A Landscape Analysis of Tech Careers in the Clean Energy and Energy Efficiency Fields

DECEMBER 2025

IREC

Table of Contents

Executive Summary

This report, prepared by the Interstate Renewable Energy Council (IREC) in partnership with the Urban Institute, is a landscape analysis of tech careers in the energy industry. Our research is specifically focused on careers in clean energy, such as solar energy, battery storage, and energy efficiency. Many of our conclusions can apply more broadly to energy careers in general.

IREC prepared this landscape analysis for the Urban Institute as part of the Power IT project funded by the U.S. Department of Labor (funding statement is on page 30). The report was based on two main research components: a statistical survey of about 500 tech workers in the clean energy sector, and qualitative interviews with ten clean energy employers. (Full information on the methodology can be found on page 28.)

This landscape analysis details the role of tech workers in the clean energy sector and provides insight into what draws workers to the clean energy industry; career pathways and education requirements; overall employee satisfaction; and strategies to attract new talent.

Overview of Findings

Surveying the wide array of careers in IT roles at clean energy companies, our research focused on necessary skills and training, sought-after aptitudes and competencies, and pathways in clean IT careers. Our findings include:

The landscape of IT workers in clean energy

- While much work has been done on the intersection of renewable energy and job creation, there has been little research to date on the IT sector within the clean energy workforce.

- Tech workers in clean energy are more likely to report high job satisfaction compared to those in other industries. Those with a job in clean energy generally sought it out based on their interest in these industries.

Skills, training, and certification

- Compared to tech workers in other fields, clean energy workers have more opportunities to enter the IT sector with relatively little experience and advance into management and leadership positions.

- Tech jobs in clean energy tend to require more certifications than jobs in other IT fields.

- Clean energy employers universally report using AI in some capacity, though many downplay the impact on the future of the workforce.

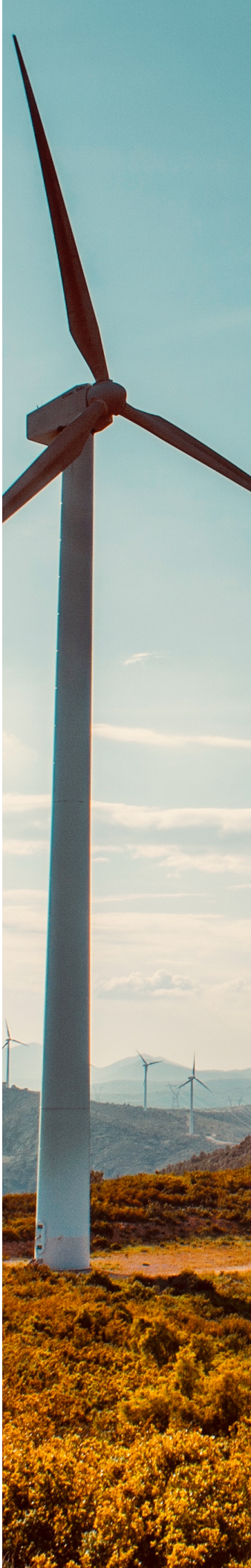
Career advancement and recruitment strategies

- Despite reporting high job satisfaction, most of the surveyed tech workers in clean energy are looking for a new job.
- 22% of clean energy IT workers report concerns about their prospects for career advancement. Some employers acknowledge that more work is needed to create pathways for advancement.
- Most tech workers who do not work in clean energy have some interest in the sector, and those who do have usually worked in other tech sectors, highlighting the transferable nature of their skills.
- Some clean energy employers anticipate growth within the IT departments at their companies, while others expect adverse impacts from federal policies impacting the clean energy sector.

Recommendations

This landscape analysis includes strategic recommendations for the outreach, recruitment, hiring, and retention of tech workers, outlining a path to expanding a skilled workforce that can meet the growing demand for clean energy. Recommendations include:

- Increase the visibility of tech careers in the energy industry by making them more relatable. This can be done by highlighting the importance of transferable skills or sharing tech workers' career pathways.
- Emphasize outreach to underrepresented groups, including women and job candidates from varied backgrounds.
- Provide general information on where tech career opportunities are available, such as the regions of the country where companies are hiring and the types of positions most in demand.
- In job postings, stress the benefits of working in the clean energy industry, including the opportunity for workers to help their community and be part of a larger mission.
- Focus on internships, workforce development programs, and Registered Apprenticeships as tools for recruitment and retention. Engage incumbent workers in career pathways by offering training opportunities in-house.
- Identify and reduce barriers to advancement to create a path to career growth for valued employees.



Introduction

Technology holds immense potential to drive innovation in the clean energy sector. Tech workers are building a more efficient, resilient, and sustainable grid through advanced data analytics, smart grid management, customer satisfaction, and cybersecurity protocols for both the grid and the rapidly expanding EV infrastructure. The demand for skilled professionals in areas like IT, data science, and cybersecurity means new, high-paying career opportunities are now available that did not exist a decade ago.

Much has changed since the first IT boom in the 1990s, but information technology (IT) jobs remain among the most prominent and sought-after careers. The tech workforce employs an estimated 9.6 million people and is expected to grow twice as fast as the overall U.S. workforce over the next decade.[1] However, there has been much less recognition of the abundant opportunities for tech workers in the energy sector, one of the largest and most dynamic parts of the economy.

Energy is itself a major American jobs sector, employing 8.5 million workers, or 5% of the jobs across the United States.[2] Of these, 3.5 million workers are in clean energy industries such as solar energy, battery storage, grid modernization, and energy efficiency. The number of clean energy jobs grew by 2.8% in 2024, more than three times the pace of overall employment.[3]

The public face of the energy workforce is often represented by frontline positions such as construction, manufacturing, and electrical work. These occupations are certainly important: We need skilled workers who can install solar panels, wire electrical systems, and manufacture equipment; as well as the staff who manage, finance, and develop these projects. Behind the scenes, however, energy industries are fundamentally technology industries. There is a critical place for IT professionals who manage software, networks, cybersecurity, data, and other technological processes and systems.

In our survey results and in interviews with employers (discussed below), we found that many IT workers are unaware of career opportunities in the energy industry where they may have transferable skills. There is a clear need for more information on IT career paths in the energy industry—a need we hope this landscape analysis will help address.

This study begins with a brief review of existing literature touching on IT jobs in clean energy. We then move on to an overview of the tech workforce in the clean energy field, including typical job titles and responsibilities, and the skills, education, and certifications required. From there, we examine career advancement opportunities and strategies that companies can use to recruit, hire, and retain talent. We conclude with recommendations for how clean energy companies can encourage the growth of a highly skilled and effective IT workforce.

1. CompTIA, *State of the Tech Workforce 2025* (2025), https://www.comptia.org/en-us/resources/research/state-of-the-tech-workforce-2025/.
2. U.S. Department of Energy, *2025 United States Energy & Employment Report* (2025), https://www.energy.gov/policy/us-energy-employment-jobs-report-useer?nrg_redirect=473379. National surveys do not break down the total number of IT workers within the energy industry.
3. E2, *Clean Jobs America 2025* (September 2025), https://cleanjobsamerica.e2.org/.

Filling the Information Gaps: Tech Jobs in Clean Energy

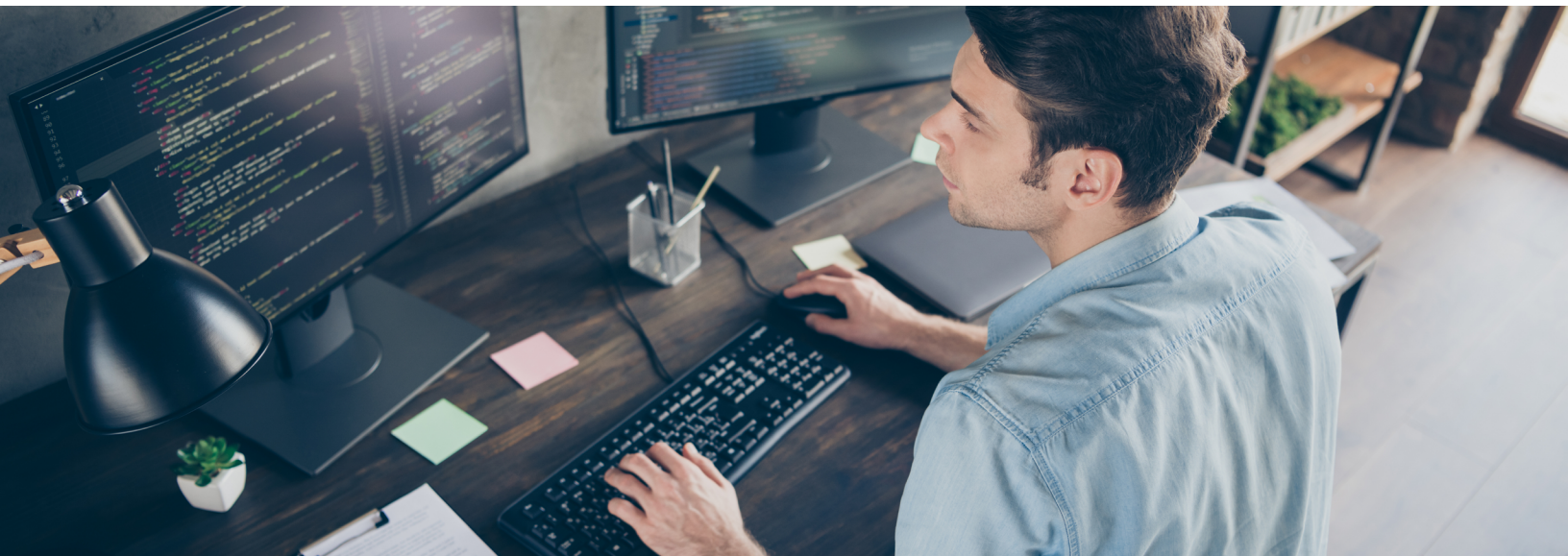
Recently, there has been much scholarship on the potential impact of renewable energy on job creation. However, a literature review finds a distinct lack of research looking specifically at IT occupations and other technical roles. While there are a number of studies related to the tech industry and clean energy, as well as workforce development in the clean energy sector, there is far less available on the intersection of these topics.

Hanna, Heptonstall, and Gross (2024), for example, conducted a systematic review of literature on job creation as part of a low-carbon transition. However, IT or related terms (such as cybersecurity or data science) are not mentioned.[4] A recent literature review by Kozar and Sulich (2023) highlighted this gap, showing that there is a dearth of research on the qualifications and skills needed in green jobs.[5] The research that does exist covers areas other than the United States. Another literature review by Ekechukwu and Simpa (2024) touched on the need for cybersecurity training to meet industry requirements but included no guidance on specific needs.[6]

There has been some research on the intersection between tech and sustainability, specifically addressing the problem of maintaining sustainable practices when dealing with inherently unsustainable technologies. A recent literature review by Chukwurah, Okeke, and Ekechi (2024) examined articles from 2010–2024 at the intersection of cybersecurity and green technology. This analysis highlighted that many environmental concerns are also cybersecurity concerns, such as lithium supply chains, energy-efficient data centers, and e-waste management.[7]

---

4. Richard Hanna, Philip Heptonstall, and Robert Gross, "Job Creation in a Low Carbon Transition to Renewables and Energy Efficiency: A Review of International Evidence," *Sustainability Science* 19, no. 1 (2024): 125–50, https://doi.org/10.1007/s11625-023-01440-y.
5. Łukasz Jarosław Kozar, and Adam Sulich. 2023. "Green Jobs in the Energy Sector." *Energies* 16, no. 7 (2023): 3171, https://doi.org/10.3390/en16073171.
6. Darlington Eze Ekechukwu and Peter Simpa, "The Future of Cybersecurity in Renewable Energy Systems: A Review, Identifying Challenges and Proposing Strategic Solutions," *Computer Science & IT Research Journal 5*, no. 6 (2024):1265–99, https://doi.org/10.51594/csitrj.v5i6.1197.
7. The opportunity to work on such issues may dovetail with the priorities of many tech workers in clean energy. As noted later in this report, tech workers often enter the industry due to their interest in the field and its mission.



