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Engineering Labour Market Conditions 2009 – 2018

Final Report, September 1, 2010

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9/1/2010

Monitoring the pulse of the **ENGINEERING*** profession

Engineering Labour Market Tracking System
Labour Market Conditions 2009 - 2018
Final Report, September 1, 2010

Report Outline

Executive Summary

Engineers Canada initiated a system for tracking labour markets as part of the Engineering and Technology Labour Market Study in 2008. The tracking system has been updated in 2010 based on new economic, industry and demographic projections and input from Provincial Labour Market Information Committees[1].

The analysis covers twenty six separate engineering labour markets and provides an assessment of conditions that will assist industry stakeholders including:

- Employers and recruiters
- Students, immigrants and other potential entrants
- Faculty and managers of post secondary programs
- Federal and provincial government officials managing immigration and other labour market programs
- Provincial engineering associations

The Engineers Canada system tracks trends in labour supply and demand across recent history and adds a new projection from 2010 to 2018. These trends cover a period of growing supply early in the last decade as a surge of immigration arrived. Since 2001 immigration has declined rapidly while graduations from engineering programs have increased slowly. Over this period supply has slowly moved down to line up with demand. This balance was interrupted by the recession in 2009 as job cuts weakened markets.

Most markets trend back to balance across the scenario from 2010 to 2018. Key exceptions emerge for occupations where labour requirements are driven by older age profiles and high levels of retirement or where a strong economic cycle increases or decreases employment. This report describes the components of supply and demand and prospects for recruiting and job search.

The system is based on historical data and future scenarios for:

- Output, investment and employment for engineering-intensive provincial industries
- Employment in engineering occupations
- Graduates from Canadian Engineering Accreditation Board (CEAB) programs
- Immigration (permanent and temporary foreign workers) by engineering occupations
- Retirement and mortality in engineers

The provincial measures are combined into employment drivers that reflect the distribution of engineers across industries. Each driver is based on provincial economic conditions across a scenario from 2010 to 2018. These drivers are provided from economic forecasts prepared by the Centre for Spatial Economics.[2]

[1] These committees were organized and invited to comment on an early draft by; Association of Professional Engineers and Geologists in British Columbia, Alberta, Saskatchewan, Manitoba, New Brunswick and Nova Scotia, Professional Engineers of Ontario, Ontario Society of Professional Engineers, Ordre des Ingenieurs du Quebec, Reseau des Ingenieurs du Quebec.

[2] See the C4SE "January 2010 Provincial Economic Forecast", Centre for Spatial Economics

The annual change in employment is added to retirements and mortality (replacement demands) to estimate changing labour requirements. These estimates are compared to increases in labour supply through graduates from post secondary programs and immigration. Excess supply is defined as the difference between supply and labour requirements.

These measures are combined into a summary ranking on a scale from 1 to 5 with 1 representing a very weak market and 5 a tight market.

Rankings & Description	
1	**Significant excess of supply over demand** No difficulty in recruiting qualified engineering staff with 0-5 years or 5-10 years of Canadian experience at established compensation norms within the local labour market.
2	**Excess of supply over demand** No difficulty in recruiting qualified engineering staff with 0-5 years or with 5-10 years of Canadian experience at established compensation norms within the local or regional labour market. The geographic range of recruiting and the range of acceptable qualifications is broader than in 1.
3	**Moderate supply pressures** Difficulty in recruiting qualified engineering staff with more than 5 years of Canadian experience, with industry or technology-specific skills, and with appropriate non-technical skills. The time required to fill these positions is typically longer than historic norms. Vacancies sometimes need to be re-posted. Employers actively solicit applications from outside the local and regional labour market and reimburse applicants for travel expenses related to interviews, etc. Recruiting engineering staff with 0-5 years of Canadian experience poses fewer challenges.
4	**Significant supply pressures** Difficulty across the board in recruiting qualified engineering staff in the local and regional labour market. It is normal practice to actively solicit applications from outside the local and regional labour market and to reimburse applicants for travel expenses related to interviews. Employers are generally obliged to improve offered terms of compensation and to assist with re-location costs. Recruitment difficulties lead many employers to increase their use of third-party recruiters and to increase their outsourcing of engineering and technology work to consultancies or staff the assignment with engineering workers from another region. There is a significant increase in the risk of project delays and compensation-driven cost escalations.
5	**Supply constraints** Systemic difficulty in recruiting qualified engineering staff. International recruiting is common among large employers. There is widespread perception that the consulting sector is working at full capacity and that there is little, if any, remaining scope to outsource engineering and technology work to qualified consultancies with a known track record.

Rankings summarize the findings for national markets and for British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec and Atlantic Canada.

National Findings

Exhibit ES1 reports the rankings for nine engineering occupations.

Exhibit ES1 – Labour Market Rankings National Summary

Labour Market Rankings - Summary	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Civil engineers	2	3	3	4	4	4	4	4	4	4
Mechanical engineers	2	3	3	4	3	3	3	4	4	4
Electrical and electronics	2	3	3	3	3	3	3	4	4	4
Chemical	2	3	2	3	3	3	3	3	3	3
Industrial and Manufacturing	2	4	4	4	4	4	4	4	4	4
Petroleum	4	3	3	3	3	4	4	4	4	4
Aerospace	3	4	4	4	4	3	3	3	3	4
Computer	2	2	2	3	3	3	3	3	3	3
All Other	2	2	2	3	3	2	3	3	3	3
Total Engineers	2	3	3	4	3	3	3	3	4	4

Key Points:

- The recession weakened markets in 2009 as job cuts undermined labour requirements.
- Overall employment for engineers in Canada regains lost ground during 2010; returning to pre recession levels during 2011.
- A modest drop in graduations combined with stable but low levels of immigration to limit the rise in excess supply in 2009 and balance markets in 2010
- A strong recovery in manufacturing and related activity from 2010 to 2014 increases employment for mechanical, electrical, chemical, industrial and other disciplines;
    - The available workforce in industrial and manufacturing engineering was reduced by weakening demand since 2005 and large declines in permanent immigration over the past decade.

- Labour requirements increase moderately in other sectors (e.g. government, construction) later in the scenario.
- Graduations from CEAB programs will rise in 2011 and then sustain higher levels; meeting the labour requirements later in the scenario.
- Data reliability is a concern for some smaller markets – in particular for petroleum engineers.
- Retirements and the age profile of each workforce drives labour requirements later in the scenario,
- Levels of immigration and graduation established in the 2008 – 2009 period are likely sufficient to balance markets across the coming decade
- Rankings measure general conditions and may not reflect tight or weak conditions for specific occupations and regions.
- Market conditions will vary depending on the experience level of the engineer. Note that a ranking of 3 signals “difficulty recruiting qualified engineers with more than 5 years of Canadian experience”.
- Replacement demands related to retirements in many occupations will add to current challenges recruiting experienced engineers.

British Columbia

Exhibit #ES2 reports the results for all engineers as a group in British Columbia. Limited statistical reliability prevents tracking more individual markets.

Exhibit ES2- All Engineers, BC

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Engineers	2	3	3	3	3	3	4	4	4	4

- Lagging immigration combined with employment growth to tighten markets in 2007.
- The recession was severe and excess supply increased to very high levels in 2008 and 2009.
- The recovery will be strong in 2010 and 2011, absorbing unemployed and underemployed engineers.
- Immigration continues to fall faster than the steady rise in graduates:
    - The limited number of new entrants will tighten labour markets during the recovery.

Alberta

Exhibit #ES3 reports the results for all engineers as a group in Alberta. Statistical reliability and independent estimates allow tracking for four individual markets.

Exhibit ES3– All Engineers, Alberta

Labour Market Rankings - Summary	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Civil engineers	2	3	3	3	4	4	4	4	4	4
Mechanical, Electrical, Chemical	2	3	3	3	3	3	3	3	3	3
Petroleum	2	3	3	3	3	3	3	4	4	3
All Other	2	3	3	3	3	3	3	3	3	3
Total, All Engineers	2	3	3	3	3	3	3	3	3	3

- The recession cut jobs at the same time as immigration was rising and graduations were near record levels.
- Tight markets for civil engineers reflect steady employment growth, the older age profile and higher replacement demand.
- Market measures for petroleum engineers are less reliable than other occupations.
- Balanced markets with rankings of 3 are consistent with short term recruiting challenges for specialized skills and experience.

Saskatchewan

Exhibit #ES4 reports the results for all engineers as a group in Saskatchewan. Limited statistical reliability prevents tracking more individual markets.

Exhibit ES4- All Engineers, Saskatchewan

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Engineers	4	3	3	3	3	3	3	4	4	4

- Saskatchewan had one of the strongest economies in Canada in 2009 and 2010 and the recession had a more limited impact there.
- Significant employment growth and low levels of immigration kept labour markets tight in 2009.
- Large industrial and utility projects will end in 2012 and markets may weaken later in the scenario.
- Moderate growth and a steady supply of new entrants maintain balanced markets over the forecast period.

Manitoba

Exhibit #ES5 reports the results for all engineers as a group in Manitoba. Limited statistical reliability prevents tracking more individual markets.

Exhibit ES5- All Engineers, Manitoba

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Engineers	2	3	3	3	4	3	3	4	4	4

- The sharp decline in manufacturing employment in 2009 combined with the above average number of new entrants in 2008 resulted in an easing of market conditions in 2009.
- Large investments in the utilities sector stress the provincial labour supply, tightening markets in 2010, and over the medium term.
- As utility sector investments wind down in 2014 markets return to balance for the remainder of the forecast period.

Ontario

Exhibit #ES6 reports the results for all engineers as a group in Ontario. Statistical reliability and independent estimates allow tracking for five individual markets

Exhibit ES6– All Engineers, Ontario

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Civil engineers	3	3	4	4	4	4	4	4	4	4
Mechanical engineers	3	3	4	4	4	3	4	4	4	4
Electrical and Electronics	2	3	3	4	4	3	3	4	4	4
Industrial and Manufacturing	2	3	4	4	4	4	4	4	4	4
All Other	2	3	3	4	3	3	3	3	3	3
Total, All Engineers	2	3	3	4	4	3	3	3	4	4

- Engineering labour markets were returning to more balanced conditions from 2006 to 2008; recovering from an influx of immigrants that peaked in 2001.
- Recession in 2008 and 2009 weakened most markets.
- The recovery is generally modest and labour requirements are not growing rapidly by historical standards, but:
  - Manufacturing grows out of a deep slump with a period of strong investment.
  - This change will increase demand for engineers in related fields.
- At the end of the scenario, from 2014 to 2018, growth is limited but replacement demands for retirements rise and immigration is needed to sustain workforce levels.
  - Retirements will dominate labour requirements later in the scenario and this will aggravate difficulties recruiting experienced engineers.

Quebec

Exhibit #ES7 reports the results for all engineers as a group in Quebec. Statistical reliability and independent estimates allow tracking for four individual markets.

Exhibit ES7– All Engineers, Quebec

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Civil engineers	3	3	3	3	4	3	4	4	4	4
Mechanical	1	3	2	2	2	3	3	3	3	3
Electrical	2	2	2	3	3	3	3	3	3	3
All Other	2	3	2	2	3	3	3	3	3	3
Total Engineers	2	3	2	3	3	3	3	3	3	3

- Tighter markets for civil engineers are related to the older age profile and higher retirement demands for this occupation.
- Some variations in the pattern of enrolments and graduations may temporarily tighten or weaken the other markets.

Atlantic Canada

Exhibit #ES8 reports the results for all engineers as a group in Atlantic Canada. Limited statistical reliability prevents tracking more individual markets.

Exhibit ES8 - All Engineers, Atlantic Canada

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Engineers	3	3	3	3	3	3	3	4	3	3

- The recession had a mild impact on job creation while graduations continue to rise.
- Recovery is strong enough to tighten the markets as migration has fallen.
- Over most of the projection, the number of graduates and arriving immigrants exceeds labour requirements.

Findings and Conclusions

The conclusions drawn by this study reflect both the economic model which underpins our assessment of current and projected labour market conditions, and the important input received from validation meetings. These meetings brought an industry perspective to bear on the conclusions from the economic model.

1. It is clear that there is an asymmetry between the way that employers and engineers look at the engineering labour and the way that standard economic statistics describe that market. Both employers and engineers ascribe a high degree of importance to general business experience, and to specialized, technical experience. Indeed, experience is so important in the engineering profession that the measurement of both the supply and the demand for engineers needs to be parsed in terms of experience categories.

2. It is clear from our analysis of specific engineering labour markets that many of these markets are characterized by a surplus of recent graduates, who have little or no experience, but a shortage of experienced engineers with five or more years of practical experience and the specialized, experience-based technical skills that employers require. This concurrence of a labour surplus with a skills shortage was discussed in the reports produced by the Engineering and Technology Labour Market Study. [3]

3. The difficulties that many employers experience in recruiting engineers with specific experience and skills has led to a sharp increase in the use of foreign-trained engineers brought into Canada by employers under the Temporary Foreign Worker program. Increasing the supply of domestic graduates, by itself, will not address employers' skills needs. New graduates are not a substitute for experienced engineers with 5-10 years of experience and specialized technical skills.

4. The difficulty that many employers have in recruiting engineers with specialized skills and experience also has led to an increase in off-shoring. Our analysis suggests that skill shortages are at least as important as cost factors, if not more important, in driving the increase in off-shoring.

