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Project Insights Report

The Demand for Green Skills and the Impact on the Supply and Demand for Apprentices and Certified Journeypersons in the Canadian Economy

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Executive Summary

Canada's transition to a net-zero economy is transforming the nature of work in the skilled trades. As industries such as energy, construction, manufacturing, and transportation, adopt cleaner technologies, the demand for certified tradespeople is sharply increasing. However, Canada's training and apprenticeship systems are not fully equipped to meet this surge in need. Without coordinated action, workforce shortages could limit the country's ability to achieve its 2050 climate goals.

To understand where and how demand will grow, the Canadian Apprenticeship Forum commissioned Prism Economics and Analysis to assess the impact of decarbonization on apprenticeship and labour needs. Using national data and Prism's CANTRAQ model, the project analyzed 26 apprenticeable trades and related occupations under two scenarios: a baseline projection and an accelerated "green" scenario reflecting stronger climate action. The study also drew on labour-market data, job postings, and a literature review to identify emerging green skills and training gaps.

The findings show that Canada will need to train and certify more than 264,000 apprentices by 2034 — a 49% increase over current levels. HVAC technicians, industrial mechanics, electricians, and welders are among the most in-demand occupations. The research also revealed that Canada's green transition is reshaping and not replacing the trades, as existing occupations increasingly integrate new competencies in energy efficiency, electrification, and sustainable construction.

These insights have clear implications for policy and for practice. Expanding training-seat capacity, improving apprenticeship completion rates, and embedding green skills and climate literacy into curricula will be vital. Canada's success in reaching net-zero will depend on the collective effort of governments, educators, employers, and unions to modernize training systems, attract underrepresented groups, and ensure the skilled trades workforce is ready to power the country's low-carbon future.

KEY INSIGHTS

1. Canada will need to train and certify over 264,000 apprentices by 2034, a 49% increase over current levels, to meet workforce demand under the green transition scenario.

2. Canada's apprenticeship and training systems are not yet aligned with the pace of the green transition, highlighting an urgent need for coordinated, data-driven planning across jurisdictions.

3. Existing trades, and not new ones are driving the green economy, suggesting that upskilling and modernizing current apprenticeship curricula are more effective than creating entirely new training programs.

