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## → Addressing workforce challenges in the energy sector

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### Introduction

Energy service providers understand the necessity of enhancing their workforce to overcome industry-specific challenges such as the aging workforce and the growth of distributed energy resources. But technological advancements and utility industry transformation also present many opportunities for future energy workers.

ICF works closely with utilities, state energy offices, and others to facilitate the integration of workforce development (WFD) paradigms into operational frameworks, meet internal economic needs, and realize broader community benefits.

According to the U.S. Department of Energy (DOE), the energy sector in the United States created 300,000 jobs in 2022, increasing the number of energy jobs to 7.8 million. Federal legislation such as the Inflation Reduction Act (IRA) and Infrastructure Investment and Jobs Act (IIJA) are driving energy workforce investment. The IRA is set to make a substantial impact with approximately \$400 billion in clean energy and climate solutions, which over the next decade will generate over a million jobs in the renewable energy sector. Therefore, there is an urgent need to develop initiatives that adequately skill professionals to work in clean energy.





## Workforce challenges in the energy sector

The energy sector in the U.S., including utilities, is experiencing a shortage of workers and a shortage of skills among existing workers and those entering the workforce. Contributing factors include an aging workforce and accelerating advancements in technological innovation as the nation shifts to cleaner energy sources.

### Aging workforce

Exhibit 1 shows employment by age group for all industries as a whole and for utilities sector industries in the U.S. The median age of utility workers is roughly two years older than workers in all sectors combined, and the percentage of workers over 55 years old is 25.1% compared to 23.6%.

Based on U.S. Bureau of Labor Statistics data, ICF estimates that roughly 310,000 workers left the utilities sector in the U.S. in 2022, through retirements, quits, layoffs, and discharges, while almost 41,000 job openings remained unfilled.

Exhibit 1: Employment by age group, all industries and utilities sector industries in the U.S.

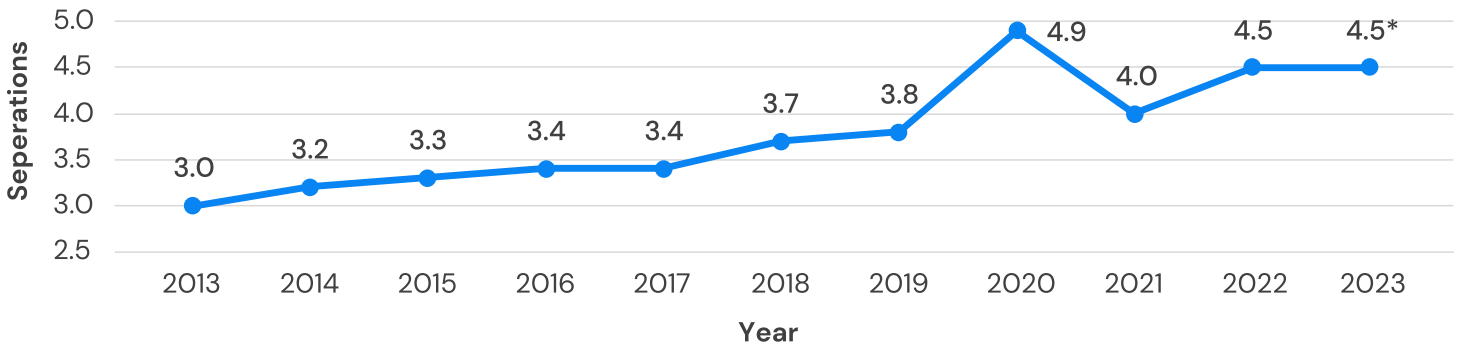
Industry	Total, 16 years and over (thousands)	Number employed by age (%) - 2022							Median age	Percent 55 and over
		16 to 19 years	20 to 24 years	25 to 34 years	35 to 44 years	45 to 54 years	55 to 64 years	65 years+		
Total, all industries	158,291	4%	9%	22%	22%	20%	17%	7%	42.3	23.60%
Utilities	1,380	1%	5%	22%	25%	22%	20%	5%	44.1	25.10%

