Labour Market Demand and Transitions in the Electricity Industry

Final Report

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ABOUT THE ELECTRICITY SECTOR COUNCIL

Approximately 100,000 Canadians are involved in the generation, transmission and distribution of one of our country's essential utilities: electricity. Their work powers homes and businesses across the country, fuelling everything from light bulbs, cell phones and refrigerators to water treatment plants and road vehicle assembly lines.

The Electricity Sector Council provides support to this dedicated team by working with industry employers and other stakeholders to research and resolve human resource and workplace development issues.

This report is also available in French and can be obtained electronically at www.brightfutures.ca.

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1. Executive Summary

This report is an examination of the short to medium term labour force demand for the electricity industry. It also explores barriers and opportunities facing the industry when dealing with labour market transition initiatives. Its assessment of current and emerging human resource needs and opportunities served as a foundation for a series of recommendations designed to maintain the electricity and renewable energy sector strength well into the future.

The report was prepared by the Educational Policy Institute on behalf of the Electricity Sector council. The project commenced in November 2006 and was finalized in September 2007.

This project was managed by the Electricity Sector Council (ESC) and was funded by the Government of Canada's Sector Council Program.

1.1 Key Findings

Talent Challenge

The electricity industry is not operating in a human resource vacuum. There are widespread skills shortages throughout Canadian industry, not just in electricity but also in resource areas such as petroleum and mining. These sectors are also looking at ways of acquiring new post-secondary education graduates. At some point, with many employers pursuing the same pool of potential employees, the only long-term solution will be to find a way of expanding the size of the pool.

These sectors (and many others) are also looking at ways of transitioning skilled workers from declining industries. As discussed in depth later in the report, this measure likely provides little in the way of potential supply for the electricity industry.

Knowledge Transfer Challenge

The electricity industry is set to experience a significant loss of older, experienced workers due to retirement in the next decade. These workers possess a tremendous amount of corporate memory and experience and it is imperative that a process be in place to ensure as much of this is preserved and passed onto to younger workers as possible. The industry could benefit from exploring programs that ensure knowledge transfer from older to new workers occurs.

Supply Challenge – Engaging Youth

Given the recruitment constraints on foreign trained workers (e.g., credential recognition, security clearance, language barriers, etc.) and the challenges in place for recruiting workers from declining industries, it stands to reason that the vast majority of recruitment energies should be place on younger workers. The ability to engage individuals prior to college, technical training or university is paramount. Youth need to be aware of the diverse career opportunities in the electricity sector (both traditional and emerging {renewable}). It is also important to highlight the stability of the industry and the relatively high compensation and benefits.

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Supply Challenge – Education and Training Programs

As stated in the CEA 2004 Keeping the Future Bright report, the projected number of electricity related program post-secondary education enrolees is well below the industry demand. This problem is further compounded by the fact that other resource based sectors (e.g., mining and petroleum) and telecommunications and technology firms are growing at the same time as electricity. This is intensifying the quest for domestically trained engineers.

An additional challenge is the inability to fully utilize Statistics Canada's national educational databases to extract both college (and technical institutes) and university enrolment and graduation data. University data has its limitations and college enrolment data has not been updated since 1998-1999. Plus, unlike university engineering data, there is no national or association reporting data similar to work done by the Canadian Council of Professional Engineers. The absence of this college data results in an inability to determine the number of technicians or technologists enrolled or graduating across Canada in any given year. The lack of comparable, national data means that data gaps must be plugged locally or through other collaborative efforts.

Supply Challenge – Retaining Existing Employees

Given the age of the existing workforce – i.e., the high proportion of employees who are in the 45- to 54-year-old age group, it is clear that the main human resource issue that the sector will be facing over the short to medium term is the replacement of retiring workers. This will have a much bigger impact than any increase in demand arising from growth in the industry or changes in productivity.

It is paramount that new employees be recruited and trained to enter the industry, however, it is equally important for the industry to not lose sight of the fact that many of the older workers possess a tremendous amount of corporate and technological knowledge and this needs to sustained and passed on. Also, older workers should, where possible, be encouraged to remain in the industry behind the traditional retirement age. In order for this to occur, increased efforts need to be placed on ensuring "phased retirement" (e.g., gradually reduced work over a set period of time) options are available for workers approaching retirement age to provide a slow disengagement from the industry instead of a sudden departure. Also, modifications could be made to organizational and government policy with respect to mandatory retirement (i.e., the extension of the mandatory retirement age), pension and other compensation benefits.

Employment Opportunity

North American policymakers are getting creative when designing programs or projects aimed at increasing an industry or jurisdiction's share of post-secondary graduates. Many healthcare professions now employ return for service agreements with new employees. These agreements often include a significant financial incentives contingent on the intended recipient committing to other party for an agreed upon block of time (e.g., 1 year).

Given the intense competition for, amongst other things, engineering graduates among many of the resource sectors, it stands to reason that a similar arrangement be attempted inside the electricity sector.

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Security Challenge (for Nuclear)

A component of the electricity industry faces additional labour entry barriers compared to other resource-based industries. Nuclear employees are often subject to multi-year long waits to receive proper government security clearance. These delays are likely to result in a mature worker from declining (or other) industries not be able to gain rapid re-employment into the nuclear field and also presents an additional barrier for foreign born workers.

1.2 Recommendations

The following summarizes the recommendations provided to the Electricity Sector Council based on findings from the Labour Market Demand and Transitions Project. The recommendations include recruitment and retention measures targeted to the electricity industry and to provincial and national associations.

The recommendations also include measures that are specific to some traditionally-underrepresented groups (e.g. Aboriginal Canadians), some specific to individuals from declining industries and others best suited for industry or association partners.

Growing the Talent Pool

1. Establish a couple of pilot projects using the framework of return for service agreements with post-secondary education students
2. Work with industry representatives to standardize industry training recognition
3. Create in-house mentorship opportunities
4. Continue to foster a culture of learning
5. Explore transition opportunities for mature workers
6. Expand electricity and renewable energy related youth marketing and awareness campaigns nationally
7. Be proactive in environmental discussions
8. Engage post-secondary institutions in the renewable energy expansion
9. Strengthen incentives, mentorship and outreach programs targeted at traditionally underrepresented individuals, document practices and share results

Transitioning Workers from Declining Industries

10. Create up to two employment recruitment pilot projects targeting workers from declining industries
11. Create a research database of past successes in transitioning from declining industries
12. Establish labour market transition initiatives with labour union representatives from industries in decline
13. Work with representatives in communities where industries are in decline

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2. Introduction

2.1 Background

In 2005, the Canadian Electricity Association (CEA) released a comprehensive study examining the short and intermediate human resource issues and challenges facing the electricity industry. The study – Keeping the Future Bright: 2004 Canadian Electricity Human Resource Sector Study –projected a future need of up to 20,000 new employees to meet the current and future human resource demands.

Another key study recommendation was to create a sector council. In part, in response to that recommendation, the CEA redefined and broadened its mandate. From this, the Electricity Sector Council (ESC) was created. The ESC is an organization with active participation and partnership of all communities of interest in the industry and takes the lead on implementing many of the recommendations made in Keeping the Future Bright.

In 2006, Human Resources and Social Development Canada (HRSDC) provided funds to five sector councils (Canadian Trucking Human Resource Council, Electricity Sector Council, the Environmental Careers Organization of Canada, the Petroleum Human Resources Council of Canada and the Mining Industry Human Resources Sector Council) to explore a series of labour market transition research projects through the Government of Canada's Sector Council Program.

2.2 Project Purpose

The purpose of this report is to develop an understanding of the barriers and opportunities mitigating short and medium term labour market demand for the electricity sector by engaging workers from sectors with excess labour supply. The report also seeks to provide insight into the tools and services required to assist workers desiring to transition to the electricity industry.

This report contains:

- An updated data analysis on the electricity industry with specific attention paid to labour force characteristics.
- An examination of domestic and international labour market transition literature.
- Telephone interviews with 43 key informants from within various sections of the electricity community.

Based on the above, this report identifies electricity human resource pressure points, provides additional context on the educational, skills and training backgrounds of declining industry employees, and recommendations designed, with the assistance of the ESC, to improve the ability of the electricity industry to meet the goals enunciated in the original research proposal, and to ensure that the industry can remain competitive in a heated labour market.

2.3 Organization of this report

The report begins with a summary of the most recent key electricity industry data and indicators in Chapter 3 (the full set of data is available in Appendix A). Chapter 4 is an overview of domestic and international labour market transition programs. Chapter 5 reviews the evidence

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collected during key informant interviews and provides an overview of attitudes on pivotal labour market subjects for employers, association representatives, labour officials and training representatives. The report concludes with a set of recommendations meant to provide future direction for the Electricity Sector Council and the electricity industry.

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3. The State of the Electricity Industry in Canada: A Summary

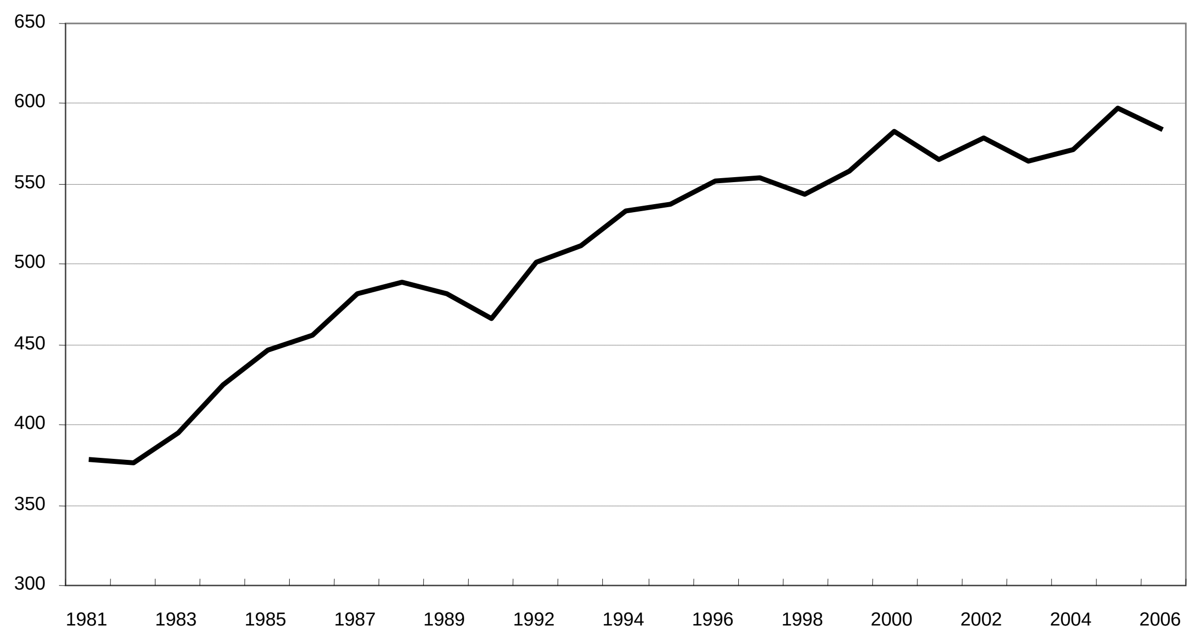
3.1 Summary and Observations

The Canadian electrical utility sector – which comprises firms whose primary activity is the generation, transmission, and distribution of electrical power – has undergone some significant changes in recent years.[1] In spite of these changes, however, the picture that emerges from the labour force data is generally one of stability rather than change.

3.2 Output and Gross Domestic Product

The amount of electricity generated in Canada has increased by an average of 1.2% per year over the past two decades, with higher rates of growth in the 1980s and lower rates of growth in recent years. From 1998 to 2006, the increase has been less than 1% per year (Figure 3.2.3).

Figure 3.2.3
Electricity Generated (MWH x 1,000,000)



There is a good deal of stability within the industry. Over time, the proportion of electricity generated from nuclear and “other” sources has increased slightly and the proportion from hydro has declined, but the changes are gradual (Figure 3.2.4). In 2006, for example, 60% of electricity was generated from hydro sources compared with 64% in 1996 and 67% in 1986. The

[1] For additional information about the electricity sector, see Keeping the Future Bright (Canadian Electricity Human Resource Sector Survey, 2004).

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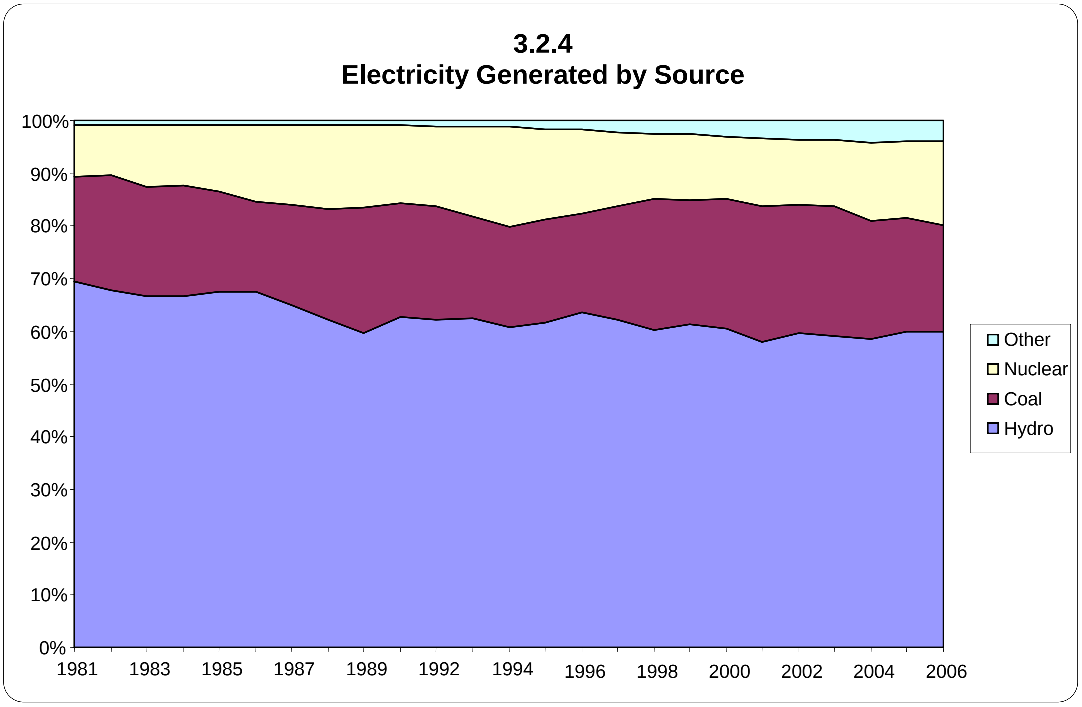
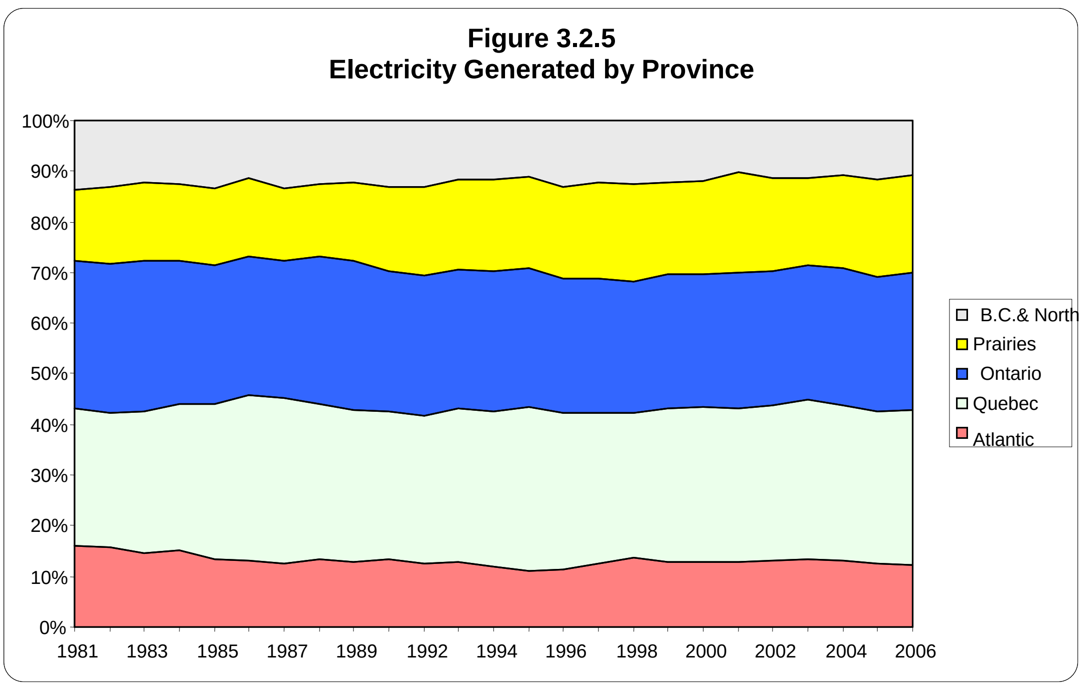
share being generated in the Prairie provinces has grown and that in Ontario and the Atlantic provinces has shrunk, but the changes are not dramatic (Figure 3.2.5).





A carbon-constrained environment may change how much electricity is consumed and how it is generated and distributed. These changes are unlikely to happen quickly so the industry will probably remain relatively stable in the short to medium term.

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3.3 Employment, Payrolls, and Earnings

Total paid employment in the industry declined steadily in the early 1990s, reaching a low of 83,213 in 1998. Employment has been gradually increasing since then, so that by 2006 employment was just over 94,000 – the same as in 1994 (Figure 3.3.1). Although relatively little information is published about paid employment by province, it appears that the increase in employment is uniformly spread across the country (Figure 3.3.2).[2, 3]

Figure 3.3.1
Number of Paid Employees in Electricity Generation, Transmission, and Distribution

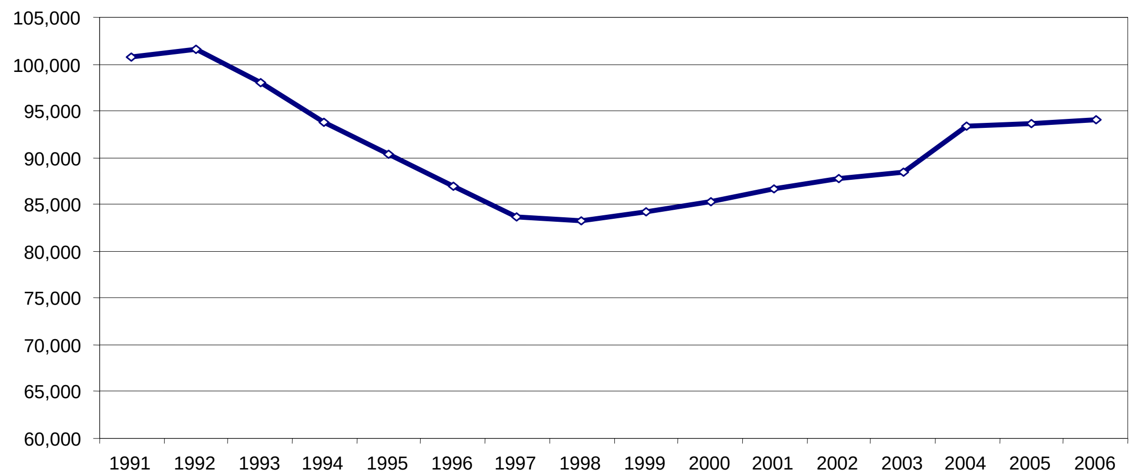
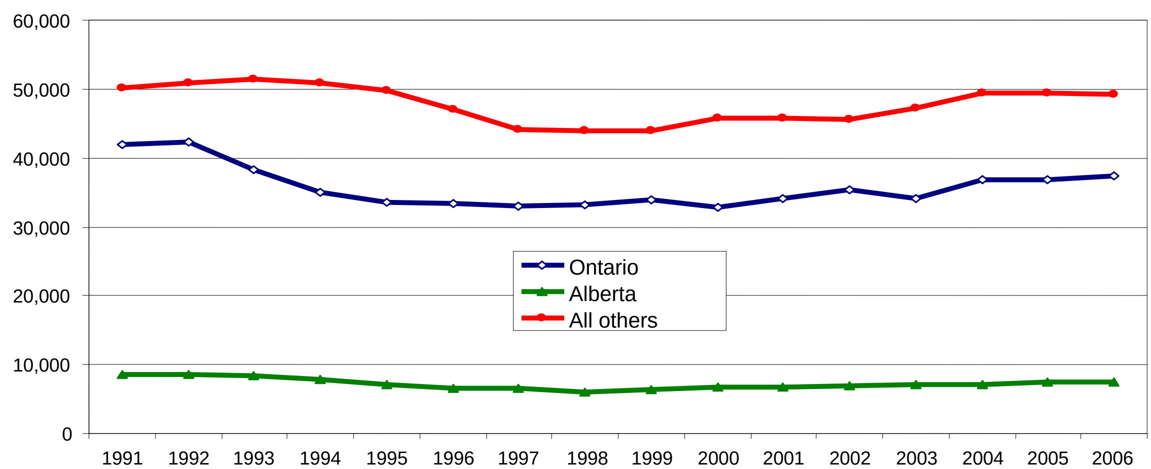


Figure 3.3.2
Paid Employees by Region



[2] The data for this section were derived from the *Survey of Employment, Payrolls, and Hours*, which is a compilation by Statistics Canada of income tax T4 data submitted to the Canada Revenue Agency. Statistics Canada suppresses the information for most provinces because, in the majority of provinces, there is only one business providing electricity.

[3] To preserve the anonymity of survey respondents, Statistics Canada does not publish payroll data for the sector in any of the provinces except Ontario and Alberta.

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Gross earnings before deductions for paid workers in the electrical utility sector are well above the national average. At $1,133 per week, earnings are 52% above the average in Canada as a whole. Excluding overtime, earnings are still 43% above the national average (Figures 3.3.3 and 3.3.5). The high earnings in the sector are a result of several factors including:

- a highly educated workforce with a high degree of seniority;
- predominantly full-time permanent positions; and
- a high rate of unionization in the sector.

Figure 3.3.3
Average Weekly Earnings, Paid Employees in Electricity Generation, Transmission, and Distribution

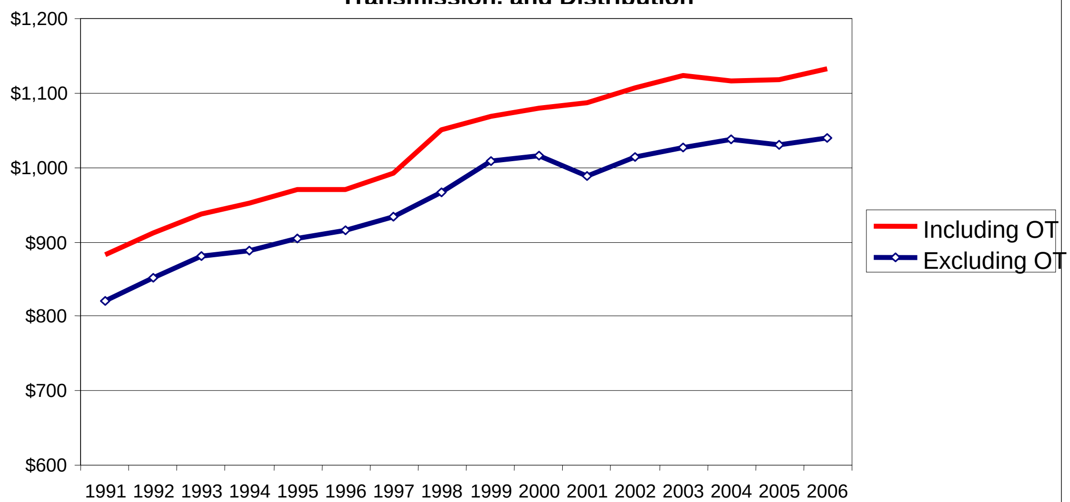
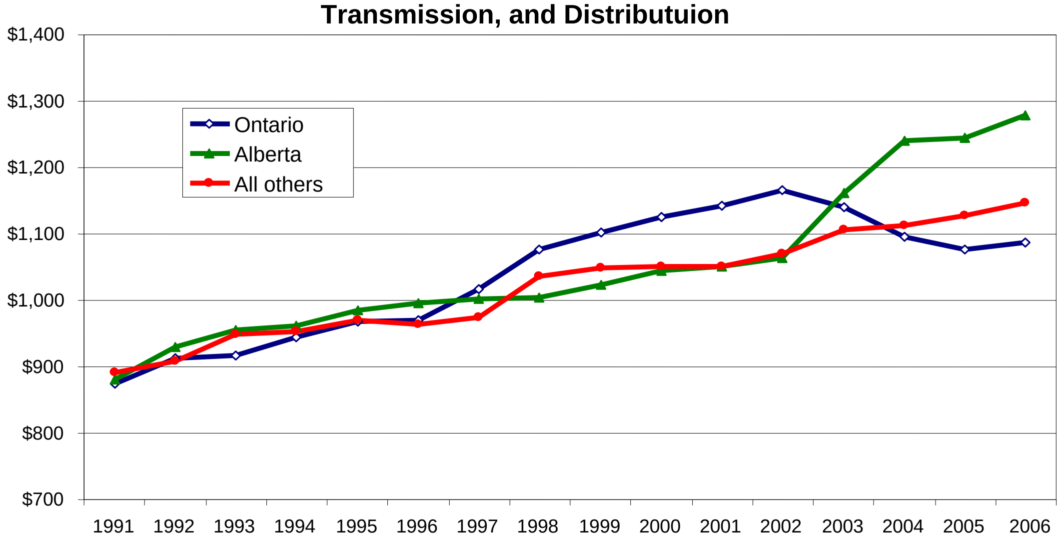


Figure 3.3.4
Average Weekly Earnings Including Overtime, Electricity Generation, Transmission, and Distributuion



While earnings are well above average, the gap has narrowed in the past ten years. In 1996, earnings in the electricity sector were 59% above the national average, compared with 52% in

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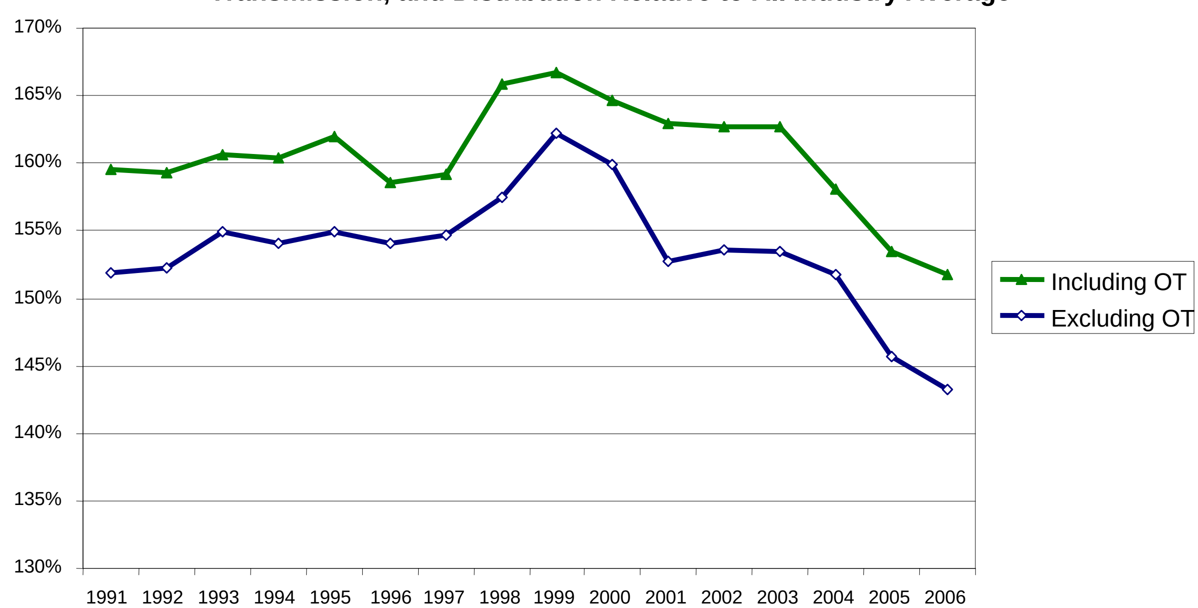
2006. Looked at another way, earnings in the electricity sector have grown by an average of 0.8% per year from 2001 to 2006, compared with 2.3% per year for all paid workers in Canada.

The recent change in gross earnings is not uniform across Canada (Figure 3.3.4). From 2001 to 2006, gross earnings have declined by an average of 1% per year in Ontario and increased by an average of 4% per year in Alberta. This reverses the pattern earlier in the decade, when earnings in Ontario exceeded those in Alberta and other provinces.

The use of overtime in the sector is increasing only slightly. Compared with levels of 5% to 7% in the 1990s, overtime represented 9% of weekly earnings in the past five years.

Figure 3.3.5
Average Weekly Earnings Including Overtime, Electricity Generation, Transmission, and Distribution Relative to All Industry Average



3.4 Labour Force Characteristics

Recent data describing those who work in the electricity generation, transmission, and distribution sector are available from Statistics Canada's Labour Force Survey. In 2006, during an average month approximately 92,300 people reported paid employment in the sector (that is, not self-employment). Approximately four out of 10 work in Ontario, three out of 10 in Quebec, and the remaining third in other provinces (Figure 3.4.1). As a proportion of all paid employment in the province, electricity is the largest employer in Manitoba, where over 1% of all paid employees are working in the sector.[4] Employment is growing the quickest, however, in Saskatchewan and Alberta (Figure 3.4.2).

[4] The *LFS* excludes the population living on reserve and in the Northern Territories, so total employment will be somewhat understated.

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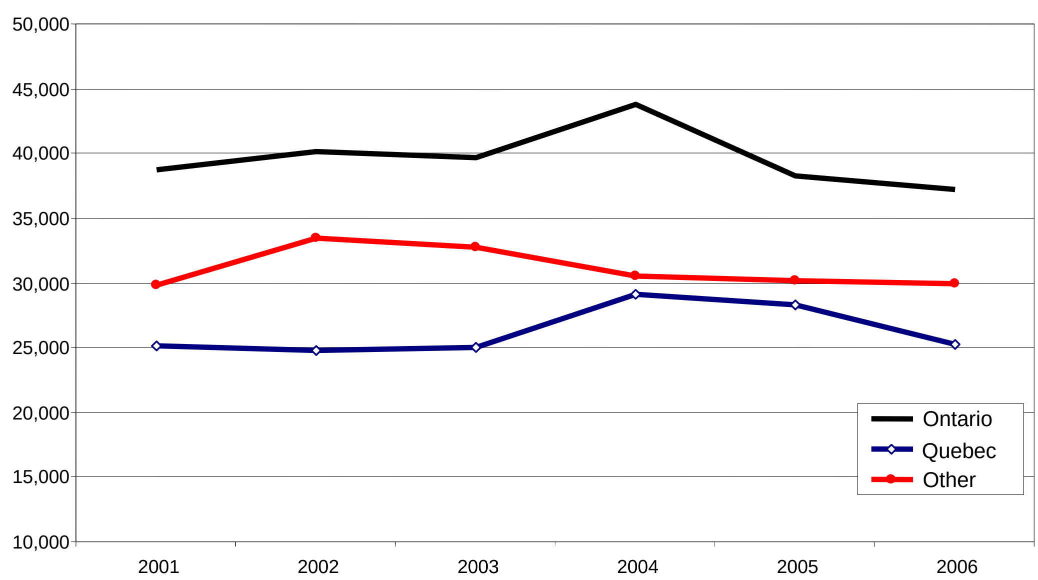

Figure 3.4.1
Paid Employment in Electrical Generation, Transmission, and Distribution

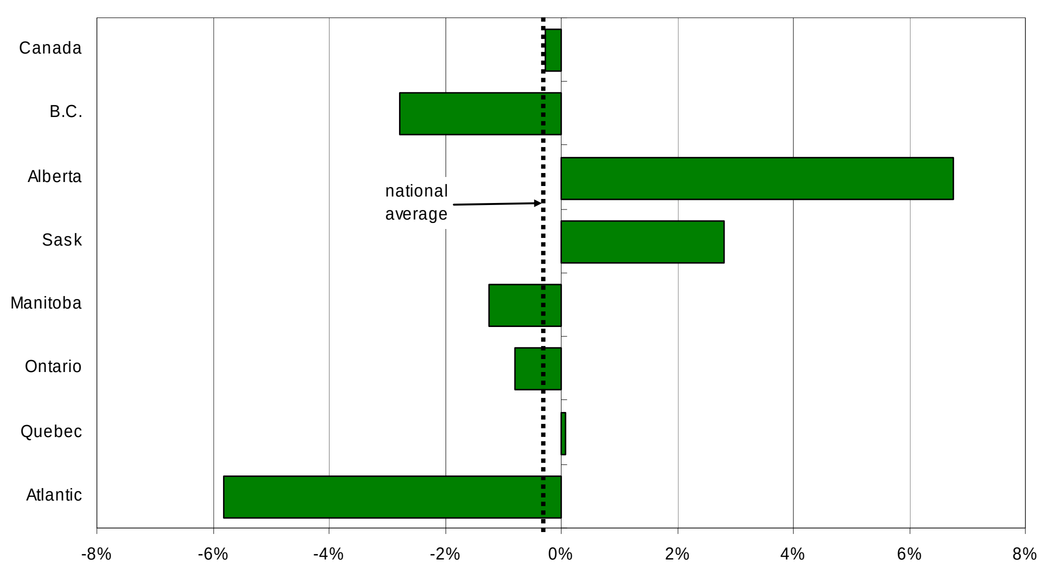

Figure 3.4.2
Average Annual Growth in Employment, by Province/Region, 2001 to 2006

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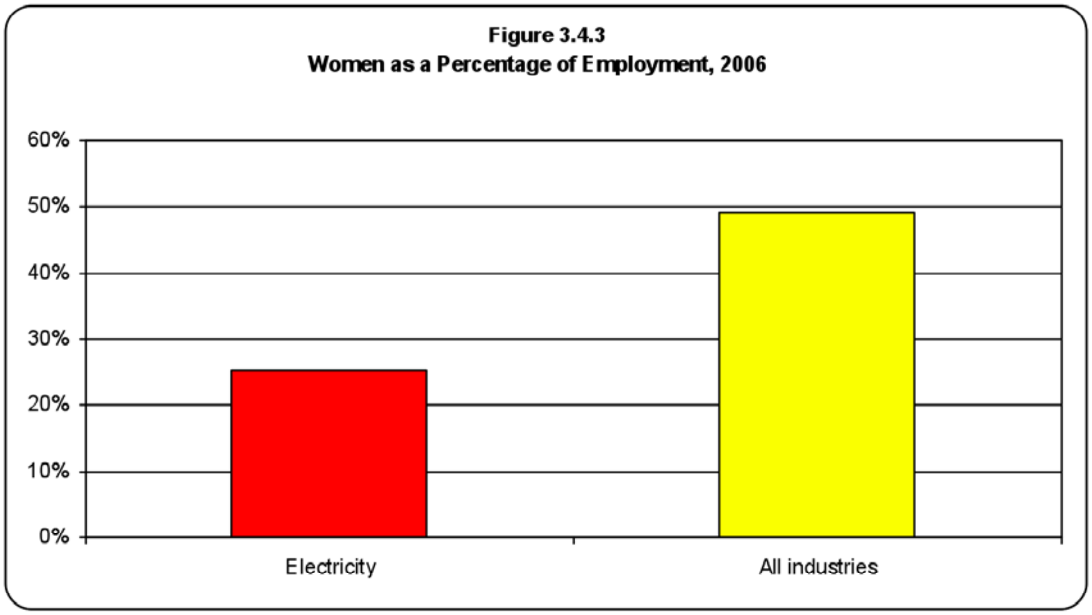
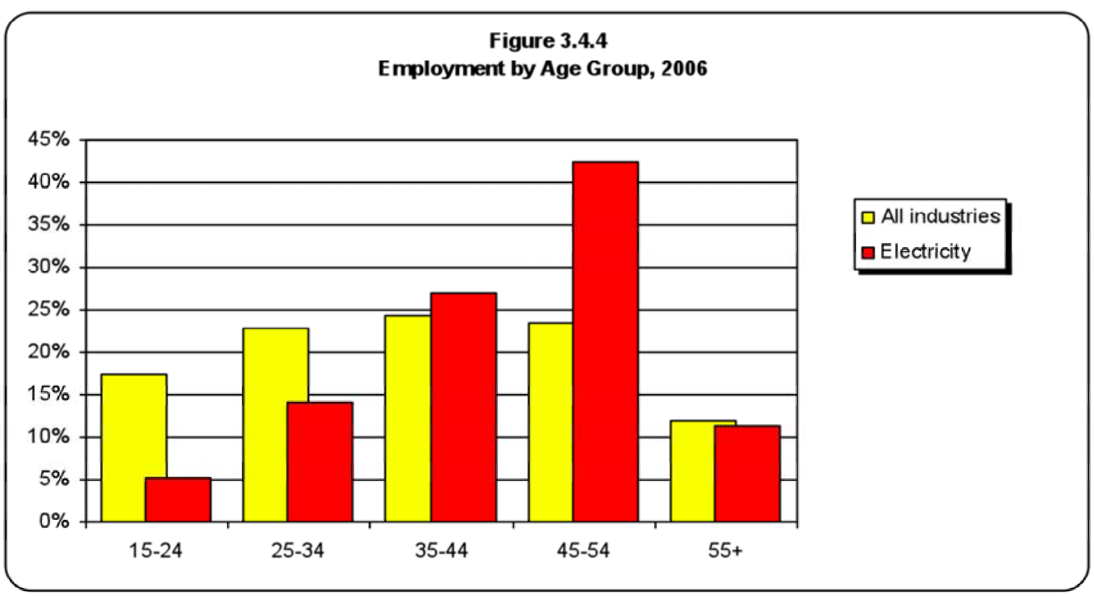
Those working in the electricity sector are, compared with the national labour force (i.e., paid workers in all industries in Canada), similar in some ways and different in others. Comparative data are shown in Figures 3.4.3 through 3.4.7 inclusive. Notable points include:



- Electricity workers are much less likely to be women (25% vs. 49% for the national labour force). Women make up a slightly larger proportion of sector employees in British Columbia (32%) and a slightly lower proportion in Ontario (23%) and the Atlantic provinces (19%).
- The age distribution is heavily skewed toward 45 to 54 year olds: 42% of paid employees fall into this age group. This means that over one half of employees (54%) were at least 45 years of age in 2006, compared with 43% in 2001. The highest proportion of older workers is in Quebec and the lowest in Western Canada.