An article by Arcelay et. al. (2021) highlighted the need for IT positions as remote operations and automation grow within the renewable energy sector. Examples include smart grid programmers and analysts, as well as remote drone operators to survey offshore wind projects. This study was one of the only academic sources that points out a need to train nontechnical roles, such as salespeople, on some IT skills, such as web-based marketing.[8]

The annual U.S. Department of Energy *U.S. Energy & Employment Report* provides a tally of energy workers by industry sector, but does not break down the number of IT-related professions.[9] The IREC *National Solar Jobs Census* uses the same data to provide a more in-depth analysis of the number of solar industry workers; however, there is no data available on how many of these workers are in tech.[10]

An industry report from Deloitte (2024) predicted that 2025 will see an increase in technology skills needed in the renewable energy sector. The report notes that both utilities and renewable energy developers "face challenges including: securing a larger workforce, developing digital and project development skills, and hiring for new roles as they diversify their positions."[11]

Tech Workers in the Energy Industry: An Overview

Tech workers at energy firms are part of a diverse and vibrant IT workforce. According to the U.S. Bureau of Labor Statistics (BLS), some of the fastest-growing jobs in the country are jobs in tech.[12] The U.S. Department of Labor O*NET program reports there is a "bright outlook" for Software Developers, Computer Systems Analysts, Data Scientists, and other IT positions, which are expected to grow rapidly and have large numbers of job openings.[13]

At the same time, the job market in tech is clouded by anxiety over the state of the economy and the impact of AI. Computer science and computer engineering graduates are reporting high unemployment rates, which points to the challenge of navigating a career in a rapidly

8. Irene Arcelay, Aitor Goti, Aitor Oyarbide-Zubillaga, Tugce Akyazi, Elisabete Alberdi, and Pablo Garcia-Bringas "Definition of the Future Skills Needs of Job Profiles in the Renewable Energy Sector," Energies 14, no. 9 (2021): 2609, https://www.mdpi.com/1996-1073/14/9/2609.
9. U.S. Department of Energy, *2025 United States Energy & Employment Report* (2025), https://www.energy.gov/policy/us-energy-employment-jobs-report-useer?nrg_redirect=473379.
10. Interstate Renewable Energy Council, *National Solar Jobs Census 2023* (September 2024), https://irecusa.org/programs/solar-jobs-census/.
11. Marlene Motyka, Thomas L. Keefe, Kate Hardin, and Carolyn Amon, *2025 Renewable Energy Industry Outlook* (Deloitte Research Center for Energy & Industrials, Dec. 9, 2024), https://www.deloitte.com/us/en/insights/industry/renewable-energy/renewable-energy-industry-outlook.html.
12. "Employment Projections," U.S. Bureau of Labor Statistics, accessed September 2025, https://www.bls.gov/emp/tables/fastest-growing-occupations.htm.
13. "Software Developers," O*NET Online, https://www.onetonline.org/link/summary/15-1252.00; "Computer Systems Analysts," O*NET Online, https://www.onetonline.org/link/summary/15-1211.00; "Data Scientists," O*Net Online, https://www.onetonline.org/link/summary/15-2051.00; accessed September 2025.

changing industry.[14] There were over 90,000 reported layoffs in the tech industry in 2025 as of September, although the number of layoffs is on track to be slightly less than in 2024.[15] On balance, the outlook for tech workers remains solid: An industry report predicts net tech employment will grow by 2.5% in 2025.[16]

As tech workers seek opportunities for meaningful careers, the clean energy sector offers a multitude of options. It offers the chance for workers to make a difference by supporting the growth of affordable, sustainable power generation. In clean energy industries like solar, energy efficiency, battery storage, and others, tech workers are using their expertise to help their communities and improve the general quality of life.

Job Titles and Responsibilities

Our research found that job responsibilities and titles within the clean energy sector tend to be similar to those in the IT sector as a whole, though energy employees are more likely to be in leadership positions.

Tech workers form the backbone of clean energy companies, providing essential services such as cybersecurity, data analysis, help desk support, and software development. They include IT specialists who design, troubleshoot, and improve computer and communications systems; software engineers who develop cutting-edge digital tools and platforms; help desk specialists who keep operations running smoothly; and many others.[17]

For this report, we surveyed the landscape of tech careers in energy using a statistical survey of 505 IT workers, both within and outside the clean energy industry. The survey was supplemented with qualitative interviews with ten clean energy employers.

Online survey results

In the online survey, the most common job titles reported were Computer and Information Systems Managers; Directors and Executive Leadership; and Software and Web Developers, Programmers, and Testers. Common job titles for those in clean tech industries are similar to those of surveyed individuals who work elsewhere in the IT sector. One difference is that clean energy tech workers are more likely to fall into Director and Executive Leadership roles (**Figure 1** on the next page). They are also more likely to be managers, with 83% reporting that they manage employees compared to only 62% among IT professionals in other industries.

Across all IT workers surveyed, most respondents (64%) work in Information and Communication Technologies (including hardware, software as a service, and tech infrastructure). Only 7% said

14. Natasha Singer, "Goodbye, $165,000 Tech Jobs. Student Coders Seek Work at Chipotle," New York Times, Aug. 14, 2025, https://www.nytimes.com/2025/08/10/technology/coding-ai-jobs-students.html.
15. See Layoffs.FYI, https://layoffs.fyi/ (accessed September 2025).
16. CompTIA, State of the Tech Workforce 2025 (2025), https://www.comptia.org/en-us/resources/research/state-of-the-tech-workforce-2025/.
17. See "Solar Career Map," Interstate Renewable Energy Council, accessed September 2025, https://irecsolarcareermap.org/.

they work in emerging technologies such as AI, machine learning, and robotics. Another 6% work in professional and business services such as banking, finance, legal, and real estate (Figure 2 below).

Figure 1 Common Job Titles in the IT Sector

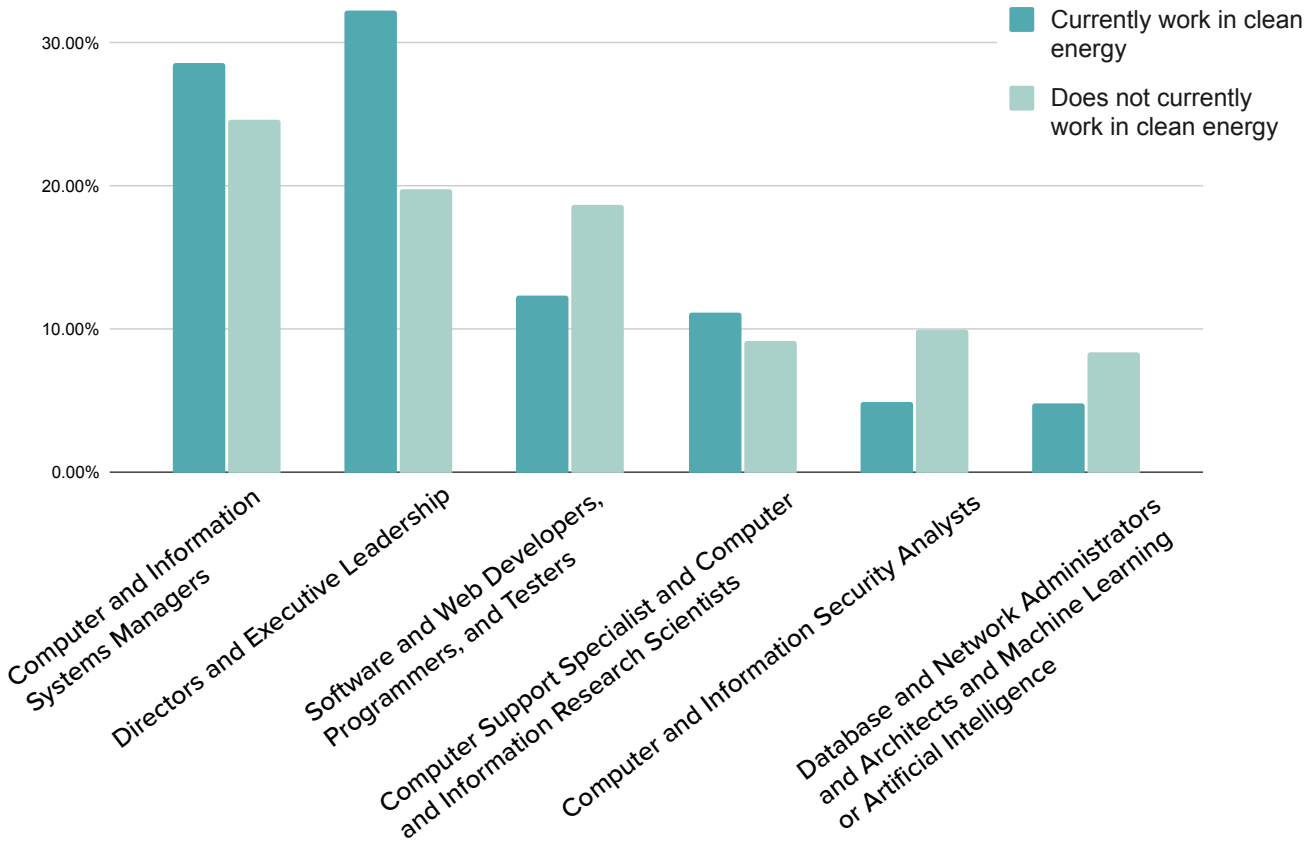
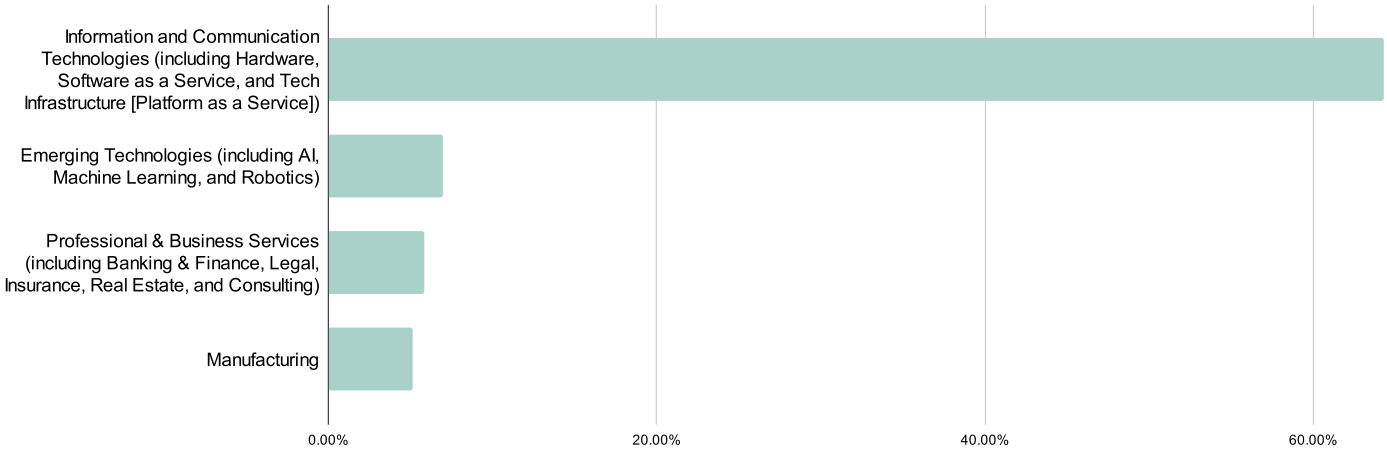


