

Climate Change and the Canadian Energy Sector

Implications for Labour and Trade Unions

John Calvert **and**
Marjorie Griffin Cohen





CCPA

CANADIAN CENTRE
for POLICY ALTERNATIVES
CENTRE CANADIEN
de POLITIQUES ALTERNATIVES

ISBN 978-1-926888-70-5

This report is available free of charge from the CCPA website at www.policyalternatives.ca. Printed copies may be ordered through the National Office for a \$10 fee.

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, progressive organizations, policy makers, journalists and others. Visit our website at www.policyalternatives.ca or call 613-563-1341 for more information.



ABOUT THE AUTHORS

John Calvert is an Associate Professor who teaches public policy in the Faculty of Health Sciences at Simon Fraser University. His academic work has focused on a variety of public policy issues including energy, labour and international trade. He is the author of a number of books on the Canadian economy, the most recent of which is *Liquid Gold: Energy Privatization in British Columbia*. He was formerly a researcher with the Canadian Union of Public Employees.

Marjorie Griffin Cohen is an economist who is a professor of Political Science and Gender, Sexuality and Women's Studies at Simon Fraser University. She has written in the areas of public policy and economics with special emphasis on issues concerning electricity and energy deregulation, labour, women, international trade agreements, and the Canadian economy. Her most recent book is *Public Policy for Women*. Professor Cohen has served on several boards and commissions in British Columbia including the Board of Directors of B.C. Hydro and the Board of Directors of B.C. Power Exchange. She was also on the Board of Directors of NewGrade Energy in Saskatchewan.

ACKNOWLEDGEMENTS

The authors appreciate the financial support received for this project through a Social Sciences and Humanities Research Council Community-University Research Alliance grant (SSHRC-CURA) for the Work in a Warming World (W3) research initiative. W3 is a five-year research project to address the challenge of climate change for Canadian employment and work carried out under the principle direction of Carla Lipsig-Mumme at York University.

The authors would also like to thank Heather Whiteside and Kaylin Woods for their research assistance on this project.

5	Summary
9	Introduction
11	Canada's Energy Production Sector
15	The Policy Context
19	Current Employment in the Energy Sector
23	Employment Trends in Oil and Gas Production
27	Future Employment Growth in Oil and Gas
30	Employment Trends in Electricity
35	Labour Needs in Renewable Sectors
	Wind
	Solar
	Biomass
	Other Renewables
41	The Role of Organized Labour in the Energy Sector
43	Trade Unions in Oil and Gas
53	Unions in the Electricity Sector
57	Unions, Energy Policy and Global Warming
65	Conclusion
67	Bibliography
74	Appendix 1
75	Appendix 2
76	Notes

Summary

THE ENERGY SECTOR is promoted by many as an area where a ‘win-win’ situation exists for labour and climate change mitigation policy. The prevailing view is that many new jobs will be created as the economy shifts from dirty energy production to clean, renewable energy.

The authors of this study find the claims exaggerated. They show that Canadian energy policy is explicitly driven by private market-based decisions, rather than careful planning by government to ensure both good environmental and labour outcomes. To the extent that there is public planning, it is focused on delivering outcomes that the energy industry wants, rather than taking into account long-term climate change improvements. This has implications both for the greening of the energy sector, and the types of jobs that are being created.

Rather than public policy in Canada focusing on the planning and training of a ‘green’ workforce, it reinforces reliance on traditional energy employment.

The findings indicate that Canada’s employment growth in the oil and gas sector, despite the ‘green’ washing that occurs, for the most part, reflects an increase in non-conventional types of fossil fuel production (tar sands, shale and tight gas). These extraction methods tend to be environmentally even more problematic than conventional oil and gas production. The resulting jobs are similar to those that have been created in the past. New production in renewable industries such as wind and solar is more labour-intensive than in existing electricity production, but still constitutes a very

small proportion of the market so far. While these industries are likely to grow considerably by 2020, their job creation potential is relatively small.

The paper includes a detailed discussion of employment trends in the energy sector by gender, age, types of occupations, and level of trade union membership. It also provides considerable information about future labour needs in the renewable sectors. In virtually all areas of energy development, there are skills shortages and the need for additional training. These shortages cover a wide range of different occupations, from engineers and architects to skilled trades, equipment operators, technicians and even construction labourers. Skills shortages also vary, regionally and by energy sector. Most of the shortages are for jobs in conventional energy production. However, the renewable sector is also experiencing significant shortages of qualified personnel.

The kinds of jobs needed in the renewable energy sector are not markedly different from those required in the major energy sectors. While the labour force of the energy sector has traditionally been largely male from within Canada, labour shortages may force changes here. Job creation in the electricity sector through green projects is characterized by small numbers of permanent jobs, but under more unfavourable working conditions than existed with electricity generation in the public sector. This is primarily because most new 'green' electricity projects are being built by the private sector, even though they are funded by public utilities. Almost all of the jobs created are short-term construction jobs, usually through non-union projects.

The authors also examine the role of organized labour in advancing green jobs in the energy sector. Trade unions have developed a number of concrete proposals, which they define as a 'just transition' strategy. Their goal is both to expand green employment and to ensure that these new jobs are decent jobs. However, neither federal, nor provincial governments treat trade unions as significant players in the policy process. This is a reflection of the failure of Canadian governments to establish an industrial policy that incorporates a major green employment component. To the extent that unions have a voice in shaping policy it is largely restricted to a relatively narrow area dealing with training and other aspects of workforce development. While this is not insignificant, governments are ignoring the views, experiences and objectives of trade unions in formulating their overall energy policies.

The paper argues that we need a fundamental rethinking of where Canada is going in its energy policy. The country needs a comprehensive strategy that would base its priorities on the urgent need to address global warming.

The strategy should include a much stronger government role in shaping Canada's energy future. It should also include a larger role for industrial policy and a comprehensive training and employment program. Trade unions, as well as environmentalists and civil society have much to contribute. They need to be included in the development of a more environmentally responsible approach to addressing climate change, one that does not rely simply on furthering the individual market-based decisions of the corporate sector.

Introduction

GLOBAL WARMING (OR climate change) will be Canada's most important environmental, economic, and public policy challenge in the coming years. A growing body of research is interested in the various ways dealing with climate change will affect Canadians. The possible impact on labour is also gaining attention in anticipation of a shift from a carbon intensive to a different kind of economy (UBC 2009). These changes potentially could have both contractive and expansive effects (Hildebrand et al 2009). The contractive effects relate to the ways that actions taken to reduce carbon use could result in lower economic activity and, therefore higher unemployment. The expansive effects relate to new industries and jobs that may arise as a result of abatement or mitigation policies. Of particular interest is how new forms of work could lessen the negative impacts on the economy if there is a switch to greater use of renewable resources in the energy sector (Marshall 2002).

The purpose of this research is to examine what is known about the impact of climate change on labour in one sector of the Canadian economy – energy production. This sector is significant for two main reasons: the production of energy is a major source of greenhouse gas emissions in Canada, and public policy in various jurisdictions is beginning to focus on the ways that some energy production, mainly electricity, could become more reliant on renewable resources (or 'green' energy).

To explore this issue, we first examine some of the basic characteristics of the energy sector itself, including the major production trends in its various components – oil, gas, electricity and coal production – to understand

output levels projected for the near future. Second, we analyze the policy context in which Canada's energy future is being determined and the role governments play and could play in determining that future. Most significant for 'green' employment in the industry is the extent the future will be shaped by market based decisions or by pro-active government decisions that may move Canada in different directions.

Third, we examine what has been happening to the energy sector workforce to understand where people are currently employed and how this employment has changed over time. Included in this will be an examination of the characteristics of the workforce in terms of gender, age and other demographic characteristics, and the extent that the labour force is represented by trade unions. Our fourth objective is to understand how climate change initiatives are likely to change the nature of work in the industry and the characteristics of the workforce. Included in this discussion will be an analysis of the role of trade unions in the energy sector and how climate change initiatives may affect their ability to protect workers in the future.

Canada's Energy Production Sector

CANADA'S ENERGY PRODUCTION sector includes a broad range of different energy sources, technologies, facilities and employment patterns.² The principal sources of energy are: oil, natural gas, coal, nuclear power, large hydro, and various renewable sources such as wind, run of river hydro, solar, biomass and geothermal. Despite the considerable attention governments have given to expanding low GHG sources of energy, in reality fossil fuels such as oil, natural gas and coal continue to dominate energy production. Also, new investments are occurring in the further exploitation of fossil fuels, particularly the expansion of the tar sands³, unconventional gas, and offshore oil and natural gas.

Energy production is a major source of GHG emissions in Canada, accounting for 274.5 megatonnes of GHG emissions in 2008, an increase of slightly over 40% from the 196.7 megatonnes generated in 1990. In 2008, the energy production sector contributed 37.4% to Canada's total GHG emissions, an increase from 35.6% in 1990. Currently the oil and gas sector contributes over 21% of all GHG emissions and the electricity sector over 16% (Canadian Energy Research Institute (CERI) 2009, p. vii).⁴

While conventional oil output declined in recent years from its peak in 1973, output from the tar sands has been expanding rapidly. It now constitutes more than half of Canada's oil production. The tar sands' share of total oil production is projected to increase much more in the coming years due

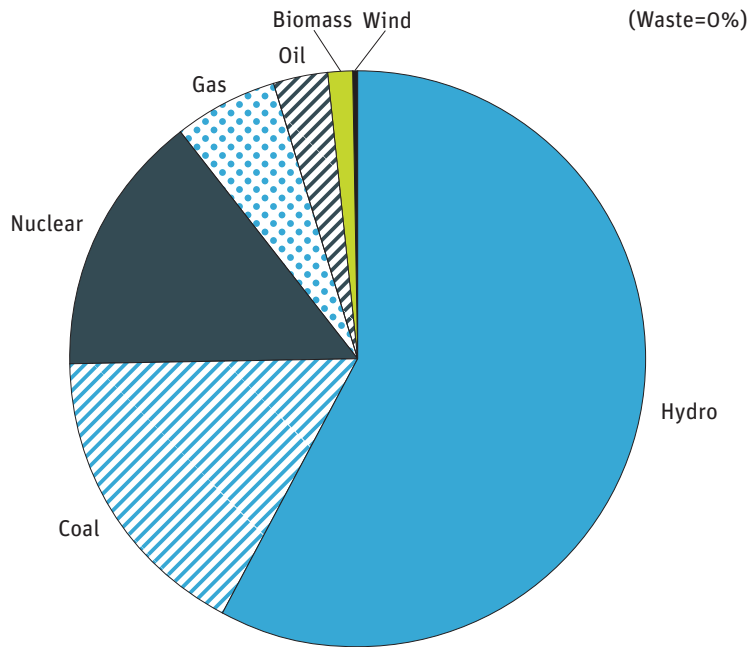
to major new investments planned by industry to exploit an estimated 173 billion barrels of bitumen. One recent study estimates that during the period from 2009 to 2025, total investment in the oil sands alone will amount to \$373 billion (CERI 2009, p. vii). The National Energy Board (NEB) expects the tar sands to constitute three-quarters of the supply by 2020. Both shale and tight gas are similarly expected to increase significantly and account for two-thirds of all gas production by 2020, compared with one-third presently (NEB 2009).

The large scale investments in oil and gas create relatively few jobs compared to other sectors of the economy. Employment impacts tend to be concentrated in the planning, exploration, development and construction of energy projects and related infrastructure, as well as in the transportation requirements associated with building and servicing these projects. These jobs are mostly short term in nature (Canadian Energy and Paperworkers Union (CEP) 2009; Newcomb 2004). Long term employment in energy construction is contingent on continuing expansion of energy projects (Garner Pinfold Consulting 2008). Manufacturing linkages for materials and equipment, as well as related administrative and technical services, do provide some additional employment, particularly in Ontario and Quebec (Canadian Association of Petroleum Producers 2009). But imports also meet a significant share of the demand for manufactured goods needed in the energy sector.

Like production of oil and gas, electricity production shows no signs of abatement and has increased significantly since 1993, with minor downturns primarily reflecting fluctuations in economic activity.⁵ The major structural changes in this sector relate to the shift away from coal for electrical generation, which has affected employment associated with coal production, and the general change in the electricity market itself, as it moves away from a predominately government owned utilities model, where increased production and distribution is planned to meet growing needs, toward a more market-oriented model of production.⁶ Two factors have contributed to the changes in the industry: one was a response to pressures to adopt the U.S. move toward a more market-oriented approach, and the other was pressure from private power producers to have the ability to compete in the market (ESC, p. 25; CEA 2004, p. 12).

Also like oil and gas, Canada's electricity production is capital intensive, creating relatively few permanent jobs compared with other sectors of the Canadian economy. Total employment was 104,000 workers (Statistics Canada 2007, table 7.1). Canada's utilities (excluding industrial self generation output) produced 575 terawatt hours (TWh) of energy in 2009 (Statis-

FIGURE 1 Total Electricity Production in Canada By Fuel Type



Source Electricity Sector Council 2008. See Table 1 in the Appendix for actual data.
Note Chart includes both utility and non-utility generation.

tics Canada 2009). Electricity production is dominated by large hydro (58%) with coal (17%), nuclear (15%) and natural gas (6%) playing lesser, but still significant, roles in some provinces. Despite the increasing focus on new sources of 'green' energy, large hydro remains the predominant source of renewable electricity and renewable energy in Canada (See Appendix I for figures). Some consider nuclear energy 'green' energy and this may well play an increasing role in Canada in the future.⁷ Nuclear generation accounts for 14.6% of Canada's electricity generation with the greatest concentration in Ontario, where it provides 51% of the province's power needs. In addition to Ontario nuclear power is also produced in Quebec and New Brunswick. According to Industry Canada, the nuclear generation industry employs about 21,000 people directly and 10,000 indirectly. The multiplier effect from direct and indirect work in the nuclear industry is about 40,000 jobs (www.ic.gc.ca/eic/site/mse-epe.nsf/eng/home).

Proposals for expanding the share of renewable energy sources in Canada's energy production mix tend to focus primarily on further greening the electricity sector through the construction of new hydro, wind, solar, tidal,

biomass and geothermal generating projects. So far, new renewable electricity (as opposed to existing large hydro) is still a relatively small contributor to overall energy supplies. Wind energy, the fastest growing and largest part of the renewable sector, still accounts for less than 1% of electricity output. Despite the attention given to the need to expand the role of new renewables in Canada's energy mix, they are unlikely to make a major impact in replacing fossil fuels or nuclear generation the near future, however desirable this objective may be in reducing GHG emissions.

At present, renewable energy projects tend to be relatively more expensive per unit of energy produced compared with coal, oil and natural gas. Part of the reason is that they are also more labour intensive both to construct and, in some cases, such as biofuels, to maintain and operate (Kammen et al 2006; Blue/Green Alliance 2009; U.S. Dept. Energy 2005, p. 12). They are normally much smaller in size, reducing opportunities to benefit from economies of scale. While from an employment perspective this is beneficial, from the perspective of cost, it constitutes a major barrier to their expansion (Calvert 2007 pp. 91–93). Consequently, governments wishing to expand green energy production have had to provide substantial subsidies, either by paying high prices for new renewable energy or by providing tax breaks and other financial incentives to energy investors.

The Policy Context

CANADA'S ABILITY TO meet the challenges arising from climate change and, consequently, the nature of the labour force demands and characteristics in the energy sector will depend, in part, on the kinds of policies that federal and provincial governments follow in the coming years. The current federal government, along with most provinces, has adopted the view that the role of government is essentially one of supporting market based, private sector solutions both to energy development and to Canada's response to climate change. The Federal Government has been explicit about its commitment to the energy sector's "market orientation," which it believes will provide the most efficient guide to meeting Canada's future energy needs. An example of the Federal Government's policy approach is explained on the Natural Resources Canada web site.

Canada's energy policy is guided by a series of principles, agreements and accords. The main principles of our energy policy are:

- A market orientation: Markets are the most efficient means of determining supply, demand, prices and trade while ensuring an efficient, competitive and innovative energy system that is responsive to Canada's energy needs.
- Respect for jurisdictional authority and the role of the provinces: Provincial governments are the direct managers of most of Canada's resour-

ces and have responsibilities for resource management within their borders (Natural Resources Canada, nd).⁸

In relying on market forces and existing institutional and treaty arrangements, the federal government seems to assume that it does not need to carry out long range planning or adopt an activist policy agenda that would take Canada in a direction different from that which market forces would otherwise dictate. The federal government seems prepared to intervene in some cases, but primarily through the support of market based policy, while minimizing direct regulation of the energy market. The apparent approach is that national leadership will not be required to plan and shape how Canada will 'green' its energy sector. The Constitutional role of provinces/territories as resource owners reinforces the belief that national public planning should be limited to supporting private initiatives. This has led to a patchwork quilt of uncoordinated policies and a continuing reliance on the exploitation and export of fossil fuel (Doern & Gattinger 2003; Dwivedi, Kyba, Stoett, Tiessen 2001).

This market-oriented method also means a continuation of the very substantial fossil fuel subsidies currently in place (Warnock 2006).⁹ The tax and royalty regimes of both levels of government have been shaped by the goal of expediting the exploitation of Canada's fossil fuel resources and, in recent years, a commitment to continued private ownership of the resource.¹⁰ Industry payments to governments are low by international standards, while environmental regulations are widely criticized as being far too industry friendly.¹¹ While the long term costs of viewing the environment largely as an 'externality' are not easy to calculate, in provinces such as Alberta they are likely to be very significant (Clarke 2008; McCullum nd.).

