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CanREA's National Workforce Strategy

For the wind, solar and energy-storage industries

This report outlines career pathways for Canada's renewable-energy and energy-storage workforce and identifies the resources needed to support workers along their career journeys.

April 2023 Edition

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ABOUT CANREA

The Canadian Renewable Energy Association (CanREA) is the voice for wind energy, solar energy and energy storage solutions that will power Canada's energy future. Our diverse members are uniquely positioned to deliver clean, low-cost, reliable, flexible and scalable solutions. For more information on how Canada can use wind energy, solar energy and energy storage to help achieve its net-zero commitments, consult "Powering Canada's Journey to Net-Zero: CanREA's 2050 Vision." For more information about CanREA, please visit renewablesassociation.ca

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2. EXECUTIVE SUMMARY

There are nearly one million unfilled jobs in Canada (Feinstein, 2022). This labour shortage also affects the renewable energy and energy-storage industries*. A highly skilled workforce will be required to decarbonize Canada's electricity production by 2035 and reach net-zero greenhouse gas (GHG) emissions economy-wide by 2050. Now more than ever, the industry will require a rapid expansion of its current workforce to ensure these ambitious net-zero targets can be achieved. The industry has specific labour needs, as renewable energy workers are highly skilled and require a wide variety of foundational and technology-specific training to meet the high standard of safety and knowledge required within the field.

CanREA's *National workforce strategy* aims to increase public awareness of the career opportunities in renewables, and to reduce the barriers to entry for job candidates. It focuses on three areas that will be key for building Canada's future renewable-energy workforce: the inclusive recruitment of new, skilled workers; retaining the current workforce; and optimizing succession planning within organizations. In addition, this report acknowledges the importance of stakeholder support and collaboration to assist workers across their occupational journeys.

There is growing interest in careers in renewables from a variety of groups, such as youth, individuals seeking a career transition, and newcomers to Canada. These individuals require resources to help them enter the renewable-energy industry. Conversely, there are also potential job candidates who are unaware of the career opportunities in renewable energy. To recruit these individuals, it is necessary to create and promote resources that share information on these exciting opportunities, and how to access the required training and education.

As part of the *National workforce strategy*, CanREA has developed an "*Employment-Process Model*" that demonstrates the variety of pathways that could lead individuals to a renewable-energy career. Our model encompasses several stages of an individual's educational journey, beginning with early experiences in elementary schools and communities. It focuses on the importance of creating awareness of career opportunities for a variety of candidates, including high school and post-secondary students, individuals seeking a career transition, newcomers to Canada and veterans.

Those interested in pursuing a career will require training, which will look different depending on the individual's previous experiences, skills, and competencies. The second and third stages of the journey concern how high-school students, post-secondary students and recent graduates, as well as those seeking a career transition, access the training or reskilling required to enter the renewable-energy industry. Personal coaches and mentors play a key role across a candidate's occupational journey, including the initial exploration of the industry.

The next stage of the model examines the transition from education to employment. This important transition will require the support of human resources professionals to identify candidates with the required attitudes, inclinations and skills for renewable-energy jobs. Internal communication surrounding the skills and competencies required for different roles is a vital component of the recruitment process. From the education perspective, many post-secondary schools have established Program Advisory Committees (PAC). These committees are comprised of several industry stakeholders that provide feedback to post-secondary programs. The collaboration between education and industry helps to ensure that students are learning the skills required to be successful in the rapidly evolving renewable-energy sector.

The final stage of our *Employment-process model* explores knowledge-retention within organizations, needed when experienced renewable-energy workers move into new roles or retirement.

Underlying the *Employment-process model* is the need for continual evolution of career pathways. As technology continues to evolve, so will renewable-energy jobs, therefore the resources required to support

candidates will also need to evolve.

In both CanREA's *National workforce strategy* and *Employment-process model*, there is substantial emphasis placed on the recruitment of skilled workers. This recruitment and hiring must be inclusive, to ensure that individuals who have been historically underrepresented in the renewable-energy industry can engage in meaningful careers relevant to the net-zero transition.

There are various workforce-development organizations specialized in electricity, renewable energy and climate change resources for individuals at all stages of their career journeys. This report includes aggregated lists of renewable-energy resources, including work-integrated learning opportunities, children & youth programs and experiential learning opportunities, career awareness and exploration, renewable-energy job boards, renewable-energy training opportunities, renewable energy in the media, mentorship programs, renewable-energy research and labour market intelligence (LMI), employer resources, educator resources, renewable-energy active initiatives, and government workforce initiatives.

In addition to these documents, CanREA is currently engaged in a series of workforce development initiatives that aim to enhance renewable-energy career awareness and reduce barriers within the field. These initiatives include the Occupational journey profiles that provide case study examples of individuals' careers in the renewable-energy industry, a renewable-energy YouTube playlist that highlights videos featuring renewables technologies, ergonomics and human factors initiatives, and research identifying various electrotechnical training programs across Canada.

While there are many workforce development resources relevant to the renewable-energy industry, there are a few areas in which members of CanREA's Workforce Development Committee and National Workforce Strategy Working Group have identified gaps. Some of these gaps include Canadian salary survey data relevant to renewable energy occupations, customizable resources to create awareness of the career opportunities for high school students, exploring the feasibility of having renewable energy occupations classified under their own National Occupational Classification (NOC) codes, and exploring options to advocate for the inclusion of skilled renewable-energy occupations within government funding programs.

As mentioned, the purpose of CanREA's *National workforce strategy* framework is to increase renewable-energy career awareness and reduce the barriers to career entry. One of the ways to reduce the barriers to entry is by making the resources outlined in this report widely accessible. Therefore, CanREA's next step is to act as a connector between a variety of key stakeholders. This concept has led to the proposed development of a workforce-focused website that will assist students, individuals seeking a career transition, Indigenous peoples, and other historically underrepresented groups locate the resources required to learn more about career opportunities in the renewable-energy industry. At the time of writing this report, the preliminary planning stages of the workforce development website are underway. In this way, we can leverage and promote the programs and initiatives of other organizations in the workforce development space without duplicating their efforts.

Renewable-energy workers will require various supports along their journey, the nature of which will vary from one individual to another. CanREA will assist by acting as an engaged conduit between key stakeholder groups to allow for information sharing and the development of beneficial partnerships. Through strategic collaboration, resource development and information sharing, organizations can work together to support the growth of a future workforce large and skilled enough to ensure that Canada's renewable energy industry has the capacity and resources required to reach net-zero.

**For the purposes of this document, the terms "renewable energy" and "renewables" are defined as wind energy, solar energy and energy storage, the three industries represented by the Canadian Renewable Energy Industry (CanREA).*

3. INTRODUCTION

Statistics Canada (2022a) reported there were 959,600 job vacancies across Canada in the third quarter of 2022. The number of job vacancies represents a 3.3% decrease from the "record high" in the second quarter of 2022 (Statistics Canada, 2022a). However, the number of vacancies "was 8.3% higher than in the third quarter of 2021" or "72.7% higher than in the first quarter of 2020" (Statistics Canada, 2022a). On average, the number of unemployed individuals per job vacancy in the second and third quarters of 2022 was 1.1 (Statistics Canada, 2022c; Statistics Canada, 2022a). In comparison, this value was 1.3 unemployed individuals per job vacancy in the first quarter of 2022, or 2.3 in the second quarter of 2021 (Statistics Canada, 2022c). This indicates that Canadian "employers are having difficulty filling vacant positions" (Statistics Canada, 2022b). According to Statistics Canada (2022a), provinces with the lowest unemployment-to-job vacancy ratios are Quebec (0.8) and British Columbia (0.9).

This is a national challenge that is experienced across a variety of industries, including the renewable-energy sector. During the Second Edition of Nergica's Transition Solutions Symposium, it was identified that "…the renewable energy workforce is currently under pressure" (Nergica, 2022). There are multiple factors compounding one another, such as the number of vacant positions, replacing workers that have retired, and filling new positions that will be created to assist with the rapid growth required for the energy transition (Nergica, 2022). This is further complicated due to data suggesting that "…it takes five years to acquire the necessary skills when starting 'from scratch…" (Nergica, 2022). While there are many job opportunities across Canada, EHRC (2019) survey data indicated that "renewable occupations were reported as the most difficult to hire for in 2017."

A report developed by IRENA and ILO (2021) states, "Including solar thermal, geothermal energy and energy storage, the renewables sector…is estimated to employ a total of 97,250 people" in Canada alone in 2021. From the perspective of person-years of employment, CanREA (2023b) reports, "Canada's wind and solar industry accounted for approximately 4,462 person-years of employment in 2022, having grown by an impressive 86% this year" compared to 2,400 in 2021. According to IRENA and ILO (2022), in 2021, solar photovoltaic accounted for 14,630 direct jobs. This exceeds The Canadian Solar Industries Association's (n.d.) estimate for solar to be "employing a labour force of approximately 10,000 people per year…" by 2020. Meanwhile, IRENA and ILO (2022) data estimate that in 2021, there were 7,400 jobs in wind.

The renewable-energy industry is expected to see tremendous growth, requiring more people to join the skilled workforce. From a regional perspective, Clean Energy Canada (CEC) (2021) reports that Quebec is "on track to see huge job growth" in the wind industry, with expected growth "by 28% a year, employing 4,300 people in the province by 2030." CEC (2021) also reports that Alberta is "on track" for rapid growth in wind careers at an estimated "22% increase per year." This claim is supported by Business Renewables Centre Canada, who have stated they expect "$3.7 billion worth of renewables construction by 2023" and 4,500 jobs to be created as a result of increased renewables development in Alberta (Anderson, 2022). Nova Scotia is also expected to see an increase in wind power careers "…with the number of people employed in the industry expected to more than double between 2020 and 2030" (CEC, 2021).

By using these estimates, it is clear the renewable-energy industry is rapidly expanding. This expansion is expected to accelerate as we transition towards the increased use of renewable-energy technologies to decarbonize Canada's electricity production by 2035, and to reach net-zero GHG emissions by 2050 (Canadian Renewable Energy Association (CanREA), 2021). The Canadian Renewable Energy Association's (2021) *Powering Canada's Journey to Net-Zero* report indicates a need "to deploy 3,800 MW of wind energy and 1,600 MW of solar energy annually for the next 29 years–resulting in an almost ten-fold expansion of Canada's wind- and solar-energy capacity." This will require growing a highly skilled workforce to accomplish these goals.

While the recruitment of more skilled workers is a key component of reaching net-zero targets, it is also important to retain workers currently in the field, and to preserve their knowledge within organizations. CanREA's *National Workforce Strategy* framework examines these three key considerations for growing the renewable-energy workforce.

1. **Attract new, skilled talent to the renewable-energy industry.**
   According to EHRC (2019), participants in a 2017 survey reported that 60% of external hires in the renewable-energy industry are recent post-secondary graduates. This indicates the importance of strategies that bring awareness of renewable-energy career opportunities to children, youth, and post-secondary students. Informal recruitment efforts in the form of an introduction to STEM (science, technology, engineering and mathematics) or renewables technologies can begin as early as elementary school. These efforts can continue with high-school students and post-secondary graduates. Individuals from an alternative industry seeking to retrain may have no, some or a lot of shared competencies. There are many opportunities to get involved in the industry, such as internship programs, co-operative learning and summer jobs where youth, post-secondary students and recent graduates can gain hands-on experience within the industry.

2. **Retain the current workforce.**
   Retaining workers involves creating opportunities for career advancement, professional development, and transitioning to leadership roles. Moreover, there is a duty to protect workers across their careers to ensure their occupational longevity. In the renewable-energy industry, there are unique challenges that can negatively impact retention. Many renewable-energy occupations are not considered Red Seal Trades. As such, there is a lack of standardization for salary expectations, and a reduced ability to access government funding programs to subsidize training and salary costs. CanREA wants to better understand these challenges and identify ways to advocate for the inclusion of skilled renewables occupations within government funding programs.
   Furthermore, although the renewable-energy industry requires similar skills to some of the registered skilled trades, wind and solar careers feature a unique combination of physical demands, including climbing, working at heights, working in confined or enclosed spaces, engaging in electrical work, torque and tensioning tasks, and manual materials handling. What's more, many renewable-energy sites are remotely located, which can require workers to travel as part of their careers. A strategy to mitigate some of these challenges include the implementation of ergonomics and human-factors solutions. CanREA is currently engaged in a variety of human factors and ergonomics projects aimed to address challenges related to work factors within the industry.

3. **Retain industry knowledge within organizations.**
   Retaining organizational knowledge involves identifying and implementing organizational succession planning strategies. Examples include mentorship programs, creating opportunities for more experienced workers to share knowledge with novice employees, and documentation. EHRC (n.d.-e) has a series of resources relevant to change management and succession planning available here.

Underlying all three of these goals for successful workforce development is a dedication to health and safety in the workplace. With a strong workplace health and safety culture, workers understand and respect the importance of these policies and procedures. In addition, advancements in assistive technology, and the implementation of ergonomics interventions, may reduce the risk of developing musculoskeletal disorders (MSDs) while also improving process optimization and efficiency.

The next question becomes: *how* do we attract new talent into the renewable-energy industry? First, it is important to identify the stages of an employee's career, as well as the various pathways that may lead an individual to a career in the renewable-energy industry. The following section highlights CanREA's *Employment-Process Model,* which aims to address the various career-entry pathways, the resources required, and the role key stakeholders play across an employee's occupational journey.

4. CANREA'S EMPLOYMENT PROCESS MODEL

DEVELOPING THE MODEL

In June 2022, CanREA's Operations Summit closed with a panel on workforce development which explored many current challenges in the recruitment and retention of a skilled renewables workforce. Shortly following the event, CanREA developed the first iteration of *our Employment Process Model*. This model identified career stages, key stakeholders and several resources that would assist workers along their occupational journeys.

Having identified these stages, CanREA began to undertake independent research to find organizations that may fit within the different stages of the model. The research focused on local, provincial, and federal non-governmental organizations and post-secondary schools. This exercise yielded a list of several organizations with programs and resources relevant to the renewable-energy industry.

CanREA's Operations team then conducted organizational outreach, meeting with members of these groups to share the *Employment-Process Model* and learn about these groups' key initiatives. The information gathered during these introductory meetings, along with independent research and conversations with CanREA members, have informed later editions of the *Employment-Process Model,* as well as the foundational information within this report.

Alongside the organizational research and outreach efforts, CanREA's workforce development committee has been working on several projects and initiatives. These initiatives are on-going and categorized under the umbrella of *CanREA's National Workforce Strategy*. These projects are discussed further in the CanREA's Current Initiatives section. They share the same, dual-pronged goals to increase the awareness of career opportunities in the renewable-energy industry and reduce barriers to entry.

The *Employment-Process Model* is foundational to CanREA's current workforce-development efforts, and will continue to guide the future work in this space. The following section explains the components of the *Employment-Process Model* and defines the roles and responsibilities of the key stakeholders identified.

INTRODUCING THE MODEL

CanREA's *Employment-Process Model* focuses on the worker's occupational journey, from their early educational experiences all the way to their retirement. The model's first component focuses on the employee, illustrating the individual's journey of learning about renewable-energy technologies, enrolling in training and education that supports their career aspirations, and entering the renewable-energy workforce (See Figure 1: CanREA's Employment Process Model, page 12).

This model highlights the fact that occupational journeys are rarely linear; candidates may experience challenges and barriers along the way. There are key individuals and groups that can assist candidates across their journey, filling the gaps and providing resources where required to ease the transition from one stage to the next.

The *Employment-Process Model* contains five stages: Introduce, Inform, Train and Evaluate, Employ and Retain. The key people, resources, concepts, and challenges that are relevant to individuals at each stage are presented within the model.

The model also explores the gaps between the stages, which represent transitionary periods within an

individual's career path. These gaps also require support from key stakeholders.

Underlying all of this is the importance of clear career pathways, with an understanding that these will evolve over time to accommodate changes to policy and technological advancement.

The second component of the *Employment-Process Model* identifies the stakeholders involved across various stages of the occupational timeline (See Figure 2: Key stakeholders involved in the five stages of the Employment Process Model, page 13).

These groups aim to support the current and future workforce across their occupational journeys. Moreover, these groups interact and influence one another. These interactions play a role in developing new programs, funding opportunities, legislation and renewable-energy project development. Therefore, these groups require the support of one another to ensure success in reaching their shared objectives.

Figure 1: *CanREA's Employment-Process Model.*

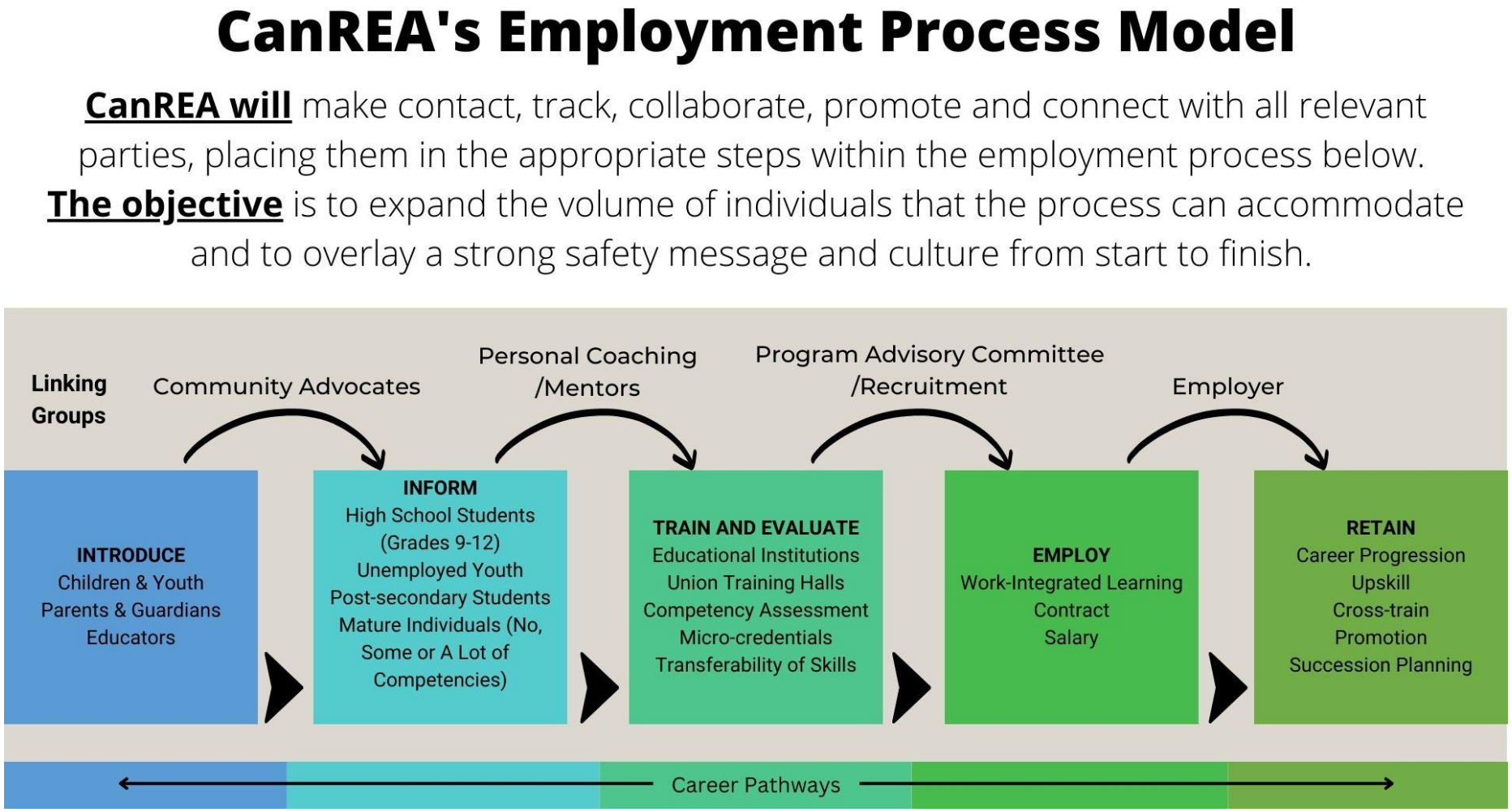
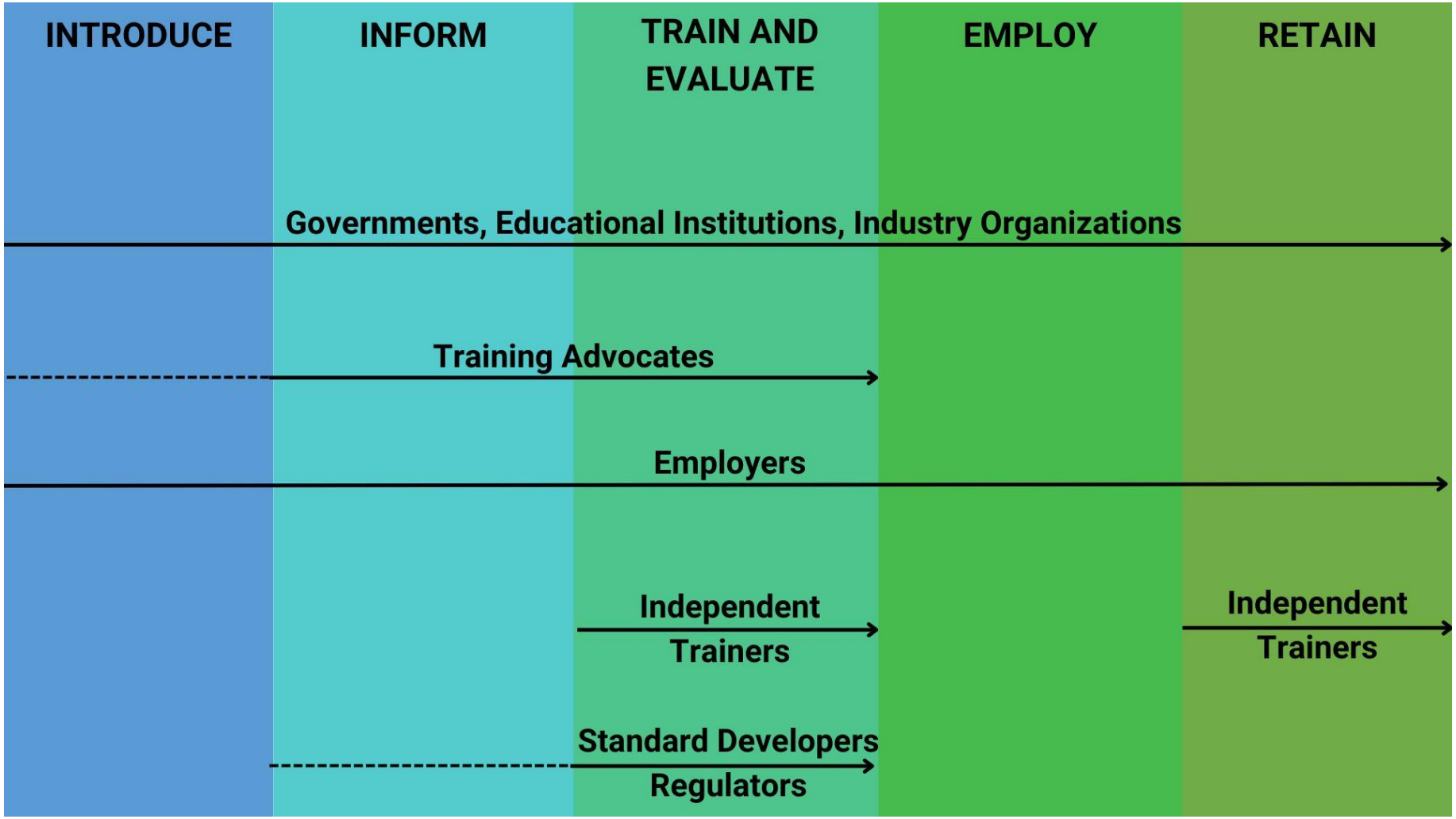


Figure 2: *Key stakeholders involved in the five stages of the Employment-Process Model.*



Stages of the Employment-Process Model

1. Introduce

The *Introduce* stage of CanREA's *Employment-Process Model* addresses the importance of early education and the influence it has on a child or youth's later career decisions. The key people involved at this stage are children, youth, parents, guardians and educators. The Coalition for Career Development (2019) states that "students and their parents/guardians should be exposed to career development—and the core idea that they have access to economic opportunity—beginning in elementary school."

