



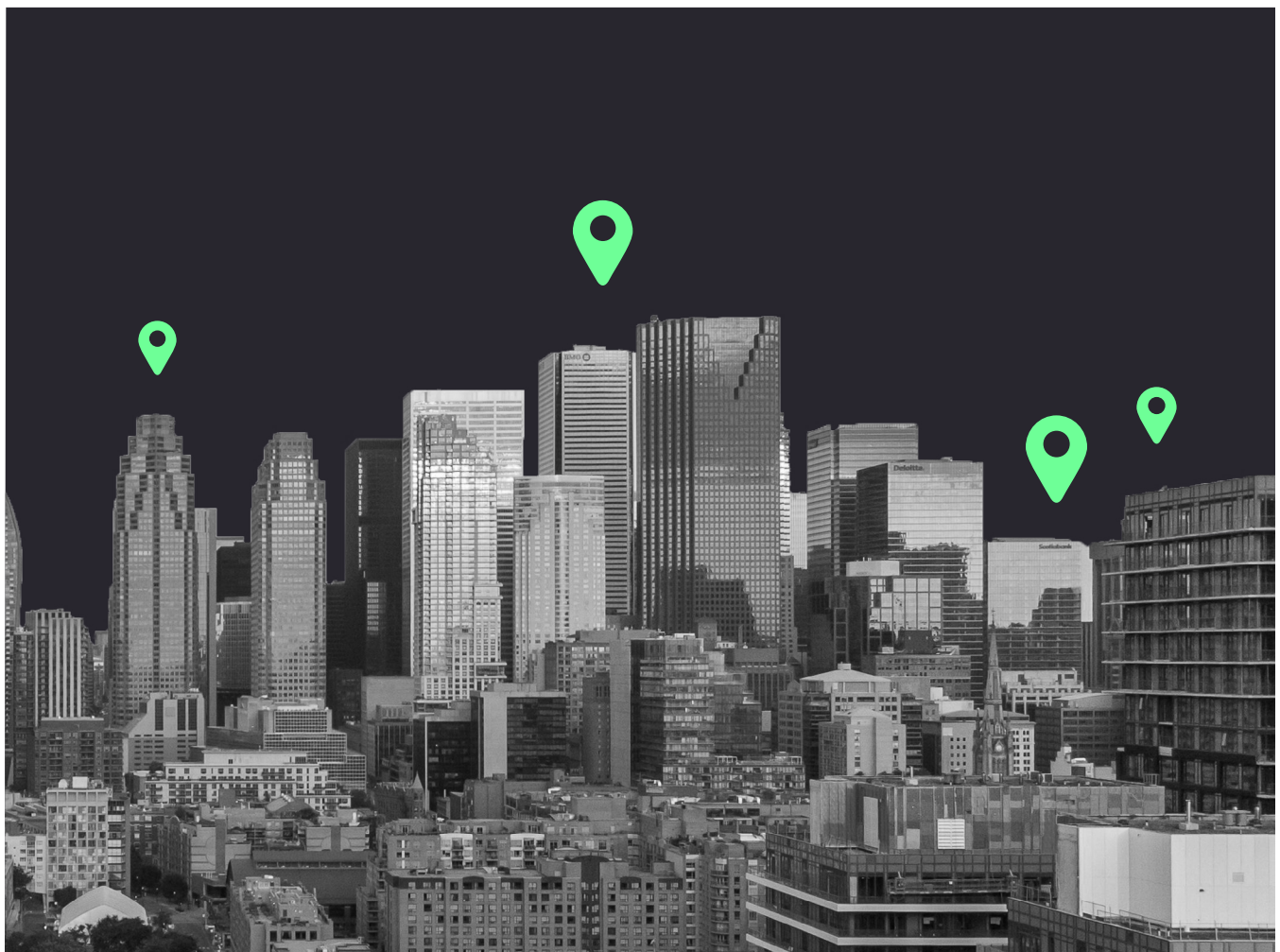
BUSINESS
COUNCIL OF
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**POWER PLAY:
TURNING CLEAN
ENERGY INTO
ONTARIO'S ADVANTAGE**

Workforce Gap Analysis

FEBRUARY 2026



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About this Report

The climate economy is one of the biggest challenges for our economy today. Success depends on having the right workforce to drive the energy transition.

For Toronto, moving to clean, reliable, and affordable energy isn't optional, it is critical for our competitiveness, productivity, and long-term prosperity.

To lead this effort, the Business Council of Toronto (BCT), through the Toronto Region Board of Trade, created the Climate and Energy Transition Council. Made up of senior business leaders from across the region, the Council is focused on building the skills, talent, and workforce conditions needed to transform our energy system. Their work aims to close productivity gaps, speed the path to net zero, and position Toronto as a global leader in climate and energy solutions. This report is the direct result of that work.

Energy demand in Ontario is expected to rise by 65% by 2050 as transportation, buildings, data centres, and industry shift to electricity. Without urgent action to build a skilled workforce, labour shortages—driven by an aging workforce and replacement needs, as well as the need for concurrent capacity to deliver multiple projects simultaneously—could limit economic growth. Ontario's Long-Term Integrated Energy Plan already

highlights the need for more engineers, project managers, and technical experts, especially in renewable energy, energy efficiency, and nuclear specializations. If workforce capacity doesn't keep up, constraints in the energy system could drive up costs, slow investment, and make it harder for the region to compete globally.

At the same time, the economic opportunity is substantial. The Toronto region has world-class strengths across renewable energy, electric vehicles, green buildings, carbon solutions, and advanced manufacturing. Canada ranks among global leaders in clean technology innovation, and Ontario sits at the centre of one of North America's most significant energy markets. With the right workforce strategy, the region can not only meet its own energy needs but also build a globally competitive clean energy workforce capable of exporting talent and services, technology, and solutions to the world.

This report presents an Ontario-wide analysis of the energy sector workforce, researched and prepared by EY Canada. It looks at Ontario's energy labour market to identify critical workforce shortages, high-demand jobs, and areas where energy competes with other sectors for talent. The report also examines how well current education, training, and apprenticeship programs match the skills needed for the energy transition.

ABOUT THIS REPORT

Based on these findings, the report outlines six targeted workforce actions to support growth across Ontario's energy sector, with a focus on technical trades, engineering, project management, and reskilling for clean energy and grid modernization. The goal is to guide policy and talent strategies, so Ontario has the workforce it needs to drive growth, enable the energy transition, and maintain long-term economic competitiveness.

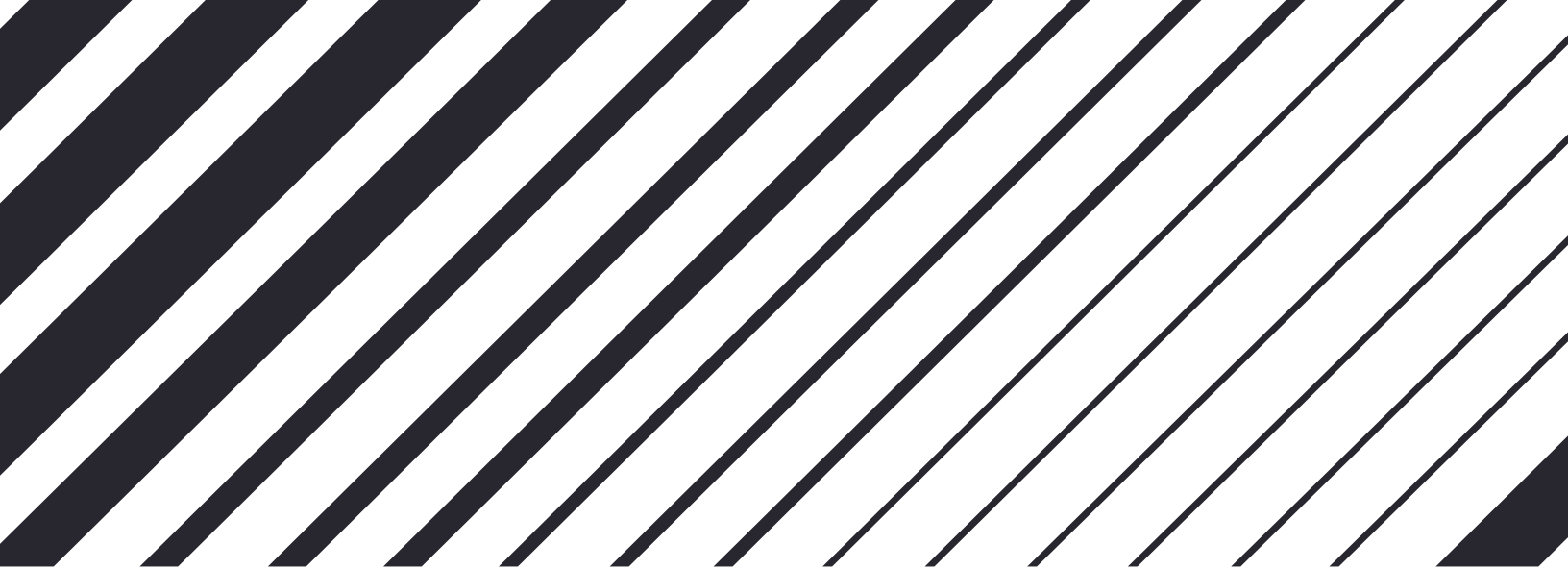
The Toronto Region Board of Trade is grateful for the invaluable insights, inputs, and resources shared by the BCT Climate and Energy Transition Partnership Council members:



ABOUT THE BUSINESS COUNCIL OF TORONTO

The Toronto Region Board of Trade brought together the region's top business leaders to deliver practical impactful solutions and advocacy that make Canada's economic engine more prosperous and a better place to live, work, invest, and do business. The Business Council of Toronto is structured around an Executive Table and three partnership councils: Advanced Manufacturing, Climate & Energy Transition, and the GTA West Economic Gateway, with a foundational Financial Services Competitiveness Coalition.





Executive Summary

Building the energy sector workforce in the Toronto region is now essential for Ontario's economic growth and climate ambitions. As demand for clean, reliable, and affordable energy accelerates, the availability of skilled talent, particularly in skilled trades, utilities operations, engineering and project management is critical. Many of these roles are facing high retirement and replacement needs. Without decisive action, labour shortages could become a major barrier to delivering infrastructure, attracting investment, and keeping the province competitive.

To address this risk, this report presents a comprehensive look at Ontario's energy sector workforce. The findings show a sector in rapid transformation: clean energy subsectors like wind and solar are expanding, grid modernization is accelerating, and workforce needs are changing. Since 2014, employment in Ontario's energy sector has grown by approximately 20 percent, driven by both expansion in clean energy activity and demand for replacement hiring across core occupations, with electricity generation and distribution remaining the largest employer. This growth highlights both momentum and urgency. Sustaining it will require coordinated action to strengthen the talent pipeline and ensure workforce renewal keeps pace with energy sector expansion.

Key findings:

- 1 WORKFORCE OUTLOOK:** Employment in the energy sector is expected to grow from nearly 60,000 workers in 2025 to over 75,000 by 2033. This projection reflects Ontario's Energy for Generations Plan, which anticipates a 33% increase in energy production between 2026 and 2033.¹ Much of the demand will come from replacing retiring workers, particularly in technical trades and engineering roles.
- 2 SKILLS GAPS:** There are significant skills gaps in clean energy-related technical skills and software expertise, such as HVAC, wind turbines, and data analytics tools. The analysis highlights the need for upskilling initiatives to build on existing workforce strengths and address these gaps.
- 3 EDUCATION AND TRAINING PROGRAMS:** Ontario offers a variety of programs to support workforce development, including apprenticeship programs, university degrees, and online courses. Tailoring these programs to industry can make workforce development more effective for the clean energy transition. Strong collaboration between industry and educational institutions is also key to inspiring young people to pursue energy careers and maintain a steady talent pipeline.



Energy Sector Workforce Development Recommendations

Based on the workforce gap analysis, the following recommendations identify where targeted action can unlock growth across Ontario's energy sector:

1 GENERATE INTEREST IN ENERGY CAREERS AMONG YOUTH

Launch collaborative initiatives such as interactive workshops and school visits from sector professionals. Curriculum updates with clean energy education can also showcase the potential for innovation and impact in the sector.

2 ATTRACT AND RETAIN TALENT

Highlight the sector's unique opportunities and positive impact by fostering a culture of innovation and inclusion, offering continuous learning opportunities, and supporting mentorship programs with clear pathways for career advancement.

3 RESOURCE PLANNING SUPPORT

The provincial government can strengthen workforce capacity by coordinating labour demand across major infrastructure projects, such as aligning project timelines and supporting collaborative resource planning, and by offering energy sector-specific incentives to help retain talent.

4 BUILD SMALL AND MEDIUM-SIZED ENTERPRISES (SME) CAPACITY

Provide streamlined workforce support to help SMEs recruit new talent and reduce regulatory complexity, allowing them to focus on workforce development.

5 ECOSYSTEM COLLABORATION AND INVESTMENT IN PEOPLE

Develop a workforce strategy with input from industry stakeholders, educational institutions, and government agencies.

6 STRENGTHEN STACKABLE RESKILLING AND UPSKILLING PATHWAYS

Develop role-specific training models that offer stackable skills for long-term professional development and expand work-based training to allow workers to show the impact of their prior experience in clean energy work.



Energy Sector Workforce Gap Analysis

The energy sector in Ontario has transformed significantly over recent decades and continues to evolve as Canada moves towards achieving net zero emissions by 2050. At the same time, the sector faces major challenges in meeting the workforce requirements driven by this transition. Notably, 83% of electricity sector employers in Canada say that “finding skilled talent” is one of their biggest challenges over the next five years.²

The following section examines labour market trends, workforce outlook, and skills development in Ontario’s energy sector.

83% of electricity sector employers in Canada say that “finding skilled talent” is one of their biggest challenges over the next five years.



Methodology

We conducted a workforce gap analysis for Ontario's energy sector, examining labour market trends, workforce needs, and education and training programs. The analysis included a 10-year occupational gap assessment and a review of skills gaps. The methodology used to carry out these assessments is outlined below:

Occupational Gap Analysis:

- Demand for energy sector workers is based on two sources: expansion and replacement. Expansion demand is projected based on forecasted industry growth and expected changes in labour demand, including annual change in employment. Replacement demand is based on projected rates of exit from the labour force due to retirement, emigration or death. Exit rates are based on the Canadian Occupational Projection System (COPS) data.
- Occupational supply is projected using three distinct sources: school leavers (i.e. post-secondary graduates and apprenticeship completions), immigrants, and job changers (i.e. individuals currently in the workforce who may enter the sector).
- Occupational labour gaps were calculated by subtracting total projected supply from total projected demand across all forecast years (2023-2032).