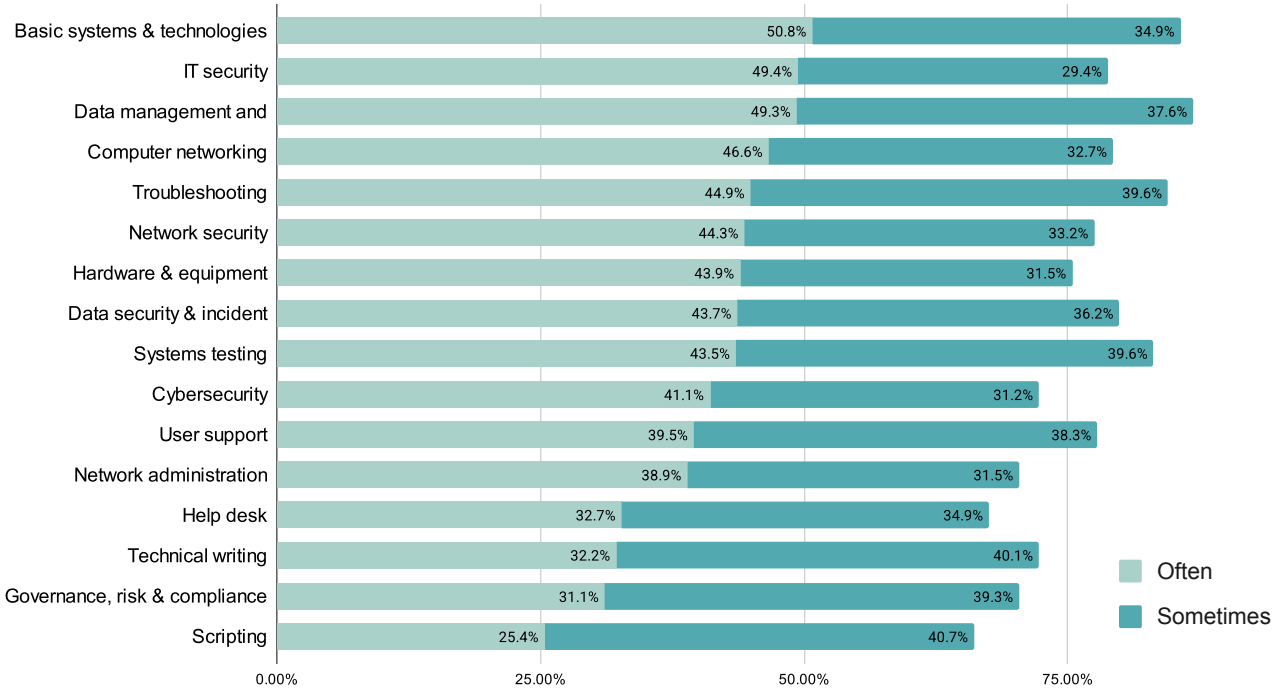
Figure 2 Top Industries for Tech Workers



18. There was a notable age difference among those who work in professional and business services. Among those 55 and older, 12% of respondents work in that sector.

Common responsibilities for tech industry workers surveyed include IT security, data management and analysis, and computer networking (**Figure 3**). The responsibilities for those who work in clean energy are similar to those identified in other fields.

Figure 3 How Often Do You Work With the Following Responsibilities in Your Current IT Role?



Insights from interviews

In interviews with clean energy employers, we found the size of an IT department varies widely, ranging from two to 500 employees. Job responsibilities for IT employees often include database and portal management, data science and analytics, software development, and the help desk. Other responsibilities include deliverable tracking, network infrastructure and engineering, and tech-adjacent skills like the operations and maintenance of equipment (ranging from solar systems to EV buses). One interview participant described IT workers as “essentially like technology translators and solution finders.”

One employer interviewed described a small team of seven that includes system administrators, business analysts, technical analysts, and software project managers. Another, larger employer manages an IT department of over 50 full-time employees in a variety of teams, including Enterprise and Local Applications teams, a Digital Team, a Data and Analytics team, an Operational Function team, and an Enterprise Architecture team.

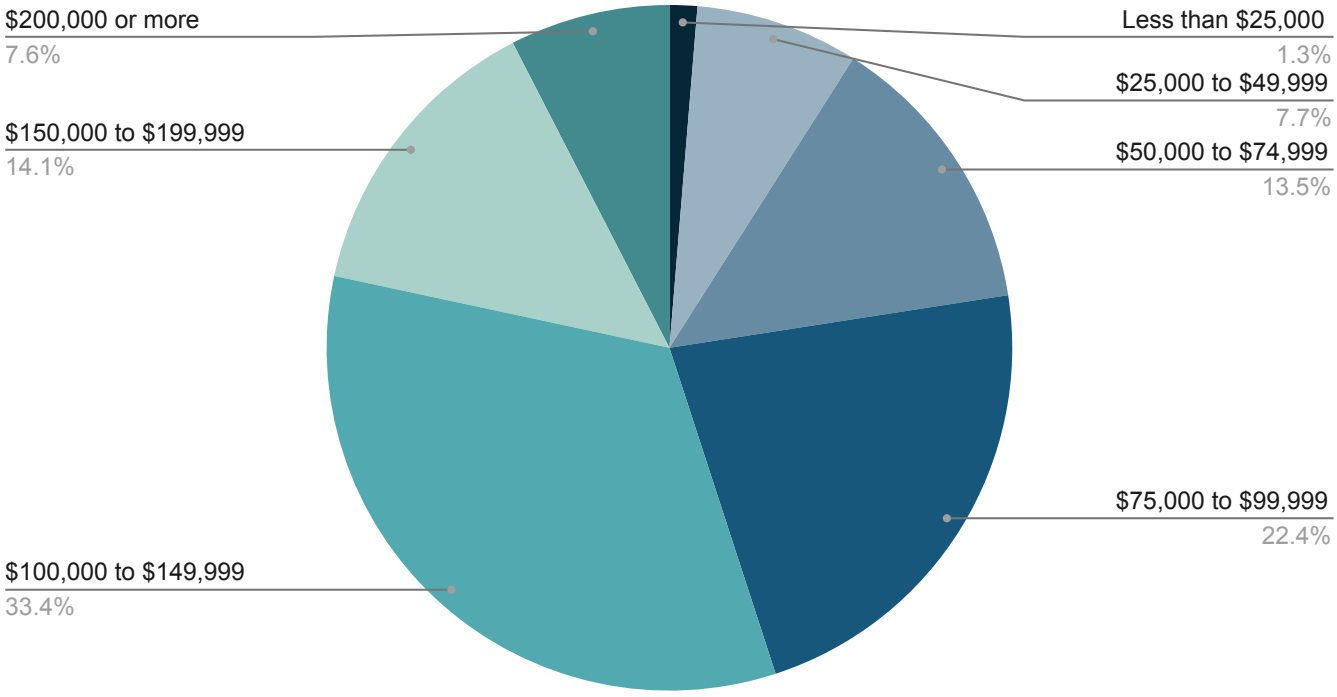
Demographics and Salaries

The demographics of tech workers in clean energy largely mirror the tech industry as a whole, including with respect to gender. Our online survey 75% of respondents were male and 25% were female, reflecting a male-dominated industry. These proportions are virtually identical among tech workers who work in clean energy and those who do not.

Across all tech workers, both within and outside the clean energy sector, 68% of respondents were white, 11% were Black, 21% were Asian, and 10% were Hispanic or Latino. Nine percent of respondents were veterans. Once again, most of these proportions are identical for the subset of IT workers in clean energy. A notable difference is that 18% of respondents who work in clean energy are Hispanic or Latino, compared to 6% outside of the clean energy industries.[19] Also, 18% of respondents who work in clean energy are veterans, compared to 6% of those outside that sector.[20]

While the survey did not ask for salary information, it did offer insight into tech workers' annual incomes. Among survey respondents, 45% reported annual incomes of $100,000 or more. For the most part, there was no statistically significant difference in reported income for those who work in clean energy and those who do not. An exception is that clean energy workers were more likely to report salaries below $50,000, while those outside of clean energy were more likely to earn between $50,000 and $99,999 (Figure 4).

Figure 4 Annual Income of All Clean Tech Workers



19. The reasons for a higher proportion of Hispanic people in clean energy are unclear, but it may reflect that there are a large number of clean energy jobs in parts of the country with a high Latino population, such as California. However, these parts of the country also have a high concentration of tech jobs.
20. U.S. Bureau of Labor Statistics, "Databases, Tables, & Calculators by Subject," accessed September 2025, https://data.bls.gov/timeseries/LNU01096583?years_option=all_years&periods_option=specific_periods&periods=Annual+Data.

