Canadian Centre for Policy Alternatives
Adapting Canadian Work and Workplaces to Respond to Climate Change
August 2019

Who is included in a Just Transition?

Considering social equity in Canada's shift to a zero-carbon economy

Hadrian Mertins-Kirkwood and Zaee Deshpande

www.policyalternatives.ca | RESEARCH | ANALYSIS | SOLUTIONS

CCPA
CANADIAN CENTRE for POLICY ALTERNATIVES
CENTRE CANADIEN de POLITIQUES ALTERNATIVES

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

ISBN 978-1-77125-467-0

This report is available free of charge at www.policyalternatives.ca.

PLEASE MAKE A DONATION...

Help us to continue to offer our publications free online.

With your support we can continue to produce high quality research—and make sure it gets into the hands of citizens, journalists, policy makers and progressive organizations. Visit www.policyalternatives.ca or call 613-563-1341 for more information.

The CCPA is an independent policy research organization. This report has been subjected to peer review and meets the research standards of the Centre.

The opinions and recommendations in this report, and any errors, are those of the authors, and do not necessarily reflect the views of the funders of this report.

UNIFOR
Local 567

ABOUT THE AUTHORS

Hadrian Mertins-Kirkwood is a senior researcher with the Canadian Centre for Policy Alternatives where he focuses on international trade and climate policy.

Zaee Deshpande is a master's student in the Institute of Political Economy at Carleton University where she studies the political economy of labour.

ACKNOWLEDGMENTS

This report is a co-publication of Adapting Canadian Work and Workplaces to Respond to Climate Change: Canada in International Perspective (ACW), a Social Sciences and Humanities Research Council of Canada (SSHRC) Partnership Grant project based at York University's Faculty of Liberal Arts and Professional Studies and headed by Dr. Carla Lipsig-Mummé. The report expands on previous work by the ACW's Domestic Policy Working Group, which is investigating Canada's evolving domestic climate policy landscape.

The authors wish to acknowledge Sheila Block, Marc Lee, Ricardo Tranjan, Chris Wilson and the ACW reviewers who provided helpful comments on earlier drafts of this report. Any remaining errors or omissions are the authors' alone.

Introduction

AS THE INTERNATIONAL community moves to act on the climate crisis, governments are increasingly being forced to reckon with the social and economic costs of climate policies. The production and consumption of fossil fuels is the primary driver of global heating, so shifting to cleaner alternatives is necessary for long-term environmental and economic sustainability. However, the global economy is highly dependent on fossil fuels, so declines in the production and consumption of coal, oil and natural gas have the potential to negatively impact large numbers of workers and their communities in the short to medium term. In Canada alone, the fossil fuel industry accounts for hundreds of thousands of jobs and more than $100 billion dollars worth of economic output.[1]

Efforts to reduce emissions from the fossil fuel sector have provoked calls for governments to ensure the transition to a cleaner economy is a *just* transition for affected workers and communities. The concept of a "just transition" for fossil fuel workers has long existed within the North American labour movement, but only in the past few years has it gained mainstream international attention. The 2015 Paris Agreement acknowledged the "imperatives of a just transition of the workforce." And in 2018, more than 50 countries signed the *Solidarity and Just Transition Silesia Declaration*, which highlights the essential role of a just transition in the broader fight against climate change.[2]

In Canada, the phrase "just transition" only began appearing in official policy documents around the time of the Paris Agreement, but it is now a

formal priority for several governments across the country. Canada's recent adoption of just transition principles has emerged almost exclusively in the context of the government-mandated phaseout of coal-fired electricity generation. Under a patchwork of provincial and federal policies, nearly all coal power plants and their associated coal mines will be shuttered by 2030.[3] To mitigate the costs of the phaseout to coal workers and coal towns, the provincial government of Alberta — home to the largest share of the coal industry — together with the federal government have implemented or announced a variety of just transition policies since 2016. Targeted programs include income support and skills retraining for coal workers as well as infrastructure investments in affected communities. These governments continue to explore initiatives to provide support to coal communities as they undergo the transition to a cleaner economy.

Canada's current plan for the transition of the coal sector achieves a politically palatable compromise between the need to reduce emissions and the concerns of affected communities. Overall, it provides a useful model for fossil fuel transitions in other sectors and countries.[4] However, lost in Canada's just transition conversation are the underlying social and economic inequities that risk being exacerbated by oversights in the design of transition policies. Specifically, the majority of Canada's coal transition programs are narrowly focused on a subset of relatively high-income coal workers to the exclusion of other workers in those same communities who will nevertheless be impacted by the phaseout policy and are more likely to be from marginalized groups (see Appendix for definitions).

Using the Canadian coal transition as its starting point, this report asks whether the emerging policy consensus on just transition is consistent with the principles of social justice and equity more broadly. Rather than discuss the necessity of a just transition to a zero-carbon economy in Canada, this report is specifically concerned with the question of whether a just transition, as it is currently being pursued at the policy level, truly achieves justice for all workers by redressing inequities or, at a minimum, by not exacerbating them. In this sense, we expand the scope of the just transition discourse beyond the current mainstream understanding of the term.

After establishing a conceptual framework for just transition, including a distinction between reactive and proactive approaches, we analyze Canada's existing transition policies to determine who is benefiting from them and who is excluded. We specifically consider gender identity, Indigenous status, racialized identity and immigrant status in our analysis of coal communities covered by the transition. We find that the main beneficiaries of present

just transition policies are Canadian-born white men, which reflects their disproportionate presence in the coal workforce. However, many socially and economically marginalized people also face costs and risks from the same climate policies but do not share in the benefits of transition policies, which means these policies may lead to further marginalization.

Next we consider the potential equity impacts of future Canadian policies to transition to a zero-carbon economy. We find that in the absence of proactive social policies to promote greater workforce diversification and inclusion, the decline of fossil fuels and the growth of alternative green industries will once again primarily benefit Canadian-born white men to the exclusion of marginalized people. Far more jobs will be created in green industries in the long term than are lost in fossil fuel industries, so ensuring those green jobs are accessible to more people is essential both for redressing historical inequities and meeting the labour needs of a decarbonizing economy.

The report concludes that a truly just transition should address and incorporate social equity from the outset. Otherwise, a "just" transition may nevertheless serve to reproduce existing patterns of inequity. The paper makes a series of policy recommendations to Canadian governments for ensuring a zero-carbon economy is more equitable and inclusive than our current economy, including through targeted training and education for people from marginalized groups.

A conceptual framework for just transition

THE TERM "JUST transition" emerged out of the North American labour movement in the 1970s in response to environmental policies, but it wasn't until the 2000s that the concept gained international attention as the debate over climate change policy entered the mainstream.[5] By the time the Paris Agreement was being negotiated, just transition was a key objective of international labour unions and widely supported by pragmatic environmentalists.

Although there is no universally accepted definition for a just transition, it generally refers to efforts to consider and prioritize the wellbeing of workers in the implementation of policies to reduce greenhouse gas emissions. For the purposes of the present report, we understand just transition as "a social justice framework for facilitating the shift to a zero-carbon economy in a way that ensures productive, equitable outcomes for workers."[6] Equity in this context means a fair distribution of the costs and benefits of transition commensurate with the historical inclusion or marginalization of different types of people in the economy. In other words, those workers who have been sidelined or exploited in the old economy — such as women, Indigenous peoples, immigrants and racialized individuals — deserve particular attention and support as we move to a cleaner economy (see Appendix for definitions of identity categories used in this paper).