Skills Gap Analysis:

- Job postings and profiles data were sourced from Lightcast, a labour market analytics firm, at the level of occupations (4-digit NOC) and grouped into occupational categories based on similarities of roles within the energy sector. The skills gap analysis was based on occupational data for a common set of skills available in both job postings (demand) and job seeker profiles (supply).
- Skill gaps were defined by comparing the average occurrence rate of a skill in sector-related job postings with the average occurrence rate of the same skill in relevant job seeker profiles. The occurrence rate represents the share of job postings that mention a given skill, tool, or technology.
- Skills Overlap was defined as the extent to which another sector shares skill requirements with the energy sector. Overlap measures were normalized across competing sectors and expressed on a scale from 0 to 100. The higher the skills overlap score, the greater the overlap between the energy sector and the competing sector for a given skillset.

Future Skills Centre survey found that 77% of Cleantech employers valued training that enhanced common workforce skills to meet Cleantech demand.

Ontario Energy Sector Trends

The energy sector in Ontario encompasses industries such as oil and gas extraction and refining, uranium mining, electric power generation and transmission, natural gas distribution, and the production and distribution of other energy sources. For the purpose of this analysis, the energy sector is defined as four industries: oil and gas extraction, electric power generation and transmission (“electricity”), natural gas distribution, and petroleum product manufacturing.

Sector Trends in Clean Energy Transition

The clean energy transition is reshaping demand for new skills and occupations and is driving growth and innovation in Ontario’s energy sector. Understanding workforce needs in the context of this transition is essential for effective workforce development.

Below is an overview of trends related to the clean energy transition in Canada and Ontario:

CLEAN SUBSECTOR GROWTH IN CANADA

Production capacity in wind and solar electricity generation and energy storage industries grew by 11.2% in 2023, and is projected to continue expanding to meet Canada’s Net Zero goal.³ Labour demand is expected to increase as a result of growth in low-emission related energy activities, as well as in the grid modernization and energy storage subsectors.

GRID MODERNIZATION AND ENERGY STORAGE TRENDS

Beyond low-emission related energy, Ontario is investing in other energy subsectors, such as grid modernization and energy storage. For instance, the Independent Electric System Operator (IESO) has invested over \$16 million in grid modernization to optimize electricity supply.⁴ Building and improving infrastructure, such as distributed energy resources (DER) and grid storage facilities, is expected to create employment opportunities for skilled trades as well as research and development.

RENEWABLE ENERGY SKILLS TRENDS

Demand for renewable energy skills is rising with job postings for wind turbine technicians more than doubling between 2018 and 2022, while postings containing the keywords “renewable energy”, “solar power”, or “wind power generation” increased by 58%.⁵

SKILLS NEEDS IN CLEANTECH

Cleantech employers are increasingly emphasizing climate literacy and sustainability awareness across occupations. A Future Skills Centre survey found that 77% of Cleantech employers valued training that enhanced common workforce skills to meet Cleantech demand, or worker education that applies existing skills in the Cleantech sector.⁶

LONG-TERM ENERGY DEVELOPMENT PLAN

As families and businesses increasingly electrify their operations, Ontario is becoming a leading destination for investment and living. The province’s first integrated energy plan, “Energy for Generations,” outlines a strategy through 2050 that combines various energy sources - electricity, natural gas, hydrogen, among others, to enhance economic competitiveness and resilience. This plan moves away from previous fragmented approaches and emphasizes affordability, security, reliability, and clean energy. Key initiatives include

improving energy efficiency, expanding electricity generation, developing transmission infrastructure, and supporting Indigenous partnerships. These efforts aim to attract investment and development activities, driving labour demand related to energy efficiency and sustainability.⁷

Energy production in Ontario is expected to further shift to clean sources under the Canadian Net Zero scenario, with wind and nuclear projected to provide the majority of electricity supply in 2050.

Figure 1 presents the Canadian Energy Regulator’s energy production projections under the Canadian Net Zero scenario.

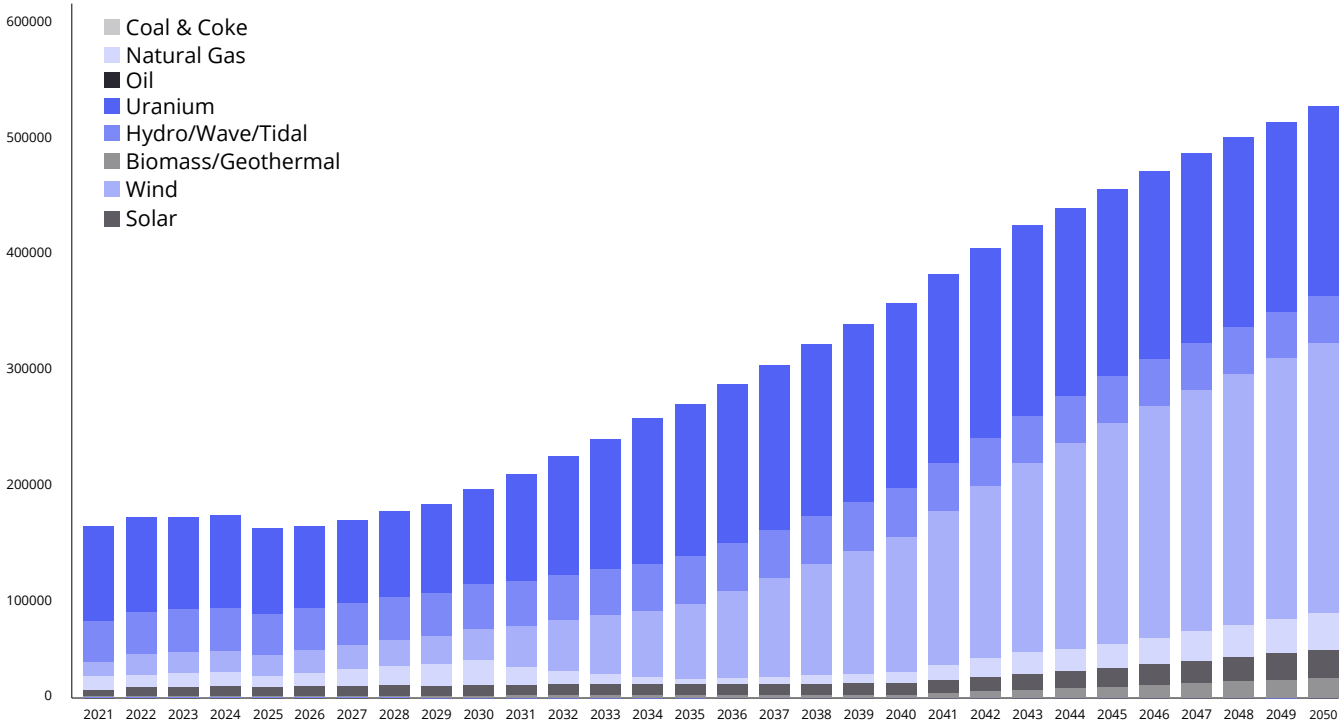


Figure 1. Sources of Energy for Electricity Generation (GWh) in Ontario, Canada Net-Zero scenario, 2021–2050⁸

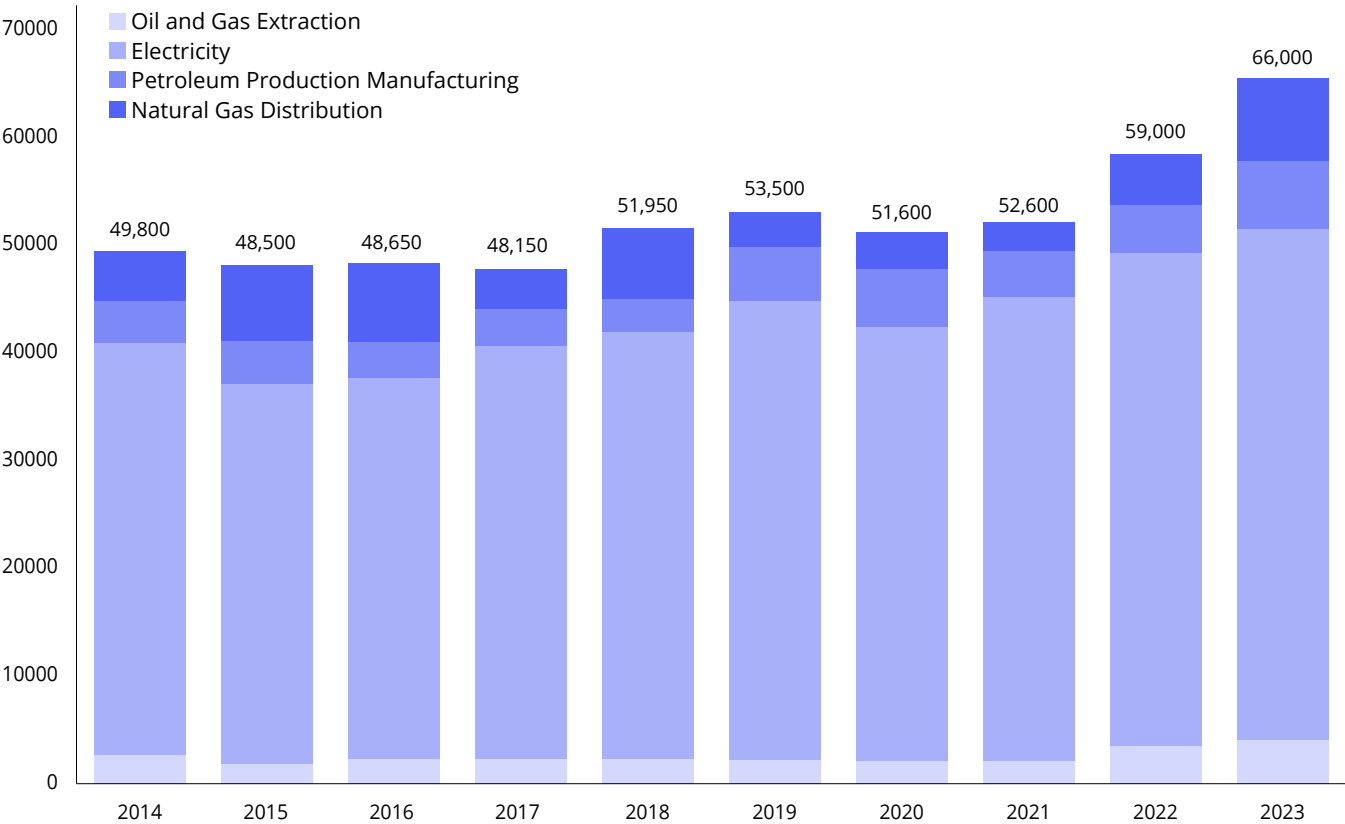
These trends underscore the need to adapt workforce development strategies to meet the evolving skills and labour demands of the clean energy transition, ensuring a capable and sustainable energy sector in Ontario. The following section outlines current and projected workforce trends in the sector.



Labour Market Trends

Below is an overview of key labour market trends in Ontario's energy sector. The sector employs approximately 60,000 workers, with employment growing by approximately 20% since 2014. Figure 2 illustrates employment trends in the sector.

Figure 2. Employment by Industry, 2014-2023⁹



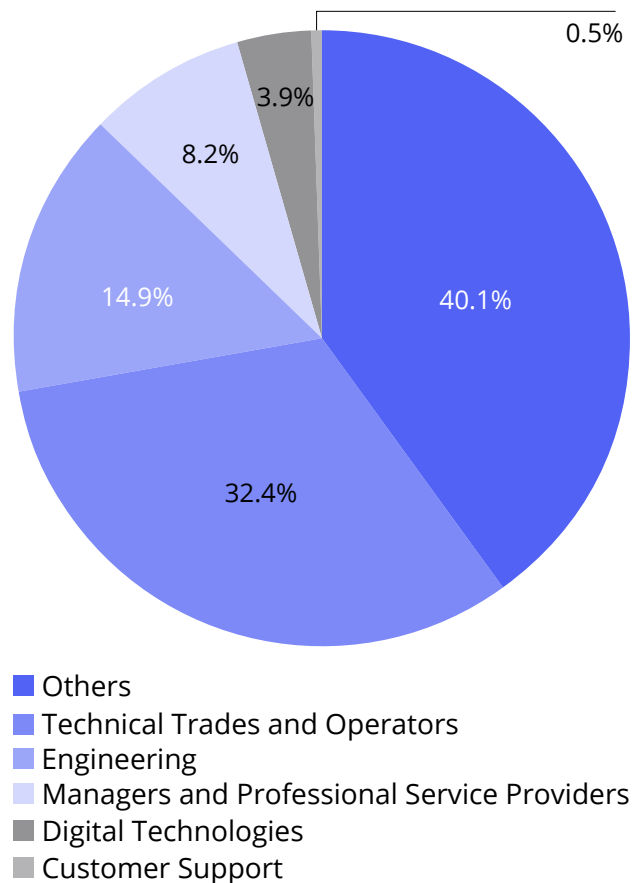
Note: For a detailed definition of the energy sector, please see Appendix A.3.

KEY OBSERVATIONS

- The electricity power generation, transmission, and distribution industry is the largest employer within Ontario's energy sector and has grown consistently with broader economic trends, including nuclear power technology development and implementation, electrification in transportation, and mining sector growth.¹⁰
- The electricity power generation, transmission and distribution industry and the natural gas distribution sector are experiencing technological and demand changes (e.g., decarbonization, small nuclear modular (SMR) technology and distributed energy resources (DER) technology), introducing uncertainty to the energy sector.

Among energy sector workers, a notable share are employed as technical trades workers and operators (32% in 2021), exceeding the electricity sector national average of 27%. Approximately 8% hold manager or professional roles, while a smaller share (4%) work in digital technology-related roles, below the electricity sector national average of 6%.¹¹ Figure 3 below shows the occupation composition in the energy sector in the province.

