Top 5 Connected Educational Institutions	Top 5 Connected Educational Institutions
	Year 1	Year 3	Year 4
Chippewa Valley Technical College (WI)	X	X	X
CT State Community College (CN)			X
Danville Community College (VA)	X	X	X
Heartland Community College (IL)		X	
Lakeshore Technical College (WI)		X	
Northeast Community College (NE)	X		
Northeast Wisconsin Technical College (NWTC) (WI)	X	X	X
Richmond Community College (NC)	X		
SUNY Canton (NY)			X
Walla Walla Community College (WA)		X	

Table 7. Top Connected Educational Institutions Over Three Iterations of the Network Survey (Year 4)

Organizations that are less connected represent the potential of the Network and are opportunities for outreach, engagement, and recruiting.

Industry and educational respondents emphasized different types of connections with partners over time. In the area of career-related support, the percentage of educational institutions saying that they had partnerships with industry partners that included internships/apprenticeships has increased (42% in Year 1 to 68% in Year 4); however, industry organizations identifying partnerships that involved internships/apprenticeships decreased from 58% in Year 1 and 32% in Year 4 (Figure 7).

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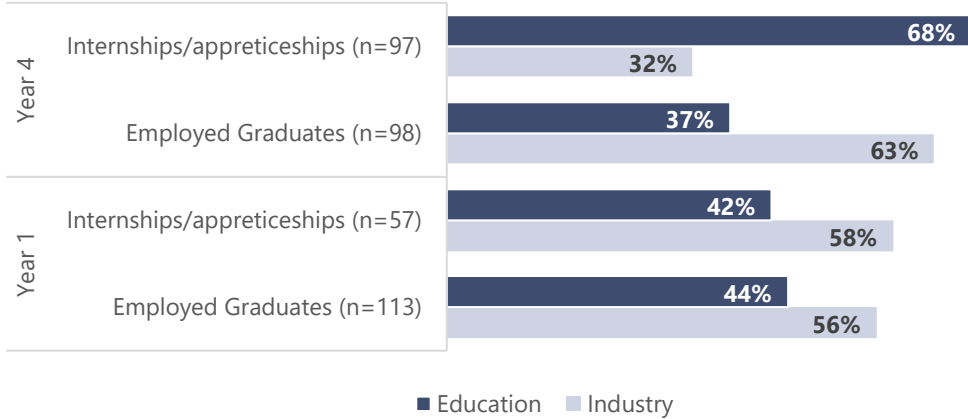


Figure 7. Percentage of Industry and Educational Institutions Whose Connections Provide Career Support

A similar trend was seen across educational supports, including partnerships that involved educational resources, instructional support, and faculty/professional development. This difference was most notable for instructional support. In Year 1, 37% of industry partners shared partnerships that involved instructional support, while in Year 4, that percentage increased to 65%. Comparatively, while 63% of educational institutions reported partnerships involving instructional support in Year 1, only 35% reported partnerships that involved instructional support in Year 4 (Figure 8).

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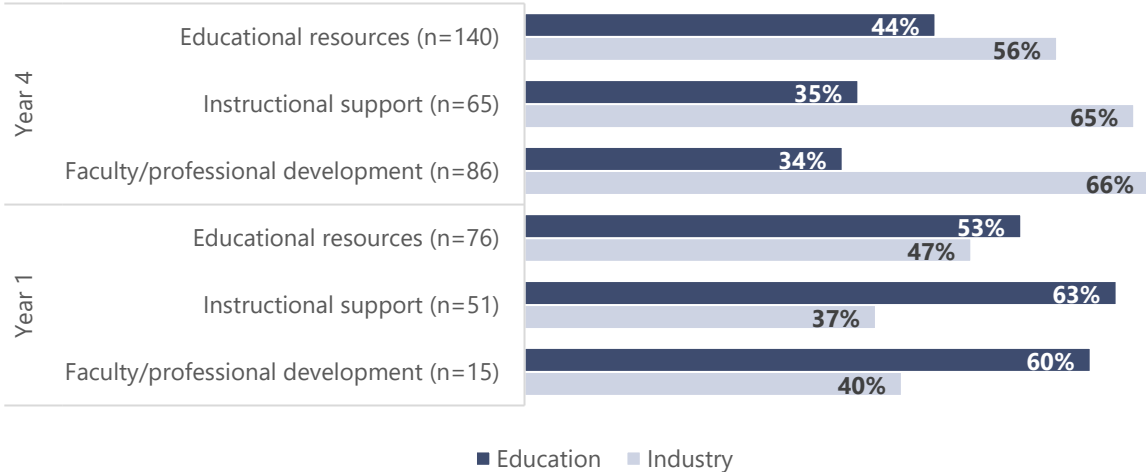


Figure 8. Percentage of Industry and Educational Institutions Whose Connections Provide Educational Support

A similar difference was seen in partnerships involving advisory board service, with an increase in the percentage of industry organizations having partnerships involving advisory board service between Years 1 and



4 and a decrease in the percentage of educational organizations having partnerships involving advisory board service (Figure 9).

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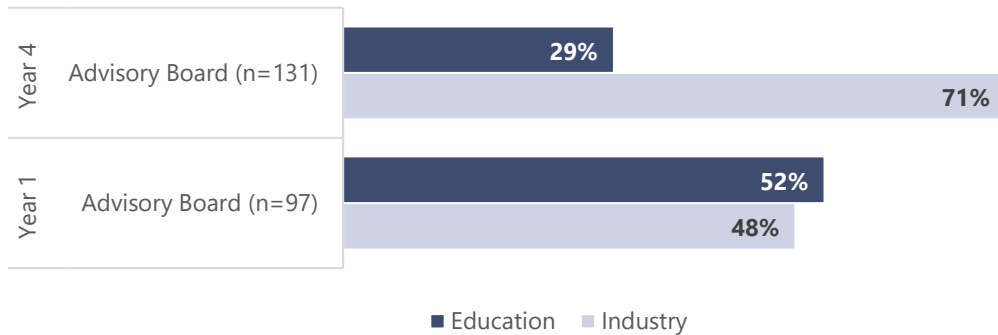


Figure 9. Percentage of Industry and Educational Institutions Whose Connections Serve on an Advisory Board

Across all of these areas, educational institutions as a whole reported decreases in each type of industry connection while industry respondents reported increases across multiple types of partnerships with educational institutions.

The distribution of partnership activities differs by employer, suggesting the need to provide flexible options for engagement. Figure 10 provides an example of the varying emphases of those employers with the highest number of reported partnerships with educational institutions. While all these employers hired graduates, and most served on advisory boards, provided internships/apprenticeships, provided faculty/professional development, and provided educational resources, there may be opportunities to develop additional areas of engagement that build on existing relationships.