The Issue

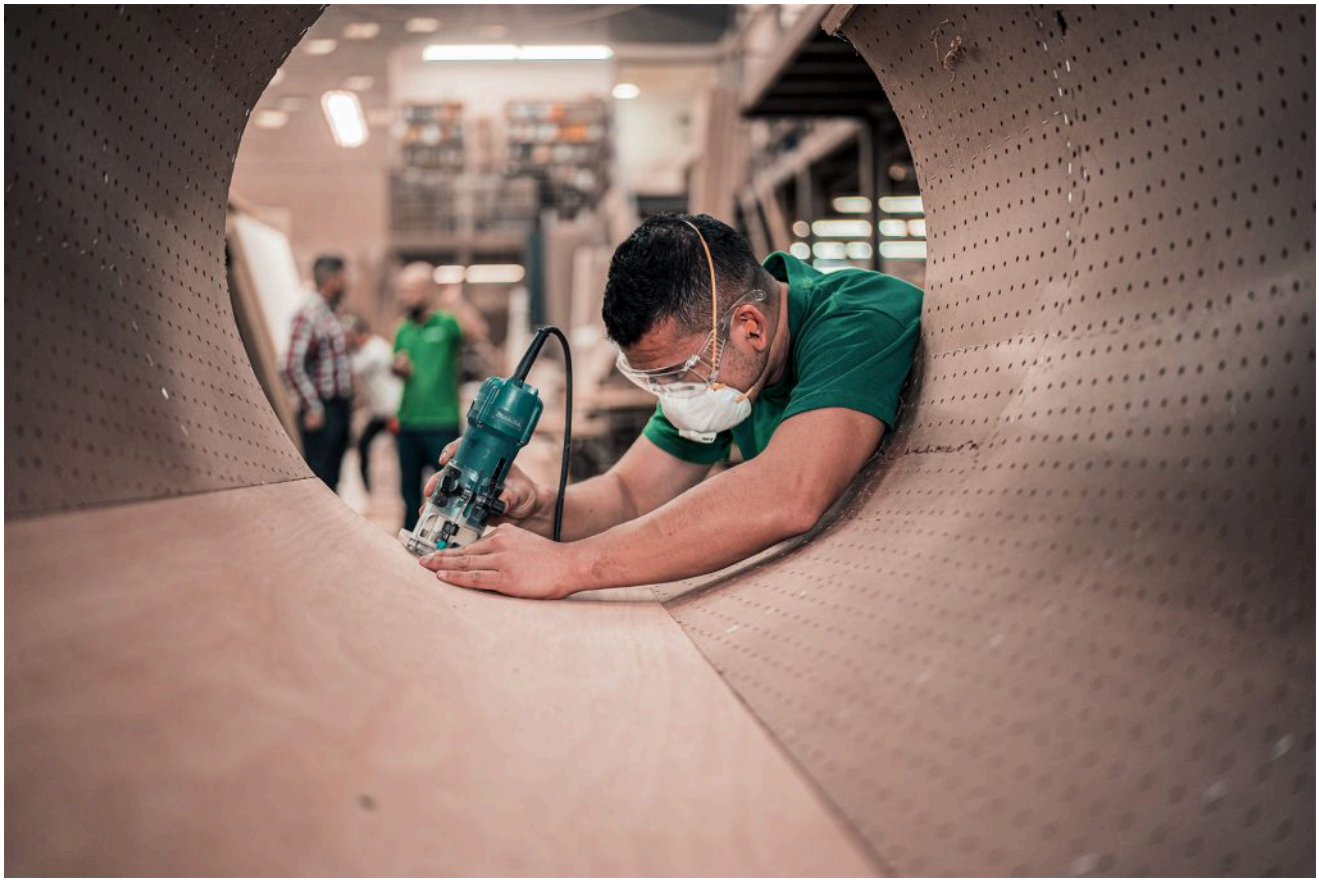
Canada's transition toward a low-carbon, net-zero economy is reshaping the country's labour market and placing unprecedented pressure on the skilled trades system. The federal government has introduced ambitious industrial and climate policies that span manufacturing, transportation, energy, and construction. These national commitments are driving rapid growth in renewable energy projects, clean technologies, and building retrofits, which are developments that depend heavily on a workforce of certified trades professionals.

While the environmental and industrial policy landscapes are advancing quickly, workforce planning has lagged behind. Canada currently lacks a holistic understanding of how the greening of the economy will affect the demand for apprentices and journeypersons across trades. Existing labour market analyses tend to treat skilled-trades and environmental sectors as separate entities, overlooking how intertwined they truly are. In reality, foundational technical skills learned through apprenticeship, such as HVAC, plumbing, electrical, mechanical expertise, and welding, are central to green transitions. For example, the installation of solar panels relies on electrical competencies; retrofitting buildings for energy efficiency depends on HVAC and plumbing skills; and the production and servicing of electric vehicles draw on the same mechanical knowledge used in traditional automotive trades.

This interdependence is emerging at a time when Canada is already facing chronic shortages of skilled tradespeople. High rates of journeyperson retirement and declining apprenticeship completions threaten to constrain the country's capacity to deliver on its climate commitments. Without targeted strategies to attract, train, and certify new apprentices, the environmental sector's demand for green skills could exacerbate existing labour shortages, especially in high-impact trades such as industrial mechanics, refrigeration and air-conditioning mechanics, and electricians.

Geographically, these pressures are being felt across all provinces and territories, reflecting Canada's diverse industrial base. While the impact of tariffs is still unfolding, until recently Ontario and Quebec were leading the shift toward electric-vehicle manufacturing and battery production; British Columbia and Alberta were expanding renewable energy and green building projects; while resource-rich regions such as Newfoundland and Labrador and the northern territories continue to scale up critical-mineral mining to supply the global clean-tech market. Each region faces unique labour-market challenges tied to its infrastructure readiness, industrial mix, and apprenticeship capacity.