The goal of this first stage is to introduce renewable-energy technologies as early as possible, through the exploration of STEM education and by encouraging students to carry this curiosity throughout high-school and into their post-secondary education and, eventually, their career pathways.

A report developed by the Coalition for Career Development (2019) suggested that a lack of career development "contributes to the lack of student engagement in school." This conclusion is supported by Gallup (2016) survey data that indicates 74% of fifth-graders and only 34% of twelfth-graders are actively engaged in school (Calderon & Yu, 2017). Today's students deserve to understand why they are learning the material in their curriculum, and what is this material's real-world application, in order to build a stronger connection between what they are learning in school and their career (Coalition for Career Development, 2019).

Learning for a Sustainable Future (LSF) (2022) published survey findings indicating that, "across Canada, only 6 of 13 provinces and territories have included climate and sustainability in their curricular documents or education policy." However, when examining the "ladder of engagement," it appears that "the percentage of students feeling 'empowered' in 2019 was 28%; this number rose to 39% in 2022." This finding indicates that "more students felt that human-caused climate change is happening AND that there are things we can do to change it" (LSF, 2022). As such, providing students with opportunities to engage in meaningful learning experiences is an important part of the learning process. These experiences may improve their educational engagement, and help develop their early interests related to STEM and renewable-energy technology. The groups responsible for creating and facilitating these opportunities are referred to as *Community Advocates*.

Community Advocates are defined as educators, parents, guardians, community program leaders, community industry representatives, educational organizations and organizations focused on providing youth opportunities. Industry can engage in the *Inform* stage of the *Employment-Process Model* by providing opportunities to students to tour facilities, participating in speed mentoring events, career fairs, and sponsoring events targeted at youth career exploration and connection to the local community.

The current report formally highlights many renewable energy and general energy sector *Community Advocates* in the forms of local, provincial, and federal non-governmental organizations, post secondary institutions and private training organizations. These organizations have a variety of programs, tools and experiences in which children, youth, parents, and educators can engage. To learn more about these programs, visit the Children & Youth Programs and Experiential Learning Opportunities section of the report.

2. Inform

The next stage of CanREA's Employment Process Model, *Inform*, has a much wider audience. This stage acts as a connection point to a variety of individuals who are on different parts of their career journey. Despite the variations that exist, this stage has one main priority: widely distributing information to create awareness of renewable-energy career opportunities.

On one side of the continuum, there are youth (late high-school) and post-secondary students. Even within

this group, candidates' needs vary. For the high-school student, their primary focus may be to determine what they wish to do following graduation. Students may wonder what their post-secondary options are based on their interests, skills, and the courses taken during their secondary school studies. It is important to encourage students to remain enrolled in STEM courses throughout high school to ensure they have the prerequisites for future education and training.

Collaboration between industry and both high-school educators and guidance counsellors is a key pathway to improving career awareness and providing youth the opportunity to gain experience in these careers. For example, in Ontario, there are a variety of programs, such as the Specialist High Skills Major (SHSM) and Ontario Youth Apprenticeship Program (OYAP) that begin midway through high school. The SHSM allows students to "focus their learning on a specific economic sector" while earning their secondary school diploma (Government of Ontario, 2022b). Similarly, OYAP "is a specialized program in high school that allows you to explore apprenticeship and consider careers in the skilled trades" (OYAP, 2021). Collaborative efforts between industry and facilitators, for programs such as SHSM or OYAP, could create opportunities for students to gain hands-on experience in the renewables field before graduating high school.

Meanwhile, those in post-secondary may be partially or nearly complete their educational program. These individuals are seeking careers that align with their training. Various industries are competing for this potential workforce, and the renewables industry needs promote these opportunities widely and clearly, to ease their transition into the workforce and ensure their participation in the renewable-energy sector.

Another set of individuals to consider in this stage are workers transitioning from their current careers into renewable-energy occupations. These individuals may possess many, few, or no competencies shared between their previous role and their desired role within the renewable-energy industry. This could apply to individuals seeking a career change, veterans or newcomers to Canada exploring career options. For example, EHRC (n.d.-p) has explored the possibilities of transitioning from the tourism industry to the electricity sector. It is important to identify shared competencies and foundational trainings to ensure an efficient career transition while also maintaining a high standard for health and safety.

One component of this stage, necessary regardless of the candidate's experience, is having *Personal Coaches and Mentors.* It is important to note that *Personal Coaches and Mentors* encompasses a large group of people and does not *only* include high school educators or guidance counsellors. In Ontario secondary schools, the average ratio of students to guidance counsellors is 391 to 1 (Hamlin & Kidder, 2015). Therefore, additional support is required outside of the educational environment to ensure candidates' long-term success.

For this reason, *Personal Coaches and Mentors* include educators, career coaches, personal coaching groups, industry representatives or spokespersons (i.e., those who partner with educational institutions, or community events), family and friends, and people working in the renewables industry. These coaches assist by bridging gaps that may inhibit or delay the candidate's entry into a renewables career. For example, they may assist by locating training programs relevant to their career goals, encouraging the candidate during their studies and during their career search, urging candidates to engage in networking opportunities, introducing candidates to industry professionals, and sharing information on subsidies and scholarships available. These *Personal Coaches* may even guide them to the renewable-energy industry in the first place.

Each mentor in a candidate's life plays a pivotal role throughout their career journey, especially when initially exploring the opportunities within a given field. More information on formal mentorship programs relevant to the renewable-energy industry can be found in the Mentorship programs section of this report. In addition to these programs, industry and educational institutions can create opportunities for students to engage in mentorship relationships through the development of speed networking events, career days, and classroom presentations to students within the communities in which renewable energy organizations operate.

3. Train and Evaluate

The third stage of *CanREA's Employment-Process Model* is *Train and Evaluate*. The key objective of the *Train and Evaluate* stage is to provide high quality education and training opportunities to prepare workers for a successful career in the renewable-energy industry. However, there are multiple routes to obtain the required training. The most efficient pathway will depend on the worker's previous education, work experience, and pre-existing competencies and skills. The *Train and Evaluate* stage may involve a college program, a course with a private training institution, upskilling training, or specific skills training as technology continuously evolves.

Recent Canadian LMI survey data indicated that 46% of renewable energy workers "had achieved a high school diploma or less as their highest level of education" (EHRC, 2019). EHRC (2019) explained this may be a result of "a lack of formal training opportunities", "a lack of standardization" in the training for the renewable-energy industry, or the rapid changes in technology requiring on-the-job learning or informal training to occur. However, EHRC (2019) states that it is likely for education levels to increase as the technology matures.

There is an additional component to this stage that explores skill evaluation. This process has two major components. The first involves the review of training program curriculum and second involves evaluating a candidate's skills.

Many post-secondary institutions across Canada have Program Advisory Committees (PAC) as part of their curriculum development. The PAC consists of business and industry professionals, graduates, employers, and representatives from accrediting bodies or professional agencies (Humber College, 2021). Members of these committees provide guidance on how to implement work-integrated learning and experiential learning opportunities, curriculum content suggestions, and information on current technologies and industry changes (Humber College, 2021). These groups provide valuable assistance to colleges to ensure their programs will assist students to gain the skills required to be successful in a renewable-energy career.

The second component involves recruitment professionals who are responsible for identifying candidates with competencies that are desirable based on the roles they are hiring. Unlike a registered skilled trade, the pathways to renewable-energy careers are not standardized. As a result, it can be difficult to identify if candidates have all the required training and skills needed for the job. The development of skill assessments and comprehensive competency pathways are important to understand the transferability of skills from an alternative industry to renewables. These pathways assist with identifying the gaps that may exist and identify ways to fill them.

4. Employ

The *Employ* stage of *CanREA's Employment Process Model* marks a major transition point for the candidate. Previously, the individual was engaged in their education and training, whereas now they can apply their skills through employment opportunities. The *Employ* section of this model explores options for bridging the gap between education and employment. It seeks to identify co-operative learning (co-op), paid on-the-job learning, internship, job shadowing, part time and limited-term contract opportunities that could lead to full-time employment following the completion of educational requirements.

Once employed, there are important considerations surrounding employment benefits, competitive compensation, and contract details. With many industries competing for talent, it is essential that renewable-energy employers provide competitive offerings to prospective employees. Glassdoor survey findings suggest that "…competitive base pay…is clearly associated with lower employee turnover" (Chamberlain, 2017). However, Canadian renewable-energy occupational salary information is not well known. CanREA aims to address this limitation in future work; please refer to the Gap Analysis section of this report to learn

more.

The competition for skilled talent is high. In fact, the majority of EHRC's 2017 survey participants (60%) indicated they were in competition for skilled workers with other utilities (EHRC, 2019). This is substantiated by survey data that revealed while recent post-secondary graduates were the largest source for external hire in the renewable-energy industry (60%), almost one-third (30%) of talent was hired from other electricity-related occupations (EHRC, 2019).

Some hiring challenges reported by electricity industry survey respondents included finding candidates with the required skills or experience (45%), the remote nature of work (29%), and having limited future occupational opportunities (5%) (EHRC, 2019). These challenges can be overcome, but only with the collaborative support of key stakeholders responsible for areas such as training, education, and policy to enable organizations to access the required resources.

The term *Employer* refers to the renewable-energy employer of an organization. The role of the employer is to ensure the workplace is a physically and psychologically safe environment that promotes an inclusive work culture. Employers must also encourage employees to engage in upskilling and take on leadership roles where appropriate.

Employers should also work closely with educational institutions, provincial governments, and the communities in which they operate to assist with the promotion of training and career opportunities to eligible candidates. However, this partnership is not mutually exclusive; education and government stakeholders should take action to look for opportunities to work with industry as well.

EHRC has developed a series of resources relevant to renewable-energy industry employers and job seekers including job demands assessments (JDAs), National Occupational Standards (NOS) and skills for success profiles. Job demands assessments identify the "essential duties required for an occupation" including both physical and cognitive requirements (EHRC, n.d.-l). The NOS are "voluntary guidelines" that provide "practical guidance" to a series of stakeholders on the competencies needed to "perform a specific occupation safely, effectively and efficiently" (EHRC, n.d.-l). Finally, the skills for success profiles "…provide a snapshot of the skills used by job incumbents" (EHRC, n.d.-l). More information about these resources can be found here.

5. Retain

One of the most important components of CanREA's *Employment Process Model* is the *Retain* stage. This section has two substantial goals. The first goal relates to retaining skilled workers in the renewable-energy industry; ensuring they are provided with long and meaningful careers. Once these workers have decided to transition out of their career, the second goal pertains to the retention and transfer of industry knowledge.

Retention is a multidimensional challenge. A few factors that impact retention are career progression opportunities and positive work culture. A Glassdoor survey found that "regular employee advancement into new roles is clearly associated with lower employee turnover" (Chamberlain, 2017). Additionally, there are many advantages in creating a work culture that exhibits a dedication to equity, diversity, and inclusion, with a strong emphasis on safety culture. In our definition, work culture is greater than a single policy or procedure, it is something that is embedded into daily operations, emergency planning, and into the way employees' approach and work with one another. The Glassdoor survey findings also suggest that "…an improved workplace culture…is clearly associated with lower employee turnover" (Chamberlain, 2017).

A challenge specific to the renewable-energy industry is the remote nature of the job sites and the impact on career advancement opportunities. If an individual works at a remote site as a technician with no nearby transfer opportunities, and the site manager is likely to remain in their role, the employee may not be aware of opportunities to progress their career. Options for remote work within the industry and utilizing a

technician's knowledge to engage in teaching or training facilitation should be considered as options for individuals seeking career progression and leadership opportunities.

In addition to the remote nature of work, there are other considerations such as the physical demands of the job and travel required to move from one job site to the next. There are also additional considerations for many renewable-energy careers that are not recognized as registered trades.

The physical well-being and safety of the worker is an important component of worker retention. Efforts to ensure this will require human-resource and health-and-safety professionals to work together to maintain worker safety and protection. Ergonomics can assist with reducing employee turnover, as well as improve how employees feel about their jobs (The Ohio State University, n.d.). However, ergonomics interventions often require the support of workplace policy changes.

Canada has a turnover rate of 16% making it "the 4th country with the highest turnover at a global level in 2018" (Simply Benefits, 2020). However, EHRC (2019) survey data indicated a voluntary termination rate of less than 5% for nearly all electricity-sector occupations. When looking at renewables-specific occupations, EHRC (2019) survey data found a voluntary termination rate of 0% for solar installers, 2% for smart-grid specialists, and 12.5% for wind-turbine technicians (EHRC, 2019). The consequences associated with an employee leaving an organization include new hiring and onboarding costs, reduced productivity and new employee training costs (TCP, 2016). The costs associated with losing an employee varies based on their position (Simply Benefits, 2020), with the turnover cost of an entry-level employee "between 30% and 50% of their annual salary," a mid-level employee approximately 150% of their salary or more, and "a high-level or highly specialized employee costs approximately 400% of their annual salary to replace" (Simply Benefits, 2020). In addition to the financial costs of losing an employee, there is also a loss of knowledge-transfer and mentorship opportunities.

When it come to knowledge transfer, EHRC (2019) noticed that some organizations utilize retirees as casual staff to assist with knowledge gaps, signifying a "lack of succession planning." This may cause retention issues within the younger workforce, "who may not see opportunities to advance materialize" (EHRC, 2019). Within the electricity industry, some common ways of succession planning are "coaching and mentoring" (35%), having new workers shadow experienced workers, various documentation efforts (14%), and cross-training within different areas of the organization (3%) (EHRC, 2019). EHRC (2019) also reported that only 26% and 37% of renewable-energy employers had succession-planning and knowledge-transfer programs in place; these were the lowest reported percentages compared to trades, engineers and engineering technologists, managers and supervisors, and ICT occupations.

Electricity Human Resources Canada (n.d.-t) has a *Succession Planning Best Practices and Tools for the Canadian Electricity and Renewable Energy Sector* resource kit that can be accessed here.

THE IMPORTANCE OF CAREER PATHWAYS

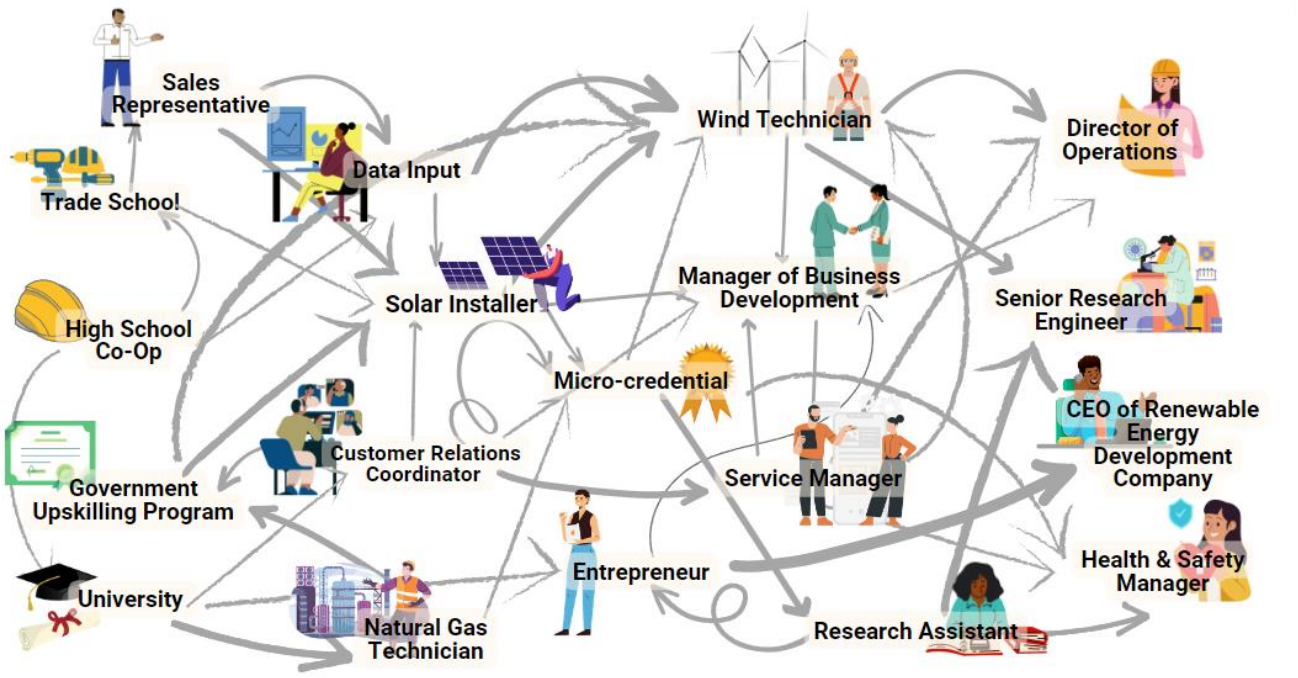
Underlying all the stages of CanREA's *Employment-Process Model* is the importance of clear career pathways. These pathways play a pivotal role in establishing an early and continued understanding of the opportunities within the renewable-energy industry for everyone, at any age, and at any stage of their unique career journey.

The World Economic Forum reports that "65 percent of the children now entering primary school will ultimately work in a job that doesn't exist today" (Lets Talk Science, n.d.). Therefore, as technology evolves, the skills required to work in the renewable-energy industry will change. Career pathways allow job seekers to understand the various occupations with related skills. Moreover, with the transition to the increased use of renewable-energy technologies, there will be a reduction in other forms of electricity generation. Understanding the shared competencies between industries will assist with the development of reskilling opportunities for workers.

Career pathways illustrate that non-linear pathways provide feasible options for workers looking to make a lateral shift between renewable-energy technologies (i.e., moving from wind to solar technologies), between similar industries (i.e., energy sector), or non-similar industries (i.e., retail). Career pathways are also utilized to "increase employee retention and engagement" (Jefferson, 2021).

Career pathways play a pivotal role across a worker's occupational journey. They will evolve with the evolution of the renewable-energy industry. Collaboration between stakeholders is required to ensure that information about new roles in the sector is shared with educators and job seekers, to create awareness of these career opportunities as well as the transferability of pre-existing skills. Figure 3 illustrates examples of potential career pathways relevant to the renewable energy industry.

Figure 3: Examples of renewable-energy career pathways.



THE COMMUNITY PERSPECTIVE

CanREA's *Employment-Process Model* emphasizes the importance of having appropriate resources available throughout someone's career, including what is needed to get individuals involved in the industry, as well as resources to optimize longevity and opportunities for advancement in their careers, and finally to assist them with the transition out of their career.

While it is not explicitly explored in the *Employment-Process Model*, a secondary factor that is also essential to consider is the community in which renewable-energy employees and organizations operate. It is of the utmost importance that workers have sufficient resources when they are living and working in remote communities. Remote work presents challenges, and the solutions for these vary on a case-by-case basis. There are a multitude of considerations with long-term, remote living situations for renewable-energy employees. From a housing perspective, building fly-in-fly-out, or temporary community infrastructure, would assist with limiting the commuting required.

There is also a responsibility for the industry to respect and care for the communities in which they operate. This extends to the people living in the community where renewable-energy sites are being constructed and operated. Community involvement during the planning stages of these projects is essential to ensuring that there are adequate resources for everyone who calls this community home.

The *Employment-Process Model* is a living document. It demonstrates the various pathways through which a candidate can enter the renewable-energy industry. It highlights the key resources and connections these individuals will need for smooth transitions between the stages of the model. The stakeholders assisting candidates with these transitions will take on new roles as the industry evolves. The interconnected nature of these groups will create opportunities to work together to promote careers in renewable energy while finding ways to reduce the barriers to entry.

5. EQUITY, DIVERSITY AND INCLUSION IN THE RENEWABLE-ENERGY INDUSTRY

The ongoing conversation around equity, diversity and inclusion (EDI) is relevant across the renewable-energy industry, and beyond. For many years, there has been underrepresentation of certain groups in the electricity sector as a whole.

Table 1 presents data focused on the employment of women, Indigenous peoples, visible minorities, individuals with disabilities, youth, and members of the 2SLGBTQIA+[1] communities in the Canadian electricity and renewable-energy sectors.

It is important to note that the availability of labour market intelligence (LMI) specific to the renewable-energy industry is limited. The data provided is the most recent information available at the time of writing this report.

Table 1: *Data regarding the employment of women, Indigenous peoples, visible minorities, individuals with disabilities, youth, and members of the 2SLGBTQIA+ communities in the Canadian electricity and renewable-energy sectors.*

Historically Underrepresented Group	Labour Market Intelligence Research Findings
Women	• Natural Resources Canada (2021a) reported that women held 31% of jobs in the energy sector. When looking at job roles, women occupied 82% of "office roles." Meanwhile, men held 97% of trades occupations. • EHRC (2020c) survey data from 52 board of directors revealed that 12% of respondents had no women on their board. Additionally, of 58 companies surveyed, 25% of respondents had no women on their executive teams. • In 2011, women made up 25% of the electricity industry workforce, only increasing 1% by 2016 (26%). This is compared to women making up 48% of the national workforce. According to the EHRC Employer Survey data, women made up less than 8% of the trades and renewable energy workers in these fields. Conversely, the 2016 Census reported women make up 3% and 5% of the trades and renewable occupations, respectively (EHRC, 2019). • Fischer (2019) conducted a survey with Canadian wind turbine technicians. Of those surveyed, five participants were women and nine did not disclose their gender. • Worldwide, it is estimated that 20-25% of the energy workforce "in advanced industrialized nations" is made up of women with less than 6% being technical positions, and less than 1% are top management positions in the sector. This is compared to women's "economy-wide share in employment, which is 40-50% for most OECD countries" (EHRC, 2017).
Indigenous Peoples	• Approximately "15,000 Indigenous people living off-reserve are directly employed in the energy sector" (Natural Resources Canada, 2022). • Five percent "of energy sector employees identified as Indigenous" (Natural Resources Canada, 2021a). • In 2011, Indigenous peoples made up 3% of the electricity sector workforce, compared to 3.9% in the nationwide workforce. The percentage of workers in the electricity sector increased to 4.7% in 2016, with a high concentration of workers in the trades (EHRC, 2019). • Thirty-one companies provided data on the percentage of their workforce that identifies as Indigenous. This percentage was reported at 2% in renewable occupations (EHRC, 2019).
Visible Minorities	• In 2019, 18% of the energy workforce "identified as members of a visible minority group,"

[1] 2SLGBTQIA+ "stands for Two-Spirit, Lesbian, Gay, Bisexual, Transgender, Queer or Questioning, Intersex, Asexual, and additional sexual orientations and gender identities" (YMCA, 2021).

	compared to 14% in 2009 (Natural Resources Canada, 2021a). • In 2016, individuals who identify as a visible minority made up 13% of the electricity workforce compared to 21% in the national workforce (EHRC, 2019). • Thirty-two companies provided data surrounding the percentage of the workforce that identifies as a visible minority. This percentage was reported at 2% in renewable occupations (EHRC, 2019).
Individuals with Disabilities	• In 2017, individuals with disabilities made up 3% of the electricity workforce, compared to 12.6% of the national workforce in 2016 (EHRC, 2019). • Thirty-two organizations provided data related to persons with disabilities in the workplace. The percentage of individuals with disabilities in the workplace was reported at 0% for renewables occupations (EHRC, 2019).
Youth	• EHRC (2020) conducted a national survey of Canadians aged 18 to 36. EHRC (2020) found that, "renewable energy, including specifics like solar and wind, have the most positive impressions out of the sources of electricity" surveyed. • The survey also found that "about half of Millennials and Gen Zers are open to considering a career in electricity", "just over one in ten…are definitely interested in a career in electricity", and "just over one third…are somewhat interested in a career in electricity" (EHRC, 2020b). • According to the national workforce statistics, 14% of workers are under 25 years old. Meanwhile, EHRC's survey and Statistics Canada (NAICS 2211) survey indicated those under 25 make up 4% and 5% of the electricity workforce, respectively (EHRC, 2019). • EHRC's survey indicated that 12% of wind turbine technicians and smart grid specialists, and 6% of solar installers are under 25 years old based on the responses received (EHRC, 2019).
Members of the 2SLGBTQIA+ Community	• EHRC (n.d.-m) indicates that Canada's electricity workforce has a lower representation of 2SLGBTQIA+ individuals "than is present in our overall population."