5. The traditional academic fields of study - civil, mechanical, chemical, electrical - are just the starting point. As graduates move into specific industries, they evolve into aerospace, systems, transportation, structural, industrial, manufacturing, petroleum, and other specialized engineers, to list but a few examples. In some cases, university curricula now reflect these specializations. In most cases, however, specializations are developed through experience.

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[3] "Engineering and Technology Labour Market Study, Final Report", Engineers Canada and the Canadian Council of Technicians and Technology, May, 2009. See Page 1 and Page 8 http://etlms.engineerscanada.ca/e/pub_pr.cfm

6. Standard economic statistics which measure supply and demand in the engineering labour market attach too little weight to experience and to specialized skills and too much weight to generic qualifications. In this report, therefore, it is common for our analysis to show a 'balance' between supply and demand (a '3' ranking) for the four large (and generic fields), namely, civil, electrical, mechanical and chemical, but shortages (a '4' ranking) in the more specialized fields, e.g., petroleum engineers.

7. The consulting sector – which employs a large share of professional engineers – plays a critical role in meeting industry's needs for specialized skills and developing those skills within the profession. Consulting also promotes the mobility of these skills across regions and industries.

8. Within the consulting sector, the internationalization of engineering services has taken on increased importance. This was described in the report *Canada's Consulting Engineering Sector in the International Economy* that was part of the Engineering and Technology Labour Market Study.[4] A central finding of that study was that the internationalization of engineering services increased the premium on specialized skills.

9. This report points to three challenges for the engineering profession.

The first, and most important, is addressing the graduation-to-work transition, or more specifically, the chronic and serious under-supply of junior engineer jobs which are also integral to the internship or EIT programs of the provincial and territorial associations. This situation sets up a contradiction between the interests of each firm and the engineering industry as a whole. It is rational business strategy for an individual employer to require 5-10 years experience for new hires, but at the system level, this business strategy leads to the serious problems that now confront the profession and employers as a whole. There are no simple solutions to the graduation-to-work transition challenge, but addressing this challenge must now become a priority for the profession. This may have implications for industry/profession relations, government/profession relations, the structuring of university programs, and the regulation of professional practices.

The second challenge is to better understand the business and specialized skill needs of industry and reflect those needs in traditional undergraduate and graduate programs, in combined MBA-engineering programs, in engineering management programs, and in continuing professional development programs. The profession may also need to consider options for credentialing specialized skills, as has been done in other professions, e.g., law.

[4] See, http://etlms.engineerscanada.ca/media/Canada's%20Consulting%20Engineering%20Sector%20in%20the%20International%20Economy1.pdf

The third challenge is to facilitate the movement of experienced engineers from declining sectors when they have lost their jobs into growing sectors. Engineers who have lost their jobs owing economic restructuring have considerable business experience, but are likely to lack some of the specialized skills that are needed by growing sectors.

Improvements to the next update might add insight in these areas and better meet user needs. Changes might include;

- Added market details that track more specializations and new disciplines including;
  - Engineering Managers
- Extended consultations with stakeholders and
  - The addition of rankings that track conditions for experienced engineers based on stakeholder input.
- Added details tracking licensing and registrations in the Provincial Associations including;
  - Engineer in training programs and other internships
  - Permanent immigrants with engineering qualifications and temporary foreign workers securing permanent status
- Added details linking employment to engineering consulting including improved links from key industry drivers, imports and exports of engineering services.

1. Background and Introduction

Engineers Canada initiated a system for tracking labour markets as part of the Engineering and Technology Labour Market Study in 2008.[5] This 2010 version of Engineering Labour Market Conditions updates the 2008 work; adding detail, drawing on a new macroeconomic scenario, and including input from a round of industry consultations.

The analysis covers twenty six separate engineering labour markets and these are set out in Exhibit # 1 below. Markets were selected based on the availability of reliable data and industry input[6]. Where possible the analysis accounts for specialization and the potential for engineers to move across disciplines as they accumulate knowledge and experience. Statistics that are used as a basis for market analysis often do not measure these circumstances. The commentary on each market assessment highlights where conditions may be impacted by specializations, mobility and the experience of the workforce.

The system is designed to provide an assessment of labour markets that would meet the needs of several industry stakeholders including:

- Employers and recruiters
- Students, immigrants and other potential entrants
- Managers of post secondary programs
- Federal and provincial government officials managing immigration and other labour market programs
- Provincial engineering associations

[5] See http://etlms.engineerscanada.ca/e/

[6] Each market assessment requires a reliable statistical foundation that measures the number of engineers at work. At a minimum these measures are needed for one starting point but a reliable time series is also important. The Statistics Canada 2006 Census is the critical starting point. Census results are suppressed or marked as unreliable for many markets. The Statistics Canada Labour Force Survey is the main source for annual trends. Weakness in the reliability of this data further limits the scope of this work.

Exhibit 1- Coverage, Occupations and Regions

Occupation by Region – Engineers								
Occupation	**Canada**	**Atlantic**	**Quebec**	**Ontario**	**Manitoba**	**SK**	**Alberta**	**BC**
1. Civil engineers	✓		✓	✓			✓	
2. Mechanical engineers	✓		✓	✓			✓	
3. Electrical & Electronics engineers	✓		✓	✓			**Mech, Elec, & Chem Engineers**	
4. Chemical engineers	✓							
5. Petroleum engineers	✓						✓	
6. Industrial & Manufacturing engineers	✓		**Other Engineers**	✓				
7. Aerospace engineers	✓							
8. Computer engineers	✓			✓			**Other Engineers**	
9. Other Engineers including metallurgical and materials, mining & geological engineers	✓			**Other Engineers**				
Total Engineers	Σ	✓	Σ	Σ	✓	✓	Σ	✓

Source: Prism Economics & Analysis

✓ = Labour Market Tracking
Σ = Sum of Individual Labour Markets
Other Occupations (residual)
Mechanical, electrical & electronic, & chemical grouped

The system assesses labour markets based on historical data and future scenarios for several measures, including:

- Output, investment and employment for engineering-intensive provincial industries:
  - Manufacturing
  - Construction
  - Professional, Scientific and Managerial Services
  - Utilities
  - Government
  - Primary Industries
  - Other industries
- Employment in engineering occupations
- Graduates from Canadian Engineering Accreditation Board (CEAB) programs
- Immigration (permanent and temporary foreign workers) by engineering occupations
- Retirement and mortality in engineering occupations

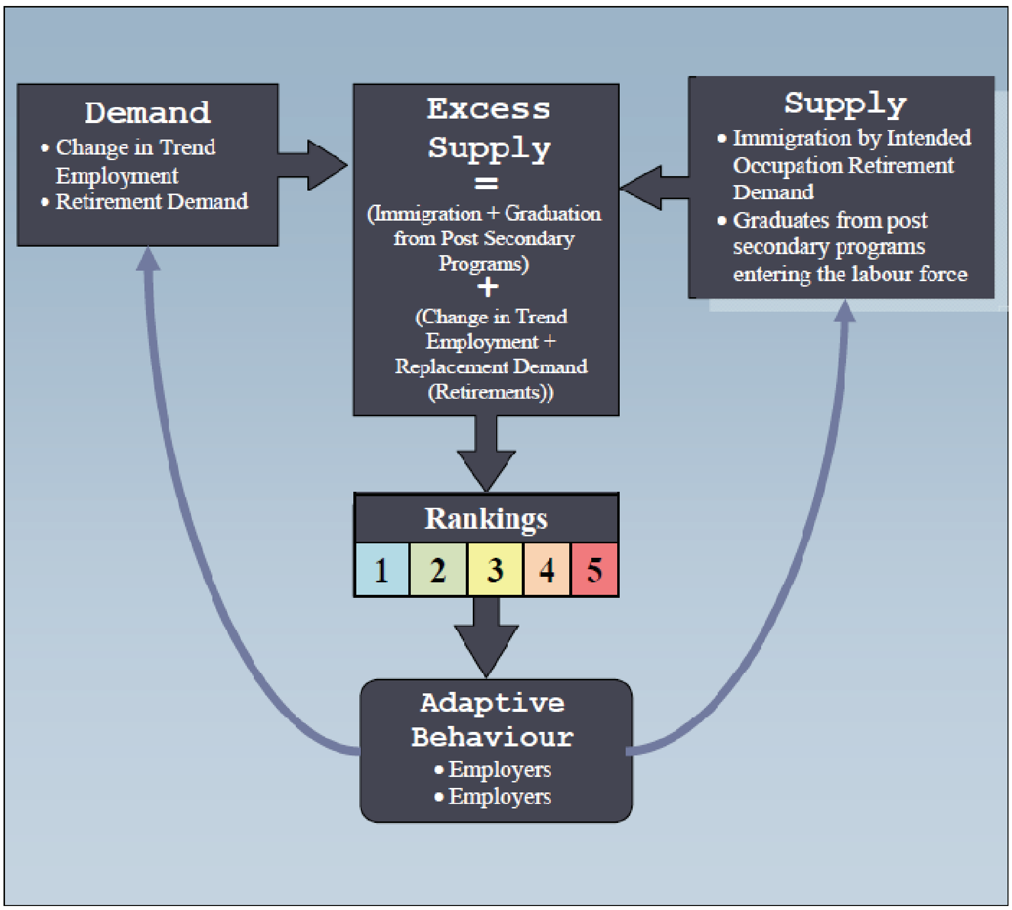
The provincial measures are combined into employment drivers that reflect the distribution of engineers across industries. Each driver is based on provincial economic conditions across a scenario from 2010 to 2018. These drivers are provided from economic forecasts prepared by the Centre for Spatial Economics.[7]

The annual change in employment is added to retirements and mortality (replacement demands) to estimated changing labour requirements. These estimates are compared to increases in labour supply through graduates from post secondary programs and immigration. Exhibit #2 summarizes the estimate of Excess Supply, a key labour market measure.

[7] See the C4SE Provincial Economics Forecast "January 2010", Centre for Spatial Economics

Exhibit 2

Engineering Labour Market Tracking System, Summary of Main Components



Measures, then, comingle many factors in the calculation of excess supply and market assessments. Rankings are interpreted carefully to reflect these differences.

Rankings describe a range of five market conditions

These measures are combined into a summary ranking through a weighted average of:

- Excess Supply as a % of Employment
- Retirement and mortality as a % of the Labour Force
- Annual % change in employment
- Industry input

Rankings are set on a scale from 1 to 5 with 1 representing a very weak market and 5 tight markets. From the perspective of employers each market might be described as follows:

Rankings & Description	
1	**Significant excess of supply over demand** No difficulty in recruiting qualified engineering staff with 0-5 years or 5-10 years of Canadian experience at established compensation norms within the local labour market.
2	**Excess of supply over demand** No difficulty in recruiting qualified engineering staff with 0-5 years or with 5-10 years of Canadian experience at established compensation norms within the local or regional labour market. The geographic range of recruiting and the range of acceptable qualifications is broader than in 1
3	**Moderate supply pressures** Difficulty in recruiting qualified engineering staff with more than 5 years of Canadian experience, with industry or technology-specific skills, and with appropriate non-technical skills. The time required to fill these positions is typically longer than historic norms. Vacancies sometimes need to be re-posted. Employers actively solicit applications from outside the local and regional labour market and reimburse applicants for travel expenses related to interviews, etc. Recruiting engineering staff with 0-5 years of Canadian experience poses fewer challenges.
4	**Significant supply pressures** Difficulty across the board in recruiting qualified engineering staff in the local and regional labour market. It is normal practice to actively solicit applications from outside the local and regional labour market and to reimburse applicants for travel expenses related to interviews. Employers are generally obliged to improve offered terms of compensation and to assist with re-location costs. Recruitment difficulties lead many employers to increase their use of third-party recruiters and to increase their outsourcing of engineering and technology work to consultancies or staff the assignment with engineering workers from another region. There is a significant increase in the risk of project delays and compensation-driven cost escalations.
5	**Supply constraints** Systemic difficulty in recruiting qualified engineering staff. International recruiting is common among large employers. There is widespread perception that the consulting sector is working at full capacity and that there is little, if any, remaining scope to outsource engineering and technology work to qualified consultancies with a known track record.

These five rankings are used to characterize engineering labour markets across Canada in the next section. Market rankings have been prepared for each year from 2009 to 2018.

Readers who are interested in more details on each component of the market assessment are referred to the Appendices. Appendix A includes a description of the Center for Spatial Economic, January 2010 Provincial forecasts that serve as the basis for the industry detail and engineering employment drivers.

2. Labour Market Assessments

This section of the report describes conditions for the twenty-six labour markets set out in Exhibit #1.

An initial summary describes the economic and demographic conditions in the region. This is a synopsis of the Center for Spatial Economics scenarios and describes the conditions linked to the industry drivers for employment.

Each section begins with Exhibit 1, an accounting of the number of engineers working in the market. The estimates of engineers employed are taken from the 2006 Census and from analysis for 2009 developed by Prism Economics and Analysis.[8] Readers are encouraged to consider these estimates and comment on any other sources that might be a basis for comparison. The accuracy of these estimates varies depending on the size of the market.

Exhibit 2 describes employment trends for each market using index numbers that track the cumulative change beginning in 2007 and running to 2018. Data from 2007 to 2009 are adjusted to reflect the historical data from the Labour Force Survey. Estimates from 2010 to 2018 are derived from drivers calculated from the Center for Spatial Economics forecasts. Graphics for each market show the major drivers and comments indicate how changing industry conditions are impacting employment. The annual change in employment, tracked in each graphic, is a key measure of labour requirements.