The need to align Canada's apprenticeship and training systems with emerging green-economy demands has never been more urgent. Understanding which trades will be most affected by decarbonization, and ensuring that training pipelines can meet this demand, is critical for achieving an equitable and sustainable transition. This project was initiated to fill that knowledge gap by mapping how green skills demand intersects with apprenticeship systems, quantifying future workforce requirements, and identifying where Canada must build capacity to prepare its trades workforce for a net-zero future.



What We Investigated

This project sought to better understand how Canada's transition to a net-zero economy is reshaping the demand for skilled tradespeople and apprentices. As the green economy expands, decarbonization initiatives and new technologies are altering the skill requirements across sectors such as transportation, energy, manufacturing, and construction. The study examined the extent to which apprenticeship and training systems are equipped to meet these evolving needs and assessed the readiness of Canada's trades workforce to support a low-carbon future.

The research was guided by five core questions:

1. How could potential decarbonization pathways in Canada affect the demand for skilled tradespeople?
2. Which apprenticeable skilled trades occupations will be in greater demand as the economy advances toward decarbonization?
3. Which related skilled trade occupations—those without formal apprenticeship programs—will also experience increased demand?
4. How will changes in demand resulting from decarbonization affect training needs for apprenticeable skilled trades?
5. Which trades are at risk of falling behind future demand based on the current number of certified workers being produced?

To answer these questions, the research team employed a multi-method approach combining quantitative modelling and qualitative analysis. The work was conducted between 2024 and 2025 by Prism Economics and Analysis for the Canadian Apprenticeship Forum. The study began with a comprehensive literature review and environmental scan of policy, academic, and industry sources published primarily within the last decade. This review identified key sectors impacted by greening activities, emerging technologies, and anticipated shifts in skill requirements for both apprenticeable and non-apprenticeable occupations.

Green jobs were identified using the U.S. Department of Labor's Occupational Information Network (O*NET), which categorizes "green" occupations as:

1. New and emerging jobs created by green technologies
2. Existing jobs that require enhanced green skills
3. Traditional jobs experiencing increases in demand due to the green economy

These occupations were mapped to Canada's National Occupational Classification (NOC) system using Prism's proprietary correspondence table to determine which trades and apprenticeship programs are most affected.

To assess labour market supply and demand, the team used CANTRAQ (Canada's system for tracking apprenticeship qualifications), a unique forecasting model developed by Prism Economics. CANTRAQ integrates demographic trends, apprenticeship registration and completion data, and occupational forecasts to estimate both the current and future supply of certified journeypersons. The model compared two scenarios: a baseline scenario reflecting historical investment trends, and a green scenario aligned with Canada's 2050 net-zero targets, including widespread adoption of electric vehicles, renewable energy, and building retrofits.

This integrated approach provides actionable insight for educators, policymakers, employers, and unions who are working to align training, recruitment, and workforce planning with the demands of a rapidly evolving green economy.

What We're Learning

Canada's transition to net-zero is reshaping the demand for skilled trades
The project confirmed that Canada's commitment to reach net-zero greenhouse gas emissions by 2050 is transforming labour needs across multiple sectors. Decarbonization is driving substantial new demand for skilled trades in construction, manufacturing, utilities and energy production, transportation, and mining. Each of these sectors relies on certified trades, and as their activities overlap, competition for skilled labour is increasing. The findings underscore that the green transition is economy-wide and that trades will play a pivotal role in enabling Canada's low-carbon future.

Construction, manufacturing, and energy will see the greatest increases in demand
Across sectors, a small group of trades consistently emerge as essential to the green economy — HVAC technicians, welders, industrial mechanics, millwrights and electricians. These occupations are critical for projects such as heat-pump installation, renewable energy development, building retrofits, and electric-vehicle production. Because these skills are transferable, demand for qualified workers will be intense. As electrification accelerates and clean-energy infrastructure expands, pressure on the apprenticeship pipeline is expected to grow rapidly.

