W3 | Work in a Warming World

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What Do We Know? Reviewing the State of Knowledge on Climate, Work and Employment in Canada

Carla Lipsig-Mummé
Professor
Work and Labour Studies
York University, Canada
carlalm@yorku.ca

Abstract

This paper presents the results of the first national 'state of expert knowledge' study of the impact of climate change on work and employment in Canada. Climate change is defined as recent changes in climate attributable to human activity. The *What do we know?* project, led by Lipsig-Mummé with Canadian academics, trade unionists and private sector labour market analysts, explores the state of knowledge about the complex interaction between climate change, response to climate change, and work and employment in Canada, in six economic sectors between 1995 and 2010. The sectors are: construction, energy, forestry, transportation equipment, postal services, and tourism. The paper begins by setting out the three international debates which shape the issue and its research. Second, it discusses its unusual research methodology. Third, the paper summarizes the research findings. Fourth, it identifies holes, silences, and next research questions on the climate/work relationship.

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Introduction

> *Climate change represents an unprecedented challenge…the anticipated job gains and losses are sizeable, and no sector can afford to ignore the consequences…If the questions of employment and human resources are not more closely integrated into climate policies, we may expect them to become a major barrier to the …transformations demanded…*(Dupressoir S. et.al 2007:3).

Canada poses an unusual challenge to the international struggle to slow global warming. In 2009 the Climatico National Policy Assessment Report (www.climaticoanalysis.org) observed that Canadian national policy 'has remained largely dormant on the national scale'. In 2010, the *Globe and Mail,* English Canada's national newspaper, reported that in the previous year the federal government had projected a reduction of 52 megatonnes of carbon emissions by 2010. However 2010's decrease by midyear was just five megatonnes and surprisingly that year's federal budget made no reference to policy response to climate change at all. In the kindest of terms, Canada is the developed world's lead climate skeptic, a spoiler in the world arena of emissions reduction, whose climate policy is reluctant, decentralised and underdeveloped.

The Canadian public continues to rank concern about climate change and the environment at or near the top of its list of urgent priorities, but climate's impact on employment and work has been strangely absent from policy and research. Promises that tens or hundreds of thousands of amorphously defined new 'green jobs' will result from major new investment in alternative energy have not been realised, and definitions of what a green job is proliferate without consistency or operationalisation. Adaptive training for ongoing jobs is not high on policy agendas. As McBride (2008) notes, the danger of climate policy remaining 'employment-blind', and employment policy remaining 'climate-blind', is serious. Indeed, the implementation of policy remains critically vulnerable to politics.

In the light of Canada's strategic paralysis, a group of Canadian researchers—academics, trade unionists, a private sector labour market researcher and an information specialist—designed and received funding for a knowledge synthesis project to assess the state of current knowledge on the climate change/work relationship in Canada[1]. The project was conceived as a first step in engaging the work world more fully in responding to climate change. The research was carried out during 2009 and 2010. *What do we know? The implications of global climate change for Canadian work and employment: regional climate change, regulatory challenges and employment transitions* assesses the scope, breadth, quality and source of current knowledge about the impact of, and response to, climate change in six key Canadian economic sectors--construction, energy, forestry, transportation equipment, postal services, and tourism.

This paper reports on the findings from the '*What do we know*?' project. The first section situates the research problematic at the intersection of three international research

[1] C. Lipsig-Mummé, Team leader. Co-investigators: G. Bickerton; J.Calvert; M.G. Cohen; J. Eaton; J. Holmes; R. Hatfield; E. Perry; J. O'Grady; S.Tufts, and C. Page, Research assistant.

debates. The second section sets out the research design and methodology. The third section summarises the findings. The fourth section focuses on the things we discovered and the things we do *not* know (but need to know) about the complex relationship between climate change and the work world's current stagnant, but potentially adaptive, response to climate change.

Situating the Research

Pivotal to 'the climate challenge' is the engagement of the world of work in transforming its work practices so as to reduce the greenhouse gasses it produces and uses. The *What do we know*? project's research question is:

> *What evaluation can we make of the state of knowledge concerning the complex interaction between climate change and Canadian work and employment? What do we know? What do we need to know?*

What do we know? is situated at the intersection of three contemporary debates.