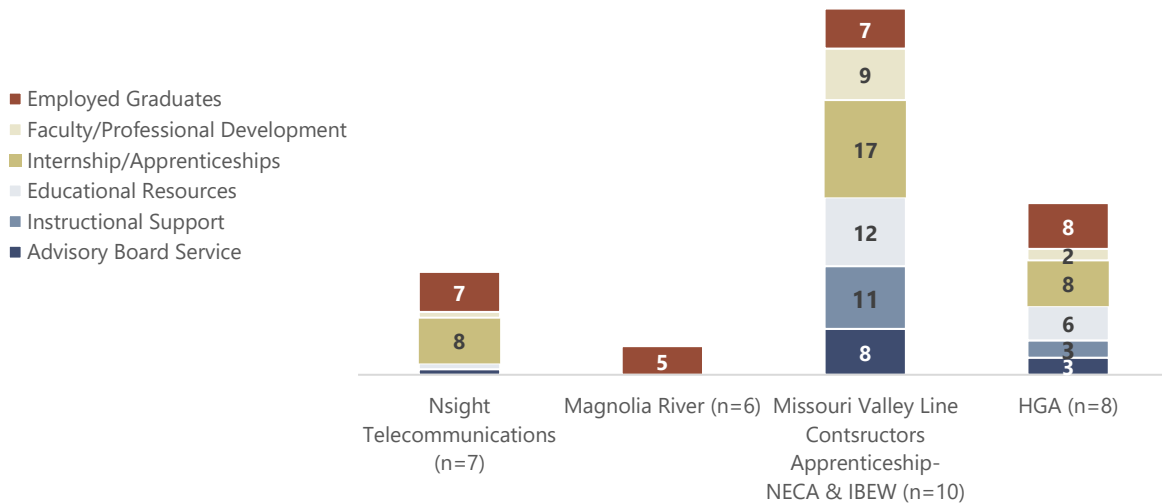


Figure 10. How the Top Connected Industry Organizations Interact with Connections



A key driver of this project is the understanding that qualified workers choose to work closer to their hometowns, which limits the ability to fill positions across a wider geography. As in Year 3, among Network survey respondents, Wisconsin and neighboring states had the greatest density of industry and educational institutions in the Network ([Figure 11](#)~~Figure 14~~), which suggests that these are members who could be actively engaged as partners to address workforce development needs in the region. In Year 3, a greater number of organizations from outside of the Midwest were noted, and although it was a small number of institutions, this still suggests that in Year 4, there was greater employer density in the Midwest than in Year 3. For example, while at least four employers in year 3 were noted as being located in the western region, in Year 4, no employers were listed in the western region. Moreover, in Year 4, fewer employers located in southern regions of the United States were reported.

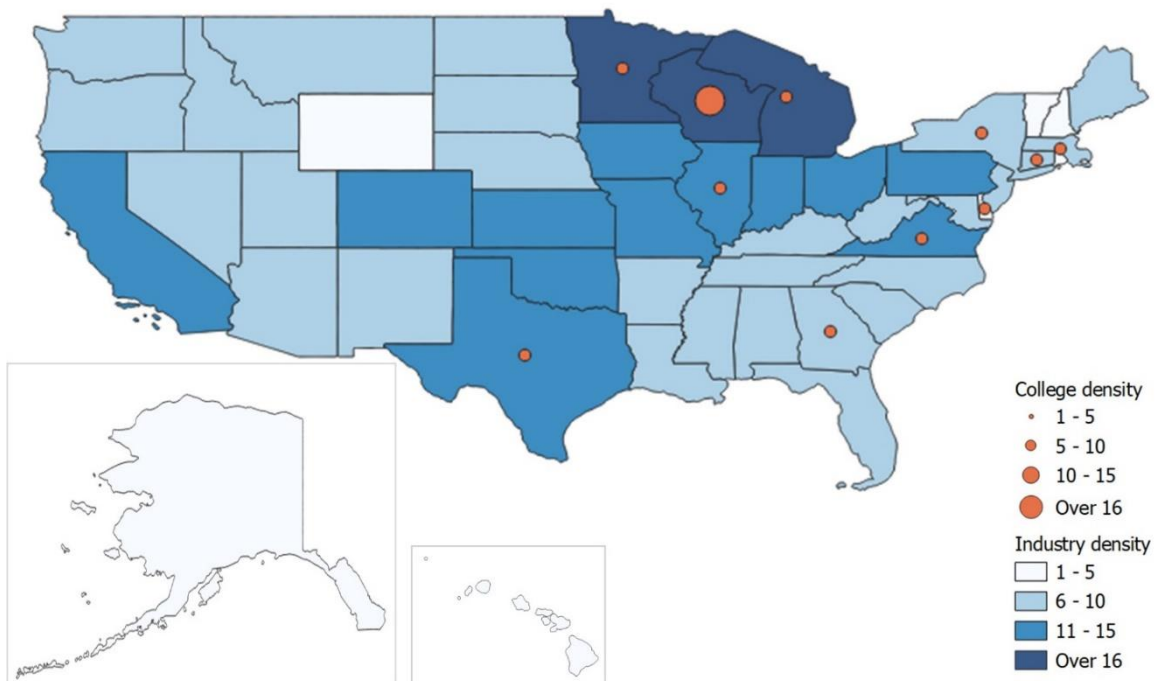


Figure 11. Location and density of industry and educational institutions participating in UECN (Spring 2024)

Network Awareness

In addition to their connections to employers and community colleges, Network survey participants were asked to indicate their level of awareness of other Network resources, including energy-related centers and professional organizations. These organizations provide value to the Network through their information resources, research, and training opportunities. Five organizations were listed across all three iterations of the Network survey. [Figure 12](#)~~Figure 12~~ below shows how awareness of these five organizations changed between Years 1 and 4, with the Advanced Technology Environmental Energy Center (ATEEC) seeing the greatest increase in awareness, with 27% of respondents reporting that they were aware of the organization in Year 1, 23% of respondents reporting so in Year 3, and 62% reporting awareness of the organization in Year 4. Awareness regarding the Center for Energy Workforce Consortium (CEWD) increased between Years 1 and 3 but then saw a dramatic decrease in Year 4, with only 9% of respondents in Year 4 reporting being aware of the organization, compared to 43% in Year 1 and 53% in Year 3. Awareness of the Midwest Energy Association

(MEA) stayed the most consistent of the five organizations, with 67% of respondents reporting awareness in Year 1, 65% in Year 3, and 60% in Year 4.