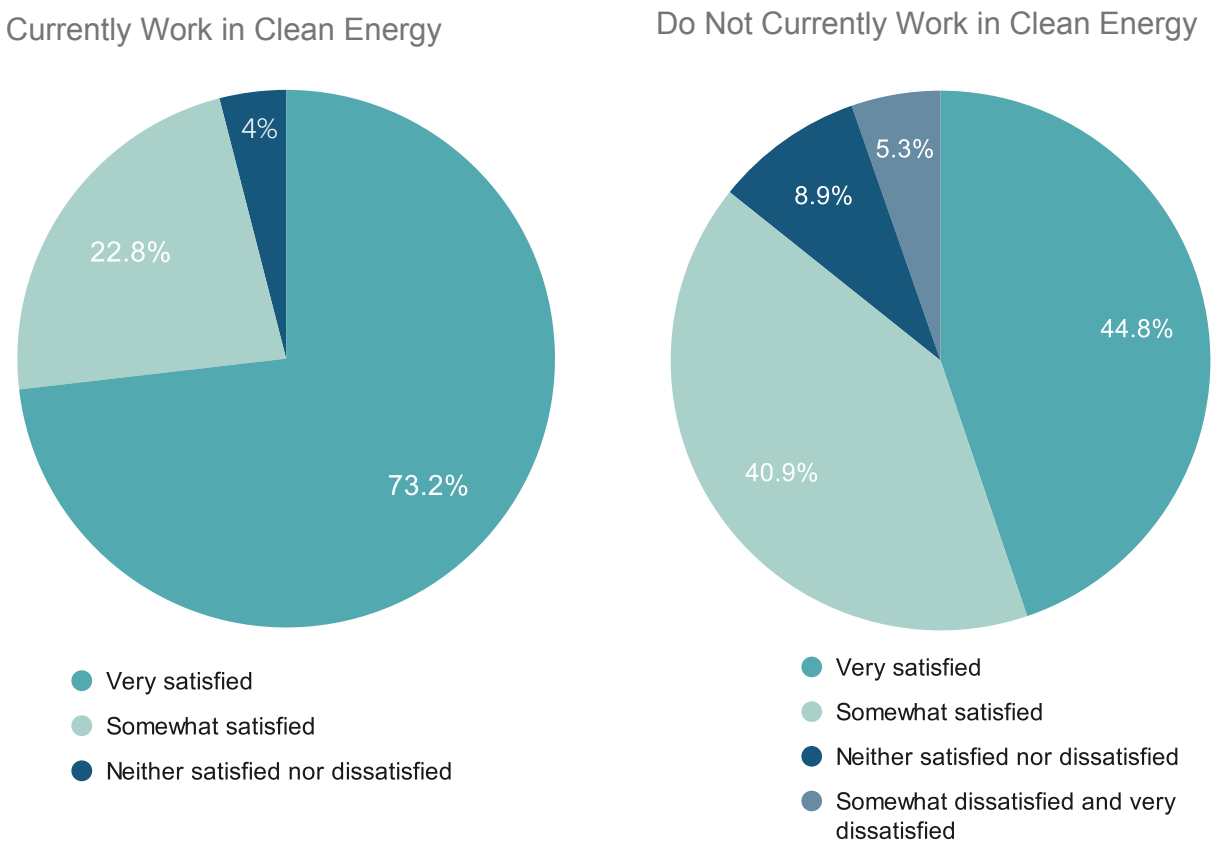
Reasons for Entering the Clean Energy Field

Those working in the clean energy industry sought it out. In our survey, 92% of IT workers in clean energy said their interest in the field influences their job choices. Tech workers in clean energy also report higher levels of job satisfaction compared to those in other industries. 73% of those in clean energy reported they were "very satisfied" with their current IT role, compared to 45% of those outside of clean energy (**Figure 5**).

When asked what led them to pursue a career in clean energy, 71% of tech workers in the field cited an interest in technology, and 61% cited an academic background in IT. Fewer respondents (40%) noted job market opportunities as a factor, while 26% were making a career change from another field.

Unsurprisingly, IT workers in clean energy rate working for a "company that is committed to sustainability and having a positive impact on the environment" as highly important to them, with 62% saying this is very important, compared to 42% of IT workers in other industries. These findings suggest that it will be helpful for recruiters to highlight the unique benefits of working in clean energy and the opportunities to contribute to a mission.

Figure 5 How Satisfied Are You in Your Current IT Role?



Skills, Training, and Certification

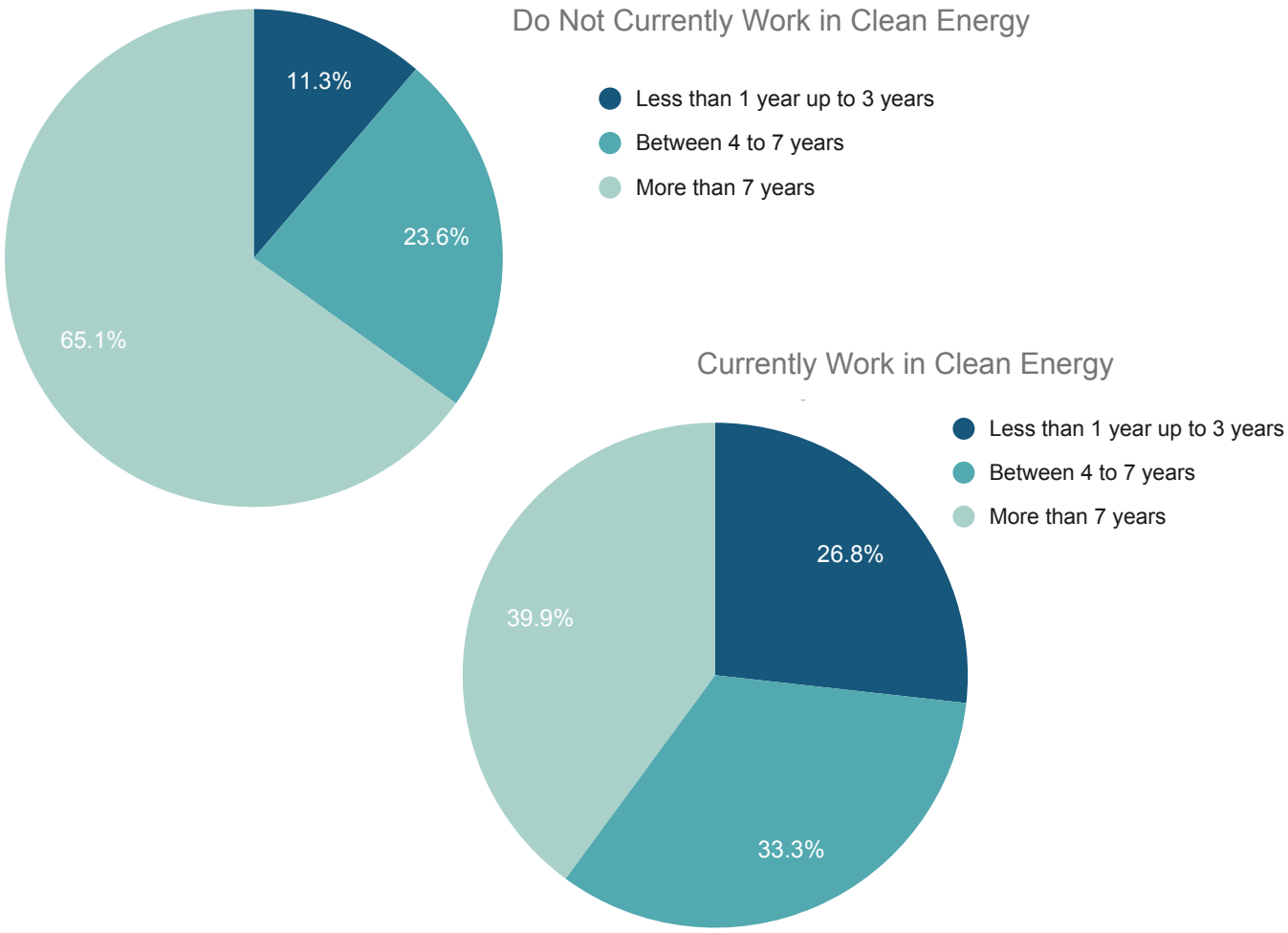
Our survey found that, compared to the IT sector as a whole, clean energy industries offer more opportunities for tech workers with relatively less experience. At the same time, clean energy jobs tend to require more specialized skills and additional technical certification.

Most employees surveyed said their IT training prepared them for a role in clean energy, but they point to the need for employers to sponsor more education and training opportunities. In our interviews, employers stressed the importance of "people skills" and the ability to communicate and learn on the job.

Experience and Education Requirements

Our online survey found that clean energy IT professionals have fewer years of experience on average than those in other industries: 27% of clean energy workers have 3 years of experience or less, compared to 11% outside the clean energy sector (**Figure 6** on the next page). Since clean energy is a relatively young and dynamic sector, this may reflect more opportunities for leadership and advancement.

Figure 6 Years of Experience in IT

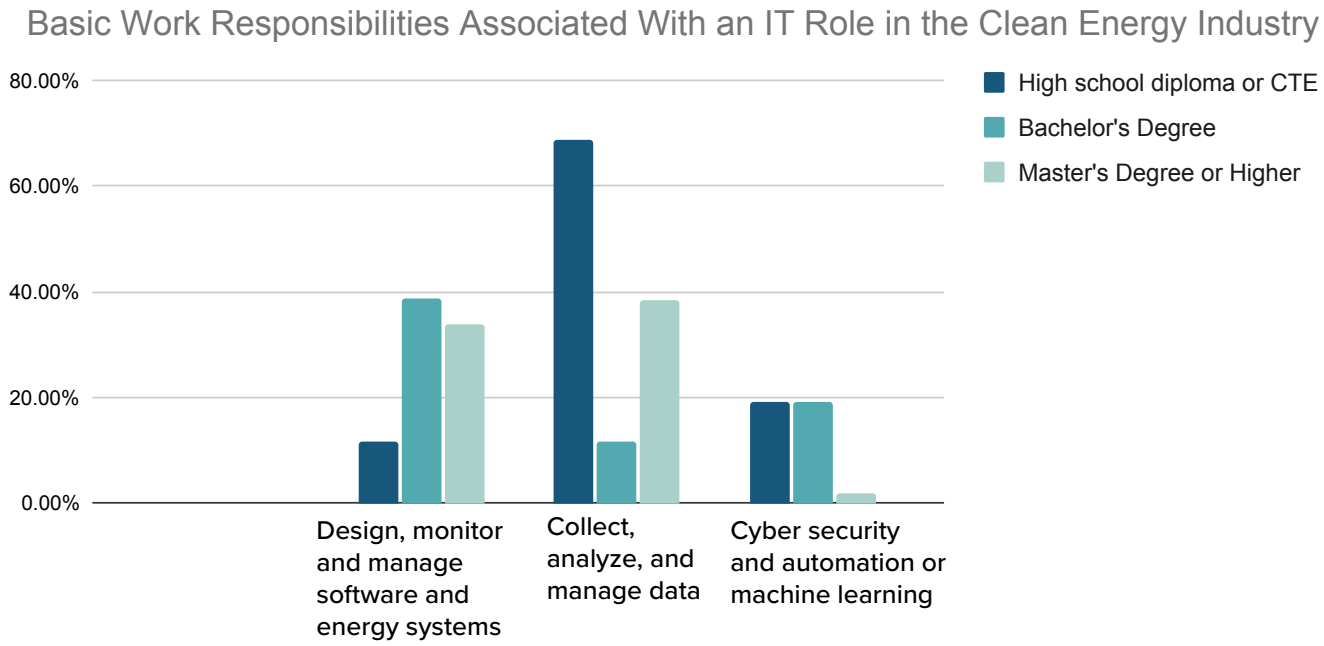


Among all IT workers surveyed, 77% of respondents had earned a bachelor's degree or higher, including 47% whose highest education level was a bachelor's degree and 30% with a master's degree. These results are similar for both those within and outside of the clean energy field.

A somewhat larger percentage of clean energy workers (16%, compared to 6% outside of clean energy) reported a high school diploma or Career Technical Education (CTE) credential as their highest education level. This may indicate that while a four-year degree is often required, it is relatively easier to enter the clean energy field with less formal education.

Tech workers with a high school diploma or CTE credential have less experience on average: 32% have three years of experience or less, compared to only 12% of those with a bachelor's degree. Basic work responsibilities also differ by education. Those with a high school diploma or CTE credential are most likely to collect, analyze, and manage data, rather than designing and managing software or working in cybersecurity and automation (**Figure 7** on the next page).