The first debate emerges in climate science and concerns the relationship between strategies to reduce greenhouse gas emissions and economic activity. It is shaped by the longstanding struggle within climate science about the role that human activity plays in creating climate warming. Serious science has now established that human activity is responsible for climate warming. But the most influential climate syntheses continue to reflect the legacy of struggle as they grapple with economic activity as both creator and reducer of greenhouse gas emissions (cf. Inter-Governmental Panel on Climate Change (IPCC) 4th Assessment Report 2007).

Can economic activity play a role in slowing global warming? For climate scientists, mitigation is 'anthropogenic intervention to reduce the sources…of greenhouse gases' (IPCC 2001). Adaptation is 'adjustment in natural or human systems in response to a new or changing environment…which moderates harm or exploits beneficial opportunities' (IPCC 2001). In 2008 Lynch, a climatologist and contributor to the IPCC, observed: 'In the 1980s 'mitigation and adaptation strategies (were) considered as an integrated package…complement(ing) each other to minimize net costs. But by the early 1990's…support of adaptation implied neglect of mitigation.' Today, serious science asserts that 'neither adaptation nor mitigation alone can avoid all climate change impacts' (IPCC 2007a, Lemmen et.al.2008). Social science concurs:

> 'If adaptation strategies for developed economies focus 'proactively' on transforming economic activities and the organization of work, they have the potential to significantly mitigate the emission of greenhouse gases' (Giddens 2009).

Adaptation and mitigation must therefore be developed in tandem, and their interdependence is essential.

Exploring the ways in which adaptation can work in tandem with mitigation opens the door to a conversation between social science and climate science.

In 2007 The Inter-Governmental Panel on Climate Change's *Synthesis Report* argued that:

> '(T)here is…much evidence of substantial economic potential for the mitigation of global GHG emissions…that could offset the projected growth of global emissions or reduce emissions below current levels' (IPCC 2007).

It added:

> *'*(E)conomic mitigation potential…takes into account social costs and benefits…' (Economic mitigation potential)…is generally greater than market mitigation potential (and) can only be achieved when adequate policies are in place and (implementation) barriers removed' (IPCC 2007).

As central as the world of work is to economic and social life (and therefore to the struggle to slow global warming), international reports draw attention to the longstanding failure of both climate science and environmental policy to consider the work world's potential for decarbonising developed economies. An ILO review of the literature on climate change and work draws attention to the paucity of research as well (Belèn-Sanchez and Poschen 2009). Further, research about the impact on and role of work and employment in containing global warming focuses heavily on poor and developing countries rather than the prosperous ones, and on adaptation rather than mitigation (UNEP 2007).

An exception to the lack of research about climate change/employment in developed countries is the multi-country study on regional and sectoral job movement to 2030 (Dupressoir et.al. 2007). Carried out by a consortium of research think tanks and the European Trade Union Confederation (ETUC) and funded by the European Union (EU) and member governments, it stands out as a model for studying developed economies and predicting job movement in function of differing targets for mitigation. It takes an industry and sector approach to projecting the future of employment in the context of three scenarios of climate warming over 20 years within the EU. It then maps predicted industry-sectoral job movement onto geographic regions. It concludes that by conservative projections there will be modest employment growth but much job churning. And that integration of climate policy, economic development, labour market and social welfare policy is essential.

The second international debate concerns 'bringing the state back in': How can climate policy move beyond its current 'employment-blindness'[2]? What are the regulatory and policy drivers that could lead climate policy to include employment and work in its consideration? The most comprehensive European research warns that *'if the questions of employment and human resources are not more closely integrated into climate policies,*

[2] The phrase was coined by Stephen McBride, McMaster University.

we may expect them to become a major barrier to the…transformations demanded (Dupressoir 2007).

In identifying drivers that integrate employment and environmental policy, distinguishing between *climate impact* on the one hand and *responses to climate impact* on the other is critical. Policy about climate impact maps the situation, and is essentially defensive and restorative. Policies of response to climate impact are essentially transformative, although they might include defensive measures. The most successful national policies of response, such as Germany's, are formulated, funded and implemented primarily with the state rather than the market taking leadership.