Exhibit 3 for each market sets out the recent history and expected trends for three key measures.

a. The number of graduates from CEAB Engineering programs. Data from Engineers Canada provides the history and estimates from 2009 to 2018 are based on the pattern of registrations. The analysis assumes that registrations and the associated graduations will remain constant at the levels reported for 2008. Industry stakeholders have observed that a proportion of graduates do not enter the workforce. An adjustment reflecting this trend reduces the number of graduates entering the workforce by 30%.
b. The reported number of engineers arriving in the market from outside Canada. This includes both permanent immigrants and temporary foreign workers.[9] The analysis assumes that the number of arrivals in 2008 remains constant from 2009 to 2018. Industry stakeholders observe that there are delays in integrating permanent immigrants and some are not able to find work as engineers. An

[8] Prism Economics and Analysis has reviewed different estimates of employment, the labour force and unemployment for engineers in as many markets as possible. Sources include the 2006 Census and the Labour Force Survey at Statistics Canada. Where reliability is a concern these measures have been adjusted.

[9] Estimates of immigration are adjusted in the case of temporary foreign workers. In theory, these workers are limited to two years of work in Canada. But experience shows that various programs are encouraging [9] Estimates of immigration are adjusted in the case of temporary foreign workers. In theory, these workers are limited to two years of work in Canada. But experience shows that various programs are encouraging these workers to remain. It is assumed that half of arriving temporary foreign workers leave after two years and half remain.

adjustment reduces the number of permanent immigrants entering the workforce by 15%.

c. The number of engineers permanently leaving the workforce including retirement and mortality. These estimates begin with the 2008 age profile of each group age 50 and over and calculate the number of exits by applying mortality rates and changes in participation rates in each year from 2009 to 2018. The resulting estimates indicate the number of engineers needed to sustain the labour force at the starting level in 2008.

Exhibit 4 describes excess supply in each year. This measure is similar to the change in unemployment and both the number and the percent of employed are included. As excess supply rises markets are growing weaker, recruiting will be easier and job search more difficult.

These exhibits provide all the information included in the rankings that are reported at the end of each section. Each annual ranking combines the measures of excess supply, the change in employment and the proportion of the workforce retiring or dying.

A - Canada

The Economy

This section introduces national results for major engineering labour markets from 2009 to 2018. Labour market conditions for engineering occupations will depend on key economic background factors. A brief summary of expected conditions is presented here and a complete write-up of the Center for Spatial Economics January, 2010 Provincial forecast is attached in Appendix A.

The recession is over and a slow recovery has started. Recovery is strongest in Asia and weakest in Europe. Canada's recovery from recession and long term growth potential depends on export markets and domestic production capacity. During a recovery period from 2010 to 2012 both these factors will encourage economic growth.

Government stimulus, introduced in early 2009 in most economies, has helped to cut the recession short and spur recovery. Stimulus spending on infrastructure projects and in engineering related construction continues in 2010 and early 2011. Accelerated design and construction will help some engineering occupations in the short term. But government deficits leave large debt burdens that will require long term restraint in government spending or tax increases.

Commodity prices rise as the world economy improves. Canada's resource industries may benefit, especially from opportunities in Asia. But higher commodity prices also create upward pressure on inflation. In response, interest rates will rise and act as a further restraint on the economy.

Canadian and US economic growth rises to near 3% -- above their potential – during the recovery period in 2010 and 2011. Growth slows later to trend rates near 2%. Traditional Canadian export markets in the United States are constrained by demographic and government finance factors. Canadian economic growth is increasingly constrained by limited domestic labour force growth. Rising immigration is assumed across the forecast scenario. Government policies will promote this and industry efforts to recruit and retain non-Canadian workers will be essential to sustaining growth.

Under these conditions employment growth will generally be far below historic patterns. At the same time labour markets will tend to be tighter than in the past. Unemployment will be well below historical levels and recruiting will be an ongoing challenge. The impact of these structural demographics depends on the age profile of each occupation and region.

These general economic conditions drive individual provincial industries and employment. Six engineering intensive industries are identified.

Manufacturing
This has been the weakest sector for at least a decade and the most vulnerable during the recession. Starting from a very low base, the recovery will be significant. This will be led by investments in new technology and capacity. Key manufacturing industries will prosper during

the next decade based on new products and designs. However, the recovery will not regain the past peaks of output until 2015 and overall manufacturing employment will not return to earlier peak levels.

Utilities
Investment in new utility capacity, including resource based projects, has been a leading source of activity for the past decade and is expected to accelerate in the forecast period. New capacity will improve productivity so that overall employment gains will be limited. Introducing major new construction projects and technologies will add jobs for engineers.

Government Services
Government and institutional investments have been a leading source of activity over the past decade and this momentum carries on to 2011 based on fiscal stimulus programs. But investment fades as the stimulus projects end and fiscal restraint sets in. Employment opportunities in government will be limited over the scenario.

Construction
This sector led the economy for the past decade and will benefit from the stimulus to infrastructure during 2010. Construction activity will slow down; lagging behind other sectors from 2012 to 2018. While employment growth will be slower, there are many industrial, institutional and utility projects planned and important opportunities are expected.

Professional, Scientific and Management Services
This sector is a major employer for engineers and includes engineering consulting. Activity tracks the general economic trends. Prospects for consulting firms, including opportunities and challenges in other countries, may not be fully reflected in the drivers.

Primary Industries
This sector combines the diverse fortunes of mining, agriculture, forestry, fishing and other industries. Investment and output have lagged behind the general economy and this is projected to continue. Specific opportunities associated with individual resources (e.g. potash, uranium, gold, etc.) may not be reflected in the general trends for these drivers.

Other Industries
These drivers represent the rest of the economy and growth tracks the general economic trends. Economic expansion will be held back across the coming decade by the lower growth in population and the labour force.

National Engineering Labour Markets
Employment growth in each of the nine engineering occupations is a key driver of labour markets. The Engineering Canada system starts with employment estimates taken from the 2006 Census and then adjusts these using the monthly Labour Force Survey to track employment during the years after the census. The Labour Force Survey is not a reliable source for smaller markets. Stakeholders are encouraged to consider the employment estimates reported in Exhibit A. These values are an important starting point for the market assessments to follow.

Exhibit A – Employment History Canada

Labour Market	2006c	2009e
	(Census)	(Estimated Trend)
Civil engineers	44680	45029
Mechanical engineers	38015	38612
Electrical and electronics	34340	35325
Chemical	9755	9528
Industrial and Manufacturing	20220	20321
Petroleum	9830	11900
Aerospace	5740	4992
Computer	26760	25676
All Other	10095	8412
Total, All Engineers	199435	199795

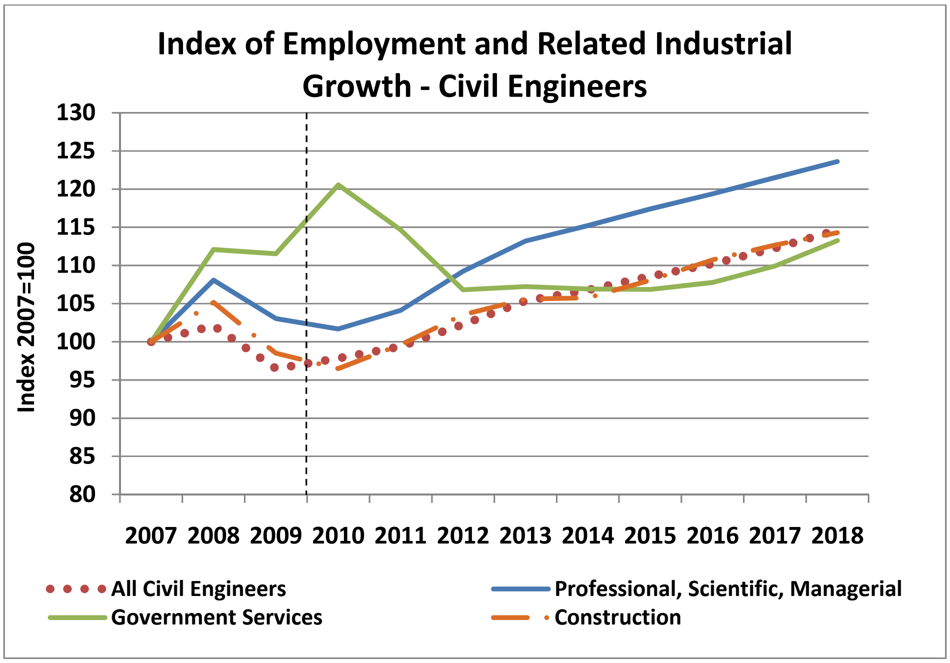
Source: Statistics Canada, Prism Economics and Analysis

Key Points:

- These estimates are based on household surveys where individuals identify their occupation. There is no verification of credentials or qualifications.
- Civil, mechanical and electrical engineering account for over half of employment.
- The “all other” category includes metallurgical and materials, mining, geological and other engineers.

Civil Engineers - Canada

Exhibit A1.1 - Civil Engineers, Canada



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment of Civil Engineers is primarily driven by investment and output in Professional, Scientific and Management Services (including engineering consulting) and Construction.
- Job losses in 2009 in some industries were partly offset by increases in the Government Services sector:
  - Gains are related to the short term infrastructure and other stimulus programs
- Employment tracks most closely with construction and professional, scientific and management services – the two largest single employers of civil engineers.
- Civil engineers are more concentrated in professional, scientific and management (including engineering consulting) services than other occupations. This might protect them from cyclical variations in employment.
- Cumulative employment growth from 2009 to 2018 is below the average for all engineers.

Exhibit A1.2 – Civil Engineers, Canada

Demographic Supply Side Measures - Civil engineers	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	1184	1209	1229	**1315**
Immigrants**	1041	1043	1059	**997**
Replacement Demand (#)***	741	1122	1018	**1085**
Replacement (% of Trend Employment)***	2.5	2.1	2.1	**2.5**

Source: statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

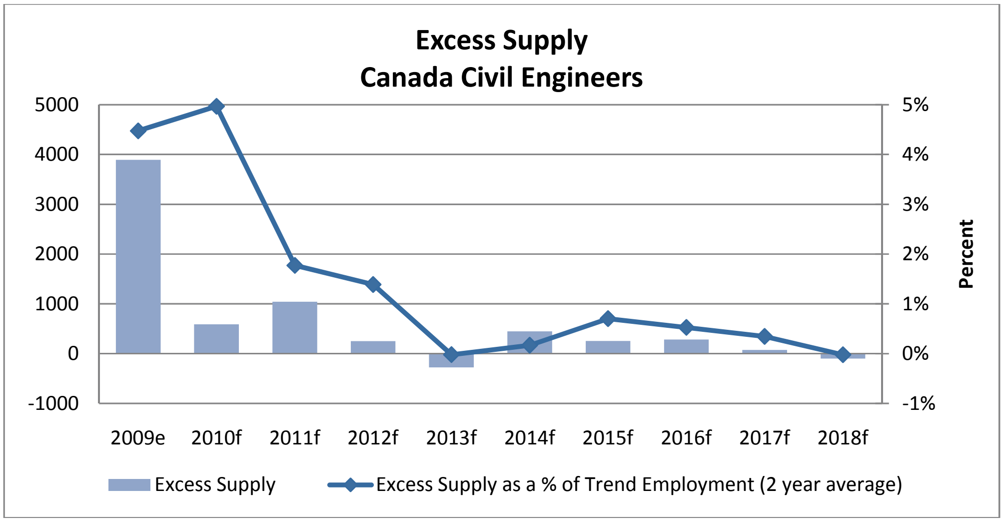
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Additions to enrolments in postsecondary programs have gradually raised graduations and these will rise to a peak in 2012
- Over the same period the number of permanent immigrants has declined and this is offset by a modest gain in temporary foreign workers.
- The age profile for this occupation is older than the average for all engineers.

Exhibit A1.3 – Civil Engineers, Canada



Source: statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- On balance additions to the workforce fall short of labour requirements and excess supply falls across the scenario.
- Low excess supply is related to the older age profile, retirements and relatively low registrations in post secondary programs compared to other disciplines.
- There is little cyclical variation after 2010 and this may be linked to trends in professional, scientific and management services (including engineering consulting services) activity.
- Self employment in consulting and professional, scientific and management services (including engineering consulting services) may offer temporary work for this group in weak markets.