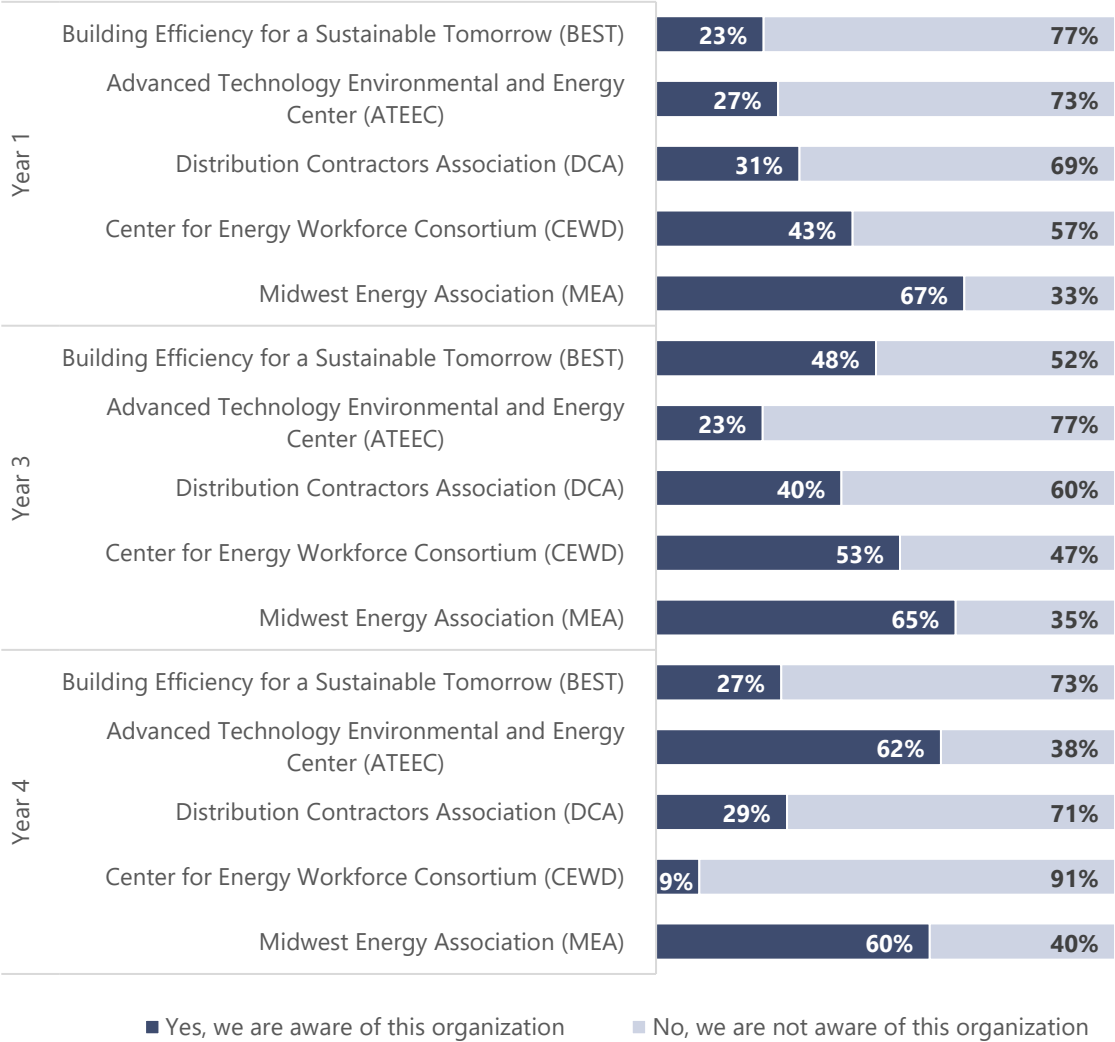


Figure 12. Awareness of Energy Organizations Listed in All Three Iterations of the Network Survey

As the Network grew, a greater number of energy-related centers and professional organizations were included in the survey to gauge awareness among respondents. [Figure 13](#) highlights awareness of the additional organizations listed in the Year 4 Network Survey. Focus on Energy, the Midwest Renewable Energy Association (MREA), and the Public Service Commission of Wisconsin were the three organizations that the greatest percentage of respondents from educational institutions were aware of, while the Interstate Renewable Energy Council (IREC), the Minnesota State Energy Center of Excellence, Pathways Wisconsin, and the Wisconsin Energy Institute were the four organizations that the greatest percentage of respondents from industry organizations were aware of.

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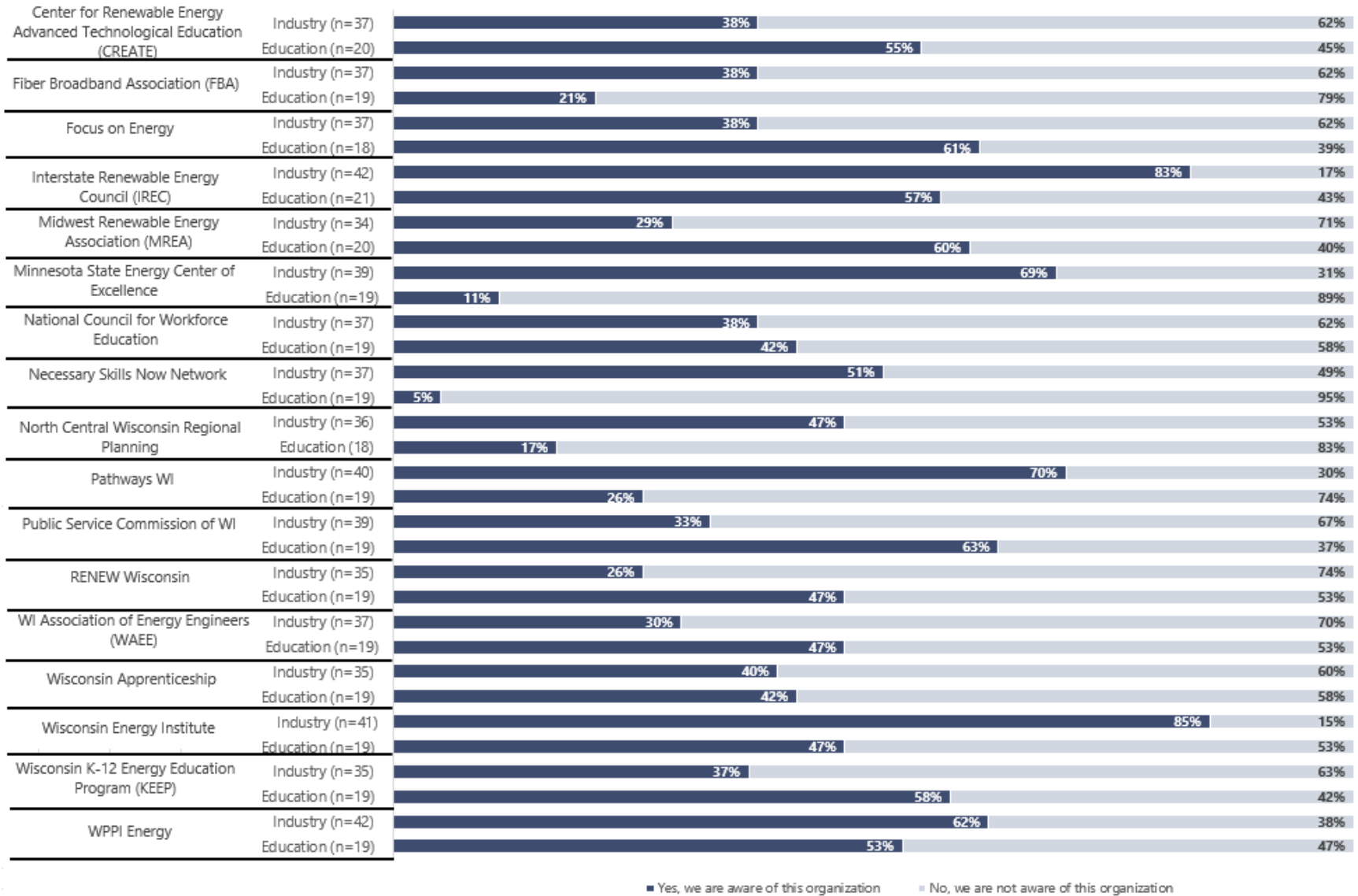


Figure 13. Awareness of Additional Energy-Related Centers and Professional Organizations

Respondents reported that their organizations are most active with the Midwest Energy Association and the Midwest Renewable Energy Association (Figure 14), further emphasizing the regional nature of the current Network. When asked about the organizations they were most interested in learning more about, the Midwest Renewable Energy Association (MREA) was cited most frequently, followed by Building Efficiency for a Sustainable Tomorrow (BEST), Midwest Energy Association (MEA), National Council for Workforce Education, Public Service Commission of WI, RENEW Wisconsin, Wisconsin Energy Institute, Wisconsin K-12 Energy Education Program (KEEP), and WPPI Energy.