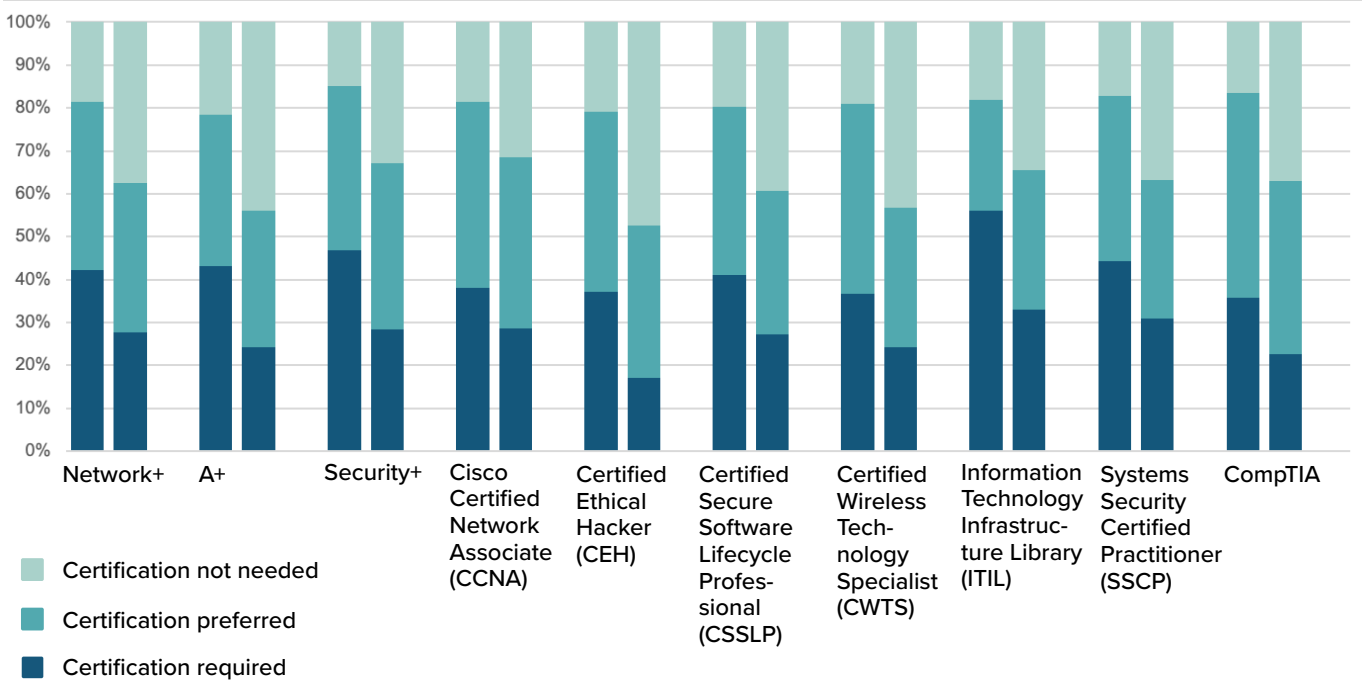
Figure 7



While offering more opportunities for those with less experience, the survey found that clean energy companies tend to require more technical certifications compared to tech jobs outside the field. Certifications that are often required include Information Technology Infrastructure Library (ITIL), Security+, A+, and Network+ (Figure 8).

Figure 8 Certification Requirements

First column: Works in clean energy
Second column: Does not work in clean energy



A large majority of clean energy tech workers surveyed say their current role in IT aligns with their formal training (Figure 9). However, half of respondents mentioned cybersecurity as a new skill they had to learn on the job. Another new skill that was cited by some clean tech employees was using renewable energy software or platforms (Figure 10). Tech jobs in clean energy often require learning customer relationship management (CRM) software like Salesforce, and can sometimes involve more specialized software platforms (for example, platforms related to solar sales or operations and maintenance).

Figure 9 How Does Your Current Role Compare to the Formal IT Training You Received? (*Only Tech Employees in Clean Energy)

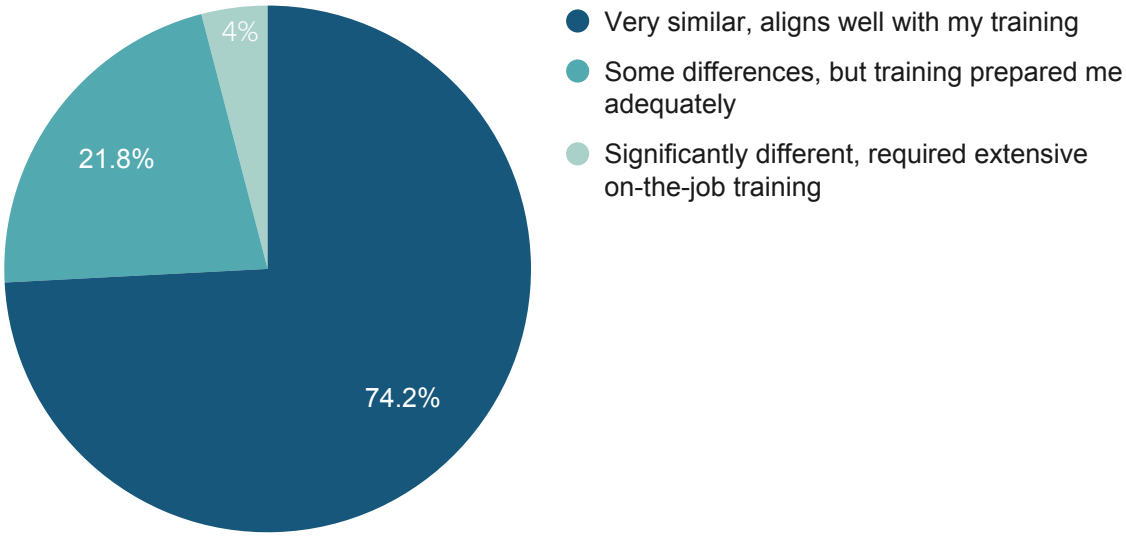
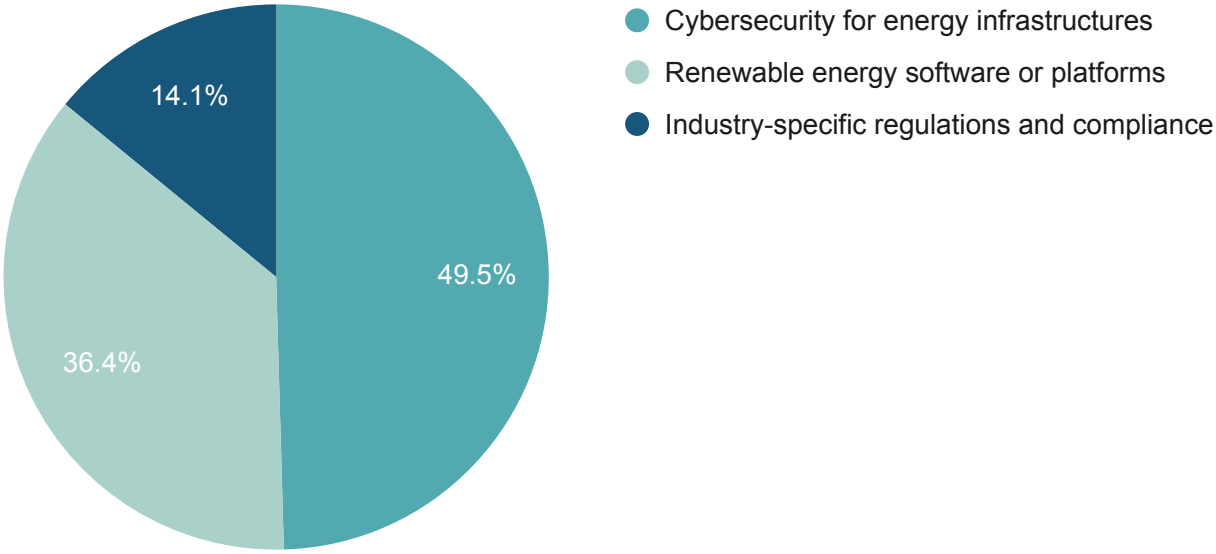


Figure 10 What Skills Did You Have to Learn on the Job That Were Not Covered in Your IT Training? (*Only Tech Employees in Clean Energy)



Employer Perspectives: Skills Required for Clean Energy Jobs

In interviews with clean energy employers, half of respondents stated they require specific certifications or credentials when hiring, but these requirements varied across companies. Examples include certifications in C Sharp, SQL, Python, CompTIA, A++, PMI-ACP, Agile development, and cybersecurity. Cisco Certifications and the Salesforce Certified Administrator credential were also mentioned. However, not all clean energy companies include such requirements: four employers of varying sizes stated that there were no certifications or credentials needed.

When clean energy employers were asked about skills needed for tech jobs, most noted cybersecurity, networking and communications, and data science. Half of the employers also mentioned a need for experience in software development. However, they also noted a variety of technical skills outside of IT that employers look for when hiring. For companies that work in the electric grid, one example could be a knowledge of electricity and an understanding of North American Electric Reliability Corporation (NERC). Others might look for skills in content creation and management, multimedia, project management, and system integration.

With a wide array of clean energy company types and focuses, ranging from battery storage to solar installation, it is beneficial for IT workers to learn more about the clean energy technologies they are working on. An interview participant from a large utility company shared that it was difficult to hire for any roles "where you need a technical skill, but you also need to pair it with a domain knowledge... maybe like solar batteries."

Importance of Non-Technical and "People" Skills

Outside of technical qualifications, nearly all employers interviewed stressed the importance of "people skills" such as the ability to communicate effectively and work as a team. A respondent with a mid-sized solar for-profit shared that "generally, the path to growth in technology is almost entirely fueled by attitude. And by that, I mean a curiosity for problem solving . . . that's one of the reasons why the degree or the certification doesn't always make a difference."

An interview participant from a large utility company shared a similar view. "I'll call it non-technical skills being most important. What's their attitude? What's their aptitude to learn and solve problems? How do you put pieces together? How do you critically think? How do you work with other team members?"

The ability to learn on the job was another skill that came up frequently in interviews. With technology always changing, IT staff who can pivot easily, learn new programming languages, and assess new efficiencies are valuable to employers.

Training Opportunities at Work

Companies that offer training opportunities are making an investment in the workforce, whether they provide on-the-job training or support continuing education. In our online survey, tech

employees identified training as a priority. A majority of tech employees in clean energy (57%) say it is very important that employers provide opportunities to go back to school while working to get a higher degree or certification. Among tech workers outside the clean energy industry, 43% say this was very important. Also, 46% of clean energy employees say it is important to provide tuition benefits, compared to 31% among other IT workers (see **Figure 14**, page 13).

Nine out of the ten clean energy employers interviewed said they do provide technical skills training to new hires. Many employers said they have in-house training programs, while a few use outside training providers such as LinkedIn Learning, Coursera, Canvas Classroom Management, and Learning3 International. An interview participant from a mid-size clean energy and energy efficiency nonprofit shared that the company has developed around 45 technical trainings "that every engineer...who joins the company will go through when they need it."

Employers say the skills they cover in internal training can include database management, software and tool use, professional development, Python development, and Windows administration. Improving "people" skills was another topic covered in training. An interview participant at a mid-size solar for-profit said the company holds trainings around "ways of working," which includes "teaching people about backlogs and sprints and how to prioritize and that kind of thing . . . I'll call it adjacent to the actual technical skills."