Beck et al. (2022) conducted interviews with "senior decision-makers from 23 Canadian energy organizations" to determine how these individuals conceptualize EDI. This report identifies that "addressing EDI is key to achieving Canada's net zero target" (Beck et al., 2022).

Foundationally, improving EDI within organizations is seen as "simply a moral imperative" (Beck et al., 2022). Furthermore, there are external pressures from various stakeholders to act on EDI issues (Beck et al., 2022). This presents a positive opportunity for organizations.

Lorenzo and Reeves (2018) reported that Harvard Business Review conducted a multinational study examining diversity in management positions and found a "statistically significant relationship between diversity and innovation outcomes." This is substantiated by the Beck et al. (2022) report, in which participants indicated a diverse workforce with an inclusive work culture led to "better decision-making, promoted creativity, and foster[ed] innovation."

It is important to remember that many individuals are part of more than one historically underrepresented group. The term 'intersectionality' was coined by American civil rights advocate Kimberlé Crenshaw and is used "to describe how discrimination against different facets of a person's identity can overlap and impact their lives" (Bagalini, 2020).

For example, Branigan (2021) writes, "While all women may encounter similar challenges…not all women will experience them in the same way." Doiron et al. (2021) explores the intersectionality of women in the energy transition and notes the "diversity of experiences that reflect the wide range of identities and intersections at play." These intersections can "result in amplified barriers" and "impact representation" (Doiron et al., 2021). An intersectional lens must be applied to improve the participation and employment of historically underrepresented groups in the electricity and renewable-energy sectors.

Table 2 provides a series of publications, resources, and organizations engaged in addressing employment barriers and inequities in the electricity and renewable-energy sectors . This table is not an extensive list of the programs, publications, and websites available. Rather, the goal of this list is to provide a place to start

conversations, create awareness, and identify strategies for mitigating barriers to employment.

Table 2: *Programs, publications, websites, and articles to support equity, diversity, and inclusion in the electricity and renewable-energy sectors.*

Cohort	Resources
Employment of Women in Renewable-energy and Electricity Sector Occupations	• Women in Renewable Energy
Employment of Indigenous Peoples in Renewable-energy and Electricity Sector Occupations	• Bright Futures Energy Camp (EHRC) • Indigenous Community Programs (Relay Education) • Aboriginal Workforce Participation Initiative (EHRC) • Accelerating Transition: Economic Impacts of Indigenous Leadership in Catalyzing the Transition to a Clean Energy Future Across Canada (Indigenous Clean Energy) • Aboriginal Participation Initiatives Project (EHRC) • Indigenous Clean Energy • Climate Career Portal (Iron and Earth) • Indigenous Climate Hub • ICE Network
Employment of Individuals with Disabilities in Renewable-energy and Electricity Sector Occupations	• Disability to Inclusion Project Resource Kit (EHRC) • Persons with Disabilities in a Just Transition to a Low-Carbon Economy (ILO)
Employment of Members of the 2SLGBTQIA+ Community in Renewable-energy and Electricity Sector Occupations	• Pride at Work Canada • U.S. Out in Energy • 2SLGBTQIA+ Inclusion (YMCA)
Supporting Diversity and Inclusion in the Workplace	• Workplace Strategies for Mental Health: Implicit Bias Workshop Materials, Leader Support for Newcomers, and Discrimination Prevention and Inclusivity • Illuminate Opportunity Toolkit (EHRC) • Welcoming Newcomers Program (EHRC) • Preparing International Talent for the Canadian Workforce (ECO Canada) • Anti-Racist Resources (Build A Dream) • National Clean Energy Workforce Alliance (IREC)
Government Initiatives to Support Equity, Diversity, and Inclusion in the Workplace	• Government of Canada – The 50-30 Challenge: Your Diversity Advantage • Natural Resources Canada – Equal by 30 • EHRC – Leadership Accord on Diversity, Equity and Inclusion

The electricity sector has made progress in recent years to engage in initiatives that support policy and programs to enhance equity, diversity and inclusion in the industry. However, there is more work to be done. CanREA believes that our association, and our industry, is best positioned to succeed when it reflects the diversity of Canada and the communities within which we operate. Discrimination, racism and sexism have no place in our industry. Recognizing, respecting and valuing individual differences and the contributions of all fosters more creative thinking, innovation and problem solving as we work to advance solutions to Canada's environmental and economic challenges.

To that end, CanREA is committed to developing and implementing actions that will advance equity, diversity and inclusion within the association (e.g., events, governance, operations) and that will encourage and support our member companies to do the same.

6. EXISTING CAREER RESOURCES

As highlighted in CanREA's *Employment-Process Model*, the availability and distribution of resources is a key component to improving renewable-energy career awareness and reducing the barriers to entry.

There are numerous organizations that focus on providing the opportunity to engage in programs related to renewable energy and the just transition to children and youth, post-secondary students and graduates, workers transitioning from alternative industries, newcomers to Canada and historically underrepresented groups.

The following pages highlight a range of organizations offering programs including the following categories of resources:

A. Work-integrated learning opportunities
B. Children & youth programs and experiential learning opportunities
C. Career awareness and exploration resources
D. Renewable-energy job boards
E. Renewable-energy training opportunities
F. Renewable energy in the media
G. Mentorship programs
H. Renewable-energy research and labour market intelligence (LMI)
I. Employer resources
J. Educator resources
K. Renewable-energy active initiatives
L. Government workforce initiatives

A. WORK-INTEGRATED LEARNING OPPORTUNITIES

There are key differences between internship and co-operative learning (co-op) programs. Work-integrated learning is an umbrella term that captures these opportunities, as well as work placement, practica, field work and applied projects (Bleakney, 2019). CEWIL Canada (2021) has defined several work-integrated learning terms to identify the key differences between these opportunities; these definitions are available here.

Work-integrated learning opportunities provide prospective employees the opportunity to gain entry-level experience and employment in their field. According to a survey by the National Association of Colleges and Employers (NACE; 2017), 91% of employer respondents "prefer that their candidates have work experience," 65% would prefer for "candidates to have relevant work experience," and 56% of employer respondents would prefer the experience to be from an internship or co-op (NACE, 2017).

Internships create the opportunity for candidates to potentially earn higher starting salaries, try out a potential career, gain positive work habits, and potentially transition into a full-time career with their internship organization (Maple Education Inc., 2021). In support of the latter point, a NACE (2019) survey reports the offer rate for interns was 70.4%. Therefore, internship programs provide a valuable opportunity to youth and first-time job seekers that will assist with further employment and professional development.

There are examples of renewable-energy employers who regularly hire seasonal students for co-op and internship opportunities. Post-secondary schools and program coordinators play a role in identifying opportunities to integrate co-op, field placement, and internships as part of their program. In addition, students who do not have work-integrated learning built into their post-secondary programs can obtain summer employment directly through an employer.

Table 3 (see page 27) provides a list of formal environmental-based internship programs for youth, provided by non-governmental organizations across Canada. The programs listed in Table 3 aim to identify opportunities for individuals who wish to participate outside of their post-secondary training, recent graduates, or those who are not currently enrolled in school. CEWIL Canada (n.d.)'s website features a National WIL Directory that identifies the various work-integrated learning opportunities at Canadian colleges and universities.

Table 3: *A series of internship programs for youth offered by provincial and federal non-governmental organizations.*

Organization	Program	Eligibility Requirements
Clean Foundation	Clean Leadership Summer Internships	• Must be a Canadian citizen, Permanent Resident or person who has been granted Refugee Status or is legally entitled to work in Canada. • Between the ages of 15-30 years old at the start of internship. • Not in receipt of Employment Insurance (EI) during the internship. • From and/or will be residing in Nova Scotia for the duration of the internship. • Some positions require applicants to be a current high-school or post-secondary student to be eligible.
	Science Horizons Internship	• Less than 30 years old at the start of the internship. • Graduated from post-secondary school. • Not receiving Employment Insurance during the internship. • Not currently working for the hiring organization. • Not currently enrolled in school. • A Canadian citizen, Permanent Resident, or person who has been granted Refugee status in Canada.
	Green Jobs	• Between 15-30 years old at the start of the internship • Eligible to work in Canada. • Not currently enrolled in school. • A Canadian citizen, permanent resident or have refugee status.
Electricity Human Resources Canada	Empowering Futures for Post-secondary Students and Apprentices	• Eligibility requirements for students and apprentices are available at the link provided.

B. CHILDREN & YOUTH PROGRAMS AND EXPERIENTIAL LEARNING OPPORTUNITIES

Experiential learning is known as "the process of learning by doing" (Kent State University, n.d.). When children and youth engage in these opportunities, it provides them with an understanding of the relevance of the topics covered in their school curriculum and applies their learning in real-world settings (Government of Ontario, n.d.).

Holdings (2014) writes that experiential learning is viewed as "the future of learning." Furthermore, this method has been reported to accelerate learning by using students' decision-making, problem-solving and critical-thinking skills, while simultaneously increasing levels of engagement (Holdings, 2014).

These opportunities can begin as early as daycare or preschool, where children can participate in "outdoor education" or "service learning" such as "recycling programs and environmental clean ups" (Rainforest Learning Centre, n.d.). Experiential learning can continue into the middle stages of the *Employment-Process Model* throughout an individual's post-secondary endeavors as well. Some examples include internships, service learning, cooperative or clinical education, student teaching, practicum, research projects, or field work (Boston University, n.d.).

Table 4 provides examples of experiential-learning opportunities for children and youth focused on climate-change awareness, electricity and renewable-energy. These programs and activities often require parents, guardians, educators and community leaders' support and facilitation. This exemplifies the importance of working together with key stakeholders to create these opportunities for children and youth.

Table 4: *A series of climate awareness, electricity sector and renewable energy experiential learning opportunities for children and youth.*

Organization	Program Title	Age Group	Region (If Applicable)
Electricity Human Resources Canada (EHRC)	Bright Futures Energy Camp	Indigenous youth ages 10-13.	Various host communities.
Clean Foundation	Eddie's Litterless Quest	Grades P-3.	Maritime Provinces
	I Wonder… Webinar Events	Grades 6, 7, 8, and 10.	Maritime Provinces
	Clean Energy School	Grade 6.	Maritime Provinces
KidWind*	Class Activities	Elementary, middle school, and high school age groups.	U.S. based, accessible internationally.
	Science Kits and Lab Materials	Various.	U.S. based, accessible internationally.
National Renewable Energy Laboratory (NREL)*	Educational Resources for Students	Kindergarten to grade 3 and grades 4 to 8. External resources listed for grades K-12.	U.S. based, accessible internationally.
National Energy Education Development (NEED) Project*	NEED Distance Learning Resources	Various.	U.S. based, accessible internationally.
	Science Fair Projects	Primary, intermediate, and secondary.	U.S based, accessible internationally.
	Energy Games, Puzzles, & Activities	Elementary, intermediate, and secondary.	U.S. based, accessible internationally.

Relay Education	Kid's World of Energy Festival	Grades 5-6.	Nationwide.
	Elementary Workshops	Varies based on the workshop. Ranges from grades 4-8.	Nationwide.
	Secondary Workshops	Varies based on the workshop. Ranges from grades 9-12.	Nationwide.
	Indigenous Youth Programs	Workshops can be tailored to grades 1-12.	Nationwide.
KickAss Careers	Workshops Introducing Trades Careers	Presentations for primary and secondary students.	Nationwide.
Indigenous Clean Energy	ImaGENation: Indigenous Youth Mentorship Program	Indigenous youth aged 18-30.	Nationwide.
	Generation Power Youth	Indigenous youth aged 18-30.	Nationwide.
	20/20 Catalysts	Indigenous youth and adults. Participants must be at least 18 years old to participate.	Nationwide.
The Gaia Project	Elementary School Resources	Kindergarten to grade 5.	New Brunswick
	Middle School Resources	Grades 6-8.	New Brunswick
	High School Resources	Grades 9-12.	New Brunswick
	Green Experts Program	High school aged students.	New Brunswick
Inside Education	Energy Innovation Days	Junior and senior high school students.	Alberta
	Generate & Navigate: Youth Energy, Water & Climate Leadership Summit	Junior and senior high school students.	Canmore, Alberta
	Classroom & Online Programs	Elementary, junior high, and high school students.	Alberta
Build A Dream	#HerPower Skills	Women in grades 9-12.	Windsor, Ontario
GreenLearning	Educational Programs	Grades 3-12.	Nationwide - Canadian educators - Quebec participants are not eligible to receive prizes.
	GreenLearning Challenges	Grades 3-12.	
Learning for a Sustainable Future	Action Project Funding	Kindergarten to grade 12 students.	Canadian residents
	Youth Forums	Varies based on the forum.	Canadian residents. Some forums are available in-person.
	Our Canada Project	Various.	National
	Sustainable Future Schools	Various	National
Student Energy	Student Energy Fellowship	People aged 18-30.	International
	Career Training Program	People aged 18-30.	International

**Indicates the organization is based in the United States.*

C. CAREER AWARENESS AND EXPLORATION RESOURCES

Career awareness and exploration can coincide with experiential-learning opportunities. These activities allow for students to broaden their career horizons. Mann et al. (2020) reports PISA (Programme for International Student Assessment) survey data that indicates “career expectations have become more concentrated over time.”

Let’s Talk Science (2021) compiled survey data which revealed students indicated previous awareness of careers or programs presented to them about half of the time. Awareness of STEM and agriculture, natural resources and conservation programs or careers was reported at 54% and 48%, respectively (Let’s Talk Science, 2021). Of the sciences, students were least aware of careers and programs related to engineering technology (Let’s Talk Science, 2021).

Let’s Talk Science (2021) concludes that improved awareness of STEM career opportunities, role models in the field, and “greater understanding of the value of interdisciplinary skills in post-secondary pathways” results in an increased desire to take elective STEM credits in high school. Thanks to their exposure to STEM courses, students allow themselves a wider range of opportunities when selecting post-secondary programs.

Career-awareness programs have been demonstrated to have long-term impacts on participants. As far back as 1970, a UK British Cohort study examined youth (age 16) who had and had not taken part in career talks (OECD, 2020). It was discovered that participating in career talks “is associated with significantly better earnings at age 26” (OECD, 2020). What’s more, OECD (2020) noted the “wage premium was found to be at its greatest where students took part in more than five career talks at age 14-15, rather than at 15-16, and when they agreed at the time that they had been very helpful.” This exemplifies the importance of creating early and frequent opportunities for students.

Understanding the importance of these opportunities, the next question becomes: how many children and youth engage in career exploration activities? OECD (2020) reports that on average, 40% of students participate in career-exploration activities. However, individuals “from more disadvantaged backgrounds” are less likely to engage compared to their more privileged counterparts (OECD, 2020).

A report by the Labour Market Information Council (LMIC) and Future Skills Centre (FSC) (2021) found that “half of youth aged 18-24” and “one in five adults aged 25-34 received career services in the last five years.” The chance of using career services varied significantly between different groups: “Men, those with post-secondary education, immigrants and unemployed people are more likely to use career services” (LMIC & FSC, 2021). While “nearly everyone” that utilized career services “reported some positive impact” many reported gaps “in the provision of labour market information” (LMIC & FSC, 2021). Interestingly, many Canadians are not accessing career services due to lack of awareness, accessibility, or feeling like they do not need them (LMIC & FSC, 2021) The rate of utilizing these career resources in Canada is much lower compared to other OECD countries (LMIC & FSC, 2021).

Therefore, it is important that workforce-development organizations work to make their resources widely available and affordable to reduce barriers to access, and that government bodies promote career awareness resources.

CanREA can have a positive impact on the number of individuals entering the industry by partnering with these organisations in order to extend the promotional reach of the outreach for their initiatives. Table 5 (see page 31) provides a list of career awareness, exploration and planning resources related to the electricity and renewable-energy industry.

Table 5: *A collection of career awareness, exploration and planning resources for students and prospective employees.*

Organization	Resource Title	Description
Electricity Human Resources Canada	Getting Started in Electricity: Jobseekers	According to EHRC's latest Labour Market Intelligence (LMI) report, employment in the sector is anticipated to grow from 2017 overall by 2% by 2022 and will need to recruit over 20,500 new employees in that time. Any one of those positions could be yours to fill. From design to construction to engineering, there are a wide variety of jobs across the sector to fit your skills and interest! Explore a selection of career options below to learn more about each one.
Iron and Earth	Climate Career Portal	The Climate Career Portal is a digital platform that connects fossil fuel industry workers with career path opportunities in the net-zero economy, along with climate solution information, industry resources, and connections to training opportunities to support their career transition.
Indigenous Clean Energy	ICE Network	The ICE Network is an open-source, open-entry platform that provides a space to learn about clean energy technologies, connect with others who are moving projects forward, share opportunities and work together to increase Indigenous inclusion and leadership in clean energy. The ICE Network has several clean energy learning resources and tools, such as webinars, case studies, job opportunities and more.
American Clean Power (ACP)*	Learning to Fly: How I Became a Wind Tech	A blog post sharing one person's journey to becoming a wind turbine technician.
	Skilled Jobs in Clean Energy are Growing and Offer Opportunities for Women to Advance within In-demand Careers	A blog post sharing the opportunities for women in renewables featuring a case study of one individual's journey into the renewable-energy industry.
Global Wind Organization (GWO)**	The Many Faces of an Entry Level Technician	Examples of individuals who were military personnel and oil and gas workers who have transitioned to a career in wind.
Interstate Renewable Energy Council (IREC)*	Solar Career Map	A map of 40 solar careers from entry-level to advanced roles.
ECO Canada	Environmental Career Profiles	Each environmental career profile gives you a snapshot of the profession, including job duties, work environment, educational requirements, and related careers.
Careers in Energy	Working in Renewables	Resources to help you find your pathway to a career in renewables.
	Explore Energy Careers	Explore more than 170 career profiles with information about work activities, qualifications and required experience, expected average salaries and related roles to find your fit with a career in energy.
	Assess your Career Change Tool	Select from a list of oil and natural gas careers to view its transferability to other sectors where the occupation is employed and identify skills match and skills gaps between oil and natural gas and the emerging energy sectors.
Relay Education	Indigenous Green	This program offers interactive workshops, mentorship and

	Careers	networking opportunities for Indigenous youth, ages 15-29. In the green career exploration workshops, participants identify how their skills and personal interests align with jobs in sustainability, environment, energy and more.
Nuvéo Creneau of Excellence in Renewable Energy	Énergie Vive – Métiers de l'éolien	A Facebook group for wind power professionals.
	Perspectives – Vivre en Gaspésie	Perspectives, c'est valoriser les possibilités professionnelles de la région. C'est se donner une occasion de démontrer aux jeunes qu'un avenir en Gaspésie est tout à fait possible.
U.S. Department of Energy*	Wind Career Map	Career opportunities in wind ranging from a bachelor's degree to a PhD.

**Indicates the organization is based in the United States.*
***Indicates the organization is based outside of North America.*

D. RENEWABLE-ENERGY JOB BOARDS

Industry-specific job boards create a central location for multiple employers to post their available careers. These job boards provide job seekers the opportunity to compare similar roles across different organizations.

Adecco (2022) conducted a web survey to examine Canadian job-seeker behaviour. The survey posed the question, “When looking for a new job, what resources do you use?” and allowed participants to select up to five responses (Adecco, 2022). The survey found that job boards such as Indeed or Workopolis (78%) and social media (47%) were the top two most common responses (Adecco, 2022). Adecco (2022) concludes from these findings that, “Posting on job boards should be a priority in every recruitment strategy.”

Lanz (2022) explores how posting on an association job board is a cost-effective option compared to advertising on the company’s own website or through a mass job board. This decision also reduces the amount of work for the hiring staff due to the niche market (Lanz, 2022).

The second benefit is related to increasing brand awareness and website traffic while getting in front of qualified candidates (Lanz, 2022). Finally using an association job board assists to simplify the candidate search process; it creates a centralized place of high-quality applicants for employers (Lanz, 2022).

Table 6 presents a collection of association and renewables-specific job boards.

Table 6: *A series of job boards containing career opportunities related to renewable-energy technologies.*

Organization	Link to Job Board
Canadian Renewable Energy Association (CanREA)	https://renewablesassociation.ca/careers/
Electricity Human Resources Canada (EHRC)	https://ehrc.magnet.today
American Clean Power (ACP)*	https://cleanpower-jobs.careerwebsite.com/
ECO Canada	https://eco.ca/new-practitioners/employment-support/job-board/
Careers in Energy	https://careersinenergy.ca/job-board/
Nuvéo Creneau of Excellence in Renewable Energy	https://nuveo.org/offres-emploi/
Solar Alberta	https://solaralberta.ca/training-jobs/job-listings/
Electric Energy Online Job Center	https://electricenergyjobs.com/

**Indicates the organization is based in the United States.*

E. RENEWABLE-ENERGY TRAINING OPPORTUNITIES

The renewable-energy industry employs highly skilled workers. To get involved in this rapidly evolving and growing industry, candidates must undergo training to understand the job duties and safety requirements of their day-to-day work tasks. Training can take place via multiple avenues, such as in post-secondary programs, third-party organizations, community-based training opportunities, within the employees' organizations, or a combination of these options.

The right training pathway will vary based on the individual. The *Employment Process Model* outlines that individuals may decide to enter a renewable-energy career immediately following high school, following post-secondary studies, or when transitioning from an alternative career (with no, some, or a lot of shared competencies), or they may already be employed in renewables and are seeking a lateral shift. Training must be accessible and complement non-linear career pathways to maximize efficiency and reduce the time to career entry, while maintaining a high standard for worker safety.

For example, an individual who has just completed high-school, with no previous renewable-energy training or experience, may benefit from participating in a post-secondary renewable-energy program. Meanwhile, an individual looking to make a lateral shift in careers from a wind technician to a solar installer, may be best suited for individual training courses that allow the worker to fill the gaps of their current knowledge and skills.

Due to the variety of training options, these resources have been categorized as either an electrotechnical post-secondary program, a renewables-specific post-secondary program (Table 7, page 35), or training offered by a third-party organization[2] (Table 8, page 36).

[2] Please note: This category also includes community-based training programs.

