

Constructing Opportunity: Understanding and Addressing Diversity in BC's HVAC Industry

Heating, Ventilation, and Air Conditioning
Labour Market Analysis, August 2023



This report was commissioned by the Vancouver Economic Commission (VEC), working on the unceded territory of the xʷməθkʷəy̓əm (Musqueam), Skwxwú7mesh (Squamish), and səliłwətaʔł (Tsleil-Waututh) Nations.

These Nations have cared for the lands and waters of “Vancouver” since time immemorial, sustaining strong economies while thriving in balance with the natural world.

Vancouver is a City of Reconciliation, and VEC – an agency of the City – commits to forming long-lasting relationships of mutual respect and understanding with First Nations and other local urban Indigenous communities.

VEC pledges to better understand the full breadth of truth and reconciliation and to work alongside local Indigenous communities to support and collaborate on building economic prosperity for all.





Who We Are



Our Purpose

The Vancouver Economic Commission's (VEC) purpose is to build a prosperous, inclusive, zero-carbon and resilient local economy, competitively positioned in the global market.

Pledge to Vancouver

As our world reopens following the COVID-19 pandemic, and as the world commits to a net zero future, we must reflect on the new realities of how people work – and how we measure prosperity across a wider social, economic and environmental framework. It is within this context that VEC delivers on its mandate to support the long-term resilience and values of our local economy. Our pledge to Vancouver is further shaped by our corporate values, which guide how we prioritize the highest and best use of our resources.



The B.C. Centre for Women in the Trades is a partnership of tradespeople, industry, and labour representatives of the skilled trades industry in B.C.. Through programs, supports, and training, BCCWITT is working to create a diverse, equitable and inclusive skilled trades industry, where all feel welcome, healthy, respected, and safe. BCCWITT's mission is to empower diverse tradespeople and to increase their participation in the trades by building respectful, equitable, dignified, and safe workplaces.



The City of Vancouver serves approximately 645,000 residents in Vancouver by providing essential services – including public infrastructure, operations, maintenance and asset management – to serve a complex, growing city. The City of Vancouver aspires to be a world-class healthy and environmentally sustainable city through meaningful and equitable climate action.

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HVAC Survey Executive Summary

Skills shortages are already hampering the transition to greener economies. Expanding the market in the local building community at the pace necessary to meet Vancouver and British Columbia’s climate goals requires the empowerment and support of tradespeople of all backgrounds, genders, and ages to participate. This is especially important for equity-priority groups, who are substantially underrepresented in the skills trade workforce in BC.

The B.C. Centre for Women in the Trades (BCCWIT), along with the Vancouver Economic Commission (VEC), City of Vancouver, and Building 2 Electrification (B2E), conducted a survey of heating, ventilation, air conditioning and refrigeration (HVAC) employers in British Columbia to understand the labour market challenges these employers face in relation to the installation, maintenance, and repair of heat pumps.

ACRONYM EXPLAINED

HVAC

Heating, Ventilation, Air Conditioning and Refrigeration

The following summary report is based on existing reports and statistics, as well as survey results from HVAC employers in British Columbia. The key insights are as follows:

- **There is a significant labour shortage**
The construction and maintenance industry in British Columbia is facing a current and growing skilled trades labour shortage and these workers are critical to the success of the climate agenda.
- **Women workers severely underrepresented**
Women make up only 5.7 percent in the construction trades; and an abysmal two percent on average of HVAC-related trades, such as plumbers, gasfitters, and refrigeration technicians.
- **IBPOC workers very underrepresented**
Representation for non-white workers is much harder to categorize, but the B.C. Government estimates that between 2008-2017 only 9.1 percent of people who acquired

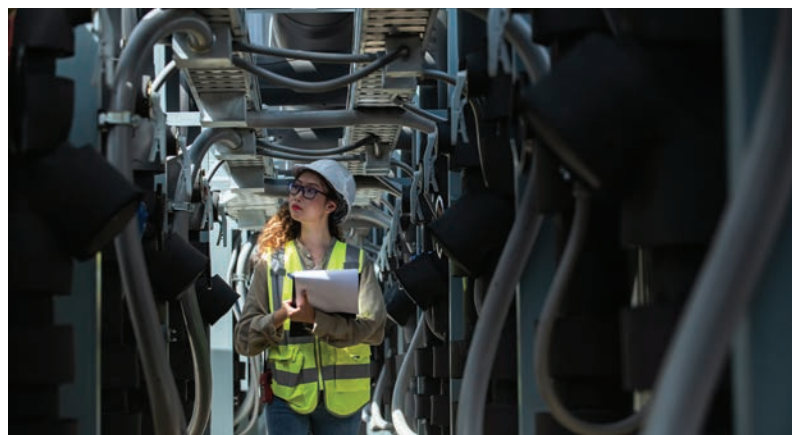
journey person designation in Canada were non-white or mixed-race, compared to 26.5 percent of the total Canadian population.