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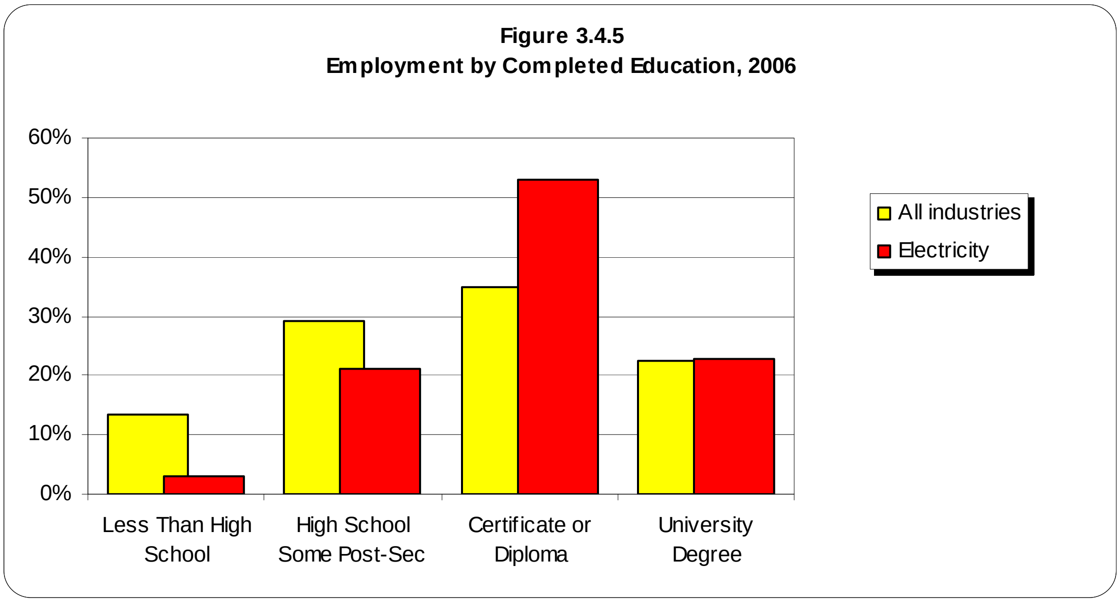

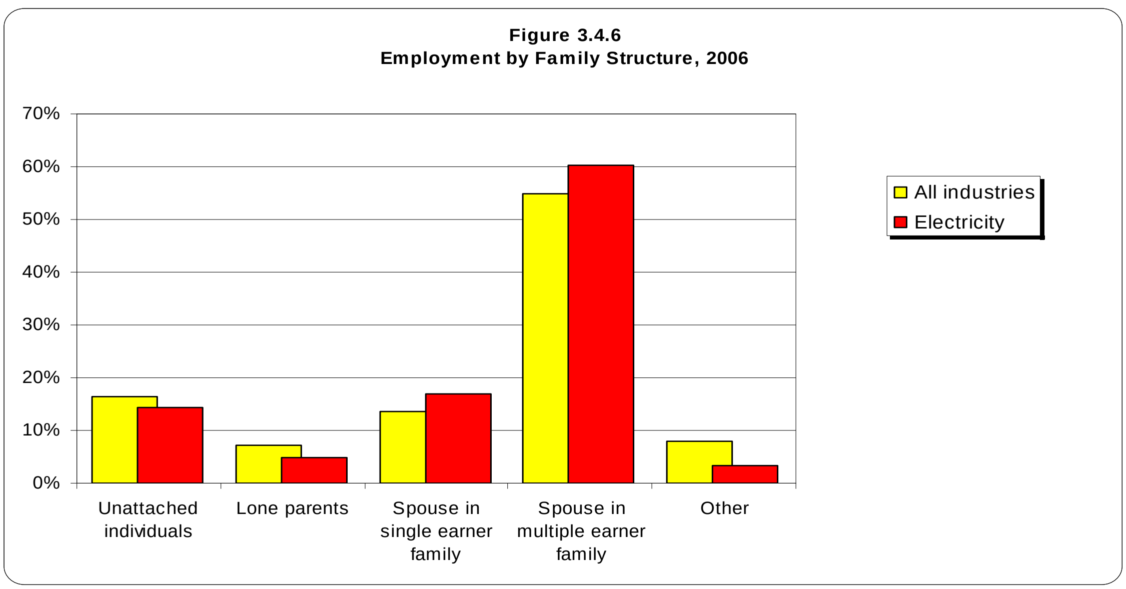

- Levels of formal education tend to be higher in the sector than in the general labour market – 76% of electrical industry workers have a post-secondary credential (degree, diploma, or certificate - including trade certificate), compared with 57% for all industries. At the other end of the scale, only 3% have less than a high school education, compared with 13% for all industries.
- In the electricity sector, 17% of the employed are in a single earner family, compared with 14% for all industries. Single parents, most of whom are women, are less common in the sector.
- Workers are less likely than those in other industries to hold two jobs simultaneously (3% do so) and less likely to be students while employed.

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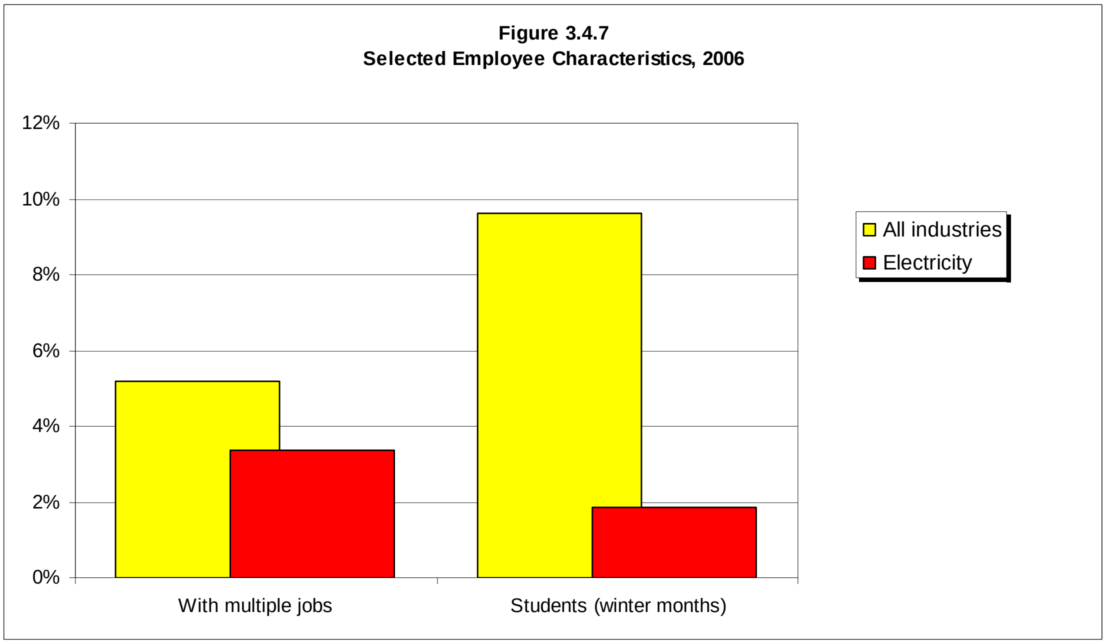

Similarly, occupations in the electricity sector resemble those in the national labour force in some respects and differ in others. Comparative data are shown in Figures 3.4.8 though 3.4.12. Notable points include:

- Occupations are somewhat more likely to be permanent in the sector (91% compared to 87% for the national labour force).
- Collective agreements cover 73% of electricity industry positions, compared with 32% for all industries. The proportion of workers who are covered by a collective agreement varies by region, from a low of 50% in Alberta to a high of 83% in Manitoba.

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- Two-thirds (66%) of sector employees work at locations with 100 or more employees, compared with one-third of workers in all industries.
- Average hours worked per week are higher than in other industries – 35.1 compared with 33.3. However, the difference is due to the fact that part-time workers are rare (less than 2%) rather than a tendency to work longer hours. The “usual” work week is longer than 40 hours in only 6% of cases.
- Occupations in the sector are dominated by the “trades, transport, and equipment operators” group, which accounts for 35% of workers, and “management and administration,” which accounts for 32%.
- The average hourly wage rate is $30.50, compared with $19.72 for all industries. Forty-six percent of paid workers reported rates in excess of $30 per hour and 16% reported rates below $20 per hour. Average hourly rates vary across provinces, with the highest rates in Ontario ($34 per hour) and the lowest ($26 per hour) in Manitoba and the Atlantic provinces.

Figure 3.4.9
Usual Hours of Work, 2006

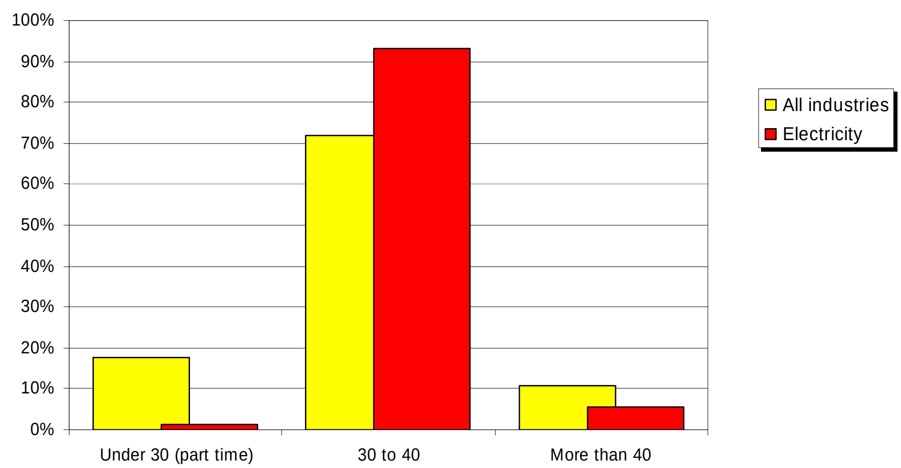

Figure 3.4.10
Actual Hours of Work, 2006

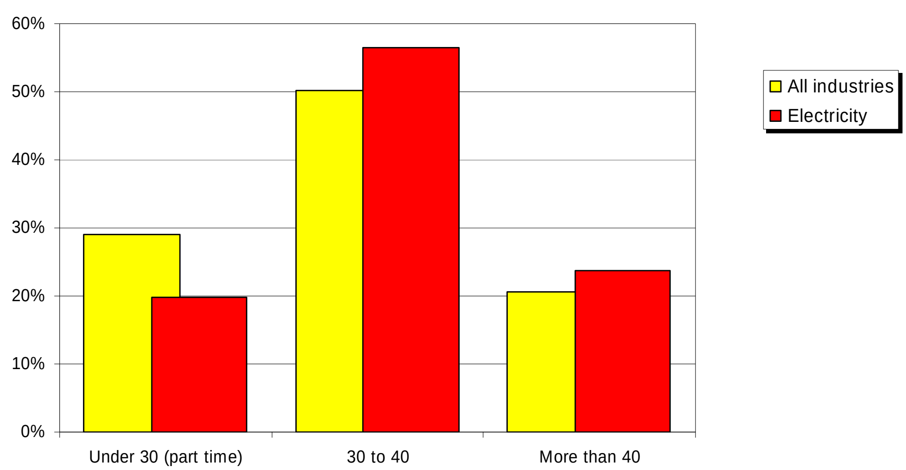

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Figure 3.4.11
Occupation Group, 2006

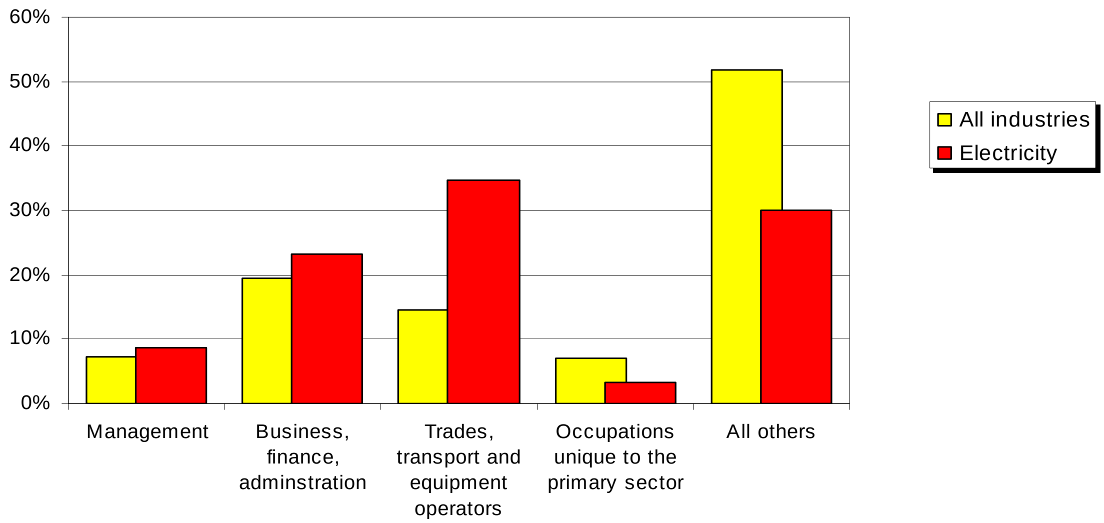
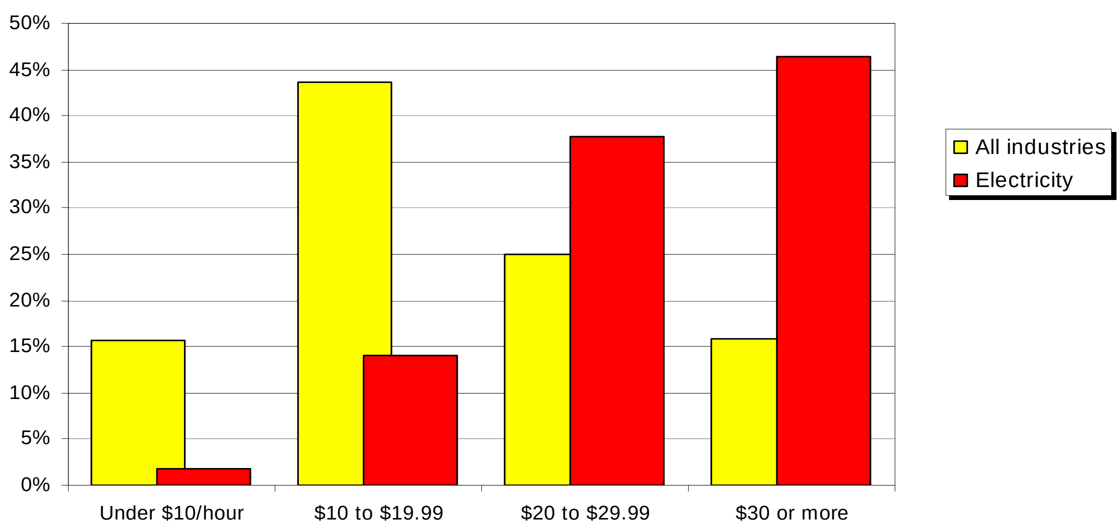


Figure 3.4.12
Average Hourly Wage Rate, 2006



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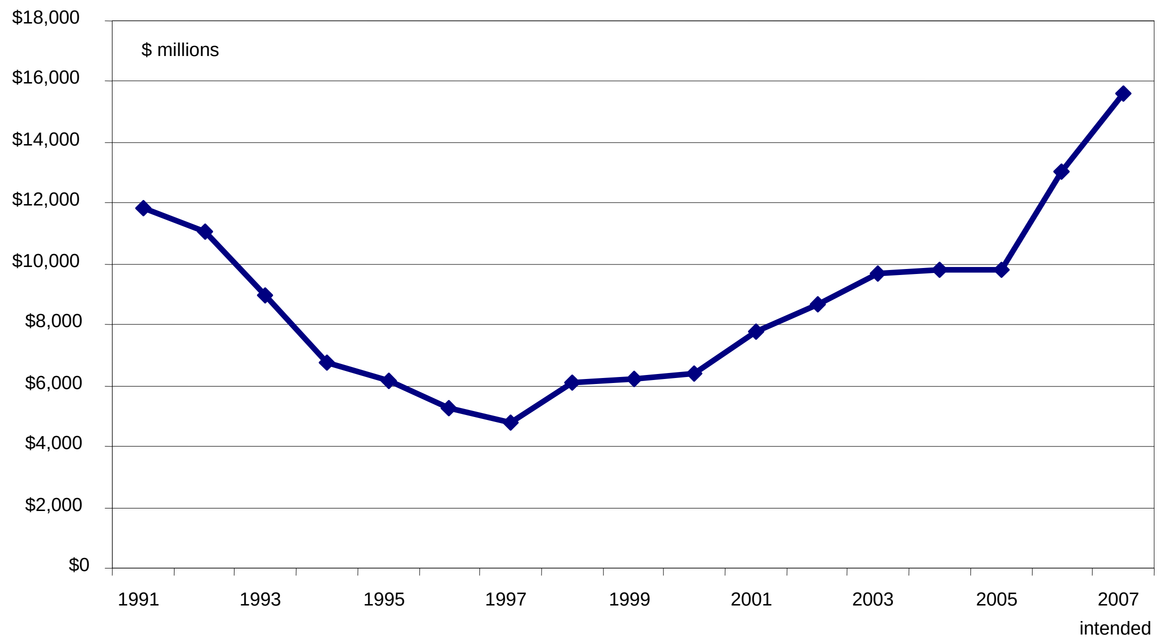
In summary, workers in the electricity sector are unlike workers in other industries in the sense that they tend to be older, male, and union members; have higher levels of completed post-secondary education; and work at full-time permanent positions in larger firms with a relatively high rate of pay.

3.5 New Capital Investment

After declining throughout most of the 1990s, capital investment in new plants and equipment has been growing steadily. Compared with a low of $5 billion in 1997, capital investment is expected to be close to $16 billion in 2007. As in the past, 50% to 70% of investment is in new machinery and equipment (Figures 3.5.1 and 3.5.2).

Figure 3.5.1
New Capital Investment by the Electric Utility Industry



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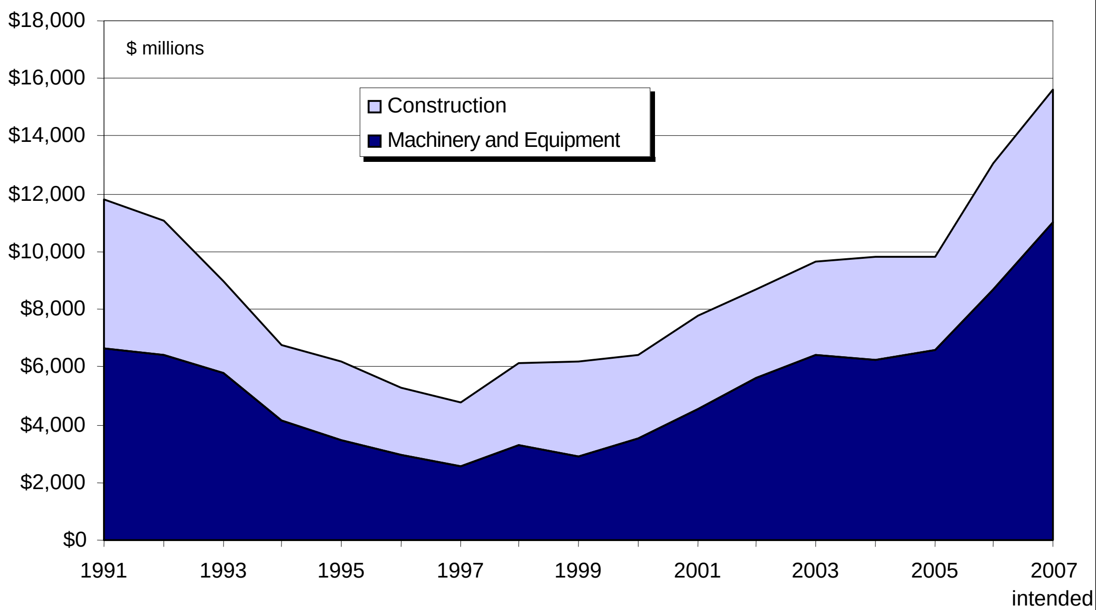

Figure 3.5.2
New Capital Investment by the Electric Utility Industry, by Category

3.6 Engineering Graduates

A closer look at the number of engineering students and graduates in Canada shows that engineering is becoming more popular, with an increasing number of full-time students. A declining proportion of students are women, although the number of graduates who are women has been above 20% for the past five years.

The number of students enrolled in electrical engineering has remained relatively constant, at 19% of all full-time engineering students. The number of undergraduate and graduate degrees awarded is increasing slightly.

One of the challenges with the slow growth, however, is that the electricity industry is one of many sectors vying for a fairly stagnant pool of post-secondary graduates. For additional details, see Figures 3.6.1 to 3.6.7 below.

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Figure 3.6.1
Full Time Enrolment of Engineering Students

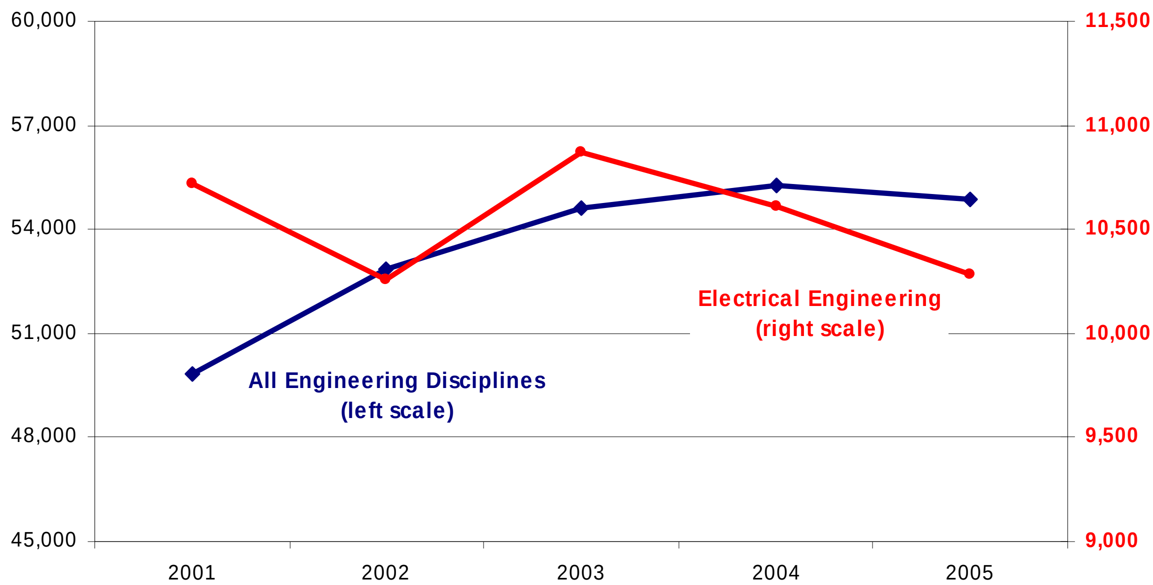

Figure 3.6.2
Women as Proportion of Engineering Students

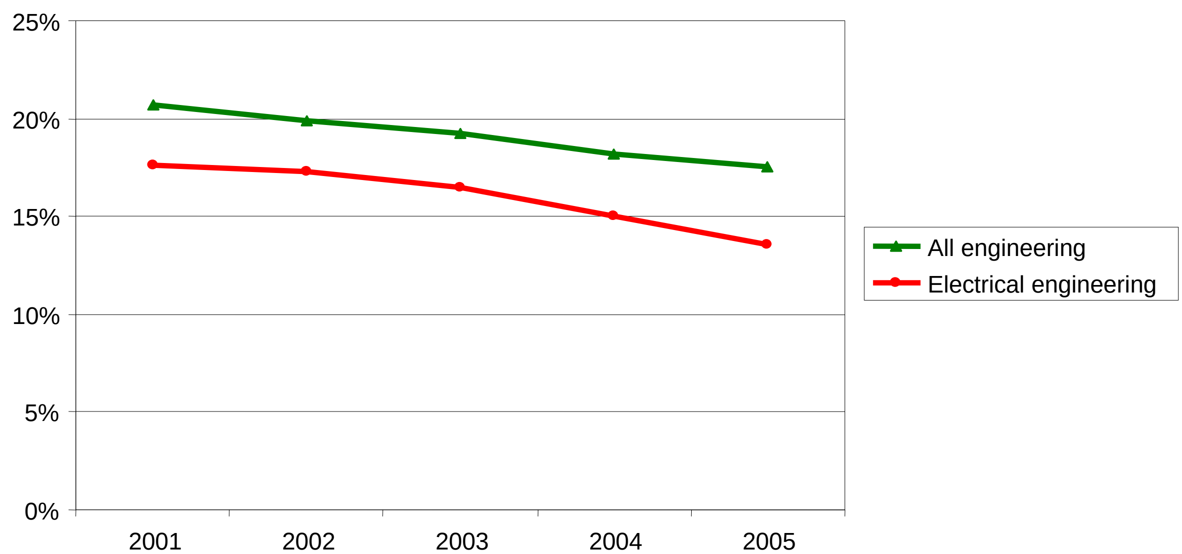

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Figure 3.6.3
Electrical Engineering Students by Province, 2005

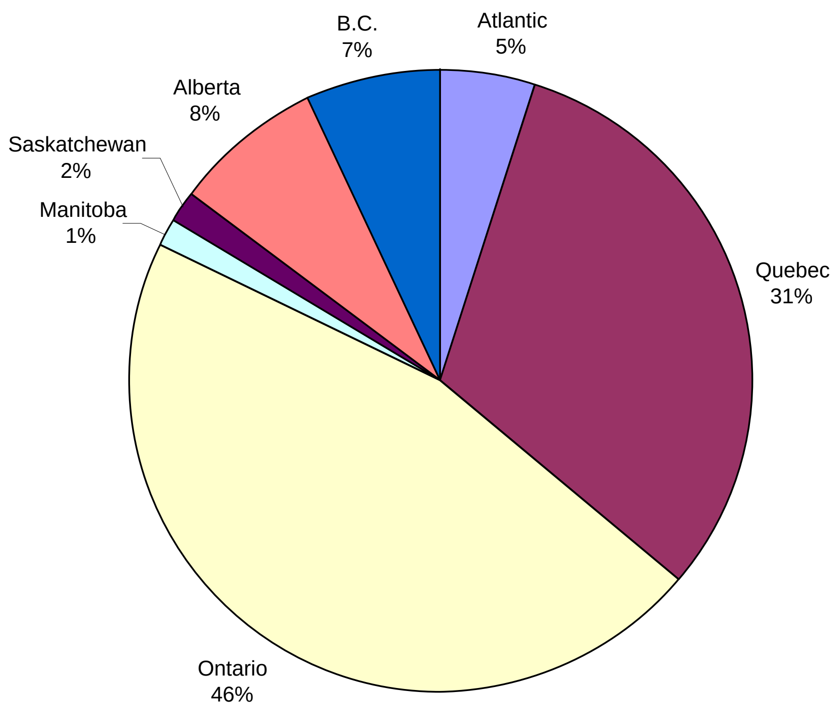
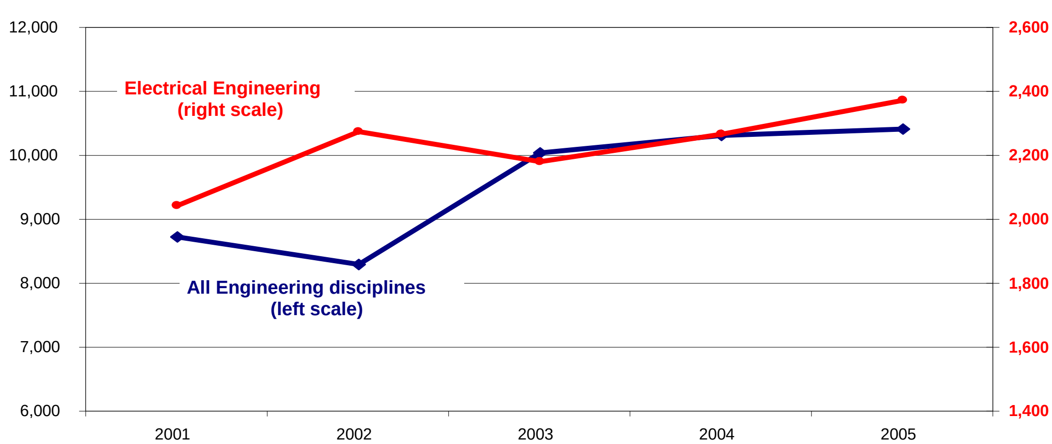


Figure 3.6.4
Undergraduate Engineering Degrees Awarded



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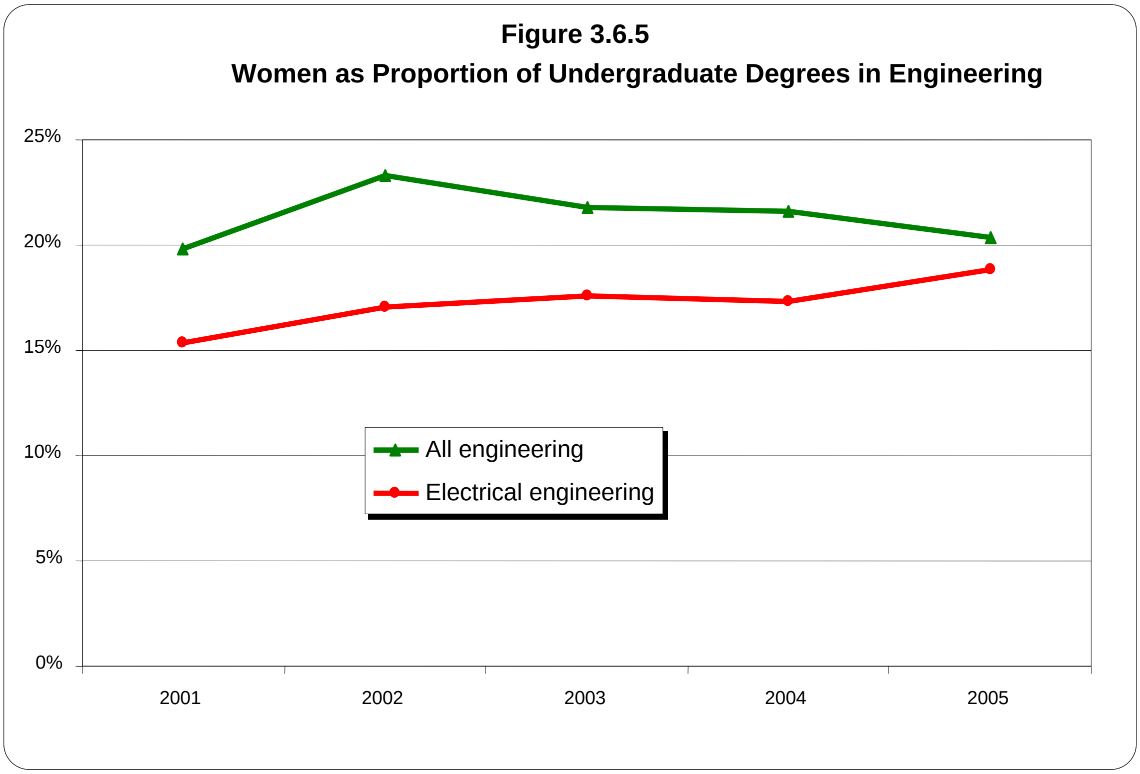

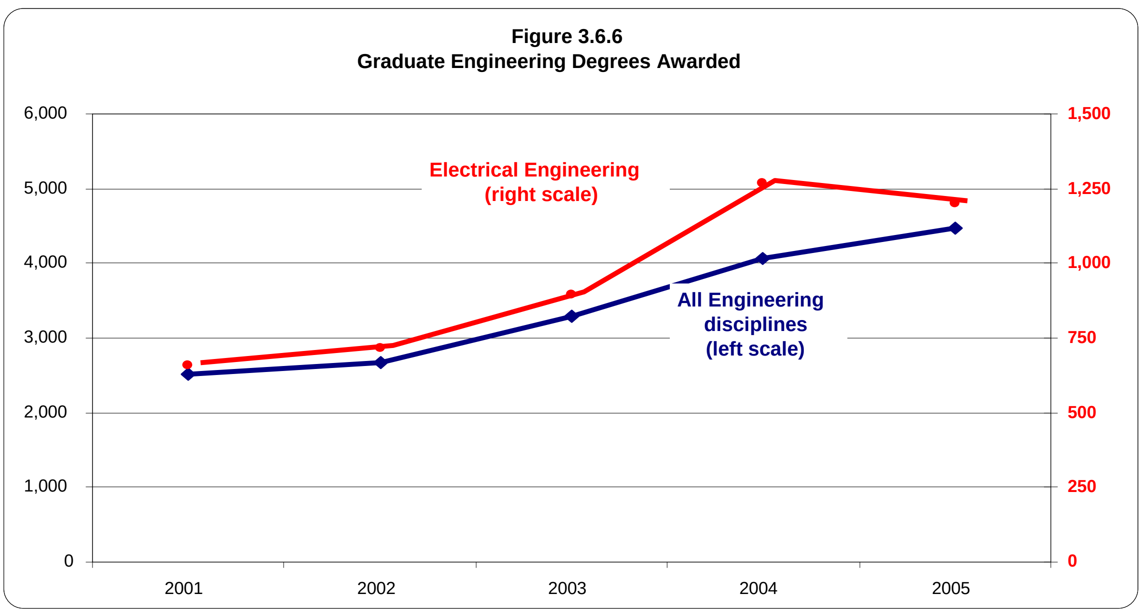

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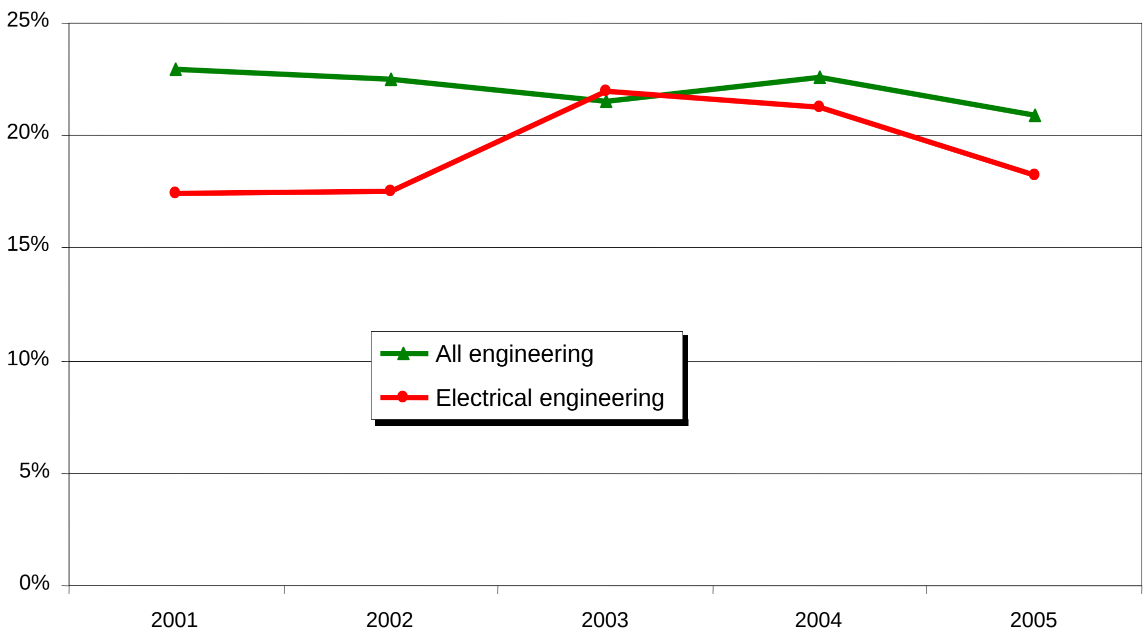
Figure 3.6.7

Women as Proportion of Graduate Degrees in Engineering



3.7 Graduate Follow-Up Survey

This section describes the characteristics of a particular group of individuals surveyed in 2002, namely those:

- who graduated from a Canadian post-secondary institution in 2000; and
- who were employed in the electrical utility industry in 2002.