Table 7: *A list of renewable-specific post-secondary programs across Canada.*

Province	School	Program
Alberta	Concordia University of Edmonton	Renewable and Sustainable Energy Management
	Lakeland College	Sustainable Energy Technology
		Solar PV Microcredential
	Lethbridge College	Wind Turbine Technician
	Northern Alberta Institute of Technology (NAIT)	Alternative Energy Technology
		Solar Voltaic Installation for Electricians
		Designing Solar Voltaic Systems
	University of Alberta	Renewable Energy Technologies
British Columbia	British Columbia Institute of Technology (BCIT)	Renewable Energy Electrical Systems Installation and Maintenance
		Smart Grid Systems and Technologies
	Camosun College	Global Sustainability
	Northern Lights College	Advanced Certificate in Wind Turbine Maintenance
Nova Scotia	Nova Scotia Community College (NSCC)	Solar Photovoltaic (PV) Panel Installation Training
Ontario	Canadian College for Health, Science, and Technology	Solar Photovoltaic Technician
	Carleton University	Sustainable and Renewable Energy Engineering
	Centennial College	Energy Systems Engineering Technician
		Solar PV Installation for Electricians (Journeymen and Apprentices)
		Energy Systems Engineering Technician (Fast-Track)
		Energy Systems Engineering Technology (Fast-Track)
		Energy Systems Engineering Technology
	Cestar College of Business, Health & Technology	Wind Turbine Technician Program
	Conestoga College	Applied Energy Management – Renewable Energy Stream
		Renewable Energy Techniques
	Fanshawe College	Renewable Energies Technician
	Niagara College	Renewable Energies Technician
	St. Lawrence College	Energy Systems Engineering Technician
		Energy Systems Engineering Technology
		Wind Turbine Technician
Prince Edward Island	Holland College	Wind Turbine Technology
Quebec	Groupe Collegia	Maintenance d'éoliennes (AEC)

Table 8: *A list of foundational, renewables, and professional development training offered by provincial and federal non-governmental organizations.*

Organization	Training Opportunity	Target Audience	Region
Electricity Human Resources Canada (EHRC)	Professional Skills Training	Recent graduates Employees Employers	Virtual
Solar Alberta	7 courses listed	Varies based on the course.	Alberta
Team-1 Academy	84 courses listed	Varies based on the course.	Various
Nouvelle Hauteur	19 courses listed	Varies based on the course.	Candiac, Quebec
Enercon	7 courses listed	Varies based on the course.	Boucherville, Quebec
ECO Canada	BEAHR Indigenous Training Programs	First Nations, Inuit, and Métis communities across Canada.	Nationwide.
	Professional Development Training	Topics range from employability advice, Indigenous stakeholder engagement, to technical knowledge on subjects like GHG and Environmental Management.	Canadian-based, accessible internationally.
	Preparing International Talent for the Canadian Workforce	Funded by the Government of Canada's Foreign Credential Recognition Program, this program strives to remove the barriers faced by highly skilled immigrants when attempting to enter the Canadian Environmental workforce.	Nationwide.
ECO Canada & Royal Roads University	In-person and online courses for professionals	In partnership with Royal Roads University and in accordance with the National Occupational Standards (NOS) for Environmental Employment, the goal of our higher education programs is to provide students advanced education, training, and professional development tailored to the Canadian environment industry.	Accessible online.
Relay Education	Indigenous Community Programs	Relay works with each community to collaborate and deliver custom renewable-energy and green career education courses based on the community's needs and desires. Each program is unique to individual Indigenous communities.	Various Indigenous communities across Canada.
Quick Train Canada (Canadian Colleges for a Resilient Recovery)	A variety of microcredentials related to clean tech, construction, natural resources and environment.	Canadians coast to coast to coast can now access fully-funded microcredentials to help to increase skills and competencies to prepare them to meet the needs of Canada's shifting economy.	National accessibility.

F. SCREEN MEDIA FOR CAREER AWARENESS

Media consumption is at an all-time high, particularly with youth and screen media (TV, YouTube, TikTok, podcasts, and other screen media). In a study by Rideout et al. (2022), teens (ages 13-18) averaged eight hours and 39 minutes of screen media daily (increasing from seven hours and 22 minutes in 2019, and six hours and 40 minutes in 2015).

To further substantiate this point, 41% of teens surveyed indicated they are engaged with screen media for more than eight hours per day (Rideout et al., 2022).

Media and pop culture may provide “an entryway for students who may have not had the ability to experience what it is like to work in a desired field” (Lubenov, 2021).

Chandler and Reckker (2011) indicate that media studies have found “that television serves as a highly popular pedagogical resource” when learning about careers. Teens reported a higher level of knowledge of careers presented on television compared to jobs that are not frequently featured in programs (Chandler & Reckker, 2011).

There are personal accounts from students that watched television shows and YouTube videos which inspired their careers in medicine and allowed them to envision themselves in the occupation (Lubenov, 2021).

Moreover, a student in psychology recalls her first interaction with the TV show *Criminal Minds* took place while exploring #criminalminds on TikTok; this assisted with building her interest in psychology along with listening to podcasts (Lubenov, 2021).

With youth media consumption on the rise, this creates an opportunity to showcase engaging content to promote career opportunity awareness in the renewable-energy industry.

Table 9 (page 38) presents some examples of podcasts, videos, and alternative media that is relevant to the renewable-energy industry.

Table 9: *Renewable energy, climate, and electricity sector podcasts, videos, and other media.*

Organization	Media Title	Topics Explored
Relay Education	In the Green Chair	In the Green Chair is a podcast for anyone looking to start or grow their green career. Throughout the show, noteworthy guests share their professional experience to help us uncover the diverse opportunities that exist in the green economy; and the possibilities that await.
Learning for a Sustainable Future	Green Jobs: Adapting to our Changing Climate – Video Series	This series of 10 videos introduces students to various Canadian experts who build climate resilience through their work. Each video is hosted by high school students from across Canada. As part of your careers studies courses, sustainability and climate change courses or club activities, share these videos with your students to inspire them to think about green jobs!
Leading Change Canada	Generation Net Zero Podcast	On Generation Net Zero, hosts Biboye Aganaba, Executive Director and Emily Lau, Programs Coordinator at Leading Change sit down with young leaders in climate justice, sustainability, activism, and more to discuss the necessary steps on the road to net zero. Join us monthly to hear from the brightest minds in the youth sustainability scene. We are Generation Net Zero. Join us.
Canadian Colleges for a Resilient Recovery (C2R2)	Various Webinars	Join us as we showcase how colleges, institutions, polytechnics and cégeps can lead the resilient recovery and support a climate-ready Canada.
Canadian Renewable Energy Association (CanREA)	Working in renewables YouTube Playlist	A series of videos that highlight worker's experiences in the renewable-energy industry and renewable-energy technologies.

G. MENTORSHIP PROGRAMS

Having mentoring relationships is important across an individual's career. From the mentees' perspective, there are numerous benefits such as professional development and networking opportunities, increased confidence, improved awareness surrounding others' work strategies and having a trusted person to share challenges and new ideas with (UC Davis, n.d.).

However, these relationships are mutually beneficial to both the mentor and mentee. A Robert Half Management Survey (2018) asked individuals with mentorship experience to identify what was the "greatest benefit of being a mentor." The responses included being provided the opportunity to improve their leadership skills (38%), receive the "internal satisfaction of helping someone else" (29%), professional network building (18%), and staying up to date on trends within industry (15%).

What's more, Kennett and Lomas (2015) identified that mentorship can "facilitate a sense of meaning" for the mentor and "being asked to mentor can boost self-worth and efficacy."

Mentorship programs can also benefit organizations as a means of knowledge transfer. EHRC (2019) reported survey data that indicated 35% of respondents used coaching and mentoring as a method of knowledge transfer within organizations.

These programs provide a unique opportunity in the renewable-energy industry for experienced technicians to share their experience and skills with novice technicians. They also provide novice technicians with a trusted individual with whom they can ask questions, communicate ideas and address challenges.

Table 10 provides a list of mentorship programs available across Canada pertaining to the electricity sector and renewable-energy industry. These programs offer opportunities for individuals seeking to become a mentor or a mentee.

Table 10: *Mentorship programs for individuals interested in the electricity and renewable-energy sector careers.*

Organization	Program Title
Electricity Human Resources Canada (EHRC)	Mentor Junction
Climate Career Portal (Iron and Earth)	Find a Mentor
Indigenous Clean Energy (ICE)*	ICE Mentorship
Women in Renewable Energy (WiRE)	Speed Mentoring

** Currently, mentorship opportunities **are limited to program participants**. If opportunities for mentorship open to other eligible applicants, they will be posted to the ICE Network. For more information, please visit the Mentorship Program website.*

H. RENEWABLE-ENERGY RESEARCH AND LABOUR MARKET INTELLIGENCE (LMI)

Labour market intelligence (LMI) refers to information such as occupational opportunities, required skills, current workforce demographic data and other occupational data categories (Future Skills Centre, n.d.-a). As the Government of Newfoundland (n.d.-b) writes, "the best LMI provides us with information to make positive labour market changes which benefit everybody."

Labour market intelligence (LMI) is important to a variety of stakeholders to assist with informed decision-making regarding the labour market (Government of Newfoundland, n.d.-b). These stakeholders can include job seekers and students, policy makers, human resources professionals and career service providers (Future Skills Centre, n.d.-a).

- For a job seeker, LMI may provide insight and direction on what to study and career opportunities whether it be a first job or the next stage in an occupational journey (Government of Newfoundland, n.d.-b).
- For policy makers, LMI provides data that "…support employment and training programs and policies, responsive to the needs of their communities" (Future Skills Centre, n.d.-a).
- For human resources professionals, LMI is an indicator that allows these individuals to "…to make accurate decisions about training their current workforce and recruiting new staff" (Future Skills Centre, n.d.-a).
- Similarly, for career service providers, LMI "…can support them with identifying training and skills development needs, hiring demands and employer engagement" (Future Skills Centre, n.d.-a).

Current and future forecasting data is required to ensure there are an adequate number of skilled workers in the renewable-energy industry as it continues to rapidly expand. As the technology evolves and new roles are created, it is important to have accurate and timely information to assist with informing prospective candidates of the opportunities in the field.

Table 11 (page 41) provides a list of the renewable-energy and general energy sector LMI reports.

Table 11: *A collection of recent labour market intelligence and other renewable-energy research reports.*

Organization	Project Title	Description
Electricity Human Resources Canada (EHRC)	Workforce in Motion: LMI 2017-2022	EHRC's latest labour market intelligence research initiative, Workforce in Motion, has gathered information on workforce demographics, labour supply and demand gaps, human resource needs, and post-secondary training. It includes supporting documents that give regional focus to labour markets, as well as special perspectives for employers, educators, labour, and government.
	Generation Impact: Future Work Perspectives	As Canada's electricity sector undergoes shifts relating to demographics and technology, engaging and developing a young talent pipeline is critical to ensuring a resilient future workforce. Generation Impact: Future Workforce Perspectives reveals that Millennial and Gen Z Canadians have a positive or neutral impression of careers in electricity but are largely unaware of the benefits of working in the sector. The report provides guidance on how organizations can position themselves as employers of choice for this age group to remain competitive.
	Leadershift: Pathways to Gender Equity	Leadershift: Pathways to Gender Equity explores the status of women's representation in companies across Canada's electricity sector, with a focus on the leadership level. It includes a review of the current levels of women's participation in the sector, highlights champions and successful initiatives, and offers recommendations for sparking meaningful change.
	Workforce Transitions: LMI for Alberta's Energy Sector 2017-2022	Workforce Transitions reports on a study undertaken by EHRC and funded by the Government of Alberta. It examines the labour market needs of the province's electricity sector, including its hiring projections, renewable integration, and the impact of innovation on the skills of the future workforce.
	Work Transformed: The Impact of Technology	The industry is facing unprecedented change—in its business models, workforce, customer expectations and work cultures. Work Transformed, a Labour Market Intelligence report from Electricity Human Resources Canada, investigates the impact of technological innovation on the Canadian electricity sector workforce.
	Renewing Futures	EHRC made Renewing Futures for anyone with a stake in the renewable energy workforce. The goal was to develop the first comprehensive look at human resources in the renewable energy sector in Canada.
	Women in Clean Energy	Women in Clean Energy attempts to synthesize existing knowledge on the degree of women's participation in the clean energy sector. The report identifies key challenges, offers opportunities and recommendations for action, and includes a collection of profiles of many inspiring women who have chosen to build careers in clean energy.
	National Occupational Standards	EHRC's NOS profiles provide benchmarks for these skills and can be used by employers, educators, labour and policymakers for curriculum and training plans, reskilling and upskilling and broader workforce planning.
	Electricity Competency Framework and National Occupational Standards: Employer Guide	This guide provides HR personnel and employers with practical recommendations for using the Electricity Competency Framework and NOS throughout the human resources management cycle. Competency-based HR management assists with the development of the organization's human resources programs, talent management strategies and hiring initiatives, and supports the demand for and growth of a safety-focused, highly-skilled, diverse and productive workforce.

Iron and Earth	Prosperous Transition Campaign	The Prosperous Transition Plan is a guide for the Federal Government of Canada to not only set a bold course towards net-zero by 2050 and meet or exceed interim 40 to 45% greenhouse gas (GHG) emissions reduction targets by 2030, but to do so while creating opportunities for Canada's existing workforce to participate and thrive in the net-zero carbon economy.
	Green Resilience Project – Communities' Transition Pathways	This report outlines the event held by Iron & Earth in Hinton, Alberta, in January 2022, as part of the Green Resilience Project on the topic of climate change, income security, and community. Participants discussed how the climate increasingly affects their community, daily lives, and income sources. They expressed the need to be proactive, to support workers in the transition, and that potential solutions should focus on diversifying local sources of income and must have economic, environmental, and social components.
American Clean Power (ACP)*	Energy Transition for All	The Energy Transition for All report identifies a series of responsibilities and associated actions to be taken by the clean power sector over the coming years across the following three pillars: Pillar #1: Expand opportunity for workers, especially those from transitioning and historically disadvantaged communities. Pillar #2: Create value for communities through supply chains, targeted investments, and local economic development. Pillar #3: Lead in diversity and inclusion, striving towards a workforce and leadership teams that are representative of the communities we operate in.
Interstate Renewable Energy Council (IREC)*	IREC Workforce Development Publications	A series of publications relevant to workforce development in the U.S. solar industry.
	Key Recommendations: Cultivating a Diverse and Skilled Talent Pipeline for the Equitable Transition	This report presents recommendations based on data collected from Alliance members through in-person and virtual meetings, live polls, online surveys, at the IREC Vision Summit, and from literature review. The recommendations will help funders, program designers, and those implementing workforce programs to focus resources where they will be most impactful—and most supportive of a just transition. They integrate provisions to support the development of a diverse workforce inclusive of those historically left behind.
ECO Canada	Labour Market Information Research	Labour Market Information involves workforce supply and demand for the entire economy or specific industries, regions, occupations and specific demographic data and trends.
Clean Energy Canada	The New Reality	The New Reality, from Clean Energy Canada and Navius Research, forecasts changes in jobs, GDP and investment in Canadian energy between 2020 and 2030.
Envirocompétences	l'Étude prospective de la main-d'œuvre et des emplois liés à la transition verte et aux changements climatiques	« Pour ce dossier, nous avons travaillé avec deux partenaires de choix, soit l'Institut du Québec et Daméco. Ce projet est inédit au Québec, et l'Étude prospective de la main-d'œuvre et des emplois liés à la transition verte et aux changements climatiques pourra devenir un outil de référence pour comprendre le marché du travail dans la transition verte et ses composantes stratégiques, et mieux influencer les actions et projets futurs. »
Learning for a Sustainable Future (LSF)	Canadians' Perspectives on Climate Change & Education: 2022	The purpose of LSF's newest climate change survey is to assess Canadians' knowledge, understanding and perceptions of climate change and its risks, and to explore views on climate change education in Canada. This survey compares current results to our 2019 benchmark survey and provides recommendations to all sectors to support climate learning.

**Indicates the organization is based in the United States.*

I. EMPLOYER RESOURCES

While CanREA's *Employment-Process Model* primarily focuses on the employee's occupational journey, employers will also require resources to assist with their daily operations. Employers have a substantial number of responsibilities under Part II of the Canadian Labour Code.

Underlying these responsibilities is the importance of creating an inclusive and safe work environment, promoting opportunities for professional development and career advancement, and ensuring workers have the resources they need to be successful on the job. By leveraging the available resources, employers can efficiently and effectively assist workers when challenges and opportunities arise.

Table 12 presents some examples of employer resources relevant to the electricity and renewable-energy industries.

Table 12: *A collection of resources for electricity sector and renewable energy employers.*

Organization	Title	Description
Electricity Human Resources Canada (EHRC)	Recharging our Workforce	The main outcome of this project was a training capacity strategic framework: Recharging our Workforce, a report on industry action that contains: recommended next steps for addressing training capacity needs; the identity of required tools for addressing training capacity needs; the identity of barriers to enhancing training capacity; and practical strategies and initiatives for organizations and the overall sector to develop and manage training capacity.
	Electricity Competency Framework	With EHRC's Electricity Competency Framework – the first of its kind in Canada – educators and employers alike are empowered with the up-to-date information needed to develop effective HR tools, resources, and relevant training programs.
	Change Management Resources	Electricity Human Resources Canada (EHRC) has prepared resources for employers to meet their change management needs
American Clean Power (ACP)*	Standards Development	American Clean Power (ACP) is an ANSI-Accredited Standards Development Organization. This webpage shares information on recently developed standards.
Careers in Energy	Employer Support	Are you an employer? We offer a variety of free resources for energy industry employers, whether you're a small, mid-size or large company.
Government of Canada	Job Bank: Employer Resources	Job Bank's free tools and resources can help you find, hire, and retain the right workers, learn about diversity and inclusion in the workplace, explore the job market and stay informed about employment standards.
Government of Alberta	Workforce Contacts and Employer Resources	A series of resources and contacts for Alberta employers.
Interstate Renewable Energy Council (IREC)*	National Clean Energy Workforce Alliance	The National Clean Energy Workforce Alliance is a cross-sector effort to improve clean energy education, training, and job placement outcomes—and ensure that expanding clean energy job opportunities are inclusive of diverse candidates and underserved communities.

**Indicates the organization is based in the United States.*

Funding programs are a specific resource category that provides substantial value for employers. These programs can provide the opportunity to create new roles within an organization, cover training costs, and subsidize the salaries of new hires. Many of these programs focus on youth and recent graduates, creating mutually beneficial opportunities for both the employer and the prospective employee.

Table 13 (page 44) provides a list of the current funding programs offered by non-governmental

organizations.

Table 13: *Information on various employment funding programs for employers offered by provincial and federal non-governmental organizations.*

Organization	Program Name	Funding Value
Electricity Human Resources Canada (EHRC)	Welcoming Newcomers	4-month internship with up to 50% wage subsidy or $10,000 maximum.
	Empowering Futures	Subsidy of up to $10,000 for every new student or apprenticeship position created by employers.
	Discovering Potential	The program can subsidize an internship, a training opportunity or a combination of both, up to a maximum of $25,000 per participant.
ECO Canada	Science Horizons	80% of wages up to $18k and training for 6-12 months of full-time employment.
	Apprenticeship Service Program	Funding up to $5,000 when hiring a first-year apprentice; or up to $10,000 when hiring a self-identified equity deserving first-year apprentice.
Clean Foundation	Science Horizons Internship	Wage subsidies of up to $25,000 per intern hired.
	Green Jobs	Wage subsidies of up to $20,000 per intern hired, or up to $25,000 for youth hired who are furthest from employment.
Indigenous Clean Energy	Generation Power	There are wage subsidies available for Indigenous youth (ages 18-30) interested in kick-starting their career in the clean energy sector. Indigenous youth participants will have the opportunity to participate in 4-12 month-long clean energy internships, and employer participants will receive a 75% wage subsidy up to a maximum of $30,000.

J. EDUCATOR RESOURCES

The *Employment-Process Model* identifies a range of educators from elementary and high school teachers, guidance counsellors, and other school support staff to post-secondary instructors, and private program facilitators. Many of these programs create opportunities for educators to interact with industry and non-governmental organizations to incorporate experiential learning or career exploration into the curriculum.

By creating renewable-energy educational resources, educators in elementary and high school settings can inform children and youth about energy, renewable technologies, and the career opportunities within the field.

In post-secondary and private program settings, the main goal is to instruct students on the skills and competencies that will be required in a career in renewables. Continued discussions with industry can assist educators with updating curriculum to ensure relevancy as the technology evolves.

Table 14 presents resources for post-secondary educators, while Table 15 presents examples of materials and resources for primary and secondary school educators.

Table 14: *A collection of resources for post-secondary educators.*

Organization	Program	Description
Electricity Human Resources Canada (EHRC)	Academic Advisory Group	EHRC has assembled an Academic Advisory Group to solicit input from a diverse group of stakeholders representative of Canada's educational landscape. The Academic Advisory Group generously provides their time and insight to ensure that our educational programs are in line with provincial standards and curriculum. Additionally, the Academic Advisory Group helps navigate educational solutions to industry challenges.
	National Occupational Standards	NOS are voluntary guidelines that have been developed with industry stakeholders to provide businesses, educators, trainers, and job seekers with practical guidance.
	Electricity Competency Framework	The Electricity Competency Framework will allow you to implement a competency-based approach to design, develop and review curriculum to ensure courses and programs align with industry needs.
Interstate Renewable Energy Council (IREC)*	National Clean Energy Workforce Alliance	The National Clean Energy Workforce Alliance is a cross-sector effort to improve clean energy education, training, and job placement outcomes—and ensure that expanding clean energy job opportunities are inclusive of diverse candidates and underserved communities.

**Indicates the organization is based in the United States.*

Table 15: *A collection of resources for primary and secondary school educators.*

Organization	Program	Description
Clean Foundation	Professional Learning Workshops	Clean is excited to offer FREE professional learning opportunities for educators across Nova Scotia. Our online and in-person workshops support educators to integrate climate and environmental learning into the curriculum – across ALL subjects.
GreenLearning	Educator Resources	A variety of activities, challenges and programs for students from grades 3 to 12.
Inside Education	Learning Resources	Our no-cost environmental and natural resource learning resources are curriculum-connected and classroom-ready, complete with fun activities and exercises that support different learning styles and teaching situations. Our

		resources are continuously being developed and updated to ensure students receive information that supports the Alberta Program of Studies.
Learning for a Sustainable Future	Professional Development Workshops	Our FREE 1 hour webinars are packed full of resources, tips and tricks for incorporating more outdoor learning, sustainability education, and more into your classroom practice, no matter your grade, subject, or experience.
	Mentoring Café	LSF is in it's second year of piloting a Mentoring Café starting in 2022. The purpose of this virtual café is to meet with like-minded K-8 educators, in a small group to share experiences and to support each other's learning in the areas of taking curriculum outdoors and connecting with the UN Sustainable Development Goals (SDGs).
	Resources for Rethinking	Welcome to Resources for Rethinking. R4R.ca provides immediate access to more than 1200 quality classroom resources. Developed by Learning for a Sustainable Future, R4R.ca connects teachers to lesson plans, books, videos and other materials that explore the environmental, social and economic dimensions of important issues and events unfolding in our world today. R4R resources have been reviewed by experienced classroom teachers and matched to relevant curriculum outcomes for each province and territory.

K. RENEWABLE-ENERGY ACTIVE INITIATIVES

The renewable-energy industry is experiencing rapid, multidimensional evolution. As Natural Resources Canada (2023) writes, “the shift to a low-carbon economy requires that we take a people-centred approach to help set the conditions for the creation of sustainable jobs so that all Canadians can share in the opportunities of a global net-zero future.”

This approach involves “…supporting Canadians and equipping them with the skills and training they need to continue to thrive while also supporting the growth of new industries…” (Natural Resources Canada, 2023).

There are several community-based and national initiatives currently underway that focus on creating career awareness and training opportunities relevant to the renewable-energy industry.

The purpose of highlighting these initiatives is to demonstrate the actions taken by various non-governmental organizations to improve the accessibility of career resources and training opportunities in communities across the country. Moreover, many of these initiatives are focused on creating opportunities for historically underrepresented groups to engage in the renewable-energy sector.