Source: Bureau of Labor Statistics (BLS)

### More people exiting the workforce than entering

Exhibit 2 shows the separations rate for the transportation, warehousing, and utilities sector over the past ten years. According to the Bureau of Labor Statistics, separations are all employees separated from the payroll during the year. The separation rate in the transportation, warehousing, and utilities sector has increased steadily over the past ten years. The rate increased from 3.0% in 2013 to 4.5% in 2022, indicating that the rate of workers leaving the workforce in these sectors is increasing.

**Exhibit 2: Separations rate—transportation, warehousing, and utilities**

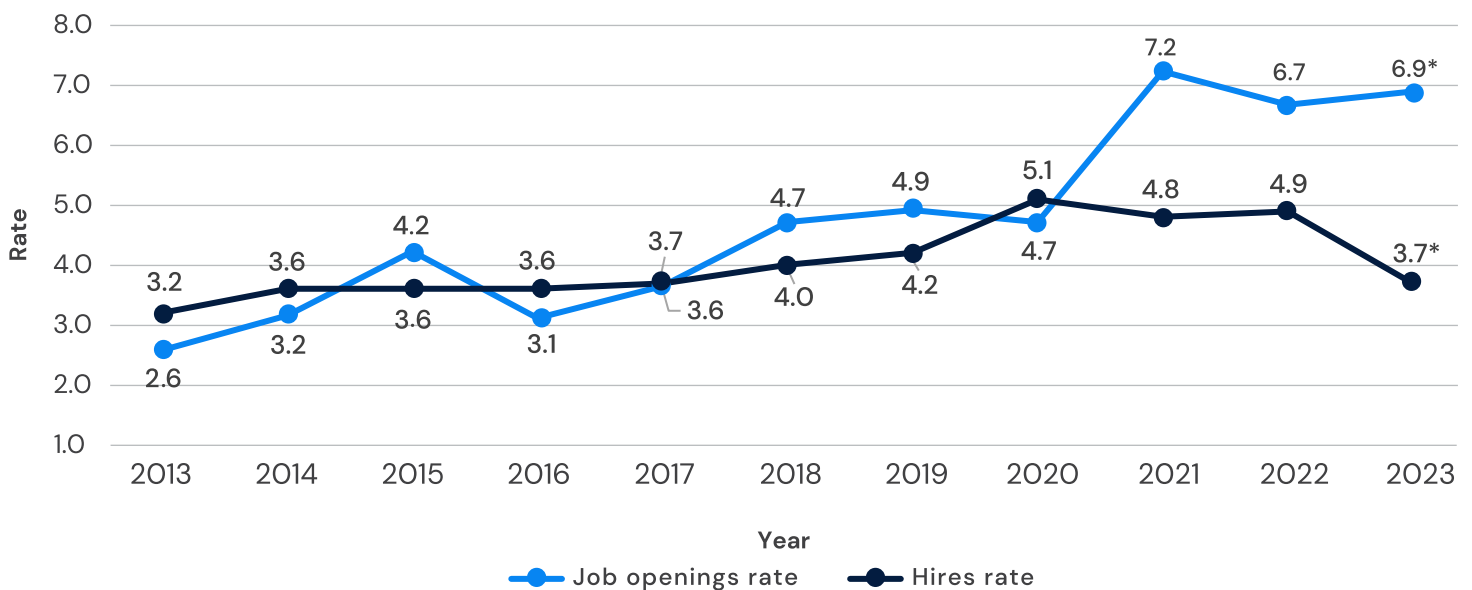


\*Through July 2023

Source: Bureau of Labor Statistics, Job Openings and Labor Turnover Survey (JOLTS)

Exhibit 3 depicts the job openings and hire rates in the U.S. for the transportation, warehousing, and utilities sector over the past ten years. Between 2013 and 2020, job openings and hires were roughly parallel. However, between 2021 and 2023 job openings have been significantly greater than hires, indicating that many job openings in these sectors are going unfilled.

