FINAL REPORT

Strategic Policy Opportunities for Women in Alberta's Green Energy Sector

PolicyWise
for Children & Families

PolicyWise for Children & Families

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Land Acknowledgment

PolicyWise for Children & Families acknowledges the lands on which our team gathers and resides are Treaty Six Territory, Treaty Seven Territory, Treaty Eight Territory, and the Kanien'kehá:ka Nation. Since time immemorial, these lands have been home to the nêhiyaw (Cree), Dene, Anishinaabe (Saulteaux), Nakota Isga (Nakota Sioux), Niitsitapi (Blackfoot), and Kanien'kehá:ka (Mohawk). We also acknowledge that we are on the lands of the Métis Nation of Alberta's North Saskatchewan River Territory, Battle River Territory, Peace River Territory, and Lower Athabasca River Territory.

We respect the histories, languages, and cultures of the First Nations, Métis, and Inuit, and are committed to learning and working towards reconciliation.

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Executive Summary

Background

Transitioning to a clean energy economy is projected to create around two million jobs by 2050 across Canada.[1] Women comprise almost half of the overall labour force but currently hold less than one-quarter of the jobs in the renewable energy sector.[2] The transition to green energy and the projected job growth is an opportunity to address the under-representation of women and gender-diverse people in the energy sector and close the gender gap that exists within the conventional energy sector.

To understand the current state and strategic opportunities in Alberta, JPMorganChase funded PolicyWise for Children & Families to conduct an environmental scan to:

1. Provide an overview of the current landscape in Alberta for women's participation in the green energy sector.
2. Identify levers and opportunities for strategic, cross-sector action to build more meaningful, sustainable workforce participation of Albertan women in the green energy sector.

Women's Participation in the Green Energy Sector

In Canada, 25% of the workforce in renewable energy are women.[2] The energy workforce in Canada is stratified by gender, including traditional and renewable energy. The majority of women hold the lowest-paid, least technical, creative, and decision or policy making positions.[3]

In Canada, women hold fewer and lower paying, less influential jobs than men. Women engineering graduates obtain professional licenses at much lower rates than men. While apprenticeship registrations are growing, large gender disparities remain in technical and construction related apprenticeships. In entrepreneurship, women own or founded few energy businesses.

Alberta continues to have the highest gender wage gap in Canada. Despite comparable graduation rates, fewer women work as science and engineering technology professionals than men. There has been growth in women registering for apprenticeships, especially in electricity. Youth participation in the natural resource sector is low, and participation of young adults in the workforce overall has been declining.

Members of equity-seeking groups are under-represented in the energy sector. Indigenous communities have shown growing interest in green energy projects, but face barriers to participation in apprenticeship training and advancement in the industry. Youth are interested in green energy, especially in electricity, but participation is low.

Challenges and Enablers of Women's Participation

Gender-based bias and workplace culture involving remote work in northern regions, shift work, and work that is perceived as unsafe for women remain the biggest barriers to participation in science, technology, engineering, math, and energy sector jobs for women. This is particularly true for women with intersecting identities and low incomes. This fundamental culture problem plays out in multiple ways along the career path and stages of the employment lifecycle in energy, which are summarized below.

Introduce: A lack of awareness about green energy careers in the public and gendered career perceptions impact how children and youth are exposed to career options in the sector. Industry-community partnered outreach can enable educators and parents to introduce young girls and women to careers, especially with the involvement of women role models in technical positions.

Inform: Women lack the prerequisites for green energy careers because more girls drop out of STEM subjects in high school, participate less in internships or co-op placements, or have less access to these options in rural and Indigenous communities. Career services are underused and need capacity building to advise women about green energy careers.

Train and Evaluate: Training pathways for green energy jobs are still evolving. Challenges include informal training pathways that are difficult to navigate and may not provide transferrable skills, high costs, and less access to funding. Community non-profits that provide training while reducing systemic barriers are key to enabling women to take advantage of opportunities in green energy.

Employ: Bias and stereotyping during recruitment and hiring impact how women can access jobs in green energy. Slow progress in equity policies and tools, including family-friendly workplace accommodations and child care, pose challenges for women with caregiving responsibilities.

Retain: Organizational and workplace culture impacts women's opportunities for advancement and lack of psychological safety. Organization-wide capacity building and metrics to ensure accountability are key enablers for a shift in workplace culture.

Women entrepreneurs: Women entrepreneurs in green energy experience discrimination in access to capital and recognition of their achievements. This is exacerbated by a lack of accountability and transparency for funding programs that aim to support women-led businesses.

Women in Indigenous Communities: Indigenous communities are interested in green energy projects that align with their values of land stewardship. More research is needed to understand barriers and gaps, and how partnerships with industry can be structured in more equitable ways.

Policy Landscape

The Government of Canada is committed to a zero-carbon economy and progress in equity and diversity. However, a common standard and metrics for accountability and trauma-informed processes for grievances and complaints are lacking.

The Government of Alberta invests in increasing women's participation in the trades and recognizes that youth need support to find rewarding employment in Alberta. There are ongoing efforts to improve accessible and affordable child care and to enhance occupational health and safety standards.

Opportunities for Action: Supporting Women in the Alberta Green Energy Sector

The rapid growth of green energy jobs offers many opportunities for cross-sectoral efforts to improve participation and employment outcomes for women. Our overview of the current landscape in Alberta and Canada reveals five strategic areas for action where gaps in participation, calls for action to address barriers, promising practices, and government and stakeholder interests overlap. From our engagement with thought leaders in Alberta, we learned that the non-profit and educational sectors are strongly committed to improving conditions and opportunities for women, gender-diverse people, Indigenous people, and newcomers.

Partnerships between industry and non-profit organizations will be vital to catalyze progress in the following five action areas:

1. Improving awareness and exposure to green energy careers for young women, in particular those experiencing low-income.
2. Cultivating champions to catalyze change at all organizational levels.
3. Developing metrics and improving accountability across actors and sectors.
4. Improving implementation of industry-partnered child care for the green energy sector.
5. Understanding economic reconciliation for partnerships between Indigenous communities and the green energy industry.

In This Report

Introduction

Transitioning to a clean energy economy is projected to create around two million jobs by 2050 across Canada.[1] Women comprise almost half of the overall labour force but hold less than one-quarter of the jobs in the renewable energy sector.[2] Women face significant barriers to participation and leadership in the transition to greener energy systems. These include:

- Bias and stereotyping within a masculinized workplace culture
- Lack of access to career information and job networks
- Biased hiring practices
- Lack of accessible, affordable child care
- Fewer opportunities to advance
- Largest gender income gap in the country
- Lack of workplace flexibility
- Slow progress in justice, equity, diversity, and inclusion efforts at the corporate level

Alberta has immense potential for growth in clean energy with its natural and human assets.[4, 5] It is well-positioned to leverage its existing infrastructure and expertise in fossil fuels to advance technologies like carbon capture and storage and hydrogen production to achieve a lower-carbon economy.[4] However, the province also navigates complex challenges to fully realize its potential in green energy related to infrastructure, policy, labour, and social equity.

The transition to green energy and the projected job growth is an opportunity to address the under-representation of women and gender-diverse people in the energy sector and close the gender gap that exists within the conventional energy sector. To better understand the related current state and strategic opportunities in Alberta, JPMorganChase funded PolicyWise for Children & Families to conduct a research project and summarize our findings in this report.

Note that we use the term green energy sector in this report to include jobs in energy generation and distribution and the many adjacent occupations, such as trades people like welders, pipefitters, electricians, millwrights, scaffolders, and construction.

We understand green energy, as generated from natural resources, does not release pollutants, nor is extracted by drilling and mining. Green energy often comes from sources such as sunlight, wind, water, geothermal energy, biomass, and biofuels.[6, 7] It is used in various ways, for example, industrial processes, heating and cooling in buildings, and transport.[7]

Project Purpose

The purpose of this project was to:

1. Provide a comprehensive understanding of the current landscape in Alberta for women's participation in the green energy sector, both in policy and practice, with attention to women facing income barriers.
2. Identify levers and opportunities for strategic, cross-sector action to build more meaningful, sustainable workforce participation of Albertan women in the green energy sector.

Project Methods

We conducted an environmental scan that included a grey literature review, a jurisdictional review, and six interviews with eight diverse thought leaders (see Appendix B: Interview Participants).

This report presents information and data that we synthesized from 83 accessible online resources, such as research, data, reports, government documents, and announcements. Our synthesis also includes notes and transcripts from the six interviews, news articles, and organizational websites.

We added representative quotes from the interviews throughout the report, quotes are edited lightly for readability and brevity.