Surprisingly, much contemporary international research in economics and political science lumps climate impact and response to climate change together. Projecting the future of employment in a climate-changing world assumes that there will be a need for climate policies. Canada's current national government does not accept this premise.

However the effects of the protracted environmental and economic crises that continue to destabilize global society risk merging with the economic restructuring that will result from climate policy (WTO 2009). Policy measures responding to these challenges have labour market consequences. Unless employment impacts are an explicit part of the climate change decision-making process, other criteria are likely to govern the selection of policy measures, which will not be good either for jobs or the greening of work practices.

Research in the European Union highlights the danger, and responds to it by proposing a double integration—the integration of climate policy and employment policy (the latter including active labour market transitions); and the integration of both with a suite of social welfare policies. Australian research by the Commonwealth Scientific and Industrial Research Organization states robustly:

> Under most scenarios of climate policy to slow global warming, job losses and job movement will be considerable, projected job gains depend on politics, and interventionist government policies are essential (Hatfield-Dodds et.al. 2008).

Effective policy to decarbonise, however, will entail restructuring of work in many sectors. Necessarily responses are predicted to have a long-lasting employment impact (World Trade Organization 2009). Policy measures responding to these challenges already have labour market consequences. Unless the employment impacts are an explicit part of the process of developing climate policy, other criteria are likely to govern the selection of measures, with possible negative impact not only for employment, but also for the political support-base for responses to environmental issues in a time of economic instability.

The third debate asks: but what about the jobs? Since the oil crisis of the early 1970s, the focus in developed economies has been on the *quantity* of jobs rather than their *quality* or the organization of work. This demolished the considerable gains made in the post-World War II decades for industrial citizenship: worker voice in the labour process,

occupational health and safety legislation, the shrinking of demographic and systemic inequalities, the flow-on effects of collective bargaining to society as a whole. Since the mid-1980s, however, the implacable spread of precarious employment and the partial withdrawal of governments from regulating labour-capital relations have eroded unions and voice in the workplace. As the struggle for quantity of jobs eclipsed the struggle for quality of work, the fragmented nature of employment and the vanishing link between identity, work and employment, make it more difficult—much more difficult—for the employed to raise the issues of environmental responsibility in their workplaces. Further, the Canadian labour movement, faced with massive job losses in its membership heartland of manufacturing—a product of de-industrialization, repeated recessions and the lack of a labour-climate policy to transition workers in services, industries and resources—developed the strategy of *Just Transitions* a decade ago. JT has since been taken up internationally. JT entails commitment by government as well as employers to create *and fund* adaptive training or premature retirement for workers affected by the 'greening' of their work and their jobs. To make JT effective requires a central role for the state and two-pronged action by unions—a push for government to enact policy and fund transitions at least at the provincial level, and widespread introduction of JT into collective bargaining. Linking JT to the greening of existing jobs may dynamize the potential of Just Transitions. As yet in Canada, JT remains an idea awaiting realization.

Methodology [3]

> *What evaluation can we make of the state of knowledge concerning the complex interaction between climate change and Canadian work and employment? What do we know? What do we need to know?*

The research was carried out over an 18-month period in 2009-2010. It produced a publicly accessible database of more than 1400 sources which continues to grow, a research report, public information forums and educational materials for labour market actors and their members.[4]

Establishing parameters

The literature on climate change is vast. The literature on work and climate change is relatively small. We sought all documents available on the web concerning the intersection of climate change, work and employment in Canada, in English and French, published between 1995 and the end of 2009. 'From the beginning, our interest went beyond the scholarly literature, to include the research and publications of the social actors in this issue: government, business, and labour' (Perry 2010).

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[3] Data in this section is drawn from Elizabeth Perry's chapter, "Results of a Literature Search Regarding the Impact of Climate Change on Work and Employment: indicators and context", *What Do We Know? What Do We Need to Know? The state of research on work, employment and climate change in Canada*, pp.35-47.

[4] For further detail on the literature search, Elizabeth Perry, op.cit, Appendix 1, p. 43. The database and Report are housed at the Work in a Warming World Programme at York University, at the following address: http://www.workinawarmingworld.yorku.ca/resources/index.html

Locating and organizing data sources

Analysis was limited to documents available on the web for two reasons: to make them easily available to the public via the database for ongoing use; to evaluate the orientations of key institutional actors. Sources were identified and gathered in three stages: first, a search of the academic literature; second, a search for grey literature on the websites of Canadian governments at federal and provincial levels, private enterprise, labour market actors; third, we gathered additional documents identified in the first and second stages of the search.