Reliance on market forces has also meant eschewing the development of an explicit industrial strategy that would move the energy sector towards more labour intensive, green jobs. In a number of European countries such as Denmark and Germany – and, to a lesser degree in parts of the U.S. – national and state/provincial governments have consciously attempted to link their efforts to build a green energy sector with the development of new manufacturing and related energy service industries (Lehr et al 2008; Boettcher et al 2009; Ayee et al 2009; Engel and Kammen 2009). They believe that employment and skills development in these sectors can make a contribution equal to, or in some cases greater than, the creation of jobs in the construction and installation of energy generation facilities. These govern-

ments view subsidization of green energy initiatives as a springboard to the development of a world class renewable manufacturing sector.

International experience indicates that most manufacturing in the renewable energy sector occurs in countries where there is considerable government support (Germany, U.S. (led by states), Spain, India, and China) and where this support is part of a larger industrial strategy. Unfortunately, growing reliance on private sector development in Canada for green energy in all renewable energy projects reduces government leverage to encourage the domestic production of inputs.

To the extent that public pressure has encouraged governments to pursue 'green' energy in Canada, provincial governments have generally taken the lead, although the federal government has provided some limited subsidies and tax breaks to stimulate private investment in this sector.¹² Where provinces, such as BC, have encouraged expansion of private 'green energy' projects, they have normally chosen not to impose local, or national, industrial offset requirements as a condition of public support (*BC Energy Plans, 2002, 2007* and *BC Clean Energy Act, 2010*). Rather, using the excuse of commitments to various trade agreements (e.g., the Agreement on Internal Trade, TILMA and other provincial trade agreements), they ignore this type of public policy tool, leaving corporations free to source components and services in national and international markets.

Ontario is one province that has an energy program that requires local content for participating in the feed-in-tariff (FIT) programs, which include substantial subsidies to green energy providers. The energy program requires that up to 60% of the inputs of all green energy projects be manufactured in the province after 2011. This strategy is specifically designed to create local jobs in manufacturing. The project was successful in attracting foreign investors to manufacture in the province with the largest deal going to Korean based Samsung which received a \$7 billion contract to locate manufacturing plants within the province. In September 2010 Japan initiated dispute settlement proceedings against Canada at the World Trade Organization (WTO) with the complaint that Ontario's green energy plan unfairly pressures its producers of clean power to buy hardware from local manufactures (*Bridges Trade BioRes, vol 10, no 17*). Japan argues that the local content requirement for green energy producers to qualify for a generous guaranteed purchase price violates WTO national agreement obligations, breaches the Agreement on Trade-Related Investment Measures, and constitutes a prohibited subsidy. Both the EU and the U.S. have joined Japan in this complaint against Canada. The U.S. notes that it is Canada's primary

source of imports for renewable energy, and has considerable concerns about subsidies for local content (Bridges Weekly, vol 14, no 34).

A win for Japan at the WTO on this issue would very effectively obstruct the development of hardware manufacturing for solar and wind energy projects in Canada. However, local content requirements are increasingly seen in green energy policies of governments throughout the world, primarily because of the extensive subsidies governments are providing the private sector to develop this energy. A similar case filed by the United Steelworkers union against China for unfairly subsidizing its domestic renewables market underlies the basic issues: the extent that domestic content is considered crucial to energy security and future economic growth (Bradsher 2010).

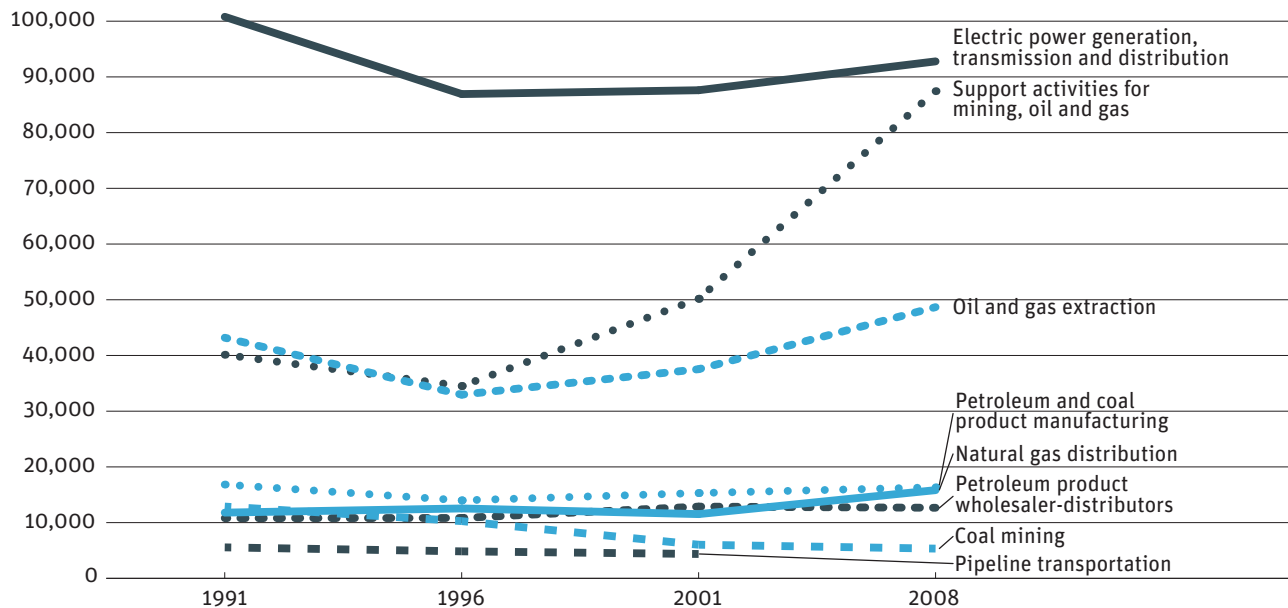
Current Employment in the Energy Sector

WHILE THE ENERGY production sector has a major impact on Canada's economy, direct employment in the sector provides only a small share of the nation's jobs. Total direct employment is slightly under 300,000 workers, or roughly 1.8% of Canada's 17 million employed workforce in 2009.¹³

Employment in the energy sector in Canada has increased steadily in the 21st century and all projections by the government and the industries indicate that it will continue to increase into the future. However, there are fluctuations in the long term upward trend. For example, during the 1990s employment in the largest sectors, electricity, oil and gas, and services dropped dramatically. The electricity sector went from employing 112,600 workers in 1993 to 85,900 in 2000 (Electricity Sector Council (ESC) 2008). Oil and gas extraction employed about 32,200 workers in 1991, but dropped about 10,000 workers by 1996 (Statistics Canada, Employment (SEPH), Table 281-0024-4,14).

Employment in the electricity and oil and gas industries, which account for over half of all energy sector jobs, has almost completely recovered from the economic downturns of the 1990s. The oil and gas sectors are now growing more rapidly than the electricity sector, which still has employment levels slightly below what it experienced in the early 1990s. Support services have expanded dramatically and this area is now the second largest source of employment in the energy sector, after electricity.

FIGURE 2 Employment in the Canadian Energy Sector



Note Pipeline data is not available past 2001 to meet the confidentiality requirements of the Statistics Act.

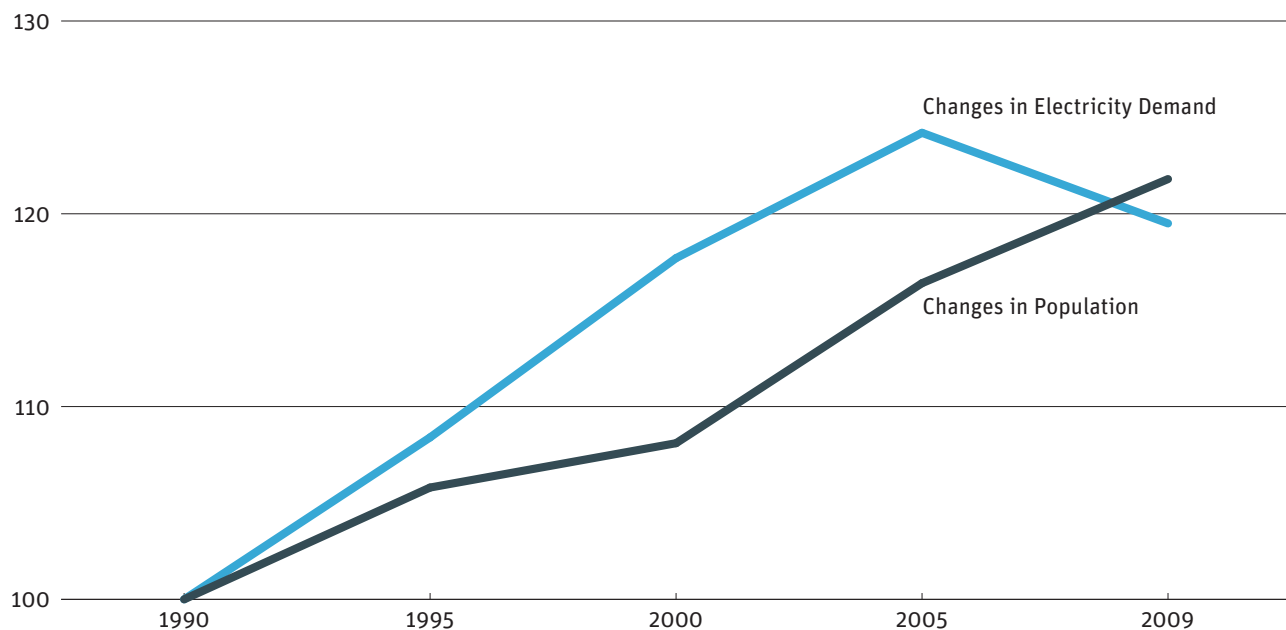
Source Calculated from Statistics Canada, Table 281-00244-Employment (SEPH). See Table 2 in the Appendix for detailed numbers employed in each sector.

As can be seen in *Figure 2*, of the entire energy sector only employment in coal mining has declined steadily since 1991 and now employs about half of what it did in 1991.¹⁴ This specifically relates to changes to shift from coal-fired electricity production to cleaner forms of energy, much of which has been driven by public policy such as the Ontario government's decision to phase out its coal-fired power stations (Ontario, *Green Energy and Green Economy Act*, 2009).

Canada's employment growth in the oil and gas sector, for the most part, reflects an increase in non-conventional types of fossil fuel production. These methods tend to be environmentally even more problematic than conventional oil and gas production due, in part, to the significant volumes of natural gas required to create steam for bitumen extraction, and the need to clear large areas for surface mining and tailings ponds.

Because of the increased production of non-conventional fossil fuels, employment trends in Canada are diverging from those in the U.S. and Europe. Unlike these jurisdictions, Canada is not experiencing overall reductions in employment in the fossil fuel (or dirty) energy sectors. In Europe

FIGURE 3 Changes in Canadian Population and Electricity Demand (Index: 1990=100)



Source Calculated from Statistics Canada, *Energy Statistics Handbook 2011*, Fourth Quarter 2010, p. 32

and the U.S., job losses in fossil fuel industries reflect a decline in resource availability, rather than environmental regulations or conservation (Kammen et al 2006). Like the EU and the U.S., Canada is experiencing a decline in conventional oil while conventional gas production remains flat (PLMI 2009). The major difference in Canada is that it has large deposits of unconventional forms of fossil fuels, such as shale and tight gas that are beginning to be developed.¹⁵ Canada is also planning to increase extraction of oil from the tar sands, including proposals for major new pipelines to export this oil. In 2009, synthetic and bitumen production (77,266 thousand cubic metres) overtook conventional oil production (70,615 thousand cubic metres) for the first time in Canada's history (CAPP 2010, table 3.1b and 3.3a).¹⁶ These new oil sources indicate that fossil fuel resource availability will continue to generate expanded labour demands in these areas.

The major drivers for employment in the electricity sector in the future will be in new infrastructure to meet growing demand (both for domestic use and exports), and replacement needs (Electricity Sector Council (ESC) 2008, p. 39; CEA 2004). Given the age of much of Canada's electricity infrastructure, considerable investment will be required to replace existing trans-

mission lines, turbine generators and aging power plants. Although Canada is a major consumer of electricity and uses more on a per person basis (at 17,307 KWh) than does the U.S. (at 13,640 KWh), according to the ESC, per capita electricity consumption is not expected to decrease in the future (ESC 2008, p. 41).¹⁷ As can be seen in *Figure 3*, electricity consumption is rising faster than population growth in Canada.¹⁸

According to a 2006 Natural Resources Canada (NRC) forecast, electricity consumption is projected to increase by 1.3% annually until 2020 with most growth occurring in the commercial market (NRC 2006). Increases in exports are likely to occur as well, since provinces like Quebec, BC and Manitoba rely heavily on electricity exports for provincial income and have initiated 'clean energy' plans with substantial export components.

Employment Trends in Oil and Gas Production

THE OIL AND gas sector constitutes four major types of activities and 37 core occupations. The four main types of activities are exploration and production (E&P); the oil sands; services; and pipelines.

E&P includes exploration and production activities associated with both conventional oil and gas reserves and unconventional reserves, such as coal-bed methane, tight gas and shale gas and oil. 40% of the oil and gas sector workforce is employed in E&P.

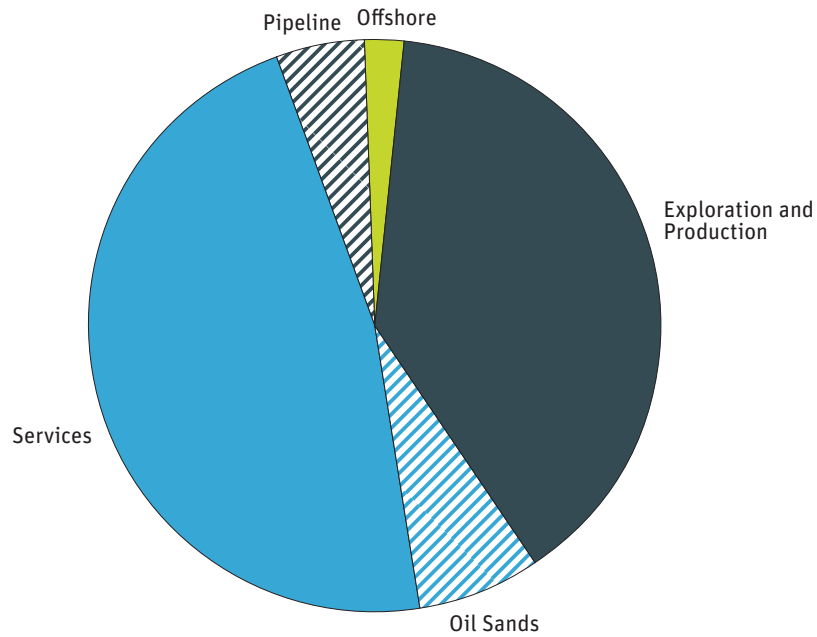
The oil sands include producer-operated extraction and the upgrading of bitumen and employs about 7% of the oil and gas sector's workforce.

Services include contracted exploration, extraction and production services to the conventional E&P and oil sands sectors. More specifically, these services include well services, oilfield construction, production services, maintenance and turnaround, transportation services, drilling, and geophysical services. Workers in services account for about 50% of the oil and gas labour force.

Pipelines refer to mainline transmission and employment in pipeline work and accounts for about 3% of the industry's labour force.

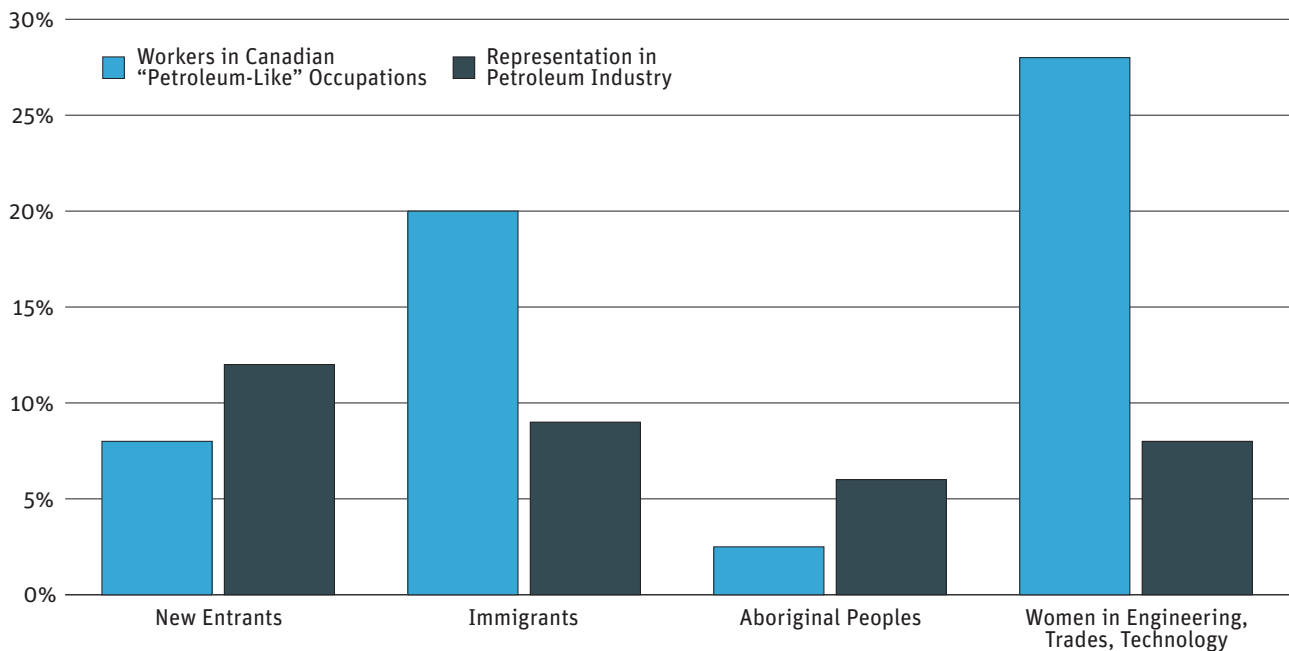
The historical hiring practices in the oil and gas sector resulted in a largely white, male labour force, with an under-representation of immigrants and women. The increased demand for labour associated with expanded production in the future, coupled with an aging workforce and natural mor-

FIGURE 4 Petroleum Sector Employment, 2009



Source: Petroleum Human Resources Council, *The Decade Ahead: Labour Market Projections & Analysis for Canada's Oil and Gas Industry to 2020* (Ottawa: March 2010)

FIGURE 5 Petroleum Industry, Share of Labour Supply Census 2006



Source: PLMI 2009 p. 34

TABLE 1 Characteristics of Oil and Gas Labour Force

	All Industries		Oil and Gas Related	
	1997	2006	1997	2006
Employed	13,706.00	16,484.30	244.7	297.6
Self-Employed	2,349.40	2,498.00	28.6	34.9
Sex				
Men	54.5	52.9	74.6	71.8
Women	45.5	47.1	25.4	28.2
Age				
15 to 34	40.1	36.8	48.8	44.8
35 to 54	50.1	49.1	45.4	46
55+	9.7	14.1	5.8	9.3
Union Coverage*	33.7	31.7	13.8	12.3
Work Schedule				
Full-time	80.9	82	85.5	88.3
Part-time	19.1	18	14.4	11.7
Avg. \$/hr	12.92	16.73	14.8	20.64

* Excludes self-employed.