Figure 3. Energy Sector Occupation Composition, 2021¹²

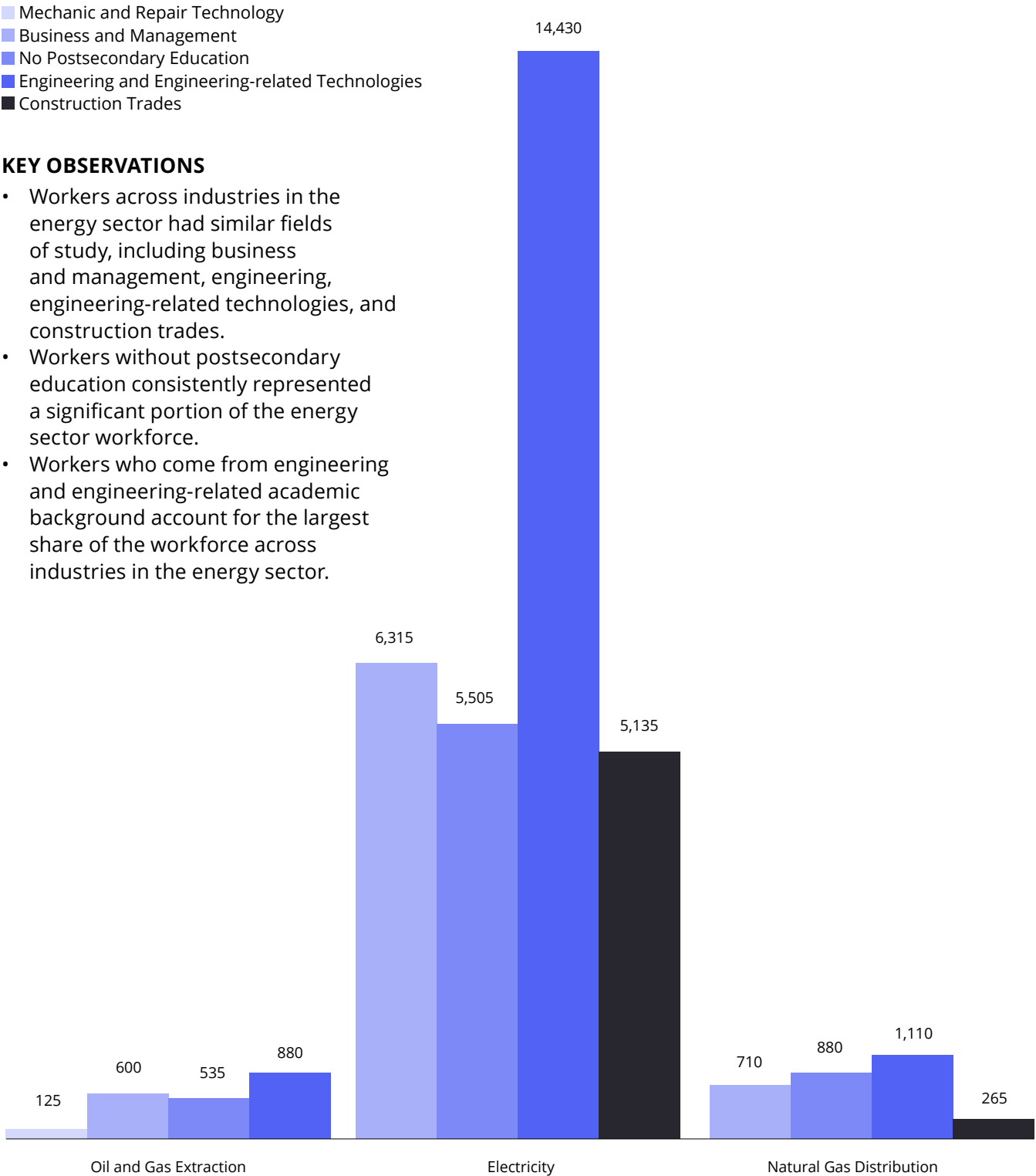


Each occupation group includes, but are not limited to, these occupations below:

Occupation Group	Key Occupations
Engineering	• Civil engineers • Mechanical engineers • Electrical and electronics engineering technologist and technicians • Electrical and electronics engineers • Mechanical engineering technologists and technicians • Industrial and manufacturing engineers
Technical Trades and Operators	• Electrical mechanics • Electrical powerline and cable workers • Electricians (except industrial and power system) • Industrial electricians • Pipefitters • HVAC technicians • Utilities equipment operators • Central control system operators
Managers and Professional Service Providers	• Contractors and supervisors, electrical traders and telecommunications occupations • Engineering managers • Utilities managers • Utilities system supervisors • Computer and information systems manager
Digital Technologies	• Computer network and web technicians • Computer systems developers and programmers • Cybersecurity specialists • Data scientists • Information system specialists • Software developers and programmers • Technology consultants
Customer Support	• Customer service representatives • Customer information agents • Technical sales representatives
Others	• Corporate finance professionals • Human resources professionals • Facility maintenance workers • Manufacturing labourers • Administration service professionals

A notable share of energy sector workers come from engineering and technical backgrounds. Figure 4 below shows the top fields of study in the energy sector workforce.

Figure 4. Top Fields of Study in Workers by Industry, 2021¹³



KEY OBSERVATIONS

- Workers across industries in the energy sector had similar fields of study, including business and management, engineering, engineering-related technologies, and construction trades.
- Workers without postsecondary education consistently represented a significant portion of the energy sector workforce.
- Workers who come from engineering and engineering-related academic background account for the largest share of the workforce across industries in the energy sector.

Figure 5. Postsecondary Graduates in Science, Technology, Engineering and Mathematics (STEM), Ontario, 2013-2022

KEY OBSERVATIONS

- The share of STEM graduates in Ontario’s postsecondary education has been increasing since 2013.
- The increase in STEM graduates can support the province’s clean energy transition in infrastructure building and innovation.

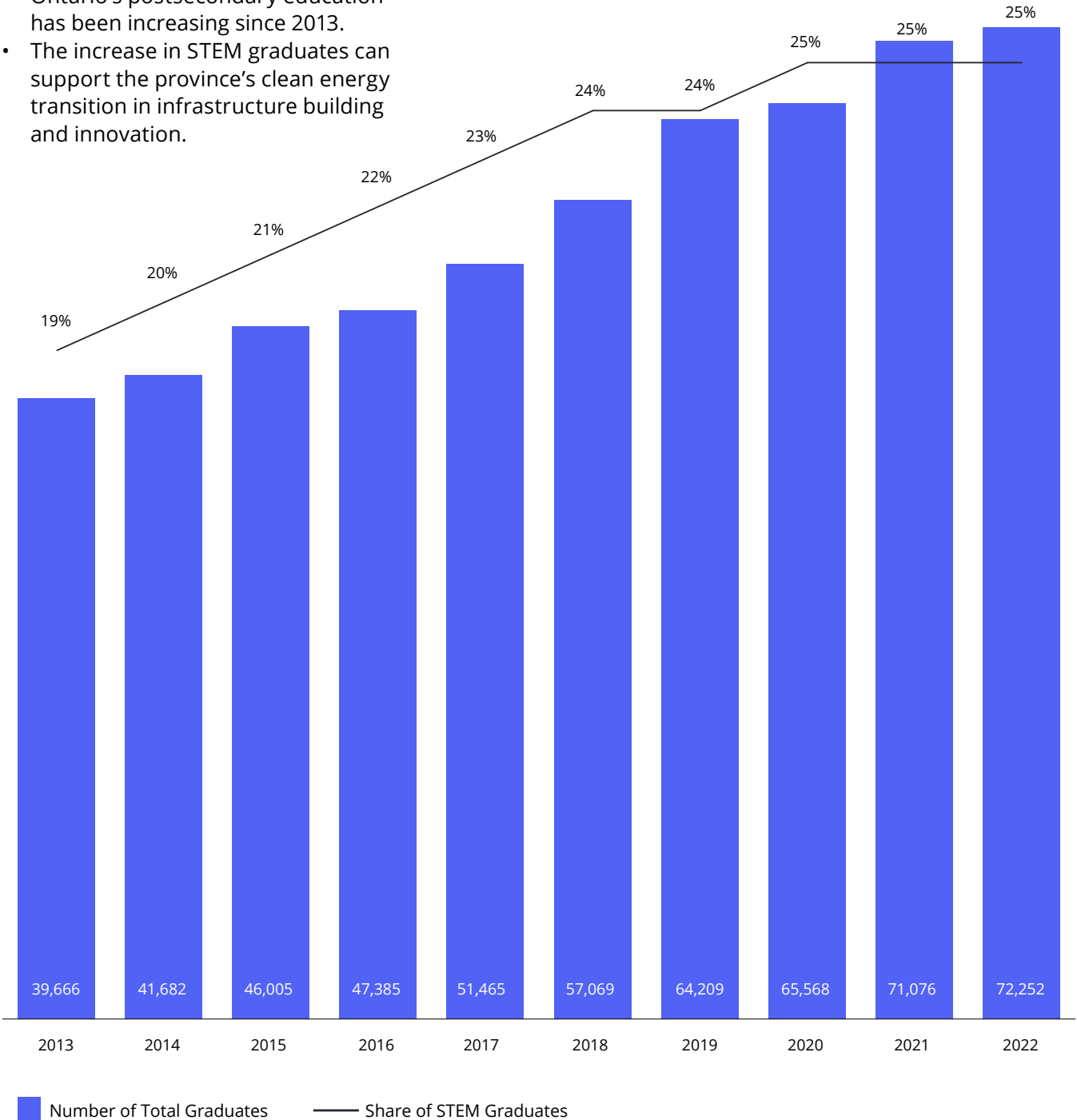


Figure 5: STEM education trends in postsecondary education institutions in Ontario from 2013 to 2022.¹⁴

Workforce Needs Assessment

Ontario's Energy Sector Workforce

We estimated labour market demand in Ontario's energy sector by making projections for the following: sector employment, sector labour demand, and labour demand in key occupation groups.

1 SECTOR EMPLOYMENT OUTLOOK

Figure 6 shows the projected employment in the energy sector in Ontario from 2025 to 2033.

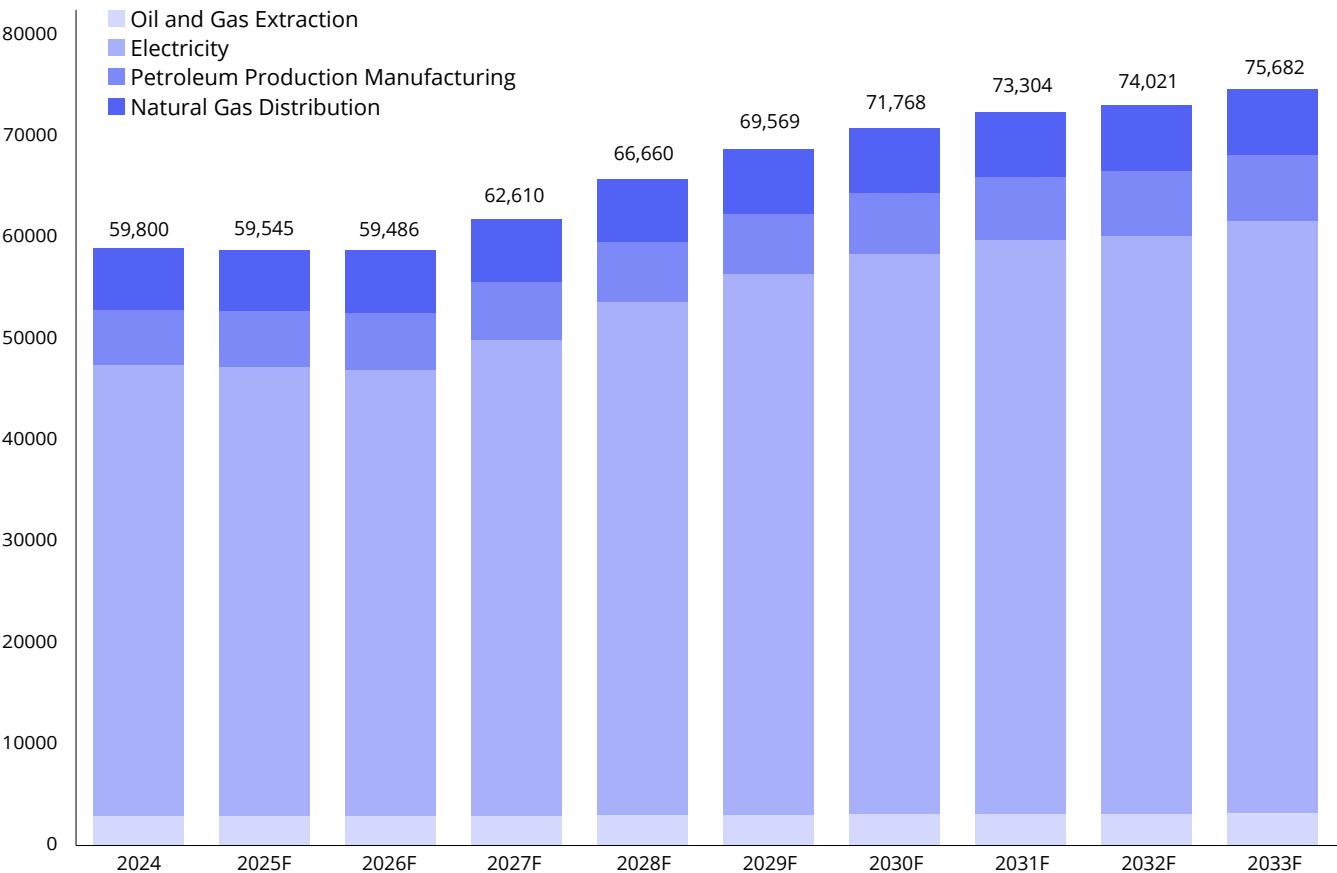
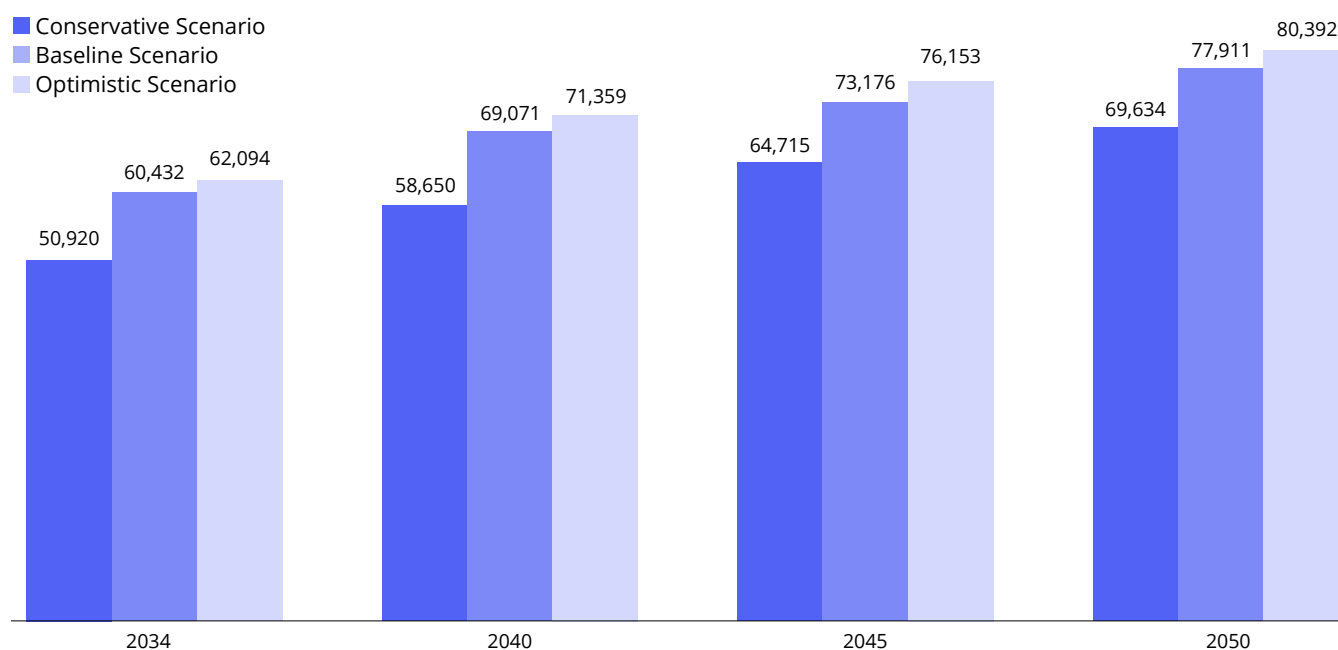