Analyzing the sources

Grey literature is defined as: **"**Information produced on all levels of government, academics, business and industry in electronic and print formats not controlled by commercial publishing, i.e. where publishing is not the primary activity of the producing body"[5]. The decision to include grey literature as well as conventional scholarly sources also made it possible to construct a broad overview and detailed information about the actions of the institutional actors.

The documents were categorized by their origin and by topic. Bibliographies were constructed for each of site of origin, and for each topic. Six sites of origin were identified: scholarly publications; research organizations; government and para-governmental organizations; labour market actors; advocacy groups; the print media. Documents were also categorized in seven topics: international and policy context, and six sectors: energy, construction, tourism, forestry, transportation equipment, and tourism.

Categorizing sources by origin provided insight into *who* was researching the topic. First, in the established English language disciplinary-based social science journals– management, economics, political science and sociology—there were very few publications on climate change, and almost none on climate change and work. Second, the great majority of socio-economic climate change publications, and climate/work papers, were published in new journals, typically multidisciplinary. Third, research on the social dimensions of climate change is principally carried out outside or on the margins of conventional university structures, in new research centres, think tanks and networks. This explains, in part, the fact that from 1995 to 2010 scholarly journals published only 18.5% of research on the social dimensions of climate change. The rest were published as grey literature. Finally, government agencies provided the largest number of publications, followed by labour market actors, followed by a smaller number of publications by advocacy groups.

We also categorized sources by topic. Seven topics were identified: international and policy context; energy; construction; forestry; postal services; tourism; transportation equipment. The six economic sectors were chosen for their significance to the Canadian economy; diversity of size and work organization; size and composition of labour force;

[5] Cited in Perry op. cit, from Luxembourg, 1997 - Expanded from New York, 2004.

significance of their contribution to GHG emissions; response of actors to date to the impact of climate change. Constructing a bibliography for each topic provided insight into the spread and depth of existing research, holes in the research, and inequalities of research among the six economic sectors studied. The bibliography on the international and policy context included documents of importance internationally and to Canada, as well as Canadian public policy documents.

The 'Context' bibliography included the big-picture and other influential studies produced internationally which influenced Canadian research; and Canadian public policy documents. It provided us with the material to compare the state of Canadian research with US and Australian research, and with research on EU policy and labour force projections as well as on the EU as a whole.

Findings: Sectoral Portraits

The separate but linked bibliographies allowed the development of sectoral portraits of the impact of and response to climate change in six economic sectors.

A common set of questions was designed for all the sectors:

1. What are the characteristics of the sector and its labour force?
2. How much is known about the impact of climate change in the sector? What are the origins of the sources and how much do they tell us?
3. How is climate change likely to change/already changing the organization of work and employment in the sector?
4. What is the policy context in which the sector operates and how important is climate change in shaping the policy context?

Next, we compared and contrasted the six sectors. Third, it became possible to identify obstacles and patterns shared by some sectors. Fourth, the international context literature allowed us to evaluate research on Canada in relation to the international body of literature.

Climate Change and Labour in the Energy Sector [6]

The focus of the literature search for this sector is on the production of energy, rather than its use. The energy sector is a major source of GHG emissions, producing 37% of Canada's total GHG emissions in 2008. Within the sector, fossil fuels continue to dominate, and Canadian oil and gas production continues to expand. However, direct employment remains small: only1.8% of the Canadian work force was employed in the sector in 2009. The labour force itself tends to be younger than the Canadian average, and dominated by white males. In oil and gas, women represent 28% of the labour force, a

[6] Material in this section is summarized from Marjorie Griffin Cohen and John Calvert, "Climate Change and Labour in the Energy Sector'. *What Do We Know? What Do We Need to Know? The state of research on work, employment and climate change in Canada*, pp. 48-79. All quotes are from the chapter unless otherwise indicated.

slight increase over the past decade. It is to be noted that union coverage in the core sectors of oil and gas is 12.3% and declining.

