CLIMATE STABILILTY, WORKER STABILITY:

Are they compatible?

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ACW | Adapting Canadian Work and Workplaces to Respond to Climate Change

WORKING PAPER # 202

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New Nouveau Brunswick
Your Environmental Trust Fund at Work
Votre Fonds en fiducie pour l'environnement au travail

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Acknowledgements

The author appreciates the financial support received for this project from the Social Sciences and Humanities Research Council of Canada (SSHRC) Partnership Program.

This report is published by "Adapting Canadian Work and Workplaces to Respond to Climate Change: Canada in International Perspective," (ACW) a Social Sciences & Humanities Research Council of Canada (SSHRC) Partnership Program-funded project, based at York University, Faculty of Liberal Arts & Professional Studies.

The project investigates how Canada's diverse workplaces can best adapt to mitigate greenhouse gases, and explores the changes needed in law and policy, work design, and business models for industry and services, to assist the "greening" of workplaces and work. ACW membership includes 56 individual researchers and 25 partner organizations in 7 countries.

Adapting Canadian Work and Workplaces to Respond to Climate Change: Canada in International Perspective (ACW). 2018

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Executive Summary

This report is published by Adapting Canadian Work and Workplaces to Respond to Climate Change: Canada in International Perspective (ACW), a Social Sciences & Humanities Research Council of Canada (SSHRC) Partnership Program-funded project, based at York University's Faculty of Liberal Arts & Professional Studies. The project investigates how Canada's diverse workplaces can best adapt work to mitigate greenhouse gases, and the changes needed in law and policy, work design, and business models for industry and services, to assist the "greening" of workplaces and work.

The University of New Brunswick team, funded by ACW, investigated through literature review and interviews, the kind of employment and training needs implied by New Brunswick's compliance with federal greenhouse gas regulations phasing out coal-fired power plants by 2030, as well as commitments to new sources of electricity supply from renewable energy and energy efficiency. Based on public statements and announced spending, energy transition in New Brunswick could be one fueled primarily by gaseous fuels (fossil and/or biofuel) and modular nuclear power, hydro, and energy efficiency, with a small role for wind and solar. This is because, the province and utility prefer to refurbish Belledune, the province's 450-MW coal-fired power plant located in Northern New Brunswick. The goal is to power Belledune with lower-emitting fuel and to operate the plant to 2040-2044.

Regardless of whether this scenario materializes, and there are good reasons to be skeptical, interviews with electricity utility and union officials emphasize that training internal to utility operations is common and ongoing. Even in the case of current investments in the Smart Grid, there could be few issues with transitioning, particularly for instrument control engineers whose skills are transferable, for example, to smart grid control functions. Utility and union officials also note that NB Power has in previous closures (i.e., the Dalhousie plant, Grand Lake Generating Station, and Courtney Bay Generating Station) ensured there were no forced layoffs, offered in some cases, generous early retirement packages and then transitioned remaining employees to other NB Power facilities. One new category of electricity sector employment emerged from the interviews. Experts believe that the potential shift, over time, from a centralized to a more distributed electricity system where customers are less passive and participate more in electricity generation and storage will generate demand for new kinds of workers. In this scenario, new training and employment potential exists for cyber-security, telecommunications and customer management professionals who can manage the security, software coding, online and face-to-face customer management required for a digitally managed electricity system.

The issue for renewable energy suppliers is a lack of government commitment to low-carbon transition through stronger government regulations and targets, including efficiency and renewable energy requirements in government procurement. Both suppliers and instructors say that if demand is there for efficiency and renewable energy they will meet the need for training. With respect to professional development of trainers, college instructors identify the need for more investment in training of instructors to ensure the most up-to-date curriculum in terms of changes to the electricity and building codes. They also want to see increased opportunities for on-site training for trainees and apprentices because renewable energy system design is very site specific. Demand creation policies, however, do

not guarantee well-paid work in stable working environments.

We note that when it comes to generating renewable energy and energy efficiency supply, utilities are outsourcing, as is the case in New Brunswick. These new sources of supply are not part of the utility-owned generation mix. Rather, they are supplied through private sector contracts where workers are less likely to be unionized and may experience less stable work at lower pay than do utility workers. Macro-economic studies projecting job growth opportunities from growing investments in renewable energy and energy efficiency may not question or explore issues associated with how we generate our wind, solar electricity and energy efficiency supply, or the working conditions of the employees who deliver it.

It appears we face a low-carbon transition dilemma. On the one hand, climate change solutions, like greenhouse gas regulation and carbon pricing, raise concerns about potential job displacement for workers in traditional energy sectors like oil and gas production and fossil-fuel generated electricity. Hence the calls for just transition. Our research, however, suggests that this blame may be at least partially misplaced. Energy workforce changes are currently affected by broader societal changes relating to fuel-cost differentials (i.e., natural gas cheaper than coal), automation, and the societal transition to non-unionized, unstable and lower-paying work. Greenhouse gas regulations and carbon pricing are certainly not the only driver of workforce change, and likely not, at least currently, not the primary driver.

Should proponents of renewable energy, energy efficiency and the low-carbon transition address these broader societal trends? If so, how? Is the solution to focus on collective responses such as energy cooperatives, public sector ownership of renewable energy supply, utility-scale and managed energy efficiency programs, rather than market-based, privatized solutions? These questions are worth answering. Our goal with this study was to better understand the training needs associated with renewable energy and energy efficiency job projections. There appears, however, to be a greater need to better integrate climate change and low-carbon economy discussions into a broader discourse on the nature of work.

This report proceeds as follows: the introduction situates the rationale for this project. We then review the literature assessing the needs and requirements of workers affected by the low-carbon transition. The discussion situates our results in the context of current conditions in New Brunswick. We close with concluding remarks and recommendations for a low-carbon electricity system transition jobs plan for New Brunswick

Introduction

The Government of Canada has committed, through the Pan-Canadian Framework (PCF), to phasing out coal-fired electricity by 2030 and to supporting energy efficiency and renewable energy to reach a 90% non-emitting electricity system by 2030. The PCF also commits to adopting fair and flexible approaches that help Canadian workers and businesses realize opportunities in the clean-growth economy. A "just transition" is defined as an approach to economic and environmental

policy that aims to minimize the impact on workers and communities, in the transition to a low-carbon economy. This approach includes involving workers and their communities in decisions that would affect their livelihoods, identifying and supporting economic opportunities for the future, and helping workers and communities to succeed and benefit from the transition (Just Transition Task Force, 2018). Implementing the PCF has then, acknowledged potential effects on job growth and workers, and the goal is to maximize the advantages and to minimize the disadvantages associated with greenhouse gas reduction. The potential advantages and disadvantages of greenhouse gas reduction policies and programs have been well documented by macroeconomic studies.