Source Williams 2007, Perspectives on Labour and Income, Vol 8, No. 5., Table 2.

tality rates (replacement demand) is forcing the industry to consider workers that had previously had low participation rates in this industry (PLMI 2010; Alberta, Employment and Immigration 2007; Jothan & Kunin 2007). According to 2006 Census figures women account for about 28% of those working in engineering, trades, and technology in the Canadian labour force, but they accounted for only about 8% of these positions in the petroleum industry. Immigrants fare slightly better, accounting for 20% of the comparable labour force, and 9% of the workers in the petroleum industry. New entrants to the labour force and Aboriginal workers represent a slightly larger share of the petroleum industry's labour force than they represent in the comparable total labour force.

Altogether women account for 28% of the employees in the oil and gas sector, an increase from 25% in 1997. Generally the oil and gas labour force is characterized as being younger than the rest of the Canadian labour force, with a greater percentage of workers under 35 than in other sectors of the economy.

As can be seen from *Table 1* union coverage in the entire oil and gas sector (including all related activities) is low and is declining. Where 32% of

the workers in Canada were unionized in 2006, only 12.3% of those in the oil and gas sector were in trade unions. Most of these unionized workers are in manufacturing and gas distribution. In the manufacturing sector about 32% of the labour force is unionized, a figure that is relatively unchanged since 1997 and in gas distribution about 45% is unionized, down from 50% in 1997. The level of unionization is very low in extraction (9.2%), and support industries (10.2%), but both have experienced about a 2% growth in unionization over 10 years.¹⁹

There is almost no unionization of gas station workers (4.8%) even though this sector of the industry is a major employer. Of the 74,000 gas station workers, 35% had part time jobs in 2006. Almost 60% were under the age of 35 and average hourly wage rates were only \$8.61. A much higher proportion (42%) were women as well. Employment in this sector has declined slightly in recent years as a result of rationalization of the number of service stations and a shift to greater customer self-service (Williams 2007, Table 3).

Future Employment Growth in Oil and Gas

THE PETROLEUM HUMAN Resources Council of Canada estimates that by 2011 100% of the Canadian labour supply growth will come from immigration and given the fierce competition that is likely to arise from a tight labour market in the future, the industry will need to diversity its workforce (*Petroleum Labour Market Information* 2009, p. 34). Considerable pressure will come from employee losses due to retirement and natural deaths over the next 10 years, with the greatest pressure from this in the pipeline sector.

The projected expansion in new demand for workers comes primarily from the oil sands production, as new operations and production come on stream, and in the services sector. The main driver in services is the support that is required by in-situ oil sands extraction. The industry estimates that the following occupations will need the largest number of additional workers by 2020 (PMLI, p. 9):

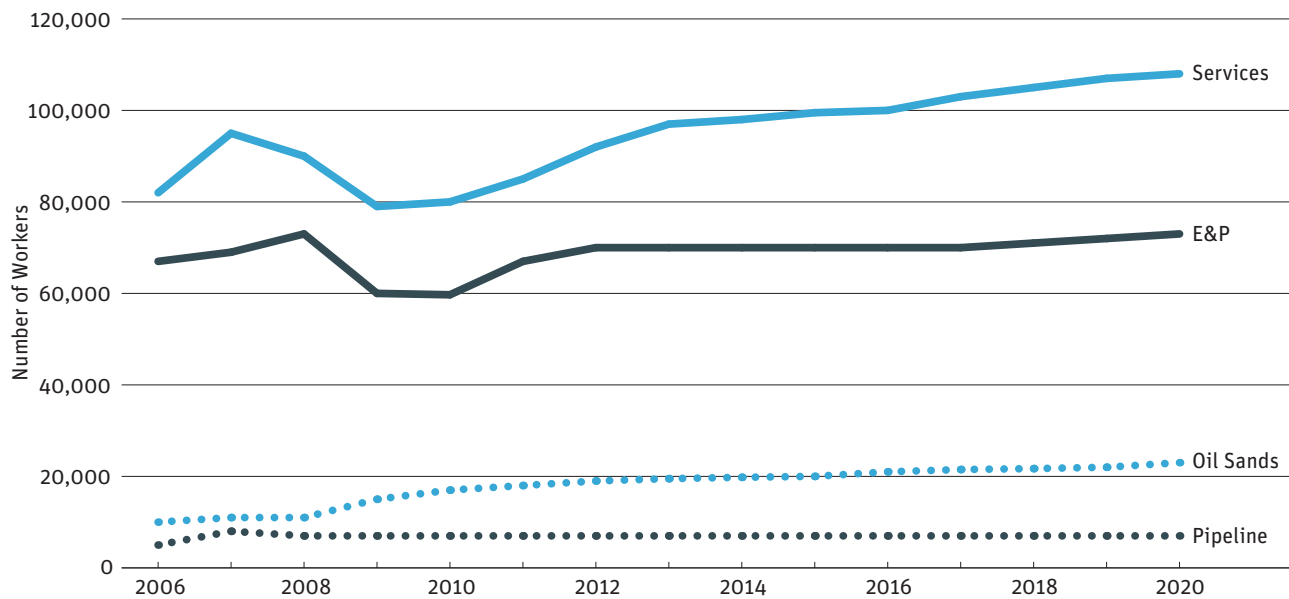
- Oil and gas drilling, servicing, and related labourers
- Oil and gas well drillers, servicers, testers, and related workers
- Operators (steam and non-steam)
- Heavy equipment operators, supervisors, oil and gas drilling and service

- Oil and gas well drilling workers and service operators
- Drilling coordinators/production managers
- Truck drivers; millwright and machinists
- Petroleum engineers
- Geologists and geophysicists.

The employment growth in some occupations will be very large, with mining engineers demand up 66% over the 2008 workforce. The demand for almost all core occupations is expected to rise between 30 and 50% over the same period. Altogether the petroleum industry will need to hire about 105,000 workers between 2010 and 2020 to meet replacement demand and to support new industry activity (PLMI, p. 13). In the short term, that is by 2011 or 2012, labour shortages are expected in five groups of the industry’s core occupations: engineers, geologists and geophysicists, trades, operators (steam and non-steam), and services (drilling & geophysical workers, operators & labourers) (PLMI, p. 19).

Most of the labour market growth will occur in provinces that focus on oil and gas production: British Columbia, Alberta, Saskatchewan, New-

FIGURE 6 Top 10 Contract Areas (April 2005 to June 2010)



Source PLMI 2009, p. 8

foundland and Labrador, and Nova Scotia (PLMI, p. 17). The industries that have experienced serious economic stress and restructuring in recent years, such as forestry, pulp and paper, sawmills, and lumber manufacturing industries, are likely to be the source of potential workers, as will industries that compete for workers with technical skills, such as chemical manufacturing and mining.

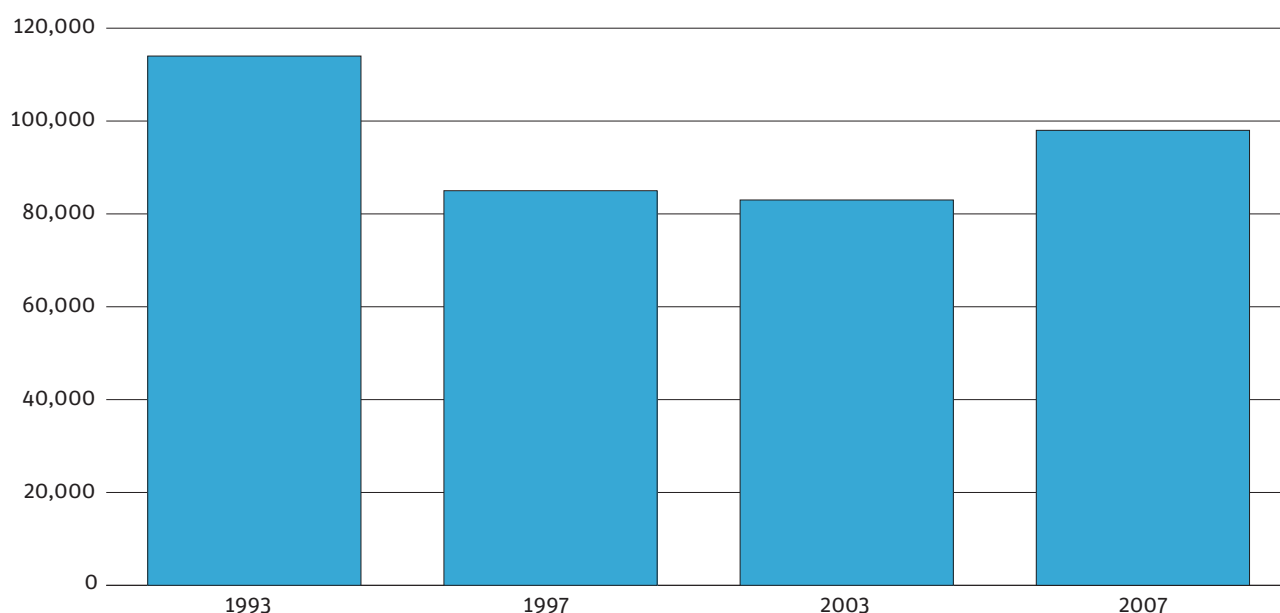
Employment Trends in Electricity

AS NOTED EARLIER, just over 100,000 people work in the electricity industry in Canada.²⁰ The main demand for future employment in this sector will come from retirements, which are expected to proceed at about 5% per year. The industry itself is less certain about labour needs for the future than is the petroleum sector, so presents its labour needs in both low and high growth scenarios. In the low-growth labour scenario, the supply-demand gaps in the short term (by 2012) are likely to be in the trades and other non-support positions (2,355) and for engineers (679). In the high growth scenario the supply-demand gaps will be more significant at 3,466 for trades and other non-support positions and 1,189 for engineers (ESC 2008, p. 97–98). However, the industry is careful to note that this is a ‘hypothetical’ gap and that employers will likely have access to employment pools, such as contractors that act as a ‘contingent workforce’ for the electricity industry, to meet labour needs.

Due to the existence of large, relatively stable employers in the electricity sector, employment patterns are somewhat different from the oil and gas industries (with the possible exception of natural gas distribution utilities and oil refineries).

In general the electricity sector workforce is highly educated, predominantly working in full-time permanent positions, well paid, working in large organizations, and has workers who are more likely to be represented by

FIGURE 7 Employment Trends in the Electricity Sector in Canada (# of Employees)



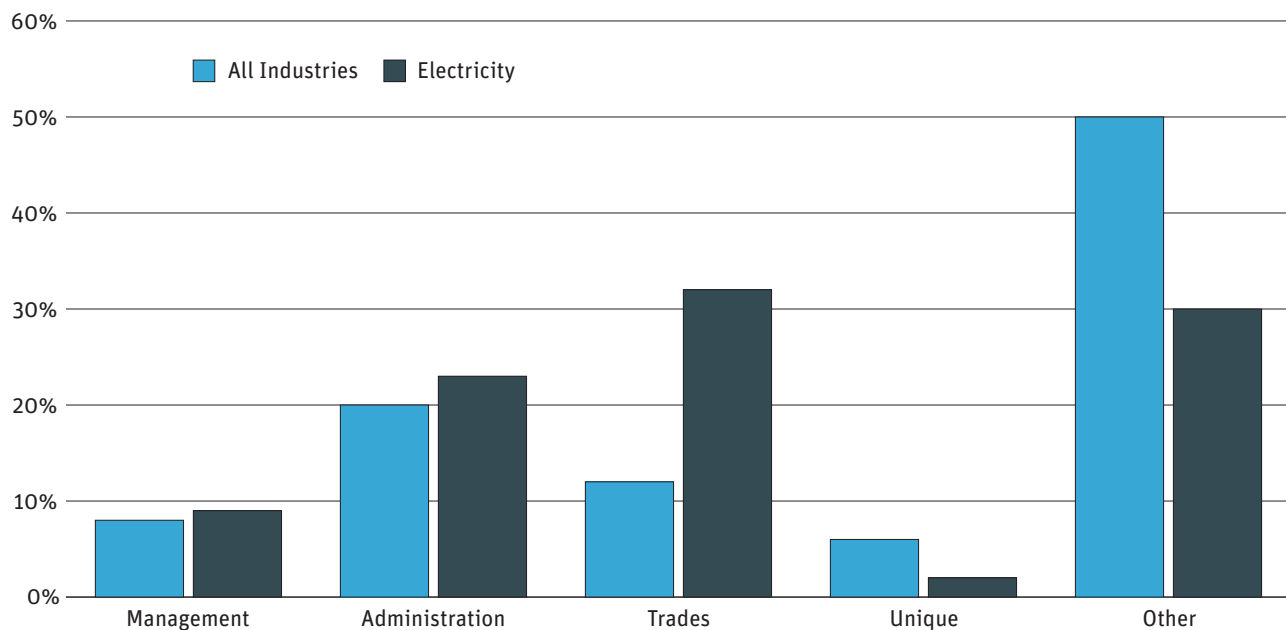
Source Chart created from ESC, 2008, p. 33, based on Statistics Canada, Labour Force Survey, 2007

trade unions than other workers in Canada. A large proportion of workers in this sector (76%) have a post-secondary credential, compared with 57% for all workers in Canada. Earnings in the sector are 52% above the average in Canada. Two-thirds of workers are employed at locations with 100 or more employees, and 70% of all workers in the industry are employed in Ontario and Quebec (ESC 2007, p. 12–19). A high proportion of the workers in this industry, 73%, are covered by collective agreements, compared with 32% for all workers in Canada. But there are variations in union coverage by region with the low being in Alberta (50%) to a high in Manitoba (83%) (Ibid, p. 18).

Occupations are dominated by the trades, transport, and equipment operators group, which account for 35% of workers in the sector. Management and administration is also large, accounting for 32% of the total labour force (Ibid. p. 19). According to the Electricity Sector Council, the 15 key occupations in the electricity sector are as follows:

- Electrical Power Line & Cable Workers
- Power Systems & Power Station Operators
- Electrical & Electronics Engineers

FIGURE 8 Occupation Group, 2006



Note Groups in the graph include the following occupations: Mgt = Management; Adm = business, finance, administration; trades = trades, transport and equipment operators; unique = occupations unique to the primary sector; others = all other occupations.
Source ESC 2007, p. 20.

- General Office Clerks Utilities Managers
- Power System Electricians
- Customer Service Information & Related Clerks
- Electrical & Electronics Engineering Technologists & Technicians
- Construction Millwrights & Industrial Mechanics (Except Textile)
- Contractors & Supervisors – Electrical Trades & Telecommunications Occupations
- Mechanical Engineers Accounting & Related Clerks
- Secretaries (Except Legal & Medical)
- Industrial Instrument Technicians & Mechanics Stationary Engineers & Auxiliary Equipment Operators
- Operators

TABLE 2 Electricity Sector Employment (% of total employment)

Group	Electricity Sector	Canadian Employment
Immigrants	12.8	21
Visible Minorities	7.9	8
Aboriginal	2.9	3
Female	25.0	51*
Current Workforce Total	100.0	100

* Females are 51% of those employed, but represent 47% of the labour force, which includes both the employed and the unemployed.

Source Electricity Sector Council, 2008, p. 48.

The electricity workforce is not one characterized by diversity, since it employs fewer women and immigrants than are represented in the Canadian workforce. In general it is largely white, male and older than average. As can be seen from *Table 2*, women constitute only 25% of total employment in the electricity sector, considerably less than female representation in the workforce, and most of the women in electricity are employed in traditional female administrative occupations within the sector. The sector employs about the same proportion of Aboriginal persons and those from visible minorities as are represented among the employed in Canada, although it hires a considerably smaller proportion of immigrants than are represented in the workforce. The aging of the electricity sector workforce presents the largest challenge for recruitment in the near future. 74% of the electricity sector's workforce is over the age of 40 and only 11% is between the ages of 25 and 40. The Canadian Electricity Association projects that between 2007 and 2012 a total of 28% of the sector's workforce will have retired (ESC 2008, p. 7).