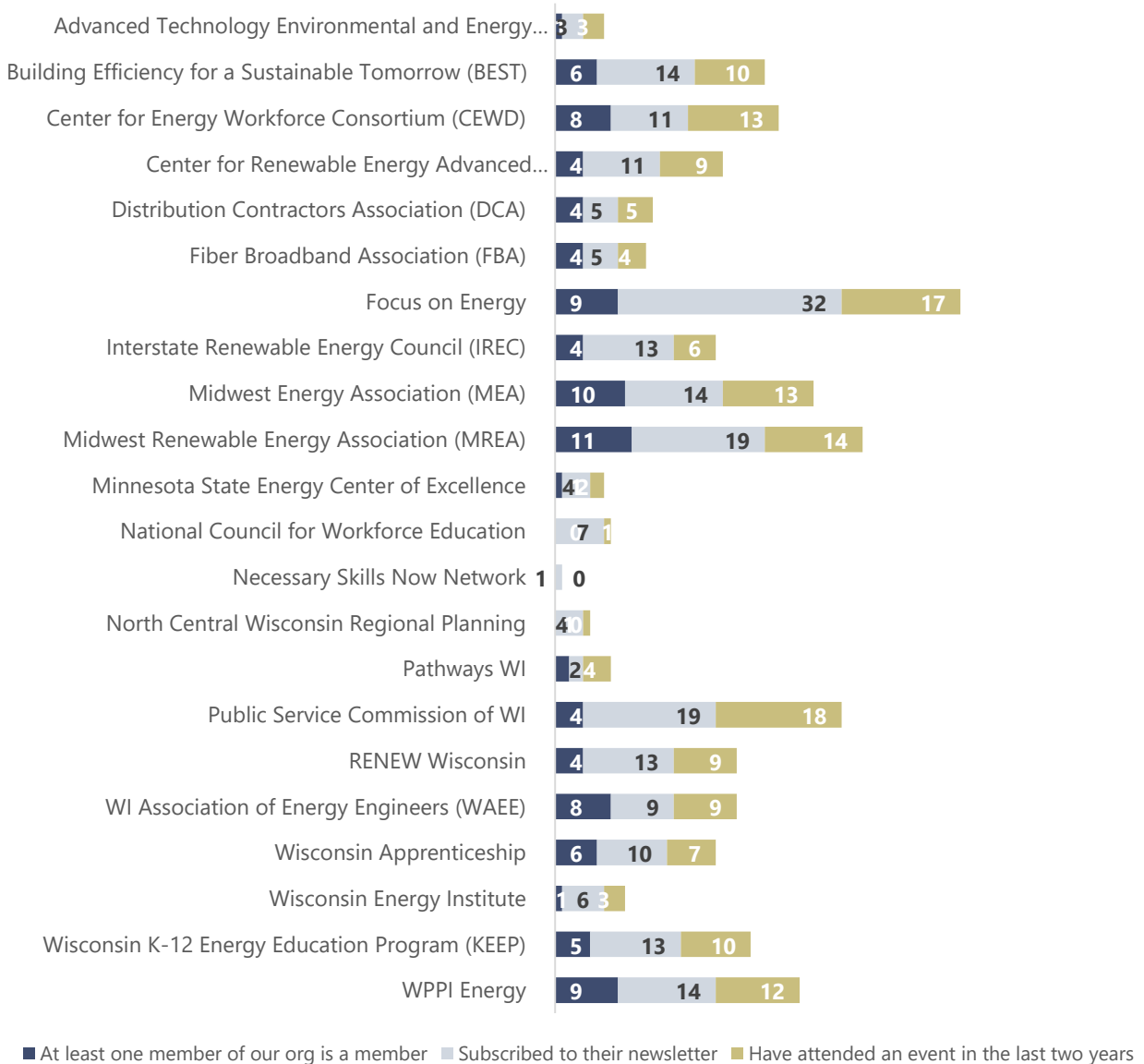


Figure 14. Respondent organizations' interactions with energy-related centers and professional organizations.

Conclusions

The most connected industry organizations have self-identified their partnerships with educational institutions, while the two most connected educational institutions have connections that are both self-identified and reported by employers. Educational institutions reported a decrease in each type of connection while industry reported increases. This may suggest that respondents from educational institutions are less aware of the relationships that are in place with industry. The number of other Network resources, such as professional organizations, has increased over the course of the grant, creating additional value. Further emphasizing the regional nature of the Network, Network members are most active with organizations based in the Midwest.

SUMMARY AND RECOMMENDATIONS

The project objectives of the Network were to:

1. Leverage the knowledge base of the NWTC Program Advisory Committees to cultivate a core leadership group consisting of stakeholders representing national and regional employers from across the electrical power, gas, solar technology, energy management, and telecommunications industry, academia, energy apprenticeships, and workforce development sectors to lead the formation of the Utilities and Energy Coordination Network (the Network);
2. Create a clear, shared vision that guides the evolution of the Network; and
3. Establish the structure and norms of the Network to build relationships and trust among members.

Like many projects beginning implementation in 2020, the global pandemic hindered outreach and recruitment efforts for the UECN project in Years 1 and 2; however, as more professional events returned to in-person formats in Years 3 and 4, the team was able to attend a greater number of both regional and national conferences. This was accompanied by a growing network, with the Network going from six organizations in Year 1 to 92 organizations at the end of Year 4.

A key objective of the UECN project is to understand the extent to which the curricula offered by colleges in the Network align with industry needs. Across three iterations of the Network Survey, Solar Energy and Electrical Power Distribution/Lineman programs were the most commonly offered. Moreover, there was an increase in the number of institutions considering adding Apprenticeships in the Energy and Utilities Industry and Energy Management programs. To further support programs in ensuring that their curricula aligned with the needs of the industry, surveys were disseminated to five groups of industry employers between Years 2 and 5, in which employers were asked to indicate the extent to which specific knowledge, skills, and abilities (KSAs) represented in the Wisconsin Technical College System curriculum were important to their company when hiring. Results from these five surveys were shared with their respective Advisory Committees. In some cases, curriculum changes were discussed to ensure greater alignment with industry needs. When asked more generally about the needs they see in the Energy and Utilities Industry, employer responses reflected needs around workforce development efforts, education and training, program/career awareness, professional skills, innovation and modernization, partnership involvement, communication, and educating the public.

Information and resources were made available to the Network through a variety of platforms, including a newsletter, a campus-based website, and an ATE microsite. As the Network grew, the number of individuals



receiving the newsletter grew, and in Year 4, an increase was also seen in the percentage of recipients actually opening the newsletter. The microsite platform was built in Year 2 of the project, housing key information such as access to curricular resources, information on training and development opportunities from NWTC and other Network partners, and access to the Network newsletter. An increase in microsite views was seen between years 2 and 3; however, views decreased between Years 3 and 4. Of those who visited the microsite, most went no further than the home page. On the other hand, an increase in views on the college-based website was seen between Years 3 and 4. As the project ends, both the microsite and the college-based website will remain active, with the college website being consolidated.

The UECN project aimed to bring industry, academic, and workforce development entities together with a shared purpose that would lead to resource sharing and collaborations focused on addressing current and anticipated industry workforce and training needs. The Network Survey provided some initial insights into the extent of connections between industry employers and educational institutions; however, a limitation of the data is that they do not include all current or potential Network members, only those who responded to the survey. In Year 4, virtually all connections among industry organizations were one-way, with industry members identifying connections to educational institutions that were not reciprocated by educational institutions. This was similar to educational institutions, with Northeast Wisconsin Technical College (NWTC) being the exception, with five reciprocal connections seen. Network survey respondents provided insights into how they interacted with partners, with industry and educational respondents emphasizing different types of connections with partners over time. For example, while an increase was seen in the percentage of educational institutions saying they had partnerships with industry partners that included internships/apprenticeships, the percentage of industry organizations identifying partnerships that involved internships/apprenticeships decreased between Years 1 and 4. Among the top four connected industry partners, all hired graduates, and most served on advisory boards, provided internships/apprenticeships, provided faculty/professional development, and provided educational resources.

In addition to how industry and educational organizations interacted, Network Survey respondents were also asked to reflect on their level of awareness of Network resources, including energy-related centers and professional organizations. Five organizations were listed across all three iterations of the Network Survey, with respondents being asked about 17 additional organizations beyond that in Year 4. Awareness of organizations differed based on the type of organization (industry vs. educational). Of the organizations that respondents were aware of, respondents reported being most active in the Midwest Energy Association and the Midwest Renewable Energy Association.

As the UECN project ends, the following recommendations are offered to support the sustainability of Network initiatives:

1. Across four years of the UECN project, Network survey respondents consistently highlighted potential changes in curricula, which speaks to a need for gathering feedback systematically to ensure that the curriculum remains up-to-date and relevant for employer needs. NWTC and other educational institutions should continue to gather systematic feedback from employers, either through annual, rotating surveys or other means that are sustainable and accessible. Consider sharing tools developed to gather employer feedback with other educational institutions. Findings from data-gathering efforts should be shared with advisory boards or other groups of employers to discuss changes that are

needed to ensure that curricula remain relevant to employer needs. In addition, ensure that ongoing internal assessment of student learning and student success in these areas is reviewed to identify additional areas for curricular modification and employer input.