Figure 6. Sector Employment Projections by Industry, 2024 – 2033¹⁵

KEY OBSERVATIONS

- Employment in the energy sector is expected to grow steadily, from nearly 60,000 workers in 2025 to over 75,000 workers in 2033.
- The petroleum and coal product manufacturing industry is projected to grow slightly faster than the overall sector.
- The petroleum and coal product manufacturing industry is expected to expand to accommodate clean fuel production, as the transportation industry is transitioning towards low emission energy sources.¹⁶ Refined petroleum products will serve as inputs alongside biomass-based fuel.¹⁷

From 2034 onwards, the Energy for Generations plan is expected to drive employment growth in the electricity sector through 2050. Figure 7 below presents projected electricity sector employment growth up to 2050 under three scenarios: conservative, baseline, and optimistic. In the optimistic scenario, electricity employment could exceed 80,000 by 2050.¹⁸

Figure 7. Electricity Sector Employment Growth Projection, Ontario, 2034 – 2050¹⁹

Long-term Employment Projections for the Electric Power Generation, Transmission and Distribution Industries, Ontario

2 TOTAL SECTOR DEMAND OUTLOOK, 2025 – 2033

Table 5 summarizes the preliminary findings of sector labour demand by industry from 2025 and 2033. With the announcement of Ontario's *Energy for Generations Plan*, labour demand over the next decade may experience significant growth driven by the Plan's implementation. The analysis accounts for the projected 33% increase in energy production by 2033 relative to 2026. Using the employment forecasts shown in Figure 1, two types of labour demand projections were estimated:

- Expansion demand was estimated as the annual change in sector employment, representing the number of job openings created from sector growth.
- Replacement demand was projected based on estimated rates of workforce exit due to retirement, mortality, or emigration, representing the number of job openings due to worker exit.

These demand figures below represent added demand beyond the existing workforce.

Table 5. Sector Demand by Industry, 2025 – 2033²⁰

Industry	Total Demand	Expansion Demand Share	Replacement Demand Share
Oil and Gas Extraction	1,009	24%	76%
Electric Power Generation, Transmission and Distribution	27,243	52%	48%
Natural Gas Distribution	2,096	23%	77%
Petroleum Product Manufacturing	2,558	41%	59%
Total	32,907	48%	52%

The IESO forecasts a 65% increase in electricity demand by 2050.

KEY OBSERVATIONS

- Labour demand in electric power generation, transmission, and distribution is expected to be driven primarily by expansion demand, whereas replacement demand is projected to account for the majority of workforce needs in other energy sector industries. This trend aligns with nationwide projections for the sector, reflecting a significant number of anticipated retirements in the sector.²¹
- The electricity sector is experiencing strong growth driven by clean energy initiatives aimed at reducing carbon emissions and transitioning to renewable sources such as wind and solar.
- Growth in petroleum manufacturing can be attributed to its role as a transitional fuel and an input to biomass fuels, providing a reliable energy source while renewable technologies and infrastructure continue to develop and scale.

POTENTIAL LABOUR MARKET DEMAND IMPACT OF THE ENERGY FOR GENERATIONS PLAN

The IESO forecasts a 65% increase in electricity demand by 2050. In response, the Ontario government announced the *Energy for Generations* plan, aimed at meeting the province's long-term energy demand. With implementation beginning in 2025, Ontario's energy sector will likely require more workers for infrastructure, distribution, generation, transmission, and support services.

Key impacts include:

- The Plan will increase production capacity and speed up sector growth in Ontario, increasing demand for skilled technical labour (e.g., industrial designers, engineers, trades) for building and installing energy networks.
- The sector is likely to see increased for corporate and customer support roles, particularly those with technical expertise, to assist with emerging technologies and ongoing maintenance.
- Since employment growth will affect the energy value chain, quantifying the changes in labour demand resulting from the Plan will require further research.



3 DEMAND BY TOP OCCUPATION GROUP, 2025 - 2033

Based on a review of employment trends in the energy sector in Ontario, key occupations were identified based on the occupations with the highest shares of employment across industries within the sector. These occupations accounted for approximately 57% of the workforce in the sector in 2021. For a list of occupations of focus and their grouping, see Appendix A.4.

Table 6 summarizes the preliminary findings of labour demand by key occupational groups within the energy sector. Labour demand for these occupations was estimated based on their employment distribution across each industry in the sector.

Table 6. Occupational Demand, 2025 - 2033²²

Occupation Group	Total Demand	Expansion Demand Share	Replacement Demand Share
Engineering	3,421	55%	45%
Technical Trades and Operators	7,325	55%	45%
Managers and Professional Service Providers	4,887	50%	50%
Digital Technologies	629	53%	47%
Customer Support	696	46%	54%
Total	16,958	53%	47%

KEY OBSERVATIONS

- Demand for key occupations is projected to exceed 9,000 in the next eight years. Across all occupation groups replacement demand consistently constitutes the majority, representing more than 70% of total demand.
- Among these occupations, technical trades and operators are projected to have the highest total demand, followed by managers and professional service providers, highlighting an emerging need for technical occupations.
- Expansion demand in the energy sector is expected to be driven by significant growth in projects and facilities related to nuclear and other forms of generation. The facilities will require labour-intensive construction, operation, and maintenance.²³
- Replacement demand growth in the energy sector reflects national trends, as a significant portion of the workforce is expected to retire over the next decade due to an ageing demographic. Technical trades workers and managers comprise some of the occupations with the highest shares of older workers. In the electricity sector, occupations with notable proportions of older workers include millwrights or industrial mechanics (27%), industrial electricians (25%), and industrial instrument technicians (22%).²⁴

4 TOTAL SECTOR SUPPLY OUTLOOK, 2025 – 2033

Table 7 summarizes the preliminary findings of sector labour supply by industry from 2025 and 2033. Labour supply projections were based on the following sources:

- Postsecondary graduates: Graduates from university and college programs who enter the energy sector.
- Apprenticeship graduates: Graduates from apprenticeship programs who enter the energy sector.
- Immigration: Immigrants that settle in Ontario who participate in energy sector activities.
- Other: Workers entering or re-entering the workforce in Ontario.

Table 7. Sector Supply by Industry, 2025 – 2033²⁵

Industry	Total Supply	School Leaver Share	Immigration & Mobility Share
Oil and Gas Extraction	1,223	73%	27%
Electric Power Generation, Transmission and Distribution	10,660	55%	45%
Natural Gas Distribution	1,834	73%	27%
Petroleum Product Manufacturing	1,440	69%	31%
Total	15,158	60%	40%

KEY OBSERVATIONS

- These projections highlight the differing reliance on school leavers versus immigration and workforce mobility across industries within the energy sector.
- On average, school leavers account for 60% of the workforce, while immigration and mobility make up the remaining 40%.
- Labour supply in the electric power generation, transmission and distribution industry differs notably from the sector average, with a greater share of labour supply coming from immigration and mobility.

Overall, labour supply trends align with observed growth in immigration in Canada, while school leavers continue to make up the majority of new entrants in the energy sector.²⁶

POTENTIAL LABOUR SUPPLY IMPACT OF RECENT PROVINCIAL AND FEDERAL POLICIES

Ontario's Energy Generations plan outlines a strategic approach to creating a sustainable energy future for Ontario while enhancing economic competitiveness. It emphasizes diversifying energy sources, integrating electricity, natural gas, hydrogen, and advanced technologies, with a focus on affordability, security, reliability, and clean

energy. The Plan aims to modernize infrastructure to ensure a reliable energy supply and underscores the importance of collaboration with Indigenous communities and community involvement in energy development, positioning Ontario as a leader in the sector. This initiative could boost workforce demand in infrastructure construction, energy distribution, and support services through the following channels:

- Projections for school leaver supply are based on postsecondary enrolment trends from Statistics Canada. Ontario's plan may encourage more students to pursue energy-related careers through outreach and employment incentives.
- Another key element is expanding export opportunities both nationally and internationally, likely requiring inter-jurisdictional collaboration and possibly attracting talent from other regions.
- In addition to the *Energy for Generations Plan*, Canada enacted the *Free Trade and Labour Mobility in Canada Act*, which aims to reduce internal labour mobility barriers. The Act allows workers authorized by provincial or territorial jurisdictions to move and work in the same occupation under federal jurisdiction. Energy sector labour supply in Ontario may shift as workers gain mobility nationwide, allowing them to seek more desirable employment opportunities across Canada.



5 SUPPLY BY TOP OCCUPATION GROUP, 2025 - 2033

Table 8 summarizes the preliminary findings on labour supply by key occupation groups within the energy sector. The labour supply for these occupations was estimated based on their employment distribution across industries in the sector.

Table 8. Occupational Supply, 2025 - 2033²⁷

Occupation Group	Total Supply Growth	School Leaver Share	Immigration & Mobility Share
Engineering	1,718	100%	0%
Technical Trades and Operators	2,745	78%	22%
Managers and Professional Service Providers	3,716	34%	66%
Digital Technologies	783	47%	53%
Customer Support	252	94%	6%
Total	9,214	63%	37%

KEY OBSERVATIONS

- Most of the labour supply in engineering occupations is projected to come from school leavers.
- Growth in the supply of managers and professional service providers is driven primarily by immigrants and workers migrating into the province, as these positions generally require more hands-on experience.

- Technical trades occupations and customer support occupations rely heavily on school leavers, as the workforce continues to age.

Overall, key occupational groups exhibit greater diversity in labour supply. However, the projected decline in engineering workers in Canada poses a challenge for worker retention in Ontario’s energy sector.

6 ENERGY SECTOR OCCUPATIONAL GAP, 2025 - 2033

Table 9 summarizes the workforce gap projections by key occupation groups.

Table 9. Occupational Gap, 2025 - 2033²⁸

Occupation Group	Average Annual Employment	Estimated Workforce Gap	Estimated Workforce Gap (% of Employment)	Outlook to 2033
Engineering	7,254	1,704	2.5%	Shortage
Technical Trades and Operators	15,866	4,580	3.2%	Shortage
Managers and Professional Service Providers	9,558	1,171	1.3%	Shortage
Digital Technologies	1,283	-154	-1.4%	Balance
Customer Support	1,238	444	3.9%	Shortage
Total	35,199	7,745	2.4%	Shortage

KEY OBSERVATIONS

- The engineering occupation group includes civil and mechanical engineers, electronics and computer engineers, electrical engineers, and technical workers in electronics and electrical engineering. This group faces an estimated workforce gap of 1,704 workers, which is approximately 2.5% of total employment within the occupation.
- The technical trades and operators group includes a range of trades, including electrical trades and electrical power line workers, plumbers and pipefitters, machinery mechanicals, utility maintenance workers, and utility equipment operators, among others. This group is estimated to face a significant workforce gap of 4,580 workers, representing 3.2% of the employment in the group.
- Managers and professional service providers include roles such as auditors and accountants, human resources professionals, managers in engineering and information systems, managers in utilities, supervisors in processing and manufacturing, as well as technical inspectors and regulatory officers. This group has a smaller workforce gap compared with engineering and technical trades, estimated at 1,171 workers, equating to 1.3% of total employment within the group.
- Customer support occupations, including

customer service representatives and information service providers, are expected to see a workforce gap of 444 workers as the sector transitions to more modular energy delivery solutions. In contrast, digital technologies occupations, which include computer professionals and workers in information systems, show a workforce surplus, with an estimated surplus of 154 workers, representing 1.4% of employment in this occupation group.

Overall, the total workforce gap across the key occupation groups is modest, accounting for 2.4% of total employment. This reflects overall sector growth and the increasing demand for technical occupations to support that growth.

The energy sector is expected to face hiring challenges in the coming years, partly due to labour shortages. According to Electricity Human Resources Canada (EHRC), over 17% of Canadian employers surveyed reported difficulty hiring technical trades and engineering-related occupations, including electrical engineers or electronics engineers (30% of employers), engineering managers (20%), and electrical and electronics technicians (19%). Corporate professionals and digital technology professionals were also affected with 17% of employers reporting recruiting challenges in each group.

Energy Sector Skills Outlook

In addition to the occupational gaps, in-demand skills and skills gaps in Ontario’s energy sector were identified. Based on the available data, these skills were categorized into four types: soft skills, specialized skills, software skills, as well as certifications and credentials.

- Soft skills include interpersonal competencies such as communication, teamwork, and problem-solving, which are essential for effective collaboration and leadership.
- Specialized skills refer to technical expertise and knowledge specific to a particular field or occupation, such as engineering or renewable energy systems.
- Software skills involve proficiency in digital tools and platforms that enhance productivity and provide professional insights.
- Certifications and credentials are formal recognitions of a worker’s qualifications and competencies, often required for certain occupations and indicative of professional advancement.

Below is a summary of in-demand energy-related skills across occupations in the energy sector.

7 SKILLS GAPS AND OVERLAP

The assessment of the emerging skills gap in the energy sector in Ontario is based on a comparison of forecasted in-demand skills and the availability of qualified workers possessing those skills. The following section breaks down this assessment across four skill types over the period 2018-2024. The skills gaps identified are foundational for future talent development and upskilling and reskilling efforts.

Table 10 summarizes key skills identified in the postings and profiles data based on the skills demand in the energy sector.