As the Electricity Council notes, workers in this sector are unlike workers in other industries in that in addition to being largely male and older than the average Canadian workers, they also are more likely to be trade union members with considerably better wages and working conditions than the average worker (Ibid, p. 21; CEA 2004, p. 12). There are several reasons for this. Canada's major electrical utilities are in the public sector where the rate of unionization is much higher than in private industry. Most workers in the sector are employed by large utilities, and large employers with stable employment patterns also tend to be more highly unionized. In addition, a significant proportion of the workers in the electricity sector are skilled trades.

Lineworkers, electricians and other related trades — even in the private sector — tend to be more highly unionized than other private sector workers.

The future labour needs in the electricity sector will be fairly consistent with past requirements for labour. As in most areas in the energy sector, specific types of occupations are in demand. ‘Target occupations’ are as follows:

- Power plant operators
- Power system operators and electricians
- Engineers: electrical and electronics, mechanical, civil
- Stationary/substation engineers and auxiliary equipment operators
- Electrical and electronics engineering technologists and technicians
- Construction millwrights and industrial mechanics
- Utilities managers
- Contractors and supervisors
- Accountants
- Electrical power line and cable worker

Labour Needs in Renewable Sectors

IT IS DIFFICULT to get a clear picture of the possibilities for ‘green jobs’ in the energy sector in Canada for several reasons. First, there is no clear, widely accepted, definition of what constitutes a ‘green’ job (Global Advantage Consulting 2009; Bezdek 2009; BlueGreen Alliance 2009). This issue is very important for understanding the nature of job growth in the energy sector. Second, there is a tendency to assume that the kinds of job creation that has occurred in other countries with the introduction of green technology could be transferred to Canada. And third, there is a tendency for potential ‘green’ projects to over-estimate the total number of jobs that will be created with each project. Too often temporary construction, or assembly, jobs are treated as if they constitute permanent employment.

No standard classification exists for ‘green’ industries or ‘green’ occupations. Green jobs are defined in a number of different ways, ranging for any job associated with the environment, to jobs dealing specifically with renewable energy. Sometimes a more strict definition is used that defines a green job as something that itself is not environmentally damaging (Renner 2008).

In Canada the most complete accounting of environmental employment is in the *Profile of Canadian Environmental Employment 2007*. This report was funded by the Government of Canada’s Sector Council Program and produced by Eco Canada. Its definition of environmental employment includes individuals who work in sectors of the economy related to three

main areas: 1) environmental protection (air quality, water quality, land quality, waste management, restoration and reclamation, human and environmental health and safety, environmental protection management); 2) conservation and preservation of natural resources (fisheries and wildlife, forestry, agriculture, mining, energy, parks and natural reserves, natural resources management), and 3) environmental sustainability (education, research and development, policy and legislation, communications and policy awareness, management for sustainable development) (ECO Canada 2007, p. 5). This is a definition that encompasses a very broad range of jobs, even those in environmentally damaging sectors (such as the tar sands), as long as it relates in some way to something as nebulous as ‘policy awareness’ about the attempts to clean up the environment. This means that a company in the tar sands that employs someone in advertising to publicize its new environmental contributions in tree planting would be counted as an ‘environmental worker.’²¹

According to this report, about 3.2% of the Canadian workforce (530,414) is engaged in either full or part-time environment related work. The categories of this work are: trades and technology occupations (50%), management jobs (31%), administrative jobs (11%), and sales and service jobs (8%). (Ibid, p. 8). The report does not specifically look at the energy sector, but does list mining and oil and gas extraction as an industry group. According to the report, 23% of the establishments have at least one environmental worker (Ibid, p. 18).²² It also says that the mining, oil and gas sector is expected to have the highest growth in environmental employment, at 2.6% per year (Ibid, p. 24).

The most recent in-depth look at the employment effects of investment in the electricity sector was produced to examine the effects of the Ontario Government’s *Green Energy and Green Economy Act*. This research, *Building the Green Economy* was sponsored by several environmental groups and specifically examines what level of investment would be necessary to meet the Ontario government’s goal of creating 50,000 new green jobs. It also examines the types of jobs that are likely to be created (Pollin and Garrett-Peltier 2009). This report based its predictions on two levels of investment, one which is relatively modest (\$18.6b over 10 years) would produce about 35,000 jobs per year, and the other on an expanded program (\$47.1b over 10 years) would produce about 90,000 jobs per year. These jobs include direct jobs in the targeted green activities, indirect jobs associated with supplying goods and services to the targeted green industries, and induced effects, which counts the multiplier effects of the direct and indirect employment on

the rest of the economy (Ibid, p. 6). The report makes it very clear that the 35,000 or 90,000 jobs created each year cannot be aggregated for a 10 year period. This is because these jobs are largely temporary jobs related to construction, including both trades and the service activities. So, while 35,000 jobs may be created each year, 50,000 jobs may not be created in 10 years.

The more the overall level of activity is locally based, as will certainly be the case with construction, but may not be the case with manufacturing or engineering services, the higher will be the employment effect. The study is careful to point out the vast majority of jobs that will be created would be in the same areas of employment where people already work (Ibid, p. 22–23). These jobs would include construction labourers, sheet metal workers, financial auditors, engineers, concrete-forming operators, secretaries, accounts, building inspectors, and research scientists. Most of these jobs pay over \$20 per hour. The jobs paying less than \$20 per hour are most likely to be in construction and manufacturing.

A Canadian-wide estimate for employment in renewable electricity development was provided earlier in the 21st century by a report of the Clean Air Renewable Energy Coalition. According to this report, renewable energy generation employs on average six people per 10 MW of capacity. It also estimated that increasing the capacity by 35,600 MW by 2020 would create between 12,700 and 26,900 jobs. The major assumption behind the estimates is that all parts manufacturing, development, and construction would be filled domestically. Of the four largest contributors to potential renewable electricity generation (offshore wind, small hydro, biomass, and offshore wind) the small hydro (or run-of-river) was predicted to be the most labour intensive per MW for pre-operational work, while biomass would be the most labour intensive in the operational phase (Clean Air Renewable Energy Coalition, nd.).

The estimate of job creation by the renewable industry itself is considerably higher than those cited above. Some of the estimates need to be treated with scepticism. For example, in BC the Sustainable Energy Association claims that the province has the potential to generate 84,250 GWH of sustainable, renewable energy. This would create over 400,000 jobs over the next 30 years (BC Sustainable Energy Association 2005). This seems to include direct, indirect and multiplier effect job creation, but even that would not explain how BC renewable energy creation in the electricity sector could create more jobs than exist in the entire energy sector in Canada at the moment. It is very unusual for any promise of job creation in the energy sector to be monitored to compare the promise with what actually happens. One

study that did examine this (although not in the renewable sector) confirms that the anticipated job creation was vastly exaggerated and even with a long-term approach to job creation it could have been anticipated that the promised level would not occur (Gunton 2003).²³ The accounts of possible jobs to be created by the associations of renewable energy producers should, therefore, be treated with considerable caution²⁴.

Wind

As noted earlier, wind energy is experiencing the largest growth among the renewable sector. The NEB estimates that it will form 10% of installed capacity by 2020, although this could be difficult to achieve, considering that it provides about 1% of capacity in 2010 (NEB 2009, p. X). Employment in this sector, while very small, has grown rapidly from 1,000 in 2004 to over 4,000 in 2010. The government estimates that it will be 13,000 by 2012 (www.ic.gc.ca/eic/site/wei-iee.nsf/eng/00169.html). Over 430 private companies who are heavily subsidized by utilities and governments undertake all activity in this sector. Most of this production relates to project development, project operation and independent power generation. Only 16% of the activity is associated with manufacturing. The manufacturing firms make wind-related components such as rotor blades, control systems, turbines, inverters, nacelles, towers and meteorological towers.²⁵

The government and the industry see the wind sector as having a great potential for generating energy in the future. If this does occur, its primary job potential would be in the construction stage, but even here the numbers will be fairly small in comparison with employment in the rest of the energy sector. It should be noted, however, that wind generates more jobs per megawatt hour than coal, gas, and nuclear industries (Ayee et al 2009; Harding; Kammen et al, 2006). If a substantial manufacturing sector were to develop, much greater job creation could be associated with the public investments in this form of renewable energy. Labour shortages exist in jobs related to operations and maintenance for wind turbines throughout North America and Europe (sqwenergy 2008; European Wind Energy Association (EWEA) January 2009, p. 10–11). These are specialist jobs that require training, but again, they do not constitute a large number (Industry Canada, *Wind Energy*).

Solar

The Canadian Solar Industries Association conducted a survey of employers in the industry with ESC and estimates a total labour force of 1,524 full-time job equivalents existed in 2008, but expected this labour force to grow over 100% by 2011 to 3,069. This dramatic increase is based on the belief that environmentally friendly green technologies will lead to future economic growth. The jobs expected to have the highest growth rates in the solar industries include project management (178% growth), installation (146% growth), sales (120% growth), and manufacturing (107% growth). The major constraint the industry sees to reaching these levels of growth relate to labour shortages (ESC 2008). Solar thermal refers to energy that is harnessed for heat and photovoltaics converts solar energy directly into electricity. The majority of solar manufacturing jobs in Canada are concentrated in five firms whose products are primarily for export. According to one report, these firms are leading firms, internationally, but there is little Canadian demand for their products (McMonagle 2005, p. 2).

Biomass

The major producers of biomass energy are China, Brazil, U.S. and Germany, and nearly 1.2 million are employed in biomass energy in these four countries (UBC 2009). The largest use of biomass energy for electricity is in countries where labour costs are very low. Of all of the renewable energy sources, biomass is the most labour intensive during production (after the construction stage). Since the devastation of BC forests by the pine beetle, considerable interest has been generated in expanding the biomass industry in that province. Biomass also has government support in Saskatchewan for the production of ethanol. Biomass currently accounts for 6% of energy demand in Canada (Natural Resources Canada), however this is not largely in a 'green' form. That is, the burning of wood for fuel is still extensive in Canada. It will take considerable changes in technology to convert most of this production to a clean, renewable energy source. Clean energy biomass production employs a very small proportion of the energy sector labour force and this probably will not change in dramatic ways in the future. Estimates of job creation from biomass, based on UK data, indicate that 1.27 employment/years occur per GWH of electricity produced, regardless of technology or scale of implementation (Thornley et al 2007). This includes direct employment related to the bioenergy plant, agricultural production

and transportation, the jobs related to development and construction of the plant, and the indirect effects from upstream manufacturing and the induced economic effects from increased economic activity. On a more understandable level, a very large 25MW plant would create jobs of about 160 full-time equivalents over the lifetime of the plant, a figure considerably higher than the 20 people who would be employed at the plant (Ibid, p. 1925).

Other Renewables

The largest employment in the renewable sector is with large hydro projects, although many environmental groups consider large hydro to be too environmentally damaging to be championed as a new source of renewable power in the 21st century. New projects are coming forward in this area in provinces that have typically had large hydro as the main supplier for electricity (such as BC and Quebec). In the large hydro sector the main job creation occurs in the construction stage of the project. Smaller, micro-hydro (or run-of-river) projects are increasingly gaining popularity among private power producers and governments. The job creation associated with micro-hydro is at the construction stage, with almost no permanent direct jobs created.

In Canada there is some small tidal and geo-thermal electricity generation, but the technology associated with these forms of energy generation have not advanced to the stage that this type of production is likely to increase rapidly in the near future.

The Role of Organized Labour in the Energy Sector

IN ADDITION TO examining the pattern of employment in the energy sector, the question of what role unions have — and will have — is important for understanding the future of labour in this sector as governments respond to climate change. The strength of trade unions will determine to what extent workers will have a voice in shaping labour, environmental and broader economic policies. Will union density increase or decrease, and how will union membership reflect the increasing diversity of workers in the energy sector workforce? Will unions be able to develop effective responses to the numerous challenges their members will face in the coming years resulting from global warming, or will they be confined simply to reacting defensively to the priorities of governments and employers?

Unfortunately, these questions are not easy to answer. This is not only because the characteristics of the industry resulting from climate change initiatives are uncertain. Equally significant is the challenge of obtaining accurate data on union membership in some parts of the energy sector and, particularly, oil and gas in provinces such as Alberta, which is key to getting a clear picture of the existing role and influence of unions. Unlike most industries that have relatively stable unions certified to individual employers, the oil sands are characterized by highly fluctuating employment lev-

els, numerous small, mobile employers and a mix of union recognition systems that includes the union-based building trades' approach to defining union membership and the more conventional employer-based certification system that is characteristic of union recognition in other parts of the economy. Although Statistics Canada's Labour Force Survey provides some useful data on union membership in this sector, the data does not fully capture the complexity of employment practices in what is a somewhat unique labour relations system. This is compounded by the gaps in the data collection system of the Alberta Labour Relations Board, the body formally responsible to collect data on collective bargaining and union membership. The dominant role of Alberta in Canada's oil and gas industry makes this gap particularly significant.

What we do know is that union density varies significantly within the energy sector. Some areas of energy production, such as upstream oil and gas exploration, particularly in Alberta, are largely unorganized (telephone interview with Gil McGowan, President, Alberta Federation of Labour, July 20, 2010). In contrast, others, such as electrical utilities are highly unionized, notably in provinces with major publicly owned utilities such as Quebec, British Columbia and Manitoba. Unlike oil and gas development, the electricity sector is generally characterized by relatively stable employment patterns and well established union representation. But even within these two broad sectors there are significant variations. Oil refineries tend to be highly unionized, while private renewable electricity projects such as run of river hydro facilities and wind farms tend to be poorly organized.

Trade Unions in Oil and Gas

AS NOTED EARLIER, union membership is generally quite low in the oil and gas sector. The notable exceptions are maintenance of gas pipelines, gas distribution utilities and oil refineries across the country and offshore oil platforms on the East Coast. There are a variety of reasons for this. Employers in the oil and gas industry have strongly resisted unionization, particularly in the key province of Alberta, but also in BC and, increasingly, in Saskatchewan. As George Bain and other industrial relations theorists have noted, the willingness of employers to accept unions is a major factor determining workers' ability to organize successfully (Bain, 1970). According to Gil McGowan, President of the Alberta Federation of Labour, provincial labour legislation in his province imposes major barriers to unionization, resulting in low union density compared with other provinces (McGowan op. cit. July 20, 2010).

Legislative constraints on unionization are exacerbated by the way work is organized. Exploration and drilling are characterized by numerous small-scale operators. Small employers tend to be hard to unionize in all sectors of the economy, but the highly dispersed – and mobile – character of these operations makes organizing even more difficult. Rapid labour turnover also makes organizing and servicing members a major challenge for most unions. Even when certified to represent a group of workers, unions can find it difficult to maintain their certifications, as high turnover gives

employers the opportunity to screen out new applicants who are supportive of union membership.

Much of the oil and gas industry is characterized by sub-contracting, a practice that results in small employers offering short term, insecure jobs. According to Wayne Peppard, of the BC and Yukon Building Trades Council, approximately 90% of the contractors in the construction industry are small businesses. They are highly mobile, with the capacity to hire and fire workers at very short notice (interview with Wayne Peppard, BC and Yukon Territory Building and Construction Trades Council, Jan. 7, 2011). It is normally more difficult to organize workers whose perception is that their employment is essentially temporary.

In recent years, the oil and gas sector has witnessed significant employment instability. Sharp fluctuations in oil prices, as well as major international economic developments, have resulted in very large changes in investment levels within remarkably short time frames. The 2008 downturn, for example, resulted in widespread lay-offs, with many workers leaving the province to return to their former homes, either in other provinces or abroad. More recently, this has been followed by a gradual return to pre-recession employment levels with employers again reaching out to recruit nationally and internationally to meet anticipated labour requirements and hedge against future labour shortages. Alberta's boom and bust employment pattern has resulted in a transitory workforce – yet another factor negatively affecting union organizing.

Nevertheless, unions have maintained representation rights with a few of the larger employers operating major extraction facilities. The Communications, Energy and Paper Workers of Canada (CEP) represents about 2,400 workers in the oil sands plant at Suncor. Although not customarily thought of as a building trades union, it also represents a smaller number of workers in the construction of oil and gas extraction facilities in Alberta. However, due to the need for specialized skills, members of the traditional building trades unions have also been employed in some of these projects. The CEP also represents a total of about 600 workers at the Hibernia and Terra Nova projects in Newfoundland and Labrador (email correspondence, Keith Newman, Research Director, CEP, July 9, 2010). The Christian Labour Association of Canada (CLAC) represents approximately 6,000 workers at the Canadian Natural Resources Ltd. (CNL) \$7 billion Horizon facility north of Fort McMurray. However, these are the exceptions. In the sector as a whole, most work is done by unorganized workers.

Because construction is such a major component of employment in the oil and gas industry, the building trades are also major union players in the sector. This reflects the fact that the members of the building trades unions have skills employers need and which they cannot readily access by recruiting elsewhere in Canada, or internationally. Since the construction unions still play a major role in apprenticeship and training, employers are dependent, to some degree, on the role of unions in mentoring skills development. Consequently, construction contractors and sub-contractors in the oil patch have been willing to hire union members and negotiate agreements with their unions to ensure that their projects are properly built.