Since the shift from an emissions-intensive economy to a zero-carbon economy should neither push the costs of transition onto workers nor exclude

workers from the benefits, a just transition can be divided into reactive and proactive elements. A reactive or defensive just transition refers to efforts to minimize the costs to affected workers of moving away from fossil fuels. For example, fossil fuel workers who are laid off due to climate policies can be transitioned into new jobs or retirement. Reactive transition policies include income support, skills retraining, pension bridging and workforce transition planning.

A proactive or offensive just transition, on the other hand, refers to efforts to maximize the potential benefits to workers of shifting to a clean economy. For example, governments can invest in education to meet the demand for skilled labour generated by green infrastructure spending. Proactive transition policies include apprenticeship training, local hiring requirements and labour market forecasting.

Reactive and proactive just transitions follow from the same principles but may look very different in practice. Although a comprehensive just transition approach will see some laid-off fossil fuel workers retrain as renewable energy workers, in practice the two transitions are mostly distinct from each other. Indeed, the majority of fossil fuel workers affected by climate policies will likely transition to retirement in the coming decades rather than retrain for work in lower-emitting industries.[7] Likewise, the vast majority of new workers in the clean economy in the coming years, especially young workers being trained in green industries, will never have worked in the fossil fuel sector. Mitigating costs on the one hand and maximizing benefits on the other hand are therefore distinct questions affecting mostly different groups of workers. In part, the difference reflects the geographic concentration of the fossil fuel industry and the geographic diffusion of green industries.

The reactive/proactive distinction is the organizing principle for this paper's evaluation of the equity impacts of just transition policies in Canada. The first section evaluates the reactive policies put in place to mitigate the social and economic costs of the phaseout of coal-fired electricity generation. The second section considers the potential changes in employment patterns as Canada shifts to a zero-carbon economy in the long term. The concluding discussion brings the two approaches back together to determine if Canada's efforts to ensure a just transition to a cleaner economy are consistent with the broader principles of social justice and equity.

Impacts on workers of Canada's just transition of the coal sector

JUST TRANSITION HAS been adopted in name or in principle by several Canadian governments including the federal government and the provincial governments of Alberta and Ontario.[8] To date, the concept has mainly been applied in the context of the government-mandated phaseout of coal-fired electricity generation, which is the focus of this section.

Under a series of overlapping provincial and federal policies enacted between 2001 and 2018, Canada is in the process of ending coal power in the country by 2030.[9] These policies require coal plants to shut down, convert to alternative energy sources (e.g., natural gas), or in limited cases to adopt carbon sequestration technologies that reduce net emissions. Although coal mines are not directly targeted for phaseout, the majority of Canadian thermal coal mines supply coal directly to Canadian power plants and will consequently shut down when their associated plants stop consuming coal. Mines producing metallurgical coal, which is mainly used in steel production, are not affected by the phaseout.

Estimates for the total number of workers affected by the coal phaseout (i.e., those at risk of involuntarily losing their livelihoods) vary by methodology. In its regulatory impact assessment the federal government claimed that 2,000–3,500 mining jobs and up to 1,500 power plant jobs could be at

TABLE 1 Number of coal workers in Canadian census divisions with active thermal coal projects

Census division	Province	Active thermal coal projects (mines or power plants)	Total employees at affected facilities	Total coal workers in census division (approx.)	Share of coal workers in total census division workforce
Division No. 11 (Edmonton)	Alberta	Genesee Generating Station, Genesee Mine, Highvale Mine, Keephills Power Plant, Sundance Power Plant	1,900	2,100	0.3%
Division No. 1 (Estevan)	Saskatchewan	Boundary Dam Power Station, Estevan Mine, Shand Power Station	827	1,000	5.6%
Division No. 14 (Hinton)	Alberta	Coal Valley Mine	315	900	5.6%
Cape Breton	Nova Scotia	Donkin Mine, Lingan Generating Station, Point Aconi Generating Station, Point Tupper Generating Station	365	400	0.9%
Division No. 7 (Wainwright)	Alberta	Battle River Generating Station, Paintearth Mine	170	300	1.4%
Division No. 3 (Assiniboia)	Saskatchewan	Poplar River Mine, Poplar River Power Station	436	300	4.0%
Division No. 4 (Hanna)	Alberta	Sheerness Mine, Sheerness Thermal Generating Station	201	300	4.9%
Division No. 18 (Grande Cache)	Alberta	HR Milner Generating Station	57	300	3.3%
Pictou	Nova Scotia	Stellarton Mine, Trenton Generating Station	92*	100	0.7%
Restigouche	New Brunswick	Belledune Thermal Generating Station	125	100	0.9%
Division No. 7 (Brandon)	Manitoba	Brandon Coal Power Plant	57	100	0.2%

Sources Environment and Climate Change Canada, "National Pollutant Release Inventory," Government of Canada, last modified February 14, 2017; and authors' calculations using Statistics Canada, "Table 98-400-X2016292," 2016 Census of Population, last modified February 20, 2019. Information on the number of employees at the Stellarton Mine was not publicly available at the time of writing. For further explanation see Appendix.

risk nationally.[10] Working independently, the federal Just Transition Task Force put the net figure more precisely at 3,000–3,900 jobs.[11] Both of these estimates only consider workers directly employed in coal facilities. Worker groups accounting for indirect impacts have tended to provide higher figures. For example, the Alberta Federation of Labour estimates that 3,000 workers could be affected in that province alone.[12]

Even at the high end, the total number of jobs considered at risk in Canada represents a vanishingly small share of national employment. If

TABLE 2 Just transition programs in Canada

Name of program	Government	Description
Coal Community Transition Fund	Alberta	Municipalities and First Nations affected by the coal phaseout could apply for funding for economic development and diversification initiatives. Twelve projects were approved before the $5 million fund was exhausted in 2017.[13]
Coal Workforce Transition Program: Bridge to Re-employment	Alberta	Eligible coal workers can apply for income support for 45 weeks or until re-employment. The program tops up a worker's employment insurance benefits to 75% of their previous weekly earnings.[14]
Coal Workforce Transition Program: Bridge to Retirement	Alberta	Eligible coal workers aged 53 or older can apply for income support for 72 weeks or until pension income exceeds benefits. The program tops up a worker's income to 75% of their previous weekly earnings.[15]
Coal Workforce Transition Program: Relocation Assistance	Alberta	Eligible coal workers relocating more than 40 kilometres for a confirmed, full-time job can apply to have expenses reimbursed up to $5,000.[16]
Coal Workforce Transition Program: Tuition Voucher	Alberta	Eligible coal workers can apply for a voucher to cover education and training costs up to $12,000 at an eligible publicly funded post-secondary institution.[17]
Regional development funding	Canada	The 2018 federal budget allocated $35 million to support skills development and economic diversification in communities affected by climate policies.[18] So far, the fund has been used to establish transition centres to act as centralized resource and service hubs for coal workers. The first two centres, in Forestburg and Castor, Alberta, were announced in fall 2018.[19]
Dedicated infrastructure fund for impacted coal communities	Canada	The 2019 federal budget allocated $150 million to fund "priority projects and economic diversification" in coal communities. Implementation will begin in 2020.[20]

these jobs were evenly distributed across the country, there would be little need for targeted transition programs. However, coal plants and mines tend to be located in rural communities that are highly dependent on the coal industry. In the regions with active thermal coal facilities, coal workers typically account for between 1% and 6% of the workforce (see *Table 1*). The figures are likely much higher for the communities that host the facilities, such as Coronach, Saskatchewan in the Assiniboia region, but public census data broken down by worker industry are not available at that level of geographic detail.