Table 10. Key Energy Sector Skills, All Occupations of Focus, 2018-2024^{29,30}

Occupation Group	Soft Skills	Specialized Skills	Software Skills	Certifications & Credentials
Engineering	• Problem Solving • Innovation • Decision Making • Project Management • Research	• Electrical Engineering • Data Analysis • Automation • Electric Power Systems • Regulatory Compliance	• Python (Programming Language) • JavaScript (Programming Language) • Application Programming Interface (API) • JIRA	• Professional Engineer (PE) License • Certified Energy Manager • Security Clearance • Certified Engineering Technologist
Technical Trades and Operators	• Teamwork • Detail Oriented • Prioritization • Time Management	• Turbines • HVAC • Valves (Piping) • Construction • Project Implementation	• Geographic Information Systems • AutoCAD • Adobe Illustrator • Workday (Software)	• Red Seal Certification • System Operator Certification • Project Management Professional Certification

Occupation Group	Soft Skills	Specialized Skills	Software Skills	Certifications & Credentials
Managers and Professional Service Providers	• Presentation Skills • Operations • Coordination • Leadership • Sales	• Auditing • Accounting • Procurement • Change Management • Occupational Safety and Health	• Information Technology Infrastructure Library • IBM Maximo • Tableau (Business Intelligence Software) • Enterprise Application Software • Human Resources Information System (HRIS)	• Certified Safety Auditor • Certified Public Accountant • Certified Professional in Supply Management (Standards Organizations) • Payroll Compliance Practitioner
Digital Technologies	• Problem Solving • Writing • Teamwork • Troubleshooting • Project Management	• Computer Science • Risk Analysis • Workflow Management • Information Systems	• Information Technology Infrastructure Library • Power BI • SQL (Programming Language) • SAP Applications	• NIST Cybersecurity Framework (CSF) • Certified Information Security Manager • Certified Information System Auditor (CISA)
Customer Support	• Communications • Customer Service • Influencing Skills • Multitasking • Negotiation	• Customer Relationship Management • Invoicing • Performance Management • Risk Management	• Microsoft Office Suite • Salesforce • Project Management Software • Customer Relationship Management (CRM) Software	• Certified Fraud Examiner • Project Management Professional Certification

Some emerging skills are more occupation-specific than others, particularly among specialized skills and credentials. For example, wind turbines skills are primarily associated with technical trade occupations, while soft skills are in demand across all occupation groups.

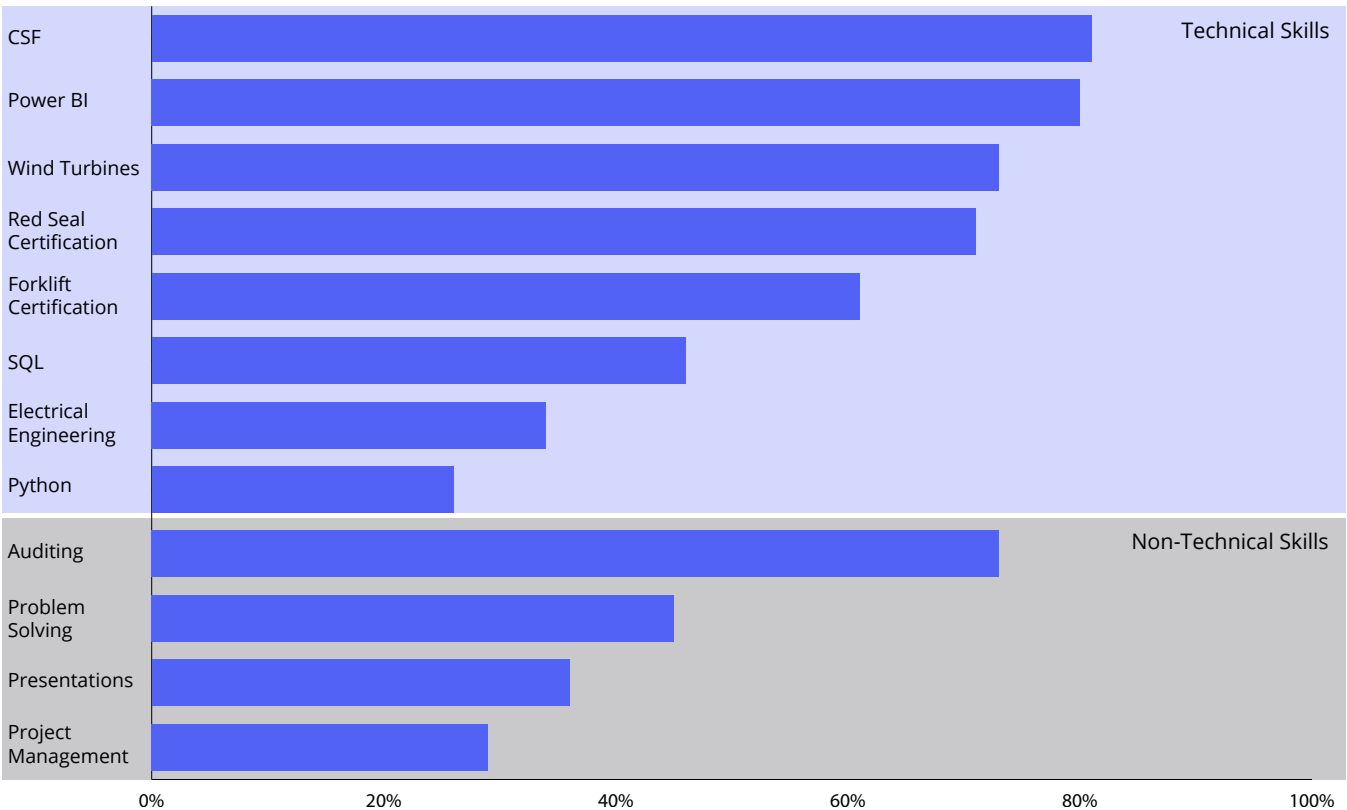
Certain specialized skills, such as programming, are in demand across multiple occupation groups including professional service providers and engineering occupations. On the other hand, workers in technical trades or engineering occupations can enhance their competitiveness by improving soft skills and their credentials.

Reskilling and upskilling training can play a significant role in increasing the supply of skilled workers for emerging energy sector occupations. Transferable skills from sectors such as construction and technology are valuable for employment in the clean energy sector. These include specialized skills

such as project management, system installations, and safety compliance. Workers with these skills can pursue sustainable career development in the energy sector through reskilling. For example, operations monitoring and maintenance skills from the fossil fuel sector can be useful in power generation facility maintenance occupations in the nuclear energy subsector.

Additionally, soft skills, such as effective communication, teamwork, and problem solving, enhance multidisciplinary collaboration and innovation. Proficiency in software tools for design, monitoring, and data analysis, alongside technical certifications, further enables workers to transition smoothly and contribute effectively to the clean energy sector. For example, client management and organizational skills training can benefit the career development of a residential electrician business owner. Figure 5 presents key skills with the largest gaps in Ontario’s energy sector workforce.

Figure 8: Key Skills Gaps³¹



Due to the nature of these occupations, each occupation group’s skill demand overlaps with various sectors. Table 11 shows the skills gaps and overlaps for key occupations of focus in the energy sector.

Table 11. Skills Gaps and Overlaps, All Occupations, 2018-2024³²

Skill Type	Average Skill Gaps	Sector Overlap			
		Construction	Transportation and Warehousing	Professional and Technical Services	Administrative Support, Waste Management and Remediation Services
Soft Skills	21%	18%	8%	92%	47%
Specialized Skills	30%	42%	5%	71%	75%
Software Skills	54%	10%	7%	91%	43%
Certifications	14%	23%	8%	57%	45%

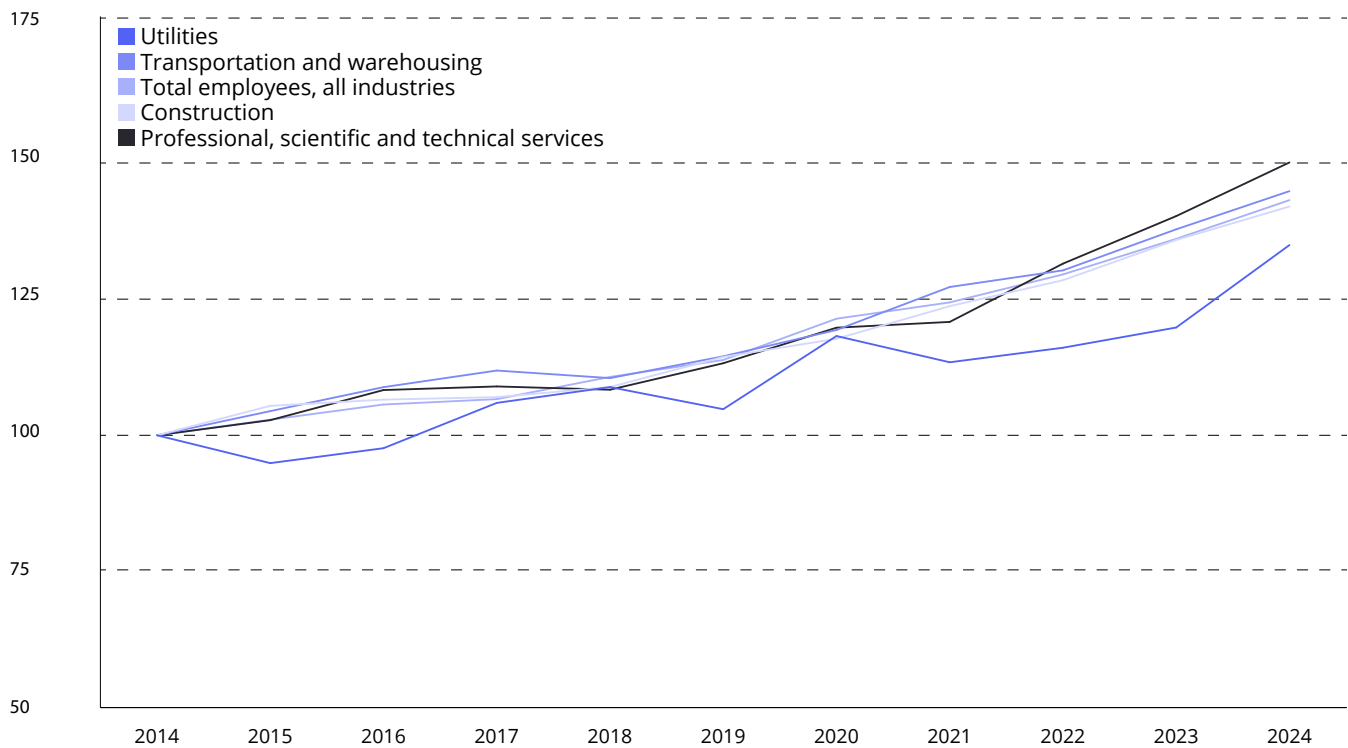
KEY OBSERVATIONS

- **Soft Skills:** On average, key soft skills show approximately 21% overlap across sectors. The highest overlap is observed in the professional and technical services sector (92%), while the lowest is in the transportation and warehousing sector (8%).
- **Specialized Skills:** There are significant overlaps with administrative support and waste management (71%) and professional and technical services (75%), with average skill gaps at 30%.
- **Software Skills:** Professional and technical services showed the highest overlap (91%), while the transportation and warehousing sector has the lowest (7%). Average skill gaps are higher at 54%.
- **Certifications:** The overlap is most notable in professional and technical services (57%), with administrative support and waste management

showing substantial overlap as well (45%). Average skill gaps are at 14%.

The skills gaps suggest that there are greater gaps in technical and software skills, with the software skills gap being particularly wide relative to demand. As the clean energy transition advances, demand for data- and technology-driven energy solutions is expected to grow, requiring software proficiency across occupations in the sector.

Additionally, wage growth trends across sectors provided insight into labour market competition among sectors with overlapping skills requirements. Figure 9 shows wage growth trends across sectors in Ontario from 2014 to 2024

Figure 9: Sector Wage Growth, Ontario, 2014-2024, 2014 = 100³³**KEY OBSERVATIONS**

- The construction sector experienced steady growth in employment, with a CAGR of 3.57% over the past 10 years. Among the sectors, the professional services sector grew the fastest, with a CAGR of 4.31%.
- Wage growth in the utilities sector has been volatile, showing lower-than average growth (3.65% CAGR) with a CAGR of 3.04% since 2014.

Wage growth trends suggest that related sectors are experiencing higher labour demand, leading to accelerated wage growth. With the expected rise in construction and infrastructure projects in the province, competition in related sectors drawing skilled labour away from the energy sector due to more attractive wages. Beyond conventional infrastructure sectors such as construction and transportation, there is significant skills overlap with professional and technical services, as well as administrative support and waste management. This means the many skills required in the energy sector are also in high demand in these related

sectors. These trends are consistent with the sector's shift to customer-centred energy solutions, and highlight these sectors as potential talent pools for energy sector workforce development.

Insights from the skills overlap analysis can help energy stakeholders with workforce development, including talent attraction and retention. The analysis highlights the types of talent with transferable skills from related sectors and identifies sectors that contribute to worker attrition in the energy sector. In this context, skills overlap is defined as the extent to which a sector shares a skill requirement with the energy sector. A higher skills overlap score indicates greater competition between the energy sector and other sectors for a given skillset.