They are compared with graduates who were employed in non-agricultural goods-producing industries: forestry, mining, utilities, oil and gas, construction, and manufacturing.

Some of the findings from that survey include:

- Approximately 45% of those employed had a certificate or diploma and 55% had a university degree.
- Generally speaking, graduates tended to work in the same province as they were living in before going to school and in the same province in which they graduated. On a net basis, there is a modest flow from other provinces into Ontario and Quebec.
- Degrees in business, management, or marketing and technical training in engineering technologies accounted for 43% of graduates employed in the industry. The next largest

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group were those with a degree in the social sciences, followed by those with a degree in engineering.

- One-third (37%) of the recent graduates hired were women, and 32% were over the age of 31 when they graduated. This compares with 30% and 19% respectively for the non-agricultural goods-producing industries.
- Compared with other industries, similar proportions of graduates were members of a visible minority group (13%), immigrants (10%), or reported an Aboriginal identity (5%).
- Eight percent were in a low-skill occupation, suggesting that their education was not related to the electricity sector. This is notably higher than the 4% in non-agricultural goods-producing industries.

Eighty percent of those employed in the electricity sector reported that their job was closely or somewhat related to their education. This is comparable to 81% in the non-agricultural goods-producing industries. More information arising from the survey is shown in Figures 3.7.1 through 3.7.6 below.

Figure 3.7.1
Class of 2000, Employed in Electrical Utilities, Province of Graduation

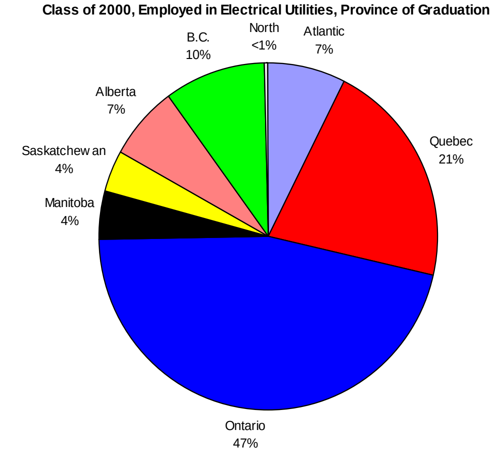

Figure 3.7.2
Class of 2000, Employed in Electrical Utilities, Province of Employment

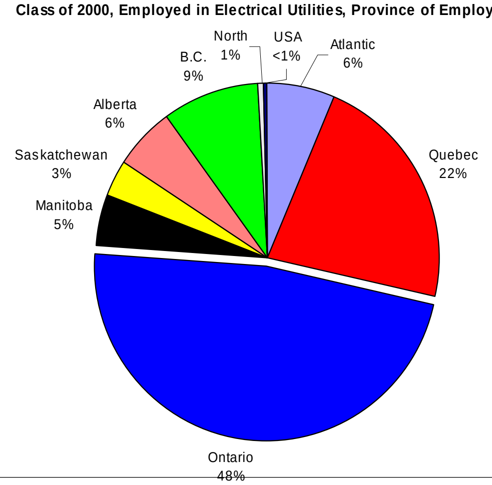

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Figure 3.7.3
Class of 2000, Employed in Electrical Utilities, Field of Study

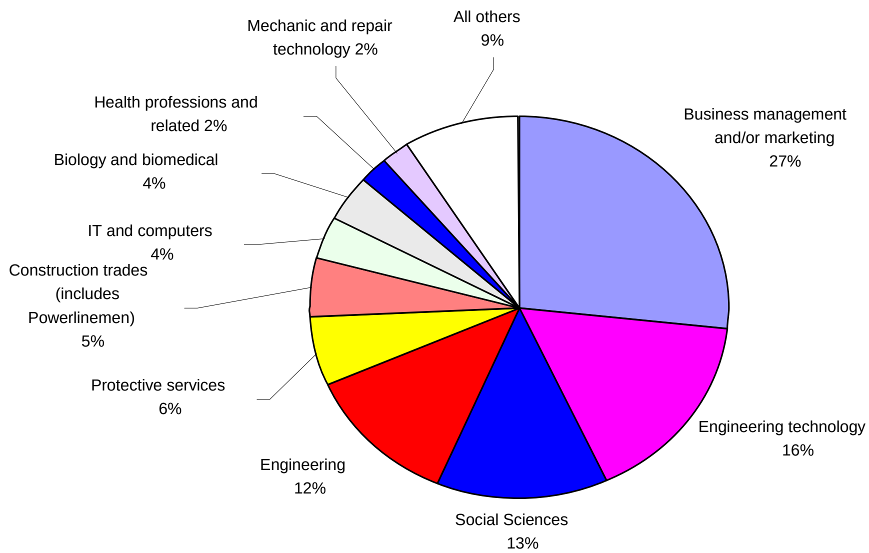

Figure 3.7.4
Class of 2000, Demographic Characteristics

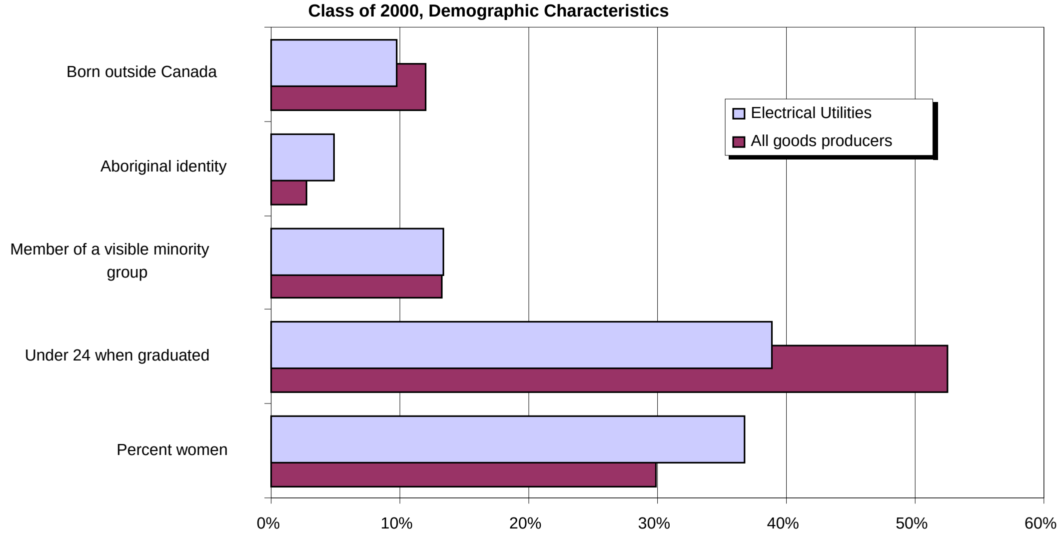

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Figure 3.7.5
Class of 2000, Skill Level of Position

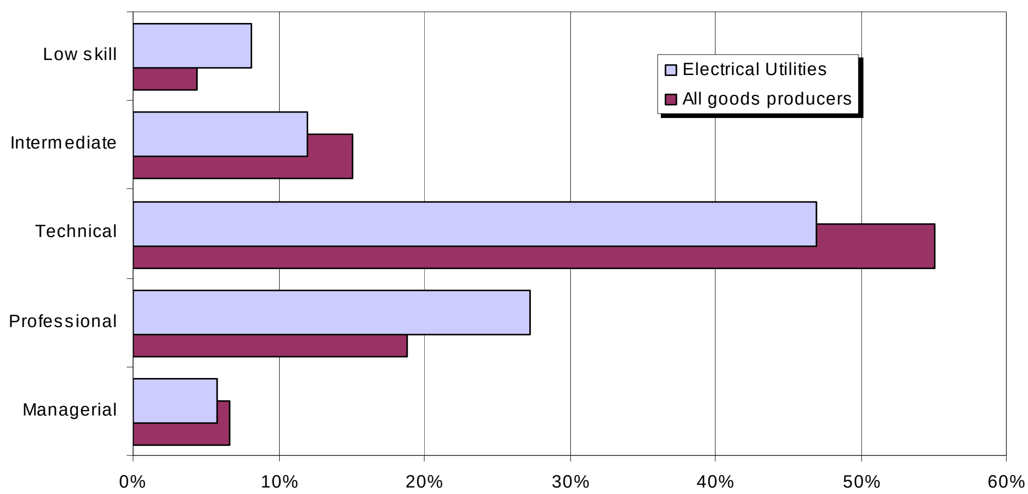
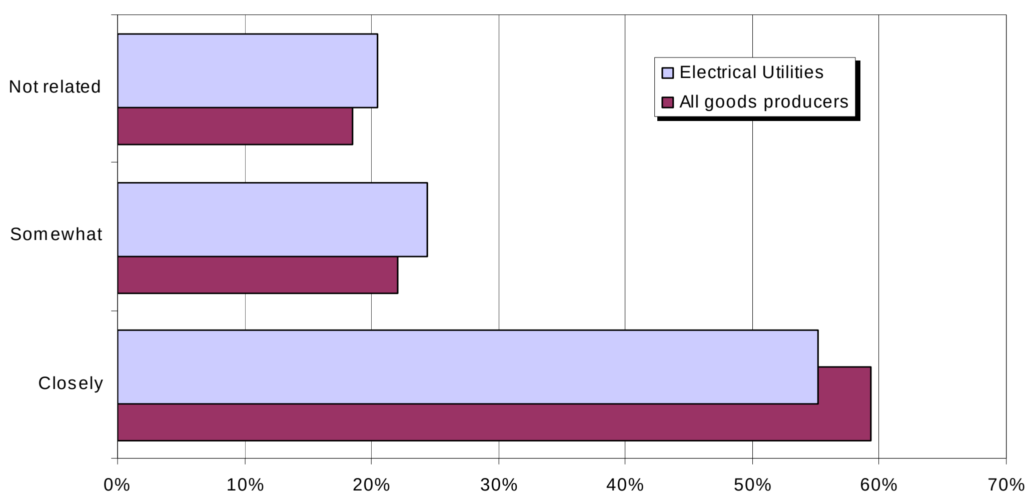


Figure 3.7.6
Class of 2000, Job Related to Education



3.8 Outlook and Projection

Any forecast of employment requires estimates of demand arising from:

- growth (that is, increase in the industry's output);
- productivity changes (output per worker); and
- employee turnover and attrition.

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There is no reason to suspect that the demand for electricity – and thus the industry's output – will grow at other than historical rates in the short term. Changes in the method used for generation may have a minor impact on overall employment, but this is more likely to change the type of people needed than it is to change the absolute numbers.

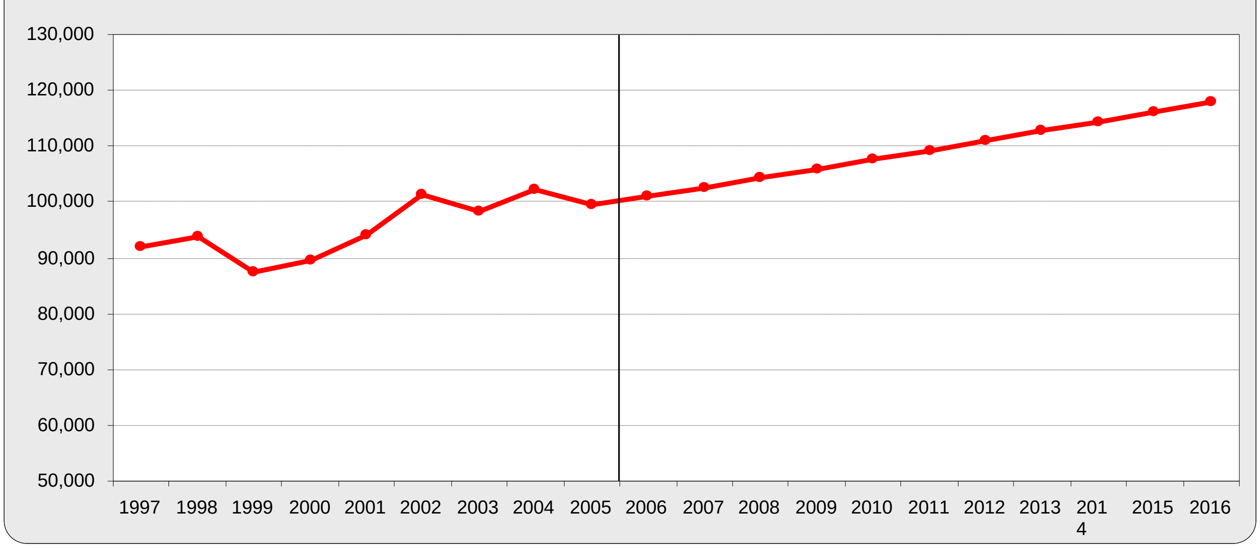
Changes in labour productivity arise from a variety of factors that are difficult to predict, but, based on the data, there is no reason to expect dramatic changes in labour productivity over the short to medium term. Output per hour worked, according to the Centre for the Study of Living Standards,[5] has been relatively constant over the past five years, after growing somewhat in the 1990s.

Under Scenario #1 shown in Figure 3.8.1, total employment increases by approximately 1,700 per year. Under the more likely[6] Scenario #2 in Figure 3.8.2 and Scenario #3 in Figure 3.8.3, employment grows by 500 and 1,000 per year respectively.

	ANNUAL GROWTH IN GDP	ANNUAL GROWTH IN GDP PER HOUR WORKED
Scenario 1	**0.2%**	**-1.3%**
Scenario 2	**1.0%**	**0.5%**
Scenario 3	**0.5%**	**-0.5%**

Scenario #1
Long Term Trend

Figure 3.8.1
Employment in Full-Time, Full-Year Equivalents, Actual and Projected



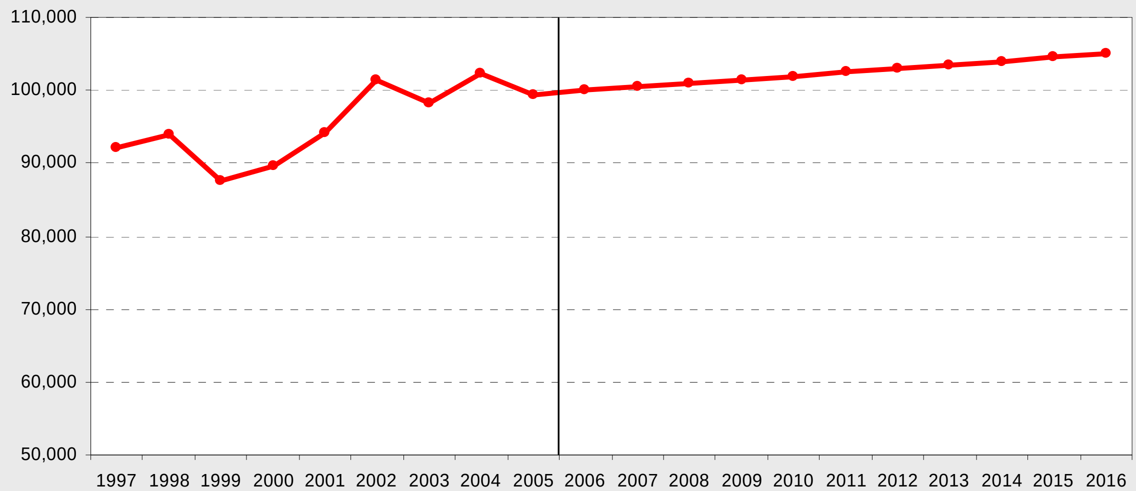
[5] See www.csls.ca for more details.
[6] The numbers in this section are not intended to match exactly with data from earlier sections. Centre for Living Standards data are expressed in this section as full-time equivalent positions and as a result part-time posts have been normalized (a ratio of 3:1). Statistics Canada data in previous sections are expressed as total employment head-count.

Scenario #2

Strong GDP Growth and Modest Productivity Growth

Figure 3.8.2

Employment in Full-Time, Full-Year Equivalents, Actual and Projected

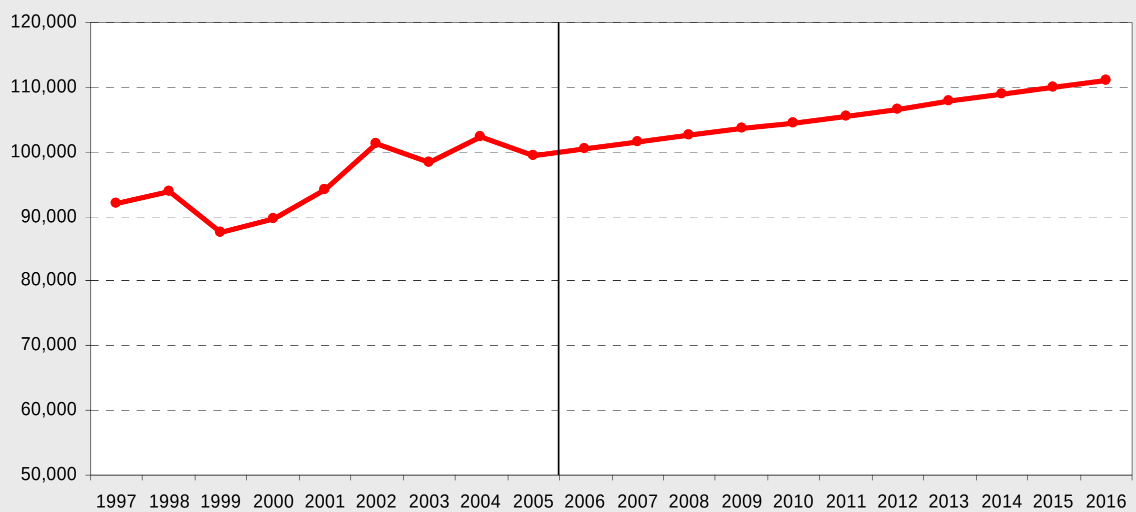


Scenario #3

Modest Growth in GDP, Slight Decline in Productivity

Figure 3.8.3

Employment in Full-Time, Full-Year Equivalents, Actual and Projected



Given the age of the existing workforce – i.e., the high proportion of employees who are in the 45- to 54-year-old age group, it is clear that the main human resource issue that the sector will be facing over the short to medium term is the replacement of retiring workers. This will have a much bigger impact than any increase in demand arising from growth in the industry or changes in productivity.

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The average retirement age in Canada is close to 60; the figure is somewhat younger among those in the public sector, where many electrical utility workers are employed. This means that approximately one half of those aged 50 and above will be retired within 10 years and virtually all will be retired within 15 years. This translates into retirement rates of approximately 2,000 people per year in the next few years, increasing to a peak of perhaps 4,000 per year over the medium term (2010 to 2020).[7] This means that the sector will have to double its hiring of recent post-secondary graduates at a time when the demand for such workers is increasing in many other sectors as well.

[7] *Keeping the Future Bright* estimated that 2,500 employees per year would be eligible to retire over the short term.

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4. Labour Market Transition Projects

4.1 Historical Overview

For the governments of most Western countries, promoting employment is a big priority. They usually do this through active and passive labour market policies. Active labour market policies (ALMPs) include job search assistance and wage subsidies. They work by targeting specific individuals. Passive labour market policies (PLMPs), however, work in a more indirect way. They typically include unemployment benefits and early retirement pensions.

Many countries have dozens or even hundreds of ALMPs. Generally, between one third and one half of all the money spent on labour market policies goes to ALMPs. However, there are large differences in the actual amounts each country spends on them. In 2000, the government of the Netherlands spent 1.58% of the GDP on ALMPs, while the government of the United States spent only 0.15%. In between, Germany was at 1.23%, Canada at 0.45%, and the U.K. at 0.32% (Heckman et al 1999).

Many reports have attempted to evaluate the effectiveness of various programs. The best work in the field is an OECD working paper called What Works and for Whom (Martin and Grubb 2001), which is an expansion and follow up to Martin (2001). It evaluates net impacts in terms of employment and/or earnings for participants (OECD sourcebook 2003) rather than wider social goals such as crime reduction or improved health.

Fay (1996) notes that an ideal evaluation process should answer three basic questions about ALMPs:

1. What are the estimated impacts of the program on the individual?
2. Are the impacts large enough to create net social gains?
3. Is this the best outcome that could have been achieved with the money spent?

Unfortunately, most evaluations focus almost completely on the first question, partially examine the second, and completely ignore the third. According to Martin and Grubb (2001), the best work in the field has been done on Canada and the United States, where the evaluation of labour market programs is more or less required. Many of the best and most comprehensive studies have been conducted in the U.S.; this is why many of the data discussed below are based on U.S. rather than Canadian studies. In contrast, European countries such as Sweden, Germany, and the U.K. are just starting to carefully evaluate their ALMPs. It is also important to remember that the majority of the ALMP literature deals with public sector information and there is very little, if any data or literature on private sector involvement.

Martin and Grubb (2001) also note that a number of problems make proper evaluation somewhat difficult. These include:

- There is no stable set of ALMPs to evaluate; countries are always chopping and changing them.
- Evaluations are almost always devoted to short-term results (i.e., within two years).
- Most programs are small scale, so it is hard to generalize from the results.

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- The literature tells us what works and for whom, but not why it works.

With these caveats in mind, the general consensus is that most ALMPs are generally ineffective. At best, the successes are minor; at worst, these programs either harm the participants or fail basic cost-benefit tests (Heckman et al 1999).

4.2 Active Labour Market Policies

Public Training Programs

These are programs designed to make up for a lack of general workplace skills or to provide participants with the skills necessary for a particular job (Heckman et al 1999). They tend to be very expensive to run and sometimes are not that effective. Those training programs that do work tend to:

- be focused on participants;
- be small scale;
- result in an accepted qualification or credential; and
- have a strong on-the-job component that establishes links with local employers (Martin and Grubb 2001).

Job Search Assistance

This involves the provision of services such as job counselling, resume services, access to job boards, reemployment bonuses, and so on. These are usually inexpensive and have good results (Martin and Grubb 2001).

Youth Measures

The results for ALMPs aimed at bringing youth into the labour market are not very impressive, and programs targeted at disadvantaged youth are particularly bad. The one exception is the U.S. Job Corps, which is an intense, high-cost program; even then, it had to rely on savings from reduced crime among the target group to yield a positive net result (Martin and Grubb 2001).

Grubb (1999) does glean a number of principles for effective programs aimed at disadvantaged youth. They must have:

- close links to the local labour market;
- academic education integrated with on-the-job training; and
- a range of support services tailored to the youth and their families.

With respect to youth programs in general, the most significant results from the U.S. and Canadian evaluations suggest the following:

- Even the successful programs have modest impacts.
- Labour market success is strongly linked to educational success.
- The biggest returns come from early and sustained interventions. That is, it is far more effective to prevent youth from dropping out of school and/or the job market than it is to

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bring them back in (HRDC 1997).

Private Sector Subsidies

These are subsidies such as wage supplements or fixed payments to private firms designed to introduce unemployed people – usually young persons – into the world of work. Most of these schemes have small or negative net employment gains. One type of wage subsidy that appears to be successful for a very small minority of participants is small business loans, which have had positive results for educated men between the ages of 30 and 40 (Martin and Grubb 2001).

Public Sector Job Creation

Although public sector job creation is one of the oldest forms of ALMP, it is not very successful. Studies from virtually every country show that public sector job creation does not help unemployed people get permanent jobs in the open market. This may partially explain why average OECD spending on this kind of ALMP dropped from 23% of all active measures in 1985 to 17.4% in 1993 (Martin and Grubb 2001).

General Conclusions

Active policies can be of some benefit, especially if they use the following principles:

- They should rely as much as possible on job search assistance programs.
- Public training programs must be small, local, and tightly targeted on both participants and employers.
- Interventions for disadvantaged youth must be early and sustained.
- Subsidies to private employment should be local, targeted, short-term, and closely monitored.
- Job creation schemes should be avoided as much as possible. Those that are used should be short and targeted at the most disadvantaged workers.

4.3 Labour Mobility for Transiting Workers

Free market economies are marked by continual competition, technological advance, and relentless change. Because of this, it is important for labour to be able to move between occupations, industries, and regions. Labour usually moves from declining industries to industries that are growing, though many factors affect the nature and extent of structural change. Some of these factors include the role of unions, government welfare, and unemployment insurance.

Researchers have found that younger workers move more frequently than older workers (Rogers 1986; Markey and Parks 1989). Also, workers with high socio-economic status and better education move between jobs and regions far more frequently than those further down the ladder (Ellis et al 1993). Finally, gender affects both occupational and geographic mobility: overall, women hold jobs that are lower in skill and reward than men, making them less likely than males to change jobs or locations (Felmlee 1982), although women who are the primary breadwinners in their household are just as likely to relocate as men (Markham et al 1983).

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Canadian studies of geographic and inter-industry mobility have tended to treat each type of movement separately, with less attention paid to the latter than the former. However, recent work recognizes that workers consider both factors at the same time when thinking about a career move (Macias 2006; Lin and Christiadi 2002; Osberg et al 2004). Osberg et al (2004), using data from the 1986-87 waves of Statistics Canada's Labour Market Activity Survey, note that workers change industries due to the availability of jobs and migrate because of differences in wages. This helps make sense of the fact that far more people change industries than change regions, since the costs and risks of moving between local industries are much lower than those of moving regions.

Displaced Workers, Employment, and Earnings

Since 1984, the U.S. Bureau of Labor Statistics and the Bureau of the Census have jointly administered the Displaced Workers Survey (DWS) as a supplement to the Current Population Survey. The DWS is the most comprehensive source of information of the nature of job loss in the United States (Farber 2005; Fallick 1996), which has by far the most flexible and fluid job market in the developed world.

While there is some disagreement as to specifics, the term "displaced worker" is commonly understood to refer to a worker who, after at least three years on the job, loses his or her job due to slack work, plant closure, or plant relocation caused by significant changes in the economy (Hamermesh 1989).

Displacement is a serious economic and social issue. According to the DWS, in each five-year period from 1984 to 1992, between 4.1 and 5.6 million workers were displaced (Fallick 1996). Displacement increased between 2001 and 2003 in the United States, when around 11 million workers were displaced (Farber 2005).

Displaced workers tend to be less educated than average. Workers with only a high school education are twice more likely to be displaced than those with a college diploma. Earlier work indicated that older workers have less chance of being displaced than younger workers, but recent studies have shown that the key factor is tenure, not age (Fallick 1996).

Most of the research in this field looks at how job loss will affect future employment and future earnings (Farber 2005; Fallick 1996; Munnell et al 2006), which will be examined in the next two sections.

4.4 Displacement, Employment and Earnings

The most important factors affecting post-displacement employment are gender, education, and age.

With respect to gender, women and men have similar patterns of displacement, but women have both lower post-displacement employment and unemployment rates than men. This is because a much higher proportion of women drop out of the labour force altogether after displacement.

In terms of education, having a post-secondary education no longer offers the protection against displacement that it once did. In 1984, a college diploma reduced the probability of displacement by 5%, but today it has no significant effect (Munnell et al 2006). However,

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educated job losers have higher employment rates after being displaced and are more likely to find full-time employment (Farber 2005).

Age makes a big difference in post-displacement employment. Prime-age job losers (aged 25 to 54) have much higher levels of post-displacement employment than older job losers (aged 55 to 64) (Farber 2005). They are also less likely to leave the work force altogether. However, research shows that older workers have lower displacement rates than younger workers. The usual explanation for this is that firms don't want to lay off older workers and train new ones because it would involve losing their investment and hurting productivity (Munnell et al 2006). At the same time, should they lose their jobs, older job losers tend to spend a longer period without work: they become attached to a sector and are thus more likely to limit their job search. They are also more likely to "sit out" a bad spell and wait for the industry to recover, rather than look for new work in other fields (Fallick 1993).

Earnings

When workers find new jobs after they have been displaced, they usually make less than what they were earning before – typically about 13% less. However, this figure understates the overall impact of displacement, as it does not include income lost during the period of unemployment (Farber 2005).

These declines in earnings tend to be permanent (Fallick 1996). Again, the standard explanation for this is that the specific skills that justified higher wages in the old job are not valued by new employers. Research shows that displaced workers who find new jobs in different industries suffer earnings losses that are 16% to 20% more than those for workers who are reemployed in their old industries (Jacobson et al 1993).

4.5 Labour Mobility for Displaced Workers

Inter-Industry Mobility

As many as seventy five percent of displaced workers end up working in different fields (Devens 1986). However, tenure and earnings at the old job are negatively associated with mobility across industries: in other words, the longer you were at your old job and the more you earned, the less likely you are to find work outside your old industry.

Most studies on displacement and declining industries examine the behaviour of firms – i.e., the decisions of employers to lay workers off. The behaviour of workers within a declining industry and the factors influencing their decision to either remain or leave is a crucial but understudied issue. One study of the U.S. textile and apparel industry suggests that, as the possibility of being displaced increases, the first to leave are those who are most mobile and have the best offers with respect to wages and security (Schumacher and Schippen 1999). The fact that the workers with the best opportunities elsewhere are most likely to leave is hardly a surprise, but the important point is that the effect is strongest for highly skilled workers. That is, highly skilled workers are more aware of gaps between what they are earning and what they could be earning somewhere else. For a declining industry, it cannot be welcome news to learn that its most skilled workers are the ones most likely to be coaxed elsewhere early on in the decline.

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Mobility and Age

The low cost of shedding workers enhances efficiency, which leads to higher output. But this means that workers are frequently thrown out of work with only the flimsiest of safety nets beneath them (Bernanke 2007). The solution favoured by most economists and public officials is for the government to cushion workers from the effects of displacement through a number of policy instruments. These include the usual passive and active labour market policies, as well as more controversial ideas such as relocation aid to encourage workers to move to where the jobs are (Farber 2005).

Older employees constitute a particularly difficult class of displaced worker. Between 1984 and 2004, older workers made up an increasingly large proportion of displaced workers. A recent study concluded, however, that this increase reflected the growing number of older workers in the labour force as a whole, not an increase in the displacement rate for older workers. Indeed, wage loss patterns have not changed much at all over the past 20 years for older workers; if anything, their employment prospects have improved slightly in recent years, probably due to the shift from defined benefit to defined contribution benefit plans (Munnell et al 2006; Farber 2005).

Finally, the protection against displacement that older workers have traditionally enjoyed turns out to be a function of tenure rather than age. Thus, workers who change jobs late in life are putting themselves at increased risk of displacement.

4.6 Conclusion

On the basis of this short survey, a number of conclusions can be drawn about the challenges and prospects of attracting workers from declining sectors into the electricity industry.

To begin with, recruiting individuals from declining industries should not be viewed as a long-term labour solution for the electricity industry. Declining industries are likely to provide only a small pool of labour at best. Recruitment initiatives such as mobility subsidies or flexible shift options (e.g., week on, week off) are necessary. This is because the factors affecting the re-employment of displaced workers or the transfer of workers from one sector to another are quite diverse, with the transferability of skills playing only a small role. For most workers, the question of skills transfer is of secondary importance compared to considerations such as family life, home ownership, quality of life, attachment to a sector or firm, and so on.

It is important to note that many of the recruitment initiatives mentioned above are simply not feasible for the electricity industry given the nature of the operations (e.g., flexible shift options are rare) and the majority of the employment opportunities are situated in mid-to-large sized communities and a significant portion of the declining industry labour force is located in rural or smaller communities across Canada.

Also, many of the younger, more mobile workers in declining industries are likely to have left closer to the beginning of the decline. These workers often have less capital invested in either the community or firm. As a result, a significant number of the remaining employees are likely to be mature workers.

Mature workers from declining industries present a series of particular recruitment challenges. These individuals have a series of options open to them, including retirement and part-time work. They are often only looking for employment for a short period of time (average five to seven years). When they do shift industries, they suffer a substantial – and permanent –

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decrease in income. This reflects the fact that they have built up a great deal of firm- or sector-specific human capital and also how relatively unproductive they will be at first in their new jobs. Mature workers also often require additional training. It would therefore be imperative to engage local educational institutions to ensure a smooth transition for workers.

The electricity industry is not the ideal sector to transition into for mature workers from declining industries. Apart from the necessary skill enhancement and re-training necessary, individuals seeking opportunities in the sector will also face delays while awaiting necessary security clearance.

It is also important to note that female displaced workers, similar to mature workers, could present a recruitment challenge for the electricity industry. Female workers in declining industries may not be the primary breadwinner and may not face the same pressure to find a new job immediately. Female workers may be able to temporarily exit the labour market altogether or seek part-time employment options.

Moving displaced workers into the electricity industry is less likely to be successful on a large scale across entire regions or industrial sectors. Successful transition programs should be small, local, and temporary, with a tightly focused connection between the individual, the employer, and the program.

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5. Electricity Sector Future Challenges: A Summary of Key Informant Interviews

5.1 Background

This report details the findings of the qualitative research portion of the Labour Market Demand and Transitions Project conducted on behalf of the Electricity Sector Council (ESC).

The main objectives are to highlight skills and training opportunities in the electrical utilities sector, identify emerging occupational shortages, and provide insight into previous attempts to integrate workers from declining industries into the electricity sector.

The expansion of the economy over the past ten years has placed tremendous pressure on employers across all sectors in Canada. Both job growth and an aging workforce are driving exceptional demand for highly skilled technical workers and professionals in all areas of the nation's economy.

These shortages in skilled labour are exacerbated by, on the one hand, a declining national birth rate and, on the other, difficulties in finding work and achieving professional or technical certification for immigrant workers entering Canada.

A 2005 study by the Canadian Electricity Association estimated that national shortages in the sector could number between 10,000 and 20,000 workers in the next decade. Shortages will be pronounced in the skilled trades, particularly for power linesmen and heavy industrial operators, and in the electrical engineering professions.

The following specific objectives guided the study's design:

1. to better understand the electricity industry's employment requirements over the next five years;
2. to document specific occupations in high demand in the electricity sector;
3. to investigate current and future skills upgrading and training opportunities in the electrical industry; and
4. to understand the barriers to recruiting and retraining traditionally under-represented groups and individuals from declining industries who could move to the electrical sector.

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5.2 Method

This section provides an overview of the qualitative research methods used in this part of the study.

Respondent Profile

The focus of this study was a cross-section of electrical industry stakeholders. Four major groups were identified by the Electricity Sector Council in advance of the research: employers, provincial and national associations, labour representatives, and training deliverers.

In order to provide a balanced set of responses, interview totals were set for all groups. The overall total was expected to be 40, with trainers accounting for 10 and the other three groups the remaining 30. No gender, regional, or linguistic goals were established. It is important to note that the total number of respondents were randomly distributed across the Canada and respondents from the province of Ontario are likely overrepresented in the research.

The table below lists the total breakdown of the relevant information for each group.

Key Informant Interview Group Summaries

INFORMANT GROUP	TARGET GOAL	ATTEMPTED	COMPLETED
Professional associations (e.g., directors)	8	20	9
Industry (e.g., human resource representatives)	16	24	16
Labour (e.g., national union representatives and research staff)	6	13	6
Trainers (e.g., program heads or deans)	10	30	12
Total	40	87	43

The Electricity Sector Council originally identified 42 contacts in the industry, provincial/national association, and labour groups. Each of these contacts received a letter from the Council's Executive Director, Ms. Catherine Cottingham, detailing the scope and purpose of the study. Each respondent was also asked to volunteer contact information for additional key informants who could be added to the sample.

Training deliverers were identified through the Association of Community Colleges of Canada (ACCC) Electricity Affinity Group. Contact information was retrieved by the Educational Policy Institute through web- or telephone-based queries, and each contact received an introductory letter in advance.

Conduct of the Interview Sessions

The key informant interview guides used for the study were designed with the input and final approval of the Electricity Sector Council. The interviews began with the introduction of the researcher, a brief description of the interview process, and a short outline of the project's overall scope.

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The following topics were covered during the interviews:

- short-term projections for the electricity industry;
- current skills upgrading and training opportunities in the electricity industry;
- the impact of technological change and automation on the electricity workforce;
- suggestions for new training or development programs for electricity employees;
- perceptions of barriers to recruitment and retention of traditionally under-represented groups in the electricity industry;
- past involvement with labour market transition attempts;
- industry and training partnership agreements;
- assessment of labour market transition attempt successes and drawbacks;
- short and intermediate occupational pressures; and
- innovative methods used by the electricity industry to recruit or retain workers.

Copies of the interview guides used for the study are included in the appendices.
All telephone interviews were conducted between April 20, 2007, and June 6, 2007.

5.3 Summary of Findings

This section provides a summary of the main messages heard from the key informants during the conduct of the 43 interviews that form the basis of this report. The evidence is arranged according to the type of key informant.