On its web site, the Building Trades of Alberta, which includes 16 construction unions, states that its affiliates represent a total of 60,000 unionized construction workers in the province. Separate construction union density figures for the oil and gas sector are not readily available, and will fluctuate significantly from year to year for reasons discussed elsewhere in this study.²⁶ In general the trade union density of construction work in the oil and gas sector could be as high as 20%, with major variations among the individual building trades unions (National Post, 2007).²⁷

Union recognition in the construction industry is different from that of most other areas of employment, a fact that is reflected in provincial labour codes in most provinces having a separate section, or a separate act, devoted specifically to construction. This is because union membership is controlled by the unions and is not contingent on certification by any specific employer. Union members are normally dispatched to employers via union hiring halls and return to the hall once a specific project has been completed. Even if they are employed directly by companies, rather than through the hiring hall, they can – and often do – maintain their membership in the union. As a result, they may work side by side with non-union workers in the same trade on the same worksite for the duration of a construction project. The mix of union and non-union workers on projects is a common feature of such projects. However, building trades members may also seek formal union recognition from their employer once a sufficient proportion of union members from their trade are active on a worksite. In some cases, the building trades union itself may negotiate a company-wide agreement that covers all its trades members working for a specific firm, regardless of the project on which they happen to be employed.

While each building trades union may negotiate recognition for its members on an individual worksite, or with individual employers across the sector, this does not necessarily mean that all workers on a project are union-

ized. Commonly, a project may have a mix of unionized skilled trades and unorganized labourers, general workers and support staff. Unions such as the Plumbers and Pipefitters, International Brotherhood of Electrical Workers, Operating Engineers, Ironworkers and United Brotherhood of Carpenters have been successful in gaining recognition on larger, more stable projects. The shortage of skilled workers has reinforced their ability to negotiate with employers.²⁸ At the same time, as the data on union density presented earlier indicate, it is important not to exaggerate the proportion of unionized construction workers active in the oil and gas sector. Union influence in construction has been in decline for some years. The building trades have been squeezed entirely out of residential construction in Alberta. They now represent less than one third of commercial construction — and only on major projects. Most of their unionized work that they do have is now on large industrial projects, primarily in the oil patch.

As noted, one factor that has enabled some of the trades to maintain a significant foothold in the industry is that they still play a role in apprenticeship and training. Many employers remain dependent, to some degree, on the contribution of unions in facilitating skills development. However, with declining union density, most of the building trades are no longer able to guarantee that their apprentices will obtain sufficient work to complete their training and obtain certification. One of the exceptions is the Ironworkers' Union which has maintained control over apprenticeship within its trade. It takes responsibility for ensuring that its apprentices are able to complete their training and thus ensures that the trade itself remains highly unionized. The UA, which represents plumbers and pipe fitters, also exercises significant control over the 5 year apprenticeships of its members. According to John Telford, Canadian Director of the 50,000 member United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada (UA), the union itself spends many thousands of dollars to train each of its apprentices (Telephone interview, Jan 11, 2011). As a result of this mentoring arrangement, on completion of their apprenticeships, workers tend to remain with the union.

Union membership in the traditional building trades unions has also been affected by the growing capacity of major, predominantly non-union, construction firms such as Ledcor, to handle even the very largest projects. In the past, the non-union oil and gas construction sector was limited to smaller jobs. But now non-union firms are capable of bidding on the largest as well, giving the oil and gas industry the option of selecting construction contractors that do not recognize unions. In addition, CLAC has moved into

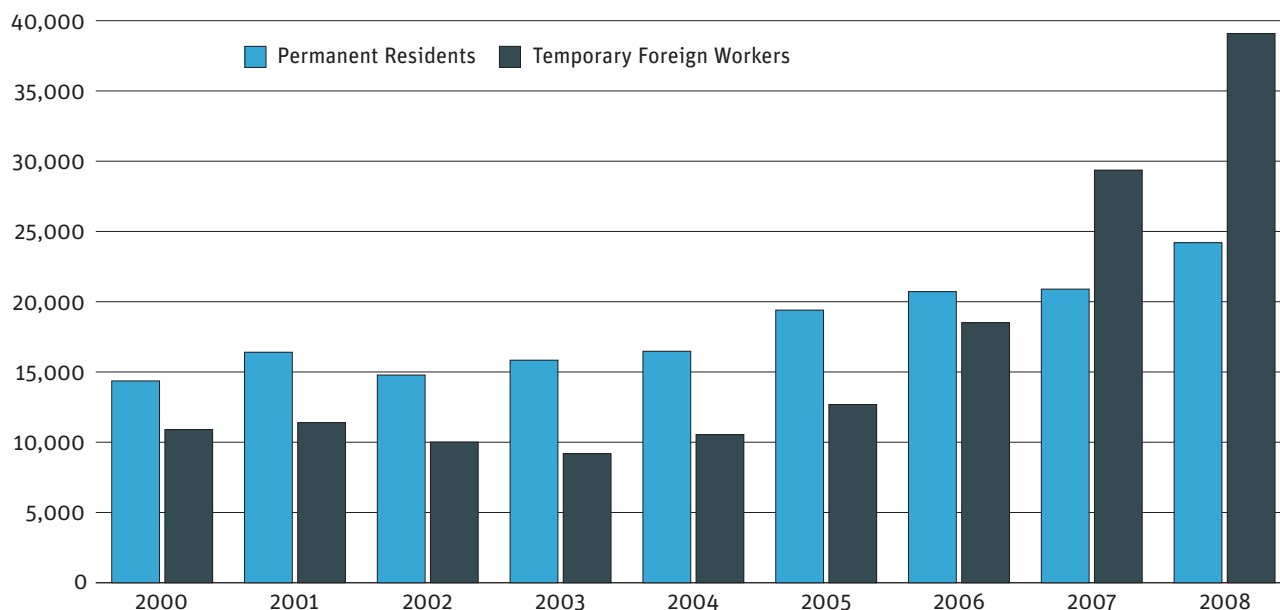
the training business in a major way, setting up its own apprenticeship programs covering trades such as operating engineers, teamsters and plumbers and pipefitters. Increasingly, it is able to provide qualified members to companies that do not wish to recognize the traditional building trades unions and to negotiate agreements that exclude building trades' members that are not members of CLAC.²⁹

Jurisdictional disputes among the various unions representing workers in the oil sector have also affected union strength. There have been a number of conflicts over turf between industrial unions affiliated to the CLC, such as the CEP and the international building trades. The building trades unions view the expansion of the CEP into construction as a negative development. They see CEP as an industrial union, not a construction union. For its part, the CEP believes it can do a better job of organizing and representing workers at several of the larger facilities. In its view, it is better that these workers be organized with an industrial union than not organized at all.

But arguably the main source of conflict within the labour movement is between unions in the more established union federations and CLAC. Both the international building trades and the CEP, which is affiliated to the Canadian Labour Congress, are very critical of CLAC's expansion in the sector. They question how effectively it represents its members and whether it is too friendly with the employers and the Alberta government. They are particularly critical of the way in which CLAC gained union recognition for the 6,000 workers at the CNL Horizon upgrader facility. They believe that CNL chose to recognize CLAC as the exclusive bargaining agent for workers at the facility to prevent other unions from organizing it. The Alberta Federation of Labour notes that this wall-to-wall agreement, which includes all workers below management on the site, was reached after the company persuaded the Alberta government to invoke Division 8, a rarely used provision of the Alberta Labour Relations Code to facilitate a project wide certification for CLAC (National Post, 2007). The established unions also believe that the way this was done effectively denied workers on the site the option of choosing a different union to represent them. These internal conflicts, both among the established unions and between them and CLAC, make it much more difficult for labour to speak with a unified voice on questions affecting climate change and the pace of energy development.

Unions also confront another challenge in the oil and gas sector: how to accommodate the increasing numbers of temporary foreign workers. No one knows for sure the size of this temporary foreign labour force in the oil and gas sector in Alberta, but it is widely recognized as one that is growing

FIGURE 9 Alberta: New Permanent Residents vs. New Temporary Foreign Workers



Source: Alberta Federation of Labour "Report on Temporary Foreign Workers in Alberta" Dec. 16, 2010, p. 13

rapidly. Responding to pressure from employers complaining of worker shortages, the Federal and Alberta governments have greatly expanded this source of labour in recent years (Sanborn, 2010). In 2009 the Federal Government allowed 178,640 workers to enter Canada under the Temporary Foreign Worker Program. Alberta employers have recruited a disproportionate number of these temporary workers. The Alberta Federation of Labour has noted that by 2009 the number working in the province had reached 65,748. This represented a fourfold increase in five years (Alberta Federation of Labour, 2010). There are now more workers on temporary work permits coming to Alberta each year than landed immigrants.

Although many of these workers end up performing relatively low wage, service sector jobs in hotels, restaurants, retail outlets and so forth, in other parts of Alberta's economy, a significant number are now working in the tar sands, as labourers, cleaners, cooks and truck drivers, as well as some skilled trades (de Guerre).³⁰ While noting that the absolute numbers of workers entering the construction industry was low, compared with other sectors of the economy, the Construction Sector Council pointed out that the exception was Alberta. "Labour Market Opinion (LMO) applications for 2006 and 2007 show a clear trend of increasing use of the TFW program. Alberta

shows dramatic and exponential growth” (Construction Sector Council 2007, p. 5). Since this was written the number of temporary workers entering Alberta has increased substantially. According to *Alberta Construction Magazine*, Canadian Natural Resources \$9.3 billion Horizon Oil Sands Upgrader Project recruited 80% of its workers from outside Alberta, most from other parts of Canada but a significant number from the U.S. and abroad (*Alberta Construction Magazine*, 2008). This figure seems a bit high, and no source for the number is given, but it does underscore that companies are actively recruiting outside the province.

The terms under which employers are able to bring in foreign workers severely limit their ability to question their working conditions, pay or living arrangements. Unions and human rights organizations have been very critical of the labour practices of employers and also the labour contractors involved in bringing temporary workers to Canada. The Alberta Federation of Labour (AFL) has questioned the exorbitant fees workers pay to brokers, the misleading job advertisements used to recruit them, the sub-standard accommodation often provided and the racism that is experienced by many of these workers (Alberta Federation of Labour, 2010).

Given the tenuous nature of their immigration status, their dependency on the employers that sponsor them and the ability of these same employers arbitrarily to have them removed from Canada, these workers face significant barriers to joining a union. In addition, many are not fluent in English while many others work in isolated locations, making contact with unions difficult. To address the numerous problems facing temporary workers, the AFL established a temporary foreign worker advocate in 2007.

Since then, the AFL has encouraged workers to contact him for help in resolving their grievances. The advocate has been flooded with requests for assistance (Alberta Federation of Labour, 2007; Cryderman, 2008).

What is also significant about this program is that neither the Federal, nor the Alberta governments has been willing to implement the key proposals by organized labour to protect the rights of these workers. According to Katherine de Guerre of the University of Sussex Centre for Migration Research, who has done a major study of the temporary foreign worker program in the tar sands:

The Government of Alberta and the Government of Canada do not provide direct compensation to local workers or consult with workers, interest groups, unions, or the general public regarding their TFW policies. This is an area where the Government could improve. The strong opposition to the pro-

grammes from Alberta's unions, which represent a large proportion of workers in Alberta, should be heard in regards to their opinions on these policies (de Guerre, 2009. p.15).

As noted earlier, the oil industry plans a major expansion of the oil sands over the next decade – plans which are supported by the recent rise in oil prices. As part of this expansion it also sees a growing role for temporary foreign workers in meeting anticipated labour shortages. Consequently, the terms under which the Federal and Alberta governments recruit foreign workers for jobs in the oil and gas sector is likely to become a significant issue in the coming years.

While considerable attention has been focused on the employment impacts of the construction and operation of tar sands facilities, manufacturing employment is also a very significant part of the energy sector, particularly in Alberta. This study does not attempt to assess the overall impact of the industry on manufacturing in Canada. However, due to the extent to which Alberta's manufacturing sector has specialized in producing the equipment and machinery that the industry requires for its massive investments, a brief account of this provincial aspect of oil and gas development is warranted. Oil and gas projects need large quantities of a wide range of specialized items such as fabricated metals, steel pipe, heavy equipment and a variety of construction materials. Alberta's manufacturing sector is different from that of other provinces in that it has developed primarily in response to the needs of the energy industry. According to Gil McGowan, roughly three quarters of manufacturing in Alberta is tied directly to oil and gas production (McGowan, op. cit. 2010). As a result of the 2008 downturn, Alberta lost about 20% of its manufacturing jobs (Statistics Canada, 2010b).

Although manufacturing employment in the province has recovered significantly over the past two years, one major consequence of the cost cutting triggered by the downturn was that a number of the major oil companies, such as Imperial Oil, have decided to move some of their manufacturing contracts offshore. South Korea and China are now emerging as major suppliers of equipment for the industry, including entire production modules formerly built almost exclusively in Alberta. Now that offshore companies have gained a foothold in the industry, they have a major incentive to expand their role as lower cost suppliers. Major energy corporations are increasingly willing to use offshore suppliers as a way of ensuring that they will not have to pay a price premium for locally produced manufactured equipment as the current expansion gains steam. This development will

not only constrain the recovery of manufacturing employment in the province: it will also act to undermine the efforts of unions to recover lost members. In addition, some companies are now exploring the feasibility of outsourcing a portion of the technical, engineering and administrative jobs to countries such as India (Vanderclippe 2010).

Another part of the energy sector, pipeline construction, also has a significant union presence, but only in the larger projects. Oil and gas needs to be transported to markets across the continent. According to the National Energy Board, which regulates pipeline construction and operation, \$127 billion of oil, gas, and petroleum products were shipped through pipelines in 2008. Operation and maintenance of pipelines cost \$4.4 billion that same year. Consequently, pipeline construction is a very significant component of the energy sector. It is also a segment of the industry that spans a number of provinces, even though the bulk of the oil and much of the natural gas originates in Alberta.

The principal pipeline construction unions are the Teamsters, Labourers, Operating Engineers and Plumbers and Pipefitters. This specialized type of construction requires highly skilled workers. Large pipeline projects are planned such that work proceeds, incrementally, according to a clearly defined schedule. Instead of hiring local residents for each segment of the construction, the companies move their workers from town to town as construction proceeds. Consequently, work crews tend to be very stable and there is relatively little labour turnover during construction of a pipeline. Employers require well-trained, specialized workers who they hire for the duration of a project.

The specialized nature of the work and the key role that the unions still play in apprenticeship and training in this energy sub-sector has made it easier for them to maintain a significant presence in the construction of large diameter pipelines.³¹ Over 90% of the Canadian portion of the Alberta Clipper pipeline that crosses Saskatchewan and Manitoba on its way to Chicago was built with unionized workers by the time of its completion in 2010. (Telford, op. Cit. 2011). However, construction of smaller lines — normally pipe of less than 24 inches in diameter — is now overwhelmingly non-union. While we were unable to find data on the share of all pipeline construction that is organized, the unions themselves believe that when all sizes of pipe are taken into account, as much as 90% of this work is now done by non-union crews. (Telford, op. Cit. 2011).

While Alberta's tar sands and related pipeline construction are the major component of Canada's oil and gas industry, other sectors of the industry

also merit attention. According to the Canadian Petroleum Products Institute, Canada currently has 18 major refineries (Canadian Petroleum Products Institute 2011). In contrast to the low rate of unionization in oil and gas production, oil refining, over 70% of which is carried out in central and eastern Canada, is relatively highly unionized. The CEP represents most of the unionized workers at the major refineries in Quebec, Ontario, Saskatchewan, Alberta, and British Columbia. Workers at the Irving Refinery in Saint John had been represented by the CEP, but the local was decertified a number of years ago after a bitter strike. The United Steelworkers of America (USWA) represents workers at a major refinery at Come by Chance in Newfoundland and Labrador.

Refinery workers tend to have stable employment, good pay, reasonable pensions and considerable job security. However, the number of refineries has been declining over the past two decades due to corporate mergers within the industry, a shift to larger, more efficient plants, consolidation of North American gasoline refining, surplus capacity in Europe (resulting in refined petroleum products being shipped to North America), and little growth in demand for gasoline in recent years (personal communication, Keith Newman, July 7, 2010). Union membership in this sector is likely to decline gradually as the industry further consolidates in the coming years.

Unions in the natural gas distribution utilities currently represent about 45% of the Canadian workforce in this sector. Workers are represented by a number of different unions, including the CEP, which has members at Enbridge's Ontario facilities and SaskEnergy. The Canadian Office and Professional Employees Union (COPE 378) represents workers at Terasen Gas in BC.

Unions in the Electricity Sector

AS NOTED EARLIER, union density is quite high in the electricity sector in Canada. According to a 2004 Canadian Electricity Sector Human Resource Study, 81.8% of non-salaried electrical utility workers were union members (Canadian Electricity Association 2004).³² This reflects the generally higher level of unionization in Canada's public sector (as Canada's major utilities are public) and also the size and employment stability that characterizes large utilities.

The Canadian Union of Public Employees (CUPE) with over 38,000 electrical utility members is the largest union in the sector. It represents over 17,600 trades, technical and administrative workers at Quebec Hydro. The Ontario Power Workers Union (CUPE Local 1000) represents approximately 14,400 employees working in the former components of Ontario Hydro. This includes trades, technicians and other classifications working at nuclear, coal and gas fired power plants, as well as maintaining Ontario's transmission infrastructure. CUPE also has approximately 2,400 members employed in local electrical distribution utilities in the province, the largest of which is Toronto Hydro Local One (Keith Cameron, CUPE Research Officer, email correspondence, July 9, 2010). CUPE Local 998 represents just over 1,100 clerical and technical workers at Manitoba Hydro.

The International Brotherhood of Electrical Workers Local 2034 represents approximately 2,800 trades and electrical workers at Manitoba Hydro.