While oil and gas production has been decreasing in other countries, such is not the case in Canada. Instead, production from unconventional sources is expanding, and electricity use is increasing. Both developments are environmentally problematic. Employment growth in oil and gas is projected for the foreseeable future, fueled partly by the need to replace retirements in electricity, and partly by continued employment growth in the tar sands.

Will the growth in employment be growth in green jobs? Difficult to project, for several reasons. First, there is no accepted definition of a green job. Second, Canada is not one of the countries which has encouraged green R&D, linked research to the manufacture of green technologies, facilitated the domestic take up of green technologies, thereby creating a flow-on effect for employment. Third, the labour process in green projects in the energy sector may not be significantly different from labour process in conventional energy jobs. Fourth, green projects tend to overestimate the number of jobs they will create. Many are temporary jobs, and there is rarely any follow-up to monitor the number of green jobs actually created. Finally, while new production in renewable sources is more labour intensive, the sector remains very small, and therefore a minor producer of new jobs.

To conclude, the demand for employment in the energy sector will continue to grow in the foreseeable future, focused in retirement replacements and continued employment growth in unconventional sources. While the demand grows, there is no indication that the way work is carried out in the energy sector will become more 'green'. Or more unionized. Renewable sources are more labour intensive, but they represent a small part of the market, and thus of new job growth. While employment will grow, 'most significant for the growth of green employment is the extent to which future energy policy will be shaped by market-based decisions or by pro-active government decisions that may move Canada in different directions'.

The Forestry Industry [7]

Forestry has historically been one of Canada's leading manufacturing sectors, and its largest net exporter. However the combined effect of major structural change in the industry, downturn in demand since the 'Great Recession' of 2008, the disastrous impact of climate warming on logging, processed wood and pulp and paper, have together triggered a crisis of unemployment, modifications of labour process, and reorganization of the supply chain. In the first half of 2009, British Columbia alone lost approximately 25% of its wood and pulp shipments and its newsprint shipments.

What role does climate change play? Warming is affecting where trees grow, and therefore where forest work takes place. Warming incubates disastrous pests like the pine

[7] Material in this section summarizes J. Holmes, 'The Forestry Industry' in *What Do We Know? What Do We Need to Know? The state of research on work, employment and climate change in Canada*, pp. 148-168. All quotes are from the chapter unless otherwise indicated.

beetle, which destroy forests. Since 2005, over 100,000 jobs have been lost, and most of that loss is permanent. Nor have the several levels of government been forthcoming with help in bailing out the struggling industry. Since forest work and forest communities are dependent on each other, major job loss threatens vulnerable communities.

'Forests and climate warming are intimately connected', says John Holmes. Forests may be carbon sink or carbon source. With 400 million hectares of forest, Canada's forests can absorb about 20 times the annual CO^2 emissions that burning fossil fuels creates. Thus the major role of forests is to determine carbon balance.

There are three ways that climate change in the forest may impact employment. First, climate warming shifts some species of trees northward, and leads to the death of others. This shifts the geographic relationship between extraction and manufacturing. It also may distance workers from their communities. Second, new wood products are emerging, new skills and occupations are coming forward, and the transformation of traditional jobs calls both for adaptive training as well as for employing newly skilled workers. In addition, the pressure to green production practices may well have an impact on skills and training. Yet so far, governments at every level have not provided the industry with look-forward funding. Third, trees are both carbon source and carbon sink. In a cap and trade market, Canada's trees might become more valuable left in the ground, than harvested.

Yet it is difficult to untangle the precise role of climate change in relation to other stressors for the forest industry, and its impact on present and future employment. Forestry has been struggling with a cluster of vulnerabilities that affect production and marketing, including a shift from vertical to horizontal integration. 'Sound management models could go a considerable way to offsetting GHG emissions elsewhere in the economy.' Finally, there is need to know what impact a move towards greener production practices would have on employment, and might have on work practices.

The Impact of Climate Change on Employment and Skills Requirement in the Construction Industry [8]

The construction industry in Canada in 2009 employed 1.2 million people, approximately 7% of the labour force. It is characterized by a preponderance of small and mid-sized businesses, and is heavily, although unevenly, unionized.