The analysis indicates that workers from related sectors have transferable skills that allow smooth transitions into energy-related roles. This compatibility enhances both employability and adaptability in the evolving labour market. For example, professionals with experience in

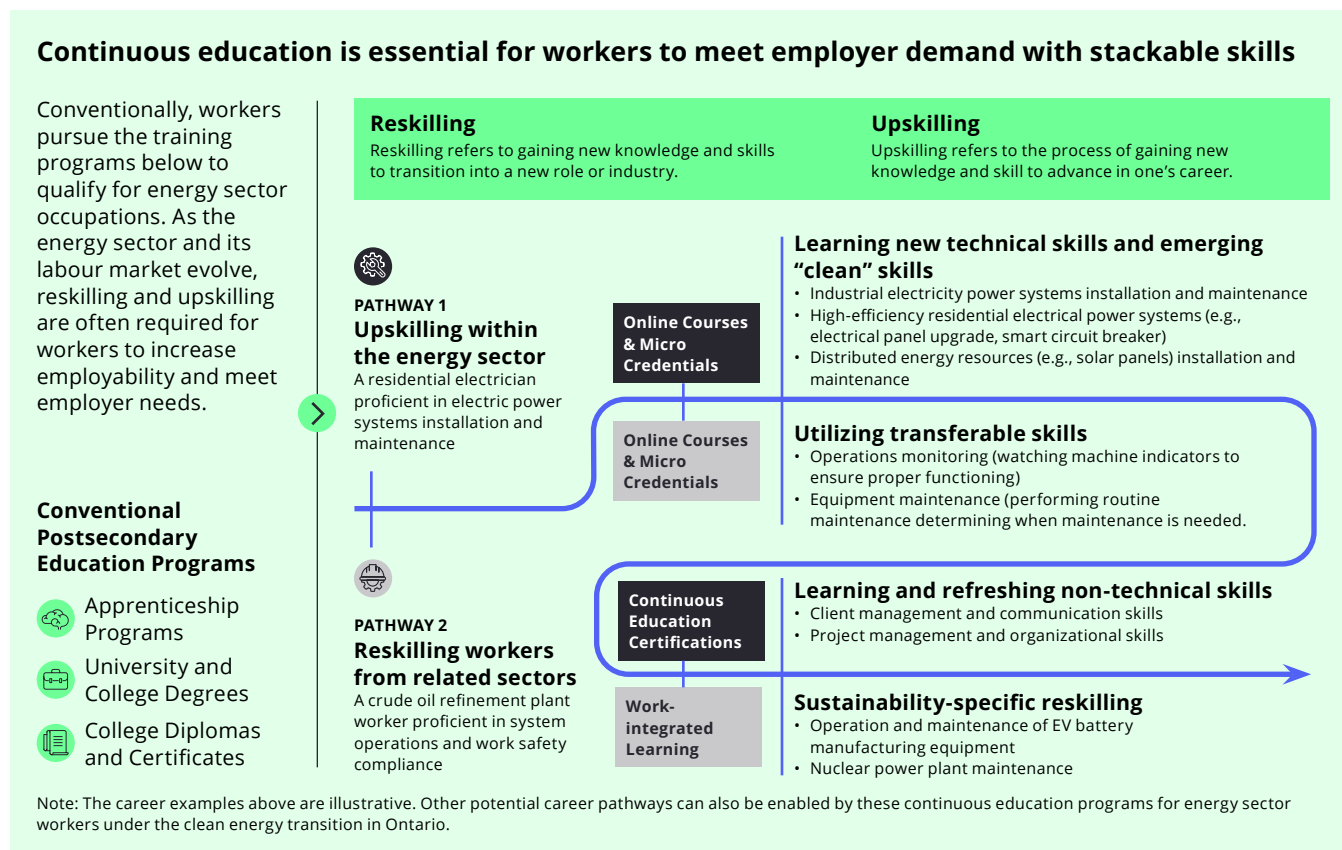
manufacturing, construction, or technology can more easily adapt to energy sector roles due to overlapping skills such as project management, technical expertise, and problem-solving. This fluidity benefits the energy sector by providing a steady influx of skilled workers while providing individuals a broader range of career opportunities.

Conversely, a high skills overlap may signal that workers leave the energy sector for more desirable opportunities in other sectors, potentially widening the sector's labour force gap. Positions in other sectors that offer more competitive salaries, or safer working conditions can draw energy sector

workers away, leading to a shortage of skilled labour and making it challenging for employers to find and retain qualified personnel.

These dynamics underscore the importance of understanding the career trajectories and potential of energy sector workers and workers from related sectors. A key focus area for workforce development is the "stackability" of skills across four skill types. These skills complement one another, and a broad skillset enhances a worker's occupational agility and competitiveness across the labour market. The following are some illustrative examples of career pathways for workers with transferable, energy-relevant skills.

Figure 10: Illustrative Upskilling and Reskilling Pathways for Workers with Energy Sector-Related Skills



Employers in the energy sector can benefit from recognizing the value of transferable skills and investing in continuous training and development programs to keep their workforce engaged and up to date with industry advancements. Additionally, fostering a supportive work environment with competitive compensation

and clear career progression pathways can help attract and retain talent, reducing the risk of skilled worker attrition to other sectors. By addressing these factors, the energy sector can better manage labour demand competition and ensure a sustainable, skilled workforce for the future.



Education and Training Programs

This section highlights a range of talent and workforce development programs in Ontario ranging from postsecondary degrees and on-the-job training programs to K-12 education and upskilling and reskilling opportunities.

Presented below is a sample of programs and tools in Ontario and across Canada, available to support workers and potential workers in the energy sector to acquire the necessary knowledge and training needed for the emerging technologies and tools shaping the clean energy transition.

1 Apprenticeship Programs

Apprenticeship programs provide practical, hands-on experience for individuals seeking to specialize in specific trades or acquire transferable skills. These programs combine on-the-job training with classroom instruction, allowing participants to develop competencies that are directly applicable to their chosen field. Examples of apprenticeship programs include:

INDUSTRIAL ELECTRICIAN - APPRENTICESHIP, ST. LAWRENCE COLLEGE

This program provides a hands-on pathway to becoming a qualified Industrial electrician, combining on-the-job training with classroom instruction. Apprentices earn a wage while learning essential skills and competencies required in the trade.

The program supports the clean energy transition by preparing electricians to install and maintain renewable energy systems, contributing to sustainable energy practices and reducing carbon emissions.³⁴

POWER WORKERS' UNION / HYDRO ONE APPRENTICE AND TECHNICAL TRAINEE PROGRAM

This program offers apprenticeships in trades such as Construction and Maintenance Electrician, Power Line Technician, and Meter Technician. These roles are crucial for maintaining and upgrading Ontario's electrical grid, facilitating the integration of renewable energy sources and supporting the province's clean energy goals.³⁵

THE ELECTRICAL APPRENTICE TRAINING ALLIANCE

309A, 631A & Ontario Youth Apprenticeship Program (OYAP) - The Alliance provides structured apprenticeship pathways for the Industrial, Commercial & Institutional (ICI) Electrician (309A), Network Cabling Specialist (631A), and Low-Rise Residential Electrician trades. These trades are key to clean energy initiatives, especially in enabling electrification, smart infrastructure, and the deployment of advanced energy systems in residential and commercial environments.³⁶



2 University and College Degrees

University and college degrees prepare individuals for non-technical or highly specialized occupations in the energy sector. Professionals from a wide array of fields of study can contribute significant value. Individuals with advanced studies in business and management can support the sector in areas such as business strategy, market research or accounting.

Conversely, professionals with highly specialized technical expertise in the sector often hold degrees that are necessary to drive innovation in the clean energy transition. Examples of college and university degree programs include:

BACHELOR OF ENGINEERING, SUSTAINABLE AND RENEWABLE ENERGY ENGINEERING PROGRAM

Carleton University's Sustainable and Renewable Energy Engineering program provides students with education in smart technologies for power generation and distribution, as well as efficient energy generation and conversion. The program equips students with skills to design, operate, and enhance efficient energy systems.³⁷

ELECTRICAL ENGINEERING DEGREE, SHERIDAN COLLEGE

Sheridan's Electrical Engineering degree is the first accredited program in Ontario by the Canadian Engineering Accreditation Board (CEAB). Students can specialize in Energy or Mechatronics, with

the Energy stream focusing on careers in the electrical utility sector. This program supports the clean energy transition by preparing engineers to develop and implement sustainable energy solutions, essential for advancing renewable energy technologies.³⁸

BACHELOR OF ENGINEERING DEGREE IN NUCLEAR ENGINEERING, ONTARIO TECH UNIVERSITY AND HUMBER POLYTECHNIC

Ontario Tech University and Humber Polytechnic have partnered to address the increasing demand for a skilled nuclear workforce essential for Canada's clean energy transition. This collaboration combines Ontario Tech's unique strengths, including Canada's only accredited undergraduate Nuclear Engineering degree, with Humber's expertise in training and applied research in clean energy. The initiative aims to cultivate a workforce capable of supporting significant nuclear developments across Canada by working with other post-secondary institutions. This coordinated national approach is designed to keep Canada at the forefront of clean energy innovation and position nuclear power as a vital component of the country's net-zero future. Leaders of both postsecondary education institutions emphasize the importance of this partnership in generating a pipeline of skilled professionals to meet future energy needs, drive job growth, and enhance international collaborations in the nuclear sector.³⁹



3 Upskilling and Reskilling Programs

Upskilling and reskilling programs are essential in helping workers adapt to ongoing disruptions in the energy sector, particularly as it undergoes unprecedented technological advancement. These programs enable individuals to acquire new skills or enhance existing ones, ensuring they remain competitive and capable of contributing to a connected, autonomous, and electric future. Examples of upskilling and reskilling programs include:

RETRAIN CANADA

ReTrain Canada offers technology-oriented training designed to help Canadians adapt to evolving job market demands. Their courses in leadership, IT, and project management can be tailored to clean energy applications, equipping workers to manage renewable energy projects, optimize energy use through smart technologies, and support sustainable innovation initiatives.⁴⁰

POLYTECHNICS CANADA

This national network includes colleges that offer certificate programs, corporate training, and micro-credentials aligned with workforce needs. George Brown's EV Technician Certificate and Algonquin's Trades Entrepreneurship Program, for example, directly prepare learners for careers in electrified transportation and clean energy business development.⁴¹

THE INFORMATION AND COMMUNICATIONS TECHNOLOGY COUNCIL (ICTC) ETALENT CANADA

This platform supports reskilling through digital tools and labour market insights. By connecting workers to courses in emerging technologies, including smart grids and energy efficiency software, eTalent helps to prepare Canada's workforce for roles in clean and connected energy systems.⁴²

4 Online Courses and Micro Credentials

Online courses and micro credentials provide flexible and accessible learning opportunities for working professionals and others seeking skills development. These programs allow individuals to acquire specific skills or knowledge in a convenient format, often at their own pace, making it easier to balance education with work and personal commitments. Examples of online courses and micro credential programs include:

ECAMPUSONTARIO, MICRO-CREDENTIALS PORTAL

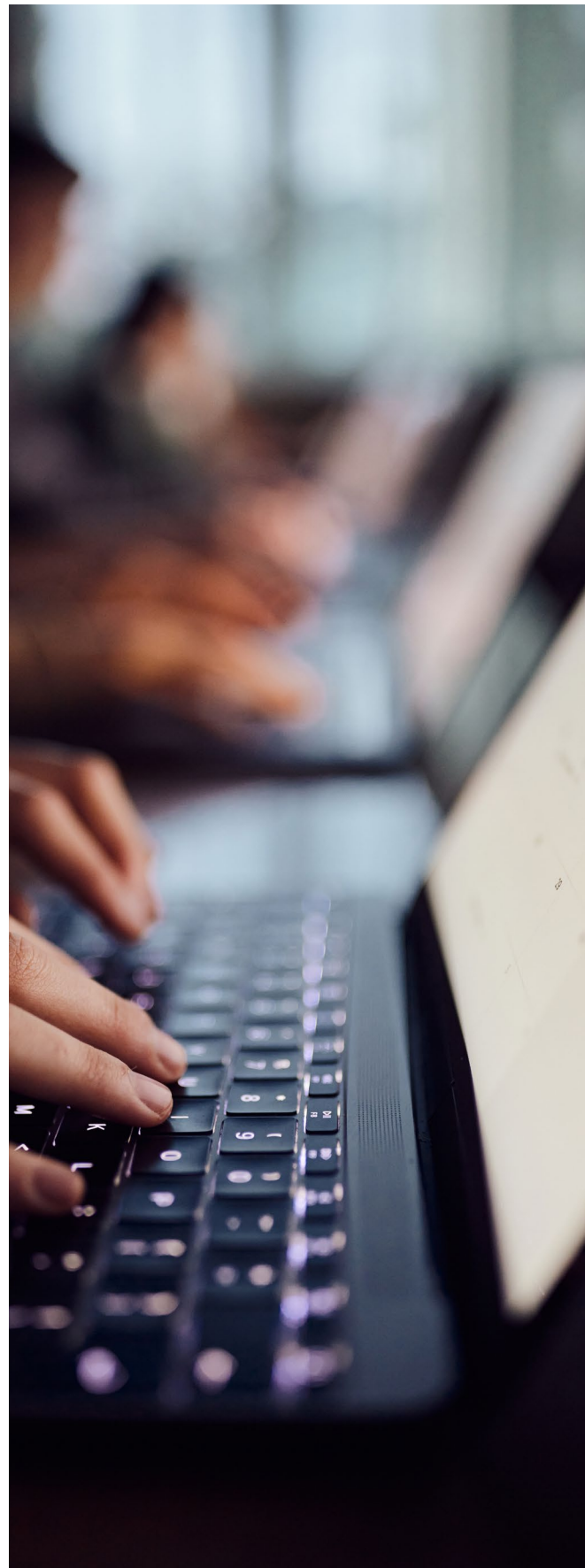
eCampusOntario's platform aggregates online micro-credentials across Ontario's public institutions. Learners can access clean energy-related courses on topics such as Net Zero building design, carbon literacy, and sustainable leadership, providing critical upskilling opportunities for workers transitioning to green careers.⁴³

NET ZERO AND GREEN ENERGY MICRO CREDENTIALS, CONFEDERATION COLLEGE

This innovative program offers a series of Micro Credentials that can be stacked to earn a Green Energy certificate. It equips participants with essential skills and knowledge to excel in the sustainable energy sector. The program directly supports the clean energy transition by preparing individuals to implement and maintain green energy solutions, addressing the urgent need for sustainable practices and contributing to climate change mitigation efforts.⁴⁴

BUILDFORCE CANADA, ONLINE TRAINING PROGRAMS

BuildForce Canada delivers targeted online courses for the construction sector, including content on energy-efficient construction practices and sustainable infrastructure. These programs help industry professionals adopt new technologies and methods aligned with the clean energy transition.⁴⁵





5 Work-integrated Learning

Work-integrated learning programs, such as internships and co-op placements, support skills development for new entrants to the energy sector. These programs provide hands-on work experience, allowing participants to apply theoretical knowledge in practical settings, gain industry insights, and build professional networks. Examples of work-integrated learning programs include:

RENEWABLE ENERGIES TECHNICIAN (CO-OP), FANSHAWE COLLEGE

Fanshawe College's Renewable Energies Technician (Co-op) program is a two-year Ontario College Diploma focusing on designing and installing renewable energy solutions like solar, wind, biomass, and geothermal. The co-op component provides practical experience, preparing students for careers as Metering/Engineering and Wind Turbine Service Technicians. This program directly supports the clean energy transition by equipping students with the skills needed to implement and maintain sustainable energy technologies.⁴⁶

ELECTRICAL ENGINEERING TECHNICIAN – POWER, MOHAWK COLLEGE

Mohawk College's Electrical Engineering Technician - Power program offers an integrated technician-apprenticeship pathway, equipping students with essential skills to install, repair, and maintain electrical motors, generators, and automation equipment. The co-op option allows students to gain valuable on-the-job experience, enhancing their readiness for careers in electrical engineering. This program contributes to the clean energy transition by training professionals who can optimize and innovate electrical systems, crucial for integrating renewable energy sources into the grid.⁴⁷

CAREER READY PROGRAM, TECHNATION

The Career Ready Program, offered by Technation as part of the Government of Canada's Student Work Placement Program (SWPP), supports businesses in hiring students for work-term placements by providing wage subsidies. This initiative allows students to apply their academic knowledge in real-world settings, paving the way for successful careers. By preparing students for careers in technology and innovation, this program plays a vital role in advancing the clean energy transition through the development of skilled professionals who can drive sustainable practices.⁴⁸

HUMBER POLYTECHNIC AND CANADIAN NUCLEAR ASSOCIATIONS

Humber Polytechnic and the Canadian Nuclear Association (CNA) have signed a Memorandum of Understanding (MoU) to address the increasing demand for skilled labour in Canada's nuclear sector. This partnership aims to develop innovative pathways for workforce growth as Canada transitions to a clean energy future. The collaboration focuses on creating training programs, academic credentials, and experiential learning opportunities tailored to the nuclear industry. Both organizations emphasize the importance of aligning talent development with industry needs to ensure the success of future nuclear projects and maintain Canada's leadership in nuclear technology. Humber Polytechnic's involvement will also include initiatives that promote equitable access to careers in the nuclear field, particularly through collaboration with Indigenous communities and other stakeholders. The MoU reflects a shared commitment to tackling workforce challenges and supporting Canada's low-carbon economy transition.⁴⁹



6 K-12 Programs

K-12 programs play a crucial role in preparing the next generation of professionals in the energy sector, particularly through training in STEM (Science, Technology, Engineering, and Mathematics) curricula and introductory programs related to energy technologies. These educational initiatives aim to inspire students and equip them with the foundational skills necessary for future careers in the industry.