IBEW Local 258 represents 1,900 trades and electrical workers at BC Hydro which supplies electricity to 94% of BC's residents. IBEW Local 1615 represents trades and office workers at Newfoundland and Labrador Hydro Nalcor. The IBEW also has a number of certifications in smaller private electrical utilities in various provinces across Canada such as Fortis in BC, Nova Scotia Power, New Brunswick Power and a significant number of local electrical distribution utilities, both public and private, in Ontario.

The Canadian Office and Professional Employees Union (COPE 378) represents 2,100 clerical, administrative and technical workers at BC Hydro. It also represents a small number of workers in similar classifications at privately owned Fortis BC (Formerly West Kootenay Power). In Saskatchewan, the Communications, Energy and Paper Workers' Union of Canada (CEP) is the major union at publicly owned SaskPower for trades, technical and administrative workers.

There are also a handful of smaller unions or independent locals representing workers at various private utility generation facilities or local electrical utilities, such as the Canadian Energy Workers Association (CEWA), which has certifications with various ATCO subsidiaries in Alberta.

In the construction of new electricity projects, the pattern of unionization varies somewhat depending on whether the owner is public or private, the region in which construction takes place and the provincial labour relations regime.³³ Large hydro, thermal or nuclear construction projects commissioned by publicly owned utilities tend to be highly unionized. Provinces such as Manitoba still maintain the practice of negotiating project agreements in which all workers on a new power generation facility will be members of one of the building trades unions. Major new power lines are generally built by unionized labour, but smaller distribution lines may be built by both union and non-union workers. Projects commissioned by major private utilities have a mix of union and non-union construction workers, depending again on the contractors and sub contractors selected to do the work. A few of the private 'green' electricity projects are built by unionized construction trades, notably Operating Engineers, IBEW and plumbers and pipefitters, but the overwhelming majority are being built and operated primarily by unorganized workers with a few unionized skilled trades brought in to do specialised components of the work.

The level of unionization in the electricity construction sector also varies among provinces. Quebec has the highest rate of construction unionization. This is partially due to the higher overall level of support for unions in the province. Quebec shares with Newfoundland and Labrador the dis-

tion of having the highest rate of unionization in Canada. In construction, its more supportive labour law (the *Act Respecting Labour Relations, Vocational Training, and Manpower Management in the Construction Industry*) facilitates a high level of union membership. It allows workers to select the union that will represent them in the four main sectors of the industry through a vote every three years. The legislation also facilitates province wide agreements in these four sectors. Most major new energy construction is commissioned by Quebec Hydro, which further reinforces the use of unionized workers in energy projects in the province.

In Ontario, the picture is more mixed. Major public energy construction projects including nuclear facilities, natural gas power plants, transmission infrastructure and some of the larger public hydro facilities tend to be highly unionized. However, the provincial government has a policy of sourcing much of its future energy requirements from the private sector. This has resulted in a growing number of new private electricity generation facilities. Construction work on these may be either union or non-union, depending on size, location and the commissioning firm. In addition, small hydro projects often require lengthy penstocks to move water to the turbines in the power plant. Due to the skills required, unionized plumbers and pipefitters do much of this work, even on projects that are built by predominantly non-union contractors.

As with oil and gas, Alberta has the lowest overall rate of unionization of construction workers in the electrical sector. But, as noted, the high demand for workers with particular skills, such as electricians, plumbers and pipefitters and boilermakers has meant that employers needing particular skills have been prepared to hire union members or recognize the unions to which they belong. However, union representation in the electricity construction sector has been declining in recent years, a trend that parallels developments in some other parts of the construction industry.

Energy projects have significant upstream impacts resulting from their need for manufactured goods, heavy equipment and fabricated materials such as steel. They also create demand in a wide range of other areas of Canada's economy. A number of unions in the manufacturing sector, principally in Ontario and Quebec, have certifications in plants that manufacture equipment and supplies for the conventional energy sector and, particularly, the expanding tar sands. These include the Canadian Auto Workers, the United Steel Workers of America (USWA) and the CEP, among others. Similarly, unions represent some of the manufacturing workers employed in plants that are making renewable energy components. However, as noted earlier,

while this is an important area, it is outside the scope of this study to provide a detailed breakdown of union representation or the role of unions in this sector of the economy.

Unions, Energy Policy and Global Warming

IF THERE IS one significant observation about the current role of unions in the energy sector, it is that they are increasingly marginalized in the public policy debate, except with respect to a narrow range of collective bargaining and labour relations matters. In some sectors like construction, they still play a modest role in shaping government policy on trades training, apprenticeship and inter-provincial programs such as the Red Seal certification process. In the electricity sector, the major unions have been active in campaigning against deregulation and privatization and, arguably, have slowed this process in a number of provinces such as Quebec, Manitoba and BC. But overall, governments and employers in the energy sector do not see the labour movement as having any significant role in shaping energy policy or in developing responses to global warming.

There are a variety of reasons for the limited role of unions in the policy debate. The influence of organized labour in Canada has eroded significantly in the past three decades. Increasingly the media and governments simply ignore what unions say on policy issues. There is no longer even a single labour reporter in any major newspaper in English Canada, while labour reporting in Quebec is far less comprehensive than even a few years ago. Unions in the energy sector have not been immune from this development. In addition, declining union density, particularly in some provinces such

as Alberta, has weakened the ability of unions to argue that they speak on behalf of all workers.

Larger economic trends have also reduced union influence. The triple impact of free trade, deregulation and privatization has weakened union bargaining power in a number of key sectors of the economy. The shift towards a more service based economy, which is less well organized, coupled with the decline of some of the most highly unionized sectors of the economy such as manufacturing, forestry and mining, has also reduced the clout of the labour movement. And while overall union density has not fallen precipitately in Canada, compared with a number of other countries in recent years, the seemingly good retention rate conceals the extent of the decline in the private sector, where most of the key energy unions have members.³⁴

Unions are not unaware of these developments. As the CEP noted in its 2002 policy statement on energy and the environment:

International treaties to stop climate change, environmental campaigns, and the forces of economic globalization are each advancing an energy agenda in conflict with each other. Yet there is an essential voice largely absent from these crucial decisions. It is time that governments, companies and decision makers include and listen to workers, and in particular to energy workers. There can be no successful, meaningful or viable energy policy for Canada that does not respect the views and interests of the working people who produce, distribute and process this country's energy resources (CEP Policy 917, 2002, p1).³⁵

Energy sector unions are very concerned about the impact of global warming on the work their members do and on the wider consequences for the planet, as is illustrated by a point made in the more recent version of CEP Policy 917:

CEP members understand the necessity of taking action on climate change, and they signal through this policy their determination to take on the issue. We have a positive vision of a sustainable environment and a prosperous economy that requires a stable energy supply. The energy industries of the future will be increasingly diversified, renewable and smaller scale. Our homes, workplaces and transportation systems will be more energy efficient and technologically advanced. Greenhouse gases produced by non-renewable fossil fuels will be reduced, with tremendous implications for workers and whole regions of Canada. However, in our view, these changes do not necessarily mean a lesser standard of living or fewer good jobs in energy

industries. The key to this positive future is democratic, public control and regulation of our energy resources and just transition measures to ensure that today's working families and communities are included in *tomorrow's energy industries* (CEP 2008).

A number of the unions discussed in our report, such as the CEP, USWA, CUPE, and CAW, as well as many of the building trades, are also deeply concerned about the long term future of Canada's energy sector. They are worried about how global warming will affect employment levels, incomes, employment security and the kinds of jobs, skill sets and training workers will need in the future. They are frustrated that governments do not seem to have a viable transition strategy to address the fundamental economic changes that global warming will trigger. In the tar sands, unions are particularly concerned about the `boom and bust` pattern of development which has been so disruptive to the employment of their members and the communities in which their members live.

Unions also believe that much of the potential employment associated with the oil and gas industry is being lost because the companies are failing to maximize the value added potential of the resource. For example, methane is the major component of natural gas. However, it also contains other fraction products such as ethane which are used in the production of chemicals and plastics. These other products can be separated from the methane and then manufactured in chemical plants. The industry has succeeded in building new pipelines in recent years that enable it to ship the gas directly to the U.S. without extracting any of these products. Hence the jobs associated with this area of production are being transferred out of Canada. The export of largely unprocessed bitumen has similar consequences. For this reason, the CEP and other energy unions have opposed the expansion of pipeline capacity for export (CEP Policy 917, 2008; Canadian Labour Congress, 2008). Similarly, the outsourcing of manufacturing components for upgraders and other oil and gas facilities is eliminating significant numbers of jobs. More prudent management of the resource, in the view of the unions, could maintain employment levels without having to continually raise output and exports. Increasing value added job creation is thus a key component of a transition strategy advocated by labour. Similarly, a well thought out labour adjustment program would make it much easier for workers to support a move away from jobs associated with high GHG output to jobs that are more environmentally sustainable.

At a broader level, Canada's energy sector unions have been quite critical of the overall direction of government policy — or perhaps more accurately, the abandonment of public policy — in favour of a market based approach that allows corporations a free hand to shape the country's energy future. In the oil and gas sector, they have raised concerns about the uncritical reliance by both levels of government on the decisions of private investors, as well as the incremental integration of Canada's oil and gas sector into a North American market dominated by the U.S. They have also questioned the export oriented growth trajectory promoted by the industry, the negative environmental impacts of the rapid, if erratic, expansion of the tar sands and the failure of governments to engage in long range planning. They have been highly critical of policies that are based on further deregulation of the industry. In their view, Canada needs a comprehensive plan to address global warming that would respect the country's Kyoto commitments, encourage conservation and incorporate an effective labour transition strategy (CEP Policy 917, 2008).³⁶

Energy sector unions also prompted the CLC to develop a comprehensive policy statement to address the future of Canada's energy development in the context of global warming (CLC 2003). The statement acknowledged the serious environmental threat Canada now faced and argued that governments should take major steps to address this threat in the immediate future through a 'just transition' program. It supported the Canadian government's decision to endorse the Kyoto Accord but was critical of Canada's lack of progress in implementing the Accord's basic objectives. While recognizing that Canada would continue to need significant energy supplies as a consequence of its cold climate and the desire of Canadians to maintain a decent standard of living, it argued that reliance on fossil fuels must be significantly reduced and tax breaks for the fossil fuel industries be curtailed. Consequently, it supported a variety of measures to shift energy production towards renewables through targeted subsidies, tax measures and slowing the growth of fossil fuel extraction. It endorsed higher taxes on fossil fuels to encourage more efficient use of energy. However, it argued that governments should use the additional revenues to support the transition to sustainable, low GHG economy and cushion the impact on low income Canadians.

One of the key planks of the CLC policy statement was to challenge the negative environmental impact of the Canada-U.S. FTA and NAFTA. These agreements locked Canada into an export focused approach to energy development. They promoted the rapid expansion of oil and gas production without regard for Canada's future requirements. And they exposed Can-

adian consumers to unpredictable price changes based on fluctuations in the U.S. energy market. In the document's words:

There is an urgent need to re-establish Canadian control over the long-term future of the energy sector to meet the public interest. This will demand challenging the energy provisions of NAFTA by re-regulating oil and gas exports through the National Energy Board (NEB), and rejecting proposals for further 'deep integration' of energy on continental lines as well as *further domestic deregulation and privatization* (CLC 2003).

The alternative, according to the CLC, was a new national energy plan that would focus on curbing the growth of fossil fuel production and re-focusing Canadian production to meet Canada's needs, rather than exports to the U.S. market. Complementing a domestically focused energy policy, Canada should implement a comprehensive just transition program that would provide financial assistance and retraining to workers displaced as a result of the shift to a low carbon economy. It should also provide support for communities negatively affected by this shift, while encouraging the development, or expansion, of new climate friendly industries. These various proposals underlined the need for a much stronger government role in regulating Canada's energy sector. International market forces would not address the challenge of global warming: it was essential that governments provide the needed leadership (CLC 2003).

Unions representing workers in Canada's major public electricity corporations have been very critical of the incremental privatization and deregulation of Canada's electricity system, the break-up of integrated utilities such as Ontario Hydro and the negative impact of other market based reforms such as those promoted by the U.S. Federal Energy Regulatory Commission. They have strongly opposed policies that further integrate Canadian utilities into the U.S. grid, fearing that this will compromise the ability of Canada to develop its own approach to energy security. CUPE, IBEW, CEP and COPE, among others, have attempted to play a role in influencing the policy direction of provincial governments. Typical of these efforts is a statement included in a presentation to Saskatchewan's Standing Committee on Crowns and Central Agencies by the CEP:

CEP strongly supports public ownership of large scale electricity generating facilities as well as the power distribution system. Electricity is not a commodity like any other. It is an essential public service. The provision of electricity should not be left to market forces with their fundamental drive for short term

profit regardless of social cost, environmental impact or worker health and safety. (Bailey and Sol, 2010, p.8)

CUPE makes similar points in a major research paper analyzing the problems resulting from the Harris governments deregulation and partial privatization of Ontario's electricity system. The paper asserts that it was a mistake to break up vertically integrated public utilities, such as Ontario's. Rather than promoting north-south integration of Canadian and U.S. electricity systems, it argued that Canada should explore further east-west transmission linkages to improve energy security and maintain domestic control over the country's electricity system. It claimed that deregulation and the introduction of a competitive electricity market had undermined utility conservation programs and called for their reinstatement. It also highlighted what the union viewed as the negative impact of NAFTA in narrowing the public policy options of government while facilitating the integration of Canada's electricity system into a continental framework dominated by the U.S. (CUPE 2003).

These policies have been accompanied by specific actions designed to stop deregulation and preserve public ownership in this sector. For example, in 2009, CUPE and other civic unions launched a court challenge to the decision of the city of Edmonton to privatize the electricity generating assets of Epcor. In Ontario, the CEP and CUPE successfully challenged the government's proposed \$5.5 billion sale of part of the transmission assets of Hydro One, forcing it to scrap its plans for the largest IPO in Canadian history. The court ruling in 2002 directed the government to halt the sale because it had no legislative authority to do so. In BC, two unions, the Canadian Office and Professional Employees (COPE) Local 378 and IBEW Local 258 have engaged in a decade long fight to prevent the break up and privatization of BC Hydro. They supported a class action lawsuit by BC Citizens for Public Power to stop the contracting out of the administrative and billing services of BC Hydro to Accenture. Although the lawsuit was eventually dropped because the government amended the legislation on which it was based, the action focused public attention on the government's efforts to weaken BC Hydro. COPE also financed a major campaign to oppose the incremental privatization of electricity production in BC. It set up a special website for its Take Back the Power campaign and populated it with credible, union funded research reports and videos illustrating the negative impacts of private power projects (COPE 378, 2011).

In recent years, energy sector unions, along with the broader labour movement, have been pushing for new policies that are explicitly focused on ‘greening’ the economy, both in terms of a more environmentally responsible approach to energy production and in terms of creating a manufacturing sector with the capacity to provide the products needed in the transition to such an economy. A number of major unions have passed policy statements and convention resolutions that reflect this approach.³⁷

Unions have also attempted to build bridges with parts of the environmental and social justice movements, taking initiatives to establish a variety of forums in which labour activists and members of these other organizations can discuss co-ordinated responses to climate change. One such recent initiative is the Green Energy Network. It is sponsored by the Canadian Labour Congress, a number of major environmental organizations such as Greenpeace, the Sierra Club, the David Suzuki Foundation and the Pembina Institute. It also includes a number of leading NGOs such as the Council of Canadians, the Polaris Institute and Kairos. The goal is to develop a collaborative process in which the various partners can develop policy responses to climate change that will incorporate environmental, employment, training and social justice considerations (Green Economy Network, 2010).

At the provincial level, COPE and IBEW as well as the BC Federation of Labour have supported public policy advocacy groups such as BC’s Citizens for Public Power, which brings together labour, environmental and citizen representatives. Its focus has been to challenge the provincial government’s electricity privatization agenda and to work with other organizations to promote policies that give priority to energy conservation, rather than the expansion of export led private power development.

The BC Federation of Labour and its major affiliates sponsored a major conference in September, 2010 entitled “Jobs, Justice and the Environment.” It was co-sponsored by the Sierra Club, the Pembina Institute, the David Suzuki Foundation, Eco Justice and the Canadian Centre for Policy Alternatives among others. It brought together labour, environment, social justice and community organizations to build a broader coalition for the promotion of fundamental policy changes needed to combat the challenge of global warming in British Columbia. It also invited representatives of the BlueGreen Alliance in the U.S. to share their experience in coalition work. Energy sector unions and provincial federations of labour in other provinces have also initiated similar kinds of campaigns.

It would be misleading to argue that there are no tensions between organized labour and environmental groups. The kinds of changes that global

warming will trigger will also create ‘winners and losers’. While energy sector unions are supportive of major policy changes they are also concerned that these changes do not unreasonably or unfairly impact their members. This is one reason why the question of how to transition to a greener economy in a manner that shares the burdens fairly is high on the agenda of many unions. Nor would it be accurate to say that the unions themselves are in full agreement on the policy changes needed. Union members are part of the larger society in which they live and work. They are influenced by the overall climate of public opinion on these issues. They have practical concerns about their own jobs and their economic futures. To some degree their opinions reflect the circumstances — and the interests — of the industries in which they work. While it remains to be seen how unions will meet these challenges, certainly there is evidence that many unions understand the seriousness of the climate change issue and are attempting to find a way to develop effective responses.