Dunsky Energy Consulting (2018) assessed positive and negative employment and economic effects from increased demand for efficiency-related goods and services, redistribution of household savings, and reduced energy sales associated with implementing the PCF. Full implementation of energy efficiency actions in the PCF is projected to add 118,000 jobs (average annual full-time equivalent) to the Canadian economy and increase gross domestic product (GDP) by 1% over the baseline forecast, during the study period (2017-2030). The overall economic impact is largely driven by the money households and businesses would save on their energy bills. Projections for New Brunswick show a 2017-2030 net change in GDP ($2017 billions) of $0.3 and a 2017-2030 net change in employment (full-time equivalent jobs) of 25,879. These results are consistent with other studies. Consistent with Dunsky (2018), the Green Economy Network (2017) finds that over five years these net zero scenarios could create more than 23,000 (direct, indirect and induced) jobs in New Brunswick.

Taking a longer-term perspective, a 2017 Columbia Institute study suggested even greater jobs growth potential. Bridge and Gilbert (2017) assessed the job creation implications of net zero scenarios developed by Bataille, Sawyer and Melton, as well as Mark Jacobson at the Solutions Project[1]. The authors projected up to "3.9 million direct jobs could be created in the building trades by 2050 and 19.8 million jobs if induced, indirect and supply-chain jobs are included," (p.7). Of the total direct job creation, 1,177,055 are projected to be in the electricity sector. Projections, however, are interesting, but meaningless if they cannot be realized or potentially misleading if achieving the projections generates unintended effects.

The Columbia Institute, Green Economy Network and Dunsky reports are typical in showing net positive gains in employment small gains in gross domestic product associated with greenhouse gas reduction efforts. The results are consistent with a climate change solutions narrative about energy transition based on growing our dependence on electricity fueled by efficiency and increasing reliance on renewable energy like solar and wind. In Canada, projections are that the size of the electricity system could double from today's levels by 2050 (Bataille, Sawyer, & Melton, 2015). There is, however, a challenge. These studies say little about the worker experience and in New Brunswick at least, there is doubt about these projections, particularly in the electricity sector. In his fall, 2016 presentation[2] to the Legislative Committee on Climate Change, Business Manager of the International Brotherhood of Electrical Workers (IBEW, Local 37), Ross Galbraith noted:

Some have argued that workers employed in legacy facilities could transition to

[1] http://thesolutionsproject.org/
[2] https://www.ibew37.com/wp-content/uploads/Climate-Change-Presentation.pdf

> *jobs in the renewable energy sector. While there may be some examples of this that I'm not aware of, there are also many examples where these jobs are not steady, full time or well paid. Reports of the viability of replacement jobs in the new energy sector are all over the board. We submit that the government should initiate an independent and objective study to determine the true viability of jobs in the renewable energy sector, and what impact they could have in New Brunswick. For example, if we lose good jobs here in order to simply install technology that is manufactured in other jurisdictions, the result will be a net loss for New Brunswick.*

We set out to take up Mr. Galbraith's challenge to better understand the nature of work in a low-carbon world through interviews and literature review to assess the (1) training, (2) transition, and (3) community support requirements implied by energy transition in New Brunswick. The focus on electricity makes sense given the projected increase in demand for electricity from energy transition. It also makes sense because New Brunswick is not a coal producer, but rather an importer of coal through the Belledune port for use at the NB Power Belledune power plant. As a result, energy transition in New Brunswick is a case of electricity transition.

Literature Review

This literature review summarizes key themes emerging from research exploring opportunities and barriers to a just transition for workers affected by the shift to a low-carbon economy, as well as recommendations on how to exploit those opportunities and remove identified barriers.

Macro-economic job growth projections represent a maximum likelihood potential. There are, of course, barriers to achieving this idealized potential and recommendations to address these barriers are summarized in numerous reports (Alberta Advisory Panel on Coal Communities (2017); Bridge, T., & Gilbert, R. (2017); ECO Canada (2012); Goldman, C. A., Peters, J. S., Albers, N., Stuart, E., & Fuller, M. C. (2010); Government of Canada (2016); Louie, E. P., & Pearce, J. M. (2016); Stone, L., & Cameron, C. (2018); The International Labour Organization (2016); Warren, D., Brake, D. (2017) For additional detail see Appendix 1).

Cross-cutting themes include the need to:

1. Stimulate demand for renewable energy and energy efficiency, as well as stimulating the supply of renewable energy and energy efficiency workers through government policy and programs, and consumer education.
2. Integrate and collaborate across institutions to support worker transition financially, professionally and emotionally, including for First Nations and immigrants.
3. Provide ongoing support for professional development and lifelong learning.
4. Coordinate skills development with industry and education institutions and developing trainer-the-trainer, mentorship and peer teaching programs.
5. Balance investment in generic, emotional intelligence skills with technical and science

skills, and expand understanding of what an electricity job is to cover the growing need for telecommunications, data management, and customer management personnel.

In addition to the programmatic themes, energy transition researchers note that job requirements in the low-carbon economy imply adaptation more than they do acquiring completely new skills. The Green Jobs Map compiled by ECO Canada, for example, provides a comprehensive listing of Green jobs and expected growth by position (ECO Canada, 2012). Jobs linked to the green economy are classified into two categories: jobs that require environmental skills, knowledge, or experience to produce products or services that have an environmental benefit, and jobs that do not require environmental skills, knowledge or experience. While workers in the second category perform economic activities that have an environmental benefit, they would not require additional training or skills to perform their work. For jobs in the first category, education will be a priority because post-secondary education is required for 98% of the job openings linked to a green economy. Only 2% of job vacancies indicate that a high school education is enough for the position. These researchers also found that the environmental competency needed for most positions is highly transferable between positions and that worker who have attained a high level of competency in one or more environmental skill areas are well-suited to adapt as economic conditions in any specific sector change.

The Aldersgate Group, an alliance of leaders from business, politics and civil society based in the UK investigated whether there was a skills gap for the transition to a low carbon economy. (2009). The group found a need for qualified engineers, craft technicians across many disciplines, project managers, and for employees at all levels to have first class communications skills. Education in STEM (science, technology, engineering and mathematics) subjects is also important. The Group also noted that these are skills needed beyond the low-carbon economy because there are similarities among existing skill sets and those that will be needed. The Aldersgate Group contrasts the renewable energy industry in the UK with Germany, which is built on an effective long-term regulatory framework and supplemented with investment in the skills necessary for high-tech manufacturing, with focus on the education system. As noted by other researchers, supply-side policies are important to creating worker demand, including incentive structures, planning legislation, and supply infrastructure. Finally, the authors challenge the notion of "new green jobs" as a discrete employment category instead arguing that over time almost every occupation could be described as green. As a result, they see little advantage in arguing whether a job is "green" when the aim should be to accomplish a transition that brings widespread economic and social benefits.