Recognizing the economic and social risks to these workers and communities, the governments behind the coal phaseout have implemented or announced several targeted transition programs. The provincial government of Alberta has enacted the most tangible transition strategy to date, which was developed in consultation with labour groups. The federal government is further behind but has recently committed funding to initiatives supporting a just transition of the coal sector (see *Table 2*). Whether or not they employ "just transition" language, these government programs are designed explicitly to support workers and communities negatively impacted by climate policies (i.e., they are reactive policies). They are distinct from

policies such as employment insurance or the Canada Job Grant that are available to all workers, industries and/or regions.

These reactive just transition policies can be divided into worker-focused and community-focused programs. The worker-focused programs tend to be narrow in scope. For example, eligibility for Alberta's coal workforce transition programs is restricted to employees laid-off from permanent positions at specified facilities. Contract workers, who already have less job security and may be ineligible for employment insurance, are excluded from these benefits, as are workers who are temporarily unemployed regardless of years of service at an affected facility. Workers indirectly employed in the coal industry, such as workers in specialized firms that drill and pump mines, are also excluded even though their livelihoods are similarly threatened by the phaseout.

For the workers who do qualify, the benefits are reasonably generous. For example, Alberta's Bridge to Re-employment program can double or triple the value of standard employment insurance benefits, while the $12,000 tuition voucher can cover a full year of education at a post-secondary institution.[21] Alberta labour groups have generally been supportive of the policies.[22]

The community-focused programs provide funding to municipal and Indigenous governments to stopgap public services and encourage regional development initiatives, although the available funding falls short of enabling economic diversification on a major scale. Alberta's $5 million Coal Community Transition Fund only provided enough money for a handful of local governments to undertake consultations and develop strategies. The $150 million in federal infrastructure funding for coal communities announced in the 2019 federal budget will be enough to get some small projects off the ground, but this money will hardly fill the gap left by coal facility closures. For context, replacing one of the smallest coal power plants in Canada, the Point Tupper Generating Station on Cape Breton Island, with equivalent wind power generation could cost as much as $250 million.[23]

Economic diversification for coal towns does not necessarily require new investments in the energy industry. It is equally viable for a former coal town to turn to tourism, agriculture, forestry or another industry to anchor the local economy. Nevertheless, for any industry to fill the gap left by coal will take substantial external investment. One of the main concerns for coal towns is replacing the tax base left by the closure of coal plants and mines, which threatens the long-term financial sustainability of public services in these communities.[24]

Taken together, Canada's coal transition plan includes relatively generous benefits for a subset of coal workers coupled with modest supports for economic diversification in coal communities. However, these reactive policies do not necessarily reflect the relative risk of the phaseout policy to different kinds of workers. Although coal workers are at greatest direct risk of job losses, many other workers in those communities are also threatened.

According to Statistics Canada's national multipliers, every million dollars of economic activity in coal mining leads to 1.3 jobs directly and an additional 2.2 jobs indirectly or through induced economic activity.[25] The figures for electricity generation are 1.9 and 3.5 respectively. In other words, based on the above estimates of 3,000–5,000 coal jobs being at risk, we can expect upwards of 10,000 jobs in other industries to be at risk from the phaseout of coal power.

In the eleven census divisions where thermal coal facilities are located, the largest employers are the health care and retail trade sectors, which together account for a quarter of all jobs.[26] As the coal sector shrinks, these secondary service industries will face new pressures, which may lead to corresponding job losses. The concern is greatest in private sector services, which are primarily demand-driven, rather than public services delivered provincially or nationally, which are more insulated from local conditions. Nevertheless, even in industries like health care, a drop in the local economy or a declining population will have job impacts.

Overall, losses in the service industries will be smaller in relative terms than those facing the coal industry. But since the service sector employs so many more people in total there may be greater services job losses in absolute terms.

Equity analysis of coal transition policies

The risk that the coal phaseout poses to non-coal workers in coal communities is especially important because of structural inequities in the labour market. Based on national-level data, coal workers are overwhelmingly white, male and born in Canada (see *Table 3*). As an illustrative contrast, workers in health care and retail trade — the largest employers in coal communities — are predominantly women. These sectors also include a more proportionate share of racialized and immigrant workers given their share of the overall workforce. Indigenous men are overrepresented in the coal industry, but they face other barriers and challenges discussed further below.

TABLE 3 Share of workers in select Canadian industries, by identity category

	Coal industry		Largest employers in coal communities		All industries
	Coal mining	Electric power generation	Health care and social assistance	Retail trade	
Women	14%	26%	82%	54%	48%
Indigenous	6%	5%	4%	4%	4%
Racialized	5%	13%	22%	22%	21%
Immigrant	9%	15%	24%	21%	23%

Source Statistics Canada, 2016 Census of Population. Green cells indicate overrepresentation relative to other industries. Red cells indicate underrepresentation.

These national figures may differ from the demographic makeup of coal communities, which tend to be concentrated in rural areas that are not as ethnoculturally diverse as urban centres. Publicly available data combining identity, industry and geography are not sufficiently detailed for community-level breakdowns. Nevertheless, we can reasonably expect that non-coal workers are still more diverse than coal workers in these communities given the large gaps in overall representation. For example, in the region of Estevan, Saskatchewan, which has one of the highest concentrations of coal workers, immigrants account for only 12% of the overall workforce (well below the national average) but more than 20% of retail workers.[27]

Future layoffs notwithstanding, the coal industry offers significantly more job security than most industries. Two-thirds of workers in mines and power plants enjoy permanent, full-time positions compared to fewer than half in health care and retail. This distinction is important because precarious workers are less likely to have employer benefits or to be eligible for government benefits like employment insurance.[28] Even in the absence of just transition programs, most coal workers have a stronger social safety net in place than many or most other workers in their communities.

Most coal workers are also relatively well-paid. The median coal miner earns $103,000 while the typical electricity worker earns $94,000 per year. Workers in the health care and retail sectors earn median incomes of $40,000 and $22,000 respectively. Even when temporary and part-time workers are excluded, the national income gap between miners and retail workers is $68,000 per year.

In part, the better job security and wages of coal workers reflect the successes of labour unions in that industry. Workers in the extractive sector and especially in the utilities sector enjoy far higher rates of unionization

TABLE 4 Estimated distribution of benefits from coal workforce transition programs

Men	79%	21%	**Women**
Non-Indigenous	95%	5%	**Indigenous**
Non-Racialized	91%	9%	**Racialized**
Non-Immigrant	88%	12%	**Immigrant**

Source Authors' calculations using Statistics Canada's 2016 Census of Population. Share values represent the approximate proportion of workers in coal mines and coal power plants working in full-year positions (either full time or part time), which is broadly consistent with the eligibility criteria for Alberta's coal workforce transition programs.

than most service workers.[29] Coal miners, and to a lesser extent coal power plant workers, are also paid a premium that reflects the dangerous nature of their work. Mining is among the deadliest industries in Canada.[30]

For marginalized workers in the coal industry, the benefits are somewhat smaller. Women working in coal mines earn 17% less than the industry average and women working in the electricity sector earn 23% less even after adjusting for permanent, full-time employment (but not seniority or occupation). Indigenous workers face pay gaps of 3% and 11% respectively. Racialized workers and immigrants generally face smaller pay gaps in these industries, but they are slightly more likely to be precariously employed. Nevertheless, coal workers on the whole are likely to have substantially greater private resources to fall back on in the event of job loss than workers in other sectors in their communities.