See Appendix A and B for more methodological details.

Data Limitations

Canada lacks national-level green energy workforce data.[1, 8] Due to the emerging nature of the green energy sector and small numbers, there is currently limited national data on workforce participation by gender, province, and populations.

The collection and sharing of such data are critical to understanding and addressing gender equity within the green energy sector. It is also essential to understanding the participation of Indigenous and racialized women as well as gender-diverse people within the sector.

Without comprehensive and disaggregated national data to draw on, we used what was available. This was primarily data from the conventional energy sector, the electricity sector, trades and apprenticeships, leadership, and participation in Science, Technology, Engineering, and Math (STEM) to provide an overview of participation and gaps for women and gender-diverse people in green energy.

Where available, we included data on groups with intersectional identities such as immigration status or racialized groups.

Background: Alberta's Unique Green Energy Context

In this section, we provide an overview of the Alberta green energy context. We highlight the potential and the challenges for this sector in the province.

Historical Reliance on Fossil Fuel and a Gendered Workforce

The discovery of oil in Leduc in 1947 transformed Alberta's economy and led to rapid urbanization and the dominance of oil and gas.[9] The fossil fuel sector accounts for 70% of the province's exports, nearly a third of its Gross Domestic Product, and 1 in 17 jobs.[9]

This long-standing reliance on oil has created challenges in diversifying the economy and transitioning communities dependent on traditional energy production. The energy sector in Alberta has historically been male-dominated and sustained a "frontier culture" with remote and shift work.[8]

Rapid Growth and Current Uncertainty for Renewables

Alberta has unique green energy potential. It is rich in natural resources such as wind, solar, and geothermal energy.[4] It also has a highly educated workforce. Alberta has experienced rapid development in renewable energy, particularly in wind and solar.[10]

The electricity sector expects significant job growth and a need for skilled workers in the information and communication technology fields as well as electrical and electronics engineers.[14] The electricity sector has been seeing job growth in all provinces except in the prairies.[11] The growth in Alberta has outpaced the planning capabilities of the Alberta Electricity System Operator, resulting in grid congestion that complicates the integration of new projects.[12] There is a pressing need for energy storage solutions and demand for response programs to ensure grid reliability.

Alberta is currently in the process of restructuring the energy market and reforming transmission policies.[12] While other provinces announce policies that incentivize green energy investments,[13] recent land-use policies in Alberta have created uncertainty for renewable energy investors.[12]

Like the rest of Canada, Alberta is experiencing a skilled labour shortage. This shortage is expected to increase due to a projected wave of retirement[4] and new technologies requiring upskilling and retooling of energy sector workers. Alberta's challenge is to balance the need to stabilize the labour market with developing a workforce ready for innovation and energy diversification while navigating its position in the global energy market within the energy transition.

Role within Canada's Path to Net-Zero

The federal government of Canada is committed to achieving net-zero emission by 2050 and a net-zero electricity grid by 2035.[10, 14] Canada already has one of the cleanest electricity systems worldwide. However, fuel combustion, particularly in oil and gas extraction and transportation, accounts for large parts of the country's greenhouse gas emissions.[15]

In Canada, provinces have jurisdiction over energy production and management, leading to divergent priorities, targets, and strategies. Alberta is hesitant about the feasibility of the federal goals and sets its target at 30% renewable electricity

by 2030.[15(p20), 16] In comparison, British Columbia's target is 93% renewable clean electricity, Saskatchewan aims for 50%, and Quebec already reached and exceeded its goal of 99% renewable energy production.[15]

The Government of Alberta is concerned about competitiveness, affordability, and reliability in this transition and prioritizes "continuous improvement in the oil sands and conventional oil and gas sectors."[16] This means a heavy focus on carbon capture and storage.[16, 17] To diversify the energy sources, Alberta invests in hydrogen and exploration of critical minerals for battery storage[16, 17]—priorities that do not meet the definition of green energy found in this report.

Current Practice Landscape

Globally, women represent 20-25% of the energy workforce, with less than 6% in technical positions and less than 1% in leadership roles.[18] According to the International Renewable Energy Agency report, women's participation in renewable energy has increased to 32% worldwide.[1] Solar energy is growing rapidly and is one of the sub-sectors that has improved women's participation, where they represent around 35% of the workforce globally.[19]

In this section we describe the practice landscape for women's participation in the green energy sector in Canada and Alberta. We also outline the related practice landscape for people with intersecting identities, which includes opportunities for an equity-oriented approach to increasing women's participation in the green energy sector.

Women's Participation in the Green Energy Sector: Canadian Trends

Women Hold Fewer and Lower Paying, Less Influential Jobs

In Canada, 25% of the workforce in renewable energy are women.[2] The energy workforce in Canada is stratified by gender, including traditional and renewable energy. The majority of women hold the lowest-paid and least technical, creative, and decision- or policy-making positions.[3]

Women represent 82% of office roles in the energy sector and only 3% of trade occupations.[18] In the electricity sector, women hold 26% of senior leadership positions, and half of these represent corporate rather than key decision or policy making functions.[20] Survey data from Electricity Human Resources Canada shows that nearly half of respondents in electricity companies have no women on their executive team and almost all women in leadership positions are white.[20]

Women now represent 27% of the electricity sector workforce. Yet, only 16% of these are core electricity occupations,[11] and less than 8% are positions in trades and renewable energy.[18]

Fewer Women Engineering Graduates Obtain Professional Licenses

Data from Ontario shows that girls engage in science curriculum at the same rate as boys until grade ten.[21] After this point, girls' participation drops off to a ratio of 34 girls to 66 boys. Despite increasing numbers, about 20% of people who enter university in engineering or physics are women.[17] Women's graduation rates from these programs are the same as men,[17] but only 51% obtain their licenses. The result is that for every 100 licensed engineers, only 11 are women.[17]

Greater Gender Disparity in Technical and Construction Related Apprenticeships

Overall, there is a steady increase in women's registration and certification in the trades.[22] In 2022, new registrations for women in all apprenticeships were up by 18%, bringing the share of women in all apprenticeship registrations to 12%.[22] However, many of these are in hairstyling and food services. There is a greater disparity in technical and construction-related trades. In 2022, only 7% of employed trades people, transport and equipment operators, and related occupations were women.[23]

Electricity stands out from the major trade groups as the one that women are increasingly interested in.

Women are still under-represented, with a share of only 7% of apprenticeship registrations in electricity in 2021.11 However, in 2022, Statistics Canada showed a 31% increase in women registrations as electrician apprentices compared to the previous year.[22] This trend aligns with the opportunities that are forecasted for core occupations in electricity in the transition to clean and green energy.

Women Own or Founded Few Energy Businesses

There is limited data on women's entrepreneurship specifically in the green energy sector. However, the Women Entrepreneurship Knowledge Hub's latest report shows that the majority of women-owned businesses are limited in related sectors, making up only 3.7% in construction, 9.5% in manufacturing, and 20% in scientific and technical services.[24]

Survey data indicates that women entrepreneurs are more likely to build businesses that aim for social and environmental impact,[24] which is relevant for the green energy sector.

Women's Participation in the Green Energy Sector: Alberta Trends

Alberta has the largest proportion of women working in energy-related positions within the country. However, at 26%, women are still disproportionately under-represented.[1] The electricity sub-sector has the highest participation rate of women at 31%.[1]

Alberta has the Highest Gender Wage Gap in Canada

Many jobs women hold in energy and related fields are non-technical, with poor compensation, fewer advancement opportunities, and little security.[25] This contrasts with small numbers of women in leadership, only 12% in construction and 13% in mining.[1]

This issue is compounded for women with intersecting identities, who hold even fewer positions in executive roles. Alberta has the highest gender pay gap in Canada, with women earning significantly less than men, particularly in fossil fuel-dependent regions.[25]

More Alberta Women Register for Apprenticeships

The trades are critical to support the energy transition. Occupations such as pipefitters, electricians, welders, millwrights, and scaffolders are part of the skilled workforce needed to grow green and renewable energy.

In Alberta, 8.6% of employed tradespersons are women,[14, 23] which is higher than the national representation but still strongly under-represented considering Alberta's total women workforce participation of 46.7%.[26] In 2022, the share of women apprenticeship registrations in trades related to energy, construction, and equipment operation in Alberta was up 118%.[22] This comes after years of steep decline in total apprenticeships in Alberta before 2022 and the Government of Alberta's investment in apprenticeship programs.[27] Most women registered in energy or construction-relevant trades in Alberta are in electrician programs.[22]

Lower Youth Participation in the Natural Resources Sector

Young adults, 15-24 years of age, make up approximately 13% of all employment in Alberta. However, only 6% work in the natural resource sector, and less than 2% are women.[8] Alberta's labour force is aging and losing young workers aged 20-24.[14] For Alberta, this population emerges as a priority for strategic action and support.