The Pro Enviro report commissioned by the Department of environment, food and rural affairs in the UK (2008) identified a range of both generic (cross-sector) and sector-specific skills as priorities for a successful transition to a green economy. It also highlighted that many of the required skills are not new. The challenge is enough worker supply and adaptation to a low-carbon and resource-efficient context. There was evidence of a latent demand for low-carbon and resource-efficient skills. This demand was not being articulated by many employers and as a result the demand-led skills delivery framework was ill-equipped to anticipate and respond. Low-carbon and resource-efficient skills need to be considered by, and integrated into, the whole of the skills delivery system. The authors also find weak integration of low-carbon and resource-efficient skills needs into organizational priorities or general management practices. Consistent with other report recommendations, integration is considered critical to mainstreaming understanding, knowledge, skills, and thinking.

Louie and Pearce (2016) investigated the viability of a smooth transition from coal to PV-related employment, although the focus was on coal mining workers rather than electricity workers. Current coal industry positions were determined, the skill set evaluated, and the salaries tabulated. For each type of coal position, the closest equivalent PV position was determined and then the re-training time and investment were quantified. These values were applied on a state-by-state basis for coal producing states employing the bulk of coal workers as a function of time using a reverse seniority retirement program for the current American fleet of coal-powered plants. The results show that a relatively minor investment in retraining would help coal workers switch to PV-related positions even in the event of the elimination of the coal industry. Coal to PV retraining could be implemented using scholarships, education vouchers and grants for at risk employees to universities, colleges, community colleges and certification programs, subsidized expansion of solar industry training such as workshops and online classes, government-sponsored free courses and certificates for PV positions and no or low-interest loans or subsidized loans for education and retraining.

The Green Destination is an American Green Building Portal maintained by Delmar Cengage Learning and the International Code Council (ICC). It identifies options for the electrical trades. Creating green jobs in the electrical trades emerge from investments in energy efficiency, renewable energy and smart grid investments. The core requirement for an electrical education will remain completion of an apprenticeship program, an associate degree, or a certificate in Electrical Systems, Electrical and Electronic Technicians, Computer and Electronics Technicians and related programs. Essential green electrical courses and competencies will include: photovoltaics, wind turbine operations, renewable energy power generation (small scale commercial and residential, industrial), energy efficient electrical systems (residential, commercial, industrial), monitoring systems (Smart Grid), green energy safety, green energy safety codes and compliance.

Stone and Cameron (2018) summarize five case studies for relatively fast transitions in Spain, England, China, Germany and Scotland. The review identified a typology of interventions that have been utilized, often in concert, to manage transitions: early retirement/pension/financial compensation for workers, job retraining and skills development, infrastructure regeneration projects, regional support schemes and forums for stakeholder participation and dialogue. The key requirement is to combine these elements at the right time and with enough support. It is also important to offer as much support to the broader community affected and not just individual workers. Governments that plan for the low-carbon transition, ensuring education and training are suited to future and evolving low-carbon economies, and regions are supported in diversifying their economies, avoid the negative social and economic impacts *and* their economy is positioned to capitalize on the low-carbon transition. Such action can promote transition at the speed and scale required, triggering similar measures elsewhere. Managing low-carbon transitions needs to be contextualized to include the wider transition agenda for the future of work, including the broader technological trends, for example in automation and manufacturing.

David Autor (2015) explores the role of automation and its effect on worker remuneration. He finds that technology is both a substitute for and complementary to human workers. He argues that focusing only on lost jobs misses how automation raises the value of the tasks that workers uniquely supply. While some of the *tasks* in many current middle-skill jobs are susceptible to automation, many middle-skill *jobs* will continue to demand a mixture of tasks from across the skill spectrum (italics in

original). Most of these occupations require mastery of "middle-skill" mathematics, life sciences, and analytical reasoning. They typically require at least two years of post-secondary vocational training, and in some cases a four-year college degree or more. This broad description also fits numerous skilled trade and repair occupations, including plumbers, builders, electricians, heating/ventilating/air-conditioning installers, and automotive technicians. It also aligns with several modern clerical occupations that provide coordination and decision-making functions, rather than simply typing and filing. There are also cases where technology is enabling workers with less esoteric technical mastery to perform additional tasks. Autor concludes that middle-class workers are not doomed by automation and technology. Rather, he argues that human capital investment must aim to complement rather than substitute for by technological change. We now summarize results from our interviews.

Interviews

Eleven face-to-face and/or telephone semi-structured interviews were completed in spring-summer of 2018. Each interview was recorded electronically, transcribed, and summarized by question responses. Of the 11 one-hour-long interviews, five are with New Brunswick Community College instructors from Saint John, Fredericton, Saint Andrews, and Moncton; one is with a representative of the Canadian Wind Energy Association, one is with a representative of Solar Installers of Canada, one with a representative of Iron Earth's East Coast office, one is with the International Brotherhood of Electrical Workers (Local 37), one with NB Power, and one is with a representative of the Conservation Council of New Brunswick. To maintain confidentiality, an issue important to some interviewees, we are reporting results without identifying interviewees by name. An interview protocol was used to guide the conversation, which focused on identifying the perceived differences in the need for skills, training and education to meet the needs of a low-carbon economy, compared today, and asked interviewees for three recommendations (Appendix 2).

Interviews with electricity utility and union officials emphasize that training internal to utility operations is common and ongoing. Even in the case of current investments in the Smart Grid, there could be few issues with transitioning, particularly for instrument control engineers whose skills are transferable, for example, to smart grid control functions. Utility and union officials also note that NB Power has in previous closures (i.e., retirement of the Dalhousie coal-fired plant in 2012, Grand Lake Generating Station, and Courtney Bay Generating Station) ensured there were no forced layoffs, offered generous early retirement packages and then transitioned remaining employees to other NB Power facilities. One new category of electricity sector employment emerged from the interviews. Experts believe that the potential shift, over time, from a centralized to a more distributed electricity system where customers are less passive and participate more in electricity generation and storage will generate demand for new kinds of workers. In this scenario, new training and employment potential exists for cyber-security, telecommunications and customer management professionals who can manage the security, software coding, online, and face-to-face customer management required for a digitally managed electricity system.

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transition through stronger government regulations and targets, including efficiency and renewable energy requirements in government procurement. Both suppliers and instructors say that if demand is there for efficiency and renewable energy they will meet the need for training. With respect to professional development of trainers, college instructors identify the need for more investment in training of instructors to ensure the most up-to-date curriculum in terms of changes to the electricity and building codes. They also want to see increased opportunities for on-site training for trainees and apprentices because renewable energy system design is very site specific. Demand creation policies, however, do not guarantee well-paid work in stable working environments.