5.3.1 Provincial and National Electricity Association Representatives

Nine interviews were conducted with various provincial and national electricity association representatives, as well as representatives from provincial governments. Opinions were offered on four main topics: the short or intermediate outlook for the industry; skills gaps and training opportunities; projected employment outlook for the electrical sector; and past experience with labour market transition projects.

Short and Intermediate Outlook for the Electrical Sector

All respondents expected increasing labour supply pressure in the short to medium term. Many felt that the oncoming wave of baby boomer retirements would deplete the utilities' labour ranks significantly, with a corresponding loss of the experience and skills needed to instruct the youngest cohort of workers. One respondent observed that some labour projections forecast an extreme shortage of available talent.

A government representative summed up the situation as follows:

> *"In terms of skills and training and labour, we are in a world of hurt at the moment. Demographics are going sooner [to retirement here] than in other provinces. About 44% of the electricity workforce is retiring, and we are ahead of the curve."*

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Beyond the labour shortage, however, there were some bright spots, with many association representatives reporting that their members are fleshing out policies and practices beyond simply installing new solar and wind power plants. One respondent said that some of these included a new pricing structure in Ontario, the promotion of a new renewables plan for British Columbia, and the issuing of a number of energy project Requests for Proposals (RFPs), as well as a number of conservation and demand management projects. Others mentioned related initiatives, such as incentives for compact fluorescent light bulbs and expanded construction of nuclear reactor facilities, as well as assorted policy changes. All of these strategies are designed to enhance the utilities' competitiveness against the new renewable providers.

There was a perception that the larger utilities are to some extent being outmanoeuvred by smaller, faster, nimbler firms specializing in renewable energy sources. Also, these firms have been keen to exploit their appeal to younger workers. Younger workers were generally perceived as being more in tune with sustainable development and were described as having a different value system than their parents' generation. Also, being more nimble ensures that a particular renewable provider will find a fit, in terms of policy or otherwise, with at least a segment of the Generation Y group.

Skills Gaps and Training Opportunities

Most interviewees felt that training would be an ongoing process for utility companies and their employees, with technological change a constant presence in workers' lives.

The most in-demand technical profession at members' utilities was power lineman, closely followed by electrical engineer, as well as civil and mechanical engineers. In addition to these occupations, power plant operators, instrumentation technicians, millwrights or mechanics, and construction workers (both in general and for the building of new hydroelectric capacity in particular) were frequently mentioned.

One respondent felt that the need for technological awareness would actually be somewhat less than most people expect, arguing that the most significant changes would be in the renewable energies field. These changes will stem from the increased drive to economize and improve efficiencies in production and measurement, particularly in infrastructure-level devices such as batteries and generators.

Others thought that the range of technical occupations listed above was too narrow in scope. Several respondents believed that the need for upgrading of skills extended far beyond the field's traditional occupations into support and management positions such as finance and human resources. In these other areas, technical expertise married to an awareness of the specific issues surrounding energy provision and delivery as well as the overall regulatory and commercial framework of the industry was felt to be required, not just simply beneficial or desirable. Skilled administrators and accountants were especially prized by some. Others mentioned that they would like to see increased participation from project managers and business analysts with a regulatory and environmental focus throughout the industry.

Most felt that post-secondary education in some form would cease to be an option and become a mandatory requirement for workers in nearly every job. However, it was noted that the value of the credential was not in the letters but rather in enabling workers to acquire critical thinking skills applicable to a variety of jobs and working environments. A number of options were suggested with regard to improving existing training options. These included: auditing current

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training modules and courses offered through post-secondary education institutions to create a better fit for job requirements; rethinking the entire approach to college training; and beefing up graduate output, especially in the engineering professions.

One respondent suggested that training providers would need to work regularly with utilities to ensure that their graduates meet current requirements and noted that previous training from 10 years ago, for example, might not be immediately relevant to the latest graduates. The respondent continued:

> *"Thirty percent of [people in] the [electrical] sector do not have their credentials. They [i.e., the industry] need to develop [them] with colleges and start creating programs so that some of those people can upgrade and start moving into more advanced positions."*

Another respondent questioned the whole idea of using colleges so extensively, claiming that provincial governments could accredit existing utility employees "through the back door," as it were, or instructors could come to plants to offer on-site training. This would minimize time away from the workforce. The same respondent suggested that colleges and universities need to work together with electrical utilities to provide more flexible solutions. However, the interviewee acknowledged how expensive this type of training could become and that funding would remain a key issue. Individual programs could be funded on a case-by-case basis, but in the long term a larger, simpler, more accessible funding pool would be needed.

5.3.2 Labour Representatives

Six interviews were conducted with various national and provincial electrical union representatives, with each interview lasting just over 30 minutes. Opinions were offered on three main topics: the general outlook for the electrical industry as a whole; skills gaps and training opportunities; and past experience with labour market transition projects.

Electricity Employment Outlook

Labour representatives described two national challenges for the industry unfolding at the moment.

The most pressing is the need to put new workers in place prior to the wave of baby boomer retirements due to begin in the next five years. A related need is for the utilities doing the hiring to invest in proper training measures to ensure that each new worker has the skills and knowledge required to carry out their duties competently, particularly in the skilled trades. This will be analyzed in greater detail below.

All interviewees noted their belief that the industry will not be short of employment opportunities over the coming five to 10 years. However, they expressed concern that the utilities would be unable to cope with simultaneous consumption increases and labour and skill shortages. More generally, interviewees remarked on the lack of overall resources – a lack of skilled instructors, a lack of funds to deliver training, and a lack of time available to allow workers to pursue that training.

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Skills Upgrading and Training Opportunities

Generally speaking, the union representatives were satisfied with the training given to new workers, but they noted differences in training offered on an ongoing basis to experienced workers in need of refreshing, upgrading, and cross-training opportunities. These differences were not regional but rather dependent on the organization's size. Other differences in training stemmed from the occupational type – for example, heavy duty equipment operators are expected to undertake cross-training for many different skills, whereas nuclear power plant operators are not expected to do so.

Several respondents indicated that they were generally satisfied with the progression of workers into needed apprenticeship arrangements, although all respondents felt that indenturing could still be expanded significantly to meet higher expected demand and offset predicted retirements.

Individual labour representatives made the following points:

- more money should be available for shop-steward training;
- training is adequate, but opportunities to exercise it in practical situations are not;
- distance learning and mentored relationships through online "portal activity" might be a solution for training gaps.

One respondent expressed concern about the differences in values and work ethics between generations:

> *"The way apprentices are trained these days is antiquated – you're indentured like the feudal days from the 1500s. With the availability of IT and distance learning and all sorts of electronic training, it would really be great if they would make it much more skills/competency-based. This old model will turn [younger] people off the sector, because if they don't see matches with their working experience and styles of learning, they won't know how to relate to it."*

Respondents noted that larger utilities are able to offer more ongoing training opportunities because they can guarantee providers – such as local colleges – that enough personnel will be made available for any given course. Strength in numbers permits larger organizations to have more defined and specialized training pathways, whereas smaller utilities tend to take an ad hoc approach to imparting knowledge. Larger utilities also offer professional development courses to their employees (e.g., financing selected individuals' MBA courses). For the most part, however, union members stick to training courses more directly related to their areas of work.

In comparison, the smaller utilities were perceived to have proportionately greater percentages of their workforces in generalist roles or dealing with the public and as a result have fewer opportunities to give staff time off to receive training. Many union heads in Ontario noted that the smaller utilities would frequently centralize their training at the Electrical and Utilities' Safety Association to take advantage of economies of scale.

5.3.3 Post-Secondary Education Trainers

Twelve interviews were conducted with various national college and university training representatives, with each interview lasting just over 30 minutes. Opinions were offered on three

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main topics: an overview of the training programs designed for personnel entering the electrical sector; the availability of transitional programs for workers entering the sector from other areas; and a general appraisal of the electrical industry's future workforce needs and training capacity.

Overview of Current Electricity-Related Training Programs

Training programs offered nationally at community colleges, technical institutes, and universities tend to fall within several broad categories.

Within the skilled trades, post-secondary institutions offer courses in power line duties, regular electricians, power systems technicians, instrumentation technicians, all construction trades, millwrights, industrial electrical technicians, and others.

For professional post-secondary programs, all three engineering degrees (civil, mechanical, and electrical) are offered, as well as industrial control technologists, electronic engineers, and others, though many institutions have had declining rates of take-up by students.

The majority of provincial governments now offer pre-apprenticeships through local high school systems to interested students, giving credit toward full apprenticeships and associated credentials upon successful completion of the program.

Many trainers noted that of late the student composition has changed, becoming smaller, younger, and more focused. One respondent said that the local student body is shrinking and the trades and technology instructors are responding by offering a wider, more attractive programming mix. This has resulted in electrical entry level and electrical apprentice programs filling up without the need to engage in public advertising.

Others noted that increasing numbers of university graduates are taking trades training programs. Nearly all respondents indicated that they had made formal arrangements with local utilities with an eye to giving candidates access to job fairs, practical experience, and exposure to working conditions and cultures at local power plants or on the line as needed.

Future Workforce Needs and Training for the Electricity Industry

Echoing comments made by other participants in this research, the majority of electricity training instructors believe that entrants to the sector will need:

- strong technical skills, as defined by their individual fields of work;
- numerous and overlapping soft skills, such as customer relations and environmental awareness; and
- employability skills such as communication skills, problem-solving, decision-making ability, literacy and mathematical ability, negotiation skills, and team- and rapport-building skills.

However, unlike other participants, some training providers felt that the industry needs to do much more to request training that would be beneficial in the future, to engage in longer-term forward planning in partnership with colleges and universities, and to start paying more of its own way with respect to funding the academic and technical education of its future workforce.

One respondent summed up the situation at length:

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"There are a number of [challenges in training for the electricity sector]. Industry needs to change the model, as governments have shed responsibility. What tells a young person what to do in terms of career? Young people need to do the research themselves. Industry needs to start planning ahead – three or four years ahead... Industry doesn't do enough of this – they seem to think they can get employees magically on the day they need people. The whole model needs to change...

"To give you an example, housing for students is getting short. Over the last few months rents have started to double ... and students failed to show up for programs because they couldn't afford to take the courses or find places to live near [the college]. Some people thinking of upgrading their training cannot do so because they can't afford to come."

5.3.4 Industry Employers

Sixteen interviews were conducted with various electricity industry representatives, most of whom were from human resource departments. Each interview lasted just over 30 minutes. Opinions were offered on four main topics: the short and intermediate outlook for the electrical sector; skills gaps and training opportunities for potential and existing employees; and electricity sector employment outlook.

Short and Intermediate Outlook for the Electrical Sector

All industry respondents noted urgent and pernicious labour shortages arriving at a time of steadily climbing personal electricity consumption and replacement periods for essential infrastructure. One human resource representative stated that by 2011 one-third of the overall workforce would be eligible for retirement and a further 35% by 2020, meaning that pervasive gaps would be the norm rather than the exception. The impending retirement of a huge segment of the workforce was cited by all respondents as the single most pressing issue facing the utilities both now and in the foreseeable future.

One contractor recruiting former utility personnel said that his firm was so oversubscribed that it had to turn away fully 75% of all work requests from the utilities. He lamented the time period required for a new worker in the field to become competent. He believed that it might be possible to address this shortage with new entrants via colleges and universities, but only with massive investment in training.

Another respondent acknowledged the lack of infrastructure and conceded that opportunities to build new machinery were being missed due to the labour shortfall.
The push to control climate change was seen as complicating matters a great deal. One respondent stated:

"Capital rebuilding, drain on resources, rising costs, rising metal prices, increasing activism in the public, there is a huge NIMBY [not in my backyard] factor. We are refurbishing aged infrastructure. We're not driving the growth, we're responding to it. There seems to be a lack of understanding that in order to accommodate growth we need more energy. Rising costs are going to be a significant issue."

A number of respondents located outside of major urban centres felt that their utilities were disadvantaged in terms of drawing younger workers, as the following comments show:

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"There's a geographic issue [with regard to] recruiting people [in] smaller towns."

"We are quite isolated and labour is not as mobile."

"We have a hard time retaining employees because of the [physical] temperature. It's hard to find skilled labour."

While industry representatives on the whole welcomed the opportunity to implement greener energy solutions and assorted conservation measures, many felt that the process would be a slow one and would have a limited effect in terms of total megawatts generated.

Most renewable efforts across the country are based on wind. One interviewee felt that transmission systems would become much more decentralized and based on local solar and wind power generators. Another stated that his utility would be implementing street light dimmer projects to lower the lights between 12 and 4 a.m. Two others stated that while their utility had a sustainable development policy and philosophy, with a 100MW wind turbine in place, the technology was not yet tough enough to survive the region's winters. Another key informant replied that his firm had been chastised by a commission regarding its biomass efforts and was selling off its subsidiary as a result. However, many utility observers pointed out that hydroelectric energy could qualify as effectively renewable and that they themselves were making sizeable efforts to build or extend capacity.

Conservation efforts, according to several observers, would be directed to the marketing of new energy-efficient appliances, as well as so-called "smart appliances" that would automatically manage energy usage and turn lights off and on as required. However, while some were enthusiastic to a certain degree, others were more dismissive, saying that building "smart houses" and "being able to call your house and turn off your furnace is just silly."

Other observers commented that their firms would be making efforts in energy innovation, such as hydrogen-based fuel cell efficiency programs.

Many respondents preferred not to answer questions about targets and renewable energy goals, citing an unwillingness to tip off competitors about their own firms' intentions. Industry participants identified a series of occupations that are most in demand (and will be for some time), ranging from **engineers** in all specialties to **power line operators, dispatchers, operators, mechanical maintainers, project managers, electrical technologists, communications protection and controls specialists, IT technicians, programmers,** and **instrument specialists**.

Skills Gaps and Training Opportunities

Most respondents indicated that two major skills categories – technical and soft skills – would need to be improved in the workforce over the next five to 10 years. Both categories were seen to be equally important in terms of future need.

Technical skills were cited by all respondents as critical to their companies' success in the future. Familiarity and high adaptability to changing technology and technical mastery of the worker's chosen field of expertise were the aspects of these skills considered most important by these interview subjects. Specific skills seen to be in high demand – mostly due to above-average rates of retirement – were those involved with the maintenance and repair of high

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voltage transmission lines, such as **power linemen**, **power line technicians**, and **substation engineers**. A distinct but vocal minority of employers indicated that highly specialized software skills would be key to answering utilities' needs, specifically CAD/CAM.

Soft skills were deemed equally important to the continued success of the industry, particularly in the areas of communication, leadership, project planning and management, and affiliated supervisory roles. One human resources specialist at a large utility was quite explicit, believing that hiring would have to be motivated by the need for increased customer service and better interpersonal skills, as well as communication skills. Two other human resource specialists described the need for "continuous learning teams based on strategic thinking."

These needs in turn mean that new training opportunities have opened up in the electrical industry. Many respondents outlined extensive subsidy programs designed to defray the end-user or trainee costs of upgrading, particularly in the technical areas of **journeymen linemen**, **meter technicians**, and **general** and **specialist electrician** programs, as well as **communication technicians**, technical leadership (such as **shift** or **operator supervisors**), and business leadership programs such as **professional** or **managerial development** (e.g., executive Masters of Business Administration (MBA) programs sponsored through business schools at various universities). Several informants indicated that tuition costs for these programs were reimbursed to employees under the utilities' collective agreements.

Some felt that post-secondary education would be important as a factor contributing to recruitment. One industry respondent said that the post-secondary sector needs to focus less on the traditional core electrical and mechanical engineering skills and more on computers and instrument interfaces, as well as troubleshooting and diagnostic skills.

One respondent stated that in the interests of national security and safety standardization all nuclear, hydroelectric, and fossil-burning training had to be tracked in some form by the utilities themselves.

A number of respondents suggested that governments could provide much-needed policy direction and financial and marketing assistance, with a stated goal of increasing post-secondary engineering graduate numbers. Governmental aid was also desired for the unrelated area of speeding up and simplifying immigrant credential recognition.

The other major area where government guidance would be most appreciated is pre-apprenticeship programs, where secondary school students are given the chance to study various courses for advanced credit. Employers advocated the continued study of math to Grade 12, citing the overwhelming need for electrical sector workers to have numerical skills.

Electrical Sector Employment Outlook

Despite the extensive training opportunities identified in the previous section, the ongoing labour shortage will worsen, for reasons unrelated to the recruitment of the Generation Y cohort. As has been extensively discussed in this document, the oncoming wave of experienced worker retirement will deplete ranks considerably in years to come. This depletion will strain existing workers to their limits, reduce levels of on-the-job experience, and possibly have effects in terms of safety as well.

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Several respondents suggested that government assistance might have a role to play here as well, noting that provincial governments could phase out mandatory retirement laws – as recently happened in British Columbia – and allow electricity utilities, among others, to offer their own phased retirement plans.

These plans would enable utilities to offer experienced older workers a gentle slide into reduced workloads, as well as opening up opportunities such as mentoring to the rest of the workforce. One respondent characterized the phased-in retirement plan as a win-win situation for all concerned:

“A phased-in retirement plan would be able to benefit the worker, the company, and the consumers ultimately, by making the delivery safer, stretching out their experience to benefit younger workers, and easing workloads and transitions for older workers.”

Industry representatives also commented that the electricity sector is not the only sector experiencing growth and labour shortages. This reality is likely to cause increased competition for labour talent and force companies to be creative with recruitment and retention measures. One respondent indicated that companies like Bell Canada, Microsoft, and IBM are competing [with the utilities] for engineering and programming graduates.

5.4 Conclusions Regarding the Key Informant Groups

Specific Labour Skill Shortages

All four informant groups identified **power linemen**, **electrical engineers**, and **power plant operators** as being the most in-demand professions.

Inertia in Ontario during the 1990s

A long period of legislative confusion in Ontario over plant construction and maintenance, aborted corporate mergers, and stop-start deregulation dissuaded many electrical firms in the province from expansion during the 1990s, with many experienced staff pensioning themselves out. However, this has changed recently, with workers needing to work with a greater customer-focused mindset and a larger awareness of overriding commercial needs.

Of the four groups, union officials were the most critical of both the industry and the government in the province, believing that the two reinforced each other in making the situation worse. As one informant put it:

> *“Industry deregulation was an issue … Since 1992 the industry has declined by 20 to 25% in staffing levels, as there was a massive retirement package … The remaining workers can’t keep up with the loads. … There was … no work in knowledge management and so now we have no institutional memory of any importance.”*

Nonetheless, union officials were the most likely to see themselves as co-operative partners to industry and a necessary part of the solution.

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Construction of Infrastructure

Association representatives took the long-term view in identifying a pressing need for infrastructure construction, something that no other informant group emphasized to the same degree. This was typified by provinces needing new hydroelectric dams or maintenance on existing infrastructure, with high demand for engineering designers and construction engineers. As one interviewee put it:

> *"We don't need more physicists, nor chemical engineers; we need people to design and build things."*

Aboriginal Workers

There were two main perceived obstacles identified when hiring Aboriginal workers that were discussed. All four correspondent groups were quick to assert that these obstacles could be addressed with appropriate educational measures, if industry – as the primary driver and consumer of such measures – chose to use them.

The first Aboriginal hiring barrier is a perceived lack of essential workplace skills such as mathematical ability and literacy, as well as work ethic. However, respondents in Western Canada said that suggesting training would often inadvertently imply assimilation instead of educational improvement. Employer respondents tended to be the most sensitive to this perceived paternalism.

The other barrier cited was that Aboriginals on reserve had expressed hesitation in leaving friends and family to work at a utility. Barriers notwithstanding, both association and industry representatives expressed interest in having more Aboriginal members in the workforce.

With respect to training, it was felt that enticements would be needed to recruit potential Aboriginal workers. One professional respondent suggested the option of having training come to reserves, as the utilities have (or at least have access to) mobile trades units to train off-site workers. Among the informant groups, trainers were, however, the least likely to mention outsourcing training as an option.

Immigrants

Unlike many Aboriginals, a significant number of immigrants have extensive technical or professional skills, particularly if they have experience in the electricity sector in their country of origin. Association and industry representatives expressed the greatest interest in recruiting immigrants to the sector, but they were also the most concerned with the level of bureaucratic interference involved. For example, mandatory background checks create time delays for immigrants, and these are measurably worse since September 11, 2001 – even more so if the candidate is put forward for a nuclear position. These investigations include criminal record checks in source countries.

Nonetheless, approvals have been given for skilled immigrants working in non-sensitive positions, such as those given to workers brought into the finance and drafting operations of various utilities; this was met with approval by industry respondents in particular.

Union representatives and training instructors focused less on immigrants entering the sector, although several trainers noted that enrolment of foreign students had increased – in some

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cases by a lot – in comparison with previous years, especially if their institution offered renewable programs. However, many of these students return to their countries of origin upon completion.

One provincial government respondent noted that slow but steady progress is being made on reducing barriers to entry into Canada and that the federal government is moving toward trying to accommodate provincial needs, but more needs to be done, particularly in terms of welcoming immigrants to Canadian communities. This respondent thought that there is still a problem with outmoded regulations, which result in, for example, someone with an M.A. in art history being considered more valuable than a certified trade worker by Canadian immigration officials.

Attracting skilled immigrant labour to rural locations throughout the country was perceived by many to be difficult, if not impossible. Immigrants to Canada tend to cluster around the three major urban centres of Toronto, Montreal, and Vancouver, as opposed to rural areas or Atlantic Canada.

In summary, one interviewee declared that regardless of the current bumps in the road and issues regarding the acceptance of professional qualifications, more hiring of immigrants is to be expected and necessary in the future.

Females

Association respondents tended to have the most detached perspective with respect to women in the industry – while being part of the industry, they are not involved so much in terms of day-to-day direct contact in work situations. As such, their general observations were often the most relevant. Industry respondents, conversely, had the advantage of direct contact with women on the job and thus were perhaps best placed to observe the issues faced by women in some labour-intensive trades.

With respect to recruiting more women, association respondents generally felt that the industry's biggest issue is its outdated image. That is, it is perceived as being traditionally male-dominated and unfriendly or unwelcoming to women, particularly in the skilled trades employed at many electricity providers. One informant made the following point:

> *"We're trying to see women across the board in management and the trades ... They need to see more information about the stability [and] well-paid jobs and [that] there is a variety of jobs, even with just one employer like Hydro. We just haven't done very well with [promoting] that."*

One industry representative attributed the lower rates of participation among women to other factors, namely, a lower level of willingness to take the preparatory courses required in secondary school. This has a knock-on effect in terms of being qualified for the heavier trades. As well, women were perceived by many as falling short in posts demanding extensive physical labour – specifically the line trades. Women thus self-select out of the trades after short periods of time. One respondent explained:

> *"Would-be apprentices have to take line workers' tests – women still have to have upper body strength and grip strength, and many women fail these tests because they just do not have the strength to handle the required loads."*

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One industry respondent went on to say that crews were normally highly mobile and that this fact tended to pose scheduling problems for female power line technicians with young children.

In contrast, trainers and industry respondents mentioned on several occasions the opportunities for advancement in fields such as engineering and instrumentation. This was borne out by similar remarks from industry representatives.

Older Workers

Differences between the four respondent groups were more pronounced in terms of their attitudes toward older workers.

Many association and industry respondents felt that older workers had a great deal to offer younger employees, especially where workforce experiences outside of electricity were similar to those inside the industry. Respondents in the other two groups, however, raised questions about the capacity of older workers to handle the physical labour requirements and wondered what could realistically be expected of workers who would only remain in their position for a few years. One informant would very much prefer to have older workers brought back to the fold on a contingency or consultancy basis rather than to let them go entirely through retirement. Another respondent opposed this, stating that physical ailments become pressing issues, particularly for line workers, with strain on the knees and back taking a toll:

> *"We've been training people for nearly 40 years – our experience hasn't been too great with [recruitment from other industries]. For people over the age of 30, it doesn't really work – as they are almost 40 by the time they become competent, and by that time they are starting to fade out. The ideal situation is to get people by the ages of 20 to 22."*

Recruitment from External Sectors (Declining and Otherwise)

The idea of recruiting of older workers can in many ways be considered in tandem with recruitment from sectors in decline. Association, labour, and industry respondents suggested that **forestry** would be the most likely source of declining industry workers, although some believed that forestry workers would not ultimately prove to be a good fit with the electricity sector's wide range of occupations and skill sets.

In some areas, such as Ontario, **manufacturing** was deemed the second most likely source of workers outside the electrical sector, but this often varied according to the representative's physical proximity to manufacturing plants – generally, it was limited to within striking distance of the Greater Toronto Area. Among employers outside of Ontario, however, the manufacturing sector was not mentioned frequently.

One industry representative indicated that his parent firm in the U.S. had success recruiting from both **aviation** manufacturing and the **automotive industry** during the slowdown in the early 2000s. There was, however, no attempt to replicate the experience in Canada.

Several labour respondents said that the majority of anticipated Canadian job losses in the sectors mentioned above would be in geographically isolated areas or in industries where skills may not be complementary, making recruitment difficult. This latter point was echoed numerous times by industry interviewees as well, and very few industry informants were able to identify successful past experiences of recruitment from declining industries.

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Another association respondent responded that the **construction** industry would be a suitable recruitment target, although, strictly speaking, it does not fit the definition of an industry in decline.

One association representative was quite opposed to recruitment from declining sectors, saying:

> *"It's often faster and cheaper to recruit fresh out of the colleges and universities. Often it takes too long, because the work is so different to what you see in other established industries, [which means] that it's just better to get people who have no preconceived notions."*

Most labour representatives favoured the possibility of hiring new employees or union members from sunset industries, although not all did so. In general, union personnel welcomed the opportunity to have new members entering the sector, aware of the fact many skilled workers would thus be eligible to join their own organizations.

Other potential (non-declining) industries from which workers could be recruited include the **oil and gas industry**, as electrical utilities may be able to cherry pick dissatisfied workers from Northern Alberta and Atlantic Canada. The **computing and software industries** and **telecommunications industry** could provide additional labour, since the electrical utilities offer stable and secure employment to workers who do not want to deal with labour demand fluctuations. Finally, some industry respondents indicated that the fishing industry could provide new employees, but training and skills upgrading would be necessary:

Many respondents in all groups except trainers indicated that recruitment from other industries generally tended to occur as a natural consequence of job advertisements in national and local media, rather than as a result of deliberately targeted marketing campaigns to potential job applicants.

On the question of appropriate measures to attract external workers, the four groups were in relative agreement: health and safety retraining is paramount. Literacy and other essential skills were strongly advocated by professional and industry respondents, but somewhat less so by trainers and union workers.

Some labour respondents argued that centralized mass training for former sunset industry workers would probably not work, given the wide variety of possible working experience and knowledge levels, as well as a lack of prefabricated or canned transition programs or courses in the biggest energy consumer, Ontario.

Several labour key informants highlighted the idea of promoting the stable, cheaper, family-friendly lifestyles in rural areas as a way of attracting young workers either with small children or planning to have children. However, these respondents were also the most likely to mention the costs of changing careers and locations as significant obstacles to entering the electricity sector.

Union members were the most likely to engage in a straightforward cost-benefit analysis, saying that, in many cases, two obstacles exist with respect to recruiting workers in forestry or other sunset industries:

- many have attachments and roots in smaller local communities
- the financial costs of moving to urban jobs (particularly to areas such as British

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Columbia's Lower Mainland or the Golden Horseshoe) are seen as being prohibitively expensive. Several labour representatives argued that relocation compensation packages and tax relief programs are vital.
- In contrast, trainers tended to focus on preparing the following groups:
- younger future workers fresh from high school; and
- workers in their mid-20s beginning their first apprenticeships.

Programming offered to these students includes **adult basic education (ABE)** and **foundational** courses. Closely associated with these, **prior learning assessment and recognition (PLAR)** facilities are offered as well. As a result of this vocational focus, trainers by and large did not address declining sector recruitment. There were very few examples of direct occupational transition programming provided by key education and training informants to workers from sunset industries.

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6. Labour Market Demand and Transitions Recommendations

6.1 Overview

The following report is a summary of recommendations provided to the Electricity Sector Council based on findings from the Labour Market Demand and Transition Project. The recommendations include recruitment and retention measures targeted to the electricity industry and to provincial and national associations.

The recommendations include measures that are specific to some traditionally-underrepresented groups (e.g. Aboriginal Canadians), some specific to individuals from declining industries and others best suited for industry or association partners.

Recruiting individuals from declining industries is not without its limitations and challenges. This is because the factors affecting the re-employment of workers in declining industries, or the transfer of workers from one sector to another, are quite diverse, with the transferability of skills playing only a small role. For most workers, the question of skills transfer is of secondary importance compared with considerations such as family life, home ownership, quality of life, attachment to a sector or even a firm, and so on.

Also, key informants in the electricity sector were not very familiar with attempts to recruit individuals from industries in decline and identified a series of potential challenges preventing industry officials from engaging in this type of exercise. The four most common were:

The lack of compatible skills, training and experience

Informants had a perception that potential transfer of workers from one sector into the electricity sector would not bare much fruit. Informants expressed a strong desire to recruit recent post-secondary education graduates. This is not unexpected given that levels of formal education for the electricity sector labour force are significantly higher than in the general labour market – 76 percent of workers in the sector have a post-secondary degree, diploma or certificate compared with 57 percent for all industries.

At the other end of the electricity labour market scale, only 3 percent have less than a high school education compared with 13 percent for all industries. The challenge for the electricity sector is a high percentage of workers in declining industries fall into this formal education category and would need various forms of re-training and skill enhancement.

Geographic location of individuals in declining industries

One of the largest industries in decline in Canada is forestry and industry shows very few signs of a quick or prolonged recovery. In fact, the forestry industry is likely to continue to shed workers in Ontario, Quebec and British Columbia (with some delay given the recent activity around the pine beetle) well into the future. The challenge for the electricity sector is majority of these job losses have occurred and will continue to occur in rural, northern or remote areas of the country. Given the geographic distribution of electricity providers across the country, there are very few location synergies with the forestry industry. This combined with the capital (human

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and financial) invested by many mature workers in their home communities make it a significant challenge to engage a potential pool of labour. As a result, many of the workers from declining industries will be searching for employment options with flexible shift schedules (e.g., two weeks in, week out).

Individuals from declining industries are often mature workers

One of the realities of industries in decline is that many of the first workers to find other opportunities are generally younger and more mobile. As a result, a significant number of the available workers in declining industries are older and have deep roots in their communities. The employment transition ability for these individuals is usually more complicated than simple good compensation and benefits. As well, these individuals are more likely to low levels of formal education and significant amount of in-house, non-credentialed training completed.

Security clearance issues (for nuclear operations)

There is a high percentage of mature workers (45 years old plus) employed in declining industries. These individuals are looking to move to new opportunities for a short period of time (i.e., up to 10 years). The various re-training measures (as mentioned above) needed to facilitate successful transition alone present a series of challenges, however, these are further compounded by the necessary obtainment of proper security clearance.

The points discussed above are an attempt to provide some context to the challenges of recruiting potential employees from industries in decline into the electricity industry. The potential supply of new employees is likely to be minor and only will be successful if projects are focused, regional and small.

6.2.1 Growing the Talent Pool

1) *Establish a couple of pilot projects using a return for service agreement with post-secondary education students framework*

   The Canadian electricity industry is in a period of transition – wages are increasing, employment opportunities are expanding, renewable projects are coming on stream and domestic (and international) demand for resources and talent are on the rise.

   Globalization has reduced borders and barriers for skilled workers. Jurisdictions can no longer rely on the domestic labour pool to fill all employment vacancies and are now locked in a global war for talent. This struggle means that all jurisdictions need to be aware of the global human resource policies and strategies being created to deal with impending skills shortages.

   The global quest for skilled workers results in companies and industries creating new and innovative ways to identify and nurture talent. It is paramount, given the security and skill concerns of the electricity industry, that identification and recruitment of new employees happen at an earlier stage. Simply waiting to recruit college and university graduates is not enough.

   The Electricity Sector Council should explore establishing a series of pilot projects with employers to identify and recruit secondary school students in the electricity industry.

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These programs should include both college and university students – not simply restricted to engineers. Interested students could be offered up to four years of free tuition at a Canadian post-secondary institution of their choice. In return, individuals – similar to recent programs in northern areas or dealing with health professions – would commit to an employer for a set amount of time after graduation.

2) *Work with industry representatives to standardize industry training recognition*

As mentioned in the 2004 Keeping the Future Bright study, the lack of standardized employer-provided training hinders the ability to transition throughout the labour force. The first step in addressing this problem would be to standardize training recognition. This should also include a series of steps necessary to examine previous training from other industries or electrical companies. The lack of training standardization is both a domestic and foreign employment barrier.

3) *Create in-house mentorship opportunities*

Mature workers often possess extensive technical knowledge and experience, and have a strong work ethic. These abilities, skills and knowledge need to be passed on the next generation of the electricity labour force. This exercise is often difficult to structure; however, a culture of information exchange is important and creating a proper exposure of mature workers to newcomers will return the investment made over the next few years and beyond.

4) *Continue to foster a culture of learning*

A significant (and increasing) portion of today's labour force tend to be post-secondary educated and are inclined towards pursuit of further education. Individuals often know their skills and knowledge will lead to personal and professional advancement. These individuals also want opportunities to learn new abilities and skills as well as to acquire knowledge. These developments will only come about with a learning culture in companies.

As documented in the 2004 Canadian Electricity Association *Keeping the Future Bright* study, the electricity industry has both a high level of formal education for individuals employed in the sector and a strong employee satisfaction with educational opportunity in the industry. It is paramount that these continue for the industry to remain at the forefront of recruitment of new talent.

Education and training activities need to be continually viewed as a starting and not an end point. Increasingly new electricity employees will demand flexible education and training options where employee versatility is enlarged and knowledge horizons are expanded.

The electricity industry needs to continue providing education and training as a benefit for both parties and should continue to identify, as many employees for expanded training opportunities, as possible in each year. One way to ensure this can happen is to allow individual employees to construct their own education and training options. This could provide employees with the tools to continue to utilize their skills and knowledge.

5) *Explore transition opportunities for mature workers*

The high percentage of mature workers in the electricity industry presents a series of challenges and opportunities. Prior to mature workers exiting the industry, it is

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paramount that steps are undertaken to ensure knowledge and corporate memory are transferred to the new generation of workers. This, however, is only one piece of career deceleration.

Mature workers should, where possible, be encouraged to remain in the industry behind the traditional retirement age. In order to facilitate this, increased efforts need to be placed on ensuring “phased retirement” (e.g., gradually reduced work over a set period of time) options are available for workers approaching retirement age to provide a slow disengagement from the industry instead of a sudden departure.

Continual revisions to organizational and government policy with respect to mandatory retirement (i.e., the extension of the mandatory retirement age), pension and other compensation benefits would also be beneficial. It would also be useful to revisit terms surrounding age plus years of service in the industry as this may provide additional short-term employment relief.

6) *Expand electricity and renewable energy related youth marketing and awareness campaigns nationally*

There are a series of successful provincial youth marketing campaigns – such as Ontario’s Trades Up program (i.e., a tool kit to learn about trades, with videos and instructional materials) and these could serve as a template for future projects designed to raise awareness about the electricity industry and renewable energy sector across the country. These initiatives would be best suited targeted at youth in earlier (ideally grades 5-9) in secondary school.

7) *Be proactive in environmental discussions*

The issue of environmental sustainability has become a high priority for a growing number of Canadians. The electricity industry has been at the forefront of many of these discussions with the expansion of renewable energy sources. The industry also needs to expand the environmental communication message and highlight the various sustainability initiatives being undertaken by domestic operators.

8) *Engage post-secondary institutions in the renewable energy expansion*

The electricity sector should make pursue new capital investment opportunities in renewable energy projects with community colleges and universities. The goal of these projects would be to expand training opportunities and raise awareness.

9) *Strengthen incentives, mentorship and outreach programs targeted at traditionally underrepresented individuals, document practices and share results*

Electricity industry partners should continue to work with other stakeholders to increase the number of traditionally underrepresented individuals (e.g., Aboriginals, females, etc) in the sector. Recent communications and marketing tools highlighting career opportunities in the electricity industry for underrepresented groups should be expanded and other programs maybe considered. Current Aboriginal and female employees should be deployed as employment ambassadors and literature should contain all relevant information. The material could also provide a series of sections on environmental career options in the renewable energy sector.

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Interested companies should establish a full educational strategy. Any youth outreach strategy should include more than just simple post-secondary education scholarships. This could include partnerships with local schools or school boards to provide equipment (e.g., computing, recreational or sporting) to youth. The strategy could also – for example - include Aboriginal learning accounts tied to successful completion in secondary school. Individuals could pledge to fully complete their studies in return for the promise of a monetary package invested in an educational savings account.

It is important to note that it is not enough to simply continue to call for increased policies and programs dealing with increasing attraction and recruitment for underrepresented individuals to the electricity sector. The real value added will arrive when activities are catalogued and current practices are assessed. This measure would allow the electricity sector to share promising practices amongst other stakeholders and would go along way to growing the overall talent pool.