2. Although the UECN project is ending, its website will remain active, supporting the sustainability of the project. To ensure that the NWTC website is easy to navigate for those looking for information regarding the Utilities and Energy Coordination Network, we recommend considering the following design elements:
 - a. Leverage the use of headings and sections on the main landing page to help provide clarity on the goal of the website and its intended audience.
 - b. Emphasize the resources created by the grant and the call to start an energy program while reducing the amount of text explaining the Network and the grant funding.
 - c. Use text to introduce sections such as “focus areas” and the evaluation report, indicating what it is and how it relates to the overall purpose of the website, as well as how these resources can be leveraged. Similarly, include a description of the Training Opportunities page in addition to the link to provide a stronger prompt for visitors to explore.
 - d. Provide a link to the UECN website on the ATE microsite.
3. The Utilities and Energy Coordination Network was created to provide a formal platform for industry, academia, and other stakeholders to engage, share resources, and form partnerships that would lead to expanded training opportunities across the nation. Over four years, the project team made significant progress in developing the Network, and as the grant period comes to an end, the team should consider how the network and the progress made over four years will be maintained. One mechanism to consider may be leveraging the position of energy and utilities-related professional organizations. These organizations are those that both educational and industry partners are aware of and may look to for information in the future. Sharing resources related to the Network with these organizations could help ensure that network members continue to have a place to seek out information and a common place to collaborate.
4. As members of NWTC’s project team continue to attend and participate in regional and national conferences, they should share key lessons and resources from this project, including the methods for and value of gathering employer feedback, guidance on developing regional partnerships, and the curricular changes made to emphasize communication skills. Moreover, as the team shares their findings, they should include details on how they’ve engaged with employers. As the only institution with reciprocal connections, meaning that NWTC identified some industry partners who also identified NWTC as a connection, the team should articulate how they build and recognize reciprocal partnerships, as well as the perceived benefits of these types of partnerships.

APPENDIX A: Author Biographies

Kathleen Lis Dean, Ph.D. – Senior Research and Evaluation Associate

Dr. Dean provides clients with insights from her extensive experience helping organizations connect strategy, evaluation, and learning for program improvement and impact. Prior to joining The Rucks Group, she spent 20 years in evaluation and strategic leadership roles at higher education, nonprofit, and philanthropic organizations. In these roles, she leveraged qualitative and quantitative data to support organizational effectiveness, outcomes assessment, accreditation, strategic planning, and continuous improvement. Dr. Dean utilizes a collaborative approach in her work. She also draws on her research about boundary-spanning teams, strategic thinking, and organizational learning to incorporate multiple perspectives and intentional practices to help clients achieve their goals. Dr. Dean earned a Ph.D. in higher education policy and leadership at the University of Maryland, and both a master's degree in education and a bachelor's degree in international relations at the University of Delaware.

Alyssa Horn, M.P.A. – Research and Evaluation Associate

With a background in program evaluation and data analysis, Ms. Horn joined the firm in 2022. In her prior role as a graduate research assistant, Ms. Horn gained evaluative experience by assisting on program evaluations focused on public health and K-12 education programs. In this capacity, she provided support on the development of data collection tools and protocols, conducted quantitative and qualitative data analyses, and helped with report development. At The Rucks Group, Ms. Horn provides evaluation planning support to project teams during the development of grant proposals, as well as provides data analysis and report writing support during project implementation. Ms. Horn received her Master's in Public Administration and her Bachelor of Arts in Philosophy, Politics, Economics, and Law (PPEL) with a minor in Nonprofit Administration from Bowling Green State University.

APPENDIX B: Logic Model

INPUTS	ACTIVITIES	OUTPUTS	SHORT-TERM OUTCOMES	MID-TERM OUTCOMES	LONG-TERM OUTCOMES
<p>NWTC faculty subject-matter experts</p> <p>Relationships from two previous NSF-funded projects</p> <p>Past institutional history helping launch utility/energy programming around state and U.S.</p> <p>Industry involvement via established NWTC Program Advisory Committees</p>	<p>Hire Project Coordinator to organize meetings, provide administrative support for joint projects, create structure for information sharing, create Network web presence</p> <p>Consult with NWTC Program Advisory Committees to develop plan for identifying and recruiting Network members</p> <p>PI/Co-PIs travel to meet industry and academia connections and other stakeholder groups and/or to recruit members</p> <p>Conduct contributions assessment of all members</p> <p>Identify up to 10 individuals to serve as network facilitators and provide training to ensure meeting productivity.</p>	<p>Platform identified for group communication</p> <p>Network webpage created</p> <p>Member commitment of 20-30 core stakeholders representing national and regional employers, educators, and national organizations</p> <p>List of peripheral stakeholders interested in participating in the Network once the strategic and action plans are established</p> <p>Inventory of member expertise and list of skill gaps</p> <p>Select network members complete facilitation training</p>	<p>Increased number of entities from industry, academic, and workforce development are part of the network</p>	<p>Network structures established</p> <p>Increased connectivity and communication</p> <p>Shared purpose</p>	<p>Network members are collaborating on research, training, and educational activities to address current and anticipated industry workforce and training needs through new programs and curriculum development.</p>
	<p>Conduct a SWOT Analysis</p> <p>Facilitate Network visioning session(s)</p> <p>Host strategic planning sessions</p> <p>Develop an action plan</p>	<p>Completed SWOT analysis</p> <p>Network vision statement documented</p> <p>Three-year Strategic Plan</p> <p>2023 Network Action Plan</p>			
	<p>Convene small workgroup to discuss framework/norms; draft structure and norms; Network members review/approve</p> <p>Survey members on structure and member expectations; analyze results</p> <p>PI/co-PIs implement established structure and reinforce norms/member roles and expectations</p>	<p>Group structure and norms documented</p> <p>Plan for sustainability (e.g., member fee structure)</p>			



APPENDIX C: Project Team Listening Session

Implementation

1. What were your planned activities for Year 3?
2. What was most successful? Most challenging?
3. What opportunities emerged?

Curriculum

1. How have you used the results of the employer surveys?
2. What interactions did you have with Advisory Committees around curricular topics?
3. What, if any, curricular changes are planned? If so, what does that look like? How might this happen?

Network development and activity

1. What communication mechanisms are you using to share information and resources with the Network?
2. What collaborations and partnerships have emerged in the Network?

APPENDIX D: Conferences and events attended by UECN project team

Conferences and Events	Dates	Location
HI-TEC	July 2022	Salt Lake City, UT
SCTE Cable-Tec Expo	September 2022	Philadelphia, PA
Great Lakes Technology Showcase	September 2022	Fort Wayne, IN
NWTC Energy Programs Open House	September 2022	Green Bay, WI
Wisconsin State Telecommunications Association	October 2022	LaCrosse, WI
Wisconsin Energy Efficiency Exposition	October 2022	Milwaukee, WI
NWTC Utility Preview Day	October 2022	Green Bay, WI
ATE PI Conference	October 2022	Washington DC
RENEW WI Energy Summit	January 2023	Madison, WI
BEST Center Annual Institute	January 2023	Virtual
Nate Unite 2023	February 2023	Orlando, FL
Optical Fiber Communication Conference and Exhibition	March 2023	San Diego, CA
Fiber Connect 2023	June 2023	Kissimmee, FL
Illinois Broadband & Telecommunications Association Annual Convention	June 2023	St. Louis, MO
Midwest Renewable Energy Association Energy Fair	June 2023	Custer, WI
Hi-TEC 2023	July 2023	Atlanta, GA
WI Energy Efficiency Expo (WEEE)	October 2023	Brookfield, WI
ATE PI Conference	October 2023	Washington, DC
2024 RENEW Wisconsin Renewable Energy Summit	February 2024	Madison, WI
2024 Midwest Renewable Energy Association (MREA) Conference	June 2024	Custer, WI

APPENDIX E: Electrical Power Distribution Employer Skills Survey

Q1 As part of the Utilities and Energy Coordination Network (Network) grant at Northeast Wisconsin Technical College, we are requesting your input regarding the skills needed by job candidates in the electrical power distribution industry. This survey will take approximately 10 minutes and will provide valuable information for the Network to understand the extent to which the existing curricula are meeting industry's needs. Your response will remain anonymous and confidential; responses will be aggregated for reporting. Thank you.