The IBEW's priority recommendations for transition to a low-carbon electricity system relate to communication, fairness and flexibility emphasizing that it is "important to keep the public and the workers informed about what is happening, to ensure workers know the rules and that transitions will be based on merit and experience, and to offer workers flexibility." In terms of strategies for managing transition, the IBEW believes previous experience with the closure of the Dalhousie plant offers a path forward. In the 2012 shut-down case, the IBEW says that "NB Power did some downsizing, but there were no layoffs. Early retirement and voluntary separation were offered. Workers were reabsorbed in other locations (based on demographics). Overstaffing occurred in other areas where the utility knew retirements were forthcoming. Some people enrolled in apprenticeships for other areas or upgraded to different certifications. Committees met to make sure that there was communication about what was happening to assure the public and the workers. NB Power identified what jobs would be available to gauge interest in new positions for those affected by closure. If more than one person was interested they would utilize seniority for placement. If no one wanted a position a junior worker may be moved. It was important that workers knew the rules and that things were based on merit and experience. It was important to offer workers some flexibility."

With respect to the pending coal phase-out at Belledune, the IBEW official we interviewed believes that some workers "could transition to hydro or Point Lepreau very easily. For example, a power plant operator can shift fairly easily to another kind of plant. Some folks will have to change locations which is not popular socially. People have families and a place in their communities and it's difficult to move. How can we find equivalent work in local areas? What if there is new technology available? What solutions is NB Power exploring? As the picture becomes clearer it will become easier to prepare. We need specifics. It is difficult to predict the future based on a generic principal."

The NB Power executive we interviewed agrees that clarity is required noting the need for more work on a human resources strategy around Belledune, as well as federal regulations, and that there is a "need for more details on where we want to be in ten years." The NB Power representative places priority on the need for a change in "mindset" driven by the changing electricity business model. The Canadian Wind Energy Association (CanWea) agrees. "A shift away from the traditional power grid is underway. It's important to understand the shift away from the traditional power grid. Base load generation is becoming an archaic term because a smart grid works so dynamically. Awareness is very important. People need to understand the opportunities and advancement available in the field. This is a global movement that has grown and is expecting to grow further." There is alignment between union and utility thinking on the growing need for soft skills (i.e., math, literacy, problem solving, critical thinking, management and social skills). These [soft skills] are just as important a skillset as technical ones, says the IBEW. The concern for the NB Power executive is the capacity to

secure the digital skills to manage the Smart Grid, Internet-based electricity systems. "It's competitive to grab these people. Data analysts who understand interconnected, interoperability will be critical." The NB Power interviewee is also confident about the capacity of workers to transition to the new digitally based electricity system. "We took three people out of Coleson Cove [oil-fired plant] and put them on smart grid. Involved some training but they quickly evolved since it's essentially the same job." NB Power has contracted delivery of its energy efficiency auditing function to The Summerhill Group, which has opened an office in the province. NB Power notes that The Summerhill Group does its own training, and that "energy advisors need to cover a lot more information to bring solutions to clients."

The Conservation Council of New Brunswick (CCNB) also says that clarity is required, highlighting that "it's difficult to engage with professionals when there is a lack of certainty about where we should be focusing. What should people be training for? What is going to take over the coal plant? What is the government forecast for jobs in NB? CCNB wants to see the province "build from its strengths. NB has a strong entrepreneurial and building trades culture. Construction trades can be a big part of the transition,". Like other external stakeholders, CCNB calls for a supply strategy, as well as labour strategy by setting "higher standards for renewable energy goals. We have only minimum targets at the moment and this does not send the signal that NB is open for business."

Addressing the need for an integrated approach, the non-profit environmental group would like to see more "active participation from the minister of post-secondary education in the conversation about transition. There needs to be more forward thinking and the minister needs to understand the ins and out of this new economy." Iron and Earth, the group formed by oil workers to train for the renewable energy sector, agrees integration is important noting that workers face time and money barriers to training for future work, a point endorsed by college interviewees. "The more technical and specialized the position, the more time it would take away from regular work," says Iron and Earth. "Fear of the unknown is huge. People need to be informed. What is the government's commitment? You cannot inspire confidence in workers and consumers if you don't have a specific goal. Renewables in the province seem to be left to entrepreneurs when the government should really be leading." According to the college instructor we interviewed from Moncton, that integrated strategy should include policies like a "feed-in tariff program, where consumers receive cents for kilowatts they produce based on a contract. [This] could go a long way to help stimulate the industry. It's not a question of "if" but "when" the transition will happen. Government initiatives could go a long way in preparing the province for the future instead of dragging our feet."

Speaking to the issue of the nature of work, CCNB acknowledges that there is "less likelihood of one job for your whole life. More fluidity and multiple jobs in a career path." With respect to the low-carbon transition, there will be "lots of jobs in installation but less in operations and maintenance. Will people have to move around more or travel for steady work?" CanWea agrees "people may need to move around or leave their community for employment," something the IBEW has noted is disruptive and less preferred for many workers. Iron and Earth notes the importance of social capital in managing work-related transitions.

Facilitating labour capacity to adapt to the changing reality of work, CCNB recommends "governments and employers could provide dual certificates to allow more flexibility with apprenticeships. (i.e., doing a second apprenticeship while still working). Certification is important for

softer trades, as well like home energy inspectors. It is important to inspire confidence in consumers," according to CCNB. Solar Installers Canada agrees with this assessment noting that there is a need to create a standard across all provinces that reflect the qualities wanted in installation and to educate consumers. "There should be a universal standard related to the Canadian Electrical Code and forced training programs, so everyone is operating at the same level. Standards need to be enforced." With respect to consumers, the solar representative points out that "it is very difficult to train for supply when the demand is not there yet. Build your customer base first to make training more worthwhile and enticing to people. Correcting misinformation about the reliability of wind and solar was highlighted by both CanWea and Solar Installers. Our solar industry representative emphasizes that 'decentralizing the power grid can lead to many savings and some of these should be passed on to the consumer." The top three recommendations for our solar interviewee are a bigger commitment to education and consistency; to develop more qualified individuals who can speak about the materials and the process and provide instructors experience and training to better relate issues to students."

The transferability of skills was also noted by Iron and Earth and college instructors. "There are some job areas that are specific, technical that would not exist in the renewable industry, but there are more overlaps than differences," according to Iron and Earth. "There would need to be more electrical workers and technicians in the transition to a low-carbon economy and electricity system. Biofuel has a lot of crossover with jobs already in the coal and oil industry. Specific gear may be different, but the background knowledge does not change. Our college instructor interviewee from Moncton points out that "solar uses a lot of electric skills, solar thermal uses electrical and mechanical engineering, geothermal is mostly mechanical while energy analysis involves more cost-benefit analysis and software use." Iron and Earth believes that little to no training for a welder or general labour worker, that solar would require some training, and that wind would need the most significant training. Industry specific areas that involve technology, supply-side management, monitoring technologies or developing biofuels would require more training. "However, an engineer or technologist could easily upgrade if they already have some background. Offshore wind installation is very similar to offshore oil. Working with heights and high voltage is like oil and coal training."