6.2.2 Transitioning Workers from Declining Industries

10) *Create up to two employment recruitment pilot projects targeting workers from declining industries*

The Electricity Sector Council (with a series of industry partners) could explore establishing a pilot project in one or two geographic areas of Canada (i.e., the Greater Toronto Area and Montreal) to recruit former automotive and aviation manufacturing (and to a lesser extent forestry workers from either Northern Ontario or British Columbia) to the electricity industry. These pilot projects would likely require some training funding envelopes for potential employees. It may be beneficial to secure a post-secondary institution as a partner for this project.

11) *Create a research database of past successes in transitioning from declining industries*

The Electricity Sector Council should explore the possibility of creating a database for successful experiences with labour market transition ventures inside the electricity industry. This database could include a series of testimonials from individuals who successfully transitioned (these individuals may be able to act as ambassadors for change in certain communities or industries) and thus highlight the transition process.

12) *Establish labour market transition initiatives with labour union representatives from industries in decline*

Labour unions representing individuals in declining industries (e.g. forestry, automotive manufacturing, etc.) often have created a series of employee databases containing valuable information for potential employers. These databases contain education and training histories, skill profiles and often even outline a typical employee's propensity for geographic relocation relating to employment.

One example of this type of exercise is the Communications, Energy and Paperworkers Skillfinder website (www.skillfinder.ca). The website was designed to link union members with potential employers.

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13) *Work with representatives in communities where industries are in decline*

Recruiting potential employees from declining industries often requires more than just a simple newspaper advertisement. Successful companies establish relationships with local individuals – e.g. mayors, reeves, union officials, chamber of commerce representatives, local training and adjustment boards and key economic development personnel, among others. These relationships can go a long way to showing the company is simply not in the area to grab talent and move on, and can also provide valuable insight or background on the individuals in the area.

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Bibliography

Becker, Gary, 1975, *Human Capital*, New York: Columbia University Press.

Bernanke, Ben S., "The Level and Distribution of Economic Well-Being", Federal Reserve Board Speech, February 6, 2007. Retrieved on March 14, 2007, from http://www.federalreserve.gov/boarddocs/speeches/2007/20070206/default.htm

Canadian Electricity Association, *Keeping the Future Bright:* 2004 Canadian Electricity Human Resource Sector Study, 2004, Ottawa.

Day, K.M., 1992, "Interprovincial Migration and Local Public Goods", *Canadian Journal of Economics* 25: 123-144.

Devens, Richard M., Jr., 1986, "Displaced Workers: One Year Later" *Monthly Labor Review* 109.7: 40-43.

---. Statistics Canada, CANSIM II, Table 029-0005.

---. Statistics Canada. CANSIM II, Table 029-0007.

---. Statistics Canada. CANSIM II, Table 281-0023.

---. Statistics Canada. CANSIM II, Table 281-0026.

---. Statistics Canada. CANSIM II, Table 281-0027.

---. Statistics Canada. CANSIM II, Table 379-0017.

---. Statistics Canada. CANSIM II, Table 379-0023.

---. Statistics Canada. CANSIM II, Table 379-0025.

---. Statistics Canada. 2003. *National Graduate Survey 2000*. Ottawa: Statistics Canada.

Canadian Council of Professional Engineers, 2006, *Canadian Engineers for Tomorrow: Trends in Engineering Enrolment and Degrees Awarded 2001 to 2005.* Ottawa: Canada.

Ellis, M., R. Barff and B. Renard, 1993. "Migration Regions and Interstate Labor Flows by Occupation in the United States", *Growth and Change* 24: 66-90.

Fallick, Bruce C., 1996, "A Review of the Recent Empirical Literature on Displaced Workers", *Industrial and Labor Relations Review* 50.1: 5-16.

Fallick, Bruce C., 1993, "The Industrial Mobility of Displaced Workers", *Journal of Labor Economics,*11.2: 302-23.

Funded by the Government of Canada's Sector Council Program.

Fay, R.G., 1996, “Enhancing the Effectiveness of Active Labour Market Policies: Evidence from Programme Evaluations in OECD Countries”, *Labour Market and Social Policy Occasional Papers* No. 18. Paris: OECD.

Farber, Henry S., 2005, “What Do We Know About Job Loss in the United States?: Evidence from the Displaced Workers Survey, 1984-2004”, Federal Reserve Bank of Chicago, *Economic Perspectives* QII: 13-28.

Felmlee, H. Diane, 1982, “Women's Job Mobility Processes Within and Between Employers”, *American Sociological Review* 47: 142-151.

Grubb, W.N., 1999, “Lessons from Education and Training for Youth: Five Precepts.” *Preparing Youth for the 21st Century: The Transition from Education to the Labour Market*. Paris: OECD.

Heckman, J.J., R.J. Lalonde, and J.A. Smith, 1999, “The Economics and Econometrics of Active Labour Market Programs”, *Handbook of Labour Economics* 3A, O. Ashenfelter and D. Card (eds.), North-Holland, Amsterdam.

Hamermesh, Daniel S., 1989, “What Do We Know About Worker Displacement in the United States?” *Industrial Relations* 28.1: 51-59.

Human Resources and Development Canada, 1997, “Effectiveness of Employment-Related Programs for Youth: Lessons Learned from Past Experience.” *Lessons Learned* series. Ottawa.

Lin, Ge, and Christiadi., 2002, “Interregion-Occupational Persistence and Dispersion: A Model of Geographic and Occupational Mobility”, Research Paper 2002-18. Accessed on March 14, 2007, from http://www.rri.wvu.edu/pdffiles/linwp2002-18.pdf.

Macias, Enrique F., 2006, “Mobility in the U.K. from a Comparative U.K. Perspective”, Discussion paper presented in London, April 4-5, 2006. Retrieved March 14, 2007, from http://www.eurofound.europa.eu/docs/areas/populationandsociety/mobility3paper2006.pdf

Markey, P. James, and William Parks II. 1989, “Occupational Change: Pursuing a Different Kind of Work”, *Monthly Labor Review* 3: 3-12.

Markham, William, Charles Bonjean and Judy Corder, 1983, “A Note on Sex, Geographic Mobility, and Career Advancement”, *Social Forces* 61: 1139-46.

Martin, John P. and David Grubb, 2001, “What Works and for Whom: A Review of OECD Countries’ Experiences with Active Labour Market Policies”, OECD Working Paper 2001: 14: 1-53.

Martin, John P. 2000, “What Works among Active Labour Market Policies: Evidence from OECD Countries’ Experiences”, *Economic Studies* 30: 79-113, OECD.

Munnell, Alicia H., Steven Sass, Mauricio Soto, and Natalia Zhivan, 2006, “Has the Displacement of Older Workers Increased?” Center for Retirement Research at Boston College: Working Paper 2006-17, http://www.bc.edu/crr.

OECD. 1989. *Employment Outlook*. Paris.

----. 2003. *Sourcebook*. Paris: OECD.

Osberg, Lars, Daniel Gordon, and Zhengxi Lin. 1994. “Interregional Migration and Interindustry Labour Mobility in Canada: A Simultaneous Approach.” *The Canadian Journal of Economics* 25.1: 58-80.

Picot, G., and J. Baldwin, 1990, “Patterns of Quits and Layoffs in the Canadian Economy.” *Canadian Economic Observer* 4.1-4.27, Ottawa: Statistics Canada.

Schumacher, Edward J., and Ben S. Shippen, 1999, “Wages and Exit Decisions for Workers in Declining Industries: The Case of Textile and Apparel”, East Carolina University Department of Economics working paper ecu9909.

Schumpeter, Joseph, 1962, *Capitalism, Socialism, and Democracy,* 3rd ed. New York: Harper Perennial.

Shaw, R.P, 1985, *Inter-Metropolitan Migration in Canada: Changing Determinants over Three Decades*, Toronto: New Canada Publications.

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Table and Figure Index

Chapter 3 - The State of the Electricity Industry in Canada

Tables

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Figures

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APPENDIX A : The State of the Electricity Industry in Canada: Full Data

Section 2: Output and Gross Domestic Product

Notes:

1. *Source: Statistics Canada CANSIM Matrix #379-0023. #379-0025, and #379-0017*
2. These data describe the contribution that the production and distribution of electricity makes to the national and provincial economies. The "real GDP" figures can be considered as representing the "value added" to the economies by the industry's activities.
3. All values are measured in millions of dollars. Figures are subject to periodic revision.

Table 3.2.1
Gross Domestic Product, Electricity Generation, Transmission, and Distribution

	Electricity Sector ($ millions)			
Year	**Nominal Dollars**	**Annual growth**	**Constant (1997) Dollars**	**Annual growth**
1991	$18,415	12%	...	...
1992	$19,407	5%	...	...
1993	$20,205	4%	...	...
1994	$20,677	2%	...	...
1995	$21,571	4%	...	...
1996	$22,038	2%	...	...
1997	$22,417	2%	$22,417	...
1998	$21,923	-2%	$21,965	-2.0%
1999	$22,104	1%	$22,063	0.4%
2000	$23,081	4%	$21,824	-1.1%
2001	$23,734	3%	$20,691	-5.2%
2002	$23,620	0%	$21,924	6.0%
2003	$25,578	8%	$21,870	-0.2%
2004	...	...	$22,010	0.6%
2005	...	...	$23,183	5.3%

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Table 3.2.2
GDP for Electricity Generation, Transmission, and Distribution, by Province

	Millions of Constant (1997) Dollars			
	2003	2004	2005	Share*
Nfld & North	$347	$324	$339	1.5%
N.S.	$495	$504	$507	2.2%
N.B.	$599	$596	$591	2.7%
Quebec	$7,429	$7,339	$7,694	33.0%
Ontario	$7,935	$8,204	$8,519	36.1%
Manitoba	$722	$802	$958	3.4%
Sask	$676	$639	$661	2.9%
Alberta	$1,924	$1,902	$2,017	8.6%
B.C.	$1,744	$1,701	$1,898	7.7%
Canada	$21,870	$22,010	$23,183	98.1%

** three year average*

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Table 3.2.3
Electricity Generation by Source

	MWH x 1000				
Year	**Generation**	**Hydro**	**Coal**	**Nuclear**	**Other**
1981	378,531	70%	20%	10%	1%
1982	376,485	68%	22%	10%	1%
1983	395,464	67%	21%	12%	1%
1984	424,853	67%	21%	12%	1%
1985	446,412	67%	19%	13%	1%
1986	455,820	67%	17%	15%	1%
1987	482,108	65%	19%	15%	1%
1988	489,046	62%	21%	16%	1%
1989	482,152	60%	24%	16%	1%
1990	466,062	63%	22%	15%	1%
1992	501,523	62%	22%	15%	1%
1993	511,276	62%	19%	17%	1%
1994	533,487	61%	19%	19%	1%
1995	537,076	62%	20%	17%	2%
1996	551,888	64%	19%	16%	2%
1997	554,440	62%	21%	14%	2%
1998	543,934	60%	25%	12%	2%
1999	558,093	61%	24%	12%	3%
2000	583,373	61%	24%	12%	3%
2001	565,757	58%	26%	13%	3%
2002	578,729	60%	24%	12%	4%
2003	564,218	59%	25%	13%	4%
2004	571,292	59%	22%	15%	4%
2005	597,248	60%	22%	15%	4%
2006	584,377	60%	20%	16%	4%

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Table 3.2.4
Electricity Generation by Province

	MWH x 1000					
	Generation	**Atlantic**	**Quebec**	**Ontario**	**Prairies**	**B.C.& North**
1981	378,531	16%	27%	29%	14%	14%
1982	376,485	16%	27%	29%	15%	13%
1983	395,464	15%	28%	30%	16%	12%
1984	424,853	15%	29%	28%	15%	13%
1985	446,412	14%	31%	27%	15%	13%
1986	455,820	13%	33%	27%	16%	11%
1987	482,108	13%	33%	27%	14%	13%
1988	489,046	14%	30%	29%	14%	13%
1989	482,152	13%	30%	29%	16%	12%
1990	466,062	13%	29%	28%	17%	13%
1992	501,523	12%	29%	28%	18%	13%
1993	511,276	13%	30%	28%	18%	12%
1994	533,487	12%	31%	28%	18%	12%
1995	537,076	11%	32%	27%	18%	11%
1996	551,888	11%	31%	27%	18%	13%
1997	554,440	12%	30%	26%	19%	12%
1998	543,934	14%	28%	26%	19%	13%
1999	558,093	13%	30%	27%	18%	12%
2000	583,373	13%	31%	26%	18%	12%
2001	565,757	13%	30%	27%	20%	10%
2002	578,729	13%	31%	27%	18%	11%
2003	564,218	13%	31%	27%	17%	11%
2004	571,292	13%	31%	27%	18%	11%
2005	597,248	13%	30%	27%	19%	12%
2006	584,377	12%	30%	27%	19%	11%

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Figure 3.2.1
Electricity Generation, Transmission, and Distribution, Gross Domestic Product

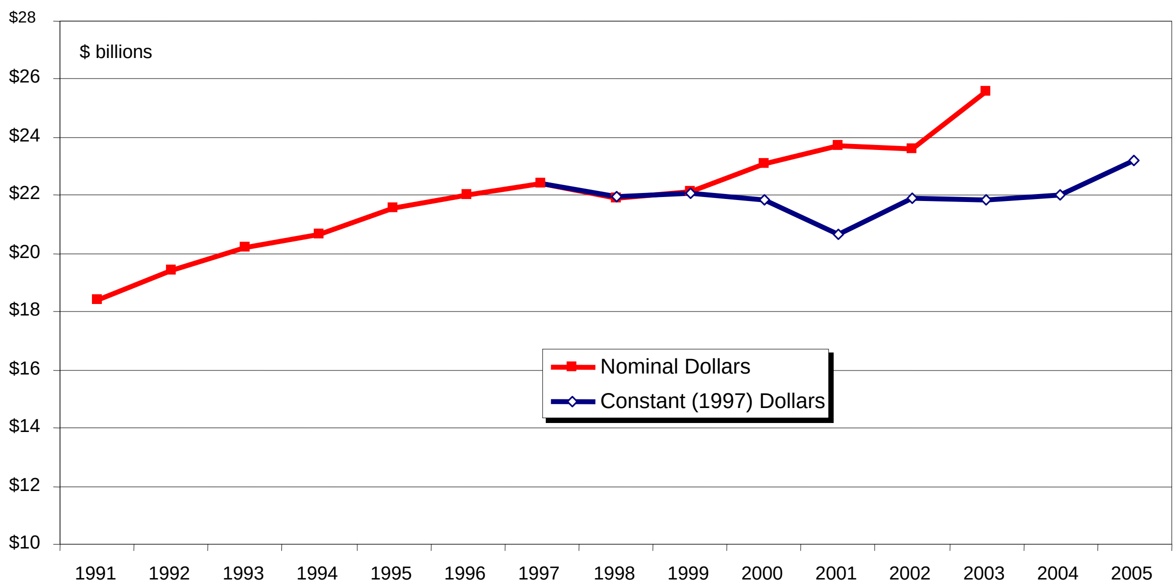

Figure 3.2.2
Share of Electricity Generation, Transmission, and Distribution, Gross Domestic Product by Province, Constant 1997 Dollars, Three Year Average Ending in 2005

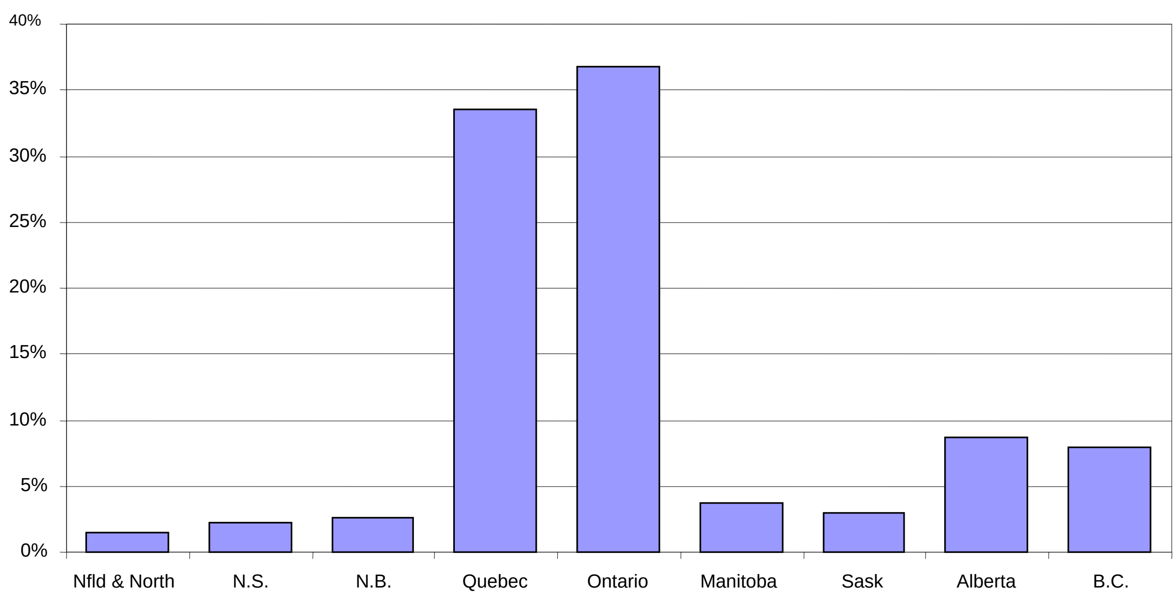

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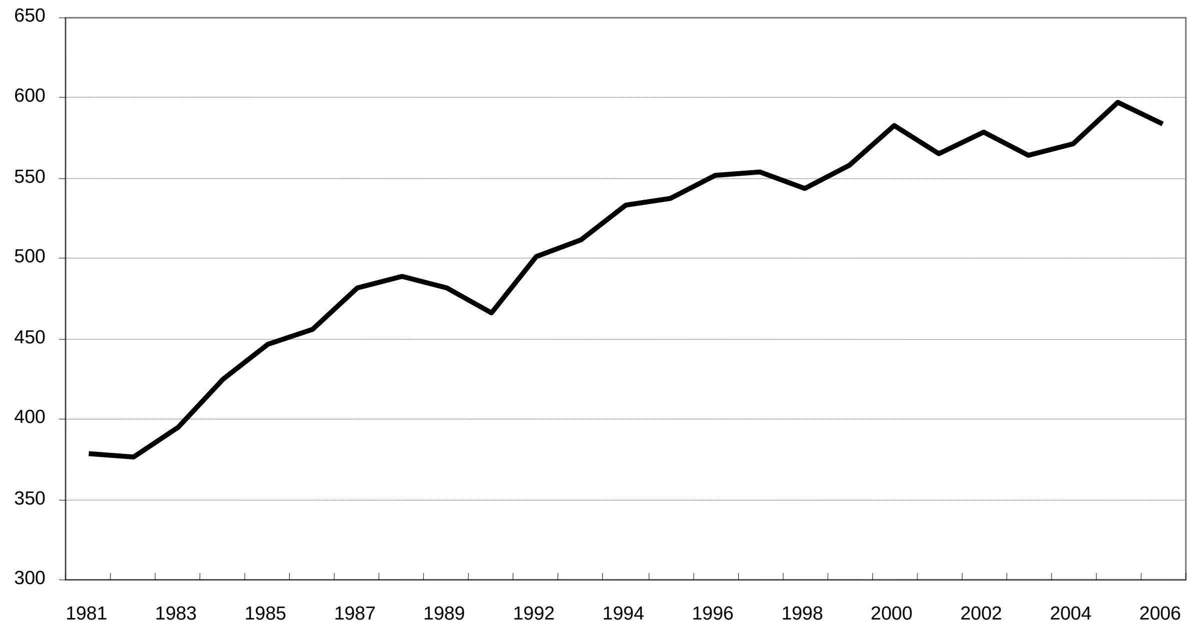
Figure 3.2.3
Electricity Generated (MWH x 1,000,000)



3.2.4
Electricity Generated by Source

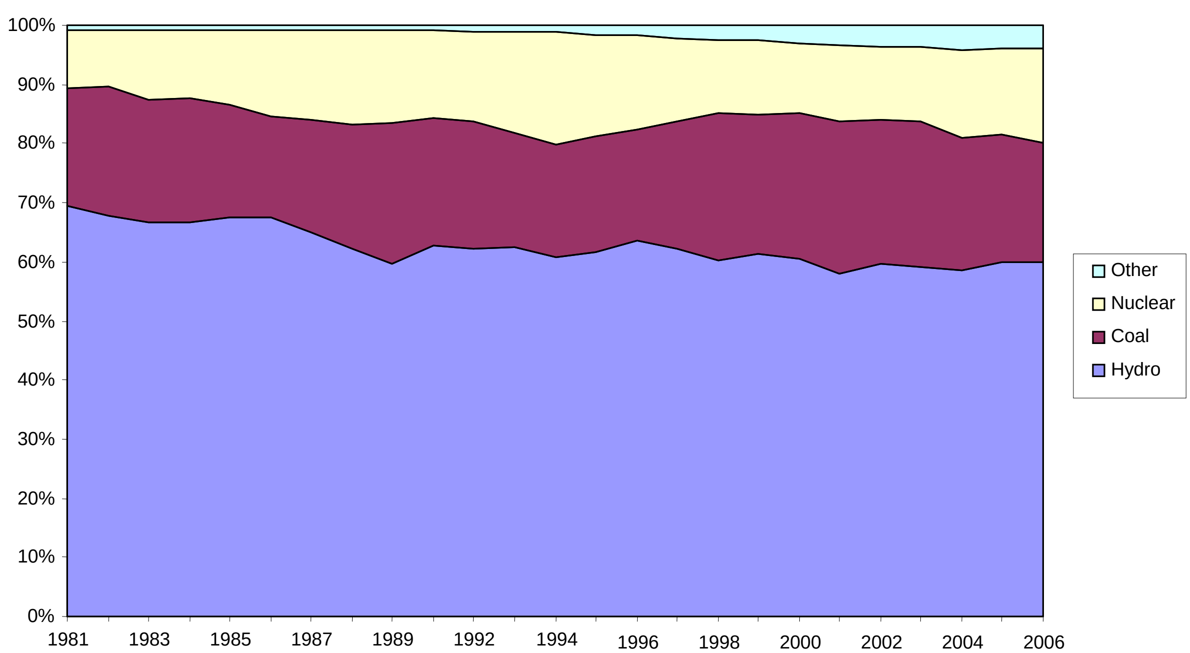


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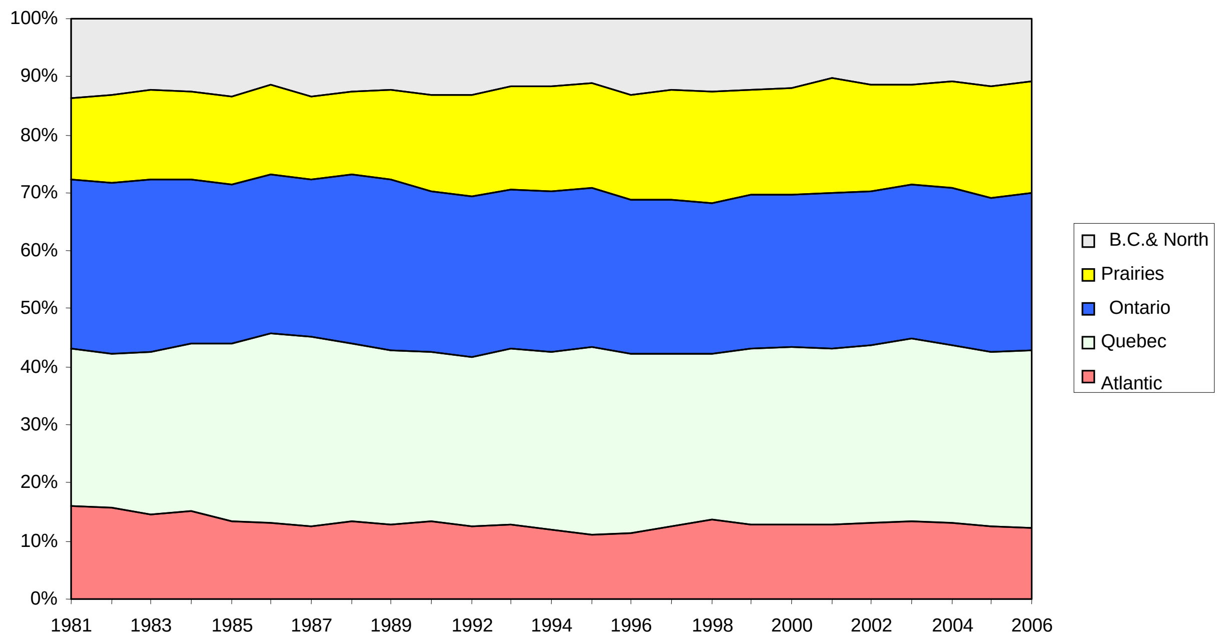
Figure 3.2.5
Electricity Generated by Province



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Section 3: Employment, Payroll and Earnings

Notes:

1. *Source: Statistics Canada Survey of Employment, Payroll, and Hours (SEPH) CANSIM Matrix 281-0026, 281-0023, 281-0027*
2. These data are derived from payroll deduction remittances to the Canada Revenue Agency. They include, therefore, all employees who receive earnings as "employees" including self-employed individuals who operate in an incorporated business. All employees, including non-production workers, are included.
3. Average weekly earnings are aggregate pay divided by the number of employees so an increase in part-time hours will result in an increase in earnings even though the hourly pay rate has not increased. Changes in average weekly earnings can also occur if there is an increase in overtime (premium pay) hours.
4. 2006 estimates are preliminary
5. Much of the provincial detail has been suppressed to ensure confidentiality of company information.

Table 3.3.1
Paid Employment and Average Earnings, Canada

	Electricity Sector				All Industries		
	Paid	Average Weekly Earnings			Paid	Average Weekly Earnings	
	Employment	Including OT	Excluding OT		Employment	Including OT	Excluding OT
1991	100,790	$883	$820		11,109,994	$553	$540
1992	101,636	$912	$851		10,789,451	$573	$559
1993	98,058	$937	$880		10,817,422	$583	$568
1994	93,801	$951	$888		10,942,431	$593	$577
1995	90,417	$970	$904		11,175,573	$599	$583
1996	86,920	$969	$916		11,260,896	$611	$595
1997	83,692	$993	$934		11,571,633	$624	$604
1998	83,213	$1,050	$967		11,801,985	$633	$614
1999	84,223	$1,068	$1,008		11,974,088	$641	$622
2000	85,266	$1,080	$1,016		12,411,402	$656	$635
2001	86,658	$1,087	$989		12,693,791	$667	$647
2002	87,783	$1,108	$1,015		12,987,353	$681	$661
2003	88,469	$1,123	$1,027		13,229,332	$691	$669
2004	93,344	$1,116	$1,038		13,351,200	$706	$684
2005	93,581	$1,117	$1,030		13,533,378	$728	$707
2006	94,062	$1,133	$1,040		13,808,742	$747	$726
Avg annual increase, 2001-2006	1.7%	0.8%	1.0%		1.7%	2.3%	2.3%

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Table 3.3.2
Paid Employment and Average Earnings, by Region

	Paid Employment				Average Earnings including Overtime		
	Ontario	**Alberta**	**All others**		**Ontario**	**Alberta**	**All others**
1991	41,968	8,621	50,201		$875	$881	$890
1992	42,236	8,507	50,893		$914	$930	$908
1993	38,347	8,364	51,347		$917	$955	$949
1994	35,021	7,864	50,916		$945	$961	$954
1995	33,625	7,071	49,721		$968	$986	$970
1996	33,328	6,624	46,968		$971	$996	$965
1997	33,060	6,475	44,157		$1,016	$1,001	$974
1998	33,167	6,033	44,013		$1,077	$1,005	$1,036
1999	33,864	6,371	43,988		$1,102	$1,024	$1,049
2000	32,779	6,733	45,754		$1,126	$1,044	$1,052
2001	34,172	6,756	45,730		$1,143	$1,052	$1,050
2002	35,381	6,850	45,552		$1,166	$1,065	$1,069
2003	34,069	7,156	47,244		$1,140	$1,161	$1,105
2004	36,770	7,103	49,471		$1,097	$1,239	$1,113
2005	36,760	7,411	49,410		$1,078	$1,246	$1,128
2006	37,381	7,506	49,175		$1,088	$1,278	$1,146
Average annual increase, 2001-2006	1.8%	2.1%	1.5%		-1.0%	4.0%	1.8%

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Figure 3.3.1
Number of Paid Employees in Electricity Generation, Transmission, and Distribution

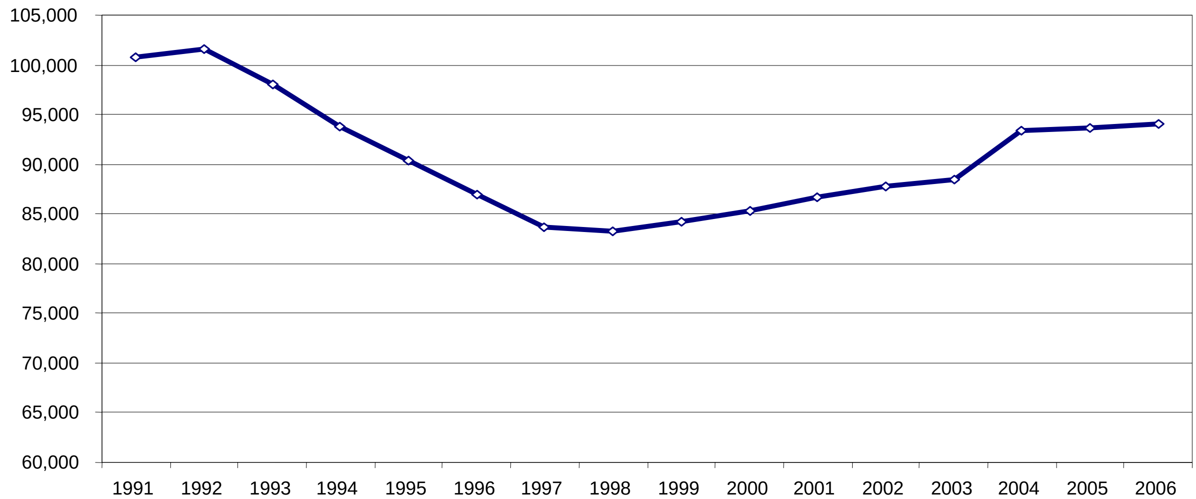

Figure 3.3.2
Paid Employees by Region

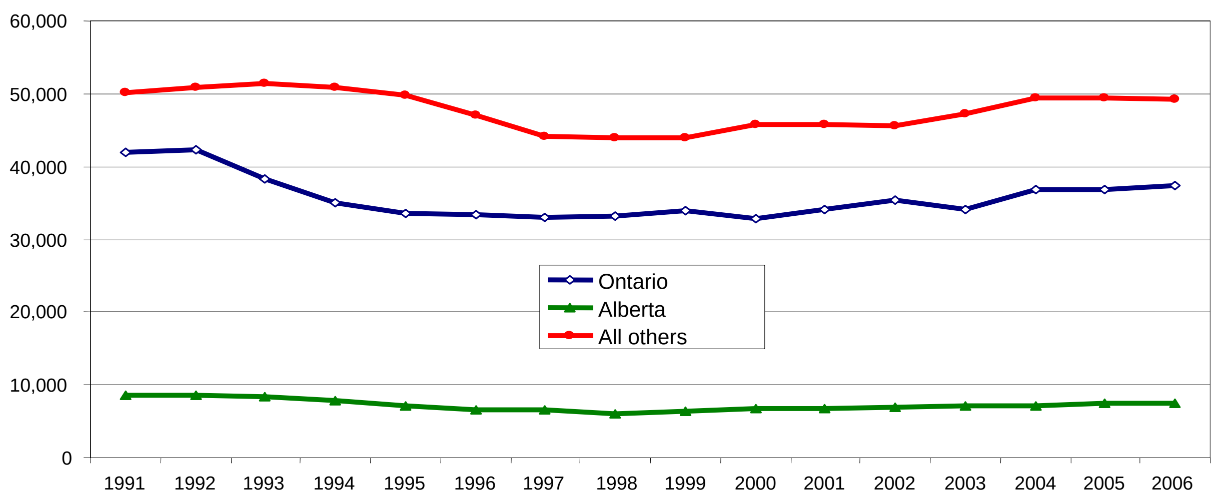

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Figure 3.3.3
Average Weekly Earnings, Paid Employees in Electricity Generation, Transmission, and Distribution

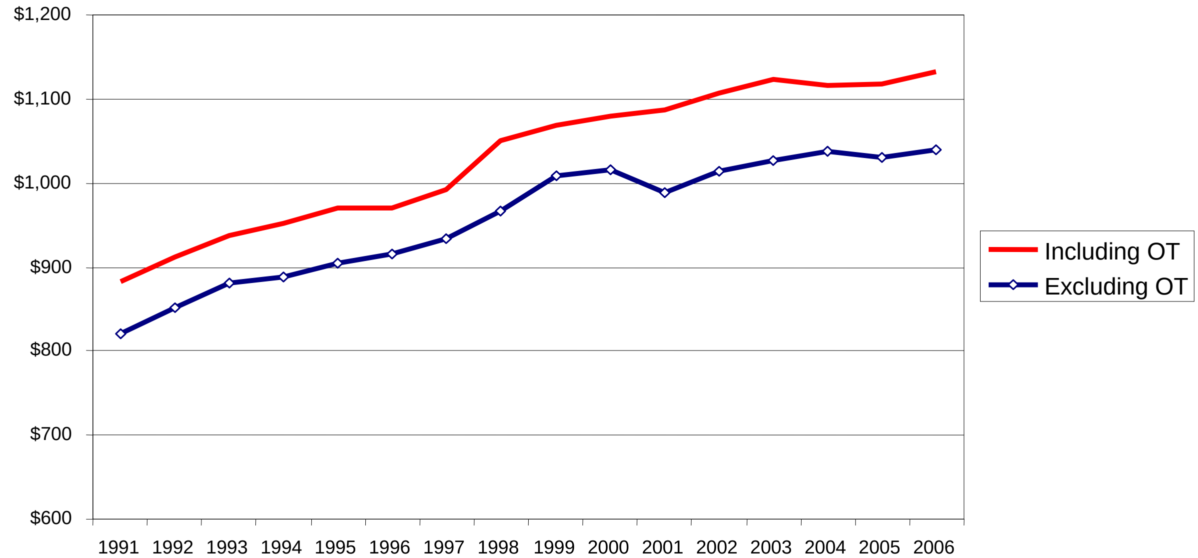

Figure 3.3.4
Average Weekly Earnings Including Overtime, Electricity Generation, Transmission, and Distributuion

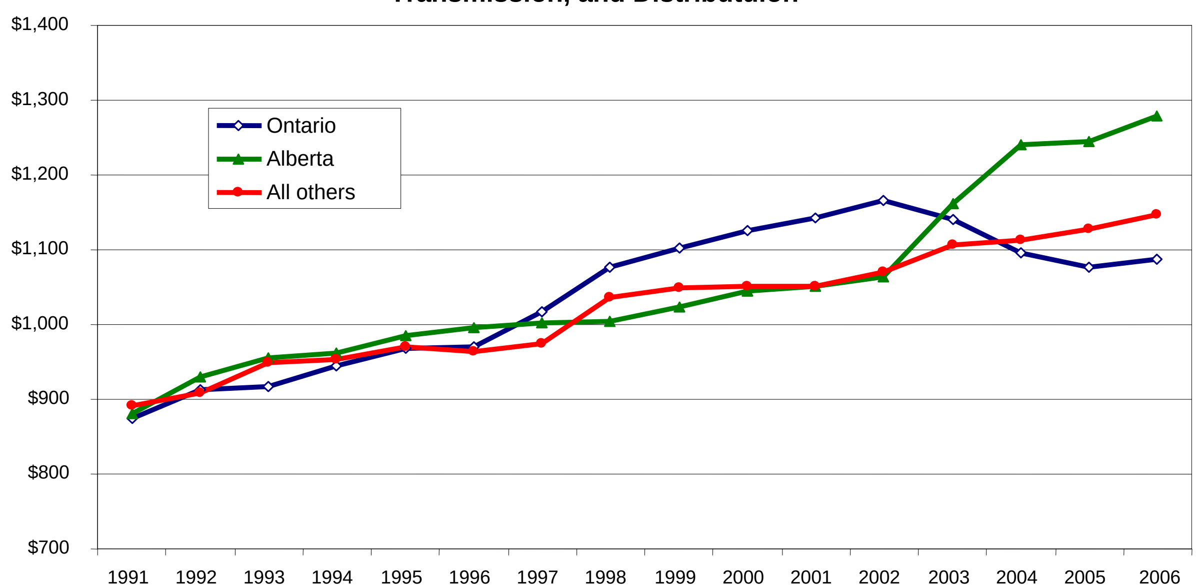

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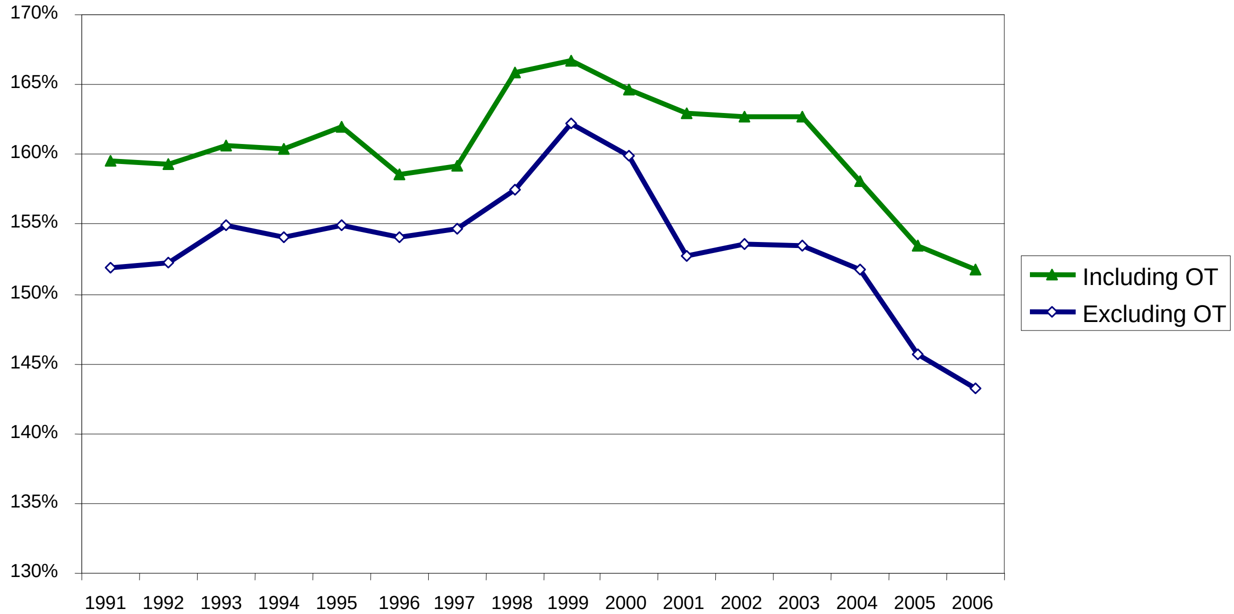
Figure 3.3.5
Average Weekly Earnings Including Overtime, Electricity Generation, Transmission, and Distribution Relative to All Industry Average



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Section 4: Characteristics of the Electricity Sector Labour Force

Notes:

1. *Source: Special Tabulation from Statistics Canada Labour Force Survey*
2. These data are based on a telephone survey of adults -- the Labour Force Survey. Only those who reported that they were "paid" employees are included, that is, the self-employed are not included.
1. 3. These data include only those persons who report employment in the electricity sector as their main job, excluding those who report a main job elsewhere and a second job in the electricity sector.