Existing trades — not new occupations — are driving the green economy
The research found little evidence of entirely new trades emerging from the shift to green technologies. Instead, existing trades are evolving through updated materials, tools, and processes that reduce environmental impact. Core training and certification requirements remain relevant, but green skills, such as renewable-energy installation, energy-efficient construction, and sustainable maintenance practices, must now be integrated. This finding reinforces that apprenticeships remain the foundation of Canada's climate workforce, provided training keeps pace with technological change.

Apprenticeship systems must scale significantly to meet future demand
Under the baseline scenario, Canada will need to train and certify over 177,000 apprentices between 2025 and 2034 across 26 trades. About one-quarter of this reflects new job growth, while the remainder replaces retiring journeypersons. Under an accelerated green scenario, that requirement rises to 264,000 apprentices — a 49% increase. Two trades: refrigeration and air-conditioning mechanics and construction electricians account for nearly half of the added employment demand, followed by plumbers, carpenters, and industrial electricians. These results highlight the scale of expansion needed to sustain Canada's green transition.

Labour shortages are already constraining progress toward net-zero
Current labour-market data reveal severe tightness: as of 2024, some key trades had fewer than one unemployed worker per job opening. The model identified six trades at high risk of recruitment shortages, these include glazier, industrial electrician, construction labourer, power system electrician, machinist, and refrigeration and A/C mechanic. While there are 11 trades at moderate risk, including boilermaker, millwright, and construction electrician. Only a few trades, such as carpenters and sheet-metal workers, appear to have balanced labour markets. Without stronger recruitment and completion supports, these shortages could delay major decarbonization projects.

Upskilling and reskilling are critical for a climate-ready workforce
Meeting future demand will require expanding opportunities for current tradespeople to upskill and for workers in adjacent occupations to reskill into green trades. Many green competencies build on existing technical expertise, making short-cycle training and micro-credentials effective tools, and some institutions are already responding. For example, colleges are offering electric-vehicle technician certificates and trade unions developing climate-literacy modules. However, system-level coordination remains limited. A national strategy for green-skills development, supported by industry, governments, and education partners, is needed to scale these initiatives.

Inclusion and demographic renewal are vital for sustainability
As large numbers of journeypersons retire, the transition offers an opportunity to engage underrepresented groups, including women, Indigenous Peoples, newcomers, and youth. Promoting trades careers that align with environmental values can attract a new generation motivated by purpose-driven work. Pre-apprenticeship supports, inclusive recruitment practices, and mentoring, will help address demographic gaps while building a more resilient and diverse workforce.

Collaboration between policy, industry, and training systems is essential
The research highlights the need for integrated planning between climate policy and workforce development. Fragmented data systems and inconsistent training standards currently limit Canada's ability to forecast and respond to skills shortages. Prism's CANTRAQ model demonstrated how linking apprenticeship completions, certification rates, and demographic trends can inform targeted interventions, such as data-driven planning which should guide where to invest training resources, and what trades require the most urgent attention.

Canada must act quickly to close the green-skills gap
The overarching lesson is one of urgency: the pace of greening exceeds the capacity of the apprenticeship system. Without increased investments in training infrastructure, curriculum modernization, and mentorship, Canada could face tens of thousands of unfilled skilled-trade positions by 2034. Strengthening apprentice intake and completion, embedding green skills into all technical programs, and coordinating efforts across provinces are vital next steps. Canada's success in achieving its climate goals will depend on its ability to train, certify, and retain the skilled trades workforce needed to power the green economy.

Why It Matters

Canada's ability to meet its climate commitments depends on whether it can train and retain enough skilled tradespeople to support the net-zero transition. The findings of this project show that achieving a low-carbon economy is as much a workforce challenge as it is an environmental one. Demand for tradespeople in manufacturing, transportation, construction, and energy is growing far faster than current training systems can supply. More than 264,000 newly certified workers will be needed by 2034 under a green transition scenario, yet several key trades already face shortages. Workforce readiness has therefore become central to advancing Canada's economic and climate objectives.