Exhibit A1.4 – Civil Engineers Canada

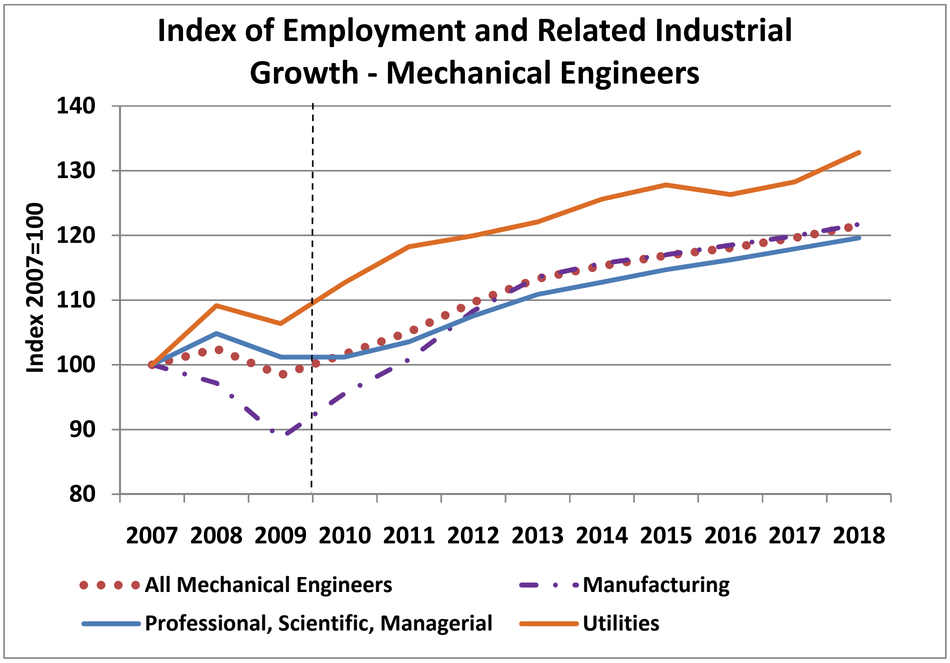
Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Civil engineers	2	3	3	4	4	4	4	4	4	4

Key Points:

- Low excess supply and the older age profile contribute to high rankings later in the scenario.

Mechanical Engineers - Canada

Exhibit A2.1 - Mechanical Engineers, Canada



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment of Mechanical Engineers is primarily driven by output, investment and employment in professional, scientific and management services (including engineering consulting services), manufacturing and utilities industries.
- Mechanical Engineers have the greatest concentration in manufacturing and are more vulnerable to the recession as well as more likely to benefit from the recovery.
- Cyclical job losses in 2009 may have been partly offset by self employment in consulting and the professional, scientific and management services (including engineering consulting services) industry.

Exhibit A2.2 - Mechanical Engineers, Canada

Demographic Supply Side Measures - Mechanical engineers	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	1859	2063	1811	**2036**
Immigrants**	1406	1117	1069	**1066**
Replacement Demand (#)***	569	814	739	**814**
Replacement (% of Trend Employment)***	2.2	1.8	1.8	**2.2**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

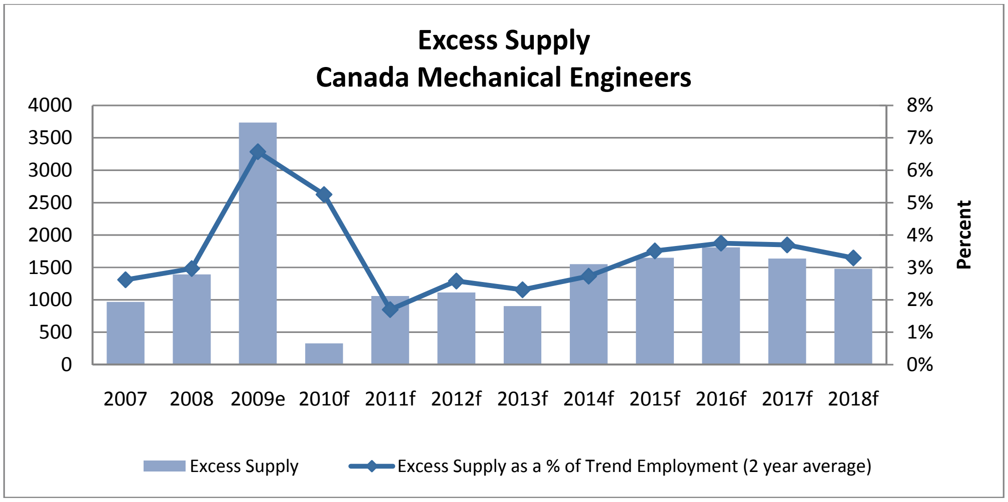
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Enrolments in CEAB programs have increased steadily across the past decade and graduations will reach a peak in 2012.
- Permanent immigration has declined steadily – falling by 75% to 2008.
- Recent increases in temporary foreign workers have only partially offset losses to permanent immigration.
- Canadian graduates from post secondary programs are the largest source of entrants to the workforce.
- The age profile for mechanical engineers is close to the average for all engineers.

Exhibit A2.3 – Mechanical Engineers, Canada



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- Excess supply is stable and consistent with balanced markets.
- Supply through both immigration and post secondary programs are consistently ahead of labour requirements.

Exhibit A2.4 – Mechanical Engineers, Canada

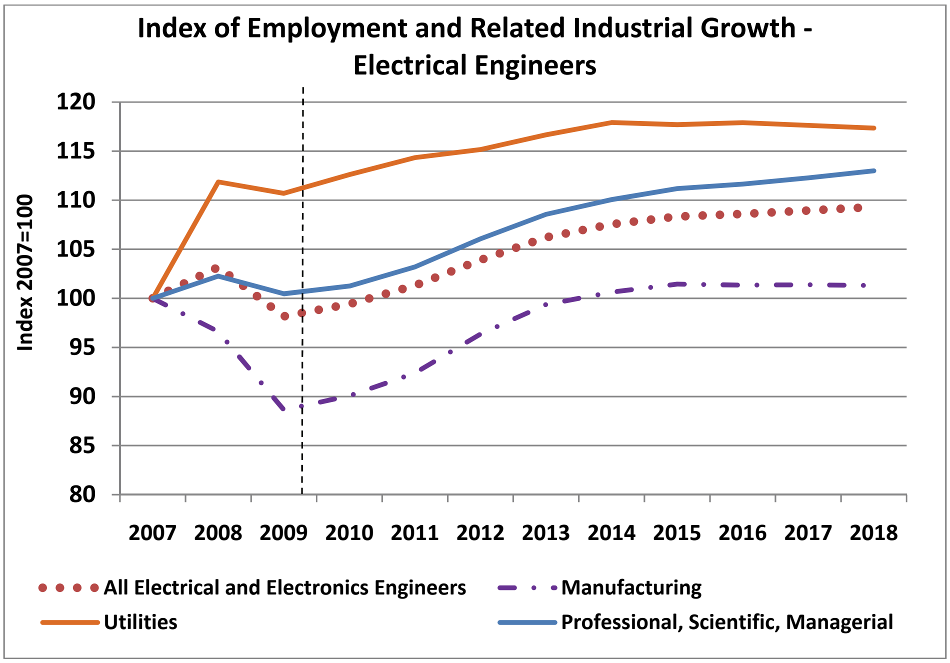
Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Mechanical engineers	2	3	3	4	3	3	3	4	4	4

Key Points:

- Markets tighten briefly as the recovery in manufacturing reaches a peak in 2012.
- Retirements will create challenges recruiting experienced engineers later in the scenario.

Electrical and Electronics Engineers - Canada

Exhibit A3.1 - Electrical and Electronics Engineers, Canada



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment of Electrical Engineers is driven primarily by investment and employment in utilities, professional, scientific and management services (including engineering consulting services) and manufacturing industries.
- Current economic conditions pull employment in different directions with manufacturing reducing and utility investment increasing opportunities.
- Utility related activity peaks in 2014; no additional employment is apparent later in the scenario.
- Long term trends suggest growth below average for all engineers.

Exhibit A3.2 - Electrical and Electronics Engineers, Canada

Demographic Supply Side Measures - Electrical and Electronics	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	1678	1656	1436	**1587**
Immigrants**	1501	730	701	**988**
Replacement Demand (#)***	710	575	621	**723**
Replacement (% of Trend Employment)***	2.1	1.6	1.6	**2.1**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

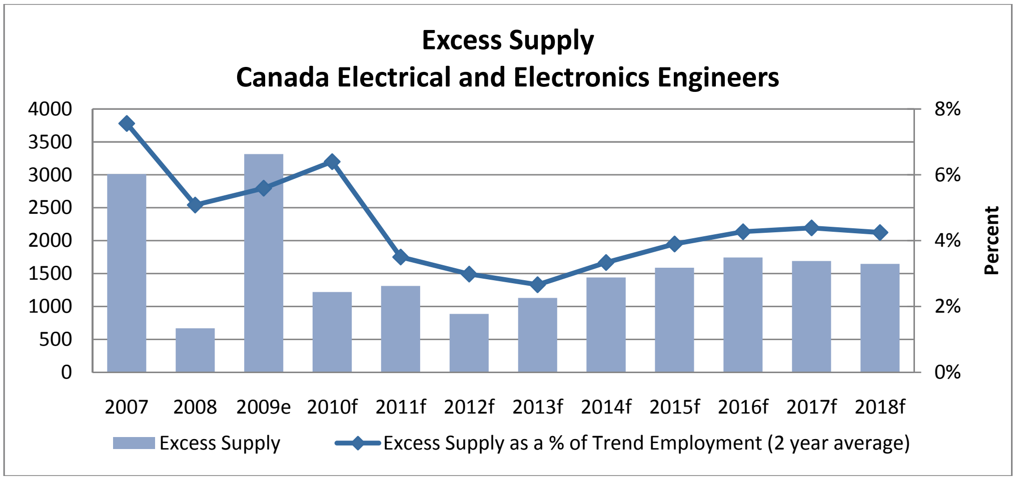
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Enrolment trends and associated graduates from post secondary programs have been flat with only moderate changes across the last decade.
- Permanent immigration has declined across the decade and the arrival of temporary foreign workers has also declined.
- The age profile for electrical engineers is close to the average.

Exhibit A3.3 – Electrical and Electronics Engineers, Canada



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- Limited employment growth combines with current trends in immigration and post secondary enrolments to sustain normal levels of excess supply.

Exhibit A3.4 – Electrical and Electronics Engineers, Canada

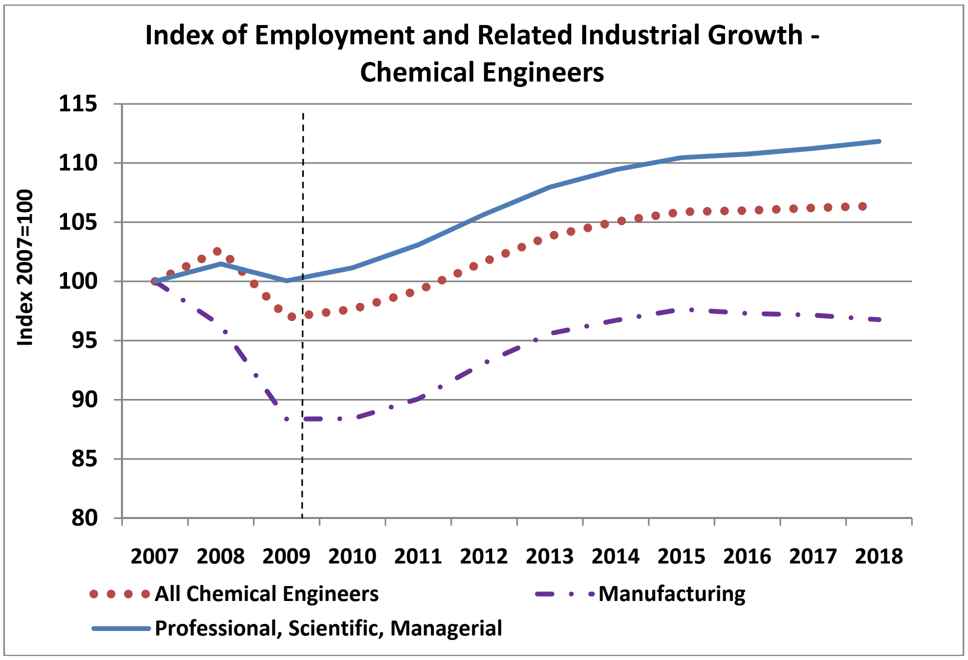
Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Electrical and Electronics	2	3	3	3	3	3	3	4	4	4

Key Points:

- Limited employment growth combines with supply side trends to leave labour markets in balance as the recovery unfolds.
- Retirements later in the scenario will add to labour requirements and recruiting experienced engineers will be a challenge.

Chemical Engineers - Canada

Exhibit A4.1 – Chemical Engineers, Canada



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment of Chemical Engineers is driven by employment in professional, scientific and management services (including engineering consulting services) and manufacturing industries.
- Declines in 2009 were weighed down by a sharp decline in manufacturing.
- Long term prospects are limited by opportunities in manufacturing.