In sum, the typical coal worker benefits from relatively good job security and a relatively high income when compared to many of the service workers in their communities who may also face job losses as the coal industry winds down. Yet transition programs that are narrowly focused on coal workers at specific coal facilities do not extend to these workers in secondary industries. Based on the current design of Alberta's workforce transition programs, we can expect most of the beneficiaries of Canada's just transition of the coal sector to be white, Canadian-born men (see *Table 4*). Narrow, reactive just transition policies for workers, like those developed in Alberta, exclude from public support many of those with the least private capacity to adapt to social and economic disruption.

To be clear, coal workers who are at risk of losing their jobs due to climate policies should be supported in any just transition, whether through education, re-employment or an early retirement. At issue are the workers in other sectors who are indirectly impacted by the coal phaseout but receive

nothing from existing transition programs, and who are more likely to be socially or economically marginalized to begin with.

Compared to the worker-focused programs discussed above, the benefits of community-focused transition programs are more evenly diffused through a local economy. If a coal facility and its associated economic spinoffs, such as property taxes, are replaced with another industry at a comparable scale, then theoretically there should be minimal disruption to indirect and induced employment in industries such as retail, food services and accommodation. However, to date, the amount of funding dedicated to economic diversification in Canadian coal communities pales in comparison to the potential revenue loss from the closure of coal facilities. The coal industry accounts for more than $3 billion in economic output in Canada, so funding in the tens or even hundreds of millions of dollars will not make up the gap for coal communities.[31] Unless and until more substantial investment is on the table, the decline of the coal industry in these communities will incur costs in every other part of the local economy.

In sum, Canada's just transition of the coal sector, based on present reactive policies, will cushion the blow of climate policies for a subset of workers while leaving out many marginalized workers in the same communities. Indeed, programs like Alberta's relocation assistance even encourage skilled former coal workers to literally leave their struggling communities behind. As they stand, Canada's coal transition programs may reproduce or even exacerbate existing inequities in coal communities. To be consistent with social justice principles, a truly just transition must do more to redress structural inequities in the labour market and the broader economy. These principles are especially important as we move beyond the relatively small coal industry to the question of decarbonizing the broader Canadian economy in the coming decades.

Impacts on workers of Canada's shift to a zero-carbon economy

AVOIDING CATASTROPHIC CLIMATE change will require a full transition to a carbon-neutral global economy.[32] For Canada that entails systemic changes on a far greater scale than those required by the phaseout of coal-fired electricity generation. Not only does decarbonization imply a substantial reduction in oil and gas production with a corresponding expansion of alternative energy infrastructure, but also intensive efforts to improve the efficiency of our buildings and transportation sector while changing how we produce and consume almost everything.

To date, Canada's climate policy ambitions fall far short of this standard. Independent analyses and the government's own projections indicate Canada will not meet its emission reduction targets in the short, medium or long term.[33] Part of the blame lies in an unwillingness to tackle emissions from oil and gas production, which is the largest source of national emissions. But Canadian governments have also failed to make the necessary investments in a lower-carbon economy.

For example, the federal government has committed $180 billion to new infrastructure over the next decade — less than half of which is earmarked for green infrastructure — and the provinces and municipalities are promising billions more. The cost of reducing national emissions in line with the Paris

Agreement targets, however, is larger by an order of magnitude.[34] Moreover, Canada's national targets are too modest given the scope and urgency of climate change.[35] Achieving anything resembling complete decarbonization of the Canadian economy may require trillions of dollars in new green infrastructure investments from the public and private sector.[36]

Although changes on this scale are not seriously being considered by any Canadian government, this section takes as its starting point the premise that Canada will ramp up its efforts to reduce greenhouse gas emissions in the coming decades through large-scale infrastructure change. Even if only a fraction of the necessary investment (and disinvestment) occurs, there will be widespread consequences for workers, so the general patterns discussed below are applicable at lower levels of ambition.

Forecasting labour market trends based on climate policies and their accompanying just transition policies is a complicated task for a number of reasons. Among other issues, policies are subject to change by future governments with different priorities. Additionally, in most cases, the workers gaining jobs in growing sectors will not be the same workers whose jobs are eliminated. Nonetheless, it is both possible and necessary to undertake a broad assessment of the changing nature of the workforce in a decarbonizing economy in order to maximize the benefits of decarbonization for workers. A proactive just transition requires governments to study these potential changes in employment patterns in order to develop effective and equitable job creation and workforce development policies moving forward.

Using the available literature, this section aims to identify the broad industrial sectors that are poised to grow and those that will likely contract as Canada undergoes the process of decarbonization, which will cause job losses and economic disruption in some sectors while creating new employment in others. As above, we consider how these changes may have uneven costs and benefits for different kinds of people in the workforce.

General employment impacts of decarbonization

A comprehensive report by the Organization for Economic Co-operation and Development (OECD) finds that by 2030, global employment in low-emitting energy sectors (e.g., solar and wind electricity, combustible renewables and waste electricity, nuclear power, hydro and geothermal electricity) will rise significantly.[37] In particular, employment in solar and wind in the OECD

area could be 40% higher than it would have been in the absence of climate change mitigation policies.

On the other hand, the greatest job destruction in the OECD area will be in the high-emitting energy sector, which includes natural gas, coal, crude oil, fossil fuel–based electricity, and petroleum and coal product manufacturing. Employment in coal, oil and gas production will decline 30–40% by 2030 in the OECD's climate mitigation policy scenario. Although these changes are significant, they do not translate into a large overall reallocation of jobs, according to the report. This is because the most heavily impacted industries represent only a small share of total employment and the transition happens gradually enough that many jobs will be lost through attrition.

The International Labour Organization (ILO) reaches similar conclusions in its 2018 World Employment Social Outlook, which compares employment trends in a lower-carbon scenario to the International Energy Agency's (IEA) business-as-usual scenario of a six degree Celsius temperature increase.[38] The ILO report finds that limiting global warming to 2°C requires reducing fossil fuel reliance in electricity and transport and improving energy efficiency in buildings and construction. This will result in net employment gains in almost all regions and sectors. The largest job growth will be in renewable power (hydro, biomass, solar thermal, solar photovoltaic, tidal and wave, and geothermal) and construction. Minor gains will be seen in the manufacturing, waste and services sectors. The largest employment losses will be in the fossil fuels and utilities sectors.

Another recent analysis from academics at the University of Technology Sydney makes employment projections for 2°C and 1.5°C mitigation scenarios.[39] The researchers find that under both scenarios the renewable energy transition is projected to increase net employment. Between 2015 and 2025 there will be a 327% net employment increase in North America because of the energy transition in the 1.5°C scenario and a 298% increase in the 2°C scenario. The greatest losses will be in fossil fuel jobs while the biggest gains will be in solar photovoltaic, and onshore and offshore wind jobs.