**Exhibit 3: Job openings and hires rates—transportation, warehousing, and utilities**



\*Through July 2023

Source: Bureau of Labor Statistics, Job Openings and Labor Turnover Survey (JOLTS)

### **Skill shortage**

As the energy industry experiences an increasing shift to renewables, organizations are navigating talent shortages. Renewable clean energy service providers have expressed difficulties recruiting experienced individuals. Labor is unable to keep up with the rapid industry changes. The [Brunel Energy Outlook 2023 Report](#) noted that, as the energy industry continues to move towards clean energy and decarbonization, companies will increasingly need to hire specialist roles, particularly those that make use of emerging technologies. Loss of expertise, due to an aging workforce and inadequate succession planning for knowledge transfer/skills retention, are key causes of skill shortage. Now, it is time to invest in transferable skill sets and to fund clean energy worker training.

**North America energy corporations are greatly affected by energy skill shortages. In the U.S., of the available energy jobs posted in the last 3 months, about 35% remain vacant.**

**—Brunel Energy Outlook Report 2023**

### **Diversity, Equity, and Inclusion (DEI)**

The [United States Energy and Employment Report](#) found that disparities in racial diversity in the energy sector's workforce largely parallel with national averages while the gender diversity gap is considerably larger in the energy industry—a differential of nearly 50% compared to national averages. Women and minority groups, including Black, Hispanic, and Indigenous communities, have been underrepresented in various roles, including leadership positions and technical roles. The need to promote diversity, equity, and inclusion within the energy sector is essential for the industry's workforce growth and sustainability, enabling it to better tackle complex challenges and contribute to a more inclusive and sustainable future.

## **Energy workforce development best practices**

To address the potential impacts of the workforce, the energy sector and utilities must develop comprehensive employer-driven training programs that incorporate DEI practices and technology.

### **Employer-based training/work-based learning**

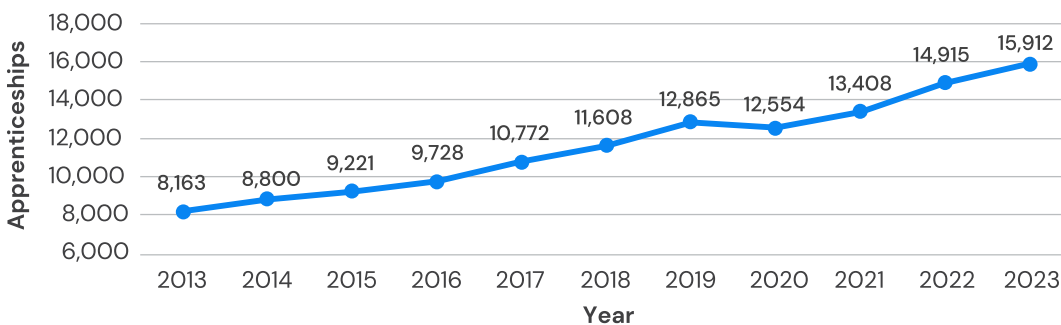
To address the workforce shortages in the energy sector and utilities, companies need work-based learning programs that are driven by the employers. Two successful programs include apprenticeships and incumbent worker training programs. [Brunel 2023](#) notes that "apprenticeships...will attract more workers who need to learn new skills and gain experience, opening the door to those with diverse backgrounds and skill sets who want to move into the industry from other areas." Likewise, ongoing training programs can help retain experienced employees who want to upskill and enter other sub-sectors of the industry.

## Apprenticeships

While training programs can upskill employees in the short term, companies need to focus on educating the next generation of energy workers to combat long-term skills shortages.