Exhibit A4.2 - Chemical Engineers, Canada

Demographic Supply Side Measures - Chemical	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	642	721	659	**721**
Immigrants**	448	455	471	**434**
Replacement Demand (#)***	142	187	173	**191**
Replacement (% of Trend Employment)***	2.1	1.7	1.7	**2.0**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

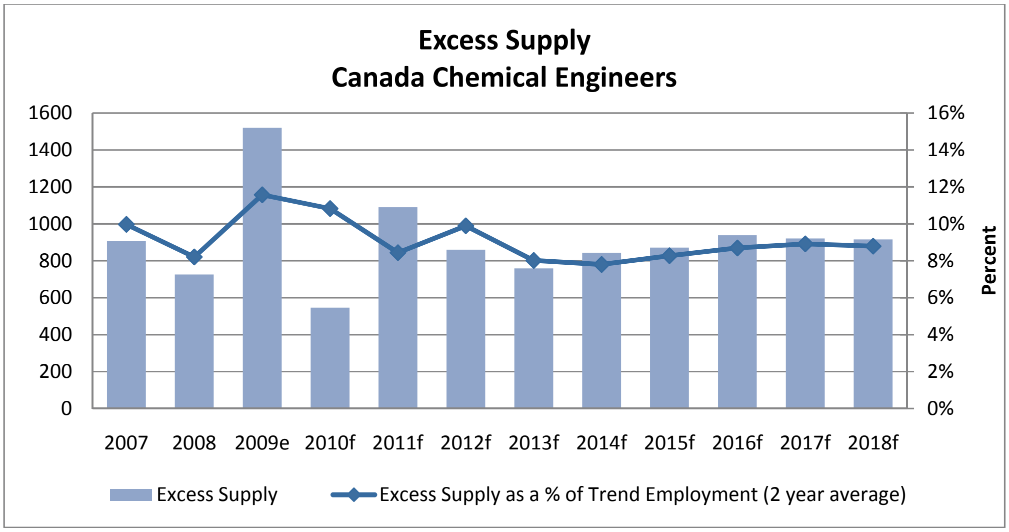
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Trends in enrolment and graduations have been cyclical but on a rising trend. Graduations reached a peak in 2008 but will decline in 2009 and 2010. Enrolment patterns will create a new peak in 2011 and 2012.
- Permanent immigration has declined steadily across the past decade and gains in temporary foreign workers have not replaced these losses.
- The age profile is average.

Exhibit A4.3 – Chemical Engineers, Canada



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- Recession and weakness in manufacturing drive up excess supply in 2009 and conditions are slow to improve.
- The expected increase in graduations in 2011 and 2012 will add to excess supply and largely balance labour requirements across the scenario.

Exhibit A4.4 – Chemical Engineers, Canada

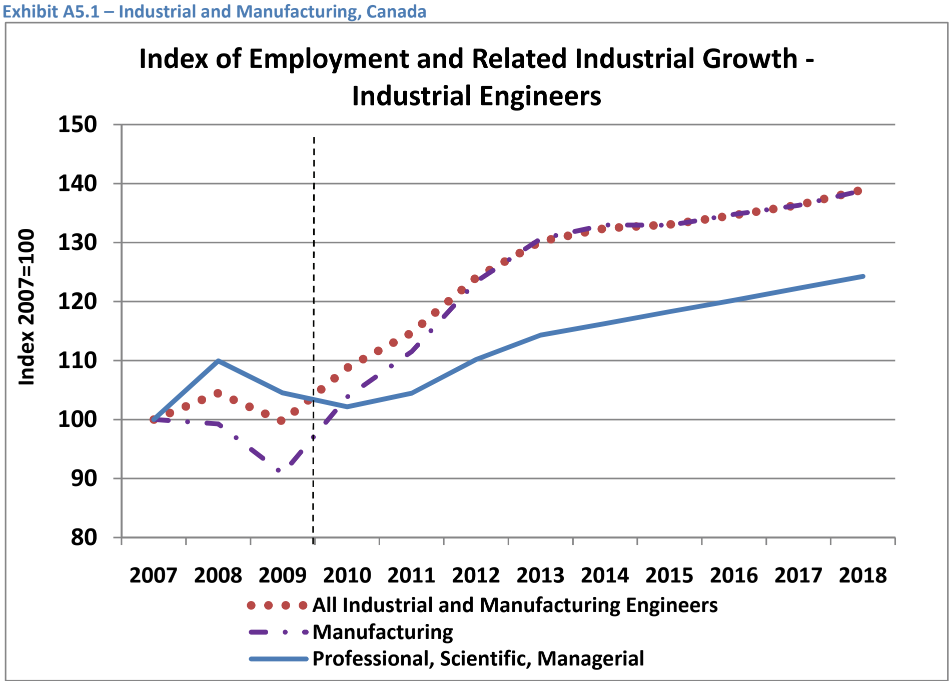
Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Chemical	2	3	2	3	3	3	3	3	3	3

Key Points:

- Labour markets will be balanced with CEAB programs largely replacing immigration as the primary source of chemical engineers.
- Difficulties recruiting experienced engineers may persist under these conditions.

Industrial and Manufacturing Engineers - Canada

Exhibit A5.1 – Industrial and Manufacturing, Canada



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment opportunities are driven primarily by investment and output in the manufacturing industry.
- Sharp decline in manufacturing cushioned somewhat by professional, scientific and management services (including engineering consulting services) sector.
- Recovery in manufacturing is related to investment in new technologies and engineers will play a key part in this.

Exhibit A5.2 - Industrial and Manufacturing, Canada

Demographic Supply Side Measures - Industrial and Manufacturing	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	365	306	311	**300**
Immigrants**	586	450	440	**472**
Replacement Demand (#)***	314	251	278	**390**
Replacement (% of Trend Employment)***	1.9	1.3	1.3	**1.9**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

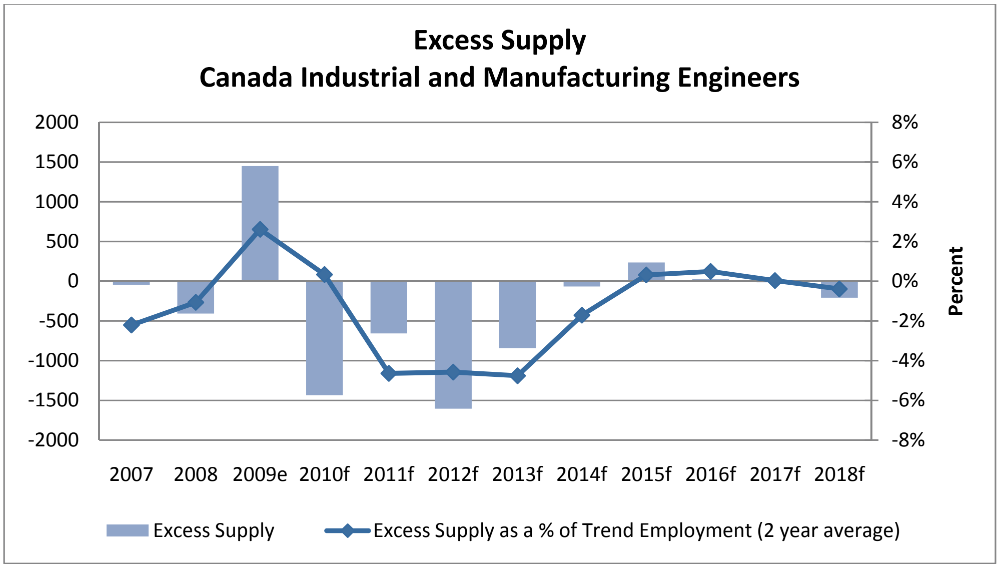
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- The workforce for industrial and manufacturing engineers grows as engineers from other disciplines (e.g. mechanical and chemical) find work and gain experience in industry.
- Enrolments and graduates from CEAB programs are limited relative to the size of the workforce.
- Immigrants have outnumbered Canadian graduates as entrants into the workplace.
- Permanent immigration has declined from a peak in 2000 while the number of temporary foreign workers has been maintained.
- Immigration has kept the average of the workforce well below average.

Exhibit A5.3 - Industrial and Manufacturing, Canada



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- The recovery of the manufacturing sector and the reliance on new technologies will reduce the excess supply of these occupations.

Exhibit A5.4 - Industrial and Manufacturing, Canada

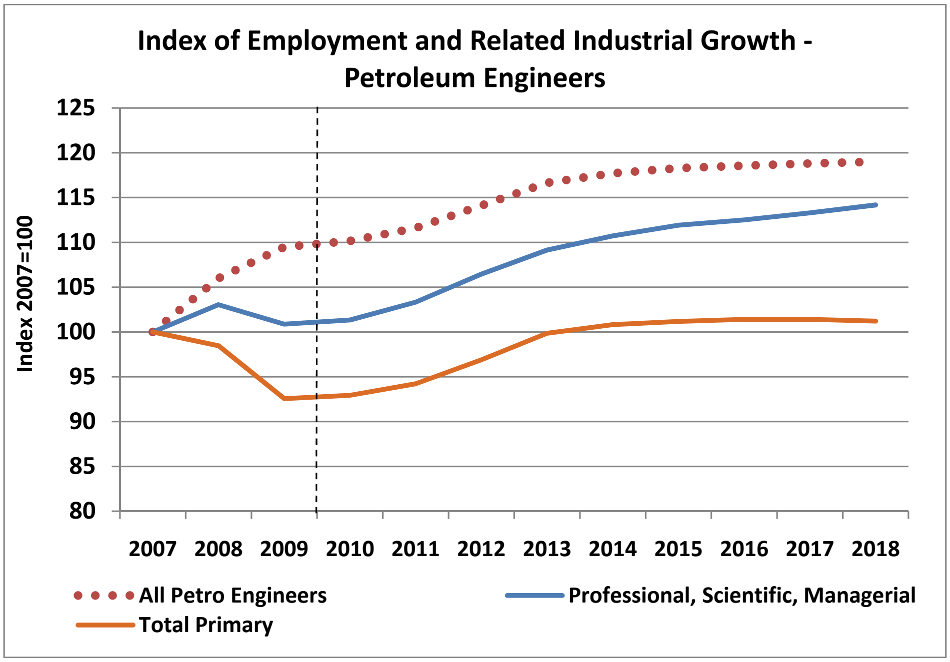
Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Industrial and Manufacturing	2	4	4	4	4	4	4	4	4	4

Key Points:

- Chronic labour shortages will continue across the scenario given the current levels of immigration and post secondary enrolments.
- Excess supply reported above for mechanical and chemical engineers may encourage these groups to seek work and shift their focus to this market.

Petroleum Engineers - Canada

Exhibit A6.1 – Petroleum Engineers



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment of Petroleum Engineers is driven primarily by Investment and employment in professional, scientific and management services (including engineering consulting services) and primary industries.
- The Statistics Canada Labour Force Survey (LFS) reports extremely strong growth between 2007 – 2009:
    - National gains are not consistent with regional data.
    - Analysis suggests that estimates may not be reliable.

Exhibit A6.2 - Petroleum

Demographic Supply Side Measures - Petroleum	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	48	59	52	**69**
Immigrants**	108	120	160	**145**
Replacement Demand (#)***	136	274	263	**233**
Replacement (% of Trend Employment)***	2.0	2.1	2.1	**2.0**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

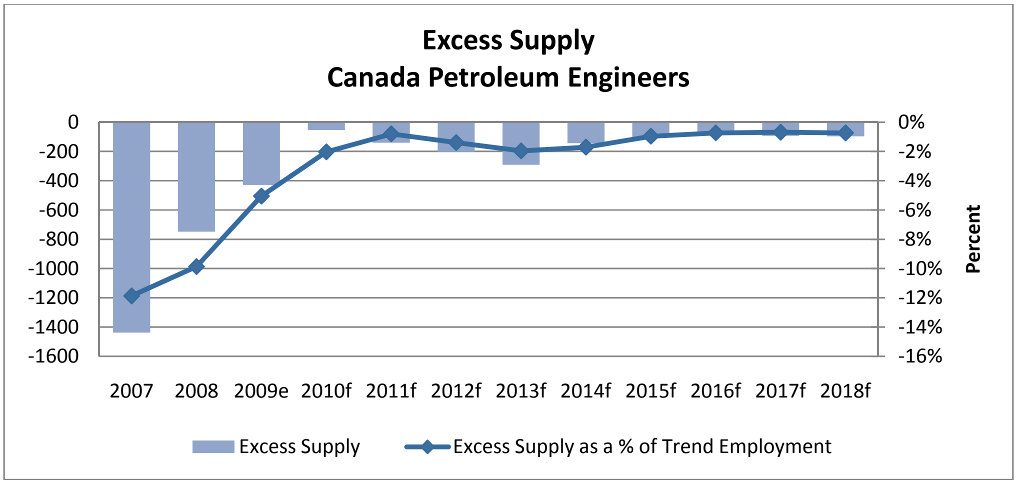
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- The petroleum engineering workforce grows as engineers from other disciplines (e.g. mechanical and chemical) find work and gain experience in industry.
- Enrolments and graduates from CEAB programs are limited relative to the size of the workforce.
- Immigration far exceeds the Canadian post secondary system as a source for this workforce.
- Immigration (both permanent and temporary) have fallen far below peak levels and modest gains in post secondary enrolments have not kept pace.
- The age profile for petroleum engineers is close to the national average for all engineers

Exhibit A6.3 - Petroleum



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- The workforce in this occupation may include mechanical, chemical and other engineers who work in the industry and have developed expertise as petroleum engineers.
- Measures of excess supply may not be reliable because of suspect employment estimates.