Table 16 highlights some of the active renewable-energy initiatives taking place across Canada.

Table 16: *Examples of current renewables initiatives across various communities in Canada.*

Organization	Project Title	Description	Region (If Applicable)
Iron and Earth	Renewable Skills Initiative	In Phase 1, Iron & Earth and the Louis Bull Tribe completed the Louis Bull Solar Daycare project, where 10 fossil fuel industry workers and 5 Louis Bull Tribe community members were trained in solar through the installation of an 8kW solar energy system on the roof of the community daycare. Phase two underway.	Alberta
	RenuWell	As a part of the project, Iron & Earth is partnering with Medicine Hat College to develop a 5-day rapid upskilling program for fossil fuel industry and Indigenous workers to learn the basics of solar before working on transforming the well sites themselves.	Alberta
Relay Education	Solar Power Camp	An in-person solar training course to learn the fundamentals of residential and commercial rooftop solar systems installation. Training will include electricity and solar energy basics, hands-on experience using demonstration solar equipment, and Working at Heights training.	Midland, ON
	Green Skills Academy	Green Skills Academy is committed to providing these courses to underserved and underrepresented communities. We are prioritizing people who are Black, Indigenous, part of other racialized communities, newcomers, women, and gender diverse. The program will help address barriers to employment that these populations face.	Nationwide
Future Skills Centre	Skills Match – The Energy Fit	Future Skills Centre is investing almost $1.2 million over two years for the PetroLMI Division of Energy Safety Canada to advance and deploy new tools it has developed to assist unemployed/underemployed oil and gas workers to	Saskatchewan, Alberta, and British Columbia

		transition to more in-demand energy sector jobs.	
	Transition to a New Tomorrow	The Future Skills Centre is investing $1,039,853 over two years in the "Transition to a New Tomorrow" project, which will impact a minimum of 120 mid-career workers. The project will take place in Albertan communities, including Drayton Valley, Whitecourt, the industrial parks of Leduc/Nisku, and Acheson.	Alberta
Fraser Basin Council	Energy Peers in Indigenous Communities (EPIC) Network	The Energy Peers in Indigenous Communities (EPIC) Network is a program to build capacity, knowledge and skills related to renewable energy in Indigenous communities in British Columbia.	British Columbia
Saskatoon Industry Education Council (SIEC)	Saskatchewan Announces Funding for Educational Events in the Information Technology and Green Energy Sectors	On May 18th, 2022, "the Government of Saskatchewan announced a one-time investment of $158,000 from Innovation Saskatchewan and the Ministry of Immigration and Career Training to the Saskatoon Industry Education Council, in partnership with Siemens Canada, to create awareness about careers in the Information Technology (IT) and green energy sectors."	Saskatchewan

L. GOVERNMENT WORKFORCE INITIATIVES

The provincial and federal governments play an integral role throughout an individual's occupational journey as exemplified in the second graphic of the *Employment-Process Model*. These government bodies also influence the ability for other stakeholders to create jobs, training, and educational opportunities relevant to the renewable-energy industry. Table 17 provides a list of the current federal and provincial initiatives that relate to employment, training, re-skilling, or job creation in the renewable and clean energy industries.

Table 17: *A list of the current federal and provincial initiatives available.*

Government Body	Key Workforce Development Initiatives, Publications, or Programs
Federal	Strategic Partnerships Initiative Science and Technology Internship Program (STIP) – Green Jobs Canada Growth Fund IRAP Youth Employment Program (YEP) Science Horizons Youth Internship Program Labour Market Development Agreements Program
British Columbia	B.C. Employer Training Grant Sectoral Labour Market Partnerships Program (SLMP) Labour Market Partnerships (LMP)
Alberta	Workforce Partnership Grants Canada-Alberta Job Grant Program Industry R&D Associates Program – Alberta Innovates
Saskatchewan	Re-Skill Saskatchewan Training Subsidy Canada-Saskatchewan Job Grant Canada-Saskatchewan Workforce Development Agreement
Manitoba	Canada-Manitoba Job Grant Program Workforce Development Program Labour Market Partnerships: Workforce Development Services, Labour Market Development Services, Labour Force Development Services
Ontario	Skills Development Fund Canada-Ontario Job Grant Program NOHFC People & Talent Program Ontario Helping More Students Enter the Skilled Trades Faster Ontario Labour Market Partnerships (OLMP)
Quebec	Aim for Employment Program
New Brunswick	Low Carbon Economy Leadership Fund – Industrial Labour Force Training
Nova Scotia	Workplace Innovation and Productivity Skills Incentive Energy Training Program Job Creation Partnerships
Prince Edward Island	SkillsPEI Workplace Skills Training Labour Market Partnerships
Newfoundland and Labrador	Maximizing our Renewable Future: A Plan for Development of the Renewable Energy Industry in Newfoundland and Labrador (2021) Labour Market Partnerships Program
Nunavut	Canada-Nunavut Job Grant Program
Yukon	Canada-Yukon Job Grant Building UP Program
Northwest Territories	Canada-Northwest Territories Job Grant Labour Market Programs

7. WORKFORCE DEVELOPMENT ORGANIZATIONS

During the development of CanREA's *Employment Process Model*, the CanREA Operations team conducted independent research and outreach to organizations that are in alignment with CanREA's workforce development efforts.

Below is a list of organizations that have programs relevant to one or more stages of the *Employment-Process Model.*

American Clean Power (ACP)

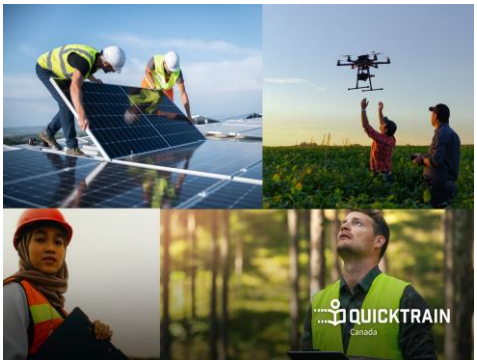
Website: https://cleanpower.org/

American Clean Power is the voice of companies from across the clean power sector that are powering America's future and providing cost-effective solutions to the climate crisis while creating jobs, spurring massive investment in the U.S. economy, and driving high-tech innovation across the nation.

Canadian Colleges for a Resilient Recovery (C2R2) + Quick Train Canada

Website: https://resilientcolleges.ca/

Canadian Colleges for a Resilient Recovery (C2R2) is a coalition of leading colleges, cégeps, institutes and polytechnics from across Canada that are collaborating to address the potential Canada's economy and workers have to lead the world in the transition to a clean, sustainable future, in part by creating Quick Train Canada.



Website: https://quicktraincanada.ca/

Quick Train Canada offers fully-funded, high impact, easy-access and flexible training courses available through C2R2 education partners from across Canada, each of whom bring unique strengths and areas of focus to the C2R2 coalition. The purpose of Quick Train is to provide Canadian workers and employees with options to update skills quickly through multi-week, virtual and in-person learning that is designed to boost job security and participation as the economy transitions to more sustainable practices.

Canadian colleges, polytechnics and cégeps are positioned to quickly develop thousands of training and research opportunities to help Canadians access good jobs, support the transition to the low carbon economy, and foster inclusion, diversity, and equity.

With C2R2 launching Quick Train Canada in January 2023, Canadians coast to coast to coast can now access fully-funded microcredentials to help to increase skills and competencies to prepare them to meet the needs of Canada's shifting economy.

Careers in Energy

Website: https://careersinenergy.ca/

Careers in Energy (formerly PetroLMI) is a division of Energy Safety Canada. Our mandate is to develop leading-edge research, tools and resources to increase awareness of career opportunities in the energy industry and to support attraction and retention of a skilled and productive workforce.

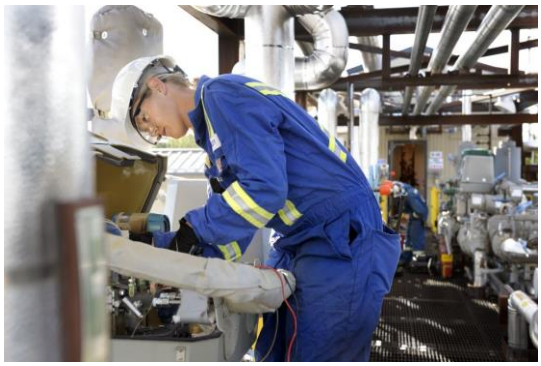


Photo credit: Cenovus

Clean Foundation

Website: https://cleanfoundation.ca/

Clean partners with organizations across Canada to place youth in subsidized positions that are rooted in the clean economy through three internship Programs that are sustainability-focused, youth employment programs. In Nova Scotia we work with local organizations to place youth in subsidized summer internships. We also work with organizations of all sizes across the country to hire youth aged 15-30 in positions lasting up to 12 months while providing wage subsidies up to 80% and additional funds for wrap-around services. Through these national internship programs, Science Horizons and Green Jobs, we work with organizations in every sector of the clean economy to create positions for youth of every education level.

ECO Canada

Website: https://eco.ca/

At ECO Canada, we act as the steward for the Canadian environmental workforce across all industries. From job creation and wage funding, to training and labour market research, we champion the end-to-end career of all environmental professionals. We aim to promote and drive responsible, sustainable economic growth, while also ensuring that environmental best practices remain a priority. We challenge the status quo by existing outside the typical activist mentality.

We work alongside government, policy makers, academia, students, employers, professionals, industry, and international audiences to ensure we support Canada as a global leader in innovative workforce solutions and job creation. We remain the go-to source in the environmental labour market; our research provides unmatched statistics and analysis on the economic and labour trends that identify workforce gaps within industry.

Electricity Human Resources Canada (EHRC)

Website: https://electricityhr.ca/

Electricity Human Resources Canada is a non-profit organization supporting the human resources needs of the Canadian electricity and renewable-energy sector.

Our Vision: Keeping the lights on in Canada by preparing and empowering a world-class workforce for the entire electricity industry.

Our Mission: Working to strengthen the ability of the Canadian electricity industry in meeting current and future needs for their workforce—one that is safety-focused, highly skilled, diverse and productive.

Foundation for Environmental Stewardship (FES)

Website: https://www.fesplanet.org/

Foundation for Environmental Stewardship (FES) is a youth-led, youth-serving sustainable development organization. FES is a not-for-profit corporation whose registered charity number is 801430307 RR0001. FES is an accredited organization by the United Nations and has a special consultative status with the Economic and Social Council (ECOSOC) of the United Nations and United Nations Environment Programme (UNEP). As the final generation that can solve climate change, FES empowers youth to create a more inclusive, fair, prosperous, and sustainable future.

Mission

Our mission is to create a sustainable future by empowering youth, changing lifestyles, and telling powerful, effective stories through training, education, advocacy, and mentorship.

Vision

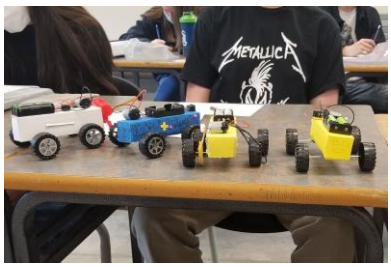
We envision every young person will grow to make their personal and professional choices to reflect the human impact on the environment for a sustainable future.

GreenLearning

Website: www.greenlearning.ca

GreenLearning is a non-profit organization that creates free education programs about energy, climate change and the green economy to engage and empower students (mainly in grades 3 to 12) in creating positive change for our evolving world. We offer programs that help students understand energy sources, our use of energy, climate change mitigation and adaptation and exploring circular economies. We offer teacher professional learning, in-class presentations and engage students in applying their learning through our five annual challenges.

Our Re-Energy program focuses on renewable energy and engages learners in STEAM and they become renewable-energy engineers - building working models of electric vehicles, energy storage systems, solar ovens, solar cars, wind turbines, hydroelectric generators, and biogas generators. .



One important component of the Re-Energy program is a project called Electrifying the Future of Transportation. We are working with a high school to help prepare students for an electric transportation future. The students are converting an internal combustion vehicle to an electric vehicle and a charging station will be installed at the school - increasing the awareness of zero-emission vehicles, energy storage and charging industries to prepare youth for Canada's energy transition.

Indigenous Clean Energy

Website: https://indigenouscleanenergy.com/

Indigenous Clean Energy Social Enterprise (ICE) is a pan-Canadian not-for-profit platform that promotes Indigenous inclusion in Canada's energy futures economy. We do this by advancing Indigenous leadership and broad-based collaboration with energy companies, utilities, governments, development firms, cleantech innovators, the academic sector, and capital markets.

ICE Network

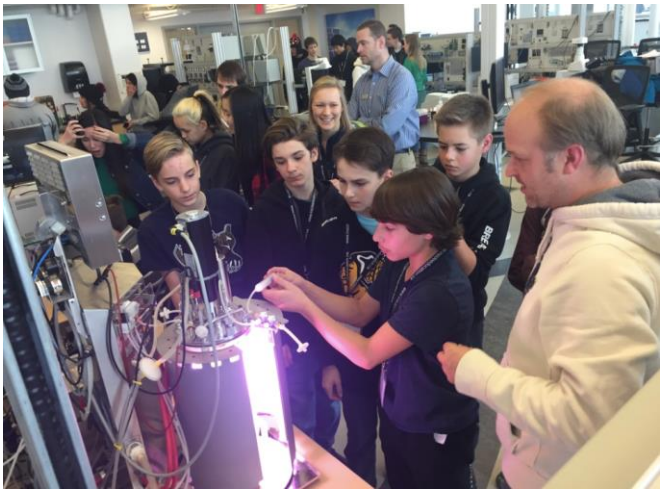
Website: https://www.icenet.work/home

The ICE Network is an open-source, open-entry platform that provides a space to learn about clean energy technologies, connect with others who are moving projects forward, share opportunities and work together to increase Indigenous inclusion and leadership in clean energy.

Inside Education

Website: https://www.insideeducation.ca/

Founded in 1985, Inside Education is Alberta's largest environmental and natural resource education charity. Working from offices in Edmonton and Calgary, our mandate is to support K-12 school teachers across Alberta and inspire their students when it comes to working towards a balanced, sustainable future for our environment, economy, and society. If today's students become informed and engaged leaders in tomorrow's issues, who are able to make informed responsible decisions, we believe the world will be in good hands.



Photographs taken during Inside Education's Edmonton Energy Efficiency Summit at the Northern Alberta Institute of Technology (NAIT) Alternative Energy Technology laboratory.

Iron and Earth + The Climate Career Portal

Iron and Earth Website: https://www.ironandearth.org/

Iron & Earth is a worker-led organization whose mission is to empower fossil fuel industry and Indigenous workers to build and implement climate solutions. Our overarching intention is to help create an environmentally and socially prosperous planet. Our vision is that fossil fuel industry and Indigenous workers will play a leading role in building the policy and infrastructure required to reach global climate targets. Our top-level goal is to help ensure a prosperous transition towards global carbon neutrality by 2050.

We carry out our unique purpose through national advocacy campaigns, upskilling programs, climate mitigation projects, technology platforms and community building events.

Climate Career Portal Website: https://www.climatecareerportal.com/

The Climate Career Portal is a digital platform that connects fossil fuel industry workers with career path opportunities in the net-zero economy, along with climate solution information, industry resources, and connections to training opportunities to support their career transition.

If you're a worker, you can find current job postings, companies, projects in the net-zero economy, as well as training programs to further prepare you for your transition. Sign up to make an account to save your favorite listings, and to get access to our future programs and features.

If you're a net-zero company, post your available positions on our job board to access our skilled pool of qualified workers, or promote your organization on our companies page.

If you're an educational institute, post your program and details on our training page to reach interested future students.

KidWind

Website: https://www.kidwind.org/

For the last 20 years KidWind has been focused on helping educators and students explore renewable energy. I wish I had kept track of all the teachers and students our team has trained and impacted over those years. But let's just say it's a pretty big number.

The idea of the KidWind Project in started in 2003 when I was a sixth grade science teacher in California. Unhappy with the poor quality of products and curricula available for teaching wind energy science, I set out to develop some new materials. With an initial investment of $1,000 and a fellowship at the Wright Center for Science Education at Tufts University, I developed a new approach to educating the world about wind energy.

KidWind and our team of amazing instructors focus on three major areas - teacher training, curricula and materials, and the KidWind Challenge.

Learning for a Sustainable Future (LSF)

Website: https://lsf-lst.ca/

Learning for a Sustainable Future is a national charity that was founded in 1991. LSF's mission is to promote, through education, the knowledge, skills, values, perspectives, and practices essential to a sustainable future. LSF works with governments, policymakers, school boards, educators and youth across Canada to provide sustainability programming, resources, education, action and more.

National Energy Education Development (NEED) Project

Website: https://www.need.org/

Started in 1980, The National Energy Education Development (NEED) Project began as a one-day celebration of energy education when National Energy Education Day was recognized by a Joint Congressional Resolution. In the same year, President Jimmy Carter issued a Presidential Proclamation stressing the need for comprehensive energy education in our schools, a reduction in our dependence of fossil fuels, and increasing energy efficiency and the use of renewable energy technologies. Since its founding over 40 years ago, NEED has kept its Kids Teaching Kids philosophy as a fundamental principle of NEED programming – encouraging students to explore, experiment, engage, and encouraging teachers to embrace student leadership in the classroom. NEED trains and assists teachers in harnessing the energy of the classroom – the energy of students.

NEED is expanding and evolving to best meet the needs of both teachers and students – in the classroom and beyond. In just the last decade The NEED Project has grown to encompass a curriculum portfolio of 100+ teacher and student guides designed to engage and teach teachers and students about energy. At the same time, the training opportunities offered by NEED expanded to include a variety of teacher professional development and training for educators and school district energy personnel as well. NEED's work in after school programs, student clubs, scouting groups, and home school networks also continues to grow.

Nuvéo Creneau of Excellence in Renewable Energy

Website: https://nuveo.org/

Previously known as the Wind Power Creneau of Excellence (founded in 2007), Nuvéo Creneau of Excellence in Renewable Energy is one of Quebec's 31 niches of excellence (or clusters). It brings together various companies that carry out interrelated economic activities in the development of energy sources that are both renewable and ecological, such as wind, solar, small hydroelectricity and energy storage.

Nuvéo covers the designated administrative region of Gaspésie–Îles-de-la-Madeleine and the MRC of Matane. It is on this territory that we find the majority of Quebec's wind farms, manufacturers, service providers, organizations, and educational institutions, all dedicated to the development of the renewable sector of the economy. Through its projects, Nuvéo promotes the growth of these companies for the betterment of our society.

Relay Education

Webpage: https://relayeducation.com/

A Canadian charity delivering hands-on quality programming about renewable energy, conservation, climate change and green careers.

Relay delivers renewable energy and environmental education programs in classrooms and communities. Relay is creating systemic change for a greener future and fostering the next generation of green energy leaders. We engaged more than 19,400 students and adults last year.

The Gaia Project

Website: https://thegaiaproject.ca/en/

New Brunswick based and founded in 2009. All programs are offered in French and English in all school districts.

Our Approach

At The Gaia Project, we use a unique approach to empower youth to take action. We incorporate inquiry-based education, curriculum links, and local action in each of our projects.

How it's Accomplished

- **Strategic Partnerships:** We work with a range of partners dedicated to creating rich, real-world learning opportunities for students and teachers.
- **Teachers Supports:** We help teachers through professional learning activities, resources and in classroom support to bring climate change into their pedagogy.
- **Enhance Student Learning:** We give students of all ages hands-on experiences to explore issues around energy, waste, water, transportation and general sustainability.
- **Thinking Globally, Acting Locally:** We give students the resources they need to take local action on the global issue of climate change.

Women in Renewable Energy (WiRE)

Website: https://womeninrenewableenergy.ca/

Purpose: WiRE is a non-profit organization advancing the role and recognition of women and underrepresented groups working in the climate sector, globally.

Vision: WiRE's vision is to empower people and organizations in the climate sector, helping to foster a workplace culture where all, including women and underrepresented groups, thrive.

Join discussions that focus on building skills and networks for jobs and roles in the energy sector. WiRE events present a welcoming and casual opportunity to meet peers, share ideas and opportunities, and educate colleagues about projects and initiatives (Table 18).

Table 18: *Women in Renewable Energy's programs and resources.*

Program	Description
WiRE NETWORKING MEET-UPS	The core of WiRE's programming. In many ways, your network IS your networth! By increasing your network, your communication skills, and your energy industry knowledge, you will be increasing your overall value. WiRE's Networking meet ups are designed to amplify all of these things and more. We bring compelling, successful, empowering individuals in the energy sector to speak on a wide range of energy industry topics. Virtual events involve audience Q&A's and breakout rooms for maximum engagement.
WiRE FIELD TRIPS	Increase your literacy across a wide range of applications related to renewable energy, and learn about power sector technologies, projects, companies and associations. WiRE conducts Field Trips both virtually and in-person (in-person on hold due to covid19). Open to all genders. Please be advised that photographs and video may be taken at WiRE events for use on the WiRE website, in marketing materials, and for other WiRE publications. By registering for this event, you consent to WiRE photographing and using your image and likeness.
WiRE SPEED-MENTORING	Aside from being an amazing networking tool, group speed mentoring is a great way for a mentee to meet several mentors and find the one who will be right for them for further one to one mentoring. Also, for those not interested in continued mentorship, it is a great way for someone who is trying to break through their own career obstacles, to meet others who have faced and overcome those same obstacles. For students, group speed mentoring is a great way to find or ensure they are on the right educational path to meet their goals. These sessions are designed to allow a mentee to meet with up to 6 different mentors over a two hour period.
WiRE SPEED-INTERVIEWING	In today's highly competitive market, it is becoming increasingly difficult for both employers and employees to navigate the sea of people and opportunities. Speed Interviewing could be the missing piece of the puzzle needed to help land the perfect job. WiRE eases this burden by facilitating both virtual and in-person speed interviewing events. We help to match innovative and cutting edge companies with bright and talented individuals. This time saving tool can help an employer pre-screen multiple candidates to select for further in-depth interviews.
WiRE WORKSHOPS	A workshop is a great way to increase skills and expand your knowledge base in the energy industry. You can find inspiration for a new idea, or gain the tools required explore it further on your own. It is the perfect place to practice a new process in a safe and controlled environment.
WiRE CONFERENCES	Increase your network, get to know your colleagues, find new mentors or mentees, meet with potential employers, gain feedback on a project or paper, engage in debates, contribute on policy, keep up to date on research, improve your communication and other interpersonal skills. The benefits of attending a conference goes on and on, and on!

8. GAP ANALYSIS

The previous sections of this report explored a series of Existing Career Resources and Workforce Development Organizations engaged in initiatives relevant to the renewable-energy industry. These organizations are responsible for the development and facilitation of programs essential to job seekers, educators, employers, and communities in the form of career exploration tools, funding programs, training, and professional development resources.

While there is a growing collection of resources available to renewable energy stakeholders, conversations with CanREA members, external meetings, and non-governmental organizations indicate there are a few areas that require additional efforts.

The following pages explore how CanREA can assist in filling these gaps.

CANADIAN RENEWABLE ENERGY SALARY SURVEY DATA

There have been multiple discussions within CanREA's Workforce Development Committee around the lack of available Canadian renewable energy salary data. This data would provide an opportunity to enhance salary consistency across the industry. It is important to have clear expectations for the salary and benefits offered for both entry- and higher-level positions in the industry. This will also assist employers in improving job satisfaction and help to boost retention rates.

In the future, CanREA would like to work with members to identify a scope for this project.

COMMUNITY CONNECTION RESOURCES

The Renewable-energy Active Initiatives section of this report provides examples of initiatives and programs related to training and education opportunities in communities across Canada.