ONTARIO ECOSCHOOLS

Ontario EcoSchools is a registered charity dedicated to fostering environmental leadership and building sustainable school communities across K-12 institutions. The program encourages schools to engage in practices such as energy conservation, waste minimization, and environmental stewardship through a certification framework. By participating in energy conservation campaigns and climate leadership initiatives, students

gain essential skills and knowledge that directly support the clean energy transition, empowering them to contribute to a more sustainable future.⁵⁰

CANCODE, INNOVATION, SCIENCE AND ECONOMIC DEVELOPMENT (ISED)

The CanCode program, funded by Innovation, Science and Economic Development Canada, supports diverse organizations across Canada in equipping youth with essential technical skills such as coding, math, and engineering fundamentals. By reaching over 220,000 teachers and 4.5 million students across Canada, CanCode prepares the next generation for careers in various industries, including those focused on clean energy technologies. This initiative fosters a skilled workforce capable of driving innovation in the clean energy transition.⁵¹

7 Career Navigation Tools and Funding Initiatives

Career Navigation Tools:

Career navigation tools are valuable resources for professionals seeking to advance their careers and secure employment across various segments of the energy sector. These tools offer guidance on career paths, skill requirements, and job opportunities, helping individuals make informed decisions about their professional development and job search strategies.

GPS FOR YOUR CAREER

First Work's GPS for Your Career is a digital platform for Ontario youth (ages 15-29), offering skills profiling, career exploration, and job matching. Funded by the Ontario Ministry of Labour, Immigration, Training and Skills Development, this initiative helps young people pursue careers in emerging fields, including clean energy, fostering a workforce ready for the clean energy transition.⁵²

JOB BOARD, ELECTRICITY HUMAN RESOURCES CANADA (EHRC)

EHRC's national job board connects job seekers with employers in the electricity sector, allowing users to create profiles and browse job postings. This platform supports the clean energy transition by facilitating the recruitment of skilled workers essential for advancing renewable energy initiatives.⁵³

JOB BANK, GOVERNMENT OF CANADA

The Job Bank offers resources for Canadians entering the labour market, including job postings, labour market trends, and the Career Handbook. Its dedicated green jobs page lists opportunities that support Canada's goals to reduce greenhouse gas emissions by 2030 and achieve net-zero emissions by 2050, empowering job seekers to pursue sustainable careers.⁵⁴

Funding Initiatives:

BETTER JOBS ONTARIO

This government grant program provides financial assistance to unemployed individuals for training in high-skill, high-demand jobs. Participants can receive up to \$28,000 for tuition, living expenses, and related costs, covering various college, university, vocational, and micro-credential programs. This initiative is vital for the clean energy transition, equipping individuals with skills for emerging green jobs

and supporting the shift towards a sustainable economy while contributing to environmental goals and reducing carbon emissions.⁵⁵

SCHOLARSHIP ON CLEAN ENERGY, ASSOCIATION OF ENERGY ENGINEERS CANADA EAST (AEE)

AEE Canada East provides financial support to students pursuing degrees or diplomas in fields related to clean energy, energy efficiency, and climate change mitigation. AEE Canada East has established endowed scholarships at Carleton University in Ottawa, the University of New Brunswick in Fredericton, and Concordia University in Montreal, helping students access education that equips them with the skills needed for a sustainable future. By fostering the next generation of professionals in clean energy and efficiency, this program empowers students to develop innovative solutions, drive advancements in renewable energy, and support the shift toward a lower-carbon economy.⁵⁶

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA (NSERC)

The NSERC is a federal organization that provides funding and support to individuals and institutions engaged in scientific and technological innovation. It offers a variety of programs to promote STEM education and research, including the Chairs for Women in Science and Engineering, Young Innovators, and PromoScience, which help foster talent and drive advancements in these fields.⁵⁷

TRAINING INCENTIVES, SAVE ON ENERGY

Save on Energy provides financial incentives for a variety of energy management training programs. These incentives support individuals pursuing industry-recognized accreditations or building foundational expertise in energy efficiency, making it easier to access current and relevant training opportunities.⁵⁸

These programs play a crucial role in shaping the future workforce by providing essential training, financial support, and career navigation resources. Investing and supporting these programs will help bridge the skills gap in emerging sectors, particularly clean energy, ensuring a steady supply of qualified professionals ready to address the challenges of a sustainable economy.



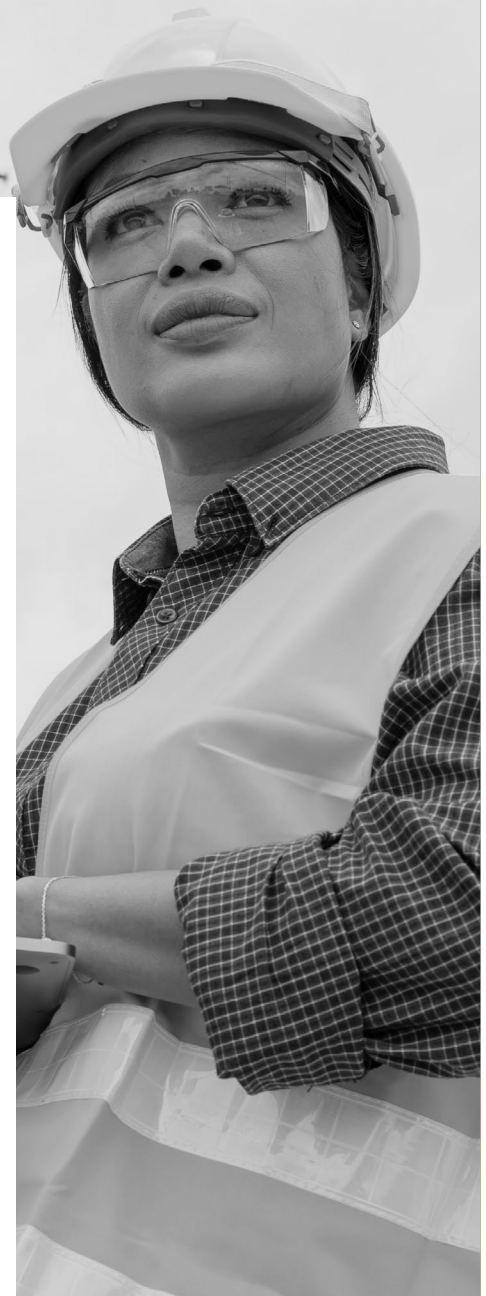
Workforce Development Opportunities and Recommendations

Workforce Development Opportunities

The workforce needs analysis indicates that the energy workforce is expected to grow steadily in the next 10 years, with more pronounced labour supply gaps in technical trade occupations and engineering occupations

Consistent with the workforce gap, notable skills gaps exist in clean energy related technical skills and software skills related to data analytics. Upskilling initiatives that build on existing workforce competencies, combined with on-the-job training can help employers address these gaps efficiently.

We have identified the following workforce development opportunities through the workforce needs analysis and insights from industry stakeholders:





Generating interest and understanding of career opportunities in youth

THE CHALLENGE

Ageing workforce and difficulty sustaining a talent pipeline

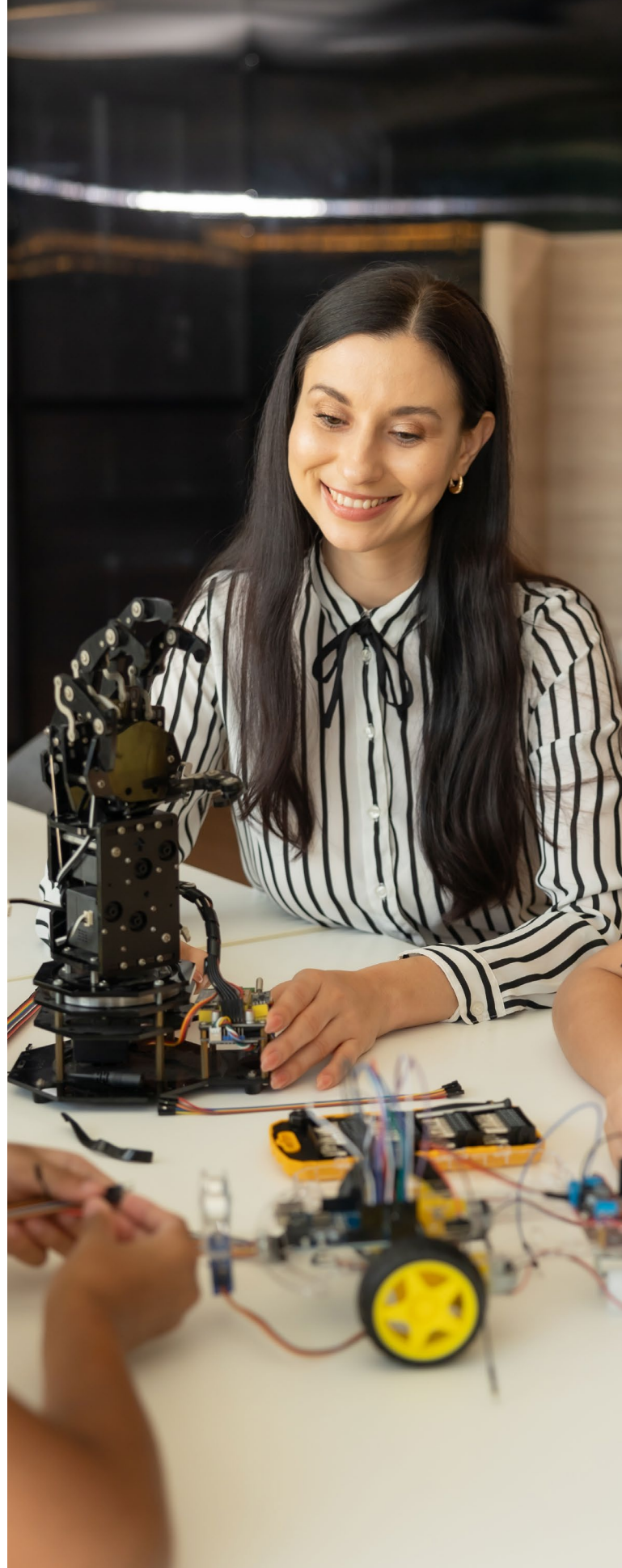
The energy sector faces challenges in attracting younger individuals, especially in skilled trades. In addition, colleges are concerned about declining enrollment in environmental technology programs which may affect the skilled talent needed for the clean energy transition.

THE OPPORTUNITY

Collaboration between industry and postsecondary education institutions

Generating interest and awareness of career opportunities among younger students will help build a long-term talent pipeline for the energy sector.

To effectively generate interest and understanding of career opportunities among younger students, collaboration between industry leaders and educational institutions can be expanded. Initiatives such as interactive workshops, internship programs, and school visits from sector professionals provide hands-on experiences and real-world insights, helping students appreciate the diverse and rewarding career paths in the energy sector. Integrating clean energy topics into the curriculum from an early age can further spark curiosity and passion for sustainable technologies. By highlighting the potential for innovation and impact, the energy sector can position itself as an exciting and viable career choice, ensuring a strong talent pipeline for the future.





Talent Attraction with competitive long-term career pathways

THE CHALLENGE

Talent attrition into competing sectors

The energy sector faces competition from other industries such as technology, construction, and healthcare, which offer competitive salaries and attractive career paths. This competition can draw talent away from energy careers, creating challenges in attracting and retaining skilled workers.

THE OPPORTUNITY

Enhance work environment and support long-term career growth

Creating an attractive work environment and supporting long-term career growth is key to demonstrating the unique opportunities and impact of working in the energy sector. By fostering a culture of innovation and inclusivity, the energy sector can appeal to potential talent by showcasing the dynamic and forward-thinking nature of the industry. Competitive salaries, comprehensive benefits, and opportunities for continuous learning and development further enhance career appeal.

Implementing mentorship programs and clear career advancement pathways give employees a sense of direction and purpose, motivating them to grow within the sector. Recognizing achievements, encouraging work-life balance, and providing a safe and supportive work environment will further employee satisfaction and retention.

The provincial government can further support the energy sector by coordinating project timelines with industry players and ministries responsible for infrastructure planning. In addition, provincial incentives for energy sector stakeholders can help ensure continued progress in the implementation of the Energy for Generations Plan.





Small and Medium-Sized Enterprises (SME) Capacity Challenges

THE CHALLENGE

Lack of talent capacity

Many SMEs lack the HR capacity to effectively hire apprentices and fill entry-level positions. They also face barriers to scaling due to a lack of suitable supporting talent.

THE OPPORTUNITY

Streamlined workforce and regulatory support

Streamlined workforce support can enhance SME capacity and help attract and retain younger talent. Tailored recruitment and training programs enable SMEs to maintain a steady influx of skilled workers prepared to meet the evolving demands of the industry.

Reducing regulatory complexity can lessen the resource burden on SMEs, allowing them to focus on workforce development. Simplified compliance and guidance in navigating regulations free up time and financial resources, which can be invested in employee development, innovative technologies, and operational expansion. Reducing bureaucratic hurdles also makes it easier for SMEs to collaborate with other industry stakeholders, fostering shared knowledge and mutual growth. This approach enhances productivity and sustainability while also strengthening the industry's capacity to respond to future challenges and opportunities.