Table 3.4.1
Employment in the Electricity Sector, Canada

	2001	2002	2003	2004	2005	2006	Average Growth
Employment by Region							
Atlantic	8,500	9,000	7,900	7,400	6,500	6,300	-5.8%
Quebec	25,100	24,800	25,000	29,100	28,300	25,200	0.1%
Ontario	38,700	40,100	39,700	43,800	38,300	37,200	-0.8%
Manitoba	5,000	5,200	6,300	6,000	6,200	4,700	-1.2%
Sask	2,700	2,900	3,100	3,500	3,100	3,100	2.8%
Alberta	7,500	10,200	8,200	8,300	7,300	10,400	6.8%
B.C.	6,100	6,100	7,300	5,300	6,900	5,300	-2.8%
Canada	93,600	98,400	97,500	103,400	96,800	92,300	-0.3%

Percent of Paid Employment in All Industries							
Atlantic	0.96%	1.00%	0.86%	0.79%	0.69%	0.66%	
Quebec	0.84%	0.80%	0.79%	0.91%	0.88%	0.77%	
Ontario	0.77%	0.78%	0.75%	0.81%	0.70%	0.67%	
Manitoba	1.06%	1.08%	1.31%	1.23%	1.26%	0.94%	
Sask	0.75%	0.78%	0.82%	0.91%	0.80%	0.78%	
Alberta	0.55%	0.73%	0.58%	0.58%	0.50%	0.68%	
B.C.	0.39%	0.38%	0.45%	0.32%	0.40%	0.30%	
Canada	0.74%	0.76%	0.73%	0.77%	0.71%	0.66%	

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Table 3.4.2
Characteristics of Paid Employees in the Electricity Sector, Canada

	2001	2002	2003	2004	2005	2006	All industries 2006
Total employment	**93,600**	**98,400**	**97,500**	**103,400**	**96,800**	**92,300**	**13,986,300**
By Gender							
Men	70,800	71,500	75,600	76,100	72,100	68,800	7,105,700
Women	22,800	26,900	21,900	27,300	24,700	23,500	6,880,600
	93,600	98,400	97,500	103,400	96,800	92,300	13,986,300
Percent Women	24%	27%	22%	26%	26%	25%	49%
Age Group							
15-24	4,000	4,800	4,700	4,500	4,900	4,900	2,443,400
25-34	12,600	14,700	15,400	13,800	15,400	13,000	3,178,000
35-44	36,600	36,400	33,400	32,000	28,800	25,000	3,414,300
45-54	33,500	33,600	36,000	41,500	37,300	39,100	3,271,600
55+	6,800	8,900	8,000	11,500	10,400	10,400	1,679,000
	93,500	**98,400**	**97,500**	**103,300**	**96,800**	**92,400**	**13,986,300**
Percent Under 25	4%	5%	5%	4%	5%	5%	17%
Percent 45 or older	43%	43%	45%	51%	49%	54%	35%
Completed Education							
Less Than High School	3,600	3,400	2,800	2,200	2,000	2,700	1,867,500
High School Some Post-Sec	22,100	22,600	21,000	25,700	21,400	19,500	4,098,600
Certificate or Diploma	49,000	48,600	49,600	52,900	51,000	49,000	4,861,000
University Degree	19,000	23,900	24,100	22,600	22,400	21,200	3,159,300
	93,700	**98,500**	**97,500**	**103,400**	**96,800**	**92,400**	**13,986,400**
Percent with less than high school	4%	3%	3%	2%	2%	3%	13%

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Percent with a post-secondary education	73%	74%	76%	73%	76%	76%	57%
Family Structure							
Unattached individuals	13,400	14,300	13,600	16,600	13,500	13,300	2,278,100
Lone parents	4,200	5,500	3,600	5,200	5,100	4,500	1,013,700
Spouse in single earner family	17,900	17,900	18,500	18,200	15,100	15,700	1,914,100
Spouse in multiple earner family	55,000	57,000	58,800	60,200	58,600	55,700	7,675,100
Other	3,100	3,800	3,000	3,200	4,500	3,100	1,105,300
	93,600	98,500	97,500	103,400	96,800	92,300	13,986,300
Percent in single earner family	19%	18%	19%	18%	16%	17%	14%

With Multiple Jobs?							
Yes	3,700	4,000	4,100	4,300	4,000	5,300	857,500
No	116,800	104,000	112,300	118,100	134,300	152,300	15,626,800
	120,500	108,000	116,400	122,400	138,300	157,600	16,484,300
Percent with multiple jobs	3%	4%	4%	4%	3%	3%	5%
School Attendance (8 winter months only)							
Student	2,300	4,000	3,800	3,500	2,500	1,700	1,572,700
Non-student	89,700	92,600	92,600	96,600	92,100	90,400	14,756,400
	92,000	96,600	96,400	100,100	94,600	92,100	16,329,100
Percent students	2.5%	4.1%	3.9%	3.5%	2.6%	1.8%	9.6%

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Table 3.4.3
Characteristics of Positions in the Electricity Sector, Canada

Union members or covered							All industries
	2001	2002	2003	2004	2005	2006	2006
Total employment	**93,600**	**98,400**	**97,500**	**103,400**	**96,800**	**92,300**	**13,986,300**
Employment by job permanence							
Permanent	85,800	88,600	88,800	93,500	87,200	84,400	12,163,100
Non-Permanent	7,800	9,800	8,700	9,900	9,600	7,900	1,823,200
	93,600	98,400	97,500	103,400	96,800	92,300	13,986,300
Percent Permanent	92%	90%	91%	90%	90%	91%	87%
Union membership							
by collective agreements	71,900	72,100	75,100	78,900	72,700	67,800	4,428,600
Not union members or covered	21,700	26,300	22,400	24,500	24,100	24,500	9,557,700
	93,600	98,400	97,500	103,400	96,800	92,300	13,986,300
Percent union	77%	73%	77%	76%	75%	73%	32%
"Usual" Hours Worked							
Under 30 (part time)	1,200	1,600	1,600	1,900	1,500	1,300	2,455,800
30 to 40	88,900	91,500	90,800	96,400	91,100	85,900	10,032,800
More than 40	3,500	5,300	5,100	5,100	4,200	5,100	1,49 7,70

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							0
	93,600	98,400	97,500	103,400	96,800	92,300	13,986,300
Percent more than 40	4%	5%	5%	5%	4%	6%	11%
Actual Hours Worked							
Under 30	17,300	17,600	20,000	22,100	17,300	18,300	4,067,300
30 to 40	58,300	56,400	55,000	60,200	55,600	52,100	7,030,600
More than 40	18,000	24,400	22,600	21,100	23,900	21,900	2,888,400
	93,600	98,400	97,600	103,400	96,800	92,300	13,986,300
Percent more than 40	19%	25%	23%	20%	25%	24%	21%
Average hours/week	34.9	35.7	35.0	34.4	35.8	35.1	33.3

Establishment size (paid employees only)							
Less than 20 employees	9,600	10,800	11,500	14,500	12,400	9,100	4,586,000
20 to 99 employees	24,600	26,000	24,900	23,200	21,400	22,400	4,583,300
100 or more employees	59,400	61,700	61,100	65,700	63,000	60,900	4,817,000
	93,600	98,500	97,500	103,400	96,800	92,400	13,986,300
Percent in large (100+) firms	63%	63%	63%	64%	65%	66%	34%

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Table 3.4.4
Characteristics of Positions in the Electricity Sector II, Canada

							All industries
	2001	2002	2003	2004	2005	2006	2006
Total employment	**93,600**	**98,400**	**97,500**	**103,400**	**96,800**	**92,300**	**13,986,300**
Employment by Occupation Group							
Management	3,600	7,600	7,100	5,600	7,500	8,000	1,005,900
Business, finance, administration	25,700	26,200	23,900	27,100	21,800	21,500	2,729,800
Trades, transport and equipment operators	34,600	31,100	37,900	36,800	34,400	32,000	2,032,400
Occupations unique to manufacturing and utilities	2,600	2,800	2,300	3,800	2,800	3,100	980,800
All others	27,100	30,700	26,300	30,100	30,300	27,700	7,237,400
	93,600	98,400	97,500	103,400	96,800	92,300	13,986,300
Occupation Distribution							
Management and administration	31.3%	34.3%	31.8%	31.6%	30.3%	32.0%	26.7%
Trades, transport and equipment operators	37.0%	31.6%	38.9%	35.6%	35.5%	34.7%	14.5%
Occupations unique to the primary sector	2.8%	2.8%	2.4%	3.7%	2.9%	3.4%	7.0%
All others	29.0%	31.2%	27.0%	29.1%	31.3%	30.0%	51.7%
Average hourly earnings (paid employees only)							

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Under $10/hour	1,200	1,300	1,600	1,700	2,100	1,700	2,194,100
$10 to $19.99	20,300	20,900	18,000	17,100	14,700	12,900	6,094,600
$20 to $29.99	42,600	42,000	40,700	40,100	36,000	34,800	3,491,000
$30 or more	29,500	34,200	37,200	44,500	44,100	42,900	2,206,500
	93,600	98,400	97,500	103,400	96,800	92,300	13,986,300
Percent $20 or more	77%	77%	80%	82%	83%	84%	41%
Average wage rate per hour for paid employees	$26.49	$27.47	$28.21	$28.95	$29.71	$30.50	$19.72

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Figure 3.4.1
Paid Employment in Electrical Generation, Transmission, and Distribution

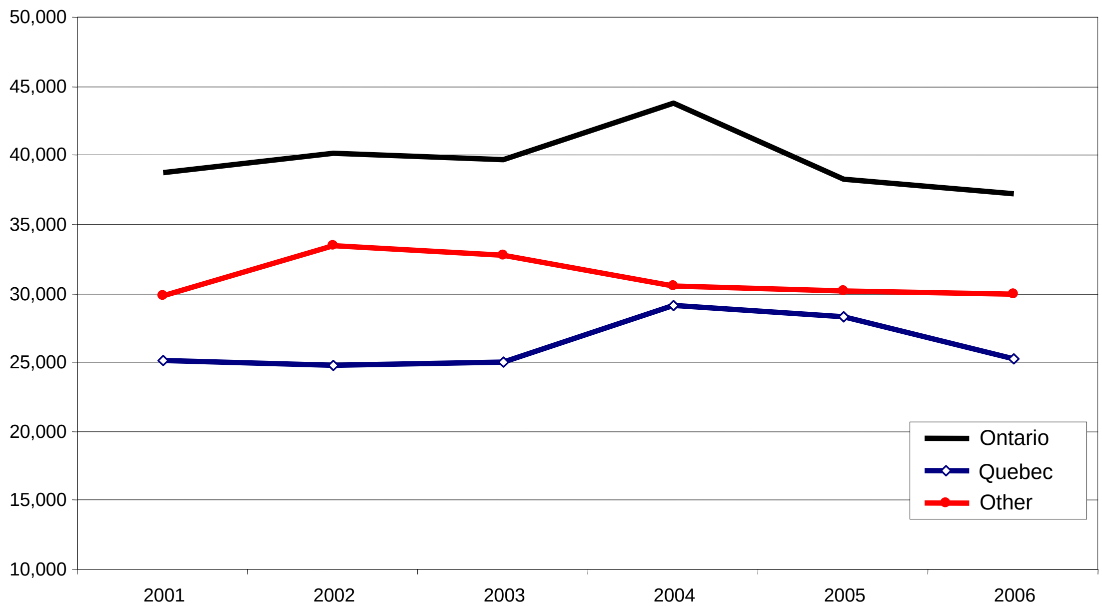

Figure 3.4.2
Average Annual Growth in Employment, by Province/Region, 2001 to 2006

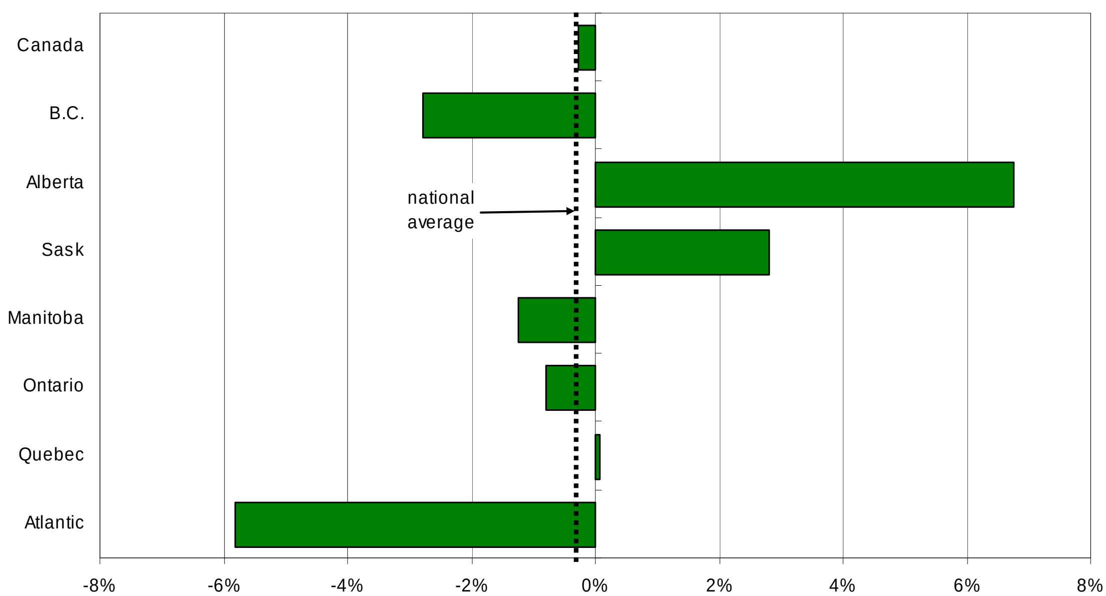

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Figure 3.4.3
Women as a Percentage of Employment, 2006

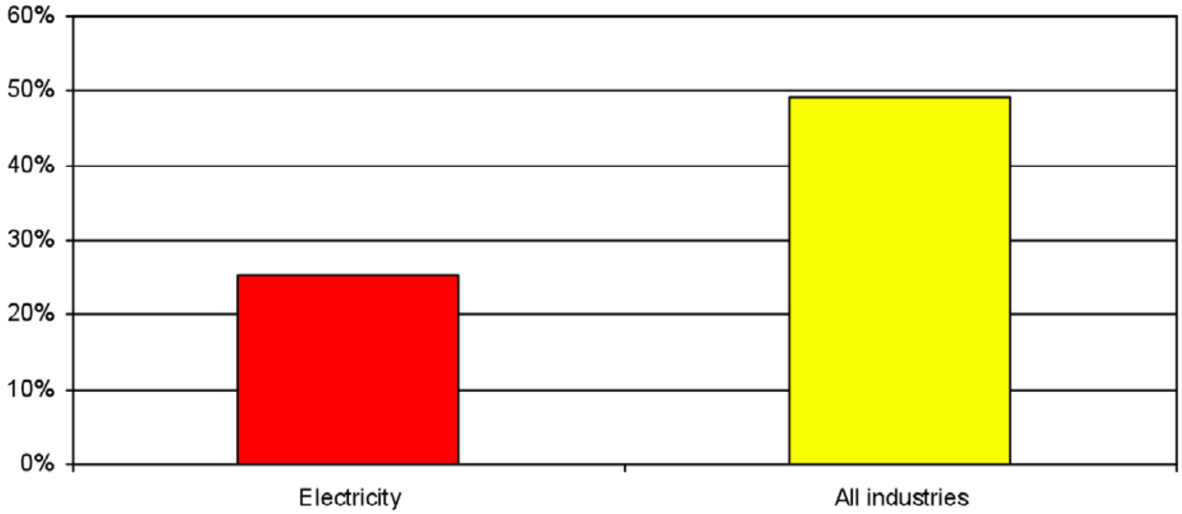

Figure 3.4.4
Employment by Age Group, 2006

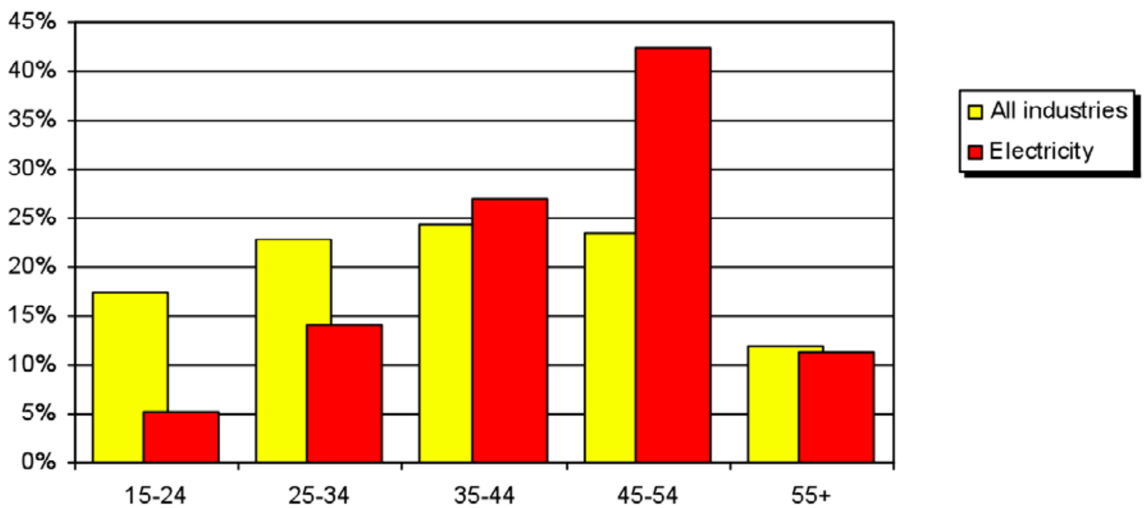

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Figure 3.4.5
Employment by Completed Education, 2006

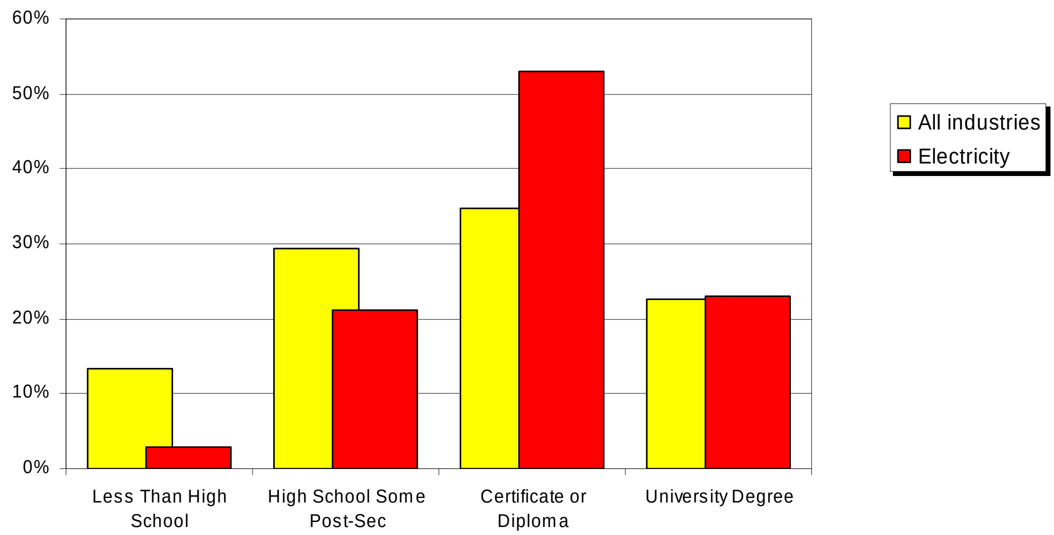
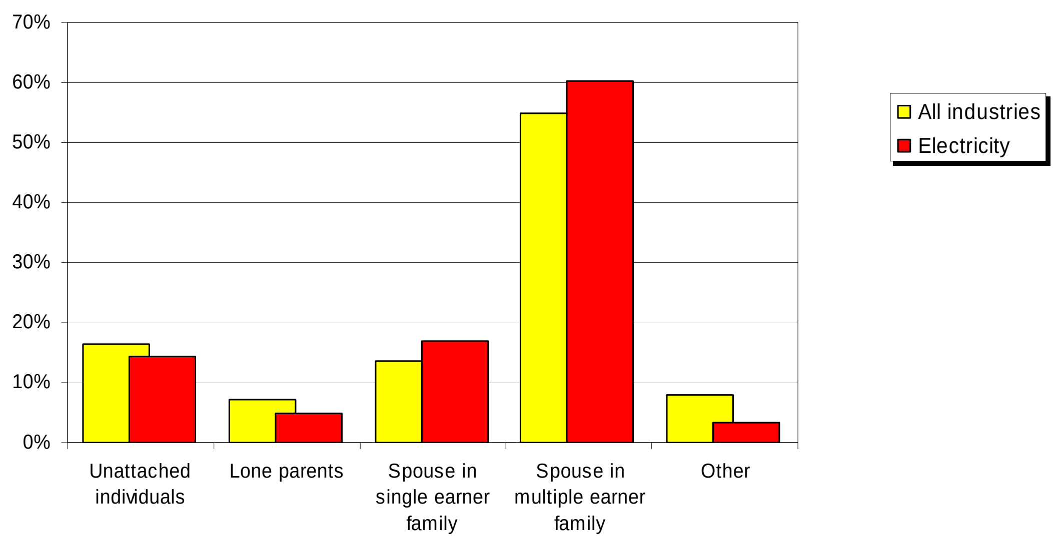


Figure 3.4.6
Employment by Family Structure, 2006



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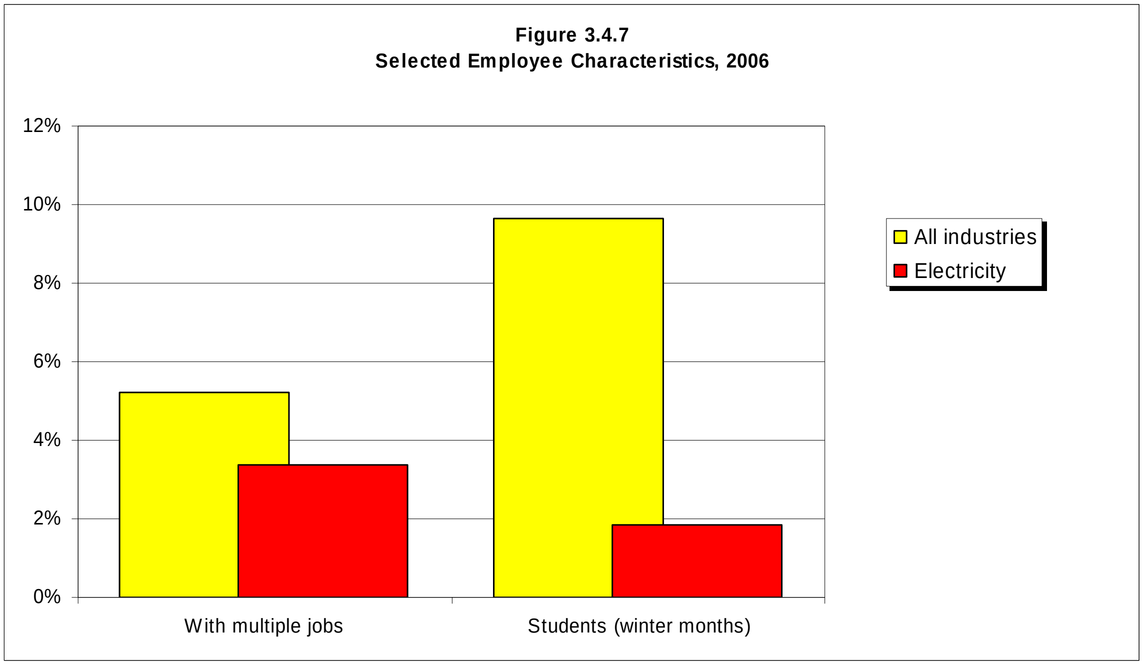

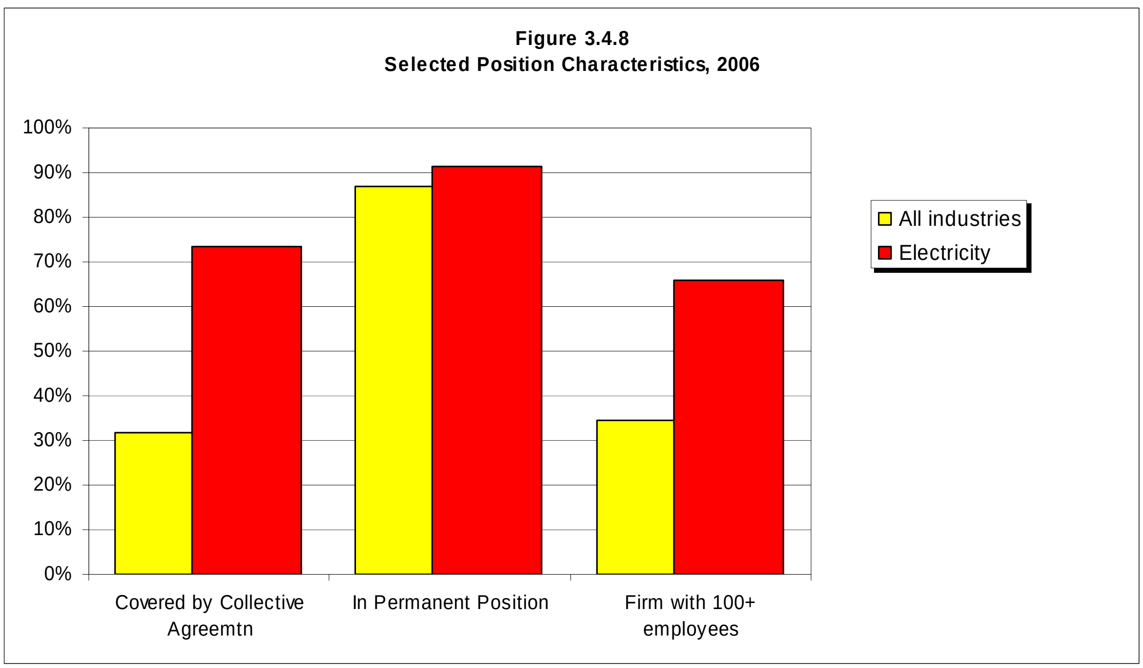

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Figure 3.4.9
Usual Hours of Work, 2006

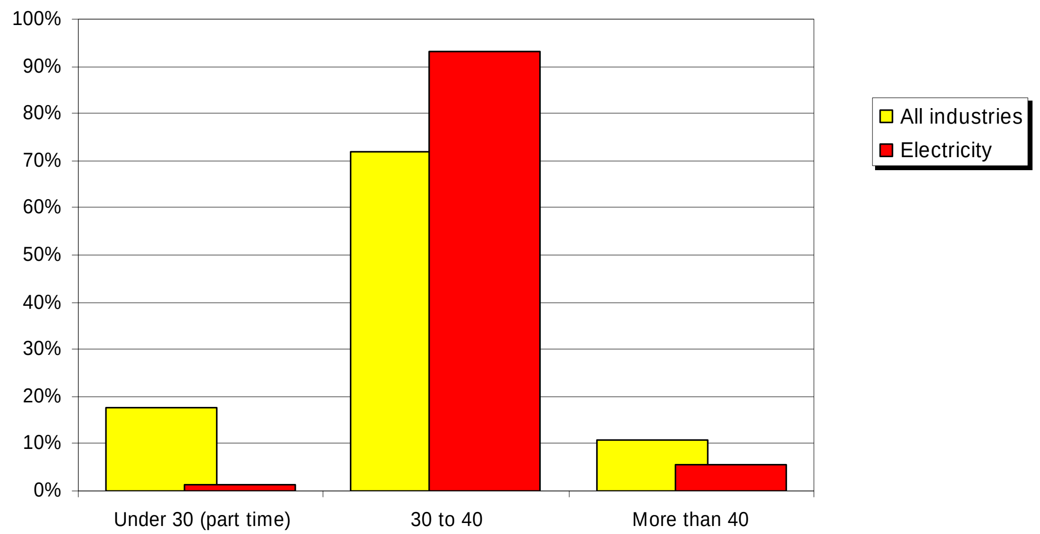

Figure 3.4.10
Actual Hours of Work, 2006

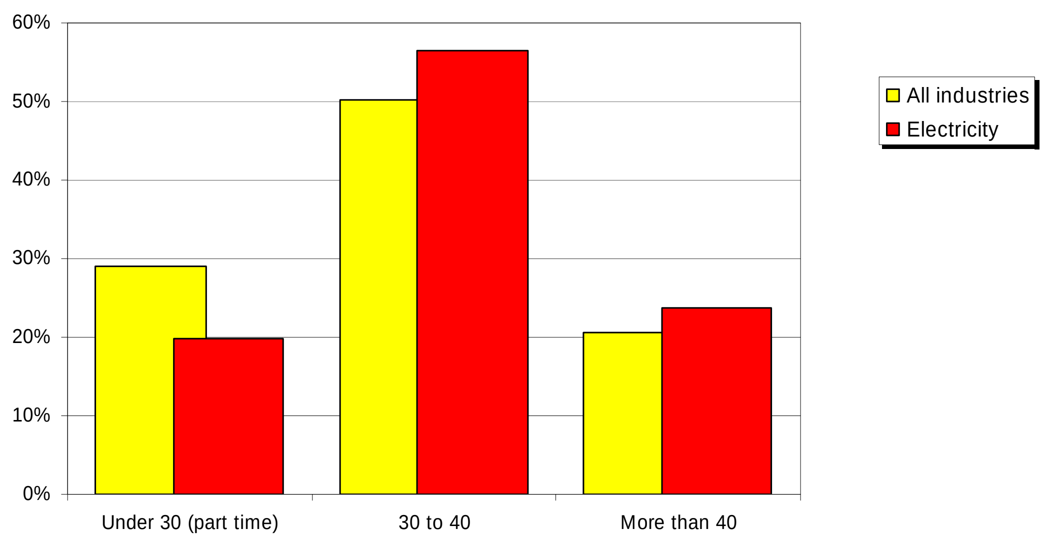

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Figure 3.4.11
Occupation Group, 2006

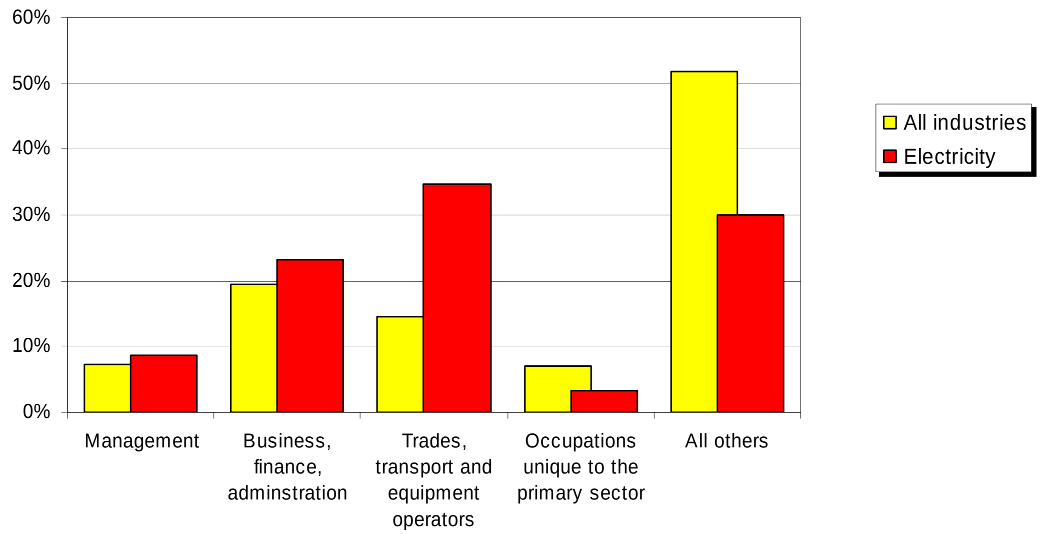

Figure 3.4.12
Average Hourly Wage Rate, 2006

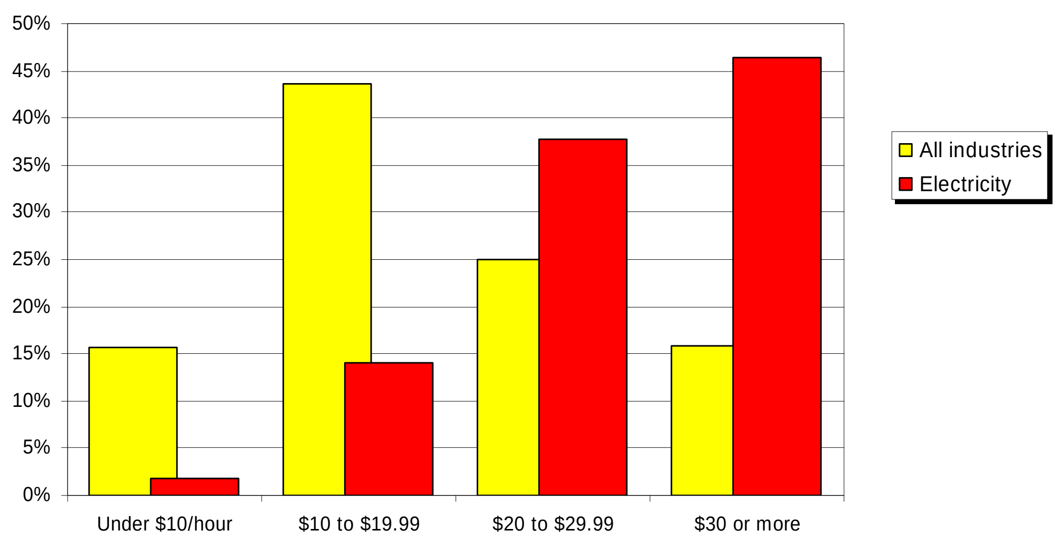

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Table 3.4.5
Employment in Electricity Sector, 2006, by Region