Fewer Women Work as Science and Engineering Technology Professionals

Like the rest of Canada, women and gender-diverse individuals are under-represented in Alberta in educational pathways leading to energy careers. Only 24% of newly graduated engineers in Alberta are women.[1] Almost half of them do not go on to work as professionals. The Association of Science and Engineering Technology Professionals of Alberta published data showing that only 13% of its members are women.[28]

Intersectional Identities and Participation in the Green Energy Sector: Canadian Trends

There is little to no data on people with intersectional identities in the energy sector, including the green energy sector. This includes data about women and gender-diverse people in different age groups and according to immigration status and Indigenous identities, among others. Despite missing data, these present possible opportunities for an intersectional approach to growing women's participation in the green energy sector.

Members of Equity-Seeking Groups Are Under-Represented

We identified a single report from Electricity Human Resources Canada that described a lower representation of gender-diverse workers in the Canadian electricity sector proportional to the overall population.[11] The Electricity Labour Trends report published data from 2021 showing that people with immigration status were concentrated in information and communication technology positions within the electricity sector at 37%, and Indigenous workers mostly held trades positions at 7%. The data was not separated by gender.[11]

When considering trends in all apprenticeships, equity-seeking groups (all genders) are even more under-represented, highlighting the intersectional nature of participation gaps. Racialized apprentices made up only 8% of all registrations, and immigrants 9%.[11]

Indigenous Peoples Face Barriers to Participation Despite Growing Interest

First Nations demonstrate a growing interest in renewable energy projects, particularly solar, wind, and geothermal energy.[16] Indigenous people are over-represented with 6% of apprenticeship registrations compared to their 5% share of the overall population.[29] However, they experience more barriers to completing the apprenticeships, leading to the lowest completion rate at 5%.[29] Indigenous individuals (all genders) represent 5% of the energy sector, mainly in construction and trades. Indigenous workers represent 2% of occupations in renewable energy.[18] Many face significant dropout rates during apprenticeships due to financial constraints.[29]

Youth are Interested in Green Energy, but Participation is Low

Younger generations express interest in renewable energy careers, particularly in solar and wind.[14] About half of survey respondents aged 18 to 36 are open to a career in electricity, and one in ten are definitely interested.[18] Currently young adults of all genders under 25 years of age make up 5% of the electricity workforce. A survey by Electricity Human Resources Canada found that 12% of wind turbine technicians and smart grid specialists and 6% of solar installers are under 25 years old.[11]

Challenges and Enablers of Women's Participation

Gender-based bias and workplace culture involving remote work in northern regions, shift work, and work that is perceived as unsafe for women[1, 14] remain the biggest barriers to participation in science, technology, engineering, math, and energy sector jobs for women. This is particularly true for women with intersecting identities and low incomes.[14] This fundamental cultural problem plays out in multiple ways along the career path and employment lifecycle in energy.

In this section, we identified challenges and enablers for women's participation in the green energy sector. We also highlight example practices from across the globe that have positively impacted women's participation in sectors typically dominated by men. These present potential opportunities, including key learnings, to improve women's participation in the green energy sector.

Along the Employment Pathway

The Canadian Renewable Energy Association's Employment Process Model[18] provides a helpful structure for identifying barriers and entry points for action to mitigating these barriers. The stages of the model include introduce, inform, train and evaluate, employ, and retain.

We outline gaps and opportunities for each stage of the employment pathway. Where relevant, we highlight specific considerations for Alberta, women with a low income, and others. Note that some gaps or opportunities align with more than one stage of the pathway. To avoid redundancies, we describe these at the first stage where they arise.

Introduce

This first stage of introduction to green energy careers includes how children and youth are exposed to career options through parents, caregivers, educators, and other community members.

We noted the following **challenges** within the introduce stage of the career path:

- **Lack of knowledge about green energy careers** among the public, especially parents and educators, who could act as community advocates. The introduction to careers in green energy starts in childhood, in the context of school, and interactions with educators, parents, advisors, and community advocates.[18] Low-income families may experience escalated barriers to attending events, participating in camps, or purchasing STEM-related toys.
- **Gendered career perceptions and expectations** impact how these community actors introduce children and youth to careers. During the introduce stage, and throughout all stages of the employment model, there is a lack of female role models in technical and leadership positions who can expose girls and women to options in the green energy sector[30, 31] and shift gendered career perceptions and expectations.
- **Little outreach initiated by the green energy sector**[18] to build awareness among the public.

Increased awareness about career options in green energy can enable parents and educators to act as community advocates and help young students make connections between what they are learning, real-world challenges, solutions, and career options.

Collaboration with community non-profit organizations that serve under-represented groups is vital to support program implementation and act as intermediaries for information flow, relationship building, trust, and follow-up.[32] Industry involvement, particularly women working in technical positions, can catalyze accessible and affordable outreach and awareness building.

Public perception of green energy is less associated with traditional male occupations,[8] which can enable a shift of entrenched gender stereotypes and bias about women's interest in these careers.

Promising Practice: Providing Mobile Outreach

Supporting and Linking Tradeswomen, Australia. This initiative used a mobile trailer with tools and equipment to offer a hands-on experience for women and girls as an introduction to the trades.

This allows the organizers to set up anywhere, for example, in remote and rural areas where access to training may be limited.[33]

Inform

The inform stage of the employment pathway includes how high school students, unemployed youth, post-secondary students, and mature individuals access information about training and career options and opportunities.

We noted the following **challenges** within the inform stage of the career path:

- **High dropout from STEM education** among girls in high school.[17(p30)]
- **Lack of awareness of the career opportunities** in STEM, green energy, and adjacent fields among young women.[8] As a result, fewer chose STEM subjects, internships, or co-op placements, which means they lack prerequisites for post-secondary training that would lead to careers in the area.
- **Inaccessible STEM courses and co-op opportunities** in rural and Indigenous communities. Barriers are compounded for rural and Indigenous communities where the full range of STEM courses may not be available, and lower-quality internet limits online participation.[30]
- **Career services are underused**,[18] and gender stereotypes impact how STEM careers or trades get marketed to girls and women.[8] If women access career services, they are often not matched to energy or adjacent jobs.[33]
- **Inadequate information distribution channels** about employment opportunities in the green energy sector due to the emerging nature of the sector.[8]

Important enablers for introducing girls, women, and gender-diverse people to career options in green energy are:

- Role models representing diverse gender, cultural, social, or ethnic contexts.[30, 34]
- High school programs that offer skills and courses towards green energy careers.[18]
- Improved informal and formal systems to distribute employment information.[8]
- Career services with capacity to recognize and mitigate gender bias.

Mentorship has been recognized as a key support for girls and women in Alberta's education system. For example, the University of Calgary offers online mentoring to young girls in grades 6 to 12, and the University of Alberta engineering mentorship program pairs high school girls with undergraduate and graduate students.[17]

Train and Evaluate

The train stage of the employment pathway model includes the availability and accessibility of training in educational institutions, unions, or micro-credentials, as well as aspects such as competency assessments, skills transferability, and availability of supports during training.

We noted the following **challenges** within the train and evaluate stage of the career path:

- **Lack of formal training pathways** due to the fast developing and emerging nature of the green energy sector results in challenges with navigating options and accessing opportunities.[18]
- **Short-term training initiatives provide limited, specialized skills.** As a result, they are insufficient to support women's participation in the industry sustainably.[30, 35]
- **Costs for apprenticeship training are higher in Alberta** compared to other provinces. In Alberta, eleven technical institutions offer apprenticeships, while unions provide this training in other provinces.[30] The government has also reduced funding for academic upgrading, which has created financial barriers for women experiencing low incomes.[36]

  It has also caused educational institutions to cancel or postpone planned employment programs related to green energy.[30] While Indigenous communities can financially support their members' diploma or certification programs, they cannot fund upgrading and preparation courses.[30]

- **Green energy occupations may not yet be classified as Red Seal Trades**[18] and excluded from government funding programs. As a result, employers in renewable energy cannot access the funding designed to increase participation in apprenticeships.[18]
- **Workplace culture is a barrier for women in training.**[29, 30] In the experience of our interviewees, faculty and management supported them during their training, while micro-aggressions occurred mainly in peer-to-peer interactions. They felt that, as women, their knowledge was questioned by peers:

"I expected a lot of sexism to come from my professors [...] And I was expecting to rely on my peers to support me there, right? Actually, what I found was the complete opposite.