Fewer Canadian studies have addressed this question directly, but those that do reach similar conclusions. Using an ambitious scenario where Canada reaches net zero emissions by 2050, a report from the Columbia Institute estimates that 3.9 million construction jobs will be created in order to meet the nation's green infrastructure demands.[40] This includes construction jobs in green electricity generation, efficient buildings, and transportation. The bulk of the jobs come from investments in renewable electrical supply

systems made up of hydroelectric, wind, solar, geothermal and tidal power generation.

Looking specifically at Alberta, a report by the Pembina Institute suggests that investing in renewable sources of electricity and energy efficiency would generate more jobs than those lost through the gradual phaseout of coal-fired power plants.[41] The report's finding that net employment in Alberta will rise is particularly encouraging because meeting Canada's climate targets will ultimately require the phaseout of oil and gas production in Alberta.

Synthesizing all of the existing international and Canadian literature poses some challenges. First, the Canadian economy is unique and dynamic so global industry projections are at best an approximation. Second, different organizations have used different methodologies to carve out industry classifications, making it difficult to overlay these predictions onto Canadian industries, which are typically defined using the North American Industry Classification System (NAICS). Third, definitions of jobs affected by decarbonization (e.g., whether indirect jobs and induced jobs are included) vary across studies. Fourth, some studies are based on more ambitious climate change mitigation scenarios while others start from more modest premises.

Despite these limitations, the existing literature on the employment impacts of decarbonization are generally consistent in their conclusions, which provides a useful starting point for understanding the general employment trends that Canada will likely experience as it transitions to a zero-carbon economy. Although more Canadian labour market research needs to be conducted for the federal and provincial governments to develop informed, forward-looking policies on the need for (and needs of) workers in a decarbonizing economy, these early reports suggest that the greatest transition-related Canadian job creation will occur in renewable energy (particularly solar and wind power generation), construction and transportation. Conversely, the greatest declines will be in the coal, oil and natural gas industries.

Equity analysis of key industries in the transition to a zero-carbon economy

While decarbonization will require significant co-ordination and investment, it is possible for Canada to dramatically reduce emissions while maintaining or growing net employment on a national scale. However, for the transition

TABLE 5 Share of workers in select Canadian industries, by identity category

	Growth industries			Declining industries		All industries
	Electric power generation	Construction	Urban transit systems	Oil and gas extraction	Support activities for mining, oil and gas extraction	
Women	26%	13%	22%	26%	17%	48%
Indigenous	5%	5%	2%	5%	7%	4%
Racialized	13%	11%	26%	16%	9%	21%
Immigrant	15%	18%	31%	18%	12%	23%

Source Statistics Canada's 2016 Census of Population. Green cells indicate overrepresentation relative to other industries. Red cells indicate underrepresentation.

to a zero-carbon economy to be a *just* transition, policy-makers must also consider the equity impacts of different climate and transition policies.

Like the coal industry, the oil and gas industry primarily employs white, Canadian-born men (see *Table 5*). The median income of an oil and gas worker is approximately $131,000 per year while in supporting industries it is about $77,000. The direct costs of decarbonization will fall disproportionately on these workers, but they will also be the primary beneficiaries of an Alberta-style, reactive transition plan.

Like the coal industry, oil and gas production is geographically concentrated in certain regions (especially in Alberta, Saskatchewan, and Newfoundland and Labrador). The indirect effects of a fossil fuel phaseout on these resource communities will be similar to the impacts of the coal phaseout but on a much larger scale. For example, in the region of Fort McMurray, Alberta, approximately a third of direct employment is in fossil fuel production with the majority of the remaining workforce directly or indirectly supported by oil and gas production.[42] Declining production will cost jobs in every sector of the economy, but the workers outside the oil and gas sector, who are more likely to be women, immigrants or racialized, will not receive the same private and public supports as oil and gas workers unless a more comprehensive reactive transition approach is undertaken.

The longer-term breakdown of workers who stand to benefit from decarbonization is of great concern from an equity perspective, because the total number of new jobs in the clean economy will exceed losses in the fossil fuel industries. Moreover, many or most fossil fuel jobs will be lost through the normal process of attrition rather than through layoffs.[43] In many of the key sectors poised for growth in the shift to a zero-carbon economy — renewable energy, construction and public transportation — marginalized groups are

currently largely underrepresented (see *Table 5*). Like the extractive sector, workers in these areas are disproportionately white, male and born in Canada compared to other sectors.

The representation gap is most extreme in the construction sector, which will be one of the biggest beneficiaries of investments in green infrastructure. Not only are marginalized people generally underrepresented in the construction workforce, but they also face major gaps in job security and pay. Racialized and Indigenous construction workers are 8% and 12% more likely, respectively, to be precariously employed than the average worker. Moreover, among full-year, full-time construction workers, Indigenous workers earn 7% less than non-Indigenous workers, immigrants earn 11% less than non-immigrants, women earn 17% less than men, and racialized workers earn 19% less than white workers. In other words, women, Indigenous people, racialized workers and immigrants are less likely to work in construction and/or have less job security and lower incomes when they do.

The patterns are similar in the electricity sector but differ for public transit. Immigrants and racialized workers are overrepresented in the transit sector and also earn higher incomes on average. Women and Indigenous workers, on the other hand, are significantly underrepresented in public transit and face full-year, full-time pay gaps of 9% and 7%, respectively. Women are also 19% more likely to be precariously employed in this industry.

In sum, marginalized workers are less likely to face the direct costs of decarbonization, but they will still be indirectly impacted and are less likely to be supported by reactive just transition programs. Marginalized workers are also less likely to work in the industries that will receive the greatest benefits of the shift to a zero-carbon economy. If current employment patterns continue, the benefits of massive new infrastructure investments — hundreds of billions of dollars in the coming decades — will not be shared with women, Indigenous workers, racialized workers and immigrants in proportion to their share of the overall workforce.

Barriers to equity in the clean economy

In the construction and renewable energy industries in particular, a large share of jobs require training and certification in the skilled trades. The lack of diversity in the present workforce is therefore determined, at least in part, by a lack of diversity in the apprenticeship training system. Indeed, women, racialized individuals and immigrants are all significantly underrepresented

TABLE 6 Apprenticeship registrations and completions, by identity category

	Share of apprenticeship registrations	Share of apprenticeship completions	Share of Canadian population
Women	13.7%	13.6%	51%
Indigenous	6.3%	4.9%	5%
Racialized	8.2%	7.6%	22%
Immigrant	8.7%	8.0%	22%

Source Kristyn Frank and Emily Jovic, "Table A.2.1: Demographic characteristics of apprentices, Canada," in *National Apprenticeship Survey: Canada Overview Report 2015*, Statistics Canada, March 2017; and 2016 Census of Population. Green cells indicate overrepresentation relative to the share of general population. Red cells indicate underrepresentation.

in the apprenticeship system (see *Table 6*). Women, racialized individuals and immigrants are also less likely to complete apprenticeships than their white, male, Canadian-born peers.