In sum, it is premature to speculate on how much influence these various union initiatives to address the challenge of climate change may have on the future direction of Canada’s energy sector. As noted earlier in this paper, the Federal Government appears intent on a massive expansion of the tar sands, as well as further integration of Canada’s electricity system into the U.S. grid. It has pushed this agenda forward through negotiating a number of new agreements with the U.S. which have set the country on a trajectory that may be very difficult to change. Whether unions and the workers they represent will be able to affect this trajectory will depend in large part on how energy policy unfolds in the coming years and how quickly Canada experiences the impact of global warming.

Conclusion

THE GENERAL ASSUMPTION that policies that would bring about substantial reductions in carbon emissions would have a negative effect on employment in the energy industry in Canada is undoubtedly true (Jaccard 2008). However, Canada is unlike the U.S. and European countries: it is not experiencing reductions in oil and gas production as is occurring elsewhere. While conventional oil and gas production is declining, as elsewhere, Canada's production from unconventional sources is expanding. Canada's use of electricity is also increasing. Associated with this expanded energy production are government policies that encourage the growth of oil and gas production while doing relatively little to encourage reductions in consumption of either oil and gas or electricity. In the electricity sector a large proportion of generation comes from hydro-based systems with some provinces also heavily reliant on nuclear energy, both of which are renewable resources that do not contribute to climate-related emissions.³⁸

Our review of the existing literature on employment in the energy sector concludes that the kinds of employment demands that have existed will continue for the foreseeable future. If government introduces substantial carbon-reduction policies, this may change, but this is not the current trajectory. New production in renewable industries such as wind and solar is more labor-intensive than in existing electricity production, but constitutes a very small proportion of the market so far. While these industries are likely to grow considerably by 2020, their job creation potential is relatively small.

It should be noted that these industries will be competing with existing generating companies for labour and since this is a sector where wages are high, the cost of labour may well be a barrier to continued expansion of these industries. This is because the kinds of jobs needed in the renewable energy sector are not markedly different from those required in the major energy sectors. While the labour force of the energy sector has traditionally been largely male from within Canada, the industry recognizes that labour shortages may force changes here. In virtually all areas of energy development, there are skills shortages and calls for additional training. These shortages cover a wide range of different occupations, from engineers and architects to skilled trades, equipment operators, technicians and even construction labourers. Skills shortages also vary, regionally and by energy sector (Alberta Employment and Immigration 2007; Lorenz 2007; SEC 2007b; SDI 2003). Most of the shortages are for jobs in conventional energy production. However, the renewable sector is also experiencing significant shortages of qualified personnel (Robitaille & Etheverry 2005; SQWenergy 2008).

Other than large-scale hydro projects where several provincial governments, such as Quebec, Ontario and Manitoba, have attempted to link some of the spending with local employment or industrial offsets, public support for private green energy projects has produced fairly limited job growth outside direct construction. Even where provinces have attempted to link 'green energy' subsidies to industrial development, their efforts have been very modest. Since most permanent jobs related to 'green' energy are created through the manufacturing of green technology, the absence of a policy to increase domestic use of this technology through Canadian based manufacturing means the loss of the employment potential of renewable energy expansion. Somewhat perversely, governments in Canada now believe that many of the policy tools associated with activist industrial strategies are 'protectionist'. If Canada is to realize the full job creation potential of green energy development, this view may have to change.

Bibliography

- Alberta. (2010) "Alberta Heritage Savings Trust Fund: Second Quarter Report 2010–2011." <http://www.finance.alberta.ca>. downloaded Jan. 28, 2011.
- Alberta Construction Magazine. (2008). "Canadian Natural Resources Limited Horizon Oil Sands Upgrader Project" Nov. Edition.
- Alberta Employment and Immigration. <http://employment.alberta.ca/apps/cba/search.asp>
- Alberta. Employment and Immigration. (2007). *Building and Educating Tomorrow's Workforce*. Edmonton: AB.
- Alberta. (2010). *Alberta Heritage Savings Trust Fund Annual Report 2009–2010*. Edmonton: AB
- Alberta Federation of Labour (AFL). (2010). "Report on Temporary Foreign Workers in Alberta." Edmonton: Dec 16, 2010. <http://www.afl.org/index.php/Temporary-Foreign-Workers/overview.html>
- Alberta Federation of Labour. (2009). "Entrenching Exploitation: Second Report of the Alberta Federation of Labour Temporary Foreign Worker Advocate" Edmonton: April. <http://www.afl.org/index.php/Reports/entrenching-exploitation-second-rept-of-afl-temporary-foreign-worker-advocate.html>.
- Alberta Federation of Labour. (2007). "Temporary Foreign Workers: Alberta's Disposable Workforce." Edmonton: Nov.
- Ayee, Gloria, Marcy Lowe, and Gary Gereffi. (2009). "Wind Power: generating electricity and employment." Chapter 11 in *Manufacturing climate solutions: carbon-reducing technologies and U.S. jobs* (Duke University. Center on Globalization Governance and Competitiveness). http://www.cggc.duke.edu/environment/climatesolutions/greeneconomy_Ch11_WindPower.pdf. Accessed Nov. 18, 2009.
- Bailey, Dan and Wendy Sol. (2010). "Presentation Regarding Electricity Generation in Saskatchewan to the Standing Committee on Crown and Central Agencies." Saskatoon, Saskatchewan: Communications, Energy and Paperworkers' Union of Canada.
- Bain, George. (1970). *The Growth of White Collar Unionism*. Oxford: The Clarendon Press.

- Barrett, James P., J. Andrew Hoerner, Steve Bernow, and Bill Dougherty. (2002). *Clean energy and jobs: a comprehensive approach to climate change and energy policy*. Washington, DC: Economic Policy Institute and the Center for a Sustainable Economy (CSE).
- BC Sustainable Energy Association. (2005). *Sustainable Energy Solutions for BC*. Victoria: BCSEA.
- Bezdek, Roger. (2009). *Green collar jobs in the U.S. and Colorado: economic drivers for the 21st century*. (Boulder, Colorado: American Solar Energy Society).
- Blanco, Maria Isabel and Gloria Rodrigues. (2009). Direct Employment in the Wind Energy Sector: An EU Study. *Energy Policy*. 37:8.
- BlueGreen Alliance. (2009). *How to revitalize America's middle class with clean energy jobs*. Minneapolis: BlueGreen Alliance. June.
- Boettcher, Markus, Niels Peder Nielson, Kim Petrick. (2009). *Employment Opportunities and Challenges in the Context of Rapid Industry Growth*. (Munich: Bain & Co.)
- Bradsher, Keith. "Union Accuses China of Illegal Clean Energy subsidies," *New York Times*, Sept. 9, 2010.
- Bridges Trade BioRes, "Japan Challenges Canadian Renewable Energy Incentives at WTO," Vol. 10, No. 17, September 24, 2010.
- Bridges Weekly Trade News Digest, "U.S., EU Joint in Row over Canadian Green Energy Incentives," Vol. 14, No. 34, October 7, 2010.
- Building Trades of Alberta. <http://www.buildingtradesalberta.ca/>
- Calvert, John. (2007). *Liquid Gold: Energy Privatization in British Columbia*. Halifax & Winnipeg: Fernwood.
- Caldes, N., M. Varela, M. Santamaria, R. Saez. (2009). "Economic Impact of Solar Thermal Electricity Development in Spain." *Energy Policy*. 37:5.
- Canadian Association of Petroleum Producers (CAPP). (2009). *Oil Sands: An important asset generating benefits across Canada*. CAPP.
- Canadian Association of Petroleum Producers. (2010). *Statistical Handbook for Canada's Upstream Petroleum Industry*, July.
- Canadian Energy Research Institute. (2003). *Economic Impact of the Canadian Nuclear Industry*. Calgary: CERI.
- Canadian Energy Research Institute. (2009). "The Impacts of Canadian Oil Sands Development on the United States' Economy Final Report." October...
- Canadian Electricity Association (CEA). (2004). *Keeping the Future Bright: 2004 Canadian Electricity Human Resources Sector Study*. Ottawa: CEA.
- Canadian Energy and Paperworkers' Union. (2008). *Energy Policy #917 revised*. Ottawa. <http://www.cep.ca/about/policies>.
- CEP (2002) Energy Policy 917, Oct. 1 Canadian Energy and Paperworkers' Union. (2000). *Just Transition to a Sustainable Economy in Energy: Policy 915*. Ottawa. Sept. <http://www.cep.ca/about/policies>
- Canadian Labour Congress. (2003). "Canadian Labour Congress Policy on Energy" Ottawa: November.
- Canadian Labour Congress. (2007). Report of the CLC Task Force on Power Generation Ottawa: March,

- Canadian Labour Congress. (2008). "Climate Change and Green Jobs: Labour's Challenges and Opportunities Document 9." 25thCLC Convention, May.
- Canadian Office and Professional Employees union Local 378. (2011) "Take Back the Power Campaign" <http://www.cope378.ca/campaign/take-back-power>. Downloaded Jan 9, 2011.
- Canadian Petroleum Products Institute. (2011). http://www.cppi.ca/index_e.php?p=23. Retrieved Jan. 8.
- Canadian Union of Public Employees. (2003). "Deregulation, Privatization and the Ontario Power Failure". CUPE Research. Ottawa: Sept.
- Churchill, Jason, Len Coad and Maureen Dickson. (2007). *Canada's Energy Future*. Ottawa: Conference Board of Canada. June.
- Clare, Demerse. (2006). "Leaked Government Document Says Canada Should End Fossil Fuel Subsidies" Pembina Institute. <http://climate.pembina.org/blog/92>, accessed May 26, 2010.
- Clarke, Tony. (2008). *Tar Sands Showdown* (Toronto: James Lorimer).
- Clean Energy Group and Meridian Institute. (2009). *Accelerated Climate Technology Innovation Initiative (ACTII): a new distributed strategy to reform the U.S. energy innovation system*. Washington DC: Clean Energy Group and Meridian Institute. November.
- Cohen, Marjorie Griffin. (2006). "Why Canada needs a national energy plan," *The CCPA Monitor*, Vol. 12, No. 8 (February), pp. 1, 12–14.
- Conference Board of Canada. (2006). *Economic Impact Analysis of the Proposed Wind Development Projects in Southeast Alberta*. Ottawa: Conference Board of Canada. November 15.
- Construction Sector Council. (2010). "Construction Looking Forward: An Assessment of Construction Labour Markets from 2010 to 2018 for Alberta." Ottawa; May, 2010. <http://www.csc-ca.org/english/index.html>.
- Construction Sector Council (2007). "Temporary Foreign Workers in the Canadian Construction Industry: An Analysis of Programs and Mechanisms" Ottawa. <http://www.tempforeignwork.ca/>.
- Cryderman Kelly. (2008). "Alberta hit with 800 complaints from foreign workers" Calgary Herald, April 1.
- de Guerre, Katherine. (2009). "Temporary Foreign Workers in Alberta's Oil Sector" University of Sussex Working Paper No 54. Feb. 2009.
- Doern, Bruce G. and Monica Gattinger. (2003). *Power Switch: Energy Regulatory Governance in the Twenty-First Century* (Toronto: University of Toronto Press)
- Donmac, J., K. Richards, and S. Risovicc. (2005). "Socio-economic drivers in implementing bio-energy projects." *Biomass and Bioenergy*. 28
- Dwivedi, O.P. , Patrick Kyba, Peter J. Stoett, Rebecca Tiessen. (2001). *Sustainable Development and Canada: National & International Perspectives* (Peterborough, On.: Broadview Press).
- Eco Canada. (2007). *Profile of Canadian Environmental Employment 2007*. (Ottawa: ECO Canada).
- Electricity Sector Council. (2007). *Labour Market Demand and Transitions in the Electricity Industry* <http://www.brightfutures.ca/resource-centre/trends.html> (accessed July 14, 2010).
- Electricity Sector Council (ESC). (2007b). *Human Resource and Skill Needs Facing the Ontario Electricity Sector: Appendix F of the report of the Agency Review Panel on Phase II of its review of Ontario's provincially-owned electricity agencies*. Toronto: Ontario Ministry of Energy. Agency Review Panel. November.

- Electricity Sector Council. (2008). *Powering the Future: 2008 Labour Market Information Study* (Ottawa: Canada's Sector Council Program).
- Elector Sector council. (2009). *Buiding bright futures: 2009 Labour Force survey of the Canadian Solar Industry* (Ottawa: Canada's Sector Council Program).
- Emery, J.C. Herbert. (2006). *Alberta's Labour Market Needs to 2015*. Calgary: University of Calgary. July.
- Engel, Ditlev, Daniel Kammen. (2009). *Green Jobs and the Clean Energy Economy*. Copenhagen Climate Change Council's Thought Leadership Series.
- Environment Canada *Greenhouse Gas Emissions Data Tables*.
- European Wind Energy Association (EWEA). (2009). *Wind at work: Wind energy and job creation in the EU*. EWEA.
- Gardner Pinfold Consulting Economists Limited. (2009). *Economic Impact of Offshore Oil and Gas Development in Nova Scotia, 2002–2006*. Halifax: NS. Department of Finance. March.
- Gereffi, Gary and Kristen Dubay. (2008). "Concentrating Solar Power: Clean Energy for the Electric Grid." In *Manufacturing Climate Solutions: Carbon reducing technologies and U.S. jobs*. Duke University Centre on Globalization, Governance and Competitiveness.
- Global Advantage Consulting. (2009). *Building a Green Economic Stimulus Package for Canada*. Ottawa: Sustainable Prosperity.
- Global Insight. (2008). *U.S. Metro Economies: current and potential green jobs in the U.S. economy*. U.S. Conference of Mayors and the Mayors Climate Protection Centre.
- Green Economy Network (2010), "Vision Statement: Green Economy Network." <http://www.green-economy.net.ca/section/2> downloaded July 10.
- Gunton, Thomas. (2003). "Megaprojects and regional development." *Regional Studies*. 37:5.
- Harding, Jim. (nd). *Is Nuclear the Answer to Global Warming?* Regina: CCPA, Saskatchewan Office.
- Hildebrand, Bernhard, Hans Georg Buttermann, Jean Marc Behringer, Micheala Bleuel. (2006). "The Expansion of Renewable Energies and Employment Effects in Germany." *Energy Policy*. 34
- Hofman, Karen, Xianguo Li. (2009). "Canada's Energy Perspectives and Policies for Sustainable Development." *Applied Energy*. 84: 4, April.
- Howard, Peter, Govinda Timilsina, Janna Poliakov, Michael Gatens, Peter Bastian, Chris Mundy. (2006). *Socio-Economic Impact of Horseshoe Canyon Coalbed Methane Development in Alberta*. Calgary: Canadian Energy Research Institute.
- Human Resources and Skills Development Canada, Citizenship and Immigration Canada and Alberta Learning (2008). "Memorandum of Understanding For the Entry of Temporary Foreign Workers For Projects in the Alberta Tar sands." March 5. http://142.236.154.113/eng/workplaceskills/foreign_workers/contracts-forms/moualbertaoil.shtml
- Jaccard, MK & Associated. (2008). *Preliminary Report: Exploration of a policy package to reduce Canadian greenhouse gas emissions 25% below 1990 levels by 2020* (Vancouver: MK Jaccard & Associates Inc., Dec.)
- Jothen, Kerry and Roslyn Kunin. (2007). *Labour Market Needs in British Columbia's Oil and Gas Industry*. Victoria: Ministry of Energy, Mines and Petroleum Resources
- Kammen, Daniel M., Kamal Kapadia, Matthias Fripp (2006). *Putting Renewables to Work: how many jobs can the clean energy industry generate?* (Berkley: University of California, Berkley).

- Kennedy, Scott. (2005). "Wind Power Planning: assessing long-term costs and benefits." *Energy Policy*. 33: 13.
- Lehr, Ulrike, Joachim Nitsch, Marlene Kratzat, Christian Lutz, Dietmar Edler. (2008). "Renewable Energy and Employment in Germany." *Energy Policy*. 36: 1.
- Lorenz, Andrea. (Summer 2007). "Competency Pays! The Petroleum Competency Program Provides a Win-Win-Win Situation for Employees, Service Companies, and Producers." *Onstream*. (pp. 8–12)
- Marshall, Dale. (2002). *Making Kyoto Work: A transition strategy for Canadian energy workers* (Ottawa: Canadian Centre for Policy Alternatives).
- Mattera, Phillip. (2009). *High Road or Low Road? Job quality in the new green economy*. Washington, DC.
- McColl, David. (2009). *Green Bitumen: the role of nuclear, gasification and CCS in Alberta's oil sands: summary report*. Calgary, AB: Canadian Energy Research Institute.
- McCullum, Hugh. (nd). *Fuelling Fortress North America: A Report on the Athabasca Tar Sands and U.S. Demands for Canada's Energy* (Ottawa: Canadian Centre for Policy Alternatives). Available at www.policyalternatives.ca.
- McEvoy, D., D.C. Gibbs, J.W.S. Longhurst. (2000). "Assessing the Employment Implications of a Sustainable Energy System: a methodological overview." *Geographical and Environmental Modelling*. 4:2.
- McMonagle, Rob. (2005). *Job Creation Potential of Solar Energy in Canada* (Ottawa: The Canadian Solar Industries Association). www.cansia.ca (accessed July 22, 2010.)
- National Energy Board. (2009). 2009 Reference Case Scenario: Canadian Energy Demand and Supply to 2020. (Ottawa: National Energy Board)
- National Post. (2007). "Alberta Labour Flexes Its Muscles" Aug. 11.
- Natural Resources Canada web site. <http://www.nrcan.gc.ca/eneene/polpol/owevue-eng.php> downloaded June 13, 2010.
- Natural Resources Canada. (2006), *Canada's Energy Outlook: The Reference Case, 2006* (Ottawa: Natural Resources Canada).
- Neuwahl, Frederik, Andreas Loschel, Ignazio Mongelli, Luis Delgado.(2008). "Employment Impacts of EU Biofuels Policy." *Ecological Economics*. 68.
- Ontario. (2009). *Green Energy and Green Economy Act, 2009*, Toronto: Ont. Petroleum Labour Market Information (PLMI). *Supply/Demand Analysis 2009–2020*. (Ottawa: Petroleum Human Resources Council of Canada).
- PLMI. (2010). "Petroleum Labour Market Information. Supply/Demand Analysis 2009–2020." Petroleum Human Resources Council of Canada. March.
- Newcomb, Bob. (2004). *Economic Impacts of Offshore Oil & Gas Development on Nova Scotia 2001–2003*. A Progress Report. Halifax: NS. Department of Energy.
- Pollin, Robert and Heidi Garrett-Peltier. (2009). *Building the green economy: employment effects of green energy investments for Ontario*. Green Energy Act Alliance, BlueGreen Canada, World Wildlife Federation. http://www.greenenergyact.ca/Storage/25/1722_PERI_ON_Green_Jobs_Report.pdf.
- Raynolds, Marlo. (2008). *Recommendations for an Economic Stimulus*. Pembina Institute. December 18.