The construction sector is responsible for between 30-40% of Canada's GHG emissions, taking into account the life-cycle of buildings. The review looked at the relation between climate change and employment in the construction industry from two perspectives. First, the impact of 'green principles' on skills requirements, both in new training and updating training. Second, the impact of 'green' retrofitting on employment in construction.

[8] Material in this section summarizes J. O'Grady', 'The Impact of Climate Change on Employment and Skills Requirements in the Construction Industry' in *What Do We Know? What Do We Need to Know? The state of research on work, employment and climate change in Canada*, pp. 167-194. All quotes are from the chapter unless otherwise indicated.

The review found, first, that there is little research on how large the task would be to retrofit infrastructure that might be damaged by climate warming. As a result, it is impossible to estimate employment growth to repair or replace infrastructure. Second, the industry and the postsecondary system as well as the professional associations have an excellent track record in adapting training to meet new needs. Third, estimates of the employment impact of implementing green policies cannot be relied upon. Fourth, building rating systems matter, in determining the application of green construction principles to new constructions and to retrofitting. However the influence of rating systems on choice of materials, skills and work processes is not well understood. Fifth, the trades have been slow to include 'green construction' into skills training. Sixth, the lag by some trades in integrating green training into standards is opening the door for 'greener' industries to move outside the established system, and establish their own training schemes. Seventh, for the design professions, green certification has become increasingly important. Finally, the research indicates that adapting construction practices to contribute to mitigation or adaptation calls for a new research agenda.

The Transportation Equipment Industry [9]

> 'There is an extensive scholarly and scientific literature on the links between transportation and GHG emissions and on the various technologies being developed in efforts to reduce emissions from internal combustion engines. Virtually nothing is being written, however, regarding the likely impacts of climate change on future employment and skill requirements in the transportation equipment industry.'

It is important to distinguish between emissions associated with the manufacture of vehicles, and emissions arising from their use. The review focuses on manufacturing.

The auto sector is Canada's most important manufacturing industry. It has accounted for one-third or all manufacturing exports, 10% of manufacturing GDP, and employed over 150,000 workers in the late 1990s. 85% of cars made in Canada however, are exported, mainly to the US, while 80% of cars sold in Canada are built elsewhere.

Like the forestry sector, the transportation equipment sector has been grappling with a comprehensive crisis in recent years. Restructuring ownership and the divisions of labour, auto manufacturers are also moving to reduce energy use and emissions. Climate change is a clear driver for technological change in vehicle design. But the literature shows that the fundamental labour process—the way cars are made—is not likely to change much as auto manufacturing 'greens'. In this, it should be noted, there are similarities between the auto industry and the energy sector.

[9] Material in this section summarizes the chapter by J. Holmes with A. Hracs, 'The Transportation Equipment Industry' in *What Do We Know? What Do We Need to Know? The state of research on work, employment and climate change in Canada*, pp. 127-147. All quotes are from the chapter unless otherwise indicated.

'Efforts to reduce energy...and GHG emissions from vehicle assembly plants has been driven both by economic considerations and criteria attached to government financial aid'.

However the shift to 'just-in-time' production over the past twenty years increases GHG emissions, as parts travel from parts-makers to factory.

What effect will climate change have on employment? In the middle distance, employment is likely to grow modestly, as compliance with government regulations on fuel efficiency and reducing GHGs make the production of each vehicle more labour intensive. 'Responding to climate change will add more content and value…and should create more auto jobs.' There are, however, more systemic and deeply-rooted problems that will threaten employment levels in Canada. As the global auto industry continues restructuring, the interaction of responding to climate change and responding to restructuring, raise a range of challenges and questions. Among them are:

- Will government regulations and longer-term changes in urban planning, lead to a shift away from cars?
- What new skills will be required to work with the new auto power-train technologies?
- How will these new skill requirements relate to the growing integration of mechanical, electrical and software engineering?

Climate Change and Work and Employment in the Canadian Postal and Courier Sector[10]

The postal and courier industry is formally a subset of the transportation sector. Included in the industry are the processing and delivery of letters, admail, delivery of parcels to homes, businesses and public agencies. Federal legislation has given Canada Post exclusive jurisdiction over the postal service: delivery of letters, addressed advertising and periodicals are almost entirely delivered by Canada Post. Beyond letters and periodicals however, the patchwork of large and small companies and the constant restructuring created by stiff market competition, the impact of new technologies and the pressure for carbon reduction, have created a volatile sector.