The Canadian Wind Energy Association (CanWea) representative notes that there tends to be two tiers of training around wind: general training relating to working with heights, health and safety, climbing, rescue, etc. and site-specific training to deal with onsite conditions. Both these points were also made by college instructors. Different turbines can have different protocols, according to CanWea. "Most companies have mentorship type programs. A lot of skills transfer to the wind industry quite nicely, for example electricians." Solar Installers Canada notes that "electricians are currently training in best practices and installation. In the future, they will also have to be engineers and designers because there is a lot of variability on site so experience with different set-ups and locations will be very important."

Iron and Earth points out that professionals could begin by familiarizing themselves with new standards and codes, issues college instructors highlight as important to keeping their courses up-to-date and to ongoing professional development. Many introductory courses [standards and codes] are very general, according to Iron and Earth, "so you could apply them to different industries with little alteration." For practicing professionals, there is usually a three-month adaptation period when changing jobs. Formal education may not be necessary if apprenticeships are readily available." Their

priority recommendations are first to do a full audit of current skills that would be lost in the transition. Then do a full inventory of opportunities that would arise and develop a comprehensive list to see where the parallels are. See who can be easily transitioned and where the gaps are. Second, develop a training program for workers stuck in this gap and third have government provide support for workers and families going through the transition.

One training strategy NB Power is deploying is to enter into a memorandum of understanding with the province's college system. The MOU establishes the intention of both parties to coordinate training and course content to increasingly meet the needs of the changing electricity system. The college instructors we interviewed strongly endorsed many of the points raised by others, including the need for clarity. Our Moncton interviewee noted that to prepare for the low-carbon transition "you need to know what you are training for first. What does the energy sector in NB look like going forward?" The need for soft system-level skills was also highlighted. "Awareness and understanding of how different engineers and departments work together is important for tradespeople working onsite." The need for on-site training was emphasized by college instructors. Priority recommendations include align with other interviewees: provide money to train instructors; educate the public on renewable energy; include more requirements in the building codes and for consumer retrofits. Undertake more research and development for wind and solar in the province. Perhaps most importantly, and consistent with NB Power views, there is a need for a shift in political mindset. We need a big picture and long-term goals that all parties should support."

There is strong alignment among low-carbon economy transition strategies identified in the literature review and interviews that inform our recommendations. We now turn to a summary discussion of the results and context for interpreting them before concluding with our recommendations for a low-carbon economy transition strategy for New Brunswick.

Discussion

Our objective with this research was to better understand the implications of the transition to a low-carbon economy and electricity system for job creation, as well as training requirements in New Brunswick, and to conclude the research with recommendations for a climate change jobs training plan for New Brunswick. There is remarkable alignment among interviewees' ideas about New Brunswick options for just transition and these ideas align well with recommendations identified in the literature review.

There is a consensus that planning for a just transition requires an integrated, coordinated strategy that includes measures to increase consumer demand for low-carbon and efficient products and electricity, as well as preparing to supply workers to meet that demand. There is consensus that clarity is required to stimulate planning and that governments have a greater role to play in setting targets and standards and supporting training and professional development. There is agreement that there is a high degree of transferability of skills from the current energy system to the new, but that the new energy-electricity system will create greater demands for soft skills, as well as newly applied skills from telecommunications, data management, cyber-security, and customer management.

The question arising from this research is the receptivity to planning for just transition within New Brunswick's political and institutional system, and potential implications of the current trajectory the province is on with respect to coal-phase-out planning. New Brunswick is exploring options for meeting federal PCF requirements that would keep its one coal-fired power plant in Belledune, NB operational well into the 2040s. The provincial Government and NB Power have announced two projects responding to coal phase-out designed to maintain jobs in Belledune (at the port where coal is brought in and at the coal-fired power plant). The province has committed $625,000 over the last two years to a company called Maritime Iron to conduct pre-feasibility studies for a project that would be in Belledune. The project, should it proceed, will process iron ore into pig iron and generate a gas by-product that NB Power would use at the Belledune power plant to generate electricity. The technology is licensed to a South Korean company called POSCO. The claim is that the project[3] would generate $1-billion in investment, create 1,000 jobs during construction, and sustain 200 jobs[4] during operation. The province also recently announced $10-million to NB Power's Energy Solutions Corporation support[5] research into small modular nuclear reactor (SMR) technology. The research will be conducted with the University of New Brunswick.

NB Power's most recent 25-year Integrated Resource Plan shows no increase in renewable energy deployment beyond current commitments to 80 MW in First Nation and small community projects, and no reductions in greenhouse gas reductions from current levels to 2040. These plans are updated every three years, but NB Power has been told the by EUB to include an update on the implications of federal regulation at next year's rate increase hearing. In addition, Utility Board requirements are affecting NB Power's capacity to change course. The utility must defend rate increase proposals, capital spending and its integrated resource plans before the New Brunswick Energy Board (EUB). The most recent hearings considered these elements and led to a July 2018 decision by the Board[6] that significantly weakens progress toward energy efficiency. NB Power failed, in this most recent hearing, to gain EUB approval to install smart meters and other smart grid technologies, expand investments in low-income and other energy efficiency programs, and to expand research into renewable energy storage capacity. NB Power can seek future approval for these activities if it improves its proposals cost-benefit analyses. There are issues with how cost-benefit analysis is conducted by NB Power and the EUB, but this issue is beyond the scope of this project. In response to what the current government perceives as the utility's failure to protect consumers from unwarranted rate hikes, the Liberals announced during the September 2018 election campaign that, if elected, it would cap utility rates for four years and require cuts to management of 30 percent. These recent rulings and political commitments potentially limit the appetite for expansion of renewable energy and energy efficiency spending.

This provincial context suggests that New Brunswick is potentially on track to a traditional re-firing at the Belledune plant (either with gas by-product from the pig iron plant or other co-firing options such as biofuel), and a no or low-growth scenario for renewable energy and energy efficiency supply. A key barrier – government generated demand – appears to be a critical block to the demand-the supply equation and our potential to prepare our labour pool for future employment demands.

[3] https://www.cbc.ca/news/canada/new-brunswick/maritime-iron-belledune-plant-gallant-1.4721336
[4] http://www2.gnb.ca/content/gnb/en/news/news_release.2018.08.1110.html
[5] https://www2.gnb.ca/content/gnb/en/news/news_release.2018.06.0832.html
[6] http://www.nbeub.ca/uploads/2018%2007%2020%20-%20Decision%20-%20Matter%20375.pdf

Combined with refurbishment of the Mactaquac hydro generating station, and modest investments in renewable energy and efficiency, the province is taking a cautious approach. The federal Government appears ready to support that the province's approach.