All of my professors were unbelievably supportive and making sure that I didn't feel isolated. And the prejudices, biasing, odd comments came from my peers, which was frustrating, especially considering these are the people I'm going into the industry with".

There is much opportunity in partnering with industry to develop formal training pathways, but also in taking advantage of rapid, informal learning that enables women to gain skills while receiving an income. Workplace-integrated learning and bursaries allow women with low incomes to support themselves and their families while learning and cover the cost of training. Training that provides transferrable skills, applicable in a wide range of sector jobs,[33] is important to enhance stability in women's careers in green energy.

Promising Practice: Reducing Systemic Barriers

Wrap-around Services at Women Building Futures, Canada.[37] This non-profit organization in Alberta, Ontario, and Saskatchewan that offers employment preparation and pre-apprenticeship courses in the trades for unemployed and underemployed women.

The program reduces barriers with wrap-around supports such as success coaches, housing, advisors, and industry relations. As a result, from 2017–2022, a time challenged by the COVID-19 pandemic, 90% of students graduated, and 80% of graduates found employment on average 33 days after graduation.[38]

Employ

At the employ stage, multiple barriers culminate to impact application rates, contract negotiations, and salary to create the under-representation of women in the green energy sector, especially from equity-seeking groups.[1]

We noted the following **challenges** within the employ stage of the career path:

- **Bias, sexism, and stereotyping disadvantage women during recruitment**. Bias can take the form of "benevolent sexism" when recruiters exclude women or direct them to support or administrative positions that are perceived as "safer".[8, 14] Interviewees shared experiences of women completing their education highly skilled and not finding jobs because of hiring and recruiter bias.[37] One woman recounted[30] how industry recruiters asked women and men different kinds of questions:

> *"After talking with my guy friends in the program, I found that the questions that they had gotten were different from mine.*
>
> *My questions were less technically focused and more broad, open ended, whereas theirs [her colleagues who are men] were more specific and technical like, explain this component to me in detail, or explain this aspect to me in detail.*
>
> *And then a lot of them got job offers that day. And both myself and the other girl, we didn't get anything. So that was really frustrating."*

- **Lack of mentors and coaches** to bridge the transition from training to employment, transitioning into green energy,[18] and support women through networking and mentorship.[8, 35]
- **Energy workplaces lack flexibility and policies that accommodate for parenting and caregiving**. In Alberta's overall workforce, more than 70% of part-time jobs are held by women, highlighting women's disproportionate role in caregiving responsibilities.[8] Part-time work is rare in the energy sector and even more so in leadership positions.[8]

  Energy sector workplaces may be remote, require travel and time away, and require shift work with extended or odd hours. Women shared how, in this sector, they are forced to choose between a career and growing a family.[38] Part-time work in Alberta also often lacks benefits such as paid vacation, sick leave, insurance plans, and pension plans.[8]
- **Child care continues to be a barrier** for women in the industry, especially in remote and rural locations.[8]
- **Slow progress in equity and diversity policies and capacity in green energy industry**. Survey data collected by Engineers Canada from 30 by 30 Champions[17(p30)] indicates that 44% of respondents never used or were unaware of gender analysis or equity tools to help ensure that their programs and supports work for men and women.

There is a lack of men in leadership who are actively engaged in fostering equity.[39] Women are rarely seen in technical leadership positions, and men may not perceive the challenges women are facing. For example, men in manufacturing believed women and men were treated equally.[33]

One interviewee shared that she experienced both awareness about the importance of equity and ongoing discrimination. She recalls being at her educational institution's program advisory committee with industry representatives:[30]

"One of the questions I asked them was, I noticed a lack of women, particularly in our field, in electronics.

From what I've seen, a lot of them are in managerial, administrative placements. I said, "What are you as a company doing to close that gap?"

The response I got was awesome for the most part. One guy was saying that, we want to create more incentives for women to be the technologists and installers, [...] they were all very open to the idea.

There were just a couple of people that had some off-comments like, "Oh, you got to bite the bullet and give them maternity leave." And I was like, wow, in a room full of people like, why would you say that?"

Networking, coaching, and mentorship[8, 35] are crucial enablers for women entering the sector, hoping to transition careers, or to reskill for green energy jobs.[18] Mentors can pass on information about networking opportunities, training and professional development, providing encouragement and sharing information about funding and awards.[18] Additional enablers are comprehensive, co-located child care programs[34] and workplace policies that help destigmatize parental leave and alleviate fears that growing a family will hinder career development.[34]

Interviewees in Alberta observed that leaders in Human Resources,[37] faculty and decision-makers in educational institutions, and industry management are showing awareness of equity challenges and want to support diversity.[40] Such leadership champions can enable wider conversations and foster champions within peer groups of students and co-workers.

Promising Practice: Cultivating Champions and Supporting Culture Shift

Reykjavik Energy, Iceland. In 2011, facing bankruptcy, the company's new leadership set the goal to achieve 49% women in management within six years. After this time, the company succeeded in eliminating the gender pay gap, improving job satisfaction, and financially recovering. The CEO emphasized that champions for equity in leadership and management are crucial for executing gender equality.[41, 42]

Next Gen Men, Canada.[43] This non-profit organization builds capacity for boys and men in healthy gender identity and relationships through tools, outreach, and workshops with the goal of preventing gender-based violence and fostering better mental health.

In November 2024, the organization hosts the Momentum Summit, bringing together diverse stakeholders, including women in energy, for dialogue, networking, and capacity-building workshops.

This generation- and sector-spanning approach is a promising example of efforts to spark a culture shift and support healthy gender relations involving the community, parents, workplaces, industry leaders, and researchers.

Retain

This stage of the employment pathway includes factors contributing to women staying in their professional field and progressing in their careers, including upskilling, cross-training, promotion and succession planning.

We noted the following **challenges** within the retain stage of the career path:

- **Organizational culture impacts on women's opportunities for advancement**, for example, professional development, networking,[38] and social events with decision makers are often scheduled outside regular working hours. This is exacerbated for women who take time away to care for children, work part-time, or are unavailable for certain times.[8, 39]
- **Women experience stereotypes that underestimate their capabilities** and qualifications,[14, 38] in particular, women with intersectional identities. Newcomer women experience microaggressions related to language, culture, and ability, for example, being mistaken for service workers based on their country of origin.[38] Racialized women are overlooked for leadership opportunities based on stereotypes about what a typical leader in the industry looks like.[38] One woman of colour shared her experience in one of our interviews:[30]

> *"I was kind of like a star coming out of university, and I feel like my career just didn't go where it should have. If I had been a white male, I would have been in a completely different space than I am right now. And I think part of it is having that sponsor, having that person who's willing to advocate for you at the right place, at the right time, doing good work is just not enough, and that's unfortunate."*

- **Women experience harassment and fear of retaliation**, resulting in a lack of psychological safety in their work environments.[39] Indigenous women experience high levels of violence and harassment, especially in remote locations.[1]
- **Hostile workplace culture may be reproduced in the green energy workforce** despite a desire within sector leadership to improve equity and diversity. Changes in the physical environment, such as improving the fit of equipment for women,[14] or the number of women in the field, do not address the need for a fundamental shift in workplace culture.[8]
- **Lack of accountability for equity, diversity, and inclusion programs**. Initiatives siloed in Human Resource Departments have not had the impact on the wider work culture that is needed.[14] While the 50 – 30 Challenge includes an equity and diversity self-assessment,[41] it is volunteer-based and limited to those organizations committing to the challenge. There is a lack of metrics that can be widely used to track progress in equity and diversity across organizations.[1, 14] One of our interviewees suggested:

> *"Can we think of psychological safety the way as of workplace safety? With real metrics and real consequences."*

Psychological safety and caregiver-friendly workplace policies are key enablers for women to succeed, progress, and stay in green energy careers.[14] Tracking and reporting impact and progress are important factors to maintain momentum in organizations' efforts to improve equity and diversity.