An interview participant from a small solar and energy efficiency for-profit shared that through their workforce development program, they offer technical training including OSHA training, North American Board of Energy Practitioners (NABCEP) certification, and additional certifications for specific products, such as solar tracking systems and inverters.

Registered Apprenticeship programs are another opportunity for employers to adopt a structured on-the-job training program. Under an apprenticeship, employees follow a structured training program under the supervision of a mentor and receive related technical instruction, leading to a nationally recognized credential. Apprenticeships are registered with the U.S. Department of Labor and/or a State Apprenticeship Agency, and can be sponsored by the employer or through a group sponsorship program.[21] As of 2024, more than 64,800 apprentices worked in tech occupations, representing a 29% increase over the past four years.[22]

21. More information on apprenticeships is available through the Interstate Renewable Energy Council *Registered Apprenticeship Toolkit for Clean Energy Employers*, https://greenworkforceconnect.org/. registered-apprenticeship-toolkit-full. The Apprenticeships in Clean Energy (ACE) Network offers free technical assistance and resources to help clean energy companies develop REgistered Apprenticeship programs. More information can be found at https://irecusa.org/programs/ace-network/.
22. ApprenticeshipUSA, "Technology," accessed September 2025, https://www.apprenticeship.gov/apprenticeship-industries/technology.

The Role of AI in Work Flows and Training

The use of AI is now a standard part of the work environment across the entire tech industry. Every employer interviewed reported that they are using AI in some capacity, with some companies using AI tools and technologies more extensively than others. Surprisingly, many tend to downplay the impact of AI on the future of the workforce.

Multiple employers stated they predominantly use AI as part of a more comprehensive software package, such as Microsoft Copilot (part of the Microsoft Suite). A few employers raised concerns about energy usage and environmental effects related to AI. An interview participant with a mid-sized nonprofit solar company said it was important for companies to have "sustainability plans that focused on offsetting the carbon impact of their AI investment." Another employer shared that there were legal concerns with AI usage.

Only one interview participant suggested that AI could lead to a reduction in the workforce, while all others stated that they viewed AI as a tool for workers rather than a replacement for them. One participant from a large, for-profit solar company stated they are "actively in a growth mode, even with AI . . . You can move from a screwdriver to a power drill; someone still has to hold either one of those tools, right? You still need the human being to leverage the tool."

An interview participant from a government transit authority offered another perspective. "I know I've seen in the news [about] software developers and software engineers—AI is coming for their jobs. And it has a small truth to it, because now you can use AI to develop code for programs. However . . . you still need that human being to review and analyze the data that . . . they've given you to help make decisions, especially when it comes to safety."

Tech Workers Organize to Take On AI Challenges

Within and outside of the clean energy sector, tech workers are turning to collective bargaining and labor unions to pursue fairer working conditions. In recent years, there has been a push for tech workers across a variety of tech sectors to organize through unions like the Communication Workers of America (CWA) and groups like the Tech Workers Coalition, with both organizations advocating for tech worker rights, benefits, and pay.

In the last couple of years, as AI has become increasingly prevalent in the tech sector, CWA has also advocated for worker rights in relation to AI. In 2023, the CWA created a committee with the goal to "address the challenges that AI presents through both bargaining strategy and public policy."[23] In 2023, the organization published a Principles and Recommendations report, which calls for updates to bargaining agreements to include some of the possible effects of AI. These include "invasive surveillance, unfair automated decision-making across all aspects of our members' employment (including hiring, discipline, and pay-setting), unsafe and stressful work intensification and speed-up, the reduction of compensation or benefit levels, and the movement of work functions out of the bargaining unit."[24]

23. Communication Workers of America, "Spotlight on Artificial Intelligence" (April 2, 2025), https://cwa-union.org/news/spotlight-artificial-intelligence.
24. Communication Workers of America, *Report to the CWA Executive Board on AI Principles and Recommendations* (November 2023), https://cwa-union.org/sites/default/files/2023-12/202311_report_to_the_cwa_executive_board_on_ai_principles_and_recommendations.pdf.

Career Advancement for Tech Workers

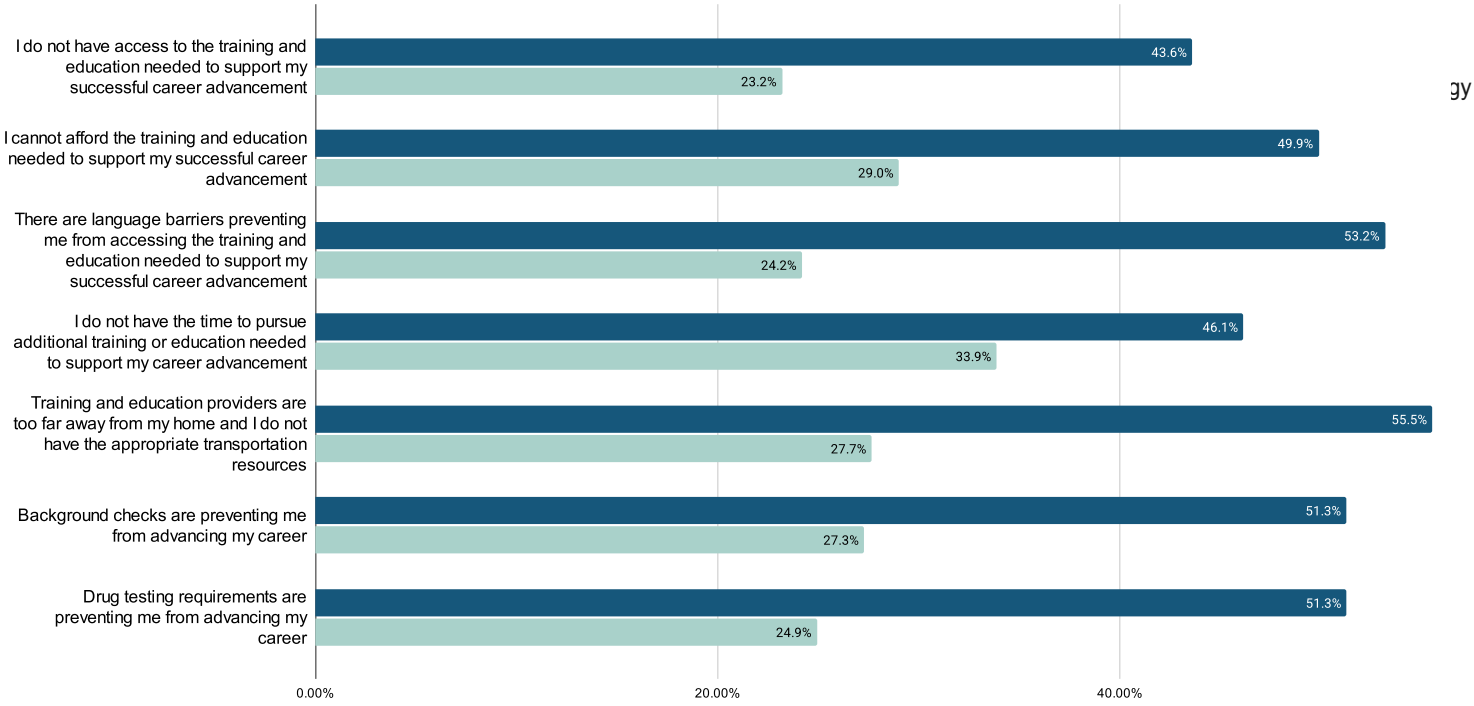
Despite reporting high job satisfaction, the survey found that 74% of tech workers in clean energy are looking for other job opportunities, compared to 54% outside the industry. It is possible this reflects an uncertain outlook for the clean energy sector, which has amplified in recent months after the survey was conducted. Recent legislation scaling back incentives for clean energy technologies, along with other developments like high interest rates, have led to a slower growth forecast for clean energy, although the outlook for this sector remains favorable over the long term.[25]

A number of the clean energy employees surveyed cited concerns over their prospects for career advancement. Among tech workers in the clean energy industry, 44% said they did not have access to the training and education necessary for advancement, and 50% said they could not afford the necessary training and education.

In addition, 53% said that language barriers prevent them from accessing training; 51% said training providers are too far away from home. In addition, many employees reported that background checks and drug testing requirements were barriers to advancement. These percentages are all significantly higher than among tech employees outside the clean energy industry (Figure 11).

Since all the employers we interviewed told us they do provide training, it is notable that so many workers report their training is inadequate. This data may point to a disconnect between training offered and training received. Possible barriers to training could also be present that are not reflected in the data.

Figure 11 Barriers to Career Advancement (Percentage That Agree or Strongly Agree)



25. Jonathan Touriño Jacobo, "US solar and wind to be 100GW lower by 2030 without tax credits – WoodMac," *PV Tech,* July 14, 2025, https://www.pv-tech.org/us-solar-and-wind-to-be-100gw-lower-by-2030-without-tax-credits-woodmac/.

Employer Strategies to Support Advancement

Employers interviewed said that while there are some pathways to advancement in their organizations, it is an area that needs more work and has presented challenges. Some note a lack of standardization in how their employees advance in the company. One reason cited was big-picture concerns like the overall budget and funding situation. An interview participant from a mid-sized clean energy nonprofit noted “radical swings in our organization” that have made advancement pathways challenging.

Other employers said they have put considerable time and effort into creating pathways for advancement. “That's one of the things that makes it attractive to come work here,” said an interview participant from a large solar for-profit, who adds that setting career pathways is a dynamic process and “more about possibilities than linear pathways.”

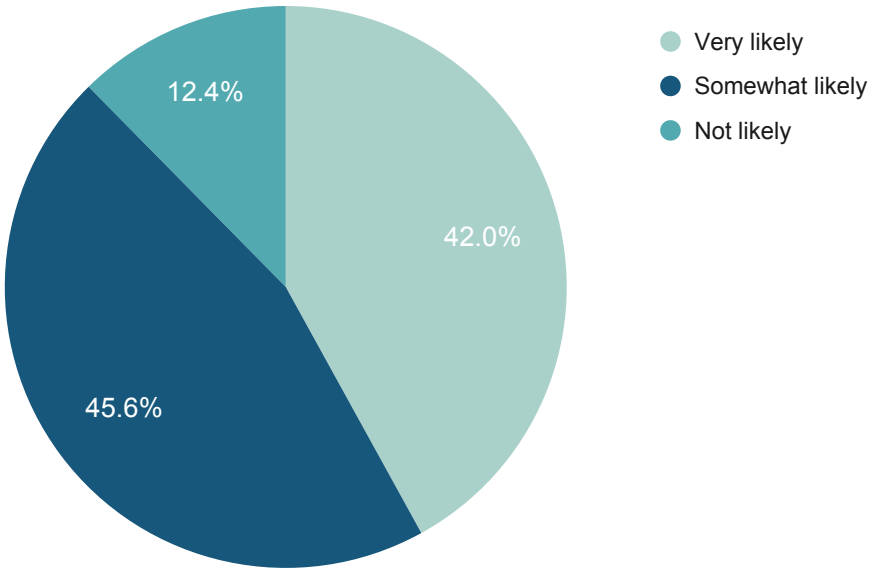
An interview participant from a government transit authority echoed the importance of setting a path to move up in an organization. “When you don't know where you're going, your chances of staying [decrease] a whole lot.” Career pathways allow people to envision a future at a company and help encourage retention.