- **Today’s labour shortage will worsen without intervention**

The combination of industry activity and policy and regulatory drive suggests that a massive number of new workers are needed in retrofitting industries; the Canada Green Building Council (CAGBC) estimated as many as 564,000 direct job years of employment being generated across 223 million square metres of retrofitted square space in B.C. in an “aggressive” retrofit scenario.

- **Recommendation: recruit and retain workers from underrepresented groups**

Recruiting and retaining workers from equity-priority groups – including Women, Indigenous, Black, and people of colour (IBPOC), newcomers to Canada, people with disabilities, and members of the LGBTQ2S+ community – can help alleviate the current and future skilled trades labour shortage, and ensure there is a steady supply of skilled tradespeople readily available to build a greener economy.





Current and Projected Labour Shortages

The construction and maintenance industry in British Columbia is suffering from an acute labour shortage, especially in the skilled trades, that is projected to increase as more workers retire. The Independent Contractors and Businesses Association (ICBA), whose membership represents 85 percent of the B.C. construction industry, found that 75 percent of their member construction companies cannot find enough workers to fill the demand for employment.¹ [The British Columbia Labour Market Outlook 2022-2023 Forecast](#) predicts that B.C. will need 72,700 construction workers over the next 10 years to meet demand, with 78 percent of those job openings as a result of workers leaving the workforce.² Similarly, the Build Force Canada report [Construction and Maintenance Looking Forward: An Assessment of Construction Labour Markets from 2022 to 2027](#) predicts that 25,000 workers – comprising 13 percent of the current labour force – will retire by 2027. Building Force Canada states that the need for construction workers will be felt most acutely in the Lower Mainland, where the industry will need to replace 14,000 workers during this same time period.³






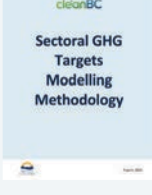





Both the B.C. Construction Association and the Vancouver Regional Construction Association highlight the skilled trades shortage as the number one concern of their members.⁴ B.C. Building Trades also identifies the challenges in finding skilled trades workers.⁵

[The British Columbia Labour Market Outlook 2022-2023 Forecast](#) estimates that there will be 83,000 job openings in the skilled trades in the next decade. In the forecast, the Province of British Columbia projects 160,000 job openings in the trades, transport and equipment operators occupations, and includes the following skilled trades in the top 60 in-demand occupations:

- carpenters;
- electricians;
- welders and machine operators;
- steamfitters, pipefitters and sprinkler systems installers;
- construction millwrights and industrial mechanics;
- heavy-duty equipment mechanics;
- plumbers;
- other construction trades, installers, repairers and servicers;
- industrial electricians;
- concrete finishers;
- machinists;
- crane operators; sheet metal workers;
- gasfitters.⁶

While there is variation between the studies on the exact numbers of existing job vacancies and projected jobs that require filling, it is clear that the labour crunch in the building trades is only likely to increase, especially as the market and policy demands of climate action and resilience intensify.

Table 1. Comparisons of Major Policy Drivers of Change in the Trades

Government of Canada	Province of British Columbia	Utilities	City of Vancouver
 <p><u>National Green Buildings Strategy</u></p>	 <p><u>CleanBC Roadmap to 2030</u></p>	 <p>Mandatory <u>Home Performance Stakeholder Council</u> (HPSC) membership for energy efficiency incentives</p>	<p><u>Climate Emergency Action Plan</u></p>  <p><u>Zero Emissions Building Plan</u></p>
 <p><u>Greening Government Strategy</u></p>	 <p><u>Sectoral GHG reduction target for buildings and communities</u></p>		<p><u>Zero Emissions Building Plan</u></p>  <p><u>Mandatory carbon pollution limits for existing large buildings</u></p>
 <p><u>Codes Acceleration Fund and Support for Provincial Regulatory Development</u></p>	 <p><u>Zero Carbon Step Code</u></p>		<p>Note: Electrified equipment replacement requirement for large single-detached homes</p>
	 <p><u>B.C. Energy Step Code</u></p>  <p><u>High Efficiency Equipment Standard</u></p>		