The participation and empowerment of men to be champions for equity and psychologically safe work environments is vital to shift culture through all levels of an organization.[2] One of our interviewees identified the need to engage men to re-imagine gender interactions in the workplace:

> *"Especially Alberta is so oil and gas heavy and focused on blue collar workers. They're the tough guys, doing the physical labouring stuff, right?*
>
> *I know there is a push for more women in trades. But I think the biggest barrier is the culture and the mindset that people have around women that are the technicians, that are the installers. [...]*
>
> *Educating the men who are getting into that industry to have a broader, more open mind to women being in that space, that's where you're going to see more effective change, rather than just inserting a bunch of women in.*
>
> *Because when you try and do that, when you try and have more women in that field, it doesn't necessarily make anything better, if anything, it puts more of a target on their back."*

We found that key enablers were men who act as champions, mentors, and sponsors through all levels of an organization and who have the skills to contribute to a psychologically safe work environment.[20] For such change to happen, organizations need to make gender diversity a priority and dedicate resources, for example hire an equity coordinator or implementation team.[33]

Promising Practice: Measuring and Rewarding Impact

Employer of Choice, Women Building Futures, Canada.[42] Through this initiative, trades, energy, and construction employers commit to diversity in recruitment, showcasing their equity and diversity progress, and building economic security for women.

As members, employers can access resources, training, and a community of practice to build capacity for equity and diversity. Women Building Futures noted in an interview that these assessments are best when they include qualitative assessments of change, impact, and experiences.

Gender Equitable Enterprise Certification, Mexico. This program certified companies on gender equity, resulting in improved performance, reduced gender gaps, and increased women in managerial positions.[19]

Women Entrepreneurs

We noted the following **challenges** that are specific to women entrepreneurs in the green energy sector:

- **Discrimination in access to capital** due to gendered stereotypes about women in business.[39] Racialized, Indigenous, and newcomer women entrepreneurs face additional obstacles to meeting the requirements for business loans.

  Our interview participants experienced bias in investment and funding compared with companies with similar technologies led by men, and the lack of government support in reducing and mitigating bias.[30]

- **Sexism impacts support and recognition.** An interviewee shared numerous experiences of sexism:

> *"And when it's [the company or product] looked at from a technology point of view, we very frequently will get the award, the recognition, etc.*
>
> *But as soon as they're aware of the ownership and the leadership, it changes. It's still not uncommon for me to have the [comment], yeah, but who really invented it, or who's really in charge? [...]*
>
> *I've watched a lot of women in tech in general go under for lack of support".*

- **Opportunities and funding earmarked for women do not always reach them.** While federal programs exist that target women entrepreneurs, there is limited transparency and accountability around selection criteria, reach of intended groups, and impact of these programs. Some funding programs aim to support women entrepreneurs, but criteria broadly require a woman in a C-suite position rather than a majority women-owned or women-founded company,[42] allowing the capital to flow to businesses founded and led by men.

> *"We didn't get it [funding]. When I looked at the results of who did, the majority of them were actually male owned businesses [...]*
>
> *That makes the whole problem worse, because now you're saying you're supporting women, but giving the money to other groups."*

Our findings identify bias and lack of accountability in investments and programs meant to support under-represented groups as a major area for needed action. Improved transparency in lending and financing, as well as equity-relevant loan performance criteria, were mentioned as key enablers for women entrepreneurs.[43]

One of our interviewees suggested ombudsperson services to independently review cases where bias in decision makers and gatekeepers hinder women entrepreneurs from accessing funding and receiving recognition for their innovations.[30]

Women in Indigenous Communities

The energy transition is taken up as an opportunity by some Indigenous communities to achieve economic security and energy autonomy in a way that is aligned with the values of land stewardship. Indigenous communities are particularly interested in solar, wind, and geothermal energy projects.[44] Both the federal and provincial governments support Indigenous-led projects with some investment and structures. There is a lack of understanding of how these policies and industry partnerships have benefited communities and how women are involved.

Currently, Indigenous workforce participation in renewables is extremely low,[18] and drop-out rates for Indigenous apprenticeship trainees are high.[29] One interviewee with renewable energy policy in Alberta noted that successful partnerships involve long-term relationships between companies and Indigenous communities.[30] The Canadian Renewable Energy Association supports Indigenous collaborators with insights and expertise related to the electricity market.[30] More research is needed to understand barriers and gaps and how partnerships with industry can be structured in more equitable ways.[45]

Promising Practice: Green Energy Projects with Indigenous Communities

Chinodin Chigumi Nodin Kitagan Project, Canada.[44] This Indigenous-led wind project aims for sustainable energy generation and enhances community self-determination and governance with economic benefits directly channelled into the community.

It is a partnership with BluEarth Renewables and the Batchewana First Nation, grounded in the First Nation's jurisdiction and responsibilities for the land and its resources. The Nation's goal is to use the increased economic autonomy to address root causes of social and economic barriers, including workforce participation, in congruency with local worldviews and independent from outside interventions.

Current Policy Landscape

In this section, we describe the Canadian and Alberta-based policy contexts for transitioning the energy sector to net-zero, growing green energy, supporting workforce development, and improving opportunities for women, gender-diverse people, youth, and Indigenous people.

Canadian Policy and Program Landscape

Committing to Net-Zero Emissions

The Government of Canada is committed to reaching net-zero emissions by 2050 with a target to reduce greenhouse gas emissions by 40-45% from 2005 levels by 2030.[15, 46] They describe their related national policy priorities in their 2030 Emission Reduction Plan.[46] It includes actions and funding to boost the green energy sector, support jobs, and develop the workforce needed for the energy transition.

Specific examples of policies and investments to support growth in green energy include:

- Canada Green Building Strategy[47] aims to drive the retrofitting of existing buildings and the construction of new zero-carbon buildings.
- Boosting Indigenous-led clean energy and energy efficiency projects, increasing renewable electricity, as well as diversifying fuels and lowering carbon emissions of the existing oil and gas sector.
- Emerging Renewables Power Program supports geothermal development in Western Canada.[48]
- Regional Energy and Resource Tables, funded in the 2022 budget, bring stakeholders together and advance the energy transformation, economic opportunities, and ensure sustainable jobs.[49]

  All provinces and territories have since launched Regional Tables, except Alberta and Quebec. In 2023, Alberta established an Alberta-Canada Working Group to engage in preliminary conversations about carbon reduction goals.[49]
- Energy Innovation Program, the Clean Fuels Fund, and Hydrogen Strategy support growth in clean fuels.[50] There is significant growth potential for hydrogen, advanced biofuels, renewable natural gas, sustainable aviation fuels, and synthetic fuels to meet a majority of national energy demand by 2050.[15(p202)] Not all of these clean fuels are considered green energy.

Improving Gender Equity in Employment

The federal government uses the Gender Results Framework[51] and applies a gender-based analysis to its policies and budget to understand and address related inequities.[52] Recently, they responded to barriers to women's workforce participation through improvements in child care and parental leave benefits.

The federal government partnered with the provinces through Early Learning and Child Care Agreements to increase access and affordability of child care.[53] Federal employment insurance promotes equality in parental leave through the parental sharing benefit.[5]

Improving Equity and Diversity in the Energy Sector

The federal government is committed to a "people-centred" approach in the transition to net-zero, including initiatives to increase the representation of Indigenous people, women, and marginalized groups in clean energy.[15]

Specific examples include:

- Clean Energy Education and Empowerment (C3E) International Initiative,[55] co-led by Canada, is focused on "closing the gender gap and increasing participation, leadership, and success of women in clean energy fields."
- Equal by 30 Campaign aimed at public and private sector commitment to equal pay, equal leadership, and equal opportunities for women in the energy sector by 2030.[56]
- 50 – 30 Challenge was co-created by the federal government, civil society, and the private sector with the goal of gender parity and representation of under-represented groups on boards and senior management.[57(p50)]
- Canada Greener Homes Initiative with a $10 million investment into recruiting, training, and mentoring new energy advisors with the goal to increase under-represented groups' participation.[46]
- Chairs for Women in Science and Engineering across five regions[58] to increase role models and participation of women in science and engineering.

Improving Gender Equity and Diversity in the Trades

Led by the Canadian Apprenticeship Forum, the National Strategy to Support Women in the Trades was developed by employers, labour representatives, educators, and equity representatives to create sustainable and measurable change for women.[59]

The strategy aims to increase the number of women apprentices, journeypersons, and supervisors to 15% by 2030. The strategy includes a call to action campaign, policy change, concrete action plans for respectful workplaces, and metrics to assess and publish results that keep employers and unions accountable.

The Canadian Apprenticeship Forum[60] also offers leadership and mentor development programs tailored to women and gender-diverse persons.

To improve access for women with low income to apprenticeships in trades, the Government of Canada provides apprenticeship grants and apprenticeship completion grants, interest-free loans, as well as apprenticeship incentive grants for employers.