According to the Canadian Apprenticeship Forum, women face a variety of barriers to apprenticeship training, including "a lack of information about the pathway, limited awareness of existing preparation programs, discrimination when trying to find employers and unwelcoming workplaces."[44] When they do complete programs, women are less likely than men to get a job and to be working full time at that job.[45] Moreover, fewer than half of women who enter the skilled trades to do so in the building trades, which are the fields with the greatest potential for growth in the clean economy. For example, women account for fewer than 5% of new registrations as electricians and carpenters.[46]

For racialized individuals, one of the largest barriers to entering apprenticeships is a lack of pre-existing professional networks. Once they've entered the system, racialized apprentices face discriminatory hiring processes and damaging stereotypes. For example, racialized workers may be more likely to be given tasks below their skill level, which limits further professional development.[47]

Immigrants face additional barriers in the skilled trades, including language and other communications barriers as well as limited financial capacity for training.[48] Immigrants who complete apprenticeships report greater difficulty finding initial employment than other groups.[49]

Indigenous people, who are overrepresented in the construction and energy industries, are also overrepresented in the apprenticeship system. However, they have the greatest drop off between apprenticeship enrolment and completion rates. The most commonly cited reason for discontinua-

tion is financial constraints.[50] Indigenous apprentices are also less likely to be employed in their field than non-Indigenous workers with the same qualifications. So while Indigenous people are entering the apprenticeship system in encouraging numbers, the system is failing to ensure equitable outcomes for many of them.

In sum, marginalized people — defined here as women, Indigenous people, racialized people and immigrants — face a variety of unique and overlapping barriers to full participation in the apprenticeship system. As a result, they are excluded from some of the greatest economic opportunities of Canada's shift to a zero-carbon economy.

Canada will see more than one-fifth of its construction workforce retire in the next decade.[51] The labour gap in the construction industry, which is already facing skills shortages, will only widen as new jobs are created in the process of decarbonization. Developing a more diverse skilled workforce is not only desirable from a social justice perspective. It is also necessary to grow the pool of skilled labour to meet demand in the construction, energy, and to a lesser extent the transportation industries. Without an adequate labour force, the Canadian economy will not have the capacity to make necessary, large-scale infrastructure changes.

There are already dozens of programs in place that aim to rectify the representation gap in the skilled trades. These efforts to engage and recruit from historically excluded groups have largely been driven by or developed in collaboration with Canadian labour unions. For example, Canada's Building Trades Unions (CBTU) operates a program called Build Together, which is designed to attract new workers from "non-traditional populations," defined as youth, older workers, women, new Canadians, visible minorities and Indigenous Peoples.[52] The Central Ontario Building Trades' Hammer Heads Program recruits at-risk youth into apprenticeships.[53] The B.C. Centre for Women in the Trades works to retain and advance women working in the skilled trades.[54] Alberta's union-led Trade Winds to Success program provides free pre-apprenticeship training to Indigenous people.[55] Project-specific diversification initiatives have been adopted across the country, such as the International Brotherhood of Electrical Workers' collective agreement for the Muskrat Falls hydro project, which requires hiring from underrepresented groups.[56]

In addition to these union-driven, supply-side programs there is growing momentum around demand-side measures. Community benefits agreements (CBAs) are negotiated between developers and community groups to ensure historically excluded groups are involved in the decision-making

process around new projects and also share in the economic benefits.[57] In Ontario, for example, public infrastructure decisions are legally required to incorporate community benefit considerations, including local job creation, training and apprenticeship opportunities.[58] The B.C. Government has also adopted CBAs to promote "jobs, training and apprenticeships, and more trades opportunities for Indigenous peoples, women and youth."[59]

B.C. has historically played a leadership role in diversifying the building trades. In the 1990s, the Vancouver Island Highway Project was one of the first significant efforts to deliberately integrate women and Indigenous workers into a major construction project in Canada.[60] In that case, the government managed hiring directly and required that all workers be unionized. Although this approach did not become standard practice in B.C or elsewhere, the project established a model for equity in large-scale construction projects that remains relevant today.

In sum, there is historical and growing support from labour unions and governments for greater inclusivity in the skilled trades for historically excluded groups. Many of these initiatives were only adopted in the past few years and it will take some time before their impact is felt, but they are positive steps forward. Nevertheless, the representation gap in the skilled trades is so large for women, racialized individuals and immigrants that more aggressive programs and proactive policies are likely necessary to bridge the gap. Likewise, the poorer career outcomes for Indigenous apprentices and other workers from marginalized groups suggest greater intervention is required. Proactive just transition policies that grow and diversify the skilled trades workforce offer a powerful opportunity to both prepare the labour market for the needs of a decarbonizing Canadian economy while simultaneously redressing historical inequities in the economy.

Conclusion

WHETHER CANADA'S TRANSITION from a high-emitting, fossil-fuel based economy to a zero-carbon economy is a *just* transition is a crucial question for workers across the country. A just transition means, on the one hand, that the costs of phasing out fossil fuels are not borne unfairly by workers and, on the other hand, that the benefits of investments in a cleaner economy are fairly shared with workers. The just transition concept, as understood and advocated by its proponents in the labour and social justice movements, is grounded in the principles of solidarity, social justice and equity.

Canadian governments at the federal and provincial level have begun to adopt reactive just transition policies with the goal of supporting workers and communities in the shift away from coal power. To date, these policies are narrowly targeted at a subset of coal workers with some modest supports for their broader communities. As Canada ramps up its climate ambitions, which will inevitably require the managed decline of most fossil fuel production, similar reactive transition policies may well be implemented for the oil and gas sector.

However, to date, the just transition conversation has failed to address deep structural inequities in the Canadian labour market. The main beneficiaries of just transition policies as they are currently proposed are overwhelmingly white, Canadian-born men earning relatively high incomes. These workers bear the greatest costs of transition, so it is reasonable that they receive the greatest benefits from transition programs. Yet there are many other workers in their communities — who are more likely to be women, immigrants,

Indigenous people or racialized individuals — who are also impacted by climate policies yet receive a disproportionately small share of the benefits of these transition programs.

Moreover, as Canada makes ever more ambitious and important investments in the clean economy, these structural inequities threaten to intensify. Workers in renewable electricity, construction, and to a lesser extent public transit — among the industries slated to see the greatest growth in the coming decades — are also disproportionately white, Canadian-born men. Without changes in the composition of the labour market during this transition, marginalized workers will be excluded from many of the economic benefits of decarbonization.

A truly *just* transition must incorporate these equity considerations from the outset. Without recognizing and addressing the relative marginalization of different kinds of workers in the economy, the zero-carbon economy of the future will be as unequal and unjust as the fossil fuel-based economy of today. To this end we offer the following recommendations to Canada's federal and provincial governments.

Recommendations

Given the importance of ensuring workers are not left behind in the shift to a zero-carbon economy, **Canadian governments at all levels should adopt and formally implement the principles of a just transition where they have not already done so**. Despite encouraging signs from some provinces and the federal government, most jurisdictions have not yet implemented concrete, comprehensive just transition policies.

Where just transition policies have been implemented, such as in the Alberta communities affected by the phaseout of coal-powered electricity generation, the main beneficiaries of those programs tend to be white, Canadian-born men with relatively high incomes and good job security, while more marginalized workers receive no direct support. The solution from a social equity perspective is not to scale back programs for coal workers who are entitled to fair and comprehensive social support. Instead, **Canadian governments should expand just transition policies to apply to all workers in affected communities**. The design of such programs must consider not only the immediate consequences of climate policies, but also the historical inclusion or exclusion of different kinds of people in the economy. These considerations are especially important as Canada moves

beyond the phaseout of coal power to the much more disruptive phaseout of oil and gas production.