The Government of Canada, for example, has recently lowered requirements for the emissions level at which industry will pay a carbon charge and New Brunswick has asked for exemption for Maritime Iron and it is not yet clear how, or if, non-coal related emissions from the electricity sector will be covered by the federal carbon pricing program. There are also reasons to be skeptical about New Brunswick's proposed approach. Technology proposals for pig iron gas and modular nuclear are untested and may prove too expensive relative to other options such as solar and wind where prices are falling rapidly. Current proposals are not in keeping with an almost emissions free electricity system or with the goal of a net-zero economy by 2050 which increasingly is the target if the world is to keep global average surface temperatures well below 2 degrees Celsius.

Over the longer-term there are legitimate questions about the wisdom of slowing the pace of electricity system change when other jurisdictions are moving forward. Barriers to increasing renewable energy and energy efficiency supply appear most related to weak regulatory requirements, lack of strong low-carbon targets, failure of government to incorporate low-carbon requirements in its procurement, weak investment in professional development to allow instructors and professors to stay up-to-date on electricity and building code changes, and in apprenticeships and on-site training. Broader societal changes toward automation and lower-paid, less stable work that appears part of the transition to a low-carbon economy and electricity system also need consideration. There are critical questions that need answers: How much of the load should climate change solutions carry for these broader societal trends? How can we address these concerning trends appropriately, and collectively? Should, and if so, how, can proponents of renewable energy, energy efficiency and the low-carbon transition address these broader societal trends? Is the solution to focus on collective responses such as energy cooperatives, public sector ownership of renewable energy, utility-scale and managed energy efficiency programs? Unfortunately, the answers to these questions are beyond the scope of this study.

Conclusion

The conclusion of our analysis is that New Brunswick needs a provincial electricity strategy and jobs plan that responds to changing market conditions, the demands of provincial and federal regulators, and that aims to develop, retain and repatriate skilled workers capable of managing this non-emitting electricity system and delivering the products that use it. Many New Brunswick workers travel west for employment. If New Brunswick were to invest in a local transition to a low-carbon economy, some of these workers may find that there are qualified and well-paying jobs are available closer to home. In the 10 years between 2006 and 2015, the province lost a 18,000 people to other provinces and three-quarters of those losses were to Alberta. However, due to low oil prices and the wildfire, these numbers are starting to change. Although 4487 New Brunswick residents did still move to Alberta in the last two years, 5033 returned to the province, for a 546-person net gain for New Brunswick (Jones 2017). The province can accelerate this trend, while continuing its efforts to

educate students who choose to stay in New Brunswick because they get jobs here.

How might one interest the province, now operating under a minority Conservative government, in a more forward-looking strategy for worker retention and training in New Brunswick as it relates to electricity, renewable energy and energy efficiency? The province, under the previous Liberal government, has invested significantly in offering free tuition to students from lower-income families, offered incentives for graduates to remain in New Brunswick, created an Opportunities New Brunswick agency, had a cabinet coordinating committee called the Jobs Board. Clearly, the province is committed to creating jobs in New Brunswick. Government announcements aimed at bringing unproven technologies to Belledune or in modular nuclear throughout the province are unproven and may not deliver. In the face of the recent rebuke of NB Power's plans from the Energy Utilities Board, and pending federal regulations for coal phase-out and carbon pricing, and a newly installed provincial government, a prudent approach would be to bring stakeholders together to develop an electricity and green jobs plan aimed at achieving decarbonization and maintaining and creating stable, well-paying work in the province.

The mandate of government, utility, supply and labour representatives would be to coordinate the provincial response to coal phase-out, but also broader changes expected in the electricity system, including issues related to stable, versus unstable work and options for generating electricity supply consistent with in-province job creation, and maintaining affordable electricity rates. A green jobs initiative would engage representatives from unions (building trades, electrical), government (key relevant departments, including the Department of Post-Secondary Education, Training and Labour), the utility and utility suppliers, certification, trainers and educators, and community representatives. The group would be tasked with creating a practical green job and labour plan for New Brunswick that includes an electricity plan to stimulate both the demand for non-emitting, affordable electricity and the supply of skilled workers to meet that demand. This plan would include short, medium and long-term strategies covering the all the dimensions identified in this literature review and interviews.

Is climate stability conducive to worker stability? Our research suggests the trend toward precarious work exists in the electricity sector, at least as it relates to renewable energy and energy efficiency. The choice of whether these trends need addressing is a social one. It is important that this choice be a conscious one meaning the issue of how we generate renewable and energy efficiency source of electricity supply should be considered by stakeholders brought together to develop a sustainable electricity and jobs plan for New Brunswick.

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Appendix 1

Alberta Advisory Panel on Coal Communities (2017). *Supporting Workers and Communities*.	-Many other organizations can and should play roles in translating these recommendations into concrete actions. <u>General Recommendations</u> -Cooperation with other governments on policy development. -Discussions with the government of Canada to address government's role in the transition process. -A coordinated approach across ministries. -Programs and funding tailored to support workers and communities. -All programs and funding should include measurable objectives and performance targets. -Develop a clear strategy for communicating with affected stakeholders and First Nations. <u>Recommendations for Supporting Workers</u> -An analysis of provincial and federal programs to identify those that can support affected workers as well as gaps. -Help impacted companies, unions and communities collaborate on implementing a strategy for worker transition. -Establishing Worker Transition Teams for each affected region. -Create an expeditious process for workers to obtain certification and/or recognition of their skills and prior learning. -Ensure workers have access to education for achieving re-employment. -Programs should be delivered as much as possible while workers are still employed and should be accessible and flexible. -Impacted workers who are not retire should have access to financial support for re-training or upgrading. -Employers and unions should facilitate training of affected workers. -Build an online job matching tool to connect affected workers with employer. -Offer relocation assistance to offset impacted workers who are prepared to relocate. -Each region establishing an economic development "concierge" so that impacted communities have one point of contact with government.

The International Labour Organization (2016). *Guidelines for a Just Transition Towards Environmentally Sustainable Economies and Societies for All*.	-Engage in social dialogue for responsive and collaborative labour market institutions and training systems, and coordinate stakeholder needs at all stages of education and skills policy development and implementation. -Promote equal access to opportunities for skills acquisition and recognition for all, in particular for young people, women, workers who need to be redeployed, including across borders, and for owners and workers of micro, small and medium enterprises (MSMEs) by offering specific training services, ensuring suitable timing and duration and promote supportive policies to enable individuals to balance their work, family and lifelong learning interests -Promote work-related training and practical experience as part of the training process in order to increase the employability of jobseekers -Formulate a holistic skills development policy to promote skills for green jobs that are coherent with environmental policies, including means for appropriate recognition through certification of skills -Foster peer learning among enterprises and workers, as well as education and training in green entrepreneurship to spread sustainable practices and the use of green technologies. -Assist businesses, particularly MSMEs, including cooperatives, in their engagement with governments and training providers with regard to management and skills upgrading of their current workforce, anticipation of future occupational profiles and skills needs, and workers' acquisition of portable and employable skills.
Goldman, Peters, Albers, Stuart, and Fuller (2010). *Energy Efficiency Services Sector: Workforce Education and Training Needs*.	-Provide energy efficiency education and support targeted at building and construction contracting and tradespeople. -Coordinate and track training efforts within states while sharing best practices across states. -Increase short-duration, applied training to augment on-the-job training and/or introduce new entrants to a field. -Increase funding to "train the trainers". -Increase access to on-the-job training for mid- and senior-level engineers and managers. -Prepare the next generation of EESS professionals.