Building Jobs and Skills for Green Energy Among Under-Represented Groups

The federal government described concrete actions to develop the workforce in the Sustainable Jobs Plan 2023-2025.[61] This strategic plan includes support for:

- Union Training and Innovation Program[62] to enhance apprenticeship training, especially for those from under-represented groups, and support unions in developing green skills training for workers in the trades

- Sustainable Jobs Centre to connect stakeholders to understand and plan for future skills requirements.[61]
- Sectoral Workforce Solutions and Program[63] to support sectors such as green energy implement solutions to address workforce needs.
- Community Workforce Development Program[64] to address labour shortages, develop skills, and transition oil and gas-dependent communities.
- Upskilling for Industry initiative to scale industry-led approaches to upskilling workers for high-growth sectors, including clean and green technologies.[61]

In Budget 2024, the federal government has announced several initiatives that combine goals from the Sustainable Jobs Plan with improved equity for under-represented groups.[52] Examples include:

- Indigenous Skills and Employment Training Program to fund Indigenous organizations to design and deliver job training services to First Nations, Métis, Inuit, and urban and non-affiliated Indigenous People in their communities.[65]
- Youth Employment and Skills Strategy (YESS)[66] to support young Canadians (15-30), in particular from under-represented groups,[52] gain the skills needed to successfully participate in the labour market.

  This initiative includes, for example, funding for businesses to hire youth in green jobs in STEM fields, funding for training for First Nations and Inuit youth, and funding for employers to hire and mentor youth in green jobs in the natural resource sector.

  For the year 2023-24, 55% of YESS program placements are expected to be from under-represented groups, including women, Indigenous people, Black and racialized youth, and youth in rural communities.

Promoting Indigenous-Led Energy Projects and Economic Opportunities

The federal government is committed to supporting economic opportunities for First Nations, Métis, and Inuit. Initiatives span business development, access to capital, jobs and training, as well as frameworks to support "economic reconciliation."[67] Examples include:

- Strategic Partnerships Initiative.[68] In 2023, the federal government announced $300 million that support clean energy projects in Indigenous, rural, and remote communities, available until 2027.
- Aboriginal Entrepreneurship Program[52] provides funding for women-owned businesses and entrepreneurs, including access to business development officers, workshops and training, and micro-loans to help start and expand their businesses.
- Clean Growth Hub is an inter-departmental initiative[52] to support clean tech innovation, including establishing a Reconciliation, Equity, Diversity, and Inclusion strategy with the goal to track diversity data and provide individualized supports.
- Boosting Indigenous Economic Opportunity program[67] with investments that prioritize clean energy projects[52] and renew the support through the Strategic Partnership Initiative.

- Natural Resources Canada has multiple programs supporting clean energy programs with priority for under-represented groups, such as the Indigenous Off-Diesel Initiative and the Smart Renewables and Electrification Pathways Program. The latter program has a minimum allotment of funds for projects owned by First Nations, Métis, and Inuit.[69]
- National Benefits Sharing Framework[70] to progress reconciliation and guide negotiations of industry-community partnerships to ensure Indigenous communities benefit from energy projects.

Supporting Women's Entrepreneurship in the Energy Sector

The federal government is committed to a gender and intersectional lens in their supports for businesses and entrepreneurs. The Women Entrepreneurship Strategy earmarked $7 billion to support women-owned businesses, including an inclusive venture capital initiative, an entrepreneurship loan fund, support for networking organizations, and a research and data hub.[71]

The Clean Growth Hub benefits small- and medium-sized businesses with priority target groups, including women entrepreneurs, Indigenous people, 2SLGBTQIA+ people, and people with disabilities.

Promising Examples: Setting Gender Targets

Nordic countries have been at the forefront of gender equity. Iceland, Sweden, Norway, and Finland top the World Economic Forum Global Gender Gap Index.[43] Nordic countries' companies also have the highest Women's Leadership Score with 26%, compared to 15% in the U.S.A. and Canada.[72] Norway and Iceland introduced gender quotas in 2008.[72]

Norway enshrined a 40% representation of women into law and increased the national average of women in construction to 35%. Among the companies with top gender equity results, a majority have implemented gender equality policies and equal pay policies.[72] The Nordic companies surveyed all had flexible work-hour policies to improve work-life balance.

Targets and quotas have been successful but require a degree of enforcement. Even with enforcement, quotas are not a complete solution. They can undermine culture change when "diversity is believed to represent a set number of otherness."[14]

Alberta Policy and Program Landscape

Reducing Emissions Through Improved Oil and Gas Sectors

The Government of Alberta aims to achieve emission reduction by focusing on "continuous improvement in the oil sands and conventional oil and gas sectors"[16] while at the same time investing in hydrogen, carbon capture and storage (CCS), biofuels, nuclear energy, and critical minerals.

It is important to note that when we speak about hydrogen in Alberta, it is "blue" hydrogen produced from natural gas with emissions stored underground, rather than "green" hydrogen that is truly emission-free.[72]

"Alberta Advantage,"[73] a strategic action plan, speaks about "Fighting for increased market access and protecting the value of our energy experts." Examples from the action plan and Budget 2024[74] include:

- Natural Gas Vision and a Hydrogen Roadmap[74] including expanding pipelines and accessing new markets for "low-carbon" energy resources.
- Energy diversification through hydrogen, geothermal, and nuclear energy.

Until recently, Alberta has been able to attract a majority of investments in renewable energy. This is because its electricity market is deregulated[75] while other provinces, such as Ontario, provide energy through publicly-owned and centrally-managed systems.[76]

Currently, policies creating uncertainty for investors interested in Alberta as a place for renewable and green energy projects[77] include:

- Ongoing energy market restructuring and transmission system reform.[12]
- Pause of all new approvals for wind and solar projects in 2023.[77]
- Restrictions on renewable energy projects on agricultural lands and around "pristine viewscapes."[78]
- Expected changes to how transmission costs are allocated to renewable generators.[78, 79]

Supporting Early-Stage Technology and Innovation

There is some provincial investment in innovation and research. It will be important to monitor which companies receive this support to determine whether this investment benefits women entrepreneurs in the green energy sector and adjacent fields. For example:

- Expanding STEM programming at the University of Calgary.[74]
- Technology Innovation and Emission Reduction fund to support clean technology development and for municipalities to support sustainable growth initiatives.[74]
- Alberta Enterprise Corporation[74] to support early-stage technology companies in Alberta.
- Emerging Innovators Challenge, under Alberta's Technology Innovation and Emission Reduction fund, to support 21 small- and medium-sized businesses in getting their projects off the ground.[80]

Addressing Labour Market Challenges

The Government of Alberta is confident in the existing skills and education of workers in the traditional energy sector: "many Albertans already possess the skills and expertise required to meet the demands of low-emission industries."[16]

Budget 2022 announced "Alberta at Work" as a key program to address labour market challenges such as youth unemployment and labour shortages[81] in health care, business, and technology. Some measures that are relevant for women in green energy include:

- Funding to upgrade or construct new school facilities and create more seats in post-secondary education.
- Funds for employers to hire Albertans.
- Services for underemployed or unemployed Albertans.
- Funds to expand work-integrated learning and micro-credentials.
- Safe, affordable, high-quality child care through creating more child care spaces, subsidizing costs, and investing in training for skilled early childhood educators.[74]
- Improving recognition of international credentials and supports for retaining international skilled workers.[82]
- Funding for the Alberta Labour Relations Board[82] for dispute resolution and to implement changes in the Occupational Health and Safety Code.

Expanding Apprenticeship Training in Trades

Alberta invests in apprenticeships and expansion of trades training. In 2022, the government announced that it would spend $30 million to improve apprenticeship training over three years.[27] Budget 2024 allocates funds to amplify the voices of young adults in the skilled trades through the Skilled Trades Youth Ambassador advisory council and the Youth Skills Network.[83]

The Alberta 2030 Building Skills for Jobs[84] strategy includes:

- Funds for non-profits and educational institutions to expand apprenticeships, work-integrated learning, and new micro-credentials received.[27, 74]
- Improved access to labour market information and responses to sexual violence in post-secondary institutions. Priority areas mentioned in the strategy are energy and technology, with a focus on artificial intelligence, precision health smart agriculture, and Carbon Capture and Storage.

While the support for expanding opportunities in trades and post-secondary education may benefit women in green energy, few green energy-related occupations are part of Alberta's trades list.[85]

Supporting Indigenous Businesses and Women's Economic Security

The 2024 Alberta Ministry Business Plan dedicates funding to support the First Nations and Métis Women's Councils on Economic Security.[82] The Alberta 2030 Building Skills for Jobs[84] strategy recognizes the extent of the income and labour participation gap for Indigenous people and states the goal to enhance learning opportunities for Indigenous people.