Q2 COMPUTER AND COMMUNICATION SKILLS

Please indicate how important each of the following computer and communication skills are to your company when hiring:

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
Manipulate files in a DOS environment					
Manipulate files in a Windows environment					
Create and edit documents in Microsoft Word					
Build and review spreadsheets in Microsoft Excel					
Design and write technical documents					

Q3 What, if any, computer and communication skills not listed previously is your organization looking for in an employee? _____

Q4 FIELD KNOWLEDGE AND SKILLS

Please indicate how important each of the following field concepts and skills is to your company when hiring:

	Not at all important	Slightly important	Moderately important	Very important	Extremely important



Operate digger derrick
trucks and bucket trucks

Operate underground
distribution (UW)
excavating equipment

Use hand and power tools

Tie knots and splice ropes

Set anchors

Pole climbing

Tree trimming

Perform pole top rescue

Perform bucket truck
rescues

Perform self-rescue from
bucket

Perform service hookup



Q5 FIELD KNOWLEDGE AND SKILLS (continued). Please indicate how important each of the following field concepts and skills is to your company when hiring:

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
Install and remove oil circuit reclosures (OCRs)					
Install and remove voltage regulators					
Install and remove capacitor bank					
Install and remove protective grounds					
Install and frame poles in single/three-phase system					
Install low pressure natural gas line					
Perform plastic pipe heat fusion procedures					
Wiring of three-phase bank configurations					
Design and construct single phase power distribution systems					
Design and construct three-phase power distribution systems					

Q6 FIELD KNOWLEDGE AND SKILLS (continued)

Please indicate how important each of the following field concepts and skills is to your company when hiring:

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
Install URD transformers/equipment					



- Install single phase O.H. and URD transformer
- Install three-phase O.H. and URD transformer/banks
- Install a meter
- Understand importance of traffic control
- Understand importance of tailgate meetings
- Commercial Driver's License (CDL)

Q7 For what field skills does your organization provide training opportunities? _____

Q8 CALCULATION AND MEASUREMENT SKILLS

Please indicate how important each of the following calculation and measurement skills is to your company when hiring:

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
Use common meters to measure voltage, current, and resistance					
Calculate circuit values of voltage, current, resistance, and power for AC resistive circuits					
Solve values of voltage, current, impedance, power factor, and phase angles of AC reactive circuits					



Calculate voltage, current, impedance, power and power factor, and phase angle for resistive-inductive (R-L) and resistive-capacitive (R-C) series, resistive-inductive-capacitive (R-L-C) AC circuits, and parallel AC circuits.

Q9 For what calculation and measurement skills does your organization provide training opportunities? _____

Q10 PROFESSIONAL SKILLS

Please rank the following list of professional skills, in the order of importance for hiring in your organization.

- _____ Computer skills: Microsoft Office word processing, spreadsheets, presentations
- _____ Conflict resolution
- _____ Customer service
- _____ Diversity, equity, and inclusion; interaction with diverse populations
- _____ Handling feedback
- _____ Problem solving
- _____ Team-building skills, teamwork
- _____ Verbal and written communication skills

Q11 What, if any, other professional skills are important to your company when hiring? _____

Q12 For what professional skills does your organization provide training opportunities? _____

Q13 What other skills should colleges help students to develop to best prepare for roles in the electrical power distribution industry? _____

Q14 For what roles does your company hire job candidates that use the above competencies? _____

Q15 Is your company connected to any educational institutions from which you regularly hire employees and/or where current employees can pursue additional education or training?

- Yes
- No

Display Q16 if Q15 = Yes

Q16 With what educational institutions are you connected? _____

APPENDIX F: Energy Management Industry Employer Skills Survey

Introduction: As part of the Utilities and Energy Coordination Network (Network) grant at Northeast Wisconsin Technical College, we are requesting your input regarding the skills needed by job candidates in the energy management industry. This survey will take approximately 10 minutes and will provide valuable information for the Network to understand the extent to which the existing curricula are meeting industry's needs. Your response will remain anonymous and confidential; responses will be aggregated for reporting. Thank you.

Q1 TOOLS and SOFTWARE. Please indicate how important the ability to use each of the following tools and software is to your company when hiring:

	Not at all important (1)	Slightly important (2)	Moderately important (3)	Very important (4)	Extremely important (5)
Architect's scale					
Digital multi-meter					
Cable continuity tester					
RJ45 continuity tester					
Wire cutter/stripper					
RETScreen					
eQuest					

Q2 Tools and software (continued)

	Not at all important (1)	Slightly important (2)	Moderately important (3)	Very important (4)	Extremely important (5)
Temperature, relative humidity, and light data loggers					
Electric current transducer logger					
Infrared camera					
Blower door					
Building automation control software					
Energy Star's "Target Finder" software					



Energy Star's "Portfolio Manager" software
 Building life cycle cost (BLCC) analysis software
 Light modeling software
 Microsoft Excel

Q3 What, if any, tools or software not listed previously is your organization looking for in an employee? _____

Q4 ANALYSIS SKILLS Please indicate how important the ability to conduct each of the following calculations and analyses is to your company when hiring:

	Not at all important (1)	Slightly important (2)	Moderately important (3)	Very important (4)	Extremely important (5)
Energy performance of commercial buildings, including BIN methodology and degree-day					
Parametric studies of building energy use					
Utility bill analysis					
Identification of energy efficiency measures					
Energy savings and investment calculations					
Calculate life cycle cost analysis of energy projects					
Financial investment analysis of energy savings					
Calculate equipment efficiencies					
Building heating and cooling loads analysis					
Program building automation control strategies					
Analysis of energy savings based on energy control strategies					
Apply utility rates to utility consumption data					



Analyze Energy Use Intensity (EUI) data

Analyze commercial building energy end use profiles

Lighting design analysis (21)

Other: (please describe):

Q5 For what calculation and analysis skills does your organization provide training opportunities? _____

Q6 TECHNICAL SKILLS. Please indicate how important each of the following technical skills is to your company when hiring:

	Not at all important (1)	Slightly important (2)	Moderately important (3)	Very important (4)	Extremely important (5)
Interpret construction drawings					
Interpret section, auxiliary views, and detail drawings					
Conduct a building audit					
Identify energy efficiency measures in new and existing buildings					
Develop strategies to operate HVACR systems efficiently					
Identify energy-saving automation control strategies					
Evaluate lighting systems, luminaries, and associated components					
Conduct a lighting audit					
Recommend energy-saving strategies for lighting systems					
Other: (please describe)					

Q7 For what technical skills does your organization provide training opportunities? _____



Q8 REPORTING. Please indicate how important each of the following reporting abilities is to your company when hiring:

	Not at all important (1)	Slightly important (2)	Moderately important (3)	Very important (4)	Extremely important (5)
Generate reports from building simulation software					
Present energy simulation results to decision makers					
Audit report writing					
Present energy accounting information to decision makers					
Prepare written economic analysis reports					
Write a lighting energy audit report					

Q9 For what reporting skills does your organization provide training opportunities? _____

Q10 KNOWLEDGE. Please indicate how important each of the following knowledge areas is to your company when hiring:

	Not at all important (1)	Slightly important (2)	Moderately important (3)	Very important (4)	Extremely important (5)
Renewable energy technologies and sustainable design practices					
Building mechanical systems including ventilation and air handling, heating, cooling, and lighting component					
Network communication standards (i.e., OSI model, IP protocol, network signal transmission, media, physical and logical topologies, hardware, and typical building automation networks and sub-networks)					
Energy Star program					



Other (please describe): _____

Q11 PROFESSIONAL SKILLS. Please rank the following list of professional skills, in the order of importance for hiring in your organization.