This analysis focuses on Canada Post and the courier sector, which includes major courier companies, car and bicycle couriers, local messenger and delivery companies. Canada Post dominates postal services. The courier sector is about delivery, and its core is comprised of the biggest companies like United Parcel Service of America, Purolator, Canada Post Corporation, and Federal Express, who have widespread transport networks. 'Their use of technology and economies of scale enable them to effectively compete on

[10] Material in this section summarizes the chapter by G. Bickerton, S. Ryan and M. Gingrich, 'Climate Change and Work and Employment in the Canadian Postal and Courier Sector' in *What Do We Know? What Do We Need to Know? The state of research on work, employment and climate change in Canada,* pp. 108-126. All quotes are from the chapter unless otherwise indicated.

the basis of price and quality of service'[11]. In contrast, the periphery of the courier sector is fragmented, unstable and floridly competitive: it includes same-day local delivery companies and large multi-nationals.

Canada Post is Canada's sixth largest employer. 90% owner of Purolator, together they operate the largest vehicle fleet in Canada. 'The major core companies in the postal sector have been continuously profitable". And their economies of scale and sophisticated sequencing make it possible for them to take on serious reduction of their carbon footprint. The courier sector, on the other hand, is polarized between its core and its periphery. The core of the courier sector, by its economies of scale and its sequencing, is or would be capable of reducing its GHG output. But, as Bickerton, Gingrich and Ryan observe:

> '(F)rom an environmental perspective, the organization of the same day[peripheral] courier segment…(is) a complete disaster…(N)o attempt to use technology to sequence deliveries (in order) to maximize delivery density…(N)umerous drivers…frequently criss-cross cities…'

Canada Post Corporation employed 80,000 people in 2008, an increase of 11% since 1997. The courier sector employed 47,000, an increase of 30% since 1997. The knowledge synthesis predicts that decline in paper products will be 'more than offset' by the growth of e-commerce and package delivery.

What is the carbon footprint of the sector? There is currently no standardized methodology to measure the carbon footprint. However the Universal Postal Union—a UN agency—is developing a standardized methodology to measure greenhouse gas emissions in postal work for all countries. At present, the United Nations Environment Program (UNEP) estimates that that postal services produce .07% of the world's total output of GHGs. Canada Post estimates that it has reduced its emissions by 4% between 2002 and 2008.

In applying existing research to the Canadian carbon footprint in the postal sector, this review focused on the interdependence of the four components of its mail chain: buildings, fleet, delivery process, and sorting processes. It was thus able to simultaneously analyze the political economy of competition in the sector, the changing labour process, the physical environment in which work takes place, and employment trends, asking how each evolved, how the components are related to each other, and how each component is reducing its carbon footprint.

The studies analyzed in the synthesis raise doubts about the goals of Canada Post and other major companies when they engage with carbon reduction. Canada Post has emitted contradictory messages on the importance of environmental responsibility. An excerpt from the 2008 Annual Report reprinted in the Bickerton et.al. chapter, reads:

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[11] Canadian Centre for Policy Alternatives (2005). The Courier Research Project. *Straddling the World of Traditional and Precarious Employment: A case study for the courier industry of Winnipeg.* Winnipeg: Canadian Centre for Policy Alternatives.

> 'Growing environmental concerns pose a threat to our mail business. These concerns could impose changes to the way we do business, and could also bring a high level of attention to Canada Post as a participant in the mail value chain. If we do not manage these concerns, we could be affected in several ways, including decreased volumes (mostly Admail) and requirements to use different transportation solutions. Additionally there may be other indirect adverse effects such as those resulting from damage to our reputation.[12]

Finally, in evaluating the state of research on climate and jobs in the sector, the authors observe:

> 'It is clear that none of the major players…are at all interested in discussing an overall reform in the organization of the industry or even modest regulatory reform as a means of significantly reducing GHG emissions produced by the industry.'

> 'Despite all of this, there is an absence of research on the effect of climate change on jobs in the postal sector. Is the number of jobs changing? Are the types of jobs changing? Is this related to climate change or other factors? What type of training is needed to adapt to new types of jobs?'