Skilled Trades and the Transition to the Low Carbon Economy

The transition to a low-carbon economy will require retrofits and upgrades to the nation's existing built environment, as well as changes to the way buildings are constructed and equipped. Natural Resources Canada's 2018 plan, [Paving the Way to 2030 and Beyond: Market Roadmap for Energy Efficient Equipment in the Building Sector](#), emphasizes the need to electrify space heating in buildings as the largest source of energy consumption in Canada's building sector.⁷ Further, the anticipated [Canada Green Buildings Strategy](#) states a strategic objective to ensure that "Canada has a skilled workforce ready and able to decarbonize buildings and ensure they are climate resilient," which would include a "broad range of trades and professionals." The combination of federal, provincial, regional, and local policy will catalyze tremendous change across the trades and represents a once-in-a-generation opportunity to reinvigorate and diversify the construction sector and its many feed-in industries.

Buildings and communities are one of the largest sources of emissions at the provincial level, and buildings specifically are one of, if not the, largest source of GHGs for communities throughout B.C. Water heating in homes is the second largest source of energy consumption in the building sector. In both cases, the switch to electric, low-carbon alternatives requires skilled tradespeople. The Canada Green Building Council's 2022 [Green Retrofit Economy Study](#) – which examines the necessary conditions to support the growth of the green economy in Canada – identifies electricians and HVAC-related trades as the most high-demand ones highest when it comes to green retrofits. Plumbers, pipefitters, steamfitters, gasfitters, refrigeration, and air conditioning mechanics are included in these trades. Under the Green Retrofit Economy Study's "accelerated demand" scenario of aggressive policy and business actions on retrofits, the Canada Green Building Council projects nearly 564,000 direct job years of employment being generated across 223 million square metres of retrofitted square space in B.C. However, the report emphasizes the current and projected labour shortages in these

trades as a significant challenge to the growth of the green economy.⁸

The Canadian HVAC industry is currently facing multiple challenges brought on by the country's transition to low-carbon technologies, particularly in the residential sector. The HVAC industry has technological solutions to substantially reduce carbon emissions in buildings across Canada. What it lacks is a workforce that is ready and fully trained to deliver on this promise. The existing HVAC workforce is already in need of reinforcement due to a decades-long decline in the number of new apprentices hired to replace aging tradespersons. Now, with the increasingly rapid shift to low-carbon technologies, existing, highly skilled workers will also need new training to prepare for this shift.⁹

In 2021, EcoCanada published an [Assessment of Occupational and Skills Needs and Gaps for Energy Efficient Buildings Workforce](#), in which they explored workforce-related capacity building that would be necessary to address both the ambitions and challenges of the country related to decarbonizing buildings and increasing their energy efficiency. Across all tradespeople and associated construction workers, EcoCanada found significant challenges related to alignment with other professions, and to the time commitment necessary to upskill themselves and colleagues to keep up with changing practices and technology – particularly when related to the digitalization of the industry.¹⁰



Table 2. Workforce Challenges – Construction and Related Trade Workers

Industry image and culture shifts

- **All trades face an aging workforce** combined with significant attraction issues
- **Limited awareness and knowledge about skilled trades careers** among youth and diverse labour force groups is an attraction barrier (Canadian Apprenticeship Forum, 2018)
 - University tends to be promoted as a "first choice" post-secondary option by parents and educators rather than a skilled trade career
- **Perception of construction trades** requires improvement to increase attraction
 - Entails enhanced awareness that trades work involves working with technology
- **Stereotypes and biases** regarding who is best suited to working in a trade have prevented a more inclusive and diverse workforce (BuildForce, Respectful Workplace Blog)
- **Shift to offsite manufacturing/prefabrication and onsite installation of modules** requires a shift in the way industry works as well as the mindset and skills of workers to operate within a highly automated plant environment and how to work with mass timber
 - The construction industry is currently **onsite focused**
 - Increased knowledge of **how to work with mass timber required**
 - The ability to **precision install modules onsite** is needed

Occupational and skills needs and gaps related to energy efficiency

- **Lack of awareness, understanding and expectations** of the "building-as-a-system" mindset and performance-related expectations that go with it
- **Enhanced abilities required to use digital tools** such as mobile apps to manage and share information, communicate and collaborate, and organize work
- **Labour shortages** due to the combination of an aging workforce and significant attraction issues
- **Further upskilling needed** for repairing, maintaining and programming automated building systems
- HVAC: **lack of standards and visibility of career path** are leading to current and future labour shortages