- _____ Computer skills: Microsoft Office word processing, spreadsheets, presentations
- _____ Conflict resolution
- _____ Customer service
- _____ Diversity, equity, and inclusion; interaction with diverse populations
- _____ Handling feedback
- _____ Problem solving
- _____ Team-building skills, teamwork
- _____ Verbal and written communication skills

Q12 What, if any, other professional skills are important to your company when hiring? _____

Q13 For what professional skills does your organization provide training opportunities? _____

Q14 What other skills should colleges help students to develop to best prepare for roles in the energy management industry? _____

Q15 For what roles does your company hire job candidates that use the above competencies? _____

Q16 Is your company connected to any educational institutions from which you regularly hire employees and/or where current employees can pursue additional education or training?

- Yes
- No

Display Q17 if Q16 = Yes

Q17 With what educational institutions are you connected? _____

APPENDIX G: Utilities and Energy Coordination Network Survey

Start of Block: Intro

Q1.1 Thanks again for taking the time to complete this survey.

Start of Block: Group and organization

Q2.1 Which best describes the organization that you represent?

- An employer or contractor in the Energy and Utilities Industry
- A product supplier in the Energy and Utilities Industry
- An educational institution

Q2.2 What is the name of the organization that you represent? _____

Q2.3 In what state(s) is your organization located? (select all that apply)

- | | |
|--|---|
| <input type="checkbox"/> Alabama | <input type="checkbox"/> Nevada |
| <input type="checkbox"/> Alaska | <input type="checkbox"/> New Hampshire |
| <input type="checkbox"/> Arizona | <input type="checkbox"/> New Jersey |
| <input type="checkbox"/> Arkansas | <input type="checkbox"/> New Mexico |
| <input type="checkbox"/> California | <input type="checkbox"/> New York |
| <input type="checkbox"/> Colorado | <input type="checkbox"/> North Carolina |
| <input type="checkbox"/> Connecticut | <input type="checkbox"/> North Dakota |
| <input type="checkbox"/> Delaware | <input type="checkbox"/> Ohio |
| <input type="checkbox"/> Florida | <input type="checkbox"/> Oklahoma |
| <input type="checkbox"/> Georgia | <input type="checkbox"/> Oregon |
| <input type="checkbox"/> Hawaii | <input type="checkbox"/> Pennsylvania |
| <input type="checkbox"/> Idaho | <input type="checkbox"/> Rhode Island |
| <input type="checkbox"/> Illinois | <input type="checkbox"/> South Carolina |
| <input type="checkbox"/> Indiana | <input type="checkbox"/> South Dakota |
| <input type="checkbox"/> Iowa | <input type="checkbox"/> Tennessee |
| <input type="checkbox"/> Kansas | <input type="checkbox"/> Texas |
| <input type="checkbox"/> Kentucky | <input type="checkbox"/> Utah |
| <input type="checkbox"/> Louisiana | <input type="checkbox"/> Vermont |
| <input type="checkbox"/> Maine | <input type="checkbox"/> Virginia |
| <input type="checkbox"/> Maryland | <input type="checkbox"/> Washington |
| <input type="checkbox"/> Massachusetts | <input type="checkbox"/> West Virginia |
| <input type="checkbox"/> Michigan | <input type="checkbox"/> Wisconsin |
| <input type="checkbox"/> Minnesota | <input type="checkbox"/> Wyoming |
| <input type="checkbox"/> Mississippi | |
| <input type="checkbox"/> Missouri | |
| <input type="checkbox"/> Montana | |
| <input type="checkbox"/> Nebraska | |

Display Q2.4 if Q2.1 = An employer or contractor in the Energy and Utilities Industry OR A product supplier in the Energy and Utilities Industry

Q2.4 For what entry-level positions do you hire? (please list below) _____

Q2.5 Could you also please provide your contact information to help ensure that we are connecting your responses to the right organization?

Name: _____

Email address: _____

Phone: _____

Start of Block: Employers

Q3.1 As an employer, does your organization have an Energy and Utilities-related connection with any post-secondary educational institutions in your region? This would include community colleges, technical career colleges, and four-year institutions. Connections might include serving on advisory boards, providing educational resources, offering internship/apprenticeship opportunities, and so on.

- Yes
- No

Skip To: End of Block if Q3.1 = No

Q3.2 Please list EVERY post-secondary educational institution with whom your organization has some type of Energy and Utilities-related connection.

1 _____

|

20 _____

Display Q3.3 if Q3.2 line 20 Is Not Empty

Q3.3 You listed 20 institutions. Could you have listed more?

- Yes
- No

Display Q3.4 if Q3.3 = Yes

Q3.4 Please list those institutions here. _____

Display Q3.5 if Q3.3 = Yes

Q3.5 Could we follow up with you at a later time to walk through this survey with the additional institutions? We would provide you with a list of the institutions you already mentioned.

- Yes
- No



Carry Forward All Choices - Entered Text from Q3.2

Q3.6 During the past 12 months, what kinds of Energy and Utilities-related connection did your organization have with each of the educational institutions you listed? *(Select all that apply)*

	Advisory Board Service	Provided instruction or instructional support	Provided educational resources	Provided internship/apprenticeship opportunities	Provided faculty/professional development	Employed their graduates	Other
1							
20							

Display Q3.7 if Q3.2 line 20 Is Empty

Q3.7 Did you think of any additional institutions as you were completing the previous questions?

- Yes
- No

Display Q3.8 if Q3.7 = Yes

Q3.8 Please list those institutions here. _____

Display Q3.9 if Q3.7 = Yes

Q3.9 Could we follow up with you at a later time to walk through this survey with the additional institutions? We would provide you with a list of the institutions you already mentioned.

- Yes
- No

Start of Block: Educational institutions

Q4.1 Which of the following educational programs does your educational institution currently offer to students? *(Select all that apply)*.

- Electrical Power Distribution / Lineman
- Gas Utility Construction & Service
- Energy Management
- Solar Energy
- Cell Tower / Telecommunications
- Apprenticeships in the Energy and Utilities Industry



Carry Forward Unselected Choices from Q4.1

Q4.2 Have you considered starting one or more of these educational programs?

	Yes	No
Electrical Power Distribution / Lineman		
Gas Utility Construction & Service		
Energy Management		
Solar Energy		
Cell Tower / Telecommunications		
Apprenticeships in the Energy and Utilities Industry		

Carry Forward Selected Choices from "Which of the following educational programs does your institution currently offer to students?"

Q4.3 In the last three (3) years, has your institution made any changes to the curriculum of these programs to better meet industry needs?

	Yes (1)	No (2)	Unsure (3)
Electrical Power Distribution / Lineman	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gas Utility Construction & Service	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Energy Management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Solar Energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cell Tower / Telecommunications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Apprenticeships in the Energy and Utilities Industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Display This Question:

If In the last three (3) years, has your institution made any changes to the curriculum of these pro... = Yes

Q4.4 Please describe the curricular modifications made to your program.



Q4.5 As an educational institution, does your institution have any connections to any employers in the Energy and Utilities Industry? These connections might include members from these organizations on advisory boards connected with your institution, providing educational resources to your institution, offering internship/apprenticeship opportunities to your students, and so on.

- Yes
- No

Skip To: End of Block If Q4.3= No

Q4.6 Please list EVERY employer in the Energy and Utilities Industry with whom your educational institution has some type of connection.

1 _____
 |
 20 _____

Display Q4.5 if Q4.4 line 20 Is Not Empty

Q4.7 You listed 20 institutions. Could you have listed more?