- Renner, Michael. (2008). *Green Jobs: Working for People and the Environment*. (Washington, D.C.: Worldwatch Institute.
- Robitaille, Lise and Jose Etcheverry. (2005). *Training, Education, and Public Awareness: key components for developing a strong and vibrant Canadian solar industry*. Solar Energy Society of Canada.
- Roland-Holst, David. (2008). *Energy Efficiency, Innovation, and Job Creation in California*. Berkeley: UC Berkeley. October.
- Sanborn, Tom. (2010) "What Do We Owe to Our Guest Workers" *the Tyee* June 1.
- Sovereign Wealth Fund Institute. "Sovereign Wealth Fund Rankings, Dec, 2010" <http://www.swfinstitute.org/fund-rankings/> Downloaded Jan 28, 2011.
- sqwenergy. (2008). *Today's Investment and Tomorrow's Assets: skills and employment in the wind, wave, and tidal sector*. A report to the British Wind Energy Association. BWEA. October
- Strategic Directions Inc. (SDI). (2003). *Labour Market Assessment of the Oil and Gas Industry Supply and Service Sector in Newfoundland and Labrador*. St. John's, Nfld.: PIHRC and NOIA.
- Statistics Canada, *Electric Power Generation and Distribution, 2007*. Catalogue no. 57-202-X; <http://www.statcan.gc.ca/pub/57-202-x/2007000/part-partie1-eng.htm>. accessed June 3, 2010.
- Statistics Canada, *Energy Statistics Handbook 2011*, Fourth Quarter 2010.
- Statistics Canada. (2007), *Labour Force Survey: Total Employment in Canada by Age Group and Gender for NAICS 2211*.
- Statistics Canada. (2009), "*Energy Statistics Handbook, 2009*." Catalogue no. 57-601, Fourth Quarter.
- Statistics Canada, Employment (2010 a) (SEPH) http://cansim2.statcan.gc.ca/cgi-win/cnsmc-gi.exe?Lang=E&RootDir=C11/&ResultTemplate=C11/C11___&Array_Pick=1&ArrayId=2810024, accessed June 1.
- Statistics Canada. (2010 b) Employment, Earnings and Hours. Catalogue. No. 72-002-X. Sept.
- Statistics Canada. (2010 c). *Perspectives on Labour and Income* Oct. "Table 1. Union Membership and Coverage by Selected Characteristics." <http://www.statcan.gc.ca/pub/75-001-x/2010110/tables-tableaux/11358/tbl001-eng.htm>. accessed Dec. 28, 2010.
- Thornley, Patricia, John Rogers, and Ye Huang. (2008). "Quantification of Employment from Biomass Power Plants." *Renewable Energy*. 33:8.
- Timilsina, Govinda, Thorn Walden, Paul Kralovic, Asghar Shahmoradi, Abbas Naini, David McColl, Phil Prince, Jon Rozhon. (2008). *The Canadian Nuclear Industry: contributions to the Canadian economy*. Calgary: Canadian Energy Research Institute. June. United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada. (UA). <http://www.uacanada.ca/>
- United States. Department of Energy. (2005). *Buried Treasure: The Environmental, Economic and Employment Benefits of Geothermal Energy*. Washington, DC: U.S. DOE
- University of British Columbia (UBC). (2009). *Sustainability Labour Market Trends: A Canadian and International Perspective*, Report by Academic Programs Working Group and the UBC sustainability Office (Vancouver: University of British Columbia).
- Vanderclippe, Nathan. (2010). Oil Sands Firms Look at Outsourcing. *Globe and Mail*, Dec. 28.
- John W. Warnock. (2006). *Selling the Family Silver: Oil and Gas Royalties, Corporate Profits, and the Disregarded Public* (Edmonton: Parkland Institute.)

Walz, R. (2006). "Impact Strategies to Increase RES in Europe on Employment and Competitiveness." *Energy & Environment*. 17:6.

Williams, Cora. (2007). "Fueling the Economy," *Perspectives on Labour and Income*, Vol 8, No. 5

Appendix 1

Electricity Generation in Canada

TABLE 3 Electricity Generation in Canada

Source	GWh	% of Total
Hydro	363,626	57.90%
Coal	106,188	16.90%
Nuclear	92,040	14.70%
Gas	36,324	5.80%
Oil	19,442	3.10%
Biomass	9,036	1.40%
Wind	1,471	0.02%
Waste	19	0.00%
Solar PV	17	0.00%
Tide	31	0.01%
Geothermal	0	0
Solar thermal	0	0
Total	628,194	100%

Source Electricity Sector Council. "Powering up the Future." 2008 Labour Market Information Study

Appendix 2

Energy Employment by Sub-Sector

TABLE 4 Energy Employment by Sub-Sector, 1991–2008

	1991	1996	2001	2005	2008
Oil and gas extraction	43186	32962	37539	44346	56278
Coal mining	12879	10270	6030	5037	6443
Support activities for mining and oil and gas extraction	40125	34514	50177	71453	87442
Electric power generation, transmission and distribution	100790	86920	87607	90627	93267
Natural gas distribution	11795	12541	11527	15060	15901
Petroleum and coal product manufacturing	16829	13990	15305	15758	17904
Petroleum product wholesaler-distributors	10806	10831	12873	12243	13792
Pipeline transportation	5556	4842	4369	n/a	n/a
Total	241966	206870	225427	254524	291027

Source Statistics Canada, Table 281-0024-Employment (SEPH), unadjusted for seasonal variation, by type of employee for selected industries classified using the North American Industry Classification System (NAICS), annual (persons) (4,14). Pipeline transportation numbers suppressed in 2005 and 2008 for confidentiality reasons.

Note The above numbers do not include employment in gasoline stations or related retail services.

Notes

1 An earlier and shorter version of this paper, one that did not include extensive information about trade unions, appeared on the website of Work in a Warming World (<http://www.workinawarmingworld.yorku.ca/>).

2 The focus of this study is on the production of energy, not on its consumption or on Canada's energy conservation potential. The latter issues are also of critical importance in addressing GHG emissions and climate change, but are outside the scope of this research. The use of energy to produce oil, gas, coal and other energy products is not the same as the resulting energy output.

3 The terms 'tar sands' and 'oil sands' refer to the extraction of very heavy oil, bitumen, in Alberta. The common term used is 'tar sands,' although there is an attempt by the industry to shift the name to 'oil sands.' "Green bitumen" refers to the attempt to achieve emissions reductions below that of conventional crude oil (McColl 2009).

4 In 1990 the oil and gas and electricity sector contributed about the same proportion of GHG to the Canadian total.

5 Thus economic downturns in major industries, such as pulp and paper or mining, can have a very substantial impact on energy use by industrial customers.

6 A significant factor in the future use of coal to generate electricity will be the extent that Ontario is able to implement its commitment to phase out coal fired generation in the coming years (NEB 2009).

7 The nuclear industry defines its energy generation as 'green' because nuclear generation of electricity does not produce GHG emissions. However the industry itself is the primary proponent of defining nuclear energy as 'green.' (Timisina et al 2008, pg. 13). Environmentalists tend to see the possibility of environmental destruction on a massive scale from nuclear accident and the enormous environmental issues associated with nuclear waste serious problems in classifying nuclear energy as 'green' energy (Marshall 2002, p34).

8 The website also acknowledges that it is sometimes necessary to have government intervention: "*Where necessary, targeted intervention in the market process to achieve specific policy objectives through regulation or other means: These policy objectives include issues of health and*

safety (e.g., pipeline regulation) and environmental sustainability". The government goes on to note that the Western Accord, the Agreement on Natural Gas Markets and Prices, the Atlantic Accords and, most significantly, the North American Free Trade Agreement effectively frame its policy orientation. (<http://www.nrcan.gc.ca/eneene/polpol/owevue-eng.php>) downloaded June 13, 2010.

9 Clare Demerse of the Pembina Institute believes that federal subsidies to the industry now amount to approximately \$2 billion annually (Demerse, nd).

10 Neither the federal, nor the provincial governments have shown any appetite in recent years for revisiting the issue of privatizing Petro Canada or establishing a state oil company similar to what many other countries, such as Norway, have done. The largest oil companies and the largest reserves throughout the world are currently owned by nation states (Cohen 2006, p. 14).

11 In this regard it is interesting to compare the approach of Alberta with Norway. While the timing of their respective production rates varies, both jurisdictions have produced about the same volume of oil over the past four decades. According to the Sovereign Wealth Fund Institute, as of December, 2010 Norway has over US\$512 billion in its 'rainy day' pension fund for future generations – a fund built up principally from its oil and gas revenues. (Sovereign Wealth Fund Institute, 2011). In comparison, Alberta's Heritage Savings Trust Fund, which was started in 1976, had accumulated assets of \$14.8 billion as of September 30, 2010. (Alberta Heritage Savings Trust Fund. 2010)

12 Over the last decade various incentive programs have been initiated to promote private sector green energy development. Typically, these programs provide tax abatements, or direct subsidies, such as a 1 cent per KWh payment for energy produced from new renewable projects for a fixed time period. See for example the \$1.48 billion ecoEnergy for Renewable Power fund announced in 2010 by the Federal Government. Information downloaded from NRC web site July 9, 2010. (<http://www.ecoaction.gc.ca/ecoenergy-ecoenergie/power-electricite/index-eng.cfm>).

13 This number does not include estimates of the employment generated in the upstream transportation, manufacturing, services, government and other economic sectors.

14 Figures for pipeline transportation are not available after 2001, which explains the appearance of a decline in employment in that sector.

15 Shale gas is produced from a sedentary rock formation composed of clay minerals and other minerals. Until recently, it was difficult to extract natural gas from such formations. However, a new process, known as hydrolic fracturing, or 'fracking,' now enables gas producers to open up the seams in the clay, allowing the gas to escape. As a result, large new pools of natural gas can be commercially exploited. The process remains controversial due to its potential environmental impacts on water supplies. Tight gas is gas that is difficult to extract from the sand in which is found with conventional technologies. This can be due to low pressure or low permeability of the sand or rock formation in which it is found. For a discussion of recent advances in extracting shale and tight gas, see: National Petroleum Council, "Topic Paper #29: Unconventional Gas" Washington: July 18, 2007.

16 Synthetic and bitumen production has increased by 387% since 1990.

17 Canada is the third largest per person consumer in the world, after two other cold countries whose electricity largely comes from hydro: Iceland and Norway.

18 The decrease in demand in 2009 relate to the economic crisis that began in 2008, however the long-term trajectory is for changes in demand to rise faster than the changes in population.

19 The last section of this paper provides an analysis of issues facing trade unions in the energy sector.

20 The estimates of the size of the electricity labour force range considerably, from the Electricity Industry Survey Publication (2005) of 76,498, to the Labour Force Survey of 105,500 (Electricity Sector Council 2008, p. 31).

21 See, for example, the full-page ad in the *Globe and Mail*, May 31, 2010 which is a message from Canada's Oil Sands Producers. It features Garrett Brown, of ConocoPhillips saying "I Grew up on a farm. I know what it means to have the land restored." The ad goes on to say that for years the petroleum producers have been planting grass and they are now beginning to plant trees, so that in a few years the forest will be re-established.

22 It is not possible to get information about the electricity sector from the report.

23 This study relates to the Northeast Coal Project and compares pre-project forecasts to post-project outcomes for one of the largest megaprojects ever undertaken in Canada. Less than half the expected regional employment occurred and the project's proposal greatly over-estimated both direct employment and its multiplier effect. The project wound up having a negative effect on regional development.

24 This is aside from whether the jobs themselves will be good jobs. For a test of assumptions that green jobs will be good jobs see Mattera 2009.

25 A nacelle is the casing, or housing, for the electrical generator and other related mechanical components of a wind turbine.

26 For a detailed estimate of the number of workers from the various trades that are currently working in Alberta, as well as for estimates of future demand for these trades, see: Construction Sector Council. "Construction Looking Forward: An Assessment of Construction Labour Markets from 2010 to 2018 for Alberta." Ottawa; May, 2010. <http://www.csc-ca.org/english/index.html>.

27 Given how much of Alberta's economy is dependent on the energy sector, it is also difficult to distinguish between construction work done directly for the industry, and work that is being done as a result of the industry's demands for various economic inputs needed to support its activities.

28 This also underlines one of the challenges of getting a clear picture of construction union membership on oil and gas projects. Due to the demand for their skills in other areas of construction, building trades workers can readily move in and out of the oil and gas sector. Internal union data on the number of members is often not disaggregated according to the sector in which they work. Consequently, knowing the number of members of a particular trade who are members of an individual union local, or the total number in the parent union working in a province does not necessarily indicate the number active in the oil patch. Conversely, knowing the number of workers with specific trades qualifications working in the oil and gas sector does not necessarily provide reliable data on the number who are union members. To further complicate matters, construction contractors may be working in a number of different sectors of the construction industry, some of which are not oil and gas related. They may move their employees frequently from sector to sector depending on the contracts on which they have successfully bid and the skill requirements and timing of the different projects.

29 See, for example, the listing of the trades noted above that are included in CLAC Local 63's collective agreement with Ledcor Utility Infrastructure Inc. for the period 2008 to 2010. This and similar CLAC agreements can be found on the Alberta Employment and Immigration website. <http://employment.alberta.ca/apps/cba/search.asp>

30 In her paper examining Alberta's temporary foreign worker recruitment program for the tar sands, Katherine de Guerre notes that the oil industry still differentiates between recruiting managers who they bring in as landed immigrants and skilled trades and other workers, who normally enter as temporary foreign workers. The former are permitted to move their families and take up permanent residency, while the latter often end up living in camps on their own, separated from

their families and with no right to remain in Canada unless they continue to work for the same employer. (de Guerre 2009). For an overview of the principal elements of the temporary foreign worker program in Alberta, see: Human Resources and Skills Development Canada, Citizenship and Immigration Canada and Alberta Learning (2008) and Construction Sector Council, (2007)

31 Interestingly, because provinces exercise control over labour relations matters within their jurisdictions, it has been more difficult for the building trades' unions in Canada to negotiate comprehensive project agreements than in the U.S. For example, the recently announced start to the U.S. leg of TransCanada's Keystone project was accompanied by a news release that the four major unions involved in its construction will represent all the workers in their respective trades throughout the project's construction across a number of U.S. states. This is because U.S. federal labour legislation permits this type of agreement.

32 The percentage cited only includes hourly workers such as skilled trades classifications (line-workers, electricians, etc.), maintenance workers, labourers, vehicle drivers and other manual workers. As noted earlier in this paper, about 73% of all workers in this sector are represented by trade unions.

33 One of the challenges in obtaining data on the number of union members in the energy sector is that unions such as the IBEW have many locals that include both energy and non energy workers. As much of their work is project based, members may work on an energy project one year and an industrial or commercial project the following year. Also many employers in the construction sector work on a variety of different types of construction rather than focusing exclusively on energy projects. Project based work also results in wide fluctuations in the number of worker involved in energy construction from one year to the next. These and other factors make data collection a challenge in this part of the energy sector.

34 Interestingly, union density has not fallen very much during the past decade. According to Statistics Canada, union density in 2010 is 29.6%, a marginal decline from 32.2% a decade earlier. However union coverage is considerably below the 1981 figure of 38%.

35 Both the 2002 and the 2008 revised CEP 917 policy statements present very well thought out analyses of the seriousness of global warming and the inadequacy of the response of corporations and governments to it, particularly with respect to meeting Canada's Kyoto commitments. They lay out a clear policy agenda, both for labour and for governments which focuses on the need for fundamental changes to how Canada manages its energy sector. As such CEP Policy 917 and its 2008 revision are probably the best overall statements of a progressive labour response to global warming.

36 This policy document strongly criticizes NAFTA for locking Canada in to a policy of increasing energy exports to the U.S. It argues that the deregulation of prices has eliminated Canada's competitive advantage in downstream processing while providing a huge windfall to the oil and gas companies at the expense of Canadian consumers.

37 See, for example: Strategic Alliance Between Environmental Defence and USWA. May, 2008 and CEP and CUPE policies noted elsewhere in this paper.

38 As has been noted earlier, nuclear energy does have the potential to be extraordinarily damaging to the environment and many environmentalists point to other damages that occur through large-scale hydro development.



CCPA

CANADIAN CENTRE
for POLICY ALTERNATIVES

CENTRE CANADIEN
de POLITIQUES ALTERNATIVES