Limitations of available training

- **Sustainability skills** entailing a mix of technical knowledge and soft skills and **systems thinking** are not sufficiently integrated into current foundational trades training
- **Foundational training is not always keeping pace** with emerging, energy efficiency technologies, equipment and materials
- **Shifts to remote learning** may create challenges for apprenticeship training, which typically includes hands-on worksite components

Industry image and culture shifts

- Small businesses and contractors have a **difficult time positioning the low-carbon value proposition** as they are typically competing on "best-price" rather than differentiating their services towards energy efficient specializations
- Small businesses with **lower staff numbers and fewer people in key roles** make it difficult to have people away for training

Further complicating matters, the HVAC workforce is already declining, and the increasing tradesperson need that the transition to the green economy creates will be difficult to fill without a commitment to inclusive hiring practices.

The Vancouver Economic Commission and Building to Electrification Coalition (B2E)'s [Heat Pump Technology Attraction Strategy](#) (2022) identifies the second most significant barrier to increased heat pump technology in Vancouver as “the lack of a qualified workforce to design and install heat pumps.”¹¹ Likewise, the Smart Prosperity Institute’s 2022 report [Jobs and Skills in the Transition to Net-Zero Economy](#) notes the transition to a decarbonized economy will produce new job opportunities, especially highly skilled labour.¹² However, to meet this demand for labour policy makers need to consider removing barriers to entry in the skilled trades for equity-priority groups (including Women, Indigenous Peoples, persons with disabilities, racialized people, and LGBTQ2S+ people).



Diversity in the Skilled Trades

The 2017 report [Enhancing the Retention and Advancement of Women in Trades in British Columbia](#) focuses on the skilled trades labour shortage through the lens of gender diversity, suggesting that “increasing participation of Women in the labour force would tend to mitigate these shortages.”

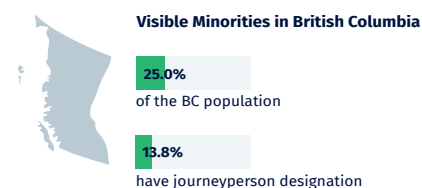
At the time of this report, Women represented less than five percent of the skilled trades workforce in British Columbia, a percentage that had barely changed in decades.¹³

According to recent data from Statistics Canada: trades, transport and equipment operator occupations have the lowest percentage of Women than any occupational group in British Columbia, with men accounting for 92.6 percent of the workforce and Women only 7.4 percent.¹⁴ Similarly, the British Columbia Construction Association noted that approximately 5.7 percent of the labour force in the construction trades are Women.¹⁵ However, of the HVAC trades in British Columbia (sheet metal workers, gasfitters, steamfitters, pipefitters, plumbers, and refrigeration and air conditioning mechanics) Women make up on average two percent of the workforce.

Statistics for other underrepresented groups in the skilled trades (Indigenous people, people of colour, people with disabilities, newcomers, and members of the LGBTQ2S+) are more difficult to confirm. cursory observations of the skilled trades industry in British Columbia describe the workforce as predominantly white and male. In its 2021 study [Labour market outcomes of journeypersons designated as visible minorities](#), Statistics Canada states that “all groups designated as a visible minority were underrepresented in the journeypersons population when compared to the Canadian population as a whole.” Within the timeframe of Statistics Canada’s study (2008–2017) only 9.1 percent of people who acquired journeyperson designation in Canada are “visible minorities,” compared to 26.5 percent of the Canadian population. Similarly, in British Columbia, visible minorities represented only 13.8 percent of those achieving Journeyperson certification compared to just under one-quarter of the population of British Columbia.¹⁶

Seattle Jobs Initiative (SJI) recently published a [report](#) examining the local construction and trades workforce for comparison. According to SJI’s [Seattle’s Energy Efficient Building Operations and Construction Industries Workforce Report](#), the sector in the city is also predominantly white and male; despite diversification efforts, the sector remains less diverse than the local population. White tradespeople make up 72 percent of journey-status workers and 81 percent of HVAC mechanics and installers (journey and apprentice statuses). The gender gap of skilled tradespeople in the Seattle workforce is comparable to British Columbia’s: 95 percent of journey-status workers are men.¹⁷