Ecosystem Collaboration and Investment in People

THE CHALLENGE

Limited collaboration among energy sector stakeholders

The energy sector faces challenges in fostering collaboration among industry players, educational institutions, and government agencies. Limited collaboration hinders the development of a unified workforce development strategy needed to address skill gaps and to foster knowledge sharing. Without effective collaboration, the sector cannot fully leverage shared resources and expertise, which are crucial for developing robust training programs and innovative solutions to workforce challenges.

THE OPPORTUNITY

Energy sector ecosystem development

Collaboration among industry stakeholders, educational institutions, and government agencies is essential for developing a cohesive workforce development strategy that addresses skill gaps and promotes knowledge sharing. In the energy sector, establishing regional hubs for energy innovation can also facilitate networking and collaboration, enabling SMEs to leverage shared resources and expertise for workforce training and development. The ecosystem also has the potential to provide cleantech-specific training for energy sector workers, supporting the development of a cleantech talent pipeline.

There have been successful cases of industry collaboration in on-the-job training. For example, the collaboration between OPG and Bruce Power demonstrates the importance of sharing labour and investing in sustainable cleantech workforce development. Bruce Power is recognized for its best-in-class investment in people, serves as a model for other organizations seeking to strengthen their workforce strategies.





Limited Cohesion in Reskilling and Upskilling Opportunities

THE CHALLENGE

Limited skills recognition for workers with prior experience

There is a need for strategies that emphasize both reskilling and upskilling the existing workforce, particularly for workers from adjacent industries (e.g., automotive) who possess transferable skills. An energy sector skills framework that highlights complementary skills can support a “stackable skills” approach, enabling workers to adapt to future labour market changes using their existing skills. The effectiveness and acceptance of reskilling and upskilling initiatives can be improved by recognizing prior experience and providing training that builds on complementary skills.

THE OPPORTUNITY

Leveraging existing experience and credentials for skilling program development

The lack of recognition for prior learning and work experience can limit workers’ ability to transition into new roles within the energy sector or transfer skills from other industries, emphasizing the need for more inclusive and accessible reskilling pathways. “Stackable” training in soft skills can complement existing skillsets, and support long-term career advancement. Role-specific training models can provide greater access to upskilling opportunities, particularly for workers seeking sustainable professional development, ensuring a more equitable workforce. Reskilling projects in Alberta, such as Halkirk Wind Project and Living Energy Project, provide a framework for energy sector worker programs in Ontario.⁵⁹



The clean energy sector faces significant challenges due to gaps in technical skills. As emerging technologies and tools shape the clean energy transition, there is a growing need for trained professionals capable of operating, maintaining, and innovating within this evolving landscape. Workforce shortages in skilled trades, such as electricians, operators, and technicians, underscore the need for targeted education and training programs to bridge these gaps. Without a strong pipeline of technically proficient workers, the sector risks slowing progress toward sustainable energy practices and the integration of renewable energy systems.



Workforce Development Recommendations

We have developed strategic recommendations to strengthen workforce development within Ontario's energy sector. The workforce analysis identifies key areas for improvement, focusing on attracting and retaining talent, enhancing the capacity of SMEs, and fostering a culture of inclusivity and continuous learning. By implementing these strategic recommendations, the region can effectively work towards addressing workforce challenges while promoting the growth of a resilient and innovative energy sector.

1 GENERATE INTEREST IN ENERGY CAREERS AMONG YOUTH

Launch collaborative initiatives such as interactive workshops and school visits from sector professionals. Curriculum updates with clean energy education can also showcase the potential for innovation and impact in the sector.

2 ATTRACT AND RETAIN TALENT

Highlight the sector's unique opportunities and positive impact by fostering a culture of innovation and inclusion, offering continuous learning opportunities, and supporting mentorship programs with clear pathways for career advancement.

3 RESOURCE PLANNING SUPPORT

The provincial government can strengthen workforce capacity by coordinating labour demand across major infrastructure projects, such as aligning project timelines and supporting collaborative resource planning, and by offering energy sector-specific incentives to help retain talent.

4 BUILD SMALL- AND MEDIUM-SIZED ENTERPRISES (SME) CAPACITY

Provide streamlined workforce support to help SMEs recruit new talent and reduce regulatory complexity, allowing them to focus on workforce development.

5 ECOSYSTEM COLLABORATION AND INVESTMENT IN PEOPLE

Develop a workforce strategy with input from industry stakeholders, educational institutions, and government agencies.

6 STRENGTHEN STACKABLE RESKILLING AND UPSKILLING PATHWAYS

Develop role-specific training models that offer stackable skills for long-term professional development and expand work-based training to allow workers to show the impact of their prior experience in clean energy work.

APPENDIX

A. Methodology

A.1 Occupations of Focus

Based on a review of employment trends within the energy sector, the following occupations of focus were identified for the workforce gap analysis:

OCCUPATIONS OF FOCUS

Occupation Grouping	Relevance to the Energy Sector	NOC Code Occupation
Managers and Professional Service Providers	This group includes roles such as project managers. They provide strategic guidance, financial planning, and regulatory compliance, and ensure the successful implementation and operation of energy sector projects.	1110 Auditors, accountants and investment professionals 1120 Human resources and business service professionals 2001 Managers in engineering, architecture, science and information systems 2223 Technical inspectors and regulatory officers 9001 Managers in manufacturing and utilities 9201 Supervisors, processing and manufacturing occupations
Engineering	Engineers design, develop, and maintain energy systems and infrastructure. Their expertise ensures that energy systems are efficient, reliable, and sustainable.	2130 Civil and mechanical engineers 2131 Electrical, electronics and computer engineers 2231 Technical occupations in electronics and electrical engineering

Occupation Grouping	Relevance to the Energy Sector	NOC Code Occupation
Technical Trades and Operators	This group includes electricians, technicians, and plant operators who are responsible for the hands-on work of installing, maintaining, and operating energy systems. They ensure that energy production and distribution systems run smoothly and safely and address any technical issues that arise.	7220 Technical electrical trades and electrical power line and telecommunications workers 7230 Plumbers, pipefitters and gas fitters 7240 Machinery and transportation equipment mechanics (except motor vehicles) 7420 Transport equipment operators, utility maintenance and related maintenance workers 7510 Longshore workers and material handlers 9210 Utilities equipment operators and controllers 9310 Central control and process operators in processing and manufacturing
Digital Technologies	Professionals in this field work on integrating digital solutions into the energy sector. Their work helps optimize energy use, monitor organization operations, and support the transition to more sustainable energy sources.	2122 Computer and information systems professionals
Customer Support	Customer support roles in the energy sector involve assisting customers with their energy needs, addressing inquiries, and resolving issues. Their key responsibilities include ensuring customer satisfaction and providing information on energy-saving practices, new energy products and services and billing.	6440 Customer and information services representatives



For each occupation group, below is an overview of the skills required by each occupation:⁶⁰

MANAGERS AND PROFESSIONAL SERVICE PROVIDERS

NOC Code	Occupation	Key Skills Requirement
1110	Auditors, accountants and investment professionals	• Information Ordering • Problem Identification • Systems Analysis • Digital Literacy • Management of Financial Resources • Numeracy • Payroll Compliance Practitioner • Auditing • Accounting • Certified Public Accountant • Certified Professional in Supply Management (Standards Organizations)
1120	Human resources and business service professionals	• Presentation Skills • Coordination • IBM Maximo • Tableau (Business Intelligence Software) • Negotiation • Time Management • Product Design • Data Analysis • Enterprise Application Software • Human Resources Information System (HRIS)
2001	Managers in engineering, architecture, science and information systems	• Leadership • Procurement • Information Technology Infrastructure Library • Monitoring • Project Evaluation • Professional Engineer Certification
2223	Technical inspectors and regulatory officers	• Certified Safety Auditor • Coordination • Critical Thinking • National Construction Safety Officer • Field Evaluation • Repairing and Maintenance • Leadership in Energy and Environmental Design (LEED) certification
9001	Managers in manufacturing and utilities	• Sales • Change Management • Occupational Safety and Health • Operations • Decision Making • Financial Resource Management • Preventative Maintenance
9201	Supervisors, processing and manufacturing occupations	• Evaluation • Resource Management • Operation Monitoring of Machinery and Equipment • Electrical Engineering • Equipment and Tool Selection • Operation and Control

ENGINEERING

NOC Code	Occupation	Key Skills Requirement
2130	Civil and mechanical engineers	• Operation Monitoring of Machinery and Equipment • Repairing • Troubleshooting • Field services • Construction material evaluation • Feasibility studies • JIRA • Professional Engineer (PE) License • Decision Making • Quality Control Testing • Problem Solving • Innovation • Decision Making • Project Management • Regulatory Compliance
2131	Electrical, electronics and computer engineers	• Digital Literacy • Product Design • Monitoring • Systems Analysis • Data Analysis • Python (Programming Language) • JavaScript (Programming Language) • Application Programming Interface (API) • Certified Energy Manager • Evaluation • Resource Management • Time Management • Product Design • Electrical Engineering • Data Analysis • Automation • Electric Power Systems
2231	Technical occupations in electronics and electrical engineering	• Research • Equipment and Tool Selection • Preventative Maintenance • Vehicle, Machinery and Equipment Operations • Performance Measurement • Security Clearance • Certified Engineering Technologist

TECHNICAL TRADES AND OPERATORS

NOC Code	Occupation	Key Skills Requirement
7220	Technical electrical trades and electrical power line and telecommunications workers	• Turbines • Troubleshooting • Quality Control Testing • Leadership in Energy and Environmental Design (LEED) certification • Project Management • Systems Design • Cisco Certified Network Professional

APPENDIX

NOC Code	Occupation	Key Skills Requirement
7230	Plumbers, pipefitters and gas fitters	- Valves (Piping) - Construction - Repairing and Maintenance - Invoicing - Process Improvement - Red Seal Certification
7240	Machinery and transportation equipment mechanics (except motor vehicles)	- Detail Oriented - HVAC - Operation Monitoring of Machinery and Equipment - Environment Health and Safety - Quality Management - Professional Engineer Certification
7420	Transport equipment operators, utility maintenance and related maintenance workers	- Time Management - Project Management Professional Certification - Continuous Improvement Process - Knowledge of Industry Standards - Machinery Inspection - Industrial mechanic (millwright) trade certification
7510	Longshore workers and material handlers	- Teamwork - Inventory Management - Supply Chain Management - Operations - Warehousing - Forklift Certification - Automation
9210	Utilities equipment operators and controllers	- Project Implementation - System Operator Certification - Monitoring - Operation and Control - Equipment Installation - Security Clearance
9310	Central control and process operators in processing and manufacturing	- Control Process Monitoring - Quality Control Testing - Preventative Maintenance - Operating Procedures Development - Coordination - Safety Compliance

DIGITAL TECHNOLOGIES

NOC Code	Occupation	Key Skills Requirement
2122	Computer and information systems professionals	- Problem Solving - Computer Science - Risk Analysis - Workflow Management - Information Systems - Certified Information System Auditor (CISA) - Certified Information Security Manager - Information Technology Infrastructure Library - Power BI - SQL (Programming Language) - SAP Applications - NIST Cybersecurity Framework (CSF)

CUSTOMER SUPPORT

NOC Code	Occupation	Key Skills Requirement
6440	Customer and information services representatives	• Communications • Customer Service • Multitasking • Negotiation • Customer Relationship Management (CRM) Software • Invoicing • Performance Management • Salesforce • Project Management Software • Certified Fraud Examiner • Project Management Professional Certification • Risk Management

A.2 Workforce Gap Analysis Data Limitations

Identified limitations of the data and approach used in the analysis include:

- The analysis of skills was limited by the availability and completeness of data. Some postings and profiles were not assigned an industry due to the lack of information and were therefore excluded from the analysis.
- Skills on jobseeker profiles were self-reported, introducing potential inaccuracies in skills supply data. As such, the skills gaps should be interpreted as directional trends rather than precise predictions.
- Future skill insights were limited by the skills present in current state data from job posting and job seeker profiles, meaning potential “new” skills that are not related to occupations in the present could not be identified.



B. Select List of Clean Energy-related Education and Training Programs

Below is a select List of clean energy-related education and training programs:

Program Category						
Apprenticeship Programs	University and College Degrees	Upskilling and Reskilling Programs	Online Courses and Micro Credentials	Work-integrated Learning	K-12 Programs	Career Navigation Tools
St. Lawrence College - Industrial Electrician Apprenticeship	Carleton University - Bachelor of Engineering, Sustainable and Renewable Energy Engineering	ReTrain Canada	eCampusOntario, Government of Ontario	Fanshawe College - Renewable Energies Technician	Ontario EcoSchools	First Work's GPS for Your Career
St. Lawrence College - Residential Air Conditioning Systems Mechanic Apprenticeship	Sheridan College - Electrical Engineering Degree	Polytechnics Canada	Net Zero and Green Energy Micro Credentials, Confederation College	Mohawk College - Electrical Engineering Technician - Power	ISED - CanCODE	Government of Canada - Job Bank
Power Workers' Union / Hydro One Apprentice and Technical Trainee Program	Ontario Tech University - Bachelor of Engineering (Honours) in Energy Engineering	Palette Skills - Upskill Canada	BuildForce	La Cité Accueil - Electrical Engineering Techniques	Ontario Youth Apprenticeship Program	Electricity Human Resources Canada - Job Board
The Electrical Apprentice Training Alliance - 309A, 631A & OYAP	Carleton University - Graduate Programs in Sustainable Energy (MAsc, MPP, MEng)	Welding Supervisor Upskilling Program - CWB Foundation	Canadian Colleges for a Resilient Recovery (C2R2)	Centennial College - Energy Systems Engineering Technician (Fast-Track)		
La Cité Accueil Electrician - Construction and Maintenance		Quick Train Canada		Confederation College - Electrical Engineering Technology		
Conestoga College Electrician - Industrial Apprenticeship				Technation - Career Ready Program		

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Ernst & Young LLP (EY) was engaged by the Toronto Region Board of Trade (the Board) to conduct a workforce gap analysis for the energy sector in Ontario. In preparing this document (Report), EY relied upon unaudited data and information from the Board and third-party sources (collectively, the Supporting Information). EY reserves the right to revise any analyses, observations or comments referred to in this Report if additional Supporting Information becomes available to us subsequent to the release of this Report. EY has assumed the Supporting Information to be accurate, complete and appropriate for the purposes of the Report. EY did not audit or independently verify the accuracy or completeness of the Supporting Information. Accordingly, EY expresses no opinion or other forms of assurance in respect of the Supporting Information and does not accept any responsibility for errors or omissions, or any loss or damage as a result of any persons relying on this Report for any purpose other than that for which it has been prepared.



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