Exhibit A6.4 – Petroleum

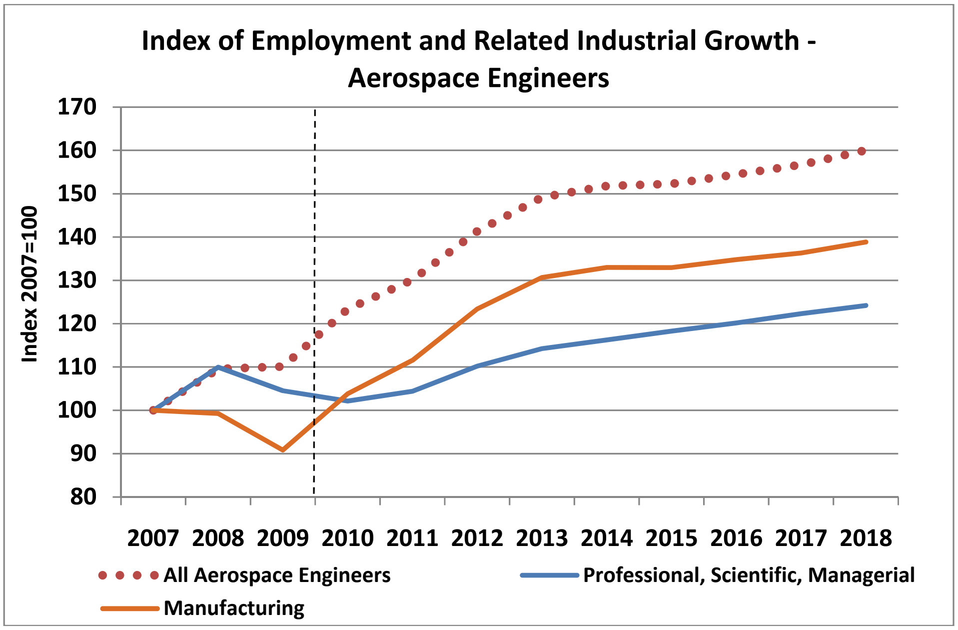
Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Petroleum	4	3	3	3	3	4	4	4	4	4

Key Points:

- Rankings are likely not reliable due to suspect employment estimates.
- Excess supply reported above for mechanical and chemical engineers may encourage these groups to seek work and shift their focus to this market

Aerospace Engineers - Canada

Exhibit A7.1 – Aerospace Engineers, Canada



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment for aerospace engineers is driven primarily by investment and output in manufacturing and professional, scientific and management services (including engineering consulting services) industries. The more specialized nature of this occupation makes broad indicators for manufacturing less reliable. Strength in the aerospace sector might not be adequately reflected in the broader economic measures.
- Data for 2009 show little change in employment while the key industrial drivers declined.
- Prospects for recovery are strong but employment has been volatile and on a downward trend for aerospace engineers for over ten years.
- Employment does not regain peak levels achieved in 1997 until 2013.
- The manufacturing recovery is linked to the adoption of new technologies with leadership from engineers.
    - This group has the strongest overall employment growth for national occupations.

Exhibit A7.2 - Aerospace Engineers, Canada

Demographic Supply Side Measures – Aerospace	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	139	125	115	**122**
Immigrants**	75	224	226	**152**
Replacement Demand (#)***	93	73	86	**85**
Replacement (% of Trend Employment)***	1.8	1.7	1.7	**1.9**

Source: statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

**Includes temporary foreign workers and permanent immigrants

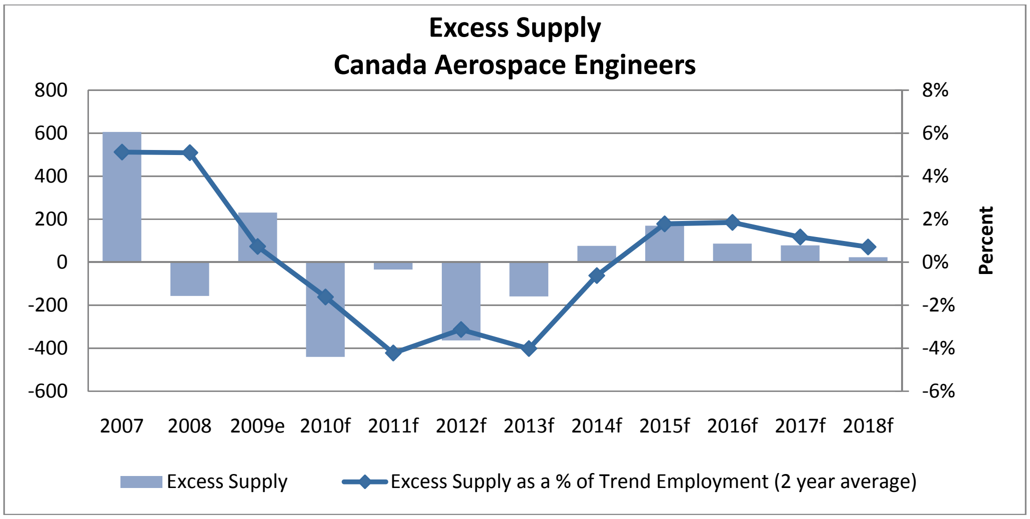
***Replacement demand = retirement and mortality

Deleted: -

Key Points:

- Immigration (both permanent and temporary) peaked with employment in the late 1990s and declined until 2007:
    - A big increase is reported in the arrival of temporary foreign workers in 2008.
- Enrolments and graduation from Canadian post secondary programs has steadily improved but has not yet filled the gap left by declining immigration.
- High levels of immigration help to keep the age profile below normal.

Exhibit A7.3 - Aerospace Engineers, Canada



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- The recession seems to have caused a pause in employment growth.
- A surge in temporary immigration has balanced markets.
- Half of the temporary foreign workers who arrived in 2008 are assumed to leave the workforce over the near future; levels of permanent immigration and graduations are not sufficient to meet labour requirements during the recovery phase from 2010 to 2013.

Exhibit A7.4 – Aerospace Engineers, Canada

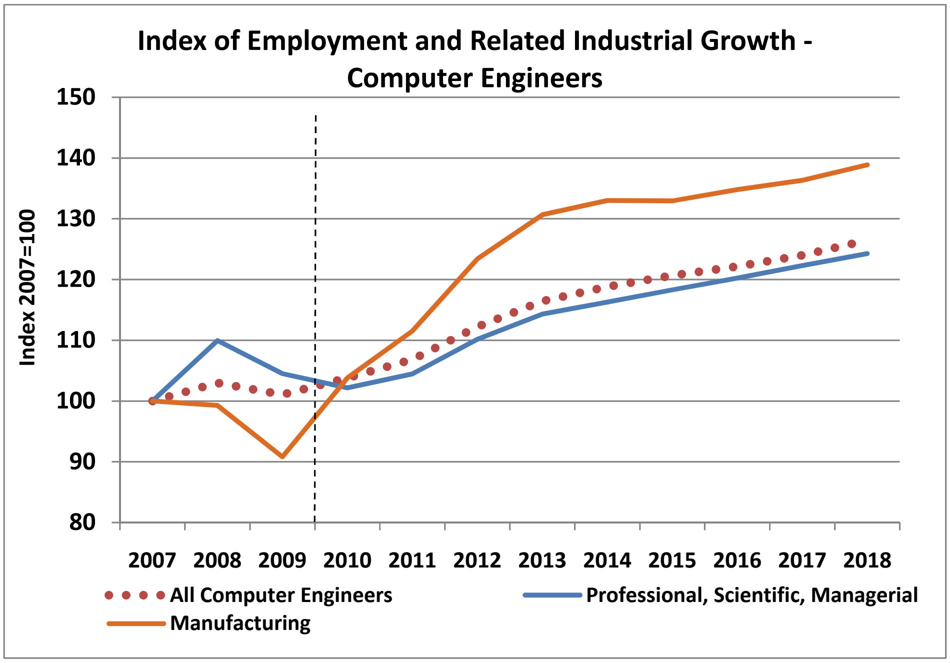
Labour Market Rankings - Summary	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Aerospace	3	4	4	4	4	3	3	3	3	4

Key Points:

- Labour markets will be tight as the projected manufacturing recovery unfolds.
- Labour supply begins to catch up with demand towards the end of the scenario.

Computer (except software engineers) Engineers - Canada

Exhibit A8.1 – Computer Engineers (except software engineers), Canada



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment by Computer Engineers is driven primarily by investment in professional, scientific and management services (including engineering consulting services) industry.
- The recession has a limited impact with a slight decline in 2009, then steady growth through 2018.
- The IT bubble drove employment to a peak in 2000 – 2001 and then declined in 2003 – 2004. Growth has been steady since then.
- Over the scenario employment growth for computer engineers exceeds the average for all engineers.

Exhibit A8.2 - Computer Engineers (except software engineers), Canada

Demographic Supply Side Measures Computer	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	1082	964	412	**957**
Immigrants**	731	612	694	**688**
Replacement Demand (#)***	138	213	211	**318**
Replacement (% of Trend Employment)***	1.2	0.8	0.8	**1.2**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

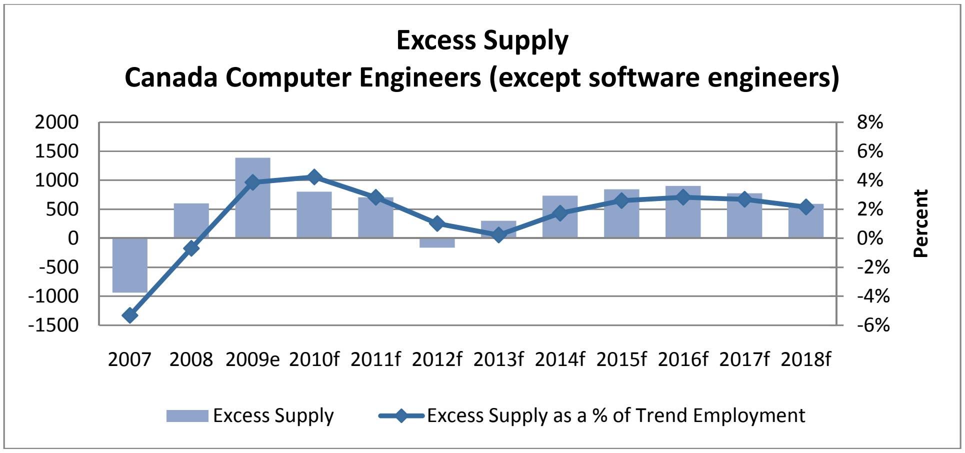
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Graduates from computer engineering programs rose to a peak in 2004 and have been declining since then.
- Permanent immigration and temporary foreign workers have been declining since 2001.
- The general reliance on immigration for new entrants has kept the average age of the workforce well below the average for all engineers.

Exhibit A8.3 - Exhibit A8.2 - Computer Engineers (except software engineers), Canada



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- Labour markets were tight from 2005 to 2007 as employment revived while supply continued to decline in reaction to the IT bust.

  Employment weakened in 2008 and 2009 allowing immigration and graduations to overshoot.

- The recovery in professional, scientific and management services (including engineering consulting services) and manufacturing will reduce excess supply in the face of low immigration and graduations.
- Labour requirements grow more slowly later in the scenario as retirements are limited and employment growth settles down to trend rates for the economy.

Exhibit A8.4 - Computer Engineers (except software engineers)

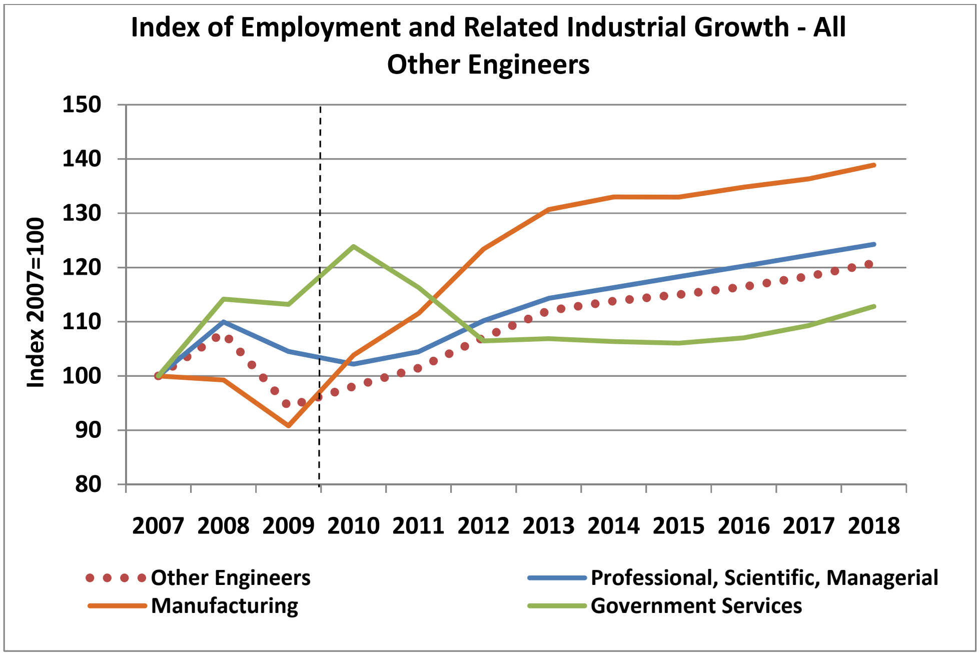
Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Computer	2	2	2	3	3	3	3	3	3	3

Key Points:

- Relatively strong employment growth is balanced by limited replacement demand as the workforce is quite young.
- There is a risk of recruiting difficulties in specialized areas.
- Overall markets balance once the recovery has settled into trend rates of growth later in the scenario.

All Other Engineers - Canada

Exhibit A9.1 – All Other Engineers, Canada



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- This category includes mining, geological, metallurgical and materials and other engineers.
- Employment in all other engineering occupations is driven primarily by investment in manufacturing, government services and professional, scientific and management services (including engineering consulting services) industries.
- Sharp decline in 2009, resumes growth in line with investment in professional, scientific and management services (including engineering consulting services) industry.
- Employment in this occupation last reached a peak in the early 1990s and this level was only passed in 2006.
- Overall growth across the scenario for this group is equal to the average for all engineering occupations.