Concrete measures in the 2024 budget include:

- Aboriginal Business Investment Fund[86] to support startup and expansion costs in Indigenous communities.
- Investment and Growth Fund to support small- and medium-sized businesses or Indigenous economic security.[82]
- Indigenous Employment Training Partnerships Program[87] to support unemployed and underemployed Indigenous individuals.
- Alberta Indigenous Opportunities Corporation to improve access to capital for Indigenous projects, including in natural resources.[88]

Supporting Gender Equity and Diversity Through Non-Profit and Educational Organizations

Albertan non-profit and educational organizations demonstrate a strong commitment to improving access and outcomes for women, particularly for Indigenous women and women from racialized communities. For example:

- **Women Building Futures**[89] is a non-profit organization in Alberta, Ontario, and Saskatchewan that provides pre-apprenticeship training and holistic support for unemployed or underemployed women experiencing low income. The organization works with industry to ensure their programs are future-facing and skill-aligned with industry needs.

  The Government of Alberta has supported these services[27] through the Alberta 2030 Building Skills for Jobs[84] program and the 2024 budget to expand their services.[74] However, a recent reduction in funding impacted their programming with the result that their planned green energy curriculum had to be postponed until further funding is found.[30]

  Women Building Futures is hoping to develop a solar technician program and evolve their vehicle technician program to include skills for electric vehicles, but industry partners and funding may not be ready to take these plans on due to the uncertainty around renewable energy projects in Alberta.

- **Norquest College**[90] designs many of their programs with flexible instructional hours to accommodate for caregiving responsibilities, hybrid instructions, clear pathways to further education, tutoring, and counselling to support students on their career path.

  The college has resident Indigenous Elders and advisors for culturally rooted support.[31] The institution hopes to launch an engineering program in the fall of 2025 with tailored supports for Indigenous women, including an academic upgrading program.

- **CAREERS**[91] is an industry-led not-for-profit foundation that partners with government, schools, communities, and industry to support youth employment. The organization provides internship opportunities for young adults, especially in rural regions, with programming tailored for Indigenous Youth,[91] and for women.

  CAREERS' Young Women in Trades and Technologies Initiative supports exposure to and information about a range of careers tailored to woman-identifying youth.[92]

Opportunities for Action: Supporting Women in the Alberta Green Energy Sector

The rapid growth of green energy jobs offers many opportunities for cross-sectoral efforts to improve participation and employment outcomes for women. Our overview of the current landscape in Alberta and Canada reveals five strategic areas for action where gaps in participation, calls for action to address barriers, promising practices, and government and stakeholder interests overlap.

From our engagement with thought leaders in Alberta, we learned that the non-profit and educational sector is strongly committed to improving conditions and opportunities for women, gender-diverse people, Indigenous people, and newcomers. Partnerships between industry and non-profit organizations will be vital to catalyze progress in the following five action areas:

1. Improving awareness and exposure to green energy careers for young | women, in particular those experiencing lower incomes.
2. Cultivating champions to catalyze change at all organizational levels.
3. Developing metrics and improving accountability across actors and sectors.
4. Improving implementation of industry-partnered child care for the green energy sector.
5. Understanding economic reconciliation for partnerships between Indigenous communities and the green energy industry.

1. Improving Awareness and Exposure for Young Women

Research shows that youth are concerned about the impact of climate change on their future, and their belief in how effective the government responds will impact their decisions about where to live and work.[14] A growing share of youth are interested in working in electricity.[11, 18]

These values and concerns, together with their currently low participation in natural resources, point to a strategic opportunity for increasing awareness about and access to opportunities for exposure to green energy occupations for youth with attention to mitigating barriers for low-income youth. In particular, industry can become more active in making awareness about career options in green energy more accessible to the public, career counsellors, educators, parents, and youth.

Increasing women's representation in operational roles, in leadership, and as role models and closing Alberta's gender-based income gap in the energy sector, require continued efforts to encourage women and gender-diverse people to take STEM fields in universities and to obtain their license and work as professional engineers.

This work requires efforts to:

- Develop outreach programs that expose youth and women from low-income families to training and career options. Build on young women's interest in sustainable economic development, environmental science, and on interest in electricity.[11]

- Consider access barriers and prioritize delivering programs in rural communities, virtually, and in urban places that are accessible and frequented by families experiencing low incomes, newcomers, and marginalized populations. For example, create mobile outreach and workshops for youth in rural areas, affordable summer camps, career pop-ups in shopping malls, public libraries, or urban recreation centres.
- Involve women who work in technical positions and operational leadership as role models in all outreach initiatives.
- Tailor media campaigns and events to youth, families, and the public to raise awareness for parents, coaches, and educators about career options.
- Build capacity for career services and career counsellors for:[18,35]
    - Knowledge about options in emerging green fields.
    - Skills in identifying and mitigating gender-based bias.
    - Encouraging women enrollment in STEM fields in universities.
- Partner with the green energy industry and educational institutions for green energy options in co-op programs, internships, and part-time options that can lead to employment in green energy.[34] Increase financial support for upgrading and covering cost of training.
- Invest in research to understand why girls drop out of STEM programs during high school and why many women drop off between engineering graduation and licensing.

2. Cultivating Champions at All Organizational Levels

Government has invested in increasing apprenticeships and women's participation in trades. More women in trades requires workplaces to make tangible progress in equity, diversity, and inclusion and psychological safety across all levels of organizations and workplaces.

Our findings suggest that there has been progress in industry leadership's commitment to diversity. However, more work is needed to engage everyone in the industry to identify discrimination and create an environment of psychological safety.

A strategic opportunity to propel a shift in worksite culture includes:

- Engage boys and men in dialogue around gender identity, norms, and relations, and build capacity to create psychologically safe work environments.
- Scale leadership development and capacity-building in the energy sector to enable all staff to identify implicit and explicit discrimination and model psychologically safe ways of interacting.[2]
- Advocate for an integration of psychological safety into workplace health and safety standards.[14]
- Develop trauma-informed and unbiased processes to report harassment and experiences of discrimination without fear of retaliation.[34]
- Expand organizational capacity for psychological safety to funders and decision makers in government and finances. Establish an independent, third-party ombudsperson to help resolve conflicts and hold funders accountable.

- Diversify board members to help address systemic inequities within organizations.[14]
- Support human resource professionals and recruiters in developing transparent industry-specific skills-based criteria for hiring, retention, and advancement.[18, 93]

3. Developing Metrics and Improving Accountability

Tracking progress and improving the implementation of equity initiatives requires metrics and accountability. A prominent finding was the lack of meaningful measures and accountability for programs aiming to support women and marginalized groups, whether those are government funding programs to support women in the sector or industry efforts to enhance psychological safety at the workplace. There are some international and national examples of metrics and certification tools[94] that provide a common language and standards for improving equity.

Next steps for Alberta and Canada include:

- Identify qualitative and quantitative metrics for evaluating equity and diversity efforts. Include experiences of impact and change, numbers of represented groups, representation in leadership, wage gaps, clear criteria for career development and advancement, and ability to retain diverse workers.[1, 34]
- Engage with government and regulatory bodies to develop and implement frameworks for embedding psychological safety in workplace health, safety, and wellness requirements, including metrics to hold workplaces accountable.[14, 37]
- Implement policies that set and measure outcomes for equity and diversity in industry and investment in projects that advance gender equity.[33]
- Establish accessible ombudsperson services to ensure unbiased, trauma-informed processes for mediating and resolving conflict and discrimination in lending, government competitive funding programs, and awards programs.
- Pilot an evaluation for a select initiative. For example, partner with Women Building Futures and their Employer of Choice[95] program to further develop their current program data-based assessment and a measurement framework including quantitative and qualitative data that meaningfully tracks impact.

4. Improving the Implementation of Accessible Industry-Partnered Child Care

Increasing the number of women in professional engineering and in trades requires sustainable solutions for child care challenges. Both the federal and provincial governments are committed to improving child care and enabling women to fully participate in the workforce.

Interview partners shared that there have been few examples of industry-partnered child care in the conventional energy sector that provided on-site and 24-hour care. However, these pilots were not continued and scaled up.

There is a strategic opportunity to partner with industry and non-profit organizations to:

- Evaluate industry-partnered child care pilot programs and their implementation to understand determinants of success.
- Partner with non-profits to explore models for an industry-community partnered approach to balancing caregiver responsibilities and career advancement.

5. Understanding Economic Reconciliation

Government policy and programs acknowledge the importance of Indigenous nations across Canada to be partners in the energy transition. However, there is very little known about how to support Indigenous interest in green energy and partnerships with industry in a way that ensures Indigenous self-determination, benefit for the community, and meaningful involvement of women and youth.