Apprenticeships are increasingly being utilized by companies in many industry sectors to develop a skilled workforce and fill open positions. Apprenticeships offer paid, work-based skills development through on-the-job, employer-directed training often supplemented with classroom instruction. Apprenticeships typically last one to six years and result in occupational credentials or certificates. As shown in Exhibit 4, there were roughly 16,000 active registered apprenticeships in the utilities sector according to the [U.S. Department of Labor](#), an increase of 95% over the past 10 years.

**Exhibit 4: Active registered apprenticeships in the utilities sector – U.S.**



Source: U.S. Department of Labor

Apprenticeship programs help employers:

- Recruit and develop a highly skilled workforce.
- Improve productivity and profitability.
- Create flexible training options that ensure workers develop the right skills.
- Minimize liability costs through appropriate training of workers.
- Receive tax credits and employee tuition benefits in participating states.
- Increase retention of workers, during and following the apprenticeship.

Many businesses don't have experience creating and executing apprenticeships or other work-based training programs. ICF has helped businesses implement this strategy by creating partnerships that help establish new demand-driven apprenticeships and expand existing ones. ICF works with numerous organizations placing thousands of workers in apprenticeship programs—helping employers develop a skilled workforce, which improves productivity and profitability.

## The Western Electrical Cybersecurity Apprenticeship and Training (WECAT) program

ICF is partnering with the University of California, Davis to expand apprenticeship and training to address acute employment needs in the areas of smart cities and power systems cybersecurity. The program has supported 1,739 apprentices and 14 Joint Apprenticeship Training Centers (JATCs) across Nevada and California as well as six community colleges, and three utility training centers.

### **Incumbent worker training**

There is a clear talent gap when analyzing the current needs of the energy industry workforce. Upskilling existing workers is a solution that can help fill these workforce needs. As utilities are encountering pressure to embrace digital transformation and produce cleaner energy, the skills needed in their workforce are shifting to a greater emphasis on data analytics and digital operations. Therefore, the energy workforce will need to adjust their existing skills to incorporate the advances in data science.

To maximize the benefits of employee retention, utilities are adjusting their internal training by investing in education. Utility training curriculums emphasize grid analytics, modernization, technology integration, and modeling. The future of the energy workforce revolves around grid innovation. Current workers understand the energy industry and often have the underlying knowledge required to adapt to new technologies. Upskilled employees are likely to remain in an organization longer and become more satisfied with their employer. There is a greater return on investment for the utility and decreased labor costs when a utility invests in the upskilling of its current workforce. ICF supported a National Advanced Lighting Controls Program that upskilled 800 incumbent workers across the United States.

### **Community-based approach**

Effective community outreach strategies are vital for energy companies, especially when engaging with the communities most impacted by environmental harms and risks through disproportionate exposure to environmental hazards (also known as Environmental Justice or EJ communities). To build trust and address concerns, it's crucial to actively engage and listen to these communities through direct channels of communication with their residents.

Efforts are being made to promote greater diversity in WFD within the energy sector for several compelling reasons. First, diverse hiring is seen as a catalyst for innovation within the energy industry. Bringing together individuals with a wide range of experiences and perspectives can lead to the development of novel solutions for pressing challenges, providing energy companies with a competitive advantage in the market. Second, diverse teams are often more effective at solving complex problems, which are pervasive in the energy sector. Diverse staffing can help energy companies better understand and serve a diverse customer base.

Collaborating with local colleges, universities, training providers, and nonprofits is also essential to ensure effective and respectful relationship-building in communities. These partnerships can create educational opportunities, scholarships, job training programs, and community-focused initiatives that all serve to alleviate the talent gap in the energy sector. By fostering such collaborations, energy companies can leverage the expertise and trust established within these communities.

### **National Advanced Lighting Control Training Program**

ICF administers the National Advanced Lighting Controls Training Program (NALCTP), an initiative aimed at increasing the use of lighting controls in commercial buildings. NALCTP educates, trains, and certifies licensed C-10 electrical contractors, state-certified general electricians in the proper programming, testing, installation, commissioning, and maintenance of advanced lighting control systems.