Exhibit A9.2 – All Other Engineers, Canada

Demographic Supply Side Measures - All Other	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	1019	1031	1009	**1147**
Immigrants**	550	555	574	**530**
Replacement Demand (#)***	449	168	162	**208**
Replacement (% of Trend Employment)***	2.4	1.7	1.7	**2.4**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

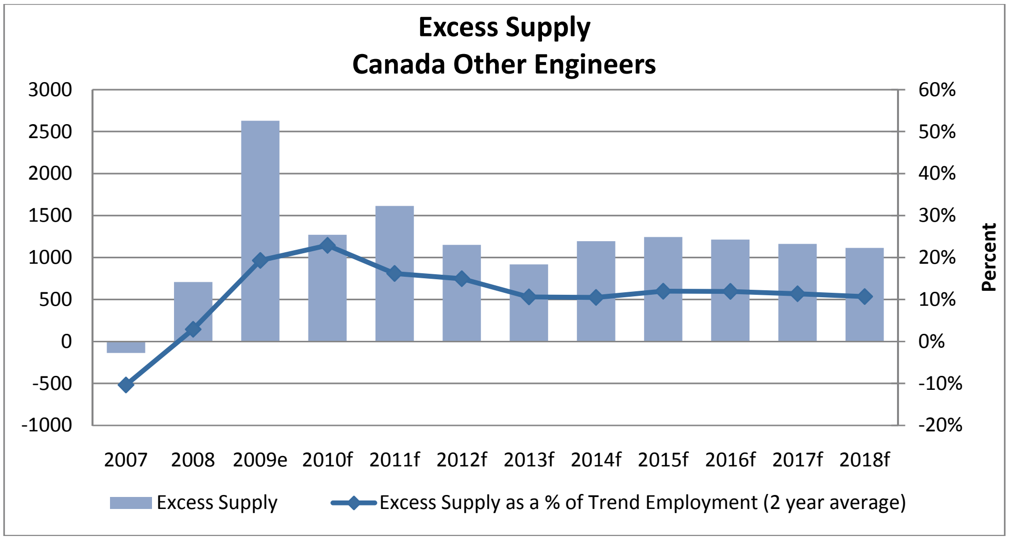
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Graduates from Canadian post secondary programs traditionally exceed immigration as a source of entrants.
- Immigration (mostly permanent) peaked in 2001, later than other engineering groups, and has been declining since.
- Declining immigration since 2001 has exceeded the gain in graduations; leaving a drop in the available workforce.
- Reliance on the domestic workforce is associated with an older age profile.

Exhibit A9.3 – All Other Engineers, Canada



Source: statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- Excess supply increased in 2008 and 2009 as employment fell and supply remained largely unchanged.
- Strong employment recovery from 2010 to 2012 is covered by a temporary gain in graduations.
- This category contains several distinct occupations and rates of excess supply for individual occupations may differ widely from the overall result.

Exhibit A9.4 – All Other Engineers, Canada

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Other	2	2	2	3	3	2	3	3	3	3

Key Points:

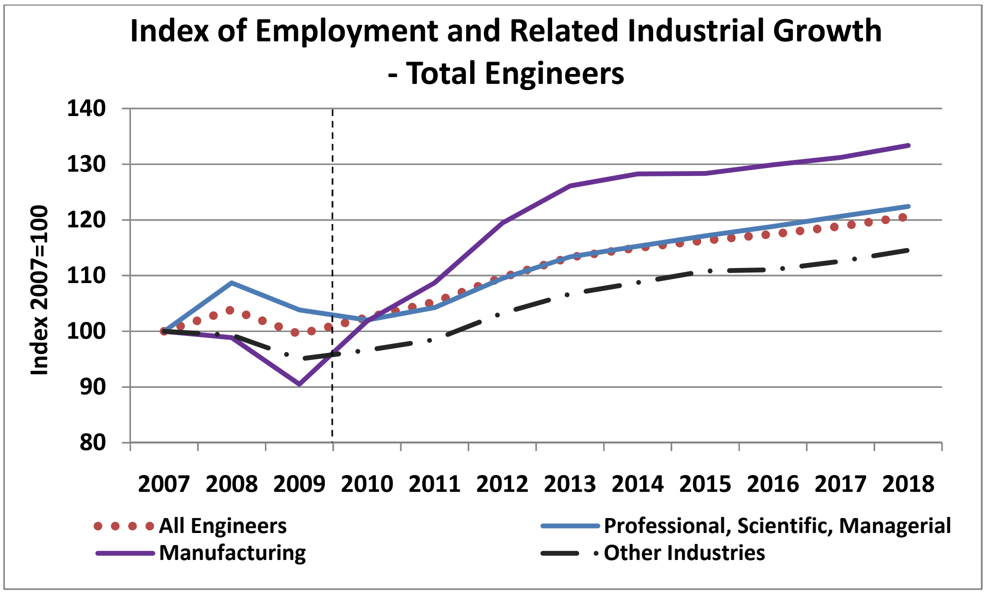
- Sustained higher levels of graduations and trend growth in employment combine to balance markets.

- The age profile for these occupations is higher than average for engineers and this will make recruiting for experienced engineers more difficult.

- Rankings for all these occupations together may conceal important market differences among individual groups.

Total Engineers - Canada

Exhibit A10.1 – Total Engineers, Canada



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Average annual growth in engineering employment from 2010 to 2018 is 1.5%, above the average growth of total Canadian employment.
- This signals a moderate increase in the proportion of engineers in the Canadian workforce and this is due, in the scenario, to the relatively strong growth in engineering intensive industries.

  The major drivers for engineering employment are investment and output in government, manufacturing and the professional, scientific and management services (including engineering consulting services) industries.
- Led by regular gains in the big three occupations (civil, mechanical and electrical) and recent additions of computer engineers, employment reached an all-time high in 2008.
- The decline in 2009 was linked to the recession and growth resumes in line with investment in professional, scientific and management services (including engineering consulting services) industry in 2010.
- The strongest cyclical growth in employment is related to the expected recovery in manufacturing. This recovery:

  - Drives employment and tightens markets for industrial and manufacturing engineers and aerospace, but
    - employment levels only slowly regain peak levels achieved in the late 1990s or in the middle of this decade.
- Where employment growth is sustained above the trend growth in the economy, it is associated with the adaptation of new technologies (e.g. manufacturing and computer engineering) or the addition of major project activity (e.g. utility construction).

Exhibit A10.2 - Total Engineers, Canada

Demographic Supply Side Measures - Total Engineers	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	8016	8133	7034	**8254**
Immigrants**	6447	5306	5395	**5472**
Replacement Demand (#)***	3196	3450	3358	**4004**
Replacement (% of Trend Employment)***	2.0	1.6	1.6	**2.1**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

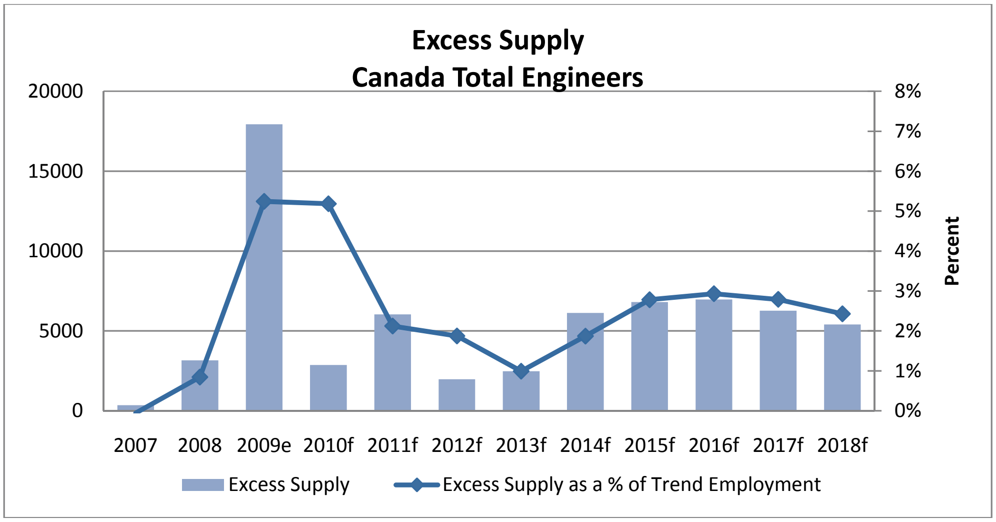
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- The steady decline in permanent immigration has been partly offset by temporary foreign workers but the overall contribution of non-Canadians to the workforce has declined.
- Steady overall growth in graduations from CEAB programs has overtaken immigration and now contributes the majority of new engineers.
- Over 2.0% of the workforce will retire; leave engineering occupations across the scenario.
- Replacing these losses with new graduates will aggravate the current difficulties recruiting experienced engineers in most markets.

Exhibit A10.3 – Total Engineers, Canada



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- The recession temporarily raised excess supply but recovery is strong and more normal balance is restored in 2010.

Exhibit A10.4 – Total Engineers, Canada

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total Engineers	2	3	3	4	3	3	3	3	4	4

Key Points:

- The ranking system projects balanced markets once the job losses of the recession have passed.
- As the number of retirements grows later in the scenario, markets will be tighter and recruiting more difficult for experienced engineers.

Exhibit A11 – Labour Market Rankings Summary, Canada

Labour Market Rankings - Summary	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Civil engineers	2	3	3	4	4	4	4	4	4	4
Mechanical engineers	2	3	3	4	3	3	3	4	4	4
Electrical and electronics	2	3	3	3	3	3	3	4	4	4
Chemical	2	3	2	3	3	3	3	3	3	3
Industrial and Manufacturing	2	4	4	4	4	4	4	4	4	4
Petroleum	4	3	3	3	3	4	4	4	4	4
Aerospace	3	4	4	4	4	3	3	3	3	4
Computer	2	2	2	3	3	3	3	3	3	3
All Other	2	2	2	3	3	2	3	3	3	3
Total, All Engineers	2	3	3	4	3	3	3	3	4	4

Key Points:

- The recession uniformly weakened markets in 2009.
- Recovery tightens markets driven by manufacturing; the available workforce in the related occupations was reduced by large declines in permanent immigration.
- Data reliability is a concern for some smaller markets – in particular for petroleum engineers.
- Levels of immigration and graduation established in the 2008 – 2009 period are likely sufficient to balance markets across the coming decade.
- Overall balance conceals the possible excess of labour supply over requirements for specific occupations and regions.

B – British Columbia

The Economy

This section introduces provincial results for major engineering labour markets from 2009 to 2018. Labour market conditions for engineering occupations will depend on key economic background factors. A brief summary of expected conditions is presented here and a complete write-up of the Center for Spatial Economics January, 2010 Provincial forecast is attached in Appendix A.

British Columbia, along with Alberta, experienced the most severe recession with real output dropping 2.6% in 2009. But recovery is also stronger than elsewhere in Canada, with growth of 3.2% in 2010. The BC economy is sensitive to the U.S. housing cycle but also close to the strong recovery in Asia. Government stimulus investments and the Olympics are important special events helping the recovery process.

Over the medium term the BC economy does relatively well with stronger population growth related to immigration and gains in productivity. Non-residential construction is expected to do well in 2010 and 2011 as government stimulus programs combine with resources and utility projects. Mining investment and output are an ongoing source of strength right through to 2015. Manufacturing activity is expected to recover well and grow faster than the overall economy. However, manufacturing is recovering from a major downturn and only gradually returns to past peak levels of output and employment.

The overall Provincial labour market weakened notably in 2009 as unemployment rose from 4.5% to 7.5%. Recovery adds back the lost jobs and reduces unemployment to record low levels by 2013. Later in the scenario employment for all occupations in BC grows at just 1% across the scenario and this growth increases labour requirements faster than any additions to the labour force. The result is declining unemployment rates and generally tight labour markets. Strong immigration is a key contribution to the long term capacity of the economy to expand.

Statistics Canada data for engineering employment is not reliable for individual occupations and the labour market assessment is limited to all engineers. The 2006 Census, outlined in Exhibit B, reports 22,500 engineers in BC and the Labour Force Survey indicates that employment has declined from that peak with losses in 2009.