	Atlantic	Quebec	Ontario	Manitoba	Sask	Alberta	B.C.	Canada
Total employment	**6,300**	**25,200**	**37,200**	**4,700**	**3,100**	**10,400**	**5,300**	**92,300**
By Gender								
Men	5,200	18,300	28,800	3,300	2,200	7,300	3,600	68,800
Women	1,200	6,900	8,400	1,400	900	3,100	1,700	23,500
Percent Women	19%	27%	23%	30%	29%	30%	32%	25%
Age Group								
15-24	...	...	2,000	...	...	...	...	4,900
25-34	700	3,500	4,500	800	...	2,000	...	13,000
35-44	2,200	5,800	9,900	1,400	800	3,500	...	25,000
45-54	2,800	12,800	16,300	1,500	1,000	3,300	1,500	39,100
55+	...	2,400	4,600	600	700	...	...	10,400
Percent 45 to 54 years	44%	51%	44%	32%	32%	32%	28%	42%
Completed Education								
Less Than High School	...	...	...	...	...	...	...	2,700
High School Some Post-Sec	1,300	5,600	7,900	1,600	900	1,600	...	19,500
Certificate or Diploma	3,700	14,200	19,200	2,000	1,600	6,200	2,000	49,000
University Degree	1,200	5,000	9,000	1,000	...	1,900	2,700	21,200
Percent with a post-secondary education	78%	76%	76%	64%	n/a	78%	89%	76%
Employment by job permanence (paid workers only)								
Permanent	5,700	22,600	34,700	4,500	3,000	9,200	4,700	84,400
Non-Permanent	600	2,600	2,600	...	...	...	...	7,900
Percent Permanent	90%	90%	93%	96%	97%	88%	89%	91%
Union membership								

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Union members or covered								
by collective agreements	4,300	19,900	28,700	3,900	2,200	5,200	3,400	67,800
Not union members or covered	2,100	5,300	8,500	800	900	5,200	1,900	24,500
Percent union	68%	79%	77%	83%	71%	50%	64%	73%
Average hours/week	37.9	33.1	35.7	32.7	34.9	36.6	36.6	35.1
Average wage rate per hour for paid employees	$25.69	$28.46	$33.71	$25.93	$28.15	$30.33	$29.18	$30.50

Figure 3.4.13
Women as Percent of Employment, Electricty Sector, 2006

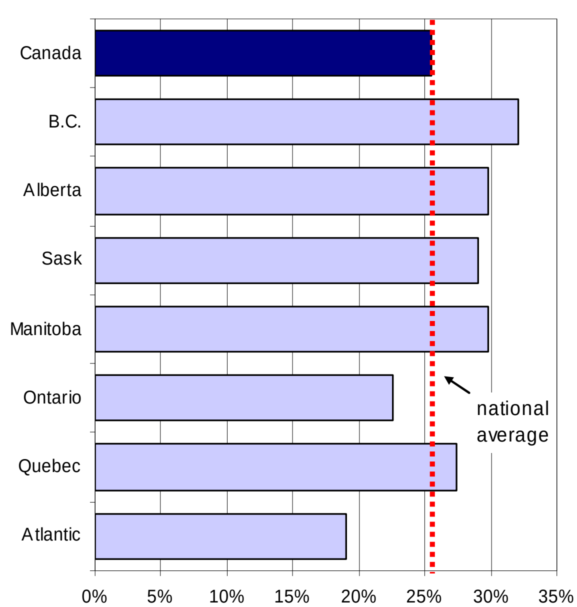

Figure 3.4.14
Employees 45 to 54 Years of Age as Percent of Employment, Electricty Sector, 2006

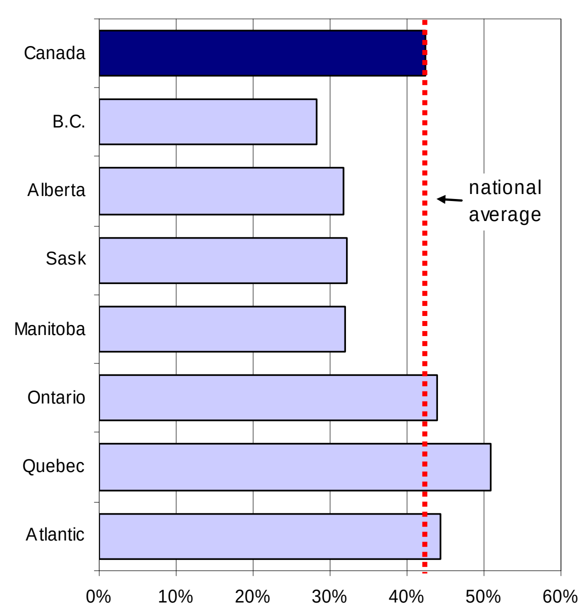

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Figure 3.4.15
Post-Secondary Graduates as Percent of Employment, Electricty Sector, 2006

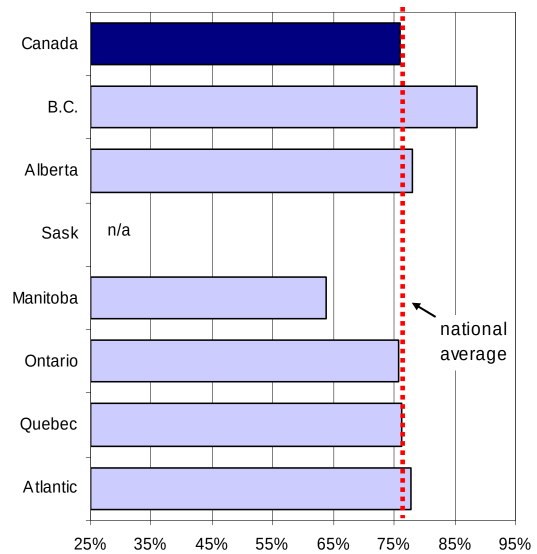

Figure 3.4.16
Union Membership as Percent of Employment, Electricty Sector, 2006

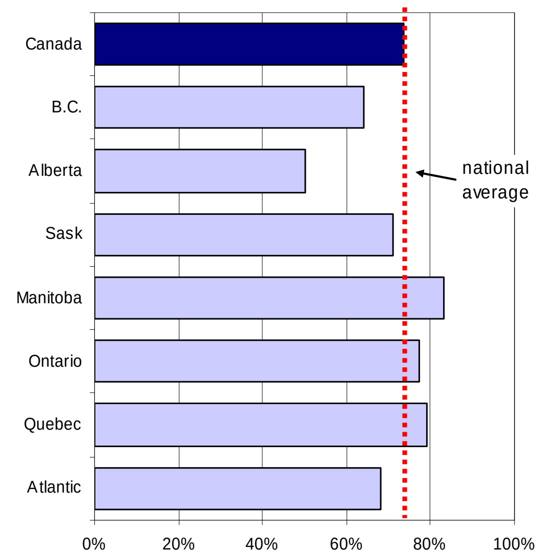

Figure 3.4.17
Average Hours Worked per Week, Electricity Sector, 2006

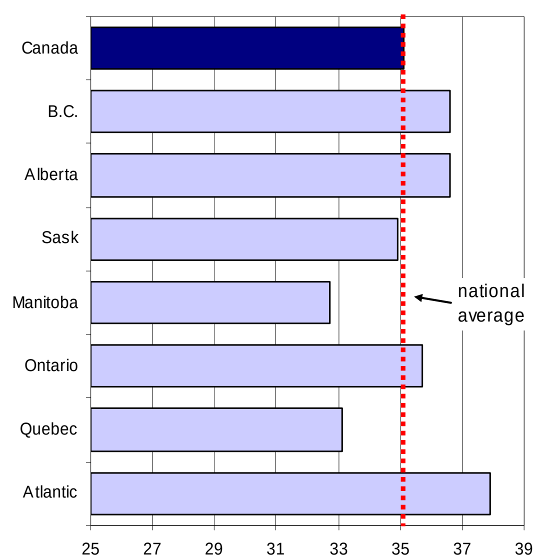

Figure 3.4.18
Average Hourly Wage Rate, Electricity Sector, 2006

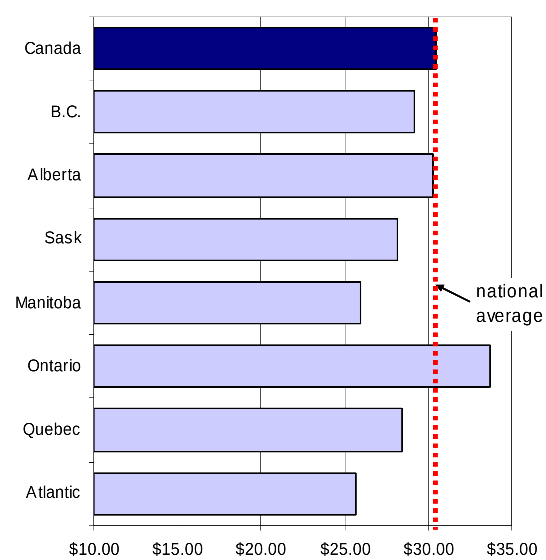

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Table 3.8.1
Scenario #1 - Long Term Trend

Assumptions, 2006 to 2016				
	Annual growth in real GDP = 0.2%			
	Annual growth in GDP per hour worked = -1.3%			
	Hours worked per week = 35			
		GDP in $1997 (millions)	GDP per Hour worked*	Calculated Number of Employees**
Actual	1997	$22,417	$134	92,031
	1998	$21,965	$128	93,920
	1999	$22,063	$139	87,477
	2000	$21,824	$134	89,694
	2001	$20,691	$121	94,049
	2002	$21,924	$119	101,329
	2003	$21,870	$122	98,309
	2004	$22,010	$118	102,351
	2005	$23,183	$128	99,437
Estimate	2006	$23,234	$126	101,002
Projected	2007	$23,285	$125	102,591
	2008	$23,337	$123	104,205
	2009	$23,388	$121	105,845
	2010	$23,440	$120	107,511
	2011	$23,492	$118	109,202
	2012	$23,544	$117	110,921
	2013	$23,596	$115	112,666
	2014	$23,648	$114	114,439
	2015	$23,700	$112	116,240
	2016	$23,752	$111	118,069

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Sector Council Program.

Table 3.8.2

Scenario #2 - Strong GDP Growth and Modest Productivity Growth

Assumptions, 2006 to 2016				
	Annual growth in real GDP = 1.0%			
	Annual growth in GDP per hour worked = 0.5%			
	Hours worked per week = 35			
		GDP in $1997 (millions)	GDP per Hour worked*	Calculated Number of Employees**
Actual	1997	$22,417	$134	92,031
	1998	$21,965	$128	93,920
	1999	$22,063	$139	87,477
	2000	$21,824	$134	89,694
	2001	$20,691	$121	94,049
	2002	$21,924	$119	101,329
	2003	$21,870	$122	98,309
	2004	$22,010	$118	102,351
	2005	$23,183	$128	99,437
Estimate	2006	$23,415	$129	99,932
Projected	2007	$23,649	$129	100,429
	2008	$23,885	$130	100,929
	2009	$24,124	$131	101,431
	2010	$24,366	$131	101,935
	2011	$24,609	$132	102,443
	2012	$24,855	$133	102,952
	2013	$25,104	$133	103,464
	2014	$25,355	$134	103,979
	2015	$25,608	$135	104,497
	2016	$25,865	$135	105,016

Funded by the Government of Canada's Sector Council Program.

Table 3.8.3
Scenario #3 - Modest Growth in GDP, Slight Decline in Productivity

Assumptions, 2006 to 2016				
	Annual growth in real GDP = 0.5%			
	Annual growth in GDP per hour worked = -0.5%			
	Hours worked per week = 35			
		GDP in $1997 (millions)	GDP per Hour worked*	Calculated Number of Employees**
Actual	1997	$22,417	$134	92,031
	1998	$21,965	$128	93,920
	1999	$22,063	$139	87,477
	2000	$21,824	$134	89,694
	2001	$20,691	$121	94,049
	2002	$21,924	$119	101,329
	2003	$21,870	$122	98,309
	2004	$22,010	$118	102,351
	2005	$23,183	$128	99,437
Estimate	2006	$23,299	$127	100,437
Projected	2007	$23,415	$127	101,446
	2008	$23,532	$126	102,465
	2009	$23,650	$126	103,495
	2010	$23,768	$125	104,535
	2011	$23,887	$124	105,586
	2012	$24,007	$124	106,647
	2013	$24,127	$123	107,719
	2014	$24,247	$122	108,802
	2015	$24,369	$122	109,895
	2016	$24,490	$121	111,000

Funded by the Government of Canada's
Sector Council Program.

Section 5: Capital Investment

Notes:

1. Source: Statistics Canada CANSIM Table 029-0007, Capital and Repair Expenditures
2. These data are based on a survey of firms. Information includes capital investment, both for equipment and for new structures; 2007 figures are intentions as of November 2006.

Table 5.1

Capital Investment, Electric Power Generation, Transmission, & Distribution, $m

	New capital investment				Repair		Total
	Machinery	**Constr.**	**Total**		**Expenditures**		**Expenditures**
1991	$6,636	$5,196	$11,832		...		...
1992	$6,425	$4,631	$11,056		...		...
1993	$5,777	$3,166	$8,943		...		...
1994	$4,145	$2,625	$6,770		$2,177		$8,947
1995	$3,441	$2,723	$6,165		$1,964		$8,128
1996	$2,969	$2,289	$5,257		$1,997		$7,255
1997	$2,573	$2,211	$4,783		$2,011		$6,795
1998	$3,302	$2,806	$6,107		$1,987		$8,094
1999	$2,906	$3,309	$6,215		$2,066		$8,281
2000	$3,527	$2,890	$6,417		$1,974		$8,391
2001	$4,563	$3,216	$7,778		$1,926		$9,704
2002	$5,606	$3,069	$8,675		$1,999		$10,674
2003	$6,391	$3,275	$9,666		$2,505		$12,171
2004	$6,263	$3,562	$9,825		$2,596		$12,421
2005	$6,579	$3,235	$9,814		$2,630		$12,444
2006 estimate	$8,684	$4,360	$13,045		...		...
2007 intended	$11,044	$4,551	$15,594		...		...

Note :.. not available or suppressed

Funded by the Government of Canada's Sector Council Program.

Figure 3.5.1
New Capital Investment by the Electric Utility Industry

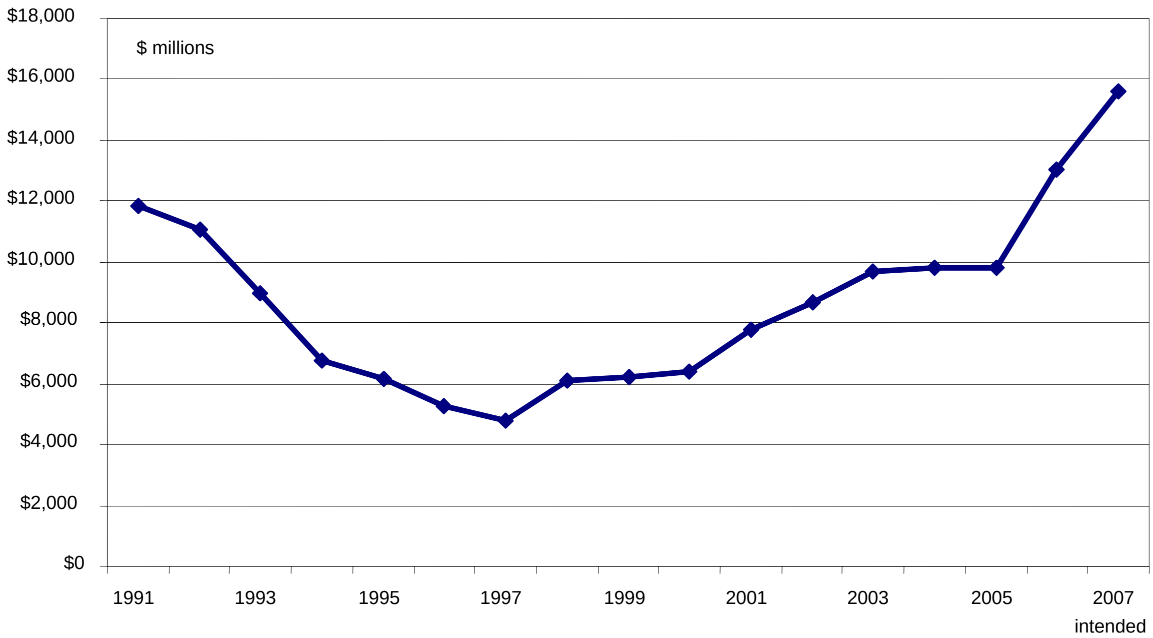
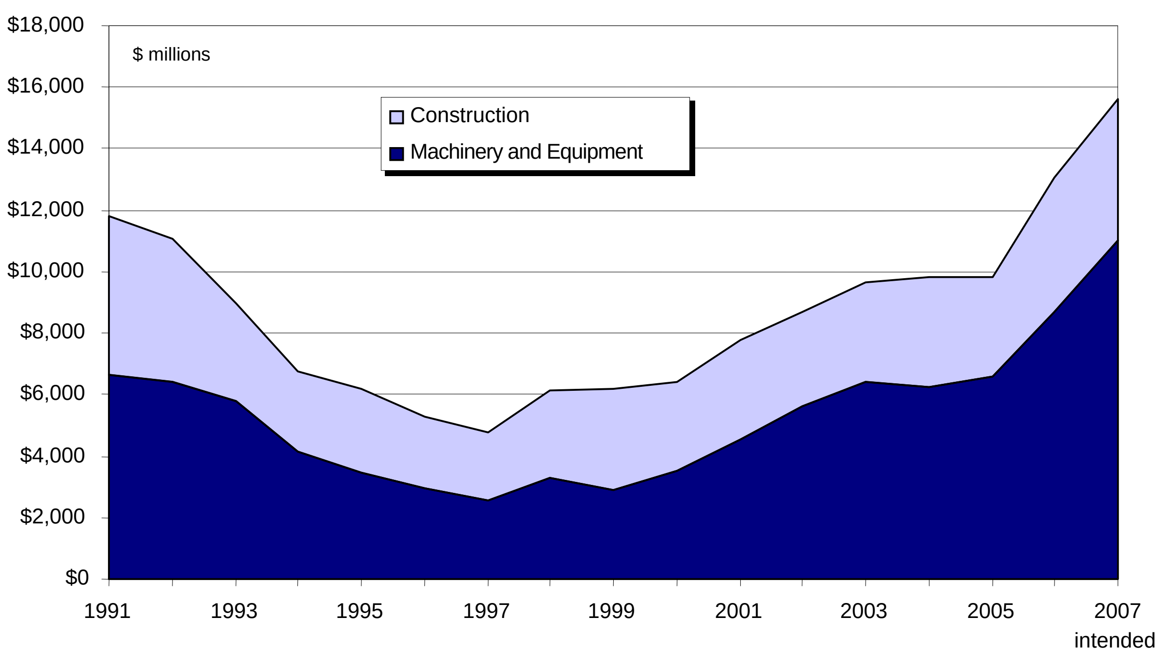


Figure 3.5.2
New Capital Investment by the Electric Utility Industry, by Category



Funded by the Government of Canada's
Sector Council Program.

Section 6: Engineering Students and Graduates

Notes:

1. Source: Canadian Council of Professional Engineers, Canadian Engineers for Tomorrow
2. These data are based on a survey of universities.

Table 3.6.1
Full Time Enrolment, Engineering

	2001	2002	2003	2004	2005
Total	**49,814**	**52,863**	**54,607**	**55,248**	**54,854**
By discipline					
Electrical	10,717	10,260	10,875	10,607	10,285
Environmental	620	580	623	600	633
Mechanical	9,659	11,001	10,834	11,745	11,944
Subtotal	20,996	21,841	22,332	22,952	22,862
Other (including common early years)	28,818	31,022	32,275	32,296	31,992
	49,814	52,863	54,607	55,248	54,854
Percent women					
Electrical engineering	18%	17%	16%	15%	14%
All engineering	21%	20%	19%	18%	18%
By Province, 2005					
	Electrical	Environment	Mechanical	Other	Total
Atlantic	518	0	899	2,717	4,134
Quebec	3,205	0	4,149	6,979	14,333
Ontario	4,730	535	4,692	13,286	23,243
Manitoba	142	0	248	548	938
Saskatchewan	181	98	274	1,524	2,077
Alberta	782	0	1,011	4,011	5,804
B.C.	727	0	671	2,927	4,325
Canada	10,285	633	11,944	31,992	54,854

Funded by the Government of Canada's Sector Council Program.

	2001	2002	2003	2004	2005
Total	8,733	8,295	10,031	10,306	10,418
By discipline					
Electrical	2,043	2,276	2,179	2,267	2,371
Environmental	140	147	147	122	121
Mechanical	2,047	2,164	2,222	2,288	2,387
Subtotal	4,230	4,587	4,548	4,677	4,879
Other	4,503	3,708	5,483	5,629	5,539
	8,733	8,295	10,031	10,306	10,418
Percent women					
Electrical engineering	15%	17%	18%	17%	19%
All engineering	20%	23%	22%	22%	20%
By Province, 2005					
	Electrical	Environment	Mechanical	Other	Total
Atlantic	109	0	176	305	590
Quebec	694	0	784	1,442	2,920
Ontario	1,150	97	907	2,524	4,678
Manitoba	22	0	58	74	154
Saskatchewan	49	24	57	201	331
Alberta	203	0	251	595	1,049
B.C.	144	0	154	398	696
Canada	2,371	121	2,387	5,539	10,418

Funded by the Government of Canada's Sector Council Program.

Table 3.6.2
Undergraduate Degrees Awarded, Engineering

	2001	2002	2003	2004	2005
Total	**8,733**	**8,295**	**10,031**	**10,306**	**10,418**
By discipline					
Electrical	2,043	2,276	2,179	2,267	2,371
Environmental	140	147	147	122	121
Mechanical	2,047	2,164	2,222	2,288	2,387
Subtotal	4,230	4,587	4,548	4,677	4,879
Other	4,503	3,708	5,483	5,629	5,539
	8,733	8,295	10,031	10,306	10,418
Percent women					
Electrical engineering	15%	17%	18%	17%	19%
All engineering	20%	23%	22%	22%	20%
By Province, 2005					
	Electrical	Environment	Mechanical	Other	Total
Atlantic	109	0	176	305	590
Quebec	694	0	784	1,442	2,920
Ontario	1,150	97	907	2,524	4,678
Manitoba	22	0	58	74	154
Saskatchewan	49	24	57	201	331
Alberta	203	0	251	595	1,049
B.C.	144	0	154	398	696
Canada	2,371	121	2,387	5,539	10,418

Funded by the Government of Canada's Sector Council Program.

Table 3.6.3
Graduate Degrees Awarded, Engineering

	2001	2002	2003	2004	2005
Total	**2,522**	**2,670**	**3,287**	**4,074**	**4,465**
By discipline					
Electrical	658	715	896	1,268	1,200
Environmental	49	35	35	48	57
Mechanical	415	517	689	794	877
Subtotal	1,122	1,267	1,620	2,110	2,134
Other	1,400	1,403	1,667	1,964	2,331
	2,522	2,670	3,287	4,074	4,465
Percent women					
Electrical engineering	17%	17%	22%	21%	18%
All engineering	23%	22%	22%	23%	21%
By Province, 2005					
	Electrical	Environment	Mechanical	Other	Total
Atlantic	49	5	36	145	235
Quebec	481	0	298	673	1,452
Ontario	513	39	349	832	1,733
Manitoba	0	0	35	55	90
Saskatchewan	15	13	23	68	119
Alberta	84	0	73	351	508
B.C.	58	0	63	207	328
Canada	1,200	57	877	2,331	4,465

Funded by the Government of Canada's
Sector Council Program.

Figure 3.6.1
Full Time Enrolment of Engineering Students

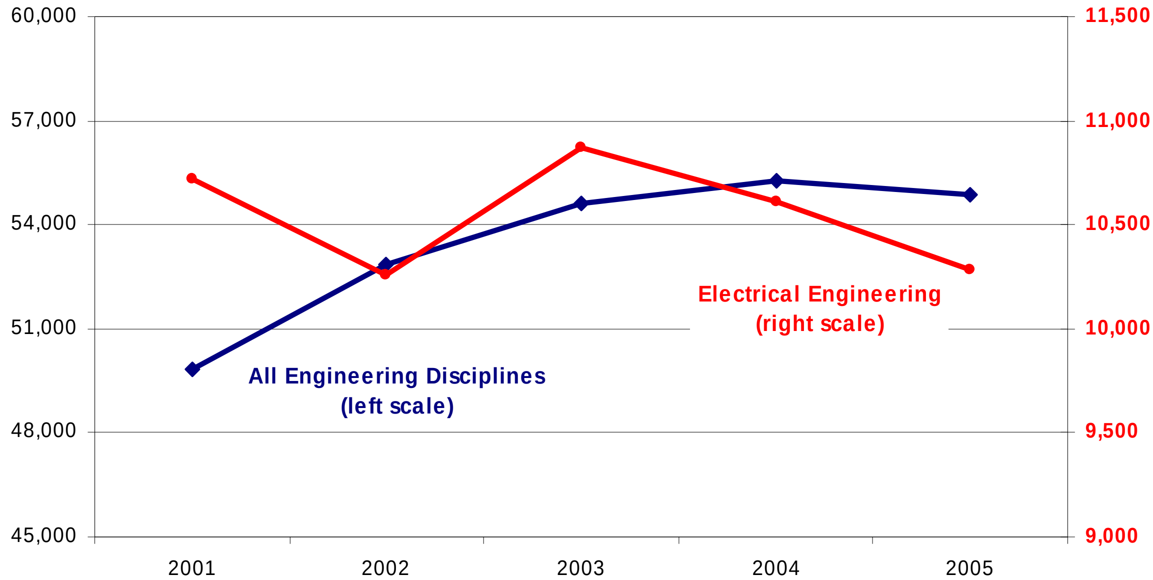
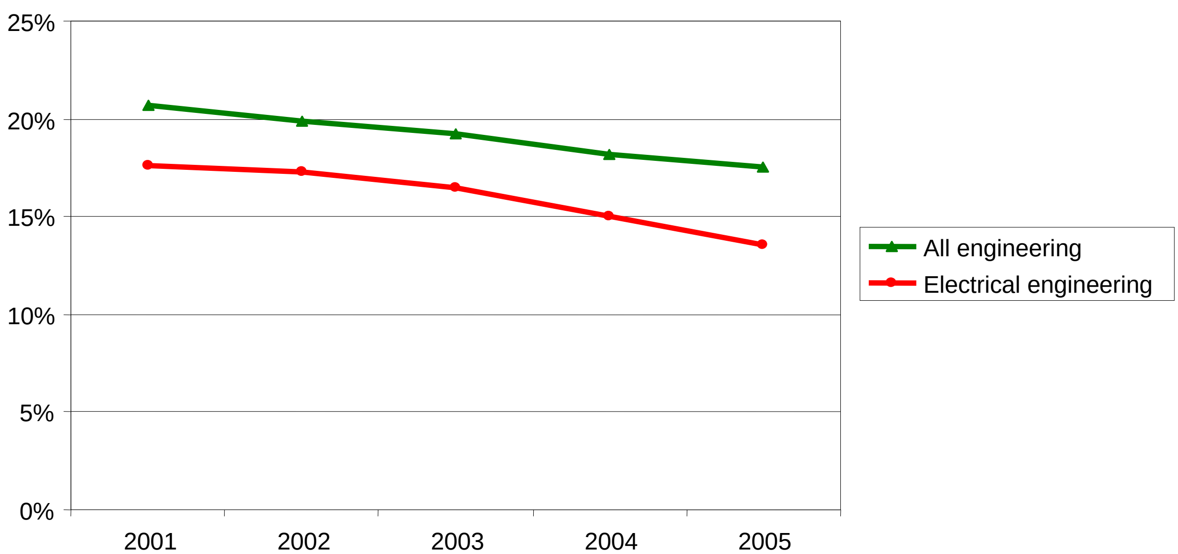


Figure 3.6.2
Women as Proportion of Engineering Students



Funded by the Government of Canada's Sector Council Program.

Figure 3.6.3
Electrical Engineering Students by Province, 2005

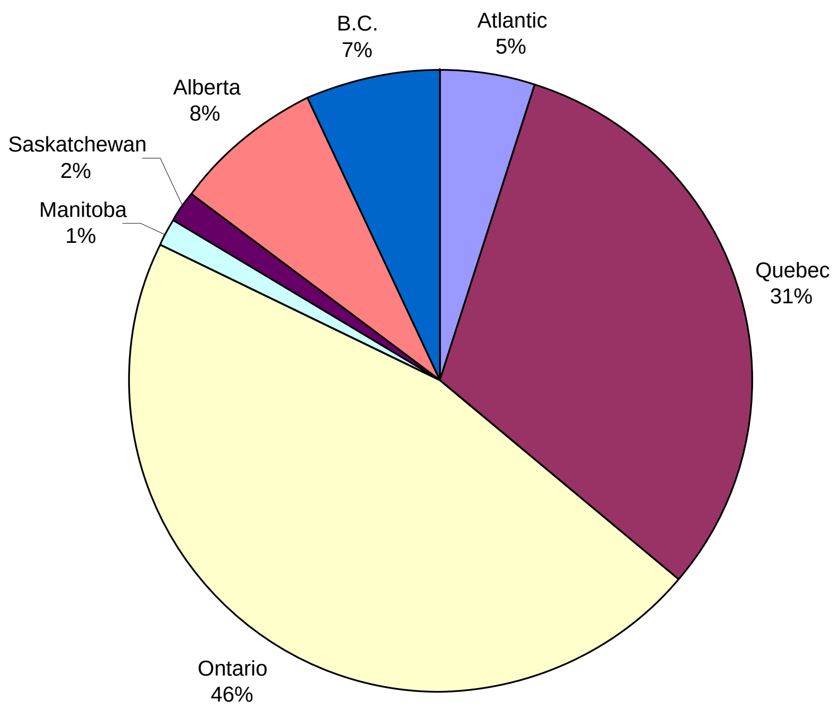
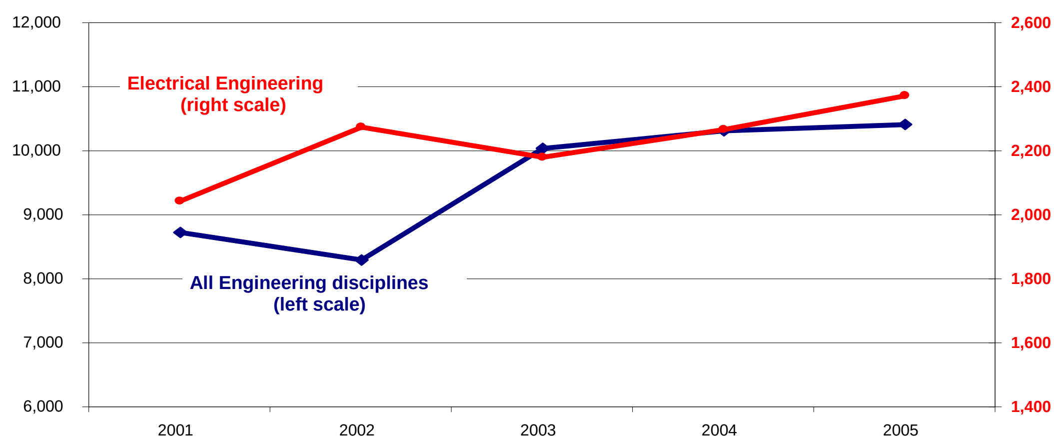


Figure 3.6.4
Undergraduate Engineering Degrees Awarded



Funded by the Government of Canada's Sector Council Program.

Figure 3.6.5

Women as Proportion of Undergraduate Degrees in Engineering

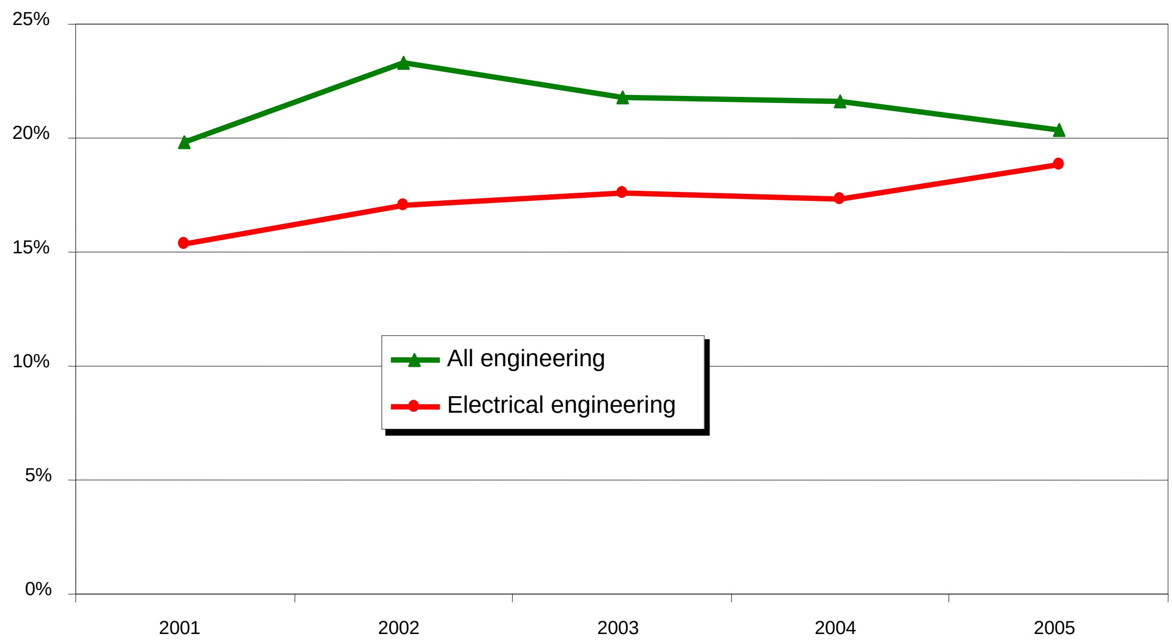
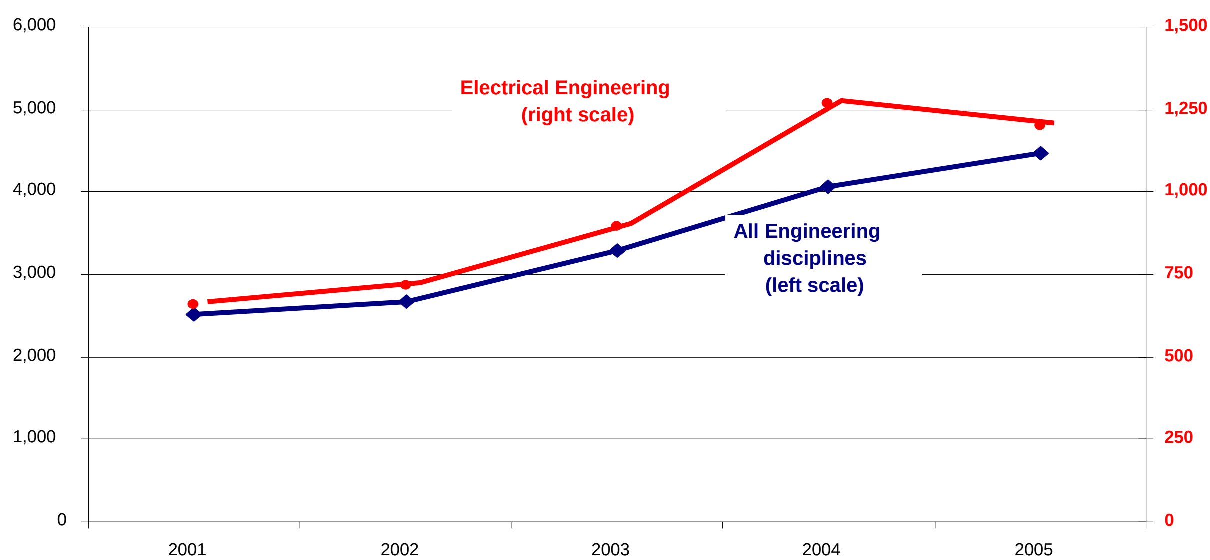


Figure 3.6.6

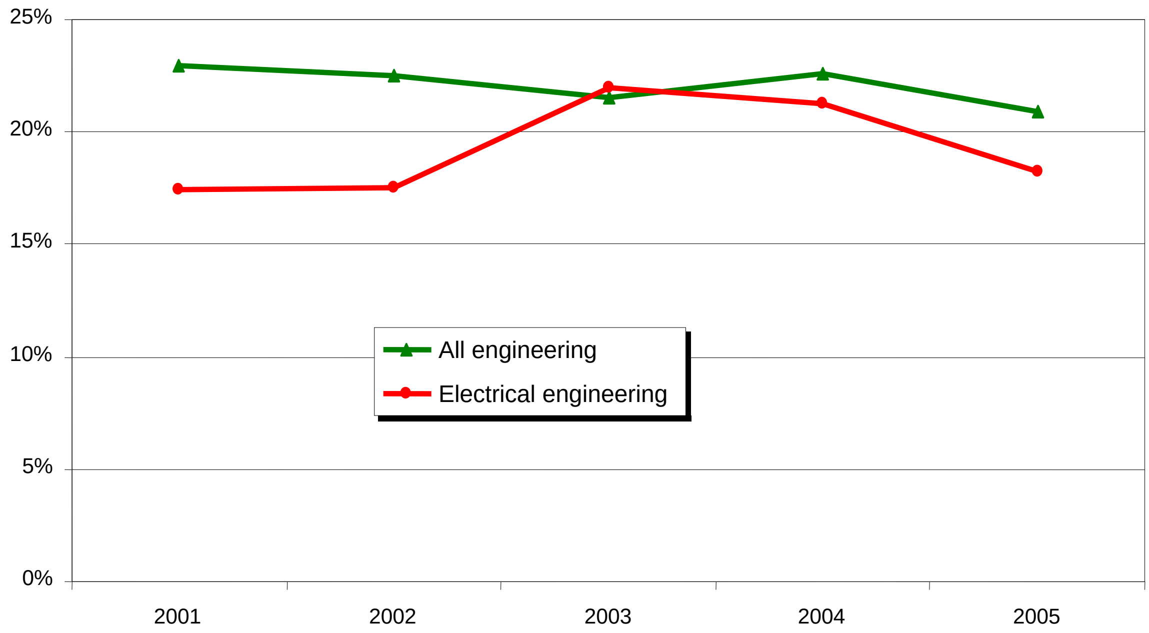
Graduate Engineering Degrees Awarded



Funded by the Government of Canada's Sector Council Program.