CanREA's conversations with industry members, post-secondary program leaders and non-governmental organization representatives have revealed a desire to enhance partnership between these key stakeholders. CanREA's *Employment-Process Model* shares areas where key stakeholders are currently engaged across a worker's occupational journey.

Employers are typically most engaged in the *Train and Evaluate*, *Employ*, and *Retain* stages of the *Employment-Process Model*. However, many employers have indicated they would like to be more engaged in community outreach and career exploration opportunities (taking place during the *Introduce* and *Inform* stages).

CanREA aims to bridge this gap by creating a customizable resource for CanREA members to take into high-schools in the communities in which they operate. CanREA will also encourage members to incorporate community outreach into their company objectives in order to solidify long term workforce prospects.

The goal of this initiative is to create awareness of the opportunities and to strengthen the relationships between industry and these communities.

RENEWABLE ENERGY NATIONAL OCCUPATION CLASSIFICATION (NOC) CODES

The National Occupational Classification (NOC) "is the nationally accepted reference on occupations in Canada" (Government of Newfoundland and Labrador, 2022). The NOC codes organize 30,000 job titles into 500 occupational groups, and are responsible for policy development, program design, and administration (Government of Canada, 2022b). A variety of stakeholders (i.e., students, workers, employers, educators, and educational institutions) use these codes "on a daily basis to support career and vocational decisions" (Government of Canada, 2022b).

Table 19 provides a list of the 2021 NOC codes that pertain to roles within the renewable-energy industry.

Table 19: *National Occupation Classification (NOC) codes and their corresponding occupations.*

NOC Classification (2021)	Renewable Occupations under this Code
73200: Residential and commercial installers and servicers	Solar panel installer
41400: Natural and applied science policy researchers, consultants and program officers	Wind energy analyst

Government of Alberta (2020) has indicated the wind-turbine technician occupation has not received an NOC code, but it is referenced as similar to the 2021 NOC code 22312: Industrial Instrument Technicians and Mechanics (Government of Alberta, 2020). However, "Windmill Repairer" is designated classification under the 2021 NOC code 72400 Construction Millwrights and Industrial Mechanics.

As the renewable-energy industry continues to rapidly grow and evolve, Labour Market Intelligence (LMI) data and forecasting will continue to be an important resource. This information will help ensure there is an adequate number of skilled workers in the renewable-energy industry.

However, many forecasting models use the NOC codes to report the level of occupational demand. For example, the Provincial Occupations Models (POMS) Labour Market Intelligence Models; and Canadian Occupational Projection System (COPS) utilize a variation of the NOC codes when conducting forecasting and occupational need analysis. Therefore, it is imperative that renewable energy careers have a designated NOC code to reference to understand the need for workers in these occupations.

CanREA wants to work towards having key renewable-energy occupations recognized under the National Occupation Classification system, to ensure future Labour Market Intelligence (LMI) and forecast data accurately depicts the skilled workforce needs in the renewable-energy industry.

RENEWABLES PARTICIPATION IN "SKILLED TRADES" GOVERNMENT INITIATIVES AND PROGRAMS

Many trade-adjacent occupations relevant to the renewable-energy industry are not classified as Red Seal Trades. As a result, renewable-energy employers have difficulty accessing government funding programs that are designed to increase participation in apprenticeship programs. For example, on July 27, 2022, there was an announcement of $33 million over five years as part of the Skilled Trades Awareness and Readiness

(STAR) program (Government of Canada, 2022c). This program encourages Canadians, with an emphasis on those who may face barriers (i.e., women, Indigenous peoples, visible minorities, newcomers to Canada, people with disabilities and youth) “to explore and prepare for careers in the skilled trades” (Government of Canada, 2022c).

Unfortunately, since many entry-level renewable energy careers are not considered Red Seal Trades, they may not be eligible for programs that focus on skilled trades, despite the fact that many of the skills used in these careers are similar to those of an electrician, millwright, and other occupations that are classified as Red Seal Trades.

With the acceleration of the energy transition, it is important that renewable occupations be considered in government-funding opportunities, especially those which reduce the barriers for underrepresented groups to enter the renewable-energy field.

To further exemplify the importance of this inclusion, Table 20 has been adapted from an ILO (2011) publication exploring the skills and occupational needs required in wind and solar projects across various development stages.

Table 20: *Occupations required for various stages of wind and solar projects.*

Technology	Project Stage	Occupations Required
Wind	Equipment Manufacture and Distribution	• R&D engineers (computer, electrical, environmental, mechanical, wind power design) • Software engineers • Modellers (prototype testing) • Industrial mechanics • Manufacturing engineers • Manufacturing technicians • Manufacturing operators • Manufacturing quality assurance experts • Certifiers • Logistics professionals • Logistics operators • Equipment transporters • Procurement professionals • Marketing specialists • Sales personnel
	Project Development	• Project designers (engineers) • Environmental impact assessment specialists • Economic/financial/risk specialists • Atmospheric scientists • Social impact specialists • Lawyers (feed-in contract, grid connection and financing contract, • construction permit, power purchase agreement) • Planners (permit monitoring, amendment and application) • Land development advisor • Land use negotiator • Lobbyist • Mediator • Environmental and social NGO representatives • Public relations officers • Procurement professionals • Wind resource assessment specialist • Geographers
	Construction	• Project managers

	and Installation	• Electrical, civil and marine engineers • Small wind turbine installers • Construction electricians • Power line technician • Construction worker • Quality control inspectors • Instrumentation and control technicians • Business developers • Commissioning engineer (electrical) • Transportation workers
	Operation and Maintenance	• Windsmith/millwright/mechanical technician or fitter/wind service mechatronics technician • Operations and maintenance specialists • Power line technician • Wind service mechatronics • Field electricians
	Cross-cutting/ Enabling Activities	• Policy-makers and government office workers • Trade association and professional society staff • Educators and trainers • Management • Administration • Publishers and science writers • Insurer representatives • IT professionals • Human resources professionals • Other financial professionals (accountants, auditors and financers) • Health and safety consultants
Solar	Equipment Manufacture and Distribution	• Researchers (chemists, physicists, engineers with specialization in electrical, • mechanical, chemical, materials, system design or process engineering) • Chemical laboratory technicians and assistants • Software engineers • Modellers • Manufacturing engineers • Manufacturing technicians • Manufacturing operators • Building systems specialists • Manufacturing quality assurance experts • Logistics professionals • Logistics operators • Equipment transporters • Procurement professionals • Marketing specialists • Sales personnel
	Project Development	• Project designers (engineers) • Architects (small projects) • Atmospheric scientists and meteorologists • Resource assessment specialists and site evaluators • Environmental consultant • Lawyers, government program • debt financier representatives • Developers/facilitators • Land development advisor • Land use negotiator • Lobbyist

		• Mediator • Environmental and social NGO representatives • Public relations officer • Procurement professionals
	Construction and Installation	**Solar Thermal (ST)** • System designer • Plumbers specializing in solar **Small Photovoltaic** • System designer (electrical engineers or technologists) • Electricians specializing in solar **Small Photovoltaic, Solar Thermal** • Roofers specializing in solar **Large Photovoltaic** • System designers (electrical/ mechanical/structural engineers) • Installers **Concentrated Solar (CSP)** • Welders • Pipefitters **Small Photovoltaic, Large Photovoltaic, ST, CSP** • Electricians specializing in solar **Small Photovoltaic, Large Photovoltaic, ST, CSP** • Project designers and managers • Project and installation evaluators • Construction professionals • Installers • Software engineers • Quality assurance specialists • Business developers • Commissioning engineer (Electrical) • Transportation workers
	Operation and Maintenance	• Photovoltaic maintenance specialists (electricians specializing in solar) • ST maintenance specialists (plumbers specializing in solar) • CSP and PS maintenance specialists • Inspectors • Recycling specialists
	Cross-cutting / Enabling Activities	• Policy-makers and government office workers • Trade association and professional society staff • Educators and trainers • Management • Administration • Publishers and science writers • Insurer representatives • IT professionals • Human resources professionals • Other financial professionals (accountants, auditors and financers) • Health and safety consultants • Clients

The information provided in Table 20 is adapted from: ILO. (2011). Skills and occupational needs in renewable energy. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_166823.pdf

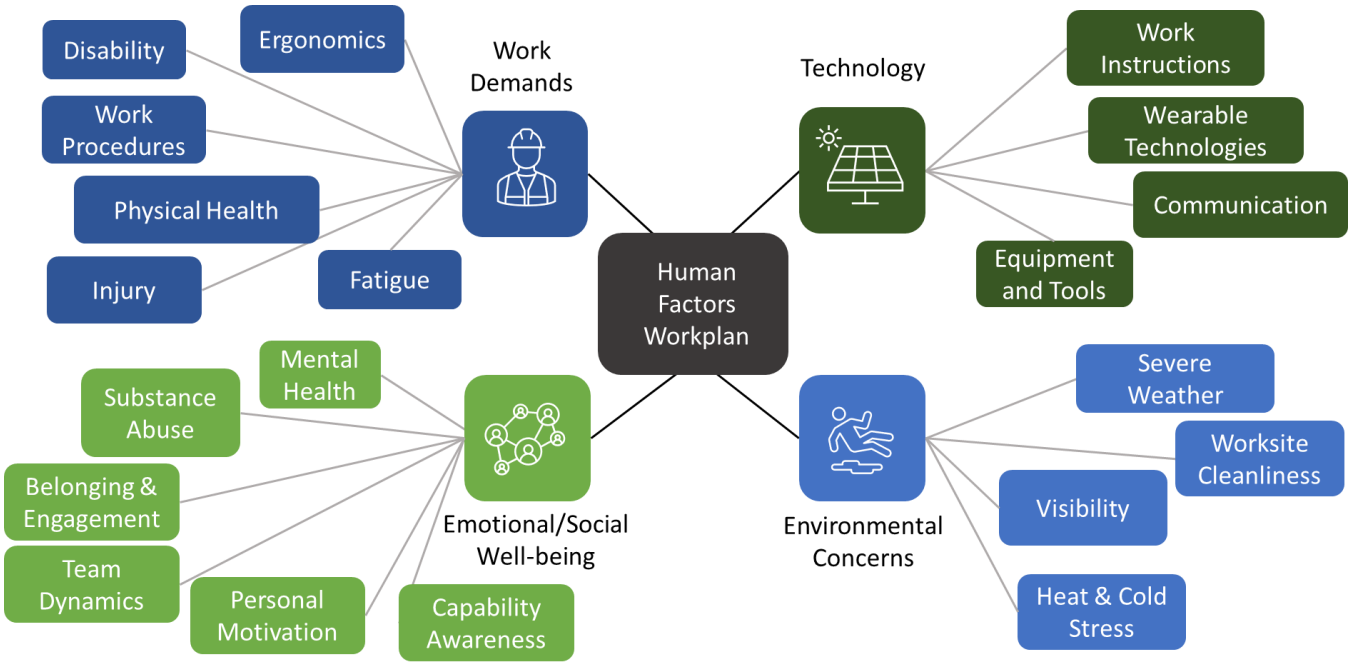
There are a considerable number of skilled occupations that are not captured when comparing the list in Table 20 to those listed on the Red Seal Trade webpage. As a result, it is necessary to evaluate the skilled trades funding programs and identify opportunities to incorporate other skilled occupations into the eligibility criteria.

9. CANREA'S WORKPLAN

CURRENT INITIATIVES

CanREA's Human Factors and Ergonomics initiatives

Ergonomics and human factors interventions can help reduce a worker's risk of injury or developing a musculoskeletal disorder (MSD). This reduction in risk can assist with improving the overall well-being of workers. CanREA created a *Human Factors Workplan* which takes a holistic approach to addressing challenges within the renewable-energy industry. CanREA is also engaged in research with the end goal of developing ergonomics best practices for the renewable-energy industry.



Occupational Journey Profiles initiative

CanREA's Occupational Journey Profiles initiative aims to collect and share career journeys of staff in member companies. To participate, selected staff members answer seven questions relating to how they got involved in the renewable-energy industry, the training or education they received, where they started and where they are now. These profiles also allow the individuals to highlight some key considerations and advice they would give to someone looking to enter a career in renewable energy. Using their responses and the photographs provided, CanREA will create one-pagers to share on LinkedIn and Twitter, as well as on our website. The goal of this initiative is to demonstrate the vast range of occupational journeys that can lead to a career in renewable energy.

Occupational Journey Profiles

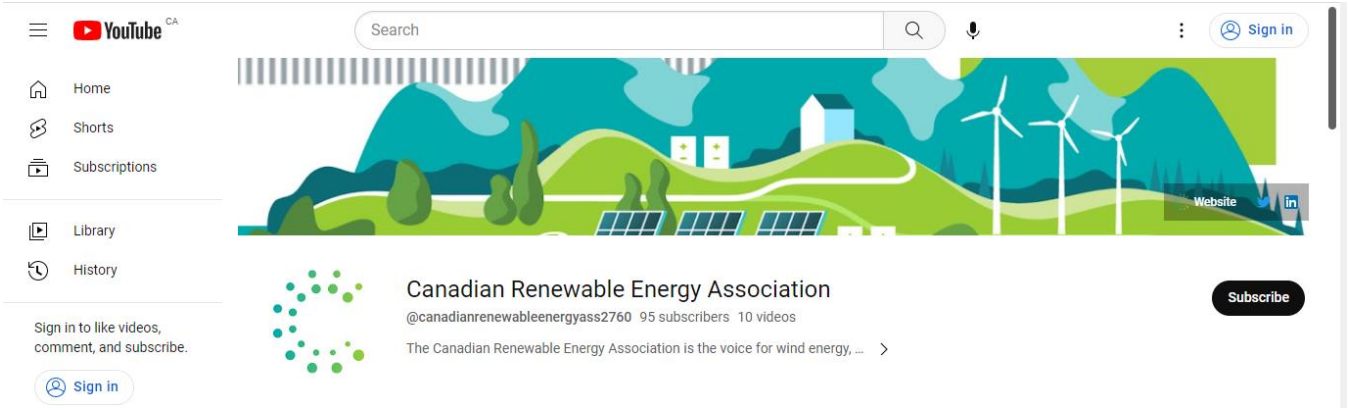
Thank you for volunteering to share your occupational career journey. The goal of this initiative is to collect career stories to share on CanREA's website that demonstrate the various career paths into renewables, and options within the renewable energy industry to youth, post-secondary students, and workers looking to transition into the renewable energy industry.

If you have any questions about this initiative, please contact Mary (mmaclean@renewablesassociation.ca).

CanREA's YouTube Playlists

On media platforms like TikTok, Instagram, and YouTube, short- and long-form videos are more easily accessible than ever before. These platforms can be used as a tool to share career or industry information with a wide audience. Recognizing this, CanREA is collecting YouTube videos that represent the renewable-energy industry in Canada. The purpose of developing this list is to provide a sneak peek inside the renewable-energy industry, including some of the technologies available, the career opportunities, and first-hand accounts of technician's day-to-day experiences.

To view the growing list of YouTube videos CanREA has collected, please visit the following link: https://youtube.com/playlist?list=PLg5nEgDRTjT-mpxj6dpOVCA7iiF0yOUEh.



Canadian Electrotechnical Training Programs

The renewable-energy industry requires a highly skilled workforce. CanREA has created a list of renewable-specific and general electrotechnical training programs available at post-secondary educational institutions across Canada. Table 21 (page 67) provides a list of the general categories and some example program titles offered at Canadian post-secondary institutions.

Table 21: *General categories and examples of specific electrotechnical programs offered at Canadian post-secondary institutions.*

General Category	Examples within the Category
Electrical	Electrical Engineering Technology, Electrical Engineering Technician, Electrical Techniques, Electrical (Foundation), Electrical Installations Technology, Electrical Power Systems, Electrician (Apprenticeship Pathway).
Energy (General)	Energy Systems Engineering Technology.
Dual-Credit for High School Students	Explore Trades for Youth, Trades Discovery, Dual-Credit, Youth Train in Trades.
Mechatronics	Electromechanical Engineering Technology – Mechatronics, Mechatronics and Robotics, Mechatronics and Advanced Manufacturing Technology.
Millwright	Industrial Mechanic/Millwright (Apprenticeship Pathway), Construction Millwright, Industrial Mechanics, Mechanical Millwright Technician, Millwright Foundation, Millwright Pre-Apprenticeship.
Power Engineering	Power Engineering Technician, Power Engineering Technology, Power Engineering (4th, 3rd, and 2nd class).
Renewable Energy (General)	Alternative Energy Technology, Sustainable and Renewable Energy Engineering, Renewable Energy Electrical Systems Installation and Maintenance, Energy Systems Engineering Technology (Fast-Track), Renewable Energy Techniques, Renewable Energy Technologies.
Smart Grids	Smart Grid Systems and Technologies.
Solar	Solar Photovoltaic Technician, Clean Energy Advanced Diploma, Solar Voltaic Installation for Electricians, Renewable Energy Installation Assistant – Photovoltaic, Solar PV Microcredential.
Trades Sampler	Introduction to Trades, Bridging to Trades Certificate, Building Trades Helper, Trades Discovery General, Skilled Trades Worker Diploma (Pre-Apprenticeship).
Wind	Advanced Certificate in Wind Turbine Maintenance, Wind Turbine Technician, Wind Turbine Technology.
Women's Training	Women in Trades Training, Trades Discovery for Women.

An additional type of training refers to foundational safety training that is required for the renewable-energy industry, as well as other industries that have similar safety considerations such as the oil-and-gas and construction industries.

Examples of foundational safety trainings include working at heights, enclosed or confined space training, first-aid, and others. These trainings can be offered via post-secondary institutions or through third party, private training organizations. CanREA has started to identify these training providers as well (Table 8, page 36).

A few of these Canadian training providers are GWO certified. The Global Wind Organisation (GWO) has created a series of training standards relevant to the skills and competencies required in the wind industry.

Working in the renewable-energy industry requires individuals to be dedicated to lifelong learning, both informally, via mentorship and knowledge transfer, and formally via training courses. CanREA wants to ensure that information on how to access all varieties of training opportunities is made widely available to anyone interested in learning more.

CANREA'S FUTURE OBJECTIVES

Workforce Development Website initiative

CanREA's *National workforce strategy for the renewable-energy industry* aims to identify the pathways into the renewable-energy industry, as demonstrated in CanREA's *Employment-Process Model*. This model acknowledges the breadth of the occupational timeline beginning as early as elementary school and leading up to retirement.

It also outlines the range of key stakeholders (see Figure 4, below) relevant to a candidate's occupational journey. These stakeholders are pivotal to ensuring the candidate has information, support, resources, and opportunities to enter a fulfilling career with opportunities for growth along the way.

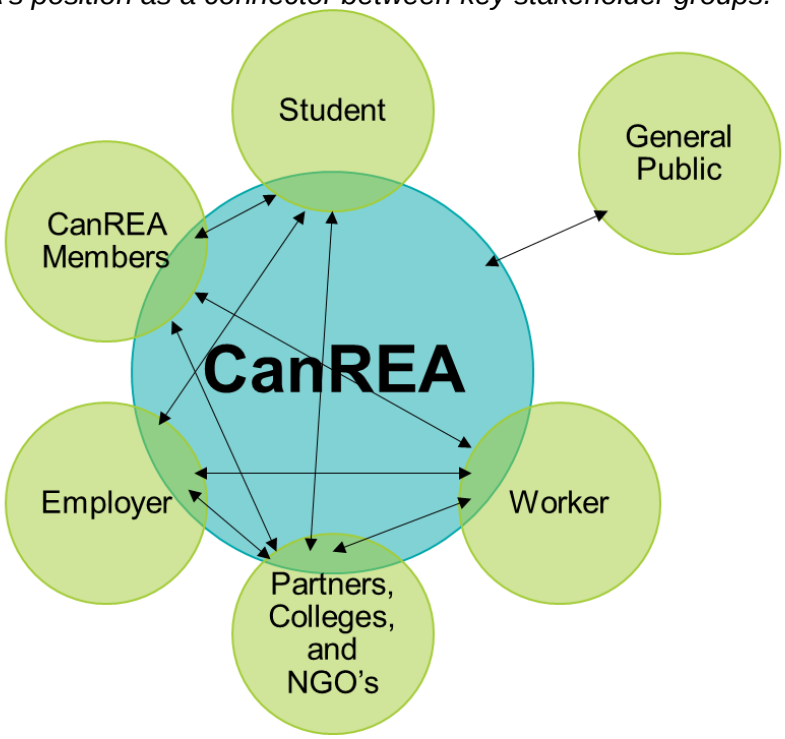
While developing the *Employment-Process Model*, CanREA identified several pre-existing resources that provide opportunities for children and youth, career exploration, funding programs, internship programs, job boards, educator resources, employer resources and more.

CanREA aims to leverage its position as a connector and create a single, centralized resource that will become known as a trusted source for renewable energy career information and will provide an enhanced networking opportunity for stakeholders.

CanREA is currently developing a workforce website that will act as a resource reservoir for individuals across their occupational journey and act as a "jumping off point" where we can focus our marketing efforts. The main goals of this website are to increase renewable-energy career awareness and reduce the barriers to entry.

It will also reference materials from other non-governmental organizations that are actively involved in renewable energy workforce development across one or more stages of CanREA's *Employment-Process Model*.

Figure 4: *CanREA's position as a connector between key stakeholder groups.*



Timeline

Developing CanREA's *Employment-Process Model* and CanREA's *National Workforce Strategy* report, while looking ahead to the workforce development website, has been a dynamic process. Figure 5 provides a high-level overview of the work to date and the next steps in this evolving project.

Figure 5: *The timeline of CanREA's National Workforce Strategy and next steps.*

This project can be viewed as three separate parts, each of which is cumulative and builds on the previous parts, collectively assisting with the future website development initiative.

CanREA's *National workforce strategy for the renewable-energy industry* outlined the process of developing CanREA's *Employment-Process Model*; the research and identification of existing career resources, and workforce development organizations.

CanREA's *National Workforce Strategy* report was launched at the Operations Summit, on April 4, 2023.

CanREA's Operations team will continue creating new partnerships and formalizing existing ones with organizations that are engaged in workforce-development efforts, with the intent to use our coming website as a portal to their programs and resources, all geared towards facilitating and encouraging workforce development in the Canadian renewable energy industry.

CONCLUSION

As the Government of Canada (2021) writes, “Climate change is the challenge of our generation. And the transition to a low-carbon economy is also one of our greatest opportunities.” This opportunity involves many moving parts; however, the biggest limiting factor could be a lack of people to do the work required to reach net-zero.

Renewable-energy and energy storage workers are supported by many individuals, including their family and friends, community members, educators and school support staff, post-secondary and private training instructors, employers, industry associations, non-governmental organizations, federal and provincial governments and their peers.

For a given individual to be successful, they will need resources that help reduce the barriers related to accessing training, employment and opportunities for career progression. And for the industry to be successful, it will need dedicated efforts focused on improving the accessibility of resources and employment opportunities for candidates. This includes seeking ways to improve inclusivity in the workforce: industry must find ways to acknowledge and mitigate the employment inequities that disadvantage historically underrepresented groups.

There is no single pathway to pursue a renewable energy* career. Renewable-energy careers must include pathways for individuals seeking career transitions, veterans and newcomers to Canada, to engage in training and employment opportunities that fit their interests, skills, and experience.

CanREA has found that there are renewable-energy resources to support prospective candidates, available from non-governmental organizations, industry organizations, and educational institutions, which CanREA has collected here and will showcase on its coming website.

However, CanREA also found there is more work to be done to bridge certain gaps. Some of these gaps include resources related to Canadian salary information, distinguishing renewable occupations under their own National Occupational Classification (NOC) code, customizable career promotion resources, and advocacy efforts to include renewable energy occupations within skilled trades funding programs.