Bridge and Gilbert (2017). *Jobs for Tomorrow: Canada's Building Trades and Net Zero Emission*.	-Developing a national economic strategy, in partnership with industrial stakeholders, that co-ordinates public spending on the zero-carbon economy with workforce (re)development initiatives. The transition is too big a task to be left to market forces. -Promoting growth and equity in the workforce by strategically investing in apprenticeships and vocational training for the zero-carbon economy. Governments have a responsibility to identify workforce shortages in advance and proactively invest in workforce development to meet future needs. -Enhancing social security programs to better support workers in any industry facing job loss and retraining costs. Eligibility criteria for employment insurance should be made more flexible and EI benefits should be extended so that workers can complete long-term training programs without fear of income loss.
Government of Canada (2016). *Working Group on Clean Technology, Innovation and Jobs Final Report.*	- Working with Ministers of Immigration to expedite immigration of highly qualified personnel needed to make Canada a global leader in welcoming international talent and expanding clean growth capacity. -Working with Labour Markets, Employment and Skills Ministers to create clean growth talent plans that ensure Canada has the right talent to transition to a low-carbon economy. Priority actions include: strengthening skills in STEM and associated trades, building stronger business leadership and management skills, and supporting the development of skills needed for adoption, installation and maintenance of clean technologies.

Warren and Brake (2017). Letter to Premier Ball from Iron and Earth.	-Build up Canada's renewable energy workforce by rapidly upskilling energy sector workers through short-term training programs and expanding apprenticeship programs. -Build up the manufacturing capacity of renewable energy products through the retooling and advancement of existing manufacturing facilities. -Position existing energy sector unions, contractors, manufacturers and developers within the renewable energy sector though incubator programs and multi-stakeholder collaboration initiatives. -Integrate renewable energy technologies and industrial scale energy-efficiency projects into existing non-renewable energy infrastructure.
ECO Canada (2012).	- Provides a comprehensive listing of Green jobs and expected growth by position. - Jobs linked to the green economy are classified into two separate categories.
Louie and Pearce (2016). *Retraining Investment for U.S. Transition from Coal to Solar Photovoltaic Employment.*	- Results showed that a relatively minor investment in retraining would allow the vast majority of coal workers to switch to PV-related positions even in the event of the elimination of the coal industry. -Coal to PV retraining could be implemented as: 1) scholarships, education vouchers and grants for at risk employees to universities, colleges, community colleges and certification programs, 2) subsidized expansion of solar industry training such as workshops and online classes, 3) government-sponsored free courses and certificates for PV positions 4) no/low interest loans or subsidized loans for education and retraining.

The Green Destination An American Green Building Portal maintained by Delmar Cengage Learning and the International Code Council (ICC) http://thegreendestination.com	-New environmental energy regulations are creating green jobs in the electrical trades within three major areas: energy efficiency, renewable energy and smart energy. -The core requirement for an electrical education will still consist of the completion of an apprenticeship program, an associate degree, or a certificate in Electrical Systems, Electrical and Electronic Technicians, Computer and Electronics Technicians and related programs. -Essential green electrical courses and competencies will include: Photovoltaics, Wind Turbine Operations, Renewable Energy Power Generation (small scale commercial and residential, industrial), Energy Efficient Electrical Systems (residential, commercial, industrial), Monitoring Systems (SmartGrid), Green Energy Safety, Green Energy Safety Codes and Compliance.
Stone and Cameron (2018). *Lessons for a Successful Transition to a Low Carbon Economy: A Summary for Policy Makers.*	-Early retirement/pension/financial compensation for workers. -Job retraining and skills development. -Infrastructure regeneration projects. -Regional support schemes. -Forums for stakeholder participation and dialogue. -Governments that plan in advance for the low carbon transition, ensuring education and training are suited to future and evolving low carbon economies, and regions are supported in diversifying their economies, avoid the negative social and economic impacts *and* their economy is positioned to capitalize on the low carbon transition

Appendix 2

INTERVIEW PROTOCOL
LOW-CARBON ECONOMY TRANSITION JOBS TRAINING RESEARCH AND PLAN

Interview framework (these are semi-structured and are intended to allow each stakeholder to present their own story and perspective on the topic of jobs training for the low-carbon economy).

1. **[IF AN EDUCATOR].**

   a. You are an instructor [or professor] who trains students in renewable energy [or energy efficiency]. How do the skills required to do this work differ from the skills of, for example, an electrical engineer has today?

   b. A recent analysis by the Green Economy Network analysing the jobs potential from the low-carbon transition, which we have shared with you, identified a number of job categories where workers would be needed to install and operate renewable energy projects, including Boilermaker, Community and social services, Construction worker, Drilling equipment operator, Education and health services, Electrician, Engineer, Excavator, Heavy equipment operator, Ironworker, Land surveyor, Machinist, Office and administrative support, Pipefitter, Plumber, and Service industry occupations. Focusing on the job categories you are most familiar with, could you identify areas that might require no change in training, some change in training and significant changes in training?

   c. [Or if energy efficiency]: A recent analysis by the Green Economy Network analysing the jobs potential from the low-carbon transition, which we have shared with you, identified a number of job categories where workers would be needed for energy efficiency-related work, including Architect, Boilermaker, Carpenter, Civil structural engineer, Community and social services, Construction equipment operator, Construction labourer, Education and health services, Electrical engineer, Electrician, Energy efficiency auditor, Heating ventilation and air conditioner (HVAC) installer, HVAC technician, Ironworker, Office and administrative support, Pipefitter, Plumber, Roofer, Service industry occupations, Steelworker, Weatherization installer/technician. Focusing on the job categories you are most familiar with, could you identify areas that might require no change in training, some change in training and significant changes in training?

   d. In areas where there is a need for moderate or substantial changes to training, or how we educate and/or certify professionals, what are they?

   e. How can we engage practicing professionals in upgrading?

   f. What barriers do we face in engaging professionals in upgrading?

   g. Are there models New Brunswick could look to for guidance in develop a low-carbon

economy jobs training plan for the electricity sector?

h. If you had to make three recommendations on what's need to successful implement a low-carbon economy jobs training plan for New Brunswick, what would they be?

i. Is there anything you would like to add?