Tourism: Climate Change and the Missing Worker: Uneven impact, institutions and response [13]

'Despite an increasingly sophisticated literature on the impact of climate change on tourism employment, 'impacts' are in reality neglected, as work remains an a priori consideration with little nuance'. The limits to knowledge about local variations in climate change and the lack of research on local vulnerabilities, resiliency and local adaptation, make it difficult to create more generalized models of impact and response.

In addition, 'a major barrier to analysis of the impacts of climate change on tourism-related employment is the chaotic conceptualization of what actually constitutes the sector'. The review focuses on transportation, accommodation, food services, and travel services.

The review identifies first order impacts: changes to climate which affect tourism directly. These are, in the main, meteorological, and health-related.

Second order impacts arise from response to climate change. Here, the focus is its impact on the workers. Reduction of air travel CO^2 emissions, reduction of emissions in ground and water transport, and greenwashing, comprise the second order impacts. Third order

[12] Canada Post Corporation (2008). *Making the Connection: Annual Report 2008*. Cited in Bickerton, Ryan, Gingrich.

[13] Material in this sector summarizes S. Tufts' chapter "Tourism, Climate Change, and the Missing Worker: Uneven Impacts, Institutions, Response' in *What Do We Know? What Do We Need to Know? The state of research on work, employment and climate change in Canada*, pp. 80-107. All quotes are from the chapter, unless otherwise indicated.

impacts comprise the broadest political and economic impacts, including economic contraction and political instability.

How is the tourism sector responding to the impact of climate change? The review contrasts a high road and a low road response to climate in relation to employment. The low road is Business As Usual, relying increasingly on worker 'flexibility', intensification of work, and greenwashing. A higher road, however, focuses on collective bargaining to negotiate environmental responsibility and climate change education. It engages state intervention to regulate employer practices and provide both infrastructure and adaptive training for green skills, the job, and the products used at work.

The review also draws attention to an important silence. Tourism-related workers and their organizations have both a positive and a normative role they *can* and *do* play in responding to climate change. Their vulnerability to climate change is great. But their wealth of expert knowledge, grounding in community, and collective organization give them unparalleled strategic resources to shape the impact of climate change: to adapt their workplaces to the effects of climate change, and to contribute to reducing greenhouse gas emissions. Understanding and engaging with the role that workers and their organizations can play in the struggle to slow global warming requires *centering* workers in the research. Given the varied nature of the tourism sector, in-depth qualitative research *bringing the workers back in,* linking mitigation to adaptation practices to changes in labour process, is urgently needed.

What Do We Need to Know? A research agenda

Labour market effects of climate warming fall broadly into two categories—changes in employment patterns across industries and within industries and sectors; and changes in skill requirements. The factors which structure the ways in which a particular industry, sector or subsector responds to climate warming however, emerge from the political economy of the sector.

The principal areas and questions that should guide the setting of the next research agenda include:

1. Research is urgently needed to identify the impact of a move towards a 'greener' economy on employment trends and skills requirements, in industries, sectors and sub-sectors.
2. Can the impacts of climate warming be differentiated from changes in employment due to other political economic transformations?
3. In some sectors (i.e. forestry and tourism), climate warming may bring a shift in the geographic location of work. Can models that have been developed by climate science to predict regional shifts in the location of work, be used to assess the impact of such shifts on geographic patterns of employment? A review of international practices would be useful.

4. Research is needed to provide more precise forecasting of employment trends and specific skills requirements, both in relation to climate warming and linking climate warming to broader changes in sectors.
5. How important is the lag in incorporating 'green' skills into training standards?
6. How different are the jobs needed in key 'greening' sectors such as renewable energy from the jobs now required in traditional energy sectors?
7. What is the spectrum of actual response to the impact of climate warming in the workplace, among large, medium and small business in Canada? Among trade unions? Among governments at all levels? What role does the introduction of new technology play?
8. Green skills are playing an increasingly important role in occupations and professions related to construction. What impact does this have on the bodies that regulate professional practice?
9. There is need to identify international and national best practice: in government action to facilitate fast and affordable sectoral greening; and in the introduction of 'green' skills requirements.
10. Research is needed to identify provincially and nationally the organizations and resources that will mobilize community and workforce actors to develop and implement green work practices and training.

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