One organization cannot bridge these gaps alone. Ensuring the renewable-energy industry has an appropriate number of skilled workers will require strong collaboration between numerous key stakeholders. By working together, stakeholders can develop mutually beneficial and meaningful partnerships to accomplish this shared objective.

If we act together, with a people-centered focus and collaborative approach, we can support the workforce required to reach net-zero.

**As mentioned in the introduction, for the purposes of this document, the terms “renewable energy” and “renewables” are defined as including wind energy, solar energy and energy storage, the three technologies represented by the Canadian Renewable Energy Association (CanREA).*

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- *These materials are intended for educational and informational purposes only.*
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REFERENCES

Adecco. (2022, February 9). *Where do candidates look for jobs?* https://www.adecco.ca/en-ca/blog/where-do-candidates-look-for-jobs/

American Clean Power. (2023). *S&P*. https://cleanpower.org/resources/types/standards-and-practices/

American Clean Power. (2022). *Energy transition for all.* https://cleanpower.org/wp-content/uploads/2022/03/Energy_Transition_For_All_ACP_Report.pdf

American Clean Power. (2016. January 21). *Learning to fly: How I became a wind tech.* https://cleanpower.org/blog/learning-to-fly-how-i-became-a-wind-tech/

Amith, M. C. (2021, October 25). *Skilled jobs in clean energy are growing and offer opportunities for women to advance within in-demand careers*. American Clean Power. https://cleanpower.org/blog/skilled-jobs-in-clean-energy-are-growing-and-offer-opportunities-for-women-to-advance-within-in-demand-careers/

Anderson, D. (2022, June 14). *Alberta renewable energy surge could power 4,500 jobs*. The Narwhal. https://thenarwhal.ca/alberta-renewable-energy-surge/

Atlantic Council. (2023). *Out in energy*. https://www.atlanticcouncil.org/programs/global-energy-center/out-in-energy/

Bagalini, A. (2020, July 22). *5 ways intersectionality affects diversity and inclusion at work.* World Economic Forum. https://www.weforum.org/agenda/2020/07/diversity-inclusion-equality-intersectionality/

Beck, M., Frank, B., and Tohme, J. (2022, October). *Equity, diversity & inclusion (EDI) in Canadian energy decision-making.* University of Ottawa. https://www.uottawa.ca/research-innovation/sites/g/files/bhrskd326/files/2022-10/PE_EDI%20Report_Fall%202022_V05.pdf

Bleakney, J. (2019, September 13). *What is work-integrated learning?* Elon University. https://www.centerforengagedlearning.org/what-is-work-integrated-learning/

Boston University. (n.d.). *Experiential learning.* https://www.bu.edu/ctl/guides/experiential-learning/

Branigan, M. (2021, June 7). *Approaching workplace diversity from an intersectional perspective – what does it mean?* Electrical Industry News Week. https://electricalindustry.ca/latest-articles/8322-approaching-workplace-diversity-from-an-intersectional-perspective-what-does-it-mean/

British Columbia Institute of Technology. (n.d.-a). *Renewable energy electrical systems installation & maintenance.* https://www.bcit.ca/programs/renewable-energy-electrical-systems-installation-and-maintenance-advanced-certificate-part-time-6185adcert/

British Columbia Institute of Technology. (n.d.-b). *Smart grid systems and technologies*. https://www.bcit.ca/programs/smart-grid-systems-and-technologies-master-of-engineering-part-time-m500meng/

Build A Dream. (n.d.-a). *Anti-racist resources*. https://www.webuildadream.com/anti-racist-resources/

Build A Dream. (n.d.-b). *Parents & students*. https://www.webuildadream.com/parents-students/

Calderon, V. J. and Yu, D. (2017, June 1). *Student enthusiasm falls as high school graduation nears.* Gallup. https://news.gallup.com/opinion/gallup/211631/student-enthusiasm-falls-high-school-graduation-nears.aspx

Camosun College. (2022). *Global sustainability*. https://prosit.camosun.ca/public/category/programArea.do?method=load&selectedProgramAreaId=1722795

Canadian College of Health, Science & Technology. (2023). *Solar photovoltaic technician*. https://www.cchst.net/programs/technology-energy/solar-photovoltaic-technician/

Canadian Colleges for a Resilient Recovery. (2021). *Webinars*. https://resilientcolleges.ca/webinars/

Canadian Federation of Independent Business. (2023). *Apply for up to $10,000 per employee for training from the Canada-Yukon job grant.* https://www.cfib-fcei.ca/en/tools-resources/apply-10000-employee-training-canada-yukon-job-grant

Canadian Renewable Energy Association. (2023a, March 27). *Working in renewables* [YouTube Playlist]. YouTube. https://www.youtube.com/playlist?list=PLg5nEgDRTjT-mpxj6dpOVCA7iiF0yOUEh

Canadian Renewable Energy Association. (2023b, January 31). *News release: Canada added 1.8 GW of wind and solar in*

2022. https://renewablesassociation.ca/news-release-canada-added-1-8-gw-of-wind-and-solar-in-2022/

Canadian Renewable Energy Association. (2021). *Powering Canada's journey to net-zero: CanREA's 2050 vision*. https://renewablesassociation.ca/wp-content/uploads/2021/11/CanREAs2050Vision_Nov2021_web.pdf

Canadian Solar Industries Association. (n.d.). *Roadmap 2020: Powering Canada's future with solar electricity.* https://www.cansia.ca/uploads/7/2/5/1/72513707/cansia_roadmap_2020_final.pdf

Careers in Energy. (2023a). *Assess your career change.* https://careersinenergy.ca/assess-your-career-change/

Careers in Energy. (2023b). *Employer support*. https://careersinenergy.ca/employer-support/

Careers in Energy. (2023c). *Explore careers.* https://careersinenergy.ca/careers/

Careers in Energy. (2023d). *Working in renewables.* https://careersinenergy.ca/plan-your-future/working-in-renewables/

Carleton University. (2023). *Sustainable and renewable energy engineering.* https://admissions.carleton.ca/programs/sustainable-and-renewable-energy-engineering/

Centennial College. (2023a). *Energy systems engineering technician*. https://www.centennialcollege.ca/programs-courses/full-time/energy-systems-engineering-technician/

Centennial College. (2023b). *Energy systems engineering technician (fast-track).* https://www.centennialcollege.ca/programs-courses/full-time/energy-systems-engineering-technician-fast-track

Centennial College. (2023c). *Energy systems engineering technology (fast-track) (optional co-op).* https://www.centennialcollege.ca/programs-courses/full-time/energy-systems-engineering-technology-fast-track

Centennial College. (2023d). *Energy systems engineering technology (optional co-op).* https://www.centennialcollege.ca/programs-courses/full-time/energy-systems-engineering-technology/

Centennial College. (2023e). *Solar PV installation for electricians (journeymen and apprentices).* https://db2.centennialcollege.ca/ce/programdetail.php?CertificateCode=7467

Cestar College of Business, Health & Technology. (n.d.). *Wind turbine technician program*. https://www.cestarcollege.com/programs/wind-turbine-technician-program/

CEWIL Canada. (2021, November 3). *What is work-integrated learning (WIL)?* https://cewilcanada.ca/CEWIL/CEWIL/About-Us/Work-Integrated-Learning.aspx

CEWIL Canada. (n.d.). *National WIL directory*. https://cewilcanada.ca/CEWIL/CEWIL/Resources/National-WIL-Directory.aspx?hkey=f11e35fa-c7cc-4ae2-bf23-6bc2d7641e4e

Chamberlain, A. (2017, February 15). *Why do workers quit? The factors that predict employer turnover*. Glassdoor, Inc. https://www.glassdoor.com/research/why-do-workers-quit/

Chandler, C. and Reckker, E. (2011, November/December). *Using media to broaden students' knowledge about career choices*. Association for Career & Technical Education. https://files.eric.ed.gov/fulltext/EJ964090.pdf

Clean Energy Canada. (2021, June). *The new reality.* https://cleanenergycanada.org/wp-content/uploads/2021/06/Report_CEC_CleanJobs2021-1.pdf

Clean Foundation. (2021a). *Clean energy school*. https://cleanfoundation.ca/education-and-engagement/youth-programming/

Clean Foundation. (2021b). *Clean leadership summer internships*. https://cleanfoundation.ca/workforce-development/clean-leadership-summer-internship/

Clean Foundation. (2021c). *Eddie's litterless quest*. https://cleanfoundation.ca/education-and-engagement/youth-programming/

Clean Foundation. (2021d). *Green jobs*. https://cleanfoundation.ca/workforce-development/green-jobs/

Clean Foundation. (2021e). *I wonder…* https://cleanfoundation.ca/education-and-engagement/youth-programming/

Clean Foundation. (2021f). *Science horizons*. https://cleanfoundation.ca/workforce-development/science-horizons/

Clean Foundation. (2021g). *Workshops, tools and resources for climate learning*. https://cleanfoundation.ca/education-and-engagement/professional-learning/

Coalition for Career Development. (2019). *Career readiness for all.* https://irp-

cdn.multiscreensite.com/81ac0dbc/files/uploaded/Career%20Readiness%20for%20All%20FINALV.pdf

Concordia University of Edmonton. (2016). *Renewable and sustainable energy management*. https://concordia.ab.ca/external-affairs/office-of-extension-and-culture/extension-programs/renewable-and-sustainable-energy-management/

Conestoga College. (n.d.-a). *Applied energy management – Renewable energy stream*. https://www.conestogac.on.ca/fulltime/applied-energy-management-renewable-energy-stream

Conestoga College. (n.d.-b). *Renewable energy techniques*. https://www.conestogac.on.ca/fulltime/renewable-energy-techniques

Doiron, G., Severson-Baker, E., and Hughes, L. (2021, October). *Women in Alberta's energy transition.* The Pembina Institute. https://www.pembina.org/reports/2021-10-14-womeninalbertasenergytransition-pembina.pdf

ECO Canada. (2021a). *Apprenticeship service program.* https://eco.ca/asp-apprenticeship-service-program/

ECO Canada. (2021b). *BEAHR Indigenous training programs.* https://eco.ca/new-practitioners/beahr/

ECO Canada. (2021c). *ECO employment programs: Training & wage subsidies for environmental jobs*. https://eco.ca/environmental-professionals/employment-funding-and-job-board/apply-for-job-funding/

ECO Canada. (2021d). *Environmental career profiles*. https://eco.ca/career-profiles-index/

ECO Canada. (2021e). *Invest in higher education*. https://eco.ca/environmental-professionals/lifelong-learning-for-professionals/higher-education/

ECO Canada. (2021f). *Labour market intelligence (LMI).* https://eco.ca/labour-market-research/

ECO Canada. (2021g). *Learning on-demand*. https://eco.ca/learning-on-demand/

ECO Canada. (2021h). *Preparing international talent for the Canadian workforce*. https://eco.ca/environmental-professionals/employment-funding-and-job-board/immigrant-bridging/

Electricity Human Resources Canada. (2021a). *Electricity competency framework and national occupational standards: Employer guide*. https://electricityhr.ca/wp-content/uploads/2022/02/EHRC-Competency-Framework-and-NOS-Employer-Guide-ENG.pdf

Electricity Human Resources Canada. (2021b, April 29). *National occupational standards profiles inform skills needs for electricity sector*. https://electricityhr.ca/2021/04/29/national-occupational-standards-profiles-inform-skills-needs-for-electricity-sector/

Electricity Human Resources Canada. (2020a). *Advancing gender diversity in Canada's electricity sector: A compendium of success stories*. https://electricityhr.ca/wp-content/uploads/2020/04/Accord-Compendium-FINAL-WEB.pdf

Electricity Human Resources Canada. (2020b). *Generation impact: Future workforce perspectives*. https://electricityhr.ca/resources/generation-impact/

Electricity Human Resources Canada. (2020c). *Leadershift: Pathways to gender equity.* https://electricityhr.ca/resources/leadershift-pathways-to-gender-equity/

Electricity Human Resources Canada. (2019). *Workforce in motion – 2017 labour market intelligence study.* https://electricityhr.ca/workplace-solutions/sector-research/lmi-workforce-in-motion-2017-2022/

Electricity Human Resources Canada. (2018, March). *Workforce transitions: LMI for Alberta's energy sector 2017-2022*. https://electricityhr.ca/resources/lmi-for-albertas-energy-sector-2017-2022/

Electricity Human Resources Canada. (2017, June 12). *Profile of women working in the clean energy sector in Canada.* https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/energy-resources/Profile_of_Women_Working_in_the_Clean_Energy_Sector_in_Canada_compressed.pdf

Electricity Human Resources Canada. (n.d.-a). *Aboriginal workforce participation initiative.* https://electricityhr.ca/resources/aboriginal-workforce-participation-initiative/

Electricity Human Resources Canada. (n.d.-b). *Academic advisory group*. https://electricityhr.ca/education-planning/academic-advisory-group/

Electricity Human Resources Canada. (n.d.-c) *Advancing gender diversity in Canada's electricity sector: A compendium of success stories.* https://electricityhr.ca/wp-content/uploads/2020/04/Accord-Compendium-FINAL-WEB.pdf

Electricity Human Resources Canada. (n.d.-d). *Bright futures energy camp*. https://electricityhr.ca/bright-futures-energy-camp/

Electricity Human Resources Canada. (n.d.-e). *Change management.* https://electricityhr.ca/workplace-solutions/change-management/

Electricity Human Resources Canada. (n.d.-f). *Discovering potential program.* https://electricityhr.ca/workplace-solutions/wage-subsidy-programs/discovering-potential/

Electricity Human Resources Canada. (n.d.-g). *Electricity competency framework.* https://electricityhr.ca/electricity-competency-framework/

Electricity Human Resources Canada. (n.d.-h). *Empowering futures*. https://electricityhr.ca/workplace-solutions/wage-subsidy-programs/empowering-futures-apprentices/empowering-futures-for-students-and-organizations/

Electricity Human Resources Canada. (n.d.-i). *From disability to inclusion: Valuing people with disabilities in the workplace.* https://electricityhr.ca/resources/from-disability-to-inclusion/

Electricity Human Resources Canada. (n.d.-j). *Getting started in electricity: Jobseekers*. https://electricityhr.ca/getting-started-in-electricity/getting-started-in-electricity-jobseekers/

Electricity Human Resources Canada. (n.d.-k). *Illuminate opportunity: Equity in the workplace*. https://electricityhr.ca/workplace-solutions/diversity-inclusion/illuminate-opportunity/

Electricity Human Resources Canada. (n.d.-l). *Industry skills*. https://electricityhr.ca/electricity-competency-framework/industry-skills/

Electricity Human Resources Canada. (n.d.-m). *Leadership accord on diversity, equity and inclusion.* https://electricityhr.ca/workplace-solutions/diversity-inclusion/leadership-accord-on-diversity-equity-and-inclusion/

Electricity Human Resources Canada. (n.d.-n). *Mentor junction*. https://ehrc.mentorjunction.ca/

Electricity Human Resources Canada. (n.d.-o). *National occupational standards.* https://electricityhr.ca/workplace-solutions/national-occupational-standards/

Electricity Human Resources Canada. (n.d.-p). *PowerShift: Transitioning from tourism to electricity*. https://electricityhr.ca/powershift/

Electricity Human Resources Canada. (n.d.-q). *Professional skills training.* https://electricityhr.ca/professional-skills-training/

Electricity Human Resources Canada. (n.d.-r). *Recharging our workforce.* https://electricityhr.ca/resources/recharging-our-workforce/

Electricity Human Resources Canada. (n.d.-s). *Renewing futures*. https://electricityhr.ca/product/renewing-futures-technology-report/

Electricity Human Resources Canada. (n.d.-t). *Succession planning bundle.* https://electricityhr.ca/product/succession-planning-bundle/

Electricity Human Resources Canada. (n.d.-u). *Wage subsidy programs*. https://electricityhr.ca/workplace-solutions/wage-subsidy-programs/

Electricity Human Resources Canada. (n.d.-v). *Welcoming newcomers*. https://electricityhr.ca/workplace-solutions/wage-subsidy-programs/welcomingnewcomers/

Electricity Human Resources Canada. (n.d.-w). *Work transformed: The impact of technology*. https://electricityhr.ca/resources/work-transformed/

Electricity Sector Council. (2011). *Aboriginal participation initiatives project*. https://electricityhr.ca/wp-content/uploads/2020/01/AWPI-Report-Full.pdf

Enercon. (n.d.). *Our trainings*. https://enercon-training.ca/trainings?tx_formationenercon_list%5Baction%5D=list&tx_formationenercon_list%5Bcontroller%5D=Trainings&tx_formationenercon_list%5Buid%5D=63&cHash=86793c7102d3a087b77ec9d643ad718b

Envirocompétences. (2023, January). *l'Étude prospective de la main-d'œuvre et des emplois liés à la transition verte et aux changements climatiques.* https://www.envirocompetences.org/media/nouvelles/document/IDQ-20230216-IMPACTPEV-court.pdf

Equal by 30. (2023). *Balance means business*. https://www.equalby30.org/sites/equalby30/files/2023-

01/eqx30_eng_accessible.pdf

Fanshawe College. (n.d.). *Renewable energies technician (co-op).* https://www.fanshawec.ca/programs/ret3s-renewable-energies-technician-co-op/next

Feinstein, C. (2022, September 22). *Does Canada have enough workers? Record-high of nearly one million jobs unfilled in the second quarter of 2022*. Toronto Star. https://www.thestar.com/business/2022/09/22/does-canada-have-enough-workers-record-high-of-nearly-one-million-jobs-unfilled-in-second-quarter-of-2022.html

Fraser Basin Council. (n.d.). *Energy peers in Indigenous communities (EPIC) network.* https://www.fraserbasin.bc.ca/epicnetwork.html

Future Skills Centre. (n.d.-a). *Focus on labour market information*. https://fsc-ccf.ca/engage/focus-on-labour-market-information/

Future Skills Centre. (n.d.-b). *Skills match – The energy fit.* https://fsc-ccf.ca/projects/skills-match-the-energy-fit/

Future Skills Centre. (n.d.-c). *Transition to a new tomorrow.* https://fsc-ccf.ca/projects/transition-to-a-new-tomorrow/

Global Wind Organisation. (2022, August 9). *The many faces of an entry level technician*. https://www.globalwindsafety.org/news/the-many-faces-of-an-entry-level-technician

Government of Alberta. (2023a). *Canada-Alberta job grant.* https://www.alberta.ca/canada-alberta-job-grant.aspx

Government of Alberta. (2023b). *Workforce contacts and employer resources.* https://www.alberta.ca/workforce-contacts-employer-resources.aspx

Government of Alberta. (2023c). *Workforce partnerships grants.* https://www.alberta.ca/workforce-partnerships-grants.aspx

Government of Alberta. (2020, March 31). *Wind turbine technician*. https://alis.alberta.ca/occinfo/occupations-in-alberta/occupation-profiles/wind-turbine-technician/#employment-advancement

Government of Canada. (2023a, March 23). *The 50 – 30 challenge: Your diversity advantage.* https://ised-isde.canada.ca/site/ised/en/50-30-challenge-your-diversity-advantage

Government of Canada. (2023b, March 9). *About the labour market development agreements program*. https://www.canada.ca/en/employment-social-development/programs/training-agreements/lmda.html

Government of Canada. (2023c, February 22). *Job bank: Employer resources.* https://www.jobbank.gc.ca/hiring/resources

Government of Canada. (2023d, February 17). *Sustainable jobs: Promoting a bright future for Canadian workers.* https://natural-resources.canada.ca/climate-change/sustainable-jobs-promoting-bright-future-for-canadian-workers/24947

Government of Canada. (2023e, February 6). *Green jobs in natural resources*. https://natural-resources.canada.ca/climate-change/canadas-green-future/green-jobs/87

Government of Canada. (2023f, January 12). *National occupational classification*. https://noc.esdc.gc.ca/

Government of Canada. (2023g, January 10). *Science horizons youth internship program*. https://www.canada.ca/en/environment-climate-change/services/science-technology/managing/horizons-youth-internship-program.html

Government of Canada (2022a, December 2). *Strategic partnerships initiative*. https://www.sac-isc.gc.ca/eng/1330016561558/1594122175203

Government of Canada. (2022b, August 9). *About the national occupation classification.* https://noc.esdc.gc.ca/Home/AboutTheNoc

Government of Canada. (2022c, July 27). *Government of Canada invests to help Canadians enter skilled trades*. https://www.canada.ca/en/employment-social-development/news/2022/07/government-of-canada-invests-to-help-canadians-enter-skilled-trades.html

Government of Canada. (2021). *People-centred just transition: Discussion paper*. https://www.rncanengagenrcan.ca/sites/default/files/pictures/home/just_transition_discussion_paper_-_en_-_july_15.pdf

Government of Canada. (2020, January 8). *Canada-Saskatchewan workforce development agreement*. https://www.canada.ca/en/employment-social-development/programs/training-agreements/workforce-development-

agreements/sk.html

Government of Manitoba. (n.d.-a). *Canada-Manitoba job grant*. https://www.gov.mb.ca/jec/busdev/financial/cmjg/index.html

Government of Manitoba. (n.d.-b). *Labour market partnerships.* https://www.gov.mb.ca/wd/ites/tes/pubs/employers_business/programs/labour_market_partnerships.pdf

Government of Manitoba. (n.d.-c). *Workforce development program*. https://www.gov.mb.ca/jec/busdev/financial/workforce.html

Government of New Brunswick. (n.d.). *Labour force training.* https://www2.gnb.ca/content/gnb/en/services/services_renderer.201466.Labour_Force_Training.html

Government of Newfoundland and Labrador. (2022, June). *Occupation projections – classification*. https://www.gov.nl.ca/fin/economics/occ-classification/

Government of Newfoundland and Labrador. (2021). *Maximizing our renewable future: A plan for development of the renewable energy industry in Newfoundland and Labrador.* https://www.gov.nl.ca/iet/files/Renewable-Energy-Plan-Final.pdf

Government of Newfoundland and Labrador. (n.d.-a). *Labour market partnerships.* https://www.gov.nl.ca/ipgs/lmda/lmp/

Government of Newfoundland and Labrador. (n.d.-b). *What is LMI?* https://www.gov.nl.ca/labourmarketinformation/what-is-lmi/#:~:text=Labour%20market%20information%20is%20any,next%20step%20in%20your%20career

Government of Northwest Territories. (n.d.). *Canada-Northwest Territories job grant.* https://www.ece.gov.nt.ca/sites/ece/files/resources/canada-northwest_territories_job_grant_brochure.pdf

Government of Nova Scotia. (n.d.-a). *Energy training program.* https://energy.novascotia.ca/industry-development/energy-training-program

Government of Nova Scotia. (n.d.-b). *Job creation partnerships.* https://novascotia.ca/employmentnovascotia/programs/job-creation-partnerships.asp

Government of Nova Scotia. (n.d.-c). *Workplace innovation and productivity skills incentive.* https://novascotia.ca/programs/workplace-innovation-productivity-skills-incentive/

Government of Nunavut. (2015, April 15). *Governments of Canada and Nunavut launch the Canada job grant to help Nunavummiut get high quality jobs.* https://www.gov.nu.ca/eia/news/governments-canada-and-nunavut-launch-canada-job-grant-help-nunavummiut-get-high-quality

Government of Ontario. (2023a, March 21). *Skills development fund.* https://www.ontario.ca/page/skills-development-fund

Government of Ontario. (2023b, March 8). *Ontario helping more students enter the skilled trades faster*. https://news.ontario.ca/en/release/1002797/ontario-helping-more-students-enter-the-skilled-trades-faster

Government of Ontario. (2022a, September 7). *Ontario labour market partnerships (OLMP).* https://www.tcu.gov.on.ca/eng/eopg/programs/lmp.html#:~:text=The%20Ontario%20Labour%20Market%20Partnerships,force%20adjustments%20and%20human%20resource

Government of Ontario. (2022b, August 31). *Specialist high skills major.* https://www.ontario.ca/page/specialist-high-skills-major#:~:text=The%20Specialist%20High%20Skills%20Major%20(%20SHSM%20)%20is%20a%20specialized%20program,Ministry%20of%20Education%20approved%20program.