As part of their efforts to ensure the long-term economic sustainability of communities affected by climate policies, **Canadian governments should make direct public investments in alternative industries in vulnerable communities while ensuring that benefits flow to marginalized people**. Community benefit agreements should be implemented to ensure that historically excluded groups can participate in the decision-making process around these new projects and share in their benefits. The federally backed geothermal plant being built in Estevan, Saskatchewan is an example of the kind of project that can replace outgoing coal, oil and gas facilities, although it does not include a public commitment to community benefits.[61]

Recognizing the significant underrepresentation of women, racialized individuals and immigrants in the skilled trades, **Canadian governments should substantially increase direct funding to programs and institutions that seek to recruit and train these workers**. Given the unique position of labour unions in the apprenticeship system and the many existing initiatives by labour unions to diversify the skilled trades workforce, these kinds of programs in particular require greater government support. Overall, both union-based programs and educational institutions lack the capacity to train new workers on a large enough scale to meet the demand for skilled tradespeople in a decarbonizing economy.

In general, the need for just transition programs at all highlights the gaps in Canada's network of social supports. To best support workers in all industries affected by the disruptive transition to a zero-carbon economy, **Canadian governments should expand and reinforce employment insurance, the public training and education system, and other social supports**. Shoring up public social programs will help bring down barriers to the participation of marginalized people in all areas of the economy.

Appendix

Definitions of identity categories

The terms "marginalized" and "historically excluded" are used interchangeably in this report to refer collectively to women, Indigenous peoples, racialized individuals and immigrants in Canada. In using a blanket term like "marginalized," we do not equate or aggregate the historical and ongoing experiences of these different groups or suggest that they face the same barriers in the labour market. We use these terms merely to distinguish these workers from the white, Canadian-born men who enjoy a greater degree of socioeconomic privilege.

Our categories of marginalized workers differ slightly from the four "historically disadvantaged" groups covered by the Employment Equity Act, which includes individuals with disabilities and excludes immigrants. We also acknowledge that other barriers to employment equity exist, such as age and sexual orientation, that are not addressed in this report. The principal reason for our focus on women, Indigenous peoples, racialized individuals and immigrants is the availability of comprehensive and consistent data.

The primary data source for this report is the official Census of Population, so our definitions for different identity categories generally follow from Statistics Canada's census definitions.

Women refers to persons who identify as female. We contrast this category with men.

Indigenous refers to persons who meet Statistics Canada's definition of "Aboriginal," which includes all First Nations, Métis and Inuk (Inuit) people;

Registered or Treaty Indians; and/or those who have membership in a First Nation or Indian band. We contrast this category with non-Indigenous persons.

Racialized refers to persons who meet Statistics Canada's definition of "Visible minority," which includes "persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour." We contrast this category with Caucasian or "white" persons.

Immigrant refers to all Canadian residents who are not Canadian citizens by birth. It includes all immigrants and permanent residents regardless of the year of entry to Canada. We contrast this category with non-immigrants or Canadian-born persons.

Coal worker calculations for Table 1

The total number of employees at affected facilities comes from official reports. Not all of these employees are coal workers (e.g., several thermal power plants also burn natural gas), so the total number of workers at risk from the coal phaseout is lower than indicated.

The total number of coal workers in each region is estimated as the sum of NAICS codes 2211 (Electric power generation, transmission and distribution) and 2121 (Coal mining) plus the estimated share of 213 (Support activities for mining, and oil and gas extraction) associated with coal mining.

Due to several confounding factors, the total number of coal workers is only an approximation of the size of the coal workforce affected by the phaseout of coal power. First, the total includes coal workers who are already unemployed. Second, the figure includes workers in the electricity sector who may not be directly employed in coal-fired electricity generation. Only the figures for Brandon, Manitoba and Alberta Division No. 11 (Edmonton) have been adjusted to account roughly for non-coal power workers, since non-coal electricity generation accounts for a significant share of power in those regions. Third, the figure includes workers in metallurgical coal mines, not only thermal coal mines, although metallurgical coal generally does not account for a large share of coal mining in these regions.

Our estimates exclude workers who commute to work at thermal coal facilities from other census divisions, which counterbalances a portion of the preceding effects. Nevertheless, based on independent estimates of the number of workers affected nationally, we likely overestimate the total number of coal workers who will be directly affected by the phaseout in each coal community.

Notes

1 Hadrian Mertins-Kirkwood, *Making decarbonization work for workers: Policies for a just transition to a zero-carbon economy in Canada*, Canadian Centre for Policy Alternatives and Adapting Canadian Work and Workplaces to Respond to Climate Change, 2018, p. 16.

2 "Solidarity and Just Transition Silesia Declaration," United Nations Climate Change Conference, 2018.

3 Environment and Climate Change Canada, "Technical backgrounder: Federal regulations for electricity sector," Government of Canada, last modified December 12, 2018.

4 Hadrian Mertins-Kirkwood and Ian Hussey, "A top-down transition: A critical account of Canada's government-led phase-out of the coal sector," in *Just transition(s): social justice in the shift towards a low-carbon world*, eds. Edouard Morena, Dunja Krause and Dimitris Stevis, Pluto Press, forthcoming 2019.

5 Just Transition Research Collaborative, *Mapping Just Transition(s) to a Low-Carbon World*, United Nations Research Institute for Social Development, 2018, p. 8.

6 Mertins-Kirkwood, *Making decarbonization work for workers*, p. 8.

7 Research in the United States suggests more than 80% of employment loss in the fossil fuel industries due to climate policies can be addressed through normal attrition-by-retirement. See: Robert Pollin and Brian Callacim, "The Economics of Just Transition: A Framework for Supporting Fossil Fuel-Dependent Workers and Communities in the United States," Political Economy Research Institute, October 13, 2016.

8 See, for example: Government of Ontario, *Ontario's Five Year Climate Change Action Plan 2016–2020*, 2016, p. 9. The government of Alberta does not use the phrase "just transition" explicitly, but it has adopted the recommendations of its advisory panel, which does use the phrase. See, for example: Alberta's Climate Leadership Panel, *Climate Leadership Report to Minister*, Government of Alberta, 2015, p. 26.

9 Exceptions are being made for power plants in the province of Nova Scotia, which can continue operating until 2040. Other provinces may yet negotiate equivalency agreements for certain facilities.

10 Government of Canada, "Regulations Amending the Reduction of Carbon Dioxide Emissions from Coal-fired Generation of Electricity Regulations: SOR/2018-263," Canada Gazette, Part II (vol. 152, no. 25), November 30, 2018.

11 Task Force on Just Transition for Canadian Coal Power Workers and Communities, *A Just and Fair Transition: For Canadian coal power workers and communities, Government of Canada*, December 2018, p. vii.

12 Alberta Federation of Labour and Coal Transition Coalition, *Getting it Right: A Just Transition Strategy for Alberta's Coal Workers*, 2017, p. 31.

13 Government of Alberta, "Coal Community Transition Fund," no date: https://www.alberta.ca/coal-community-transition-fund.aspx.