Attracting Tech Talent to the Clean Energy Industry

Our survey results show that clean energy industries have an open opportunity to attract new talent from the IT sector. The vast majority of clean energy tech workers surveyed (83%) have worked in IT roles outside of the industry, highlighting the transferable nature of their skills.

Among those not currently working in clean energy, nearly all said they would be either very likely or somewhat likely to apply for an IT role in the clean energy sector (**Figure 12**). In addition, 67% of those who are very likely to apply for a clean energy role reported that they were looking for a job, compared to only 48% of those who are somewhat likely to apply.

Figure 12 How Likely Are You to Apply for an IT Role in the Clean Energy Industry? (*Respondents Do Not Currently Work in Clean Energy)



Among tech workers who do not work in clean energy, a substantial number said they would be "very interested" in working in solar energy (40%) or energy efficiency (40%). Smaller percentages also expressed interest in working in other clean energy technologies (**Figure 13** on the next page).

Majorities among tech workers not currently in the field said they are aware of opportunities for IT positions in the clean energy industry near where they live; believe they have the education or training needed to apply for an IT position in clean energy; and know where to find or look for job postings for these positions (**Figure 14** on the next page). However, 67% of those who do not currently work in clean energy said they were not aware of any IT roles in that sector, indicating that even those who are interested in working in the industry may find it difficult to find opportunities.

Figure 13 Interest in Clean Energy Careers (Percentage "Very Interested")

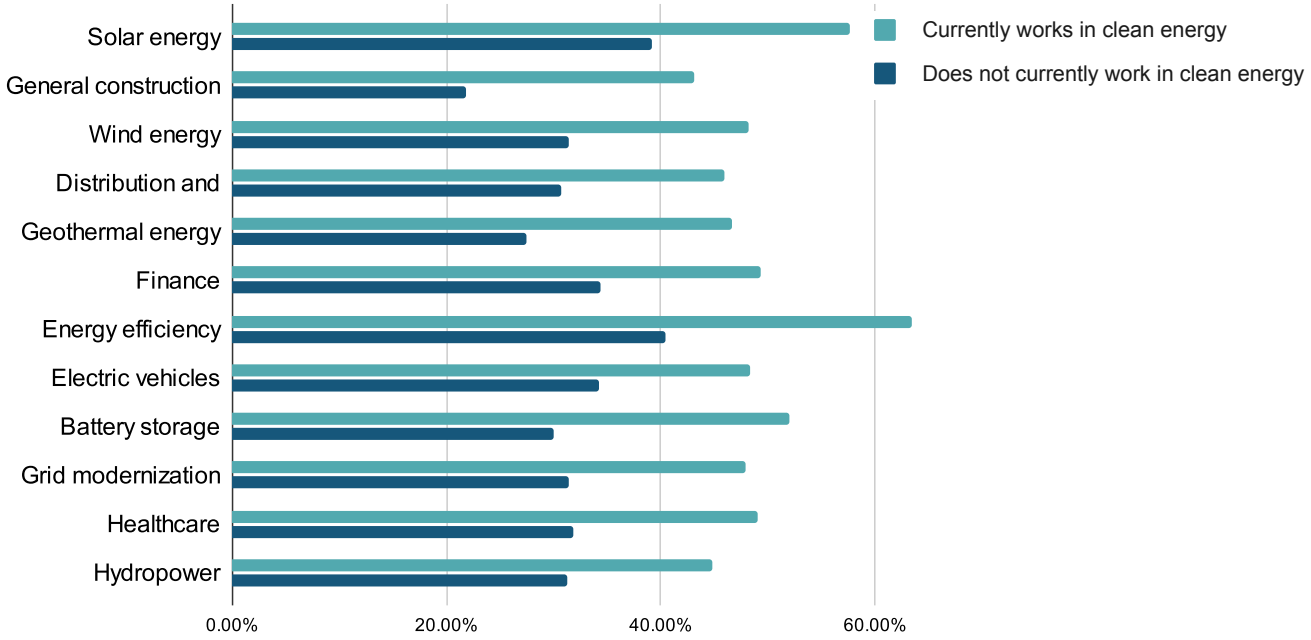
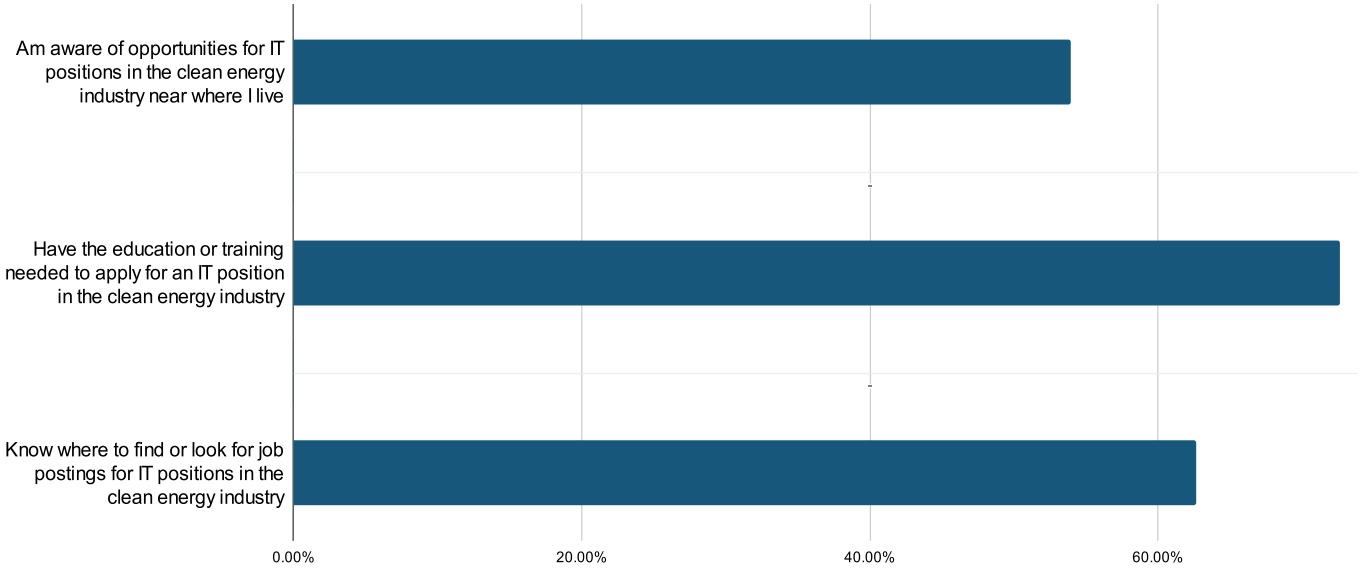


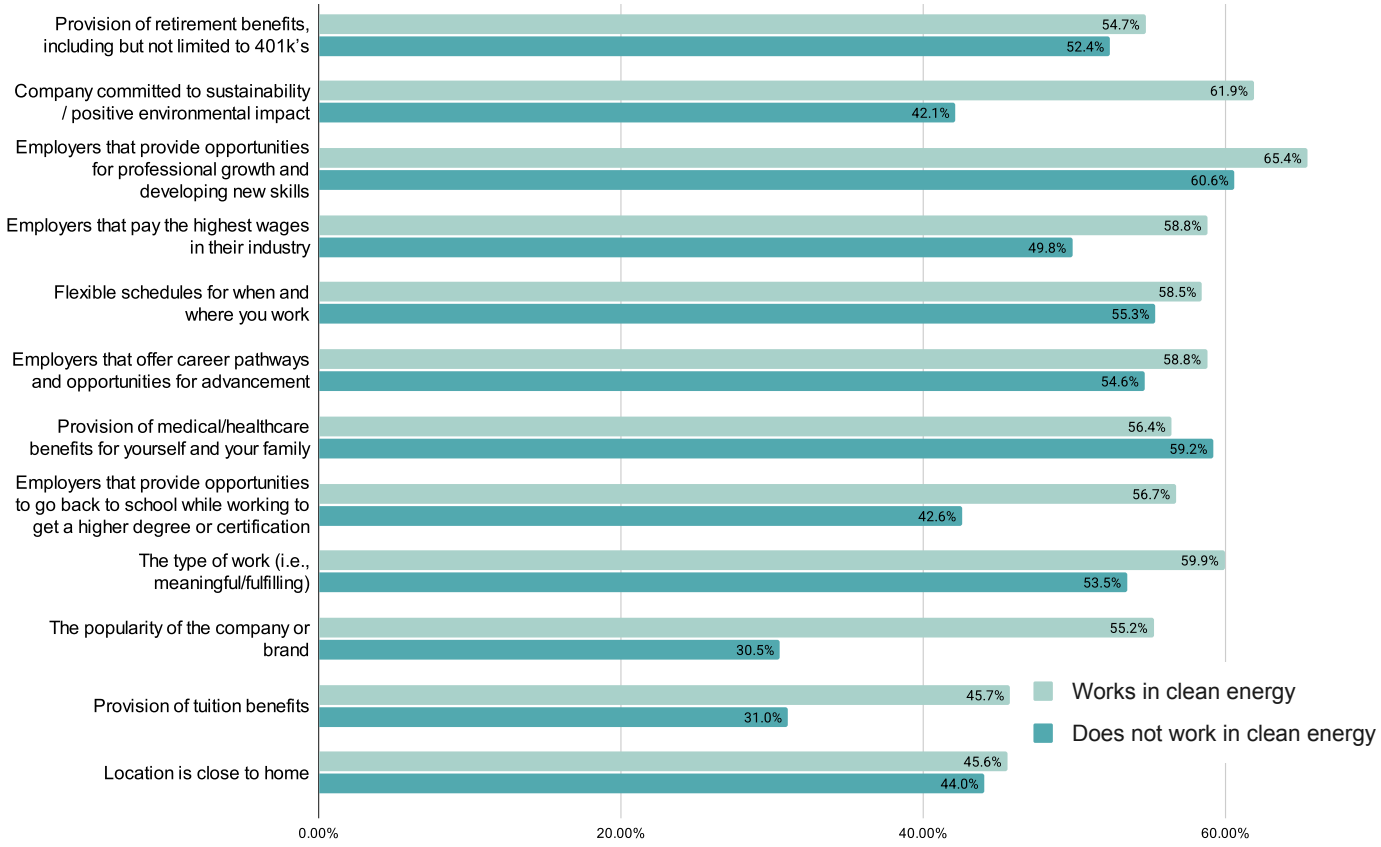
Figure 14

Level of Agreement With the Following Statements (*Those Who Do Not Currently Work in Clean Energy)



When asked about factors that were very important in deciding where to work, in addition to pay and benefits, a majority of tech workers cited opportunities for professional growth, flexible schedules, opportunities for advancement, and meaningful work. Those who work in clean energy were more likely to value employers with a commitment to sustainability and protecting the environment, and they were also more likely to value the popularity of the company or brand (**Figure 15** on the next page).

Figure 15 Importance of the Following When Deciding Where to Work (Percentage Saying "Very Important")



Prospects for Workforce Growth

Employers who were interviewed offered varying answers when asked if they expected growth within the IT departments at their companies. The majority said they were experiencing some growth, especially in data roles like analytics and data science. A few employers said they no longer expected growth after the federal government ended grants and incentives affecting the clean energy industry. One interview participant from a midsize for-profit solar and EV company said there had "already been two reductions in workforce" and they did not foresee any growth.