### **California Workforce Development Board**

ICF has assisted the California Workforce Development Board in the development and delivery of Train-the-Trainer curricula and the training of 600 apprentices/journeymen—54% of whom reside within a census tract identified as a disadvantaged community, or low-income community, or are from a low-income household.

Tailored communication plays a pivotal role. Developing clear, culturally sensitive materials available in multiple languages and utilizing various communication channels ensures broad outreach. Providing educational workshops on energy-related topics and emphasizing the environmental and health benefits of clean energy initiatives are essential. Job creation and economic benefits should also be highlighted, particularly local hiring and procurement, to support the economic development of EJ communities. Maintaining transparency throughout the project lifecycle, establishing feedback mechanisms, and demonstrating long-term commitment further enhance community engagement.

Community-based approaches are becoming requirements for many companies seeking government funding. The Department of Energy requires Community Benefits Plans as part of all IRA and IIJA funding opportunity announcements and loan applications. Community Benefits Plans promote investing in America's workforce; engaging communities and labor; advancing diversity, equity, inclusion, and accessibility; and implementing Justice40. These key principles, when incorporated comprehensively into projects, will help ensure broadly shared prosperity in the [clean energy transition](#).

Additionally, energy companies should consider conducting Environmental Justice Impact Assessments to assess potential disproportionate impacts on EJ communities and ensure fairness. Compliance with relevant regulations and a track record of positive outcomes from similar projects can build credibility. These strategies enable energy companies to engage meaningfully with EJ communities, build trust, and contribute to sustainable energy solutions that benefit all stakeholders.

## Conclusion

As the energy workforce experiences a faster departure of employees than the influx of new hires, the industry must devise innovative strategies for workforce development to bridge this talent gap. Education and training serve as the foundation of any workforce development program, ensuring employees possess the necessary skills for their roles. This includes customized training programs for new and current employees, the establishment of DEI initiatives to attract fresh talent, and the integration of cutting-edge technology. This three-fold approach enables companies to maintain competitiveness, sustainability, and inclusivity while effectively addressing the intricate workforce problems within the energy sector.

## MassSave Clean Energy Program

ICF leads the MassSave Clean Energy Pathways program, a full-time, three-month, paid internship program that aims to improve the clean energy workforce by recruiting directly from EJ communities and placing individuals into jobs. Since 2021, the program has assisted Massachusetts in achieving climate and community investment goals while simultaneously adapting to meet the needs of the changing energy workforce by training six cohorts.

## Community Benefits Plan Training and Technical Assistance

ICF is collaborating with the National Renewable Energy Laboratory to create and provide training and technical assistance on the development of Community Benefits Plans to small- and medium-sized manufacturers. ICF is working with over a dozen companies across the U.S. that are seeking DOE funding to construct facilities that manufacture clean energy related products, helping them craft Community Benefits Plans that have impactful and lasting benefits on the local community.

ICF offers a comprehensive set of solutions to effectively support federal, state, and local workforce agencies, employers, and stakeholders in developing and implementing work-based learning, training and technical assistance, and employment programs. Our works cuts across multiple domains to address complex workforce development challenges.

ICF's energy workforce development expertise







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About ICF

ICF is a global consulting services company, but we are not your typical consultants. We help clients navigate change and better prepare for the future.

Our experts have been embedded in every corner of the energy industry for over 40 years, working at the intersection of policy and practice. We work with the top global utilities, plus all major federal agencies and relevant energy NGOs, to devise effective strategies, implement efficient programs, and build strong relationships with their customers. From creating roadmaps to meet net zero carbon goals to advising on regulatory compliance, we provide deep industry expertise, advanced data modeling, and innovative technology solutions, so the right decisions can be made when the stakes are high.