14 Government of Alberta, "Coal Workforce Transition Program: Bridge to Re-employment — Application Guidelines," January 2019.

15 Government of Alberta, "Coal Workforce Transition Program: Bridge to Retirement — Application Guidelines," February 2019.

16 Government of Alberta, "Coal Workforce Transition Program: Relocation Assistance — Application Guidelines," January 2019.

17 Government of Alberta, "Coal Workforce Transition Program: Tuition Voucher — Application Guidelines," February 2019.

18 Department of Finance Canada, *Equality + Growth: A Strong Middle Class*, Government of Canada, February 27, 2018, p. 105.

19 Western Economic Diversification Canada, "Minister Sohi announces funding to support Alberta communities transitioning to a low-carbon economy," Government of Canada, November 16, 2018.

20 Department of Finance Canada, *Investing in the Middle Class: Budget 2019*, Government of Canada, March 19, 2019, p. 89.

21 Government of Alberta, "Study in Alberta: Tuition," no date: http://study.alberta.ca/plan-your-studies/tuition-fees/tuition.

22 See, for example: Alberta Federation of Labour, "Coal Transition Coalition commends province for moving forward, calls for federal government support," November 10, 2017.

23 Authors' calculations using Table 1 in: Brett Doltera and Nicholas Rivers, "The cost of decarbonizing the Canadian electricity system," *Energy Policy* (vol. 113), February 2018.

24 Task Force on Just Transition, *A Just and Fair Transition*, p. 25.

25 Statistics Canada Industry Statistics Division, "Input-Output National Multipliers, 2010," Statistics Canada Catalogue no. 15F0046XDB, February 10, 2014.

26 Unless otherwise noted, all demographic data for workers by industry are derived from the 2016 Census of Population as published in the following Statistics Canada tables: 98-400-X2016292 (workers by geography), 98-400-X2016359 (workers by sex), 98-400-X2016359 (workers by Indigenous status), 98-400-X2016358 (workers by immigrant status), and 98-400-X2016360 (workers by racialized identity).

27 Statistics Canada, "Table 98-400-X2016371," 2016 Census of Population, last modified February 20, 2019.

28 Ricardo Tranjan, *Towards an Inclusive Economy: Syncing EI to the reality of low-wage work*, Canadian Centre for Policy Alternatives, June 2019.

29 Statistics Canada, "Table 14-10-0132-01: Union status by industry," last modified June 14, 2019.

30 Association of Workers' Compensation Boards of Canada, *National Work Injury, Disease and Fatality Statistics 2015-2017*, 2018.

31 Natural Resources Canada, "Minerals and the economy," Government of Canada, last modified September 10, 2018: https://www.nrcan.gc.ca/mining-materials/facts/minerals-economy/20529.

32 Intergovernmental Panel on Climate Change, *Global Warming of 1.5 °C: An IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, World Meteorological Organization and United Nations Environment Programme, October 2018.

33 Environment and Climate Change Canada, "Greenhouse gas and air pollutant emissions projections: 2018," Government of Canada, last modified January 7, 2019: https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/projections-2018.html.

34 By one estimate, the cost of reducing Canadian emissions by 30% below 1990 levels is $2 trillion. See: Len Coad, Robyn Gibbard, Alicia Macdonald and Matthew Stewart, *The Cost of a Cleaner Future: Examining the Economic Impacts of Reducing GHG Emissions*, Conference Board of Canada, September 2017, p. viii.

35 Climate Action Tracker, "Canada," Climate Action Tracker Partners, last updated November

30, 2018: http://climateactiontracker.org/countries/canada.html.

36 Coad et al., *The Cost of a Cleaner Future*, p. viii.

37 OECD Division for Employment Analysis and Policy, *The jobs potential of a shift towards a low-carbon economy: Final report for the European Commission, DG Employment*, Organisation for Economic Co-operation and Development, June 2012.

38 International Labour Organization, *Greening with jobs: World Employment and Social Outlook 2018*, 2018, https://www.ilo.org/weso-greening.

39 Elsa Dominish, Chris Briggs, Sven Teske and Franziska Mey, "Just Transition: Employment Projections for the 2.0 °C and 1.5 °C Scenarios," in *Achieving the Paris Climate Agreement Goals*, ed. Sven Teske, Springer, February 2019.

40 Tyee Bridge and Richard Gilbert, *Jobs for Tomorrow: Canada's Building Trades and Net Zero Emissions*, Columbia Institute, July 2017.

41 Binnu Jeyakumar, *Job growth in clean energy: Employment in Alberta's emerging renewables and energy efficiency sectors*, Pembina Institute, November 2016.

42 Mertins-Kirkwood, *Making decarbonization work for workers*, p. 17.

43 Pollin and Callacim, "The Economics of Just Transition,"

44 Canadian Apprenticeship Forum, *Apprenticeship Analysis: Women and Apprenticeship in Canada*, January 2016, p. 1.

45 Kristyn Frank and Emily Jovic, *National Apprenticeship Survey: Canada Overview Report 2015*, Statistics Canada, March 2017, p. 91.

46 See Table 2 in: Statistics Canada, "Registered apprenticeship training programs, 2016," May 28, 2018.

47 Canadian Apprenticeship Forum, *Creating Diversity and Career Opportunities in the Skilled Trades: Case Studies of Organizations Assisting Visible Minority/Racialized Groups Seeking a Career in the Skilled Trades*, 2010, p. 74.

48 Canadian Apprenticeship Forum, *Regional Roundtable Summary: Integrating Newcomers into Alberta's Apprenticeship System*, September 19, 2017.

49 Frank and Jovic, *National Apprenticeship Survey*, p. 51.

50 *Ibid.*, p. 46.

51 Equipment Journal, "Canada faces construction labour crunch," March 23, 2018.

52 Build Together, "About," Canada's Building Trades Unions, no date: http://buildtogether.ca/about.

53 James St. John, "Welcome to the Hammer Heads Program," Central Ontario Building Trades Hammer Heads, 2018.

54 BC Centre for Women in the Trades, "About the BCCWITT," no date: https://www.bccwitt.ca.

55 Trade Winds to Success Training Society, "Trade Winds — Training Alberta's Indigenous People for Success in the Trades," 2018: https://tradewindstosuccess.ca/about.

56 "Lower Churchill Project Transmission Construction Collective Agreement Between Lower Churchill Transmission Construction Employers' Association Inc. and International Brotherhood of Electrical Workers and IBEW Local Union 1620, Revision 2," April 14, 2014.

57 Andrew Galley, "Community Benefits Agreements," Mowat Centre and Atkinson Foundation, 2015.

58 Infrastructure Ontario, "Community Benefits," no date: https://www.infrastructureontario.ca/Community-Benefits.

59 Government of British Columbia, "Community Benefits Agreement," January 17, 2019.

60 Marjorie Griffin Cohen and Kate Braid, *The road to equity: Training Women and First Nations on the Vancouver Island Highway — A Model for Large-Scale Construction Projects*, Canadian Centre for Policy Alternatives (BC Office), August 2000.

61 Cory Coleman, "Feds providing $25M for geothermal power plant after deepest well in Sask. history drilled," CBC News, January 11, 2019.

CCPA
CANADIAN CENTRE
for POLICY ALTERNATIVES
CENTRE CANADIEN
de POLITIQUES ALTERNATIVES

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