Figure 3.6.7

Women as Proportion of Graduate Degrees in Engineering



Funded by the Government of Canada's Sector Council Program.

Section 7: National Graduate Survey

Notes:

1. Source: Statistics Canada National Graduate Survey, 2002 follow-up to the class of 2000
2. These data describe those who, two years after graduation from a post-secondary institution in 2000, were employed in the electrical generation, transmission, and distribution industry.
3. The characteristics are compared with those who are employed in any goods producing industry, that is, forestry, mining, oil and gas, utilities, construction, or manufacturing.

Table 3.7.1
Geographic Variables for 2000 Graduates Employed in Electrical Utilities

						Employed in Goods	
	Employed in Electrical Utilities					**Producing Industries**	
	Certificate or Diploma	**Degree**	**Total**	**Percent of total**		**Total**	**Percent of total**
Total	**699**	**873**	**1,572**	**148%**			
Residence before enrolment							
Atlantic	73	41	114	7%		2,799	7%
Quebec	165	166	331	21%		15,083	38%
Ontario	279	429	707	45%		13,735	34%
Manitoba	43	48	91	6%		777	2%
Saskatchewan	33	31	63	4%		1,017	3%
Alberta	43	57	101	6%		2,726	7%
B.C.	56	88	145	9%		3,167	8%
North	...	...	7	0%		101	0%
Outside Canada	...	...	13	...		631	2%
	699	873	1,572	100%		40,036	100%
Province of Graduation							
Atlantic	73	44	118	7%		2,947	7%
Quebec	165	169	334	21%		15,261	38%
Ontario	279	444	723	46%		14,070	35%
Manitoba	43	27	70	4%		761	2%
Saskatchewan	34	28	62	4%		960	2%
Alberta	45	63	109	7%		2,826	7%
B.C.	56	98	154	10%		3,172	8%

Funded by the Government of Canada's Sector Council Program.

North	...	...	4	0%		39	0%
	699	873	1,572	100%		40,036	100%
Province of Employment							
Atlantic	70	30	100	6%		2,253	6%
Quebec	165	184	349	22%		15,025	38%
Ontario	303	445	747	48%		14,378	36%
Manitoba	43	31	74	5%		676	2%
Saskatchewan	33	20	53	3%		845	2%
Alberta	37	57	93	6%		3,183	8%
B.C.	41	103	144	9%		3,084	8%
North	...	...	8	1%		102	0%
USA	...	...	4	0%		440	1%
	699	873	1,572	100%		39,987	100%

Table 3.7.2
Field of Study for 2000 Graduates Employed in Electrical Utilities in 2002

						Employed in Goods	
	Credential Granted					**Producing Industries**	
	Certificate or Diploma	**Degree**	**Total**	**Percent of total**		**Total**	**Percent of total**
Total	**699**	**873**	**1,572**	**100%**		**40,036**	**100%**
Business, management							
and/or marketing	84	336	420	27%		7,597	19%
Engineering technology	255	0	255	16%		5,527	14%
Social Sciences	2	208	210	13%		1,235	3%
Engineering	8	180	188	12%		4,041	10%
Protective services	90	0	90	6%		519	1%
Construction trades	81	0	81	5%		3,002	7%
IT and computers	44	13	58	4%		1,833	5%
All others	135	135	271	17%		16,282	41%
	699	873	1,572	100%		40,036	100%

Funded by the Government of Canada's Sector Council Program.

Table 3.7.3
Demographic Characteristics of 2000 Graduates Employed in Electrical Utilities in 2002

						Employed in Goods	
	Credential Granted					Producing Industries	
	Certificate or Diploma	Degree	Total	Percent of total		Total	Percent of total
Total	**699**	**873**	**1,572**	**100%**		**40,036**	**100%**
Gender							
Men	473	522	995	63%		28,092	70%
Women	227	351	578	37%		11,945	30%
Total	699	873	1,572	100%		40,036	100%
Age at Graduation							
18 to 23	338	273	611	39%		20,995	52%
24 to 30	194	262	457	29%		11,593	29%
31 or older	167	338	505	32%		7,448	19%
Total	699	873	1,572	100%		40,036	100%
Member of a visible minority group							
Yes	47	162	209	13%		5,133	13%
No	646	708	1,355	87%		33,699	87%
Total	693	871	1,563	100%		38,832	100%
Aboriginal Identity							
Yes	12	64	76	5%		1,084	3%
No	687	809	1,497	95%		38,833	97%
Total	699	873	1,572	100%		39,917	100%
Born in Canada							
Yes	617	802	1,419	90%		35,169	88%
No	83	70	153	10%		4,812	12%
Total	699	873	1,572	100%		39,981	100%

Funded by the Government of Canada's Sector Council Program.

Table 3.7.4
Labour Force Characteristics of 2000 Graduates Employed in Electrical Utilities

						Employed in Goods	
	Credential Granted					Producing Industries	
	Certificate or Diploma	Degree	Total	Percent of total		Total	Percent of total
Total	**699**	**873**	**1,572**	**100%**		**40,036**	**100%**
Hours of work							
Full time	629	868	1,496	95%		39,291	98%
Part time	...	...	76	5%		688	2%
Total	699	873	1,572	100%		39,979	100%
Type of Position							
Managerial	34	57	91	6%		2,637	7%
Professional	106	322	428	27%		7,542	19%
Technical	373	365	738	47%		22,049	55%
Intermediate	58	129	188	12%		6,030	15%
Low skill	128	0	128	8%		1,756	4%
	699	873	1,572	100%		40,014	100%
Job is related to education?							
Closely	536	316	852	55%		22,922	59%
Somewhat	94	282	376	24%		8,534	22%
Not related	69	247	316	20%		7,165	19%
	699	845	1,544	100%		38,621	100%

Funded by the Government of Canada's Sector Council Program.

Figure 3.7.1
Class of 2000, Employed in Electrical Utilities, Province of Graduation

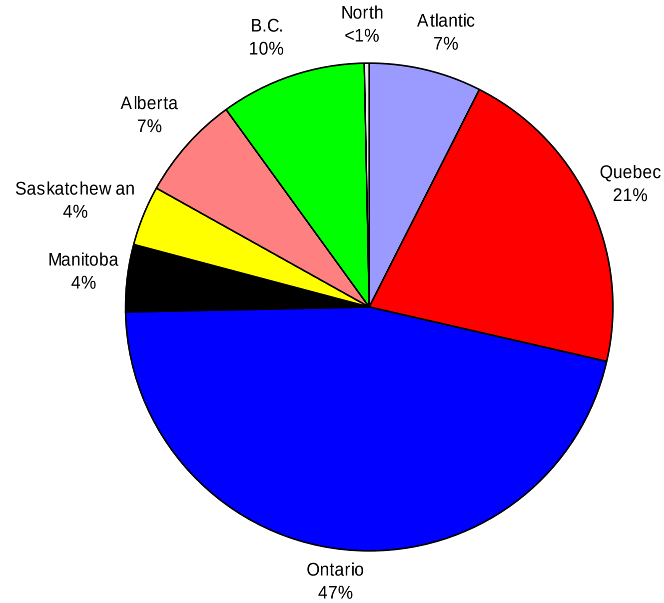
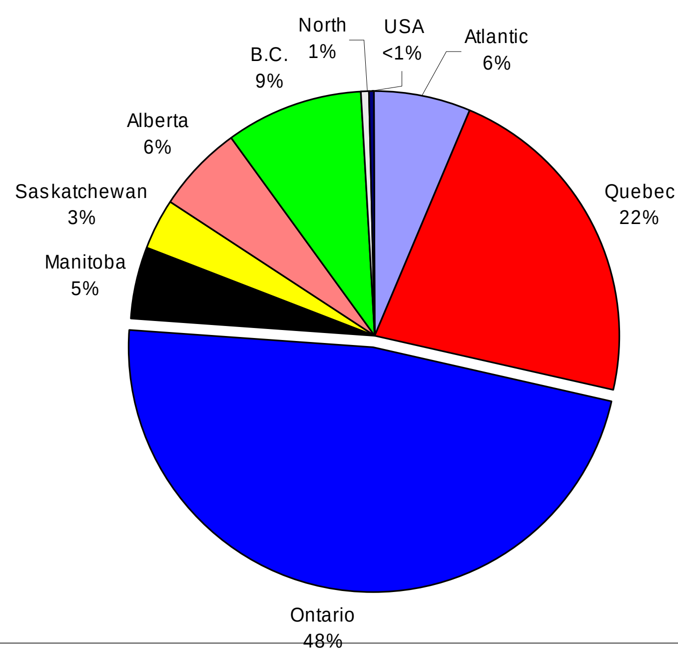


Figure 3.7.2
Class of 2000, Employed in Electrical Utilities, Province of Employment



Funded by the Government of Canada's Sector Council Program.

Figure 3.7.3
Class of 2000, Employed in Electrical Utilities, Field of Study

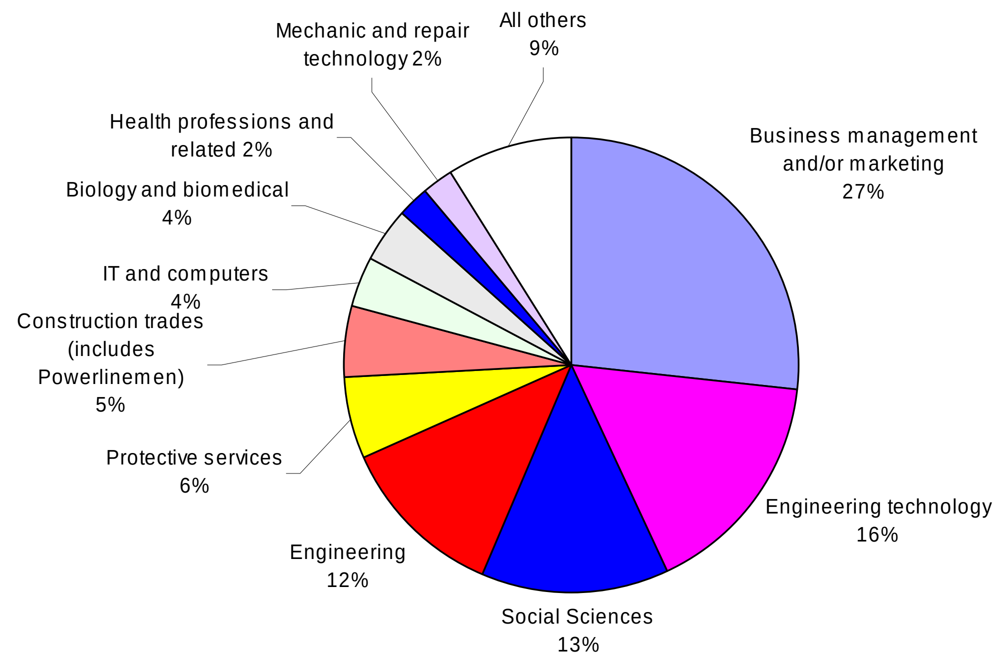
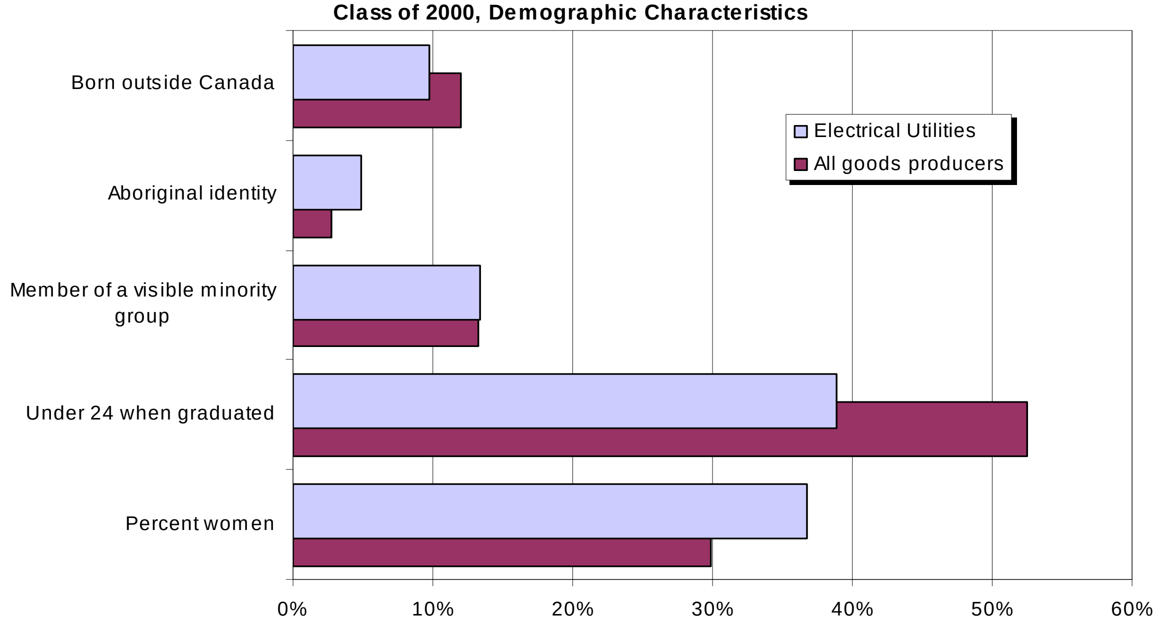


Figure 3.7.4
Class of 2000, Demographic Characteristics



Funded by the Government of Canada's Sector Council Program.

Figure 3.7.5
Class of 2000, Skill Level of Position

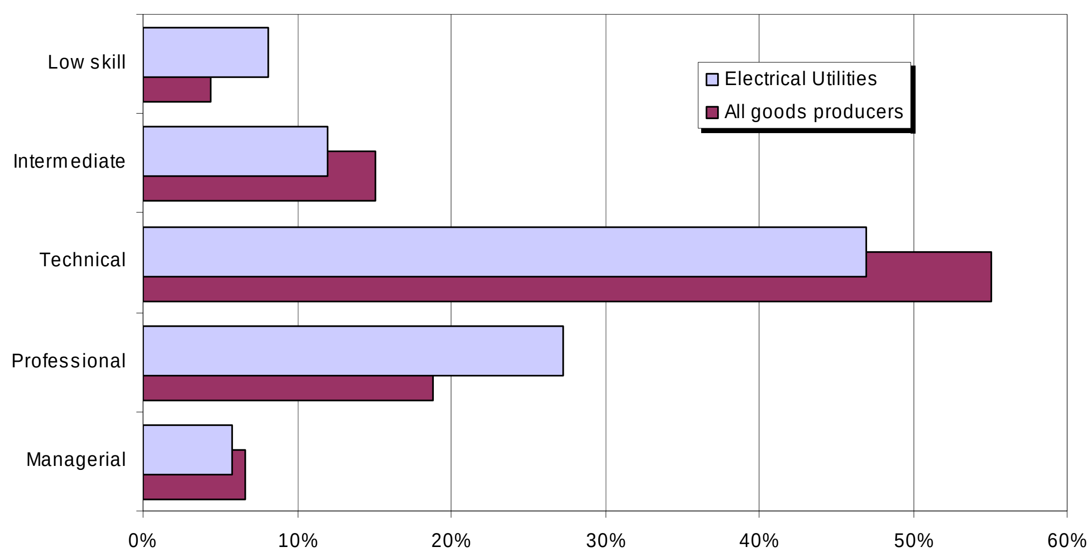
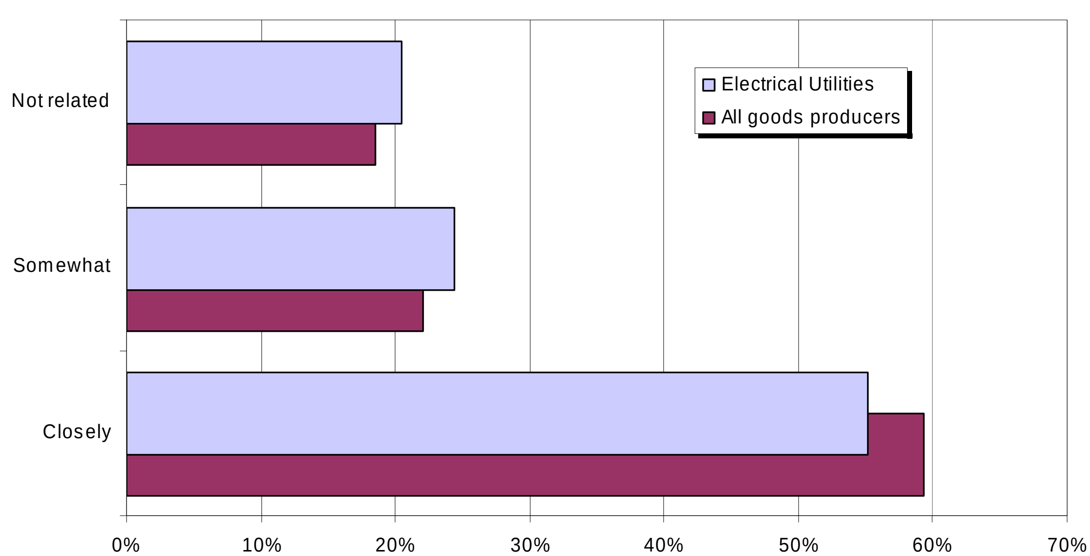


Figure 3.7.6
Class of 2000, Job Related to Education



Funded by the Government of Canada's Sector Council Program.

Section 8: Outlook

Notes:

1. *Source: Statistics Canada CANSIM Matrix #379-0023. #379-0025, and #379-0017*
   Centre for the Study of Living Standards: www.csls.ca

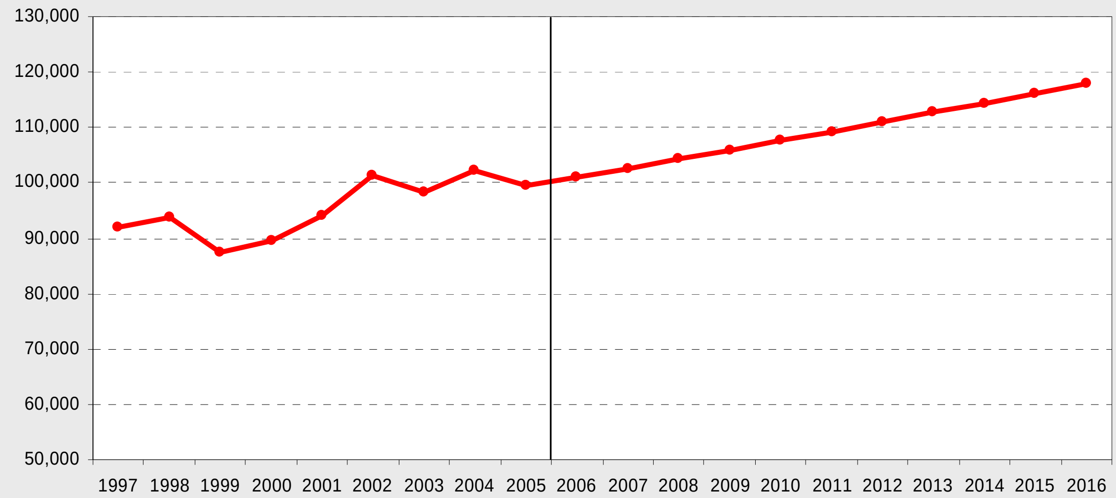
Table 3.8.1

Scenario #1 - Long Term Trend

Assumptions, 2006 to 2016				
	Annual growth in real GDP = 0.2%			
	Annual growth in GDP per hour worked = -1.3%			
	Hours worked per week = 35			
		GDP in $1997 (millions)	**GDP per Hour worked***	**Calculated Number of Employees****
Actual	1997	$22,417	$134	92,031
	1998	$21,965	$128	93,920
	1999	$22,063	$139	87,477
	2000	$21,824	$134	89,694
	2001	$20,691	$121	94,049
	2002	$21,924	$119	101,329
	2003	$21,870	$122	98,309
	2004	$22,010	$118	102,351
	2005	$23,183	$128	99,437
Estimate	2006	$23,234	$126	101,002
Projected	2007	$23,285	$125	102,591
	2008	$23,337	$123	104,205
	2009	$23,388	$121	105,845
	2010	$23,440	$120	107,511
	2011	$23,492	$118	109,202
	2012	$23,544	$117	110,921
	2013	$23,596	$115	112,666
	2014	$23,648	$114	114,439
	2015	$23,700	$112	116,240
	2016	$23,752	$111	118,069

Funded by the Government of Canada's Sector Council Program.

Figure 3.8.1
Employment in Full-Time, Full-Year Equivalents, Actual and Projected



Funded by the Government of Canada's Sector Council Program.

Table 3.8.2
Scenario #2 - Strong GDP Growth and Modest Productivity Growth

Assumptions, 2006 to 2016				
	Annual growth in real GDP = 1.0%			
	Annual growth in GDP per hour worked = 0.5%			
	Hours worked per week = 35			
		GDP in $1997 (millions)	GDP per Hour worked*	Calculated Number of Employees**
Actual	1997	$22,417	$134	92,031
	1998	$21,965	$128	93,920
	1999	$22,063	$139	87,477
	2000	$21,824	$134	89,694
	2001	$20,691	$121	94,049
	2002	$21,924	$119	101,329
	2003	$21,870	$122	98,309
	2004	$22,010	$118	102,351
	2005	$23,183	$128	99,437
Estimate	2006	$23,415	$129	99,932
Projected	2007	$23,649	$129	100,429
	2008	$23,885	$130	100,929
	2009	$24,124	$131	101,431
	2010	$24,366	$131	101,935
	2011	$24,609	$132	102,443
	2012	$24,855	$133	102,952
	2013	$25,104	$133	103,464
	2014	$25,355	$134	103,979
	2015	$25,608	$135	104,497
	2016	$25,865	$135	105,016

Figure 3.8.2
Employment in Full-Time, Full-Year Equivalents, Actual and Projected

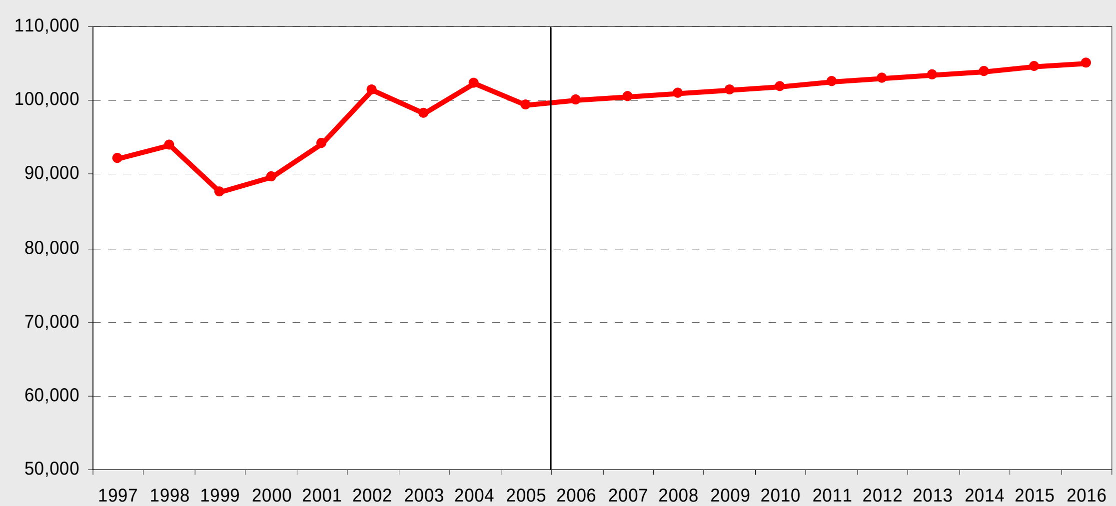


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Table 3.8.3
Scenario #3 - Modest Growth in GDP, Slight Decline in Productivity

Assumptions, 2006 to 2016				
	Annual growth in real GDP = 0.5%			
	Annual growth in GDP per hour worked = -0.5%			
	Hours worked per week = 35			
		GDP in $1997 (millions)	GDP per Hour worked*	Calculated Number of Employees**
Actual	1997	$22,417	$134	92,031
	1998	$21,965	$128	93,920
	1999	$22,063	$139	87,477
	2000	$21,824	$134	89,694
	2001	$20,691	$121	94,049
	2002	$21,924	$119	101,329
	2003	$21,870	$122	98,309
	2004	$22,010	$118	102,351
	2005	$23,183	$128	99,437
Estimate	2006	$23,299	$127	100,437
Projected	2007	$23,415	$127	101,446
	2008	$23,532	$126	102,465
	2009	$23,650	$126	103,495
	2010	$23,768	$125	104,535
	2011	$23,887	$124	105,586
	2012	$24,007	$124	106,647
	2013	$24,127	$123	107,719
	2014	$24,247	$122	108,802
	2015	$24,369	$122	109,895
	2016	$24,490	$121	111,000

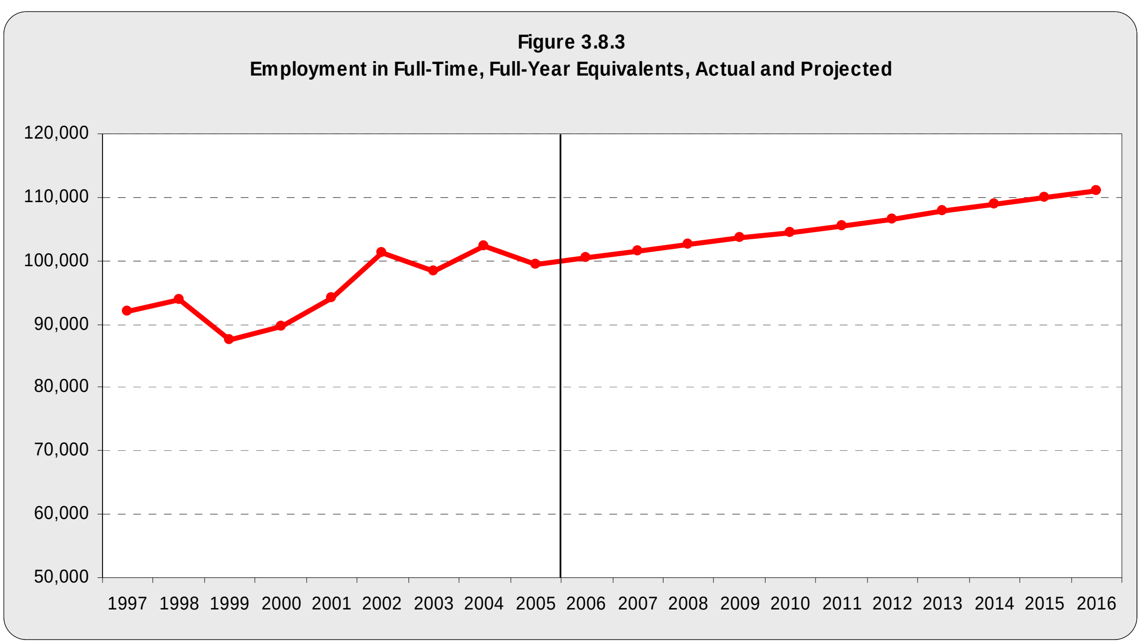

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Table 3.8.4
Forecasted Employment Growth for Selected Occupation Groups, Electricity and Electricity Support Services*

	Management occupations	Business, finance and administration occupations	Natural and applied sciences and related	Trades, transport and equipment operators and related occupations	All Others
Average Annual Growth in					
Employment from 2006 to 2016**					
Scenario #1	160	393	336	585	232
Scenario #2	48	117	100	174	69
Scenario #3	99	243	208	362	144

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Appendix B – Association Interview Guide

A. General

Where do you see the electrical industry in two to five years? What will that mean for employees in the industry?

1. Have there been any industry policy changes in the past five years regarding renewable energy options?

B. Skills and Training

The next questions will centre on the skills and training of the electricity industry's labour market.

2. What skills do you think workers will need in the next two to five years? What will be the impact of technological change on the labour force in the next two to five years?

3. What additional training programs or changes to existing training or education programs would be of benefit to the electricity industry?

C. Labour Market

The next few questions will centre on the electricity industry's labour market.

Based on the 2004 Canadian Electricity Association Sector Study, it is estimated that within the next ten years the sector could experience a shortage of 10,000 to 20,000 workers.

One of the measures identified to bridge this gap could be to recruit more members of the electricity workforce from the following groups: First Nations, women, immigrants, and older workers.

4. Are there any specific challenges or barriers to recruiting or retaining members from the identified groups mentioned?

Another possible recruitment area for new electricity employees is from declining industries – e.g., manufacturing, forestry, etc.

5. What other economic sectors offer potential new employees for the industry?

6. What type of assistance would workers from other industries need in making an adjustment to the electricity sector (e.g., increased literacy or math skills)? Which occupations would be easier to move than others?

The next few questions will deal with current and future employment outlook of the electricity industry.

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7. In the next two to five years, are there any specific occupations that are in demand for the industry? NOTE: Prompt to name three professions that will experience the most growth – engineers, technicians, electricity programming, and skilled trades.

8. Where will the majority of new employment in the industry be located?

9. Are there other industries competing for the same workers? If yes, who are they?

10. What recruitment or retention measures could companies in the industry undertake to remain competitive in the quest for new employees?

Concluding Questions

Thank you for taking the time to talk with me.

11. Do you have any questions for me or is there anything more you would like to add?

12. Are there other individuals or organizations you think we should contact on any of the topics we discussed today?

13. As we review our results we may need to confirm one or more points you and I discussed today. If so, can we call you again?

14. Would you like to be included on the distribution list to receive a copy of the final report once it is published?

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Appendix C – Employer Interview Guide

A. General

1. Are there any special considerations or characteristics within the regions (probe on labour or operations issues – these can be local or domestic) in which you operate that we should be aware of?

2. Where do you see the electricity industry in two to five years? What will that mean for employees in the industry?

3. Do you have any current renewable programs in place? If yes, are there targets or production goals for renewable energy? If not, are there plans to introduce in the future? If so, when?

B. Skills and Training

The next questions will centre on the skills and training of the electricity industry's employment outlook.

4. Do you currently offer training and skills upgrading to your existing employees? In what areas is training offered?

5. What skills do you think workers will need in the next two to five years? What will be the impact of technological change on your labour force in the next two to five years?

6. What additional training programs or changes to existing training or education programs would be of benefit to your organization or the electricity industry?

C. Labour Market

The next few questions will centre on the electricity industry's labour market.

In a recent study, the Canadian Electricity Association estimated that within the next ten years the industry could experience a shortage of workers anywhere between 10,000 and 20,000.

One of the measures identified to bridge this gap could be to recruit more members of the electricity workforce from the following groups: First Nations, women, immigrants, and older workers.

7. Are there any specific challenges or barriers to recruiting or retaining members from the identified groups mentioned?

Another possible recruitment area for new electricity employees is from declining industries – e.g., manufacturing, forestry, etc.

8. What other economic sectors offer potential new employees for your company? Are you actively recruiting new employees from other industries?

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9. Has your company ever had direct experience with attracting and recruiting employees from other sectors?

10. If yes, what were the outcomes? If no, proceed to Q10.

The next few questions will deal with your company's current and future employment outlook

11. Do you anticipate hiring any new employees in the next 12 to 24 months?

12. In the next two to five years, are there any specific occupations that are in demand for your company? NOTE: Prompt to name three professions that will experience the most growth – engineers, technicians, electricity programming, and skilled trades. If yes, proceed to Q12. If no, proceed to Q13.

13. Where will the majority of new employment be located?

14. Are you experiencing difficulties filling vacancies? How are you addressing these difficulties?

15. Are there other industries competing for the same workers? If yes, who are they?

Concluding Questions

Thank you for taking the time to talk with me.

16. Do you have any questions for me or is there anything more you would like to add?

17. Are there other individuals or organizations you think we should contact on any of the topics we discussed today?

18. As we review our results we may need to confirm one or more points you and I discussed today. If so, can we call you again?

19. Would you like to be included on the distribution list to receive a copy of the final report once it is published?

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Appendix D – Labour Interview Guide

A. General

1. **What is the biggest employment challenge(s) facing your union in the electricity sector today?**

2. **How will this challenge(s) affect your members?**

B. Labour Market

The next few questions will centre on the electricity industry's labour market.

What are the electrical sector's current work force requirements? Are there regional differences?

The Electricity Sector Council estimates that within the next decade the electricity industry could experience a shortage of between 10,000 and 20,000 workers. One suggestion to bridge this gap is to recruit new electricity employees from declining industries – e.g., manufacturing, forestry, etc. Do you think this is a feasible approach?

Are there any specific challenges or barriers to recruiting people from declining industries?

Are there specific incentives that you feel would be helpful in recruiting workers from declining industries?

Are there specific programs (e.g., training) that would be helpful in transitioning workers from declining industries into the electricity industry?

Would your union be supportive of recruiting workers from industries in decline or regions experiencing economic difficulties? Explain.

Are there other industries competing for the same workers?

Can you think of any other economic sectors or industries that offer potential new employees for the electricity industry?

Do you believe that your union has a role to play in the recruitment and retention of potential new employees?

C. Skills and Training

The next questions will centre on the skills and training outlook of the electricity industry.

Do your members have access to training and skills upgrading? In what areas is training offered?

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What poses the greatest challenges in training (e.g., adapting to new technologies)?

What skills do you think workers will need in the next two to five years? What will be the impact of technological change on your labour force in the next two to five years?

What additional training programs or changes to existing training or education programs would be of benefit to your members?

Are there adjustment programs for your members?

Concluding Questions

Do you have any questions for me or is there anything more you would like to add?

Are there other individuals or organizations you think we should contact on any of the topics we discussed today?

As we review our results we may need to confirm one or more points you and I discussed today. If so, can we call you again?

Would you like to be included on the distribution list to receive a copy of the final report once it is published?

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Appendix E – Training Interview Guide

A. General

1. For which occupations do you offer training/courses geared to the needs of the electricity sector? Please provide specific examples. (If they say all ask for an exhaustive list – don't need to know the number of trainees, just which occupations, and can be either apprenticeship or community college programs.)

2. Where do the majority of your students pursuing electricity-related programming come from (geographically)? What is their educational background – are they coming straight out of secondary school, transferring from a college or university, or coming from the labour market?

3. Have you noticed any recent changes to your student body? (see Q2)

4. Does your institution/organization have any partnership agreements with other electricity sector or non-renewable stakeholders?

5. Has your institution/organization made any recent changes to program delivery or course content in electricity-related fields?

6. Does your institution have excess supply or demand for various electricity-related programs?

7. Is the institution well positioned to receive additional students, above and beyond the normal intake? If not, what would it take to get to that point? What resources would it take? (e.g., partnership with an industry? More faculty? More capital? etc.)

Future Work Force Needs and Training

Based on the 2004 Canadian Electricity Association Sector Study, it is estimated that within the next ten years the sector could experience a shortage of 10,000 to 20,000 workers. A possible recruitment area for new electrical employees is from declining industries – e.g., manufacturing, forestry, etc.

8. What type of assistance would workers from other industries need in making an adjustment into the electricity sector (e.g. increased literacy or math skills)? Which occupations would be easier to move than others?

9. Do you have existing training modules that can be refined for this purpose? (If so, how were they developed?)

10. Do you have existing programs or assessment tools to evaluate skills or knowledge competencies? (If so, how were they developed?)

11. What skills do you think workers in the electrical industry will require in the next two to five years?

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12. What poses the greatest challenges in training for the electrical industry (e.g., adapting to new technologies, downturn in the sector)?

13. Have you developed any new programs or made modifications to existing programs (content changes) to accommodate growing interest in the renewable energy sector?

Concluding Questions

14. Are there other individuals or organizations you think we should contact on any of the topics we discussed today? We are currently contacting representatives from labour, industry, and provincial electrical associations, as well as other trainers.

15. As we review our results we may need to confirm one or more points you and I discussed today. If so, can we call you again?

16. Would you like to be included on the distribution list to receive a copy of the final report once it is published?

17. Do you have any questions for me or is there anything more you would like to add?

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