Addressing this challenge requires aligning policy, planning, and funding across government and industry. Current apprenticeship systems were not designed for the pace and scale of the green transition. They remain fragmented across jurisdictions, with inconsistent standards and limited data integration. This project demonstrates that national labour forecasting and green-skills mapping can produce highly actionable insights for policymakers, educators, and employers. Tools such as the CANTRAQ model enable governments and training institutions to anticipate where shortages will emerge and which trades need immediate investment. Embedding this kind of evidence-based forecasting in policy decisions will ensure that labour and climate strategies evolve together rather than in isolation.

The research also advances two of the Future Skills Centre's strategic learning questions: identifying effective measures to help workers transition from declining to growing sectors, and understanding how decarbonization will affect the demand and supply of tradespeople. It shows that existing apprenticeship and certification systems, if modernized and scaled, are among the most effective tools for facilitating worker mobility during major economic shifts. Although the project did not test retraining interventions, it lays the groundwork for future investments in upskilling and reskilling programs tailored to green-economy needs.

State of Skills: Sustainable Jobs for Economic Growth

Green-related skills and knowledge are growing in significance and are becoming widespread across many sectors and occupations, requiring more workers to upskill by building upon their existing competencies.

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Moreover, inclusive workforce development is essential to sustaining the green transition. With many journeypersons approaching retirement, Canada must expand access to underrepresented groups, including Indigenous Peoples, women, newcomers, racialized workers, and youth, to meet future labour needs. These groups remain underrepresented in the trades, yet represent untapped talent that can strengthen workforce innovation and diversity. Targeted recruitment, pre-apprenticeship programs, and mentorship support will help broaden participation while ensuring that the benefits of green growth are equitably shared.

Education and training systems must adapt quickly to keep pace with technological change. Apprenticeship curricula should integrate green skills and climate literacy, preparing tradespeople for technologies such as electric vehicles, battery storage, heat pumps, and renewable energy systems. Expanding micro-credentials and short-cycle upskilling can help existing workers transition more efficiently, while partnerships between training institutions and employers can ensure program content reflects evolving industry needs. Increasing training-seat capacity in high-demand trades, particularly electricians, HVAC technicians, and industrial mechanics, and expanding employer sponsorships will also be critical to scaling apprenticeship completions.

Furthermore, the project demonstrates the value of evidence-based workforce planning. By combining quantitative forecasting with sector-level insights, it provides concrete estimates of how many workers will be needed, in which trades, and by when. This enables governments and organizations to move from broad discussions about “skills for the green economy” to specific, measurable workforce targets. Future regional analyses could refine this approach by identifying province or industry specific gaps while maintaining national coordination.

The implications extend well beyond the trades themselves. Skills shortages in construction, energy, and manufacturing are closely tied to national priorities such as the housing crisis, infrastructure renewal, and industrial competitiveness. Limited trades capacity could slow renewable energy installations, affordable housing projects, and clean-technology manufacturing. Immigration and credential-recognition policies may also need to evolve to attract and integrate more qualified tradespeople while supporting domestic apprenticeship pipelines. Coordinated workforce planning across these policy domains can help mitigate economic bottlenecks and sustain growth.

Ultimately, the project’s findings emphasize that Canada’s path to net-zero will rely upon skilled trades. Whether upgrading clean-energy infrastructure, constructing energy-efficient buildings, or manufacturing electric vehicles, tradespeople form the foundation of the green economy. Addressing the skilled-trades shortage is not simply about filling jobs, it is about enabling Canada to deliver on its environmental commitments, strengthen its competitiveness, and ensure that the transition to a low-carbon economy is both sustainable and inclusive.

Have questions about our work? Do you need access to a report in English or French? Please contact communications@fsc-ccf.ca.

How to Cite This Report

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The Future Skills Centre acknowledges that the Anishinaabe, Mississaugas and Haudenosaunee share a special relationship to the 'Dish With One Spoon Territory,' where our office is located, bound to share and protect the land. As a pan-Canadian initiative, FSC operates on the traditional territory of many Indigenous nations across Turtle Island, the name given to the North American continent by some Indigenous peoples. We are grateful for the opportunity to work in this territory and commit ourselves to learning about our shared history and doing our part towards reconciliation.