Government of Ontario. (2021, September 3). *Canada-Ontario job grant.* https://www.tcu.gov.on.ca/eng/eopg/cojg/

Government of Ontario. (n.d.). *Considerations for program planning: Experiential learning*. https://www.dcp.edu.gov.on.ca/en/program-planning/considerations-for-program-planning/experiential-learning

Government of Prince Edward Island. (2023). *Labour market partnerships*. https://www.princeedwardisland.ca/en/information/labour-market-partnerships

Government of Quebec. (2023). *Aim for employment program.* https://www.quebec.ca/en/employment/aim-employment-program

Government of Saskatchewan. (2022, May 18). *Saskatchewan announces funding for educational events in the information technology and green energy sectors.* https://www.saskatchewan.ca/government/news-and-media/2022/may/18/saskatchewan-announces-funding-for-educational-events-in-the-information-technology-and-

green-energy

Government of Saskatchewan. (n.d.-a). *Apply for the Canada-Saskatchewan job grant*. https://www.saskatchewan.ca/business/hire-train-and-manage-employees/apply-for-the-canada-saskatchewan-job-grant

Government of Saskatchewan. (n.d.-b). *Re-skill Saskatchewan training subsidy*. https://www.saskatchewan.ca/business/hire-train-and-manage-employees/re-skill-saskatchewan-training-subsidy#apply

Government of Yukon. (2022, March 29). *Building UP program guidelines.* https://yukon.ca/en/building

GreenLearning. (2023a). *Our challenges*. https://greenlearning.ca/challenges

GreenLearning. (2023b). *Our programs*. https://greenlearning.ca/programs

GreenLearning. (2023c). *Our resources.* https://greenlearning.ca/resources

Groupe Collegia. (2023). *Maintenance d'éoliennes (AEC).* https://www.collegia.qc.ca/formations-creditables/maintenance-deoliennes/

Hamlin, D. and Kidder, A. (2015). *Guiding students to success: Ontario's school guidance programs.* People for Education. Toronto: January 26, 2015. https://peopleforeducation.ca/report/guiding-students-to-success-ontarios-school-guidance-programs/#:~:text=School%20Guidance%20at%20a%20Glance,-Share%3A&text=The%20average%20ratio%20of%20students,school%20is%20391%20to%201.

Holdings, K. (2014, October 24). *8 reasons why experiential learning is the future of learning.* eLearning Industry. https://elearningindustry.com/8-reasons-experiential-learning-future-learning

Holland College. (2023). *Wind turbine technology*. https://www.hollandcollege.com/programs/wind-turbine-technology.php

Humber College. (2021, May 19). *Program advisory committees policy*. https://humber.ca/legal-and-risk-management/index.php?q=policies/academic/program-advisory-committees-policy.html

Indigenous Clean Energy. (2022a). *ICE mentorship*. https://indigenouscleanenergy.com/our-programs/ice-mentorship/

Indigenous Clean Energy. (2022b). *20/20 catalysts*. https://indigenouscleanenergy.com/our-programs/20-20-catalysts/

Indigenous Clean Energy. (2021). *Generation power youth*. https://www.generationpower.ca/get-involved/generation-power-youth

Indigenous Clean Energy. (2020, June). *Accelerating transition: Economic impacts of Indigenous leadership in catalyzing the transition to a clean energy future across Canada.* https://indigenouscleanenergy.com/wp-content/uploads/2022/06/ICE-Accelerating-Transition-Data-Report-web.pdf

Indigenous Clean Energy. (n.d.-a). *ICE network*. https://www.icenet.work/home

Indigenous Clean Energy. (n.d.-b). *ImaGENation: Indigenous youth mentorship program*. https://www.imagenationenergy.com/

Inside Education. (2023a). *Classroom & online programs*. https://www.insideeducation.ca/classroom-field-programs/classroom-online-programs/

Inside Education. (2023b). *Energy innovation days*. https://www.insideeducation.ca/youth-summits/local/energy-innovation-days/

Inside Education. (2023c). *Generate & navigate: Youth energy, water & climate leadership summit*. https://www.insideeducation.ca/youth-summits/provincial/generate-navigate/

Inside Education. (2023d). *Learning resources*. https://www.insideeducation.ca/learning-resources/

International Labour Office. (2011). *Skills and occupational needs in renewable energy*. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_166823.pdf

International Labour Organization. (2019, October). *Persons with disabilities in a just transition to a low-carbon economy*. https://www.uncclearn.org/wp-content/uploads/library/wcms_727084.pdf

International Labour Organization. (2018). *World employment social outlook: Greening with jobs.* https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_628654.pdf

International Renewable Energy Agency. (2022). *Renewable energy employment by country.* https://www.irena.org/Data/View-

data-by-topic/Benefits/Renewable-Energy-Employment-by-Country

International Renewable Energy Agency. (2019). *Renewable Energy: A Gender Perspective.* IRENA, Abu Dhabi. https://www.irena.org/publications/2019/Jan/Renewable-Energy-A-Gender-Perspective

International Renewable Energy Agency (IRENA) and International Labour Organization (ILO). (2022). *Renewable energy and jobs – annual review 2022*. International Renewable Energy Agency, Abu Dhabi and International Labour Organization, Geneva. https://www.ilo.org/wcmsp5/groups/public/@dgreports/@dcomm/documents/publication/wcms_856649.pdf

International Renewable Energy Agency (IRENA) and International Labour Organization (ILO). (2021). *Renewable energy and jobs – annual review 2021*. International Renewable Energy Agency, International Labour Organization, Abu Dhabi, Geneva. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Oct/IRENA_RE_Jobs_2021.pdf

Interstate Renewable Energy Council. (2023a, February 9). *Key recommendations: Cultivating a diverse and skilled talent pipeline for the equitable transition.* https://irecusa.org/resources/key-recommendations-cultivating-a-diverse-and-skilled-talent-pipeline-for-the-equitable-transition/

Interstate Renewable Energy Council. (2023b). *National clean energy workforce alliance*. https://irecusa.org/programs/the-national-clean-energy-workforce-alliance/

Interstate Renewable Energy Council. (2023c). *Resources.* https://irecusa.org/resources/?_resources_categories=workforce-development&_paged=3

Interstate Renewable Energy Council. (2023d). *Solar career map*. https://www.irecsolarcareermap.org/

Interstate Renewable Energy Council, *National Solar Jobs Census 2021* (July 2022), available at http://www.SolarJobsCensus.org.

Iron and Earth. (2022a). *Climate career portal*. https://www.climatecareerportal.com/

Iron and Earth. (2022b, January 24). *Communities' transition pathways – Hinton, Alberta*. https://assets.nationbuilder.com/ironandearth/pages/1740/attachments/original/1648742109/Communities_Transition_Pathways_-_Hinton_AB.pdf?1648742109

Iron and Earth. (2022c). *Mentorship*. https://www.climatecareerportal.com/mentors

Iron and Earth. (n.d.-a). *Prosperous transition plan*. https://www.ironandearth.org/prosperous_transition_plan

Iron and Earth. (n.d.-b). *Renewable skills initiative*. https://www.ironandearth.org/renewable_skills_initiative

Iron and Earth. (n.d.-c). *Renuwell.* https://www.ironandearth.org/renuwell

Jefferson, C. (2021, August 6). *Career path: How to find yours and why it matters*. BetterUp. https://www.betterup.com/blog/career-path#:~:text=a%20different%20company.-,Why%20is%20a%20career%20path%20so%20important%3F,a%20well%2Dunderstood%20career%20path.

Kennett, P. and Lomas, T. (2015, August). Making meaning through mentoring: Mentors finding fulfilment at work through self-determination and self-reflection. *International Journal of Evidence Based Coaching and Mentoring, 13*(2), 1-21. https://www.researchgate.net/publication/272748839_Making_meaning_through_mentoring_Mentors_finding_fulfilment_at_work_through_self-determination_and_self-reflection

Kent State University. (n.d.). *What is experiential learning and why is it important?* https://www.kent.edu/community/what-experiential-learning-and-why-it-important

KickAss Careers. (n.d.). *Booking inquiries*. https://www.kickasscareers.ca/book-online

KidWind. (n.d.-a). *Class activities*. https://www.kidwind.org/activities

KidWind. (n.d.-b). *Gear*. https://www.kidwind.org/gear

Labour Market Information Council and Future Skills Centre. (2021, November). *Are adults making use of career services in Canada?* https://lmic-cimt.ca/are-adults-making-use-of-career-services-in-canada/

Lakeland College. (2022). *Sustainable energy technology diploma*. https://www.lakelandcollege.ca/programs-and-courses/energy-petroleum-technology/sustainable-energy-certificate-diploma

Lakeland College. (n.d.). *Microcredential – Solar PV microcredential.* https://lakelandcollege.augusoft.net/index.cfm?method=ClassListing.ClassListingDisplay&int_category_id=5&int_sub

_category_id=23&int_catalog_id=

Lanz, L. (2022, April 26). *3 employer benefits of using an association job board*. YM Careers. https://www.ymcareers.com/blog/3-employer-benefits-of-association-job-board/

Leading Change Canada. (2022). *Generation net zero*. https://podcasters.spotify.com/pod/show/generationnetzero

Learning for a Sustainable Future. (2022). *Canadians' perspectives on climate change & education: 2022*. https://lsf-lst.ca/wp-content/uploads/2023/01/Climate-Change-Education-Executive-Summary.pdf

Learning for a Sustainable Future. (n.d.-a). *Action project funding*. https://lsf-lst.ca/programs/action-project-funding/

Learning for a Sustainable Future. (n.d.-b). *Green jobs: Adapting to our changing climate.* https://lsf-lst.ca/resources/green-jobs/

Learning for a Sustainable Future. (n.d.-c). *LSF's sustainable future schools.* https://lsf-lst.ca/programs/sustainable-future-schools/

Learning for a Sustainable Future. (n.d.-d). *Mentoring café*. https://lsf-lst.ca/programs/mentoring-cafe/

Learning for a Sustainable Future. (n.d.-e). *Our Canada project.* https://ourcanadaproject.ca/

Learning for a Sustainable Future. (n.d.-f). *Professional development workshops*. https://lsf-lst.ca/programs/professional-development/

Learning for a Sustainable Future. (n.d.-g). *Resources for rethinking*. https://resources4rethinking.ca/

Learning for a Sustainable Future. (n.d.-h). *Youth forums*. https://lsf-lst.ca/programs/youth-forums/

Legislative Assembly of the Northwest Territories. (2018, May 28). *Labour market programs.* https://www.ntassembly.ca/content/labour-market-programs

Let's Talk Science. (2021, October 20). *Career awareness initiatives proven to expand youth choice*. https://letstalkscience.ca/about-us/news-and-media/career-awareness-initiatives-proven-expand-youth-choice

Let's Talk Science. (n.d.). *Importance of career education*. https://letstalkscience.ca/careers/importance

Lethbridge College. (n.d.). *Wind turbine technician*. https://lethbridgecollege.ca/programs/wind-turbine-technician

Lorenzo, R., and Reeves, M. (2018, January 30). *How and where diversity drives financial performance.* Harvard Business Review. https://hbr.org/2018/01/how-and-where-diversity-drives-financial-performance

Lubenov, D. (2021, November 18). *How social media and pop culture influence student career choices*. EGHS The Guardian. https://www.eghsguardian.com/4882/feature/how-social-media-and-pop-culture-influence-student-career-choices/

Mann A., Denis, V., Schleicher, A., Ekhtiari, H., Forsyth, T., Liu, E., and Chambers, N. *Dream jobs? Teenagers' career aspirations and the future of work.* Organisation for Economic Co-operation and Development. https://www.oecd.org/berlin/publikationen/Dream-Jobs.pdf

Maple Education Canada Inc. (2021, June 8). *How important are co-ops and internships after graduation?* https://mapleeducation.ca/importance-of-internships/

Mentor Works. (2023a). *Canada growth fund*. https://www.mentorworks.ca/government-funding/capital-investment/canada-growth-fund/

Mentor Works. (2023b). *Industry R&D associates program – Alberta innovates.* https://www.mentorworks.ca/government-funding/research-development/alberta-innovates/alberta-innovates-industry-research-associates/

Mentor Works. (2023c). *IRAP youth employment program (YEP).* https://www.mentorworks.ca/government-funding/human-resources-and-training/youth-employment-program/

Mentor Works. (2023d). *Low carbon economy leadership fund – Industrial.* https://www.mentorworks.ca/government-funding/capital-investment/low-carbon-economy-leadership-fund-industrial/

Mentor Works. (2023e). *NOHFC People & talent program.* https://www.mentorworks.ca/government-funding/human-resources-and-training/nohfc-people-and-talent-program/

Mentor Works. (2023f). *SkillsPEI workplace skills training.* https://www.mentorworks.ca/skillspei-workplace-skills-training/

National Association of Colleges and Employers. (2019). *Internship & co-op survey report: Executive summary.*

https://career.fsu.edu/sites/g/files/upcbnu746/files/2019-nace-internship-and-co-op-survey-executive-summary.pdf

National Association of Colleges and Employers. (2017, April 5). *Employers prefer candidates with work experience.* https://www.naceweb.org/talent-acquisition/candidate-selection/employers-prefer-candidates-with-work-experience/

National Energy Education Development Project. (n.d.-a). *Energy games, puzzles & activities*. https://www.need.org/need-students/games-puzzles-activities/

National Energy Education Development Project. (n.d.-b). *NEED distance learning resources*. https://www.need.org/distancelearning/

National Energy Education Development Project. (n.d.-c). *NEED student science fair projects*. https://www.need.org/need-students/science-fair-projects/

National Renewable Energy Laboratory. (n.d.). *Education resources for students*. https://www.nrel.gov/about/education-students-resources.html

Natural Resources Canada. (2023). *Consultation: Sustainable jobs*. https://natural-resources.canada.ca/climate-change/consultation-sustainable-jobs/24949

Natural Resources Canada. (2022). *Energy fact book: 2022-2023.* https://www.nrcan.gc.ca/sites/nrcan/files/energy/energy_fact/2022-2023/PDF/Energy-factbook-2022-2023_EN.pdf

Natural Resources Canada. (2021a). *Energy fact book: 2021-2022.* https://www.nrcan.gc.ca/sites/nrcan/files/energy/energy_fact/2021-2022/PDF/2021_Energy-factbook_december23_EN_accessible.pdf

Natural Resources Canada. (2021b, March 8). *Equal by 30 survey reveals women under-represented in global energy sector.* Government of Canada. https://www.canada.ca/en/natural-resources-canada/news/2021/03/equal-by-30-survey-reveals-women-under-represented-in-global-energy-sector.html

Natural Resources Canada. (2021c). *People-centred just transition: Discussion paper.* https://www.rncanengagenrcan.ca/sites/default/files/pictures/home/just_transition_discussion_paper_-_en_-_july_15.pdf

Nergica. (2022, December 16). *Recap of second edition of transition solutions symposium in Ottawa*. https://nergica.com/en/recap-of-second-edition-of-transition-solutions-symposium-in-ottawa/

Niagara College Canada. (2023). *Renewable energies technician.* https://www.niagaracollege.ca/technology/program/renewable-energies-technician/

Northern Alberta Institute of Technology. (n.d.-a). *Alternative energy technology.* https://www.nait.ca/programs/alternative-energy-technology?gclid=EAIaIQobChMIhYyngY-F-QIVSWxvBB37YQs7EAAYASAAEgJRyfD_BwE&overviewtabs=program-overview&term=2023-fall

Northern Alberta Institute of Technology. (n.d.-b). *Designing solar photovoltaic systems.* https://www.nait.ca/nait/continuing-education/courses/alte507-designing-solar-photovoltaic-systems

Northern Alberta Institute of Technology. (n.d.-c). *Solar photovoltaic installation for electricians*. https://www.nait.ca/nait/continuing-education/courses/alte506-solar-pv-installation-for-electricians

Northern Lights College. (2023). *Advanced certificate in wind turbine maintenance*. https://www.nlc.bc.ca/Programs/All-Programs-Alphabetical/Wind-Turbine-Maintenance-Technician

Nouvelle Hauteur. (2016). *Working at heights training*. https://nouvellehauteur.com/en/training-programs/

Nova Scotia Community College. (2023). *Solar photovoltaic (PV) panel installation training*. https://www.nscc.ca/programs-and-courses/coned/career-and-professional-development/photovoltaic-panel-installation.asp

Nuvéo. (2023). *Perspectives – Vivre en Gaspésie.* https://vivreengaspesie.com/perspectives/

Nuvéo. (n.d.). *Énergie vive - Métiers de l'éolien* [Facebook page]. https://www.facebook.com/groups/energievivemetierseolien/?mibextid=HsNCOg

Ontario Youth Apprenticeship Program. (2021). *What is the Ontario youth apprenticeship program?* https://oyap.com/oyap/

Pride at Work Canada. (2022). *Home – pride at work Canada.* https://prideatwork.ca/

Quick Train Canada. (n.d.). *Microcredentials*. https://quicktraincanada.ca/microcredentials/

Rainforest Learning Centre. (n.d.). *What is experiential education in early childhood, and why is it important?* https://rainforestlearningcentre.ca/experiential-education-early-childhood-important/#:~:text=As%20Wikipedia%20explains%2C%20experiential%20education,programs%20and%20environmental%20clean%20ups.

Red Seal Program. (2022, July 28). *Red seal trades*. https://www.red-seal.ca/eng/trades/tr.1d.2s_l.3st.shtml

Relay Education. (2023a). *Kids' world of energy festival*. https://relayeducation.com/programs/festival/

Relay Education. (2023b). *Green careers*. https://relayeducation.com/green-careers/

Relay Education. (2023c). *Green skills academy*. https://relayeducation.com/green-skills-academy/

Relay Education. (2023d). *Indigenous community programs.* https://relayeducation.com/programs/indigenous-community/

Relay Education. (2023e). *Indigenous green careers.* https://relayeducation.com/programs/indigenous-green-careers/

Relay Education. (2023f). *Indigenous youth programs*. https://relayeducation.com/programs/indigenous-youth/

Relay Education. (2023g). *Our programs: Elementary*. https://relayeducation.com/programs/#elementary

Relay Education. (2023h). *Our programs: Indigenous communities*. https://relayeducation.com/indigenous-communities/

Relay Education. (2023i). *Our programs: Secondary*. https://relayeducation.com/programs/#secondary

Relay Education. (2023j). *Solar power camp.* https://relayeducation.com/event/solar-power-camp/

Relay Education. (n.d.). *In the green chair podcast.* https://relayeducation.com/in-the-green-chair/

Rideout, V., Peebles, A., Mann, S., and Robb, M. B. (2022). *Common Sense census: Media use by tweens and teens*. Common Sense. https://www.commonsensemedia.org/sites/default/files/research/report/8-18-census-integrated-report-final-web_0.pdf

Robert Half Management Resources. (2018, January 17). *Executives report on benefits of being a mentor: Improved leadership, satisfaction of helping others are top rewards, CFOs say*. https://press.roberthalf.com/2018-01-17-Executives-Report-On-Benefits-Of-Being-A-Mentor

Simply Benefits Marketing. (2020, July 25). *Employee retention – What is the true cost of losing an employee*. https://www.simplybenefits.ca/blog/employee-retention-what-is-the-true-cost-of-losing-an-employee

Solar Alberta. (n.d.). *Solar Alberta training*. https://solaralberta.ca/training-jobs/training-opportunities/

Statistics Canada. (2022a, December 19). *Job vacancies, third quarter 2022*. https://www150.statcan.gc.ca/n1/daily-quotidien/221219/dq221219a-eng.htm

Statistics Canada. (2022b, November 18). *Labour shortage trends in Canada.* https://www.statcan.gc.ca/en/subjects-start/labour_/labour-shortage-trends-canada

Statistics Canada. (2022c, September 20). *Job vacancies, second quarter 2022*. https://www150.statcan.gc.ca/n1/daily-quotidien/220920/dq220920b-eng.htm

Student Energy. (n.d.-a). *Career training program.* https://studentenergy.org/program/career_training_program/

Student Energy. (n.d.-b). *Student energy fellowship*. https://studentenergy.org/program/se-fellowship-2022/

St. Lawrence College. (2023a). *Energy systems engineering technician*. https://www.stlawrencecollege.ca/programs/energy-systems-engineering-technician/full-time/kingston

St. Lawrence College. (2023b). *Energy systems engineering technology*. https://www.stlawrencecollege.ca/programs/energy-systems-engineering-technology/full-time/kingston

St. Lawrence College. (2023c). *Wind turbine technician*. https://www.stlawrencecollege.ca/programs/wind-turbine-technician/full-time/kingston

TCP. (2016, November 10). *Why poor employee retention is so expensive*. https://humanity.tcpsoftware.com/blog/why-poor-employee-retention-is-so-expensive.html

Team-1 Academy. (2023). *Complete course listing*. https://team1academy.com/complete-course-listing/

The Gaia Project. (2023a). *Elementary*. https://thegaiaproject.ca/en/resources/elementary/

The Gaia Project. (2023b). *High school*. https://thegaiaproject.ca/en/resources/high-school/

The Gaia Project. (2023c). *Middle school.* https://thegaiaproject.ca/en/resources/middle-school/

The Gaia Project. (2023d). *Youth*. https://thegaiaproject.ca/en/resources/youth/

The Ohio State University. (n.d.). *Less employee turnover.* https://spine.osu.edu/ergonomics/resources/understanding-ergonomics/less-employee-turnover

UC Davis. (n.d.). *The benefits of mentoring*. https://hr.ucdavis.edu/departments/learning/toolkits/mentoring/benefits#:~:text=Benefits%20to%20the%20Mentee%3A&text=Professional%20development%20opportunities.,of%20other%20approaches%20to%20work.

University of Alberta. (n.d.). *Renewable energy technologies*. https://ext.ualberta.ca/enroll/renewable-energy-technologies-certificate

U.S. Department of Energy. (2017, January). *U.S. Energy and Employment Report.* https://www.energy.gov/sites/default/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report_0.pdf

U.S. Department of Energy. (n.d.). *Wind career map*. https://www.energy.gov/eere/wind/wind-career-map

WorkBC. (2023a). *B.C. employer training grant*. https://www.workbc.ca/find-loans-and-grants/industry-and-employers/bc-employer-training-grant

WorkBC. (2023b). *Labour market partnerships*. https://www.workbc.ca/discover-employment-services/community-and-employer-partnerships/labour-market-partnerships

WorkBC. (2023c). *Sector labour market partnerships program.* https://www.workbc.ca/find-loans-and-grants/industry-and-employers/sector-labour-market-partnerships-program#:~:text=The%20Sector%20Labour%20Market%20Partnerships,sector%2C%20region%20or%20population%20level.

Workplace Strategies for Mental Health. (2023, January 30). *Discrimination prevention and inclusivity.* https://www.workplacestrategiesformentalhealth.com/resources/discrimination-prevention-and-inclusivity

Workplace Strategies for Mental Health. (2022a, October 18). *Implicit bias*. https://www.workplacestrategiesformentalhealth.com/resources/implicit-bias

Workplace Strategies for Mental Health. (2022b, August 5). *Leader support for newcomers.* https://www.workplacestrategiesformentalhealth.com/resources/leader-support-for-newcomers

YMCA. (2021). *2SLGBTQIA+ inclusion*. https://www.ymca.ca/2slgbtqia-inclusion#:~:text=2SLGBTQIA%2B%20is%20an%20acronym%20that,sexual%20orientations%20and%20gender%20identities.

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