- Yes
- No

Display Q4.6 if Q4.5 = Yes

Q4.8 Please list those institutions here. _____

Display Q4.7 if Q4.5 = Yes

Q4.9 Could we follow up with you at a later time to walk through this survey with the additional institutions? We would provide you with a list of the institutions you already mentioned.

- Yes
- No

Carry Forward All Choices - Entered Text from Q4.4

Q4.10 During the past 12 months, what kinds of Energy and Utilities-related connections did your institution have with each of the employers you listed? *(Select all that apply)*

	Advisory Board Service	Provided instruction or instructional support	Provided educational resources	Provided internship/apprenticeship opportunities	Provided faculty/professional development	Employed their graduates	Other
1							
20							



Display Q4.9 if Q4.4 line 20 Is Empty

Q4.11 Did you think of any additional institutions as you were completing the previous questions?

- Yes
- No

Display Q4.10 if Q4.9 = Yes

Q4.12 Please list those institutions here. _____

Display Q4.11 if Q4.9 = Yes

Q4.13 Could we follow up with you at a later time to walk through this survey with the additional institutions?

We would provide you with a list of the institutions you already mentioned.

- Yes
- No

Start of Block: Employer and Educator awareness of ATE Centers or Professional Organizations

Q5.1 For each of the Energy and Utilities-related professional organizations below, please indicate if your organization is aware of it.

	Yes, we are aware of this organization	No, we are not aware of this organization
Advanced Technology Environmental and Energy Center (ATEEC) (2)		
Building Efficiency for a Sustainable Tomorrow (BEST) (5)		
Center for Energy Workforce Consortium (CEWD) (6)		
Center for Renewable Energy Advanced Technological Education (CREATE) (7)		
Distribution Contractors Association (DCA) (3)		
Fiber Broadband Association (FBA) (22)		
Focus on Energy (23)		
Interstate Renewable Energy Council (IREC) (24)		
Midwest Energy Association (MEA) (4)		
Midwest Renewable Energy Association (MREA) (18)		
Minnesota State Energy Center of Excellence (25)		



- National Council for Workforce Education (14)
- Necessary Skills Now Network (16)
- North Central Wisconsin Regional Planning (26)
- Pathways WI (27)
- Public Service Commission of WI (28)
- RENEW Wisconsin (29)
- WI Association of Energy Engineers (WAEE) (30)
- Wisconsin Apprenticeship (32)
- Wisconsin Energy Institute (17)
- Wisconsin K-12 Energy Education Program (KEEP) (15)
- WPPI Energy (31)

Display Q5.2 if Q5.1 [Yes, we are aware of this organization] (Count) > 0
Carry Forward Selected Choices from Q5.1

Q5.2 Please select each statement that is true with regards to your organization's relationship with each of the following Energy and Utilities-related professional organizations.

	We are subscribed to this organization's newsletter	We have attended at least one of this organization's events in the last two years	At least one member of our entity is a member of this organization	We are interested in becoming more active with this organization	None are true
Advanced Technology Environmental and Energy Center (ATEEC) (x2)					
Building Efficiency for a Sustainable Tomorrow (BEST) (x5)					
Center for Energy Workforce Consortium (CEWD) (x6)					



Center for Renewable Energy
Advanced Technological
Education (CREATE) (x7)

Distribution Contractors
Association (DCA) (x3)

Fiber Broadband Association
(FBA) (x22)

Focus on Energy (x23)

Interstate Renewable Energy
Council (IREC) (x24)

Midwest Energy Association
(MEA) (x4)

Midwest Renewable Energy
Association (MREA) (x18)

Minnesota State Energy Center
of Excellence (x25)

National Council for Workforce
Education (x14)

Necessary Skills Now Network
(x16)

North Central Wisconsin
Regional Planning (x26)

Pathways WI (x27)

Public Service Commission of
WI (x28)

RENEW Wisconsin (x29)

WI Association of Energy
Engineers (WAEE) (x30)

Wisconsin Apprenticeship
(x32)

Wisconsin Energy Institute
(x17)



Wisconsin K-12 Energy
Education Program (KEEP)
(x15)

WPPI Energy (x31)

Q33 Are there any additional Energy and Utilities-related professional organizations you are connected with that are not listed above?

- Yes
- No

Display Q5.3 if Q33 = Yes

Q5.3 Please list and describe the nature of the connection between your organization and any other Energy and Utilities-related professional organization.

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____

Q32 A need I see in the Energy and Utilities industry is: _____

Q5.4 Are you aware of the Utilities and Energy Coordination Network microsite at <https://atecentral.net/msites/UECN?> **(right click to open in a new tab)**

- Yes, I have visited the microsite
- Yes, but I have not visited the microsite
- No

Start of Block: Follow-up

Q6.1 We might like to follow up with you if we have any questions or want to learn more regarding your responses to this survey. Would you be willing to have a brief 10-15 minute follow-up conversation at some point?

- Yes
- No

Display This Question:

If Are you aware of the Utilities and Energy Coordination Network microsite (<https://atecentral.net/msi>) = Yes, I have visited the microsite

Q5.7 What resources have you found to be most valuable on the microsite?



APPENDIX H: Open-Ended Responses – Energy and Utility Industry Needs

Theme	Comments
Workforce Development and Recruitment	<ul style="list-style-type: none"> • More Manpower • Workforce Development, both recruitment and retention strategies • More workers • Increased labor force • Finding qualified, drug-free employees with class A licenses who desire to work and learn • More people to be interested in pursuing careers in these fields. • Training, higher wages • More training opportunities and help with education • More building controls technicians • More well-trained employees • Lack of available talent in the trades • Educated entry-level workforce • Getting more students into training programs to get into jobs i.e., internships
Education and Training	<ul style="list-style-type: none"> • Basic knowledge of telecommunication, Pole loading, & GIS technicians (understanding ESRI and how powerful of a tool it has become) • Training on natural gas • A 2-year degree to avoid the apprenticeship schooling but not the hands-on training at a company. • Fuser and CDL License • Office Support Training • HVAC installers and building automation technicians • Training facility managers and maintenance personnel on energy efficiency and renewable energy • Qualified Candidates who possess drafting and engineering skills. Too far segmented, it's either one or the other. • A more affordable way to train apprentice linemen to make journeymen more available. • Additional gas utility training programs • Technical training, better outreach, and communications to the general public • More advanced component maintenance coursework for valves, actuators, regulators, meters, reliefs, etc. • Continuous education after becoming a Journeyman Lineman • More feedback about training, requested by apprenticeship programs, from employers. • Educated entry-level workforce



Theme**Comments**

	<ul style="list-style-type: none">• More collaboration and opportunities for on-the-job training for students.• Office Support Training• Educational opportunities for all utility staff or assisting career opportunities for those seeking a career in utilities - water, wastewater, billing, etc.
Technology and Innovation	<ul style="list-style-type: none">• Integration of more technology to streamline & make work safer.• Climate change resilience• Need to educate the masses on carbon-neutral energy production• Electric demand is growing - potentially at an exponential rate, and the industry is becoming more and more complex. High quality, well-trained, and competent people will be in high demand as this workforce continues to evolve.• Technologies in management
Collaboration and Coordination	<ul style="list-style-type: none">• Improved collaboration• More awareness of the public utilities in the state of Wisconsin• A more comprehensive plan that everyone is working towards.• A central clearinghouse of information describing each of the groups in your earlier list.• Integrated Resource Planning at the PSCW• Stronger regional education partner collaboration outside of WI to develop a roadmap to meet regional needs. Having every school replicate training is redundant, and resources should shift to supporting educational training centers of excellence.• Program Awareness
Specific Skills Needs	<ul style="list-style-type: none">• Telecom engineers• Fuser and CDL License• HVAC installers and building automation technicians• Natural gas-specific programs• More building controls technicians

APPENDIX I: Awareness of Energy Organizations Listed in All Three Iterations of the Network Survey