Despite initiatives from different orders of government, community organizations, unions, and employers, the skilled trades industry in British Columbia lacks any meaningful diversity. [The 2022 B.C. Construction Industry Survey](#) reports that 84 percent of employers surveyed have implemented diversity policies. However, there is a marked gender gap in how diversity in the workforce is viewed: “95% of Women surveyed think a more diverse construction workforce is a good idea compared to only 66% of men.” This differing opinion is a key driver to the lack of diversity on skilled trades sites, as the 34 percent of men that do not see the need for a more diverse construction workforce are often the ones that are running the sites. The opinion that diversity is not beneficial is nonetheless a minority one, because most of the skilled trades industry in British Columbia agrees that “diversification of gender, race, ethnicity, and age is key to alleviating the workforce shortages across the construction industry.”¹⁸



Source: Statistics Canada

BCCWITT HVAC Labour Market Survey Results

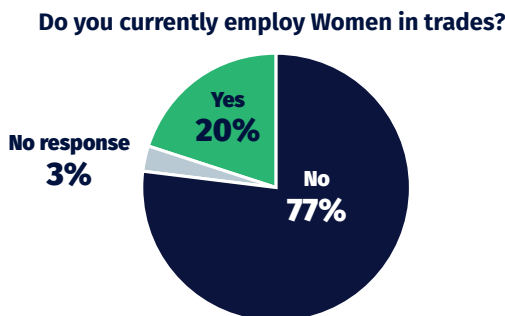
The BC Centre for Women in the Trades (BCCWITT), supported by the Vancouver Economic Commission (VEC), City of Vancouver, and Building 2 Electrification (B2E), surveyed HVAC employers in British Columbia to understand the labour market challenges these employers face, specifically in relation to the installation, maintenance, and repair of heat pumps.

In February 2023, BCCWITT recruited HVAC employers, concentrating primarily on those located in the Lower Mainland in British Columbia, to fill out a survey to identify:

- Employers that work in the installation, maintenance and repair of heat pumps;
- Trades employed by these employers;
- The number of apprentices they employ;
- An assessment of the diversity in the heat pump-related HVAC workforce;
- Trades for which they are hiring, and number of current openings;
- Difficulties HVAC employers may be experiencing in recruiting for the trades; and
- Whether HVAC employers are interested in learning more about tools and training to help recruit and retain a diverse workforce in the skilled trades.

BCCWITT received 39 survey responses from HVAC employers in British Columbia. Of these respondents, thirty-five (90 percent) work in the installation, repair, or maintenance of heat pumps. Respondents employ the following trades: plumbers, refrigeration and air conditioning mechanics, pipefitters, gasfitters, electricians, and sheet metal workers. Most of the employers (27 out of 35, or 77 percent) that work with heat pumps employ apprentices.

Figure 1: Women in Trade survey response from HVAC employers.

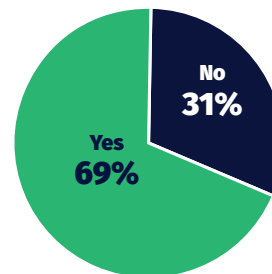


Regarding gender diversity, 20 percent of survey respondents employ Women in skilled trades positions. It is important to note that this does not mean Women make up 20 percent of the workforce; it means that HVAC employs at least a single woman on one of their job sites. Women are still highly underrepresented in this trade.

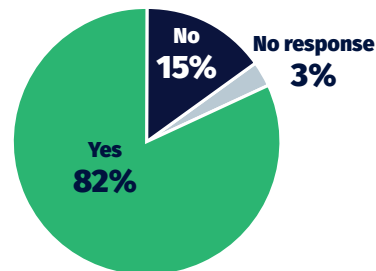
When asked about the employment of other equity-priority tradespeople, the respondents reported the following: 43 percent (15 of 35) employ people of colour/visible minorities tradespeople; 23 percent (eight of 35) employ newcomers to Canada; 17 percent (6 out of 35) employ Indigenous tradespeople; three percent (one out of 35) employ people with disabilities.

Figure 2: Recruiting in the trades survey responses from HVAC employers.

Do you have open trades positions?



Are you experiencing difficulties recruiting for open positions in the trades?



Most of the surveyed HVAC employers also reported current open skilled trades positions, and difficulties recruiting for those positions.