Another participant from a mid-size clean energy and energy efficiency nonprofit shared that the company's outlook has drastically changed since recent cuts to federal grants, noting that "this last six months have been awful."

With recent executive orders and legislation, incentives for solar and electric vehicles have been drastically decreased. The Solar for All program, a $7 billion grant program that supported community solar, multifamily solar, and incentives for low-income families, abruptly ended in August 2025. An interview participant from a small solar and energy efficiency for-profit shared that they were in the process of hiring for new roles—IT Specialist and PV Designer—using the Solar for All grant money in their state. They are now waiting to "revamp and figure out some things in order to move forward," having to put hiring on hold for the time being.

While noting these concerns, employers did not share any additional strategies during the

interviews for how they would tackle these funding issues, with most employers noting that they would wait and see.

On the other hand, an interview participant from a midsize nonprofit solar company said they were anticipating growth, noting "probably the biggest growth is in data roles." A participant from a large for-profit solar company expects to hire "maybe 5-6 people annually on the team, primarily in the data and analytics and operational technology side."

Hiring and Recruitment Strategies

Employers noted a number of recruitment strategies that can be effective, including using recruiters; having company leadership post about opportunities on LinkedIn; creating internship models for new hires; and recruiting from technical trade schools, unions, or workforce development programs. Employers also noted the importance of aptitude tests during the hiring process to ensure that applicants are qualified. Pay transparency and opportunities for career development are crucial when hiring, as they allow candidates to visualize their professional growth at an organization. Multiple employers shared that once they started adding pay bands to their job descriptions, they were able to get more applicants.

Multiple employers stated that the pool of applicants is getting larger in response to job postings, likely due to AI tools making it easier to apply for jobs. However, they noted that increased volume did not come with an increase in candidate quality. Once again, many participants emphasized it was easy to find people with the technical IT skills, but hiring candidates with "people skills" like communication and problem-solving was proving more difficult.

Other challenges include the ability to pay competitive salaries, particularly for nonprofits that have to compete with their for-profit peers. Clean energy occupies somewhat of a niche position in the tech landscape since employers have to look for both general IT skills and qualifications specific to their field. An interview participant from a small solar and energy efficiency for-profit mentioned it was difficult to find people with both the IT experience and the background in renewable energy necessary for the job. Two employers noted they would support hiring candidates with some gaps in their IT experience if they are able to learn on the job.

Los Angeles Cleantech Career Academy: Empowering the Next Generation of Energy Leaders

The Los Angeles Cleantech Career Academy is a 12-week paid program led by UNITE-LA that is connecting LA County youth (ages 18–24) to education, mentorship, and real-world experience in the clean energy sector. This program offers one excellent model for clean IT training. Its Cleantech STEAM training programs target sectors that offer broader career paths, higher wages, and stable advancement opportunities while aligning with real industry needs in the Los Angeles region.

The accomplishments of the Career Academy include:

- 95% of students agreed that the program increased their awareness of occupations and careers that exist within clean tech, and 87% of students reported increased confidence and motivation to pursue a career in clean tech.
- 224 students have graduated from the program with $90,000 awarded in scholarships for continued education.
- Employer partners say that peer learning is helping them to build inclusive internship models and diversify entry-level recruitment that is representative of the local community.

More information can be found in a webinar led by UNITE-LA and the National Clean Energy Workforce Alliance.

Conclusion and Recommendations

Tech jobs in clean energy stand at the intersection of two dynamic industries. While both industries face short-term challenges, they will need to employ a large number of skilled workers to meet demand growth in the years ahead. Our survey results and interviews found that tech workers in clean energy share many of the same skill sets, education requirements, and career goals as IT professionals working in other industries. They also have some unique training and experience requirements and may bring different expectations to the job.

Important challenges that emerged in our research include dissatisfaction among many tech workers with training opportunities and prospects for advancement. The political and economic climate has led to an uncertain outlook for jobs in the energy industry. There is room for employers to raise awareness of IT jobs in the energy sector and create avenues for advancement.

Based on our findings, the energy industry should consider the following recommendations in order to advance a skilled and qualified tech workforce:

Outreach

- **Help make tech careers in the energy industry visible, recognizable, and relatable.** Within the energy field, tech occupations should be no less prominent in the public eye than other careers, such as manufacturing and construction. Employers and industry organizations can develop tech career descriptions and stories, and they can share profiles of IT workers who have moved up in the energy industry.

- **Emphasize outreach to underrepresented groups, including women and people from varied backgrounds.** Currently, the tech industry is 75% male, which indicates there are millions of qualified candidates who have yet to enter the industry. A company that promotes inclusivity and prioritizes hiring from the communities where it provides services is best positioned to attract talent.

Recruitment

- **Provide general information on where tech career opportunities are available, such as the regions of the country where companies are hiring and the types of positions most in demand.** One possible model is IREC's Green Workforce Connect platform, which includes a portal for job seekers interested in the clean energy sector and an interactive map that features employers and training opportunities.[26]

- **Job postings should lean in on the benefits of working in the clean energy industry, including the opportunity to help your community and be part of a larger mission.**

26. See https://greenworkforceconnect.org/.

Employers can also emphasize transferable skills that can make applicants a good fit if they have not worked in the industry before. Job postings should also include clear salary range information, on-the-job training opportunities, and opportunities for career advancement.

- **Take advantage of Registered Apprenticeship Programs and internships.** Registered Apprenticeships for IT in clean energy can be used to build a talent pipeline for roles such as network administrators, help desk technicians, data analysts, and cybersecurity specialists who are important in internal and external operations and essential for managing smart grid technology, optimizing energy consumption, and protecting critical infrastructure. By combining hands-on IT training with an understanding of solar, wind, EV, and battery storage systems, these programs ensure that apprentices graduate with both technical expertise and valuable industry-specific context. Additionally, this provides a smooth career pathway for incumbent workers.

In addition to Registered Apprenticeships, several employers interviewed used internships as a way to test new talent and then hire successful individuals as employees.

Retention

- **Continue to engage incumbent workers in career pathways. Be open to offering training opportunities in-house, which will encourage candidates with people skills and problem-solving skills to apply even if they do not meet all the technical requirements.** Several employers interviewed found this to be a good strategy to retain talent, especially with existing staff who have a knowledge of the industry. Companies may consider providing on-the-job training or opportunities to obtain a new certification or degree.

- **Identify and reduce barriers to advancement to create a path to career growth for valued employees.** Many employees we surveyed noted that they did not have the training necessary for advancement, or faced other barriers such as language or drug testing requirements. Presenting clear career pathways will encourage talented employees to remain on the job.

Methodology

Online Survey of Tech Workers

This report is based on an online survey of information technology workers conducted by BW Research from May 2–12, 2025. Respondents were selected from within a universe of 4,786,660 workers in the Computer Occupations (Standard Occupational Classification (SOC) code 15-1200).

A total of 505 information technology workers completed the survey, with an average response length of 14.8 minutes. The *maximum* overall margin of error for questions answered by all 505 respondents was +/- 4.36% (95% level of confidence).

Sampling Method

Respondents were contacted from a panel of workers provided by a third party. Each respondent was required to answer several screener questions to determine eligibility for the survey.

Quotas were established to keep the sample representative of the demographics for computer occupations nationally by age, gender, race, and census region.

Data Collection

BW Research programmed the survey for online data collection. The web survey instrument was pre-tested in-house and updated as needed. A third party distributed the survey to prescreened panel respondents in each of the quotas and geographies while closely monitoring quota completions along with BW Research.

Throughout data collection, BW Research checked the data for accuracy and completeness.

Qualitative Interviews

To gain a comprehensive understanding of the IT landscape within the clean energy sector, we conducted qualitative interviews with a diverse group of employers. Our selection process was designed to capture a broad range of perspectives from across the industry. The interviews included ten organizations, representing a mix of for-profit, non-profit, government, and utility sectors. We specifically sought insights from organizations focused on various clean energy technologies, including solar, electric vehicles (EVs), battery energy storage (BES), and energy efficiency. This multi-faceted approach allowed us to gather rich data and identify key trends and challenges from a variety of vantage points.

Acknowledgments

IREC prepared this landscape analysis for the Urban Institute as part of the Power IT project funded by the U.S. Department of Labor. IREC is grateful to the Urban Institute for its support and guidance in preparing this report.

The purpose of the Power IT project is to meet the needs of the growing energy workforce through activities that include:

- Training 600 people on in-demand IT career fields at no cost to the participants, across five geographical areas: North Carolina (entire state), Detroit Metro, Los Angeles Metro, Houston Metro, and Dallas Metro.
- Providing workers' rights training to all individuals, and ultimately working to place those trained into energy careers.

Additionally, Power IT seeks to support businesses in their long-term IT hiring needs by connecting them with our training partner, Per Scholas, and providing guidance for developing Registered Apprenticeship Programs.

This report was written by lead authors Avery Palmer, former Workforce Communications Director at IREC, and Claire Laurentine, former IREC Senior Program Manager, Workforce Training.

Additional authors include Mallory Stewart Robison, former IREC Vice President of Research and Analytics, and Susan Biszewski-Eber, IREC Senior Manager, Apprenticeship Programs. Design and formatting were provided by Nicole Wilson, Communications and Digital Media Manager.

The authors would like to acknowledge Lindsey Tyson, John Marotta, Zach Boren, Bhavani Arabandi, and Deborah Kobes from the Urban Institute for their contributions to scoping and framing this report and for providing feedback on drafts.

BW research conducted and analyzed the online survey of IT workers. The interviews with tech industry employers were led by Claire Laurentine at IREC.

When referencing the report, please cite it as follows: Interstate Renewable Energy Council (IREC), *A Landscape Analysis of Tech Careers in the Clean Energy and Energy Efficiency Fields*, (December 2025).

About IREC

The Interstate Renewable Energy Council (IREC) builds the foundation for rapid adoption of clean energy and energy efficiency to benefit people, the economy, and our planet. Its vision is a 100% clean energy future that is reliable, resilient, and equitable. IREC develops and advances the regulatory reforms, technical standards, and workforce and community-based solutions needed to enable the streamlined integration of clean, distributed energy resources. IREC is an independent 501(c)(3) nonprofit, trusted for its clean energy expertise since its founding in 1982. For more information, visit irecusa.org or follow IREC on X (formerly Twitter), LinkedIn, Facebook, or Instagram.

About the Urban Institute

The Urban Institute is a nonprofit research organization founded on one simple idea: To improve lives and strengthen communities, we need practices and policies that work. For more than 50 years, that has been our charge. By equipping changemakers with evidence and solutions, together we can create a future where every person and community has the opportunity and power to thrive.

Funding

This Report was created by IREC in coordination with the Urban Institute and does not necessarily reflect the official position of the US Department of Labor (DOL). DOL makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership. This product is copyrighted by the institution that created it.

The total cost of the Power IT project is $5,815,899. $5,000,000 (86 percent) is funded through the Building Pathways to Infrastructure Jobs Grant Program of the US Department of Labor–Employment and Training Administration. The other $815,899 (14 percent) is funded through nonfederal resources.

IREC

INTERSTATE RENEWABLE ENERGY COUNCIL

Independent leadership. Trusted clean energy expertise.