We see a strategic opportunity to engage with interest- and rights-holders to:

- Explore through an in-depth case study what enabled partnerships such as the Chinodin Chigumi Nodin Kitagan Project to secure rights and benefits for Indigenous communities and how community governments and industry can be supported in building respectful and mutually beneficial partnerships.[44]
- Develop tools and standards for community benefits agreements to ensure local communities are meaningfully included in decision making, and the project creates local jobs, training, and apprenticeship opportunities.[29]

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Appendices

Appendix A: Literature Review and Jurisdictional Review Strategy

The purpose of our project is two-fold:

1. To promote a comprehensive understanding of the current landscape in Alberta for women's participation in the green energy sector, both in policy and practice, with emphasis on women facing income barriers.
2. To identify levers and opportunities for strategic, cross-sector action to build more meaningful, sustainable workforce participation of low-income Albertan women in the green energy sector.

We used three data sources to produce an environmental scan to achieve these goals:

- Rapid review of grey literature
- Semi-structured interviews across sectors and with women with lived experience
- Jurisdictional review

Our research questions included:

1. In what ways are women generally participating in the green energy labour force?

   The scope for this question was Alberta, Canada, and globally.

2. What are the policy enablers and barriers to reducing employment inequities for women in the green energy sector?

   The scope for this question was provincial (Alberta) and federal (Canada).

3. Which international jurisdictions have achieved success in reducing inequities? How?

Search Strategy

We searched publicly available organizational and government documents and peer-reviewed journals on:

- Advanced Google search
- Google customized search for government documents (generated by University of Toronto)
- Google Scholar
- Duck Duck Go
- Website search on key organizations, relevant authorities, and stakeholders producing research and policy recommendations related to the energy sector and employment equality
- Government websites

We searched Google to compile a list of relevant organizations and authorities on the topic to search their websites for relevant reports and documents.

In addition to this search strategy, publications were hand-picked from reference lists of articles which meet inclusion criteria.

Inclusion criteria

- Publications that discuss green energy workforce with gender analysis aspect
- Publications that discuss green energy sector participation from a population perspective: women with income barriers, visible minorities, newcomers, women living in rural and remote regions
- Publications that discuss best exemplars of countries and governments reducing inequities in green energy sector workforce participation

- Publications that identify gender gaps and analysis in employment in green energy sector
- Publications that discuss all of the above in the Albertan context
- Publications that discuss all of the above in the Canadian context

Exclusion criteria

- Publications that do not take into account gendered analysis of workforce participation in the energy sector
- Publications or organizational documents not in English and published before 2017, unless they provide key information
- Publications that focus on case studies of low and middle income countries
- Search limitations
- Review first 5 pages of database results

Possible search terms

A set of search terms were used for the environmental scan to present an overview of grey and academic articles on the subject matter. Searches were conducted in Google Scholar using the following terms.

- "Green energy" OR "Energy transition" OR "Renewable energy" AND "Inequity" AND "Women"
- "Women" OR "Inequity" AND "rural" AND "Green energy" OR "Energy transition" OR "Renewable energy"
- "Women" OR "Inequity" AND "Racialized" OR "Newcomer" AND "Green energy" OR "Energy transition" OR "Renewable energy"
- "Women" AND "green energy" OR "energy transition" OR "Renewable energy" AND "labour force participation" OR "work force participation"
- "Gender" "Employment" AND "green energy" OR "energy transition" OR "Renewable energy"
- "Visible minorities" OR "Newcomers" OR "Young women" OR "Mothers" AND "Employment barriers" OR "Employment advancement" AND "Green energy" OR "Energy transition" OR "Renewable energy"

Appendix B: Interview Participants

We conducted six interviews with a total of eight diverse thought leaders and women with lived experience. The table below describes participants' characteristics.

Participant	Role	Location
Participant 1	Woman engineer from racialized community. Director for policy in Alberta in a national non-profit industry association related to renewable energy.	Alberta
Participant 2	Woman entrepreneur. Founder and owner of a green energy business in Alberta. Certified women business and certified LGBTBE business.	Alberta
Participant 3	Woman electrician working in a technical position in green energy.	Alberta
Participant 4 and 5	Dean and Vice Dean of a post-secondary institution offering courses for green energy relevant training.	Alberta
Participant 6 and 7	Leadership representatives of a non-profit organization offering training for women in the trades.	Alberta
Participant 8	Manager and researcher in a national non-profit industry association related to renewable energy.	Ontario

Table 1. Interview Participants

Interview Guide

We are exploring strategic opportunities for action to increase women's participation in green energy in Alberta.

The project aims to:

1. Understand the current landscape in Alberta for women's participation in the green energy sector, both in policy and practice, with emphasis on women facing income barriers.
2. Identify opportunities for strategic, cross-sector action for more meaningful, sustainable workforce participation of low-income Albertan women in the green energy sector.

Why interviews?

There are data and research gaps with a gender and intersectional lens on workforce participation in green energy. Interviews will provide better understanding of Alberta's unique context and of women and gender-diverse people's lived experience.

What is our ask?

Participate in a one-hour interview with a PolicyWise researcher. We will briefly share preliminary findings from a rapid grey literature review and ask questions to contextualize findings and explore strategic opportunities and partnerships from different participants' perspectives.

Will this be recorded?

Recording the conversation is optional but it will help to ensure accuracy when we write up the findings.

Confidentiality

All information collected will be kept confidential, meaning it will only be accessed by researchers on the project and will only be used for this project's purpose. The summary of findings will be presented in aggregate form (themes of the conversation across the different group interviews) so no single person will be identifiable. Information will be kept confidential and used for project purposes only. Responses may be included in a research report, but names and other identifying information will be removed.

Short discussion of preliminary findings

Interview questions

There are four central questions that we will ask each participant:

- How do these findings align with your experience and knowledge of women's participation in green energy?
  - AB participation
  - Existing supports
  - Strategic opportunities: policies, programs, partnerships
- What contextual factors are critical to supporting women's participation in the green energy labour force in Alberta?

- What are the most influential enablers and barriers to increasing the participation of women and gender-diverse people? In particular, those experiencing low income?
- Who else should we be talking to?

In addition, we will ask questions tailored to each participant's expertise, role, and experience.

For example:

Policy, advocacy

- What supports do you offer? What other supports exist for women experiencing low-income and intersectional barriers?
- There is some investment in Indigenous communities' energy projects (Aboriginal Investment Fund, Local Growth and Sustainability Grant Program) and skills building (Alberta 2030 Building skills for jobs) – how are women part of these initiatives?
- Is there any conversation around collecting disaggregated data and gender-based analysis to ensure women and underrepresented groups benefit from investment in energy projects, training, micro-credentials, apprenticeship fundings?
- Alberta at Work program – who benefits?
- What are your organization's members' biggest challenges in terms of workforce? Is there opportunity for under and unemployed women?

Workplace culture (WBF, women with lived experience)

- Workplace culture was named as the biggest hurdle for women. Tell me about your experiences with advocacy and supporting industry in making this shift: what's working and what is scalable? (Employer of Choice program? Metrics?)
- What role do unions play in Alberta?
- Is the focus on work-integrated training working for women, caregivers, low-income, visible minorities and marginalized women, gender-diverse people?
- What impact will the cancelling of the Alberta Job Grant have on employers needing to train workers in skills for green energy? Cut of funding for upgrading? Are green energy careers included in government funding for training?
- Where is the momentum in the province and who needs to be at the table?
- What do you see in Ontario and nationally?

Training women with intersectional identities and barriers (WBF, entrepreneurs, educational institutions, women with lived experience)

- How do training programs and supports align with industry needs in Alberta?
- How do women participate in your training opportunities? Who is not represented? Is there outreach? What are the barriers, what supports exist?
- How is green energy represented at career fairs and in industry relationships?
- How will the program for Indigenous students look like? How will it overcome barriers?

- We found that the employment gap is biggest for women with high school or no high school education. What opportunities do you see for women experiencing low income and intersectional barriers? What training and supports need to be in place?
- What do you observe about peer-to-peer culture during training courses?
- Where is the momentum in the province and who needs to be at the table?
- What do you see happening nationally and how is Alberta unique or different in terms of workforce development?

Personal experience of barriers and enablers (entrepreneurs, women working in the sector)

- Can you describe your journey into green energy?
- What supported you then and now?
- What would you like to be in place today for women wanting to work in the sector?

AB landscape, energy and momentum, partnerships

- How do training programs and supports align with industry needs in Alberta?
- Where is the momentum in the province and who needs to be at the table?
- Who are the main actors in AB? (unions, associations, networks?)

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