The results of these survey questions show a clear need for diversification of the workforce in the HVAC industry in B.C., but another objective of the survey was to facilitate engagement with skilled trades employers to increase diversity in the trades, create more inclusive skilled trades workplaces, and address the skilled trades labour shortage, especially to support the transition to a green economy through a fostered connection with BCCWITT. The survey reported that 68 percent of respondents (24 of 35) indicated they are interested in learning more about tools and training to help recruit and retain a diverse workforce in the skilled trades.

As part of this project, BCCWITT facilitated virtual information sessions with interested HVAC employers to understand the difficulties they face with recruitment and retention of skilled tradespeople, and how to promote skilled trades jobs in the HVAC industry as part of the growing green economy – [see the companion guide to learn more](#). Most of the HVAC employers surveyed are small businesses: 60 percent (21 out of 35) have 1–10 employees, and 31 percent (11 out of 35) employ between 10–50 people. These small businesses likely lack specialized Human Resource staff, as well as staff trained in Diversity, Equity, and Inclusion (DEI) initiatives. BCCWITT aims to bridge the gap between DEI hiring practices and the skilled labour shortage through workshops with surveyed HVAC employers. BCCWITT will use input from these workshops to compile a [best practice guide](#) to share with all HVAC employers to support the recruitment and retention of diverse skilled tradespeople, suggest tactics on how to transform of workplaces into ones that welcome tradespeople from diverse backgrounds, position employees for success, and promote skilled trades opportunities in the green economy.



Photo: BCCWITT



Conclusion

Increasing diversity and inclusion in the skilled trades workforce in British Columbia requires a multi-faceted approach that includes promotion of skilled trades occupations to equity-priority groups and working with employers to create healthy, safe, respectful, and inclusive workplaces for everyone.

The construction and maintenance industry in British Columbia is suffering from an acute labour shortage, especially in the skilled trades, and this shortage will only worsen with inaction. The transition to a low-carbon economy will require building retrofits and upgrades, which will require more skilled tradespeople than are currently available. The HVAC industry is not immune to this labour shortage, particularly in the residential sector. Women and underrepresented tradespeople are the key to alleviating the workforce shortage, as Women comprise an average of two percent of the skilled trades workforce in Canada, and cursory observations of the skilled trades industry in British Columbia describe the workforce as lacking other underrepresented groups in the skilled trades (Indigenous people, people of colour, people with disabilities, newcomers, and members of the LGBTQ2S+).

The BCCWITT HVAC survey identified that HVAC employers (particularly those that work in the installation, maintenance, and repair of heat pumps) are having difficulties hiring; moreover, they may have difficulties hiring a diverse workforce. The results of the survey show a clear need for diversification of the workforce in the HVAC industry in B.C. In response to this need, BCCWITT hosted workshops for these employers in partnership with VEC and the City of Vancouver. The purposes of the workshops were to gain additional understanding about the industry and to share meaning DEI insights.

From these workshops, BCCWITT has developed a best practice guide to hiring, maintaining, and advancing the careers of skilled tradespeople in the HVAC industry, which will help to lower access barriers to the trades, and reduce the labour shortage. The guide also includes numerous resources, programs and organizations that could prove valuable guides to employers along this journey. Ultimately, committing to diversifying the industry is the first step: to succeed in filling current and projected labour shortages in the HVAC industry requires workplaces to be safe, welcoming and equitable.



More ways to get involved in the **green buildings market opportunity**

The Future of Heating & Cooling

As Vancouver works to decarbonize buildings, new opportunities are emerging to increase the quality and comfort of our buildings. As our climate gets warmer, there will be a greater need for cooling in our homes and buildings – and heat pumps, which can both heat and cool, are the perfect technology to help.

Learn more about how the City of Vancouver is transitioning to [zero emissions buildings](#).

GREEN JOBS Diversity & Workforce Development

Addressing climate change means work. VEC is taking action to create support for people in industries whose jobs are changing as part of the transition to a net zero economy, and to bring in new people – especially those historically excluded – to the good, green jobs that are coming.

Contact [Vanessa Sun](#) or [Andrew Williamson](#) to learn more about VEC's workforce development supports, and [Karen Dearlove](#) to learn more about BCCWITT.

HIGH-IMPACT INVESTMENT The Economic Opportunity

Manufacturing and installing heat pumps related systems is a huge economic opportunity. VEC is working with the [Building to Electrification Coalition](#) (B2E) through the [B.C. Heat Pump Technology Attraction Strategy](#) to attract investment and help local manufacturers and installers.

Contact [Peter Sun](#) to learn more about VEC's heat pump technology attraction work.



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