2. [IF AN EMPLOYER].

a. You are an employer (utility, renewable energy or energy efficiency-related company) who employs workers in the existing electricity sector [or renewable energy [or energy efficiency] sector. How do the skills required to operate today's electricity system differ from the work required to operate the electricity system implied by the transition to a low-carbon electricity system (i.e., after compliance with federal and provincial climate change regulations and targets for 90 percent non-emitting)?

b. How has your utility [organization] managed skill transitions in the past? What professional development support do you provide your employees?

c. Do you have a partnership with educational institutions? Other organizations?

d. A recent analysis by the Green Economy Network analysing the jobs potential from the low-carbon transition, which we have shared with you, identified job categories where workers would be needed to install or operate renewable energy projects, including Boilermaker, Community and social services, Construction worker, Drilling equipment operator, Education and health services, Electrician, Engineer, Excavator, Heavy equipment operator, Ironworker, Land surveyor, Machinist, Office and administrative support, Pipefitter, Plumber, and Service industry occupations. How would work in this list that you are most familiar with change or not change if work related to installation or operation of renewable energy?

e. [Or if energy efficiency]: A recent analysis by the Green Economy Network analysing the jobs potential from the low-carbon transition, which we have shared with you, identified a number of job categories where workers would be needed for energy efficiency-related work, including Architect, Boilermaker, Carpenter, Civil structural engineer, Community and social services, Construction equipment operator, Construction labourer, Education and health services, Electrical engineer, Electrician, Energy efficiency auditor, Heating ventilation and air conditioner (HVAC) installer, HVAC technician, Ironworker, Office and administrative support, Pipefitter, Plumber, Roofer, Service industry occupations, Steelworker, Weatherization installer/technician. Focusing on the job categories you are most familiar with, could you identify areas that might require no change in training, some change in training and significant changes in training?

f. In areas where there is a need for moderate or substantial changes to training, or how we educate and/or certify professionals, what are they? What are you doing to prepare for these changes?

g. How can we engage practicing professionals in upgrading?

h. What barriers do we face in engaging professionals in upgrading?

i. Are there models New Brunswick could look to for guidance in develop a low-carbon economy jobs training plan for the electricity sector?

j. If you had to make three recommendations on what's need to successful implement a low-carbon economy jobs training plan for New Brunswick, what would they be?

k. Is there anything you would like to add?

3. [IF A UNION].

a. You are a union with members working for a utility that employs workers in the existing electricity sector. How do the skills required to operate today's electricity system differ from the work required to operate the electricity system implied by the transition to a low-carbon electricity system (i.e., after compliance with federal and provincial climate change regulations and targets for 90 percent non-emitting)?

b. How has your union [organization] managed skill transitions in the past? What professional development support do you provide your members?

c. Do you have a partnership(s) with educational institutions? Other organizations?

d. A recent analysis by the Green Economy Network analysing the jobs potential from the low-carbon transition, which we have shared with you, identified job categories where workers would be needed to install or operate renewable energy projects, including Boilermaker, Community and social services, Construction worker, Drilling equipment operator, Education and health services, Electrician, Engineer, Excavator, Heavy equipment operator, Ironworker, Land surveyor, Machinist, Office and administrative support, Pipefitter, Plumber, and Service industry occupations. How would work in this list that you are most familiar with change or not change if work related to installation or operation of renewable energy?

e. [Or if energy efficiency]: A recent analysis by the Green Economy Network analysing the jobs potential from the low-carbon transition, which we have shared with you, identified a number of job categories where workers would be needed for energy efficiency-related work, including Architect, Boilermaker, Carpenter, Civil structural engineer, Community and social services, Construction equipment operator, Construction labourer, Education and health services, Electrical engineer, Electrician, Energy efficiency auditor, Heating ventilation and air conditioner (HVAC) installer, HVAC technician, Ironworker, Office and administrative support, Pipefitter, Plumber, Roofer, Service industry occupations, Steelworker, Weatherization installer/technician. Focusing on the job categories you are most familiar with, could you identify areas that might require no change in training, some change in training and significant changes in training?

f. In areas where there is a need for moderate or substantial changes to training, or how we educate and/or certify professionals, what are they? What are you doing to prepare for these changes?

g. How can we engage practicing professionals in upgrading?

h. What barriers do we face in engaging professionals in upgrading?

i. Are there models New Brunswick could look to for guidance in develop a low-carbon economy jobs training plan for the electricity sector?

j. If you had to make three recommendations on what's need to successful implement a low-carbon economy jobs training plan for New Brunswick, what would they be?

k. Is there anything you would like to add?

4. [IF A POLICY-MAKER, FUNDER]

a. You are a government department responsible for post-secondary education and training. Has the department engaged in assessing how the skills required to operate today's electricity system differ from the work required to operate the electricity system implied by the transition to a low-carbon electricity system (i.e., after compliance with federal and provincial climate change regulations and targets for 90 percent non-emitting)?

b. What resources and support could your department provide towards implementing a low-carbon economy jobs training plan? What professional development support does the department provide for practicing professionals?

c. Do you partner with educational institutions, other organizations to train workers? If so, who are they?

d. A recent analysis by the Green Economy Network analysing the jobs potential from the low-carbon transition, which we have shared with you, identified job categories where workers would be needed to install or operate renewable energy projects, including Boilermaker, Community and social services, Construction worker, Drilling equipment operator, Education and health services, Electrician, Engineer, Excavator, Heavy equipment operator, Ironworker, Land surveyor, Machinist, Office and administrative support, Pipefitter, Plumber, and Service industry occupations. How would work in this list that you are most familiar with change or not change if work related to installation or operation of renewable energy?

e. [Or if energy efficiency]: A recent analysis by the Green Economy Network analysing the jobs potential from the low-carbon transition, which we have shared with you, identified a number of job categories where workers would be needed for energy efficiency-related work, including Architect, Boilermaker, Carpenter, Civil structural engineer, Community and social services, Construction equipment operator, Construction labourer, Education and health services, Electrical engineer, Electrician, Energy efficiency auditor, Heating ventilation and air conditioner (HVAC) installer, HVAC technician, Ironworker, Office and administrative support, Pipefitter, Plumber, Roofer, Service industry occupations, Steelworker, Weatherization installer/technician. Focusing on the job categories you are most familiar with, could you identify areas that might require no change in training, some change in training and significant changes in training?

f. In areas where there is a need for moderate or substantial changes to training, or how we educate and/or certify professionals, what are they? What are you doing to prepare for these changes?

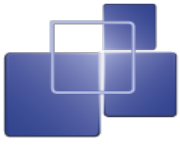
g. How can we engage practicing professionals in upgrading?

h. What barriers do we face in engaging professionals in upgrading?

i. Are there models New Brunswick could look to for guidance in develop a low-carbon economy jobs training plan for the electricity sector?

j. If you had to make three recommendations on what's need to successful implement a low-carbon economy jobs training plan for New Brunswick, what would they be?

k. Is there anything you would like to add?



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Printed by union labour (YUSA) at York University.