Exhibit B – British Columbia

Labour Market	2006c (Census)	2009e (Estimated Trend)
Total, All Engineers	22560	18037

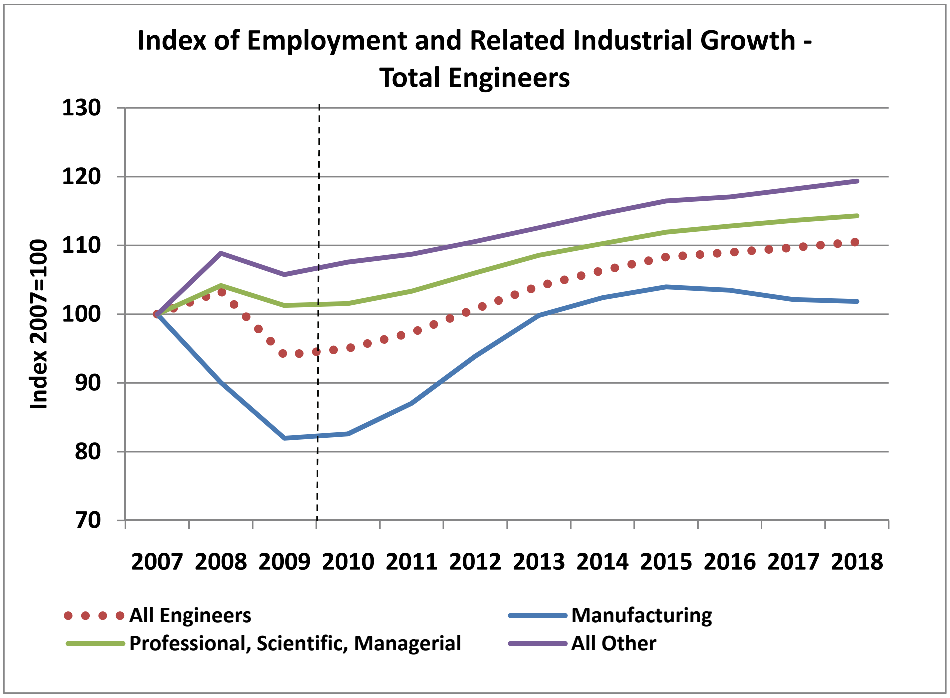
Source: Statistics Canada, Prism Economics and Analysis

Key Points:

- Wide annual variations in the Labour Force Survey estimates of engineering employment seem unreliable.
    - This is especially true of big losses in 2009.

Total Engineers- British Columbia

Exhibit B1.1 - Total Engineers, BC



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Average annual growth in engineering employment from 2010 to 2018 is 1.8%, well above the average for all employment in B.C.
- A large proportion of engineers work in the professional, scientific and management services (including engineering consulting services) sector. The moderate decline in this industry during 2009 may conceal larger losses in engineering consulting.
- Losses in manufacturing eliminated engineering jobs in 2008 and 2009.
    - These slowly return to pre recession levels after 2013.
- Key engineering intensive industries grow at slow rates late in the scenario. These include primary industries, utilities, construction and professional and scientific services (including consulting).

Exhibit B1.2- Total Engineers, BC

Demographic Supply Side Measures – Total Engineers	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	729	757	634	**726**
Immigrants**	726	647	643	**631**
Replacement Demand (#)***	385	330	371	**410**
Replacement (% of Trend Employment)***	2.4	1.9	1.9	**2.4**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70 % of graduates from CEAB programs

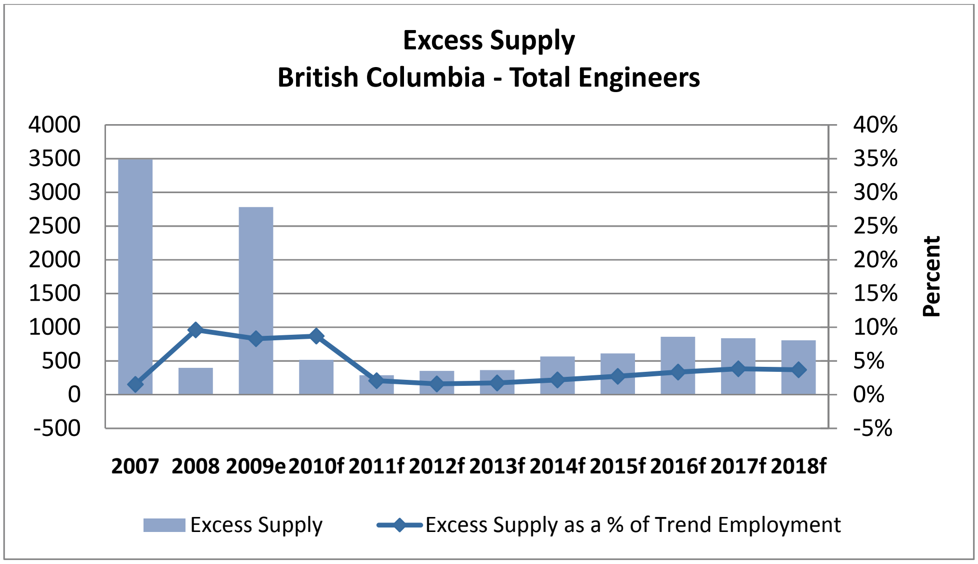
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Immigration, always prominent in BC, supplies the majority of new engineers:
    - Permanent immigration has dropped significantly from 2000 to 2008.
    - There have been modest gains in temporary foreign workers and these are too small to offset reductions in permanent immigration.
- Graduation from post secondary programs increased to new record levels by 2008 and there will be a modest downward adjustment from 2009 to 2011. Current enrolment trends add enough grads to compensate for lower immigration.
- The age profile of engineers in BC is older than in other provinces and replacement demands will be significant later in the scenario.

Exhibit B1.3 – Total Engineers, BC



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- Excess supply increased to very high levels between 2007 and 2009.
- The limited number of immigrants and graduates (from 2010 to 2013) will tighten labour markets during the recovery.
- Replacement demands related to retirements will dominate market conditions later in the scenario.
- Rankings may not adequately reflect challenges recruiting engineers with over five years of experience.
- Labour requirements are dominated by retirements while additions to the workforce come from new graduates and temporary foreign workers; creating a potential mismatch of skills and experience.

Exhibit B1.4 - Total Engineers, BC

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Engineers	2	3	3	3	3	3	4	4	4	4

C – Alberta

The Economy

A brief summary of expected conditions is presented here and a complete write-up of the Center for Spatial Economics January, 2010 Provincial forecast is attached in Appendix A.

Alberta, like British Columbia, experienced a deep recession in 2009 but rebounds to above average growth during the recovery. Recovery is led by government investment in infrastructure and improving residential activity. Long term growth is supported by resource development.

Alberta will require continuing immigration to fill jobs and fuel economic expansion. New immigrants, in turn, bring younger workforce entrants and help to fill vacancies due to the longer term impact of rising retirements.

Improvements to resource investment and output are slow as some oil and gas projects start-up in 2010 and 2011 but conventional resource production is declining. By 2012 oils sands development has reached new record high levels and sustains this activity until 2018. These gains in long term non-residential development help to balance declining government investment later in the scenario.

Key, engineering intensive, industries recover as the recession ends. Manufacturing growth exceeds all other sectors, but these gains are only sufficient to regain lost ground so that output and employment remain below past peaks until 2012. Primary industries including agriculture and oil and gas production, lead the recovery but only to regain lost ground until 2012. In the same fashion, the professional, scientific and management services (including engineering consulting services) sector, rebounds from a deep recession to only regain lost ground by 2012.

Statistics Canada data for engineering occupations in Alberta is reported in Exhibit C. The 2006 Census estimates totalled 34,360 with statistically reliable data available for three occupations. Engineers Canada's Labour Market system estimates that the market had grown to 35,273 by 2009 and this estimate is in line with analysis provided by the Alberta Occupational Demand System.

Exhibit C - Alberta

<table>
<tr><th>Labour Market</th><th colspan="2">2006c</th><th>2009e</th><th colspan="2">2009e</th></tr>
<tr><td></td><td colspan="2">(Census)</td><td>(AODS)</td><td colspan="2">(Estimated Trend)</td></tr>
<tr><td>Civil engineers</td><td>7210</td><td rowspan="2">20045</td><td rowspan="2">18100</td><td>6473</td><td rowspan="2">19679</td></tr>
<tr><td>Mechanical, Electrical, Chemical</td><td>12835</td><td>13206</td></tr>
<tr><td>Petroleum</td><td colspan="2">8170</td><td>8602</td><td colspan="2">9168</td></tr>
<tr><td>All Other</td><td colspan="2">6145</td><td>9568</td><td colspan="2">6426</td></tr>
<tr><td>Total, All Engineers</td><td colspan="2">34360</td><td>36300</td><td colspan="2">35273</td></tr>
</table>

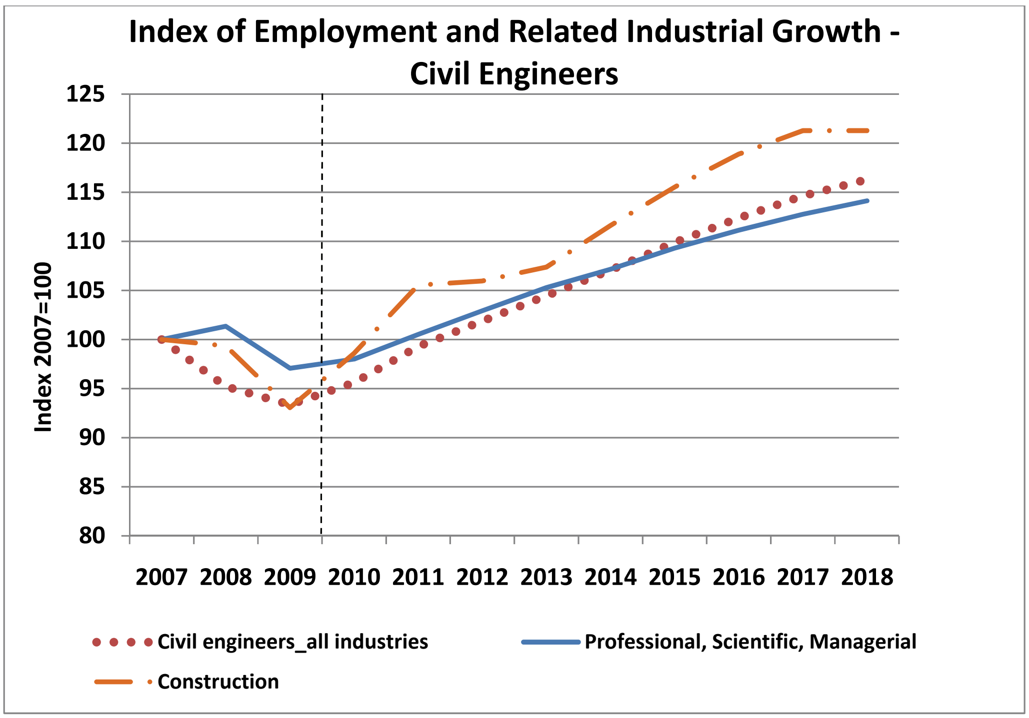
Source: Statistics Canada, Prism Economics and Analysis

Key Points:

- The Census identified 34,360 engineers in Alberta and employment has expanded in all occupations except civil.
- These estimates are drawn from small markets and are vulnerable to statistical error.

Civil Engineers - Alberta

Exhibit C1.1 - Civil Engineers Alberta



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment for civil engineers is primarily driven by output in professional, scientific and management services (including engineering consulting services), government investment and construction.
    - Construction, government and other sectors recover lost ground by 2011; adding employment.

  - Recovery in information, professional and scientific services is slower; delaying the employment recovery.

- Lower employment in 2009 and recovery in 2010 and 2011 is tied to construction.
- Employment growth across the scenario is slightly faster than for the general engineering workforce.

Exhibit C1.2- Civil Engineers, Alberta

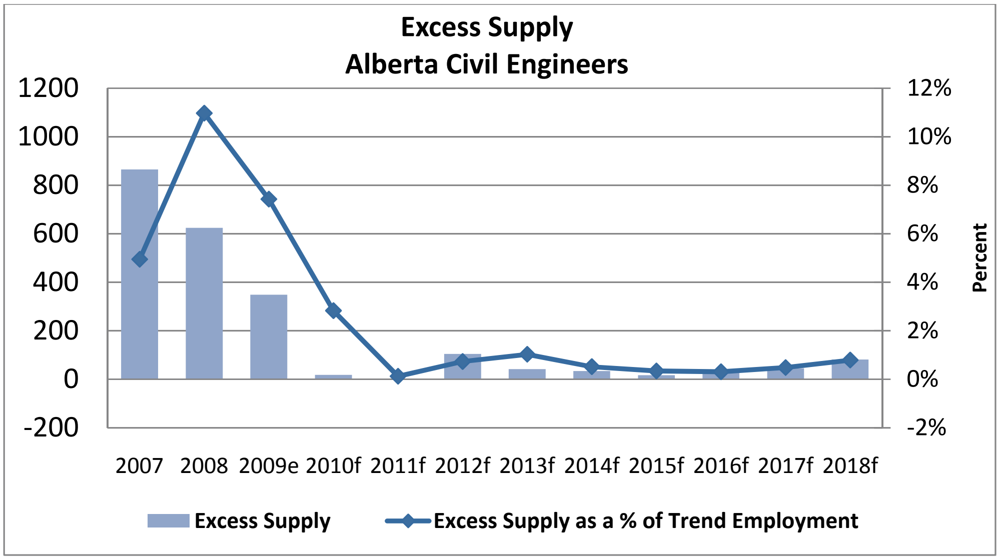
Demographic Supply Side Measures – Civil	2007	2008	2009	2010 - 2018
Graduates Entering the Labour Force*	129	153	124	**155**
Immigrants**	217	231	207	**190**
Replacement Demand (#)*	94	92	109	**127**
Replacement (% of Trend Employment)*	2.2	1.5	1.7	**2.2**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis
*Equals 70% of graduates from CEAB programs
**Includes temporary foreign workers and permanent immigrants
***Replacement demand = retirement and mortality

Key Points:

- Immigrants arriving in the Alberta workforce have been increasing slowly since 2000 and outnumber the incremental supply of new graduates from post secondary programs.
- Civil engineers have an older age profile than the average for all engineers.

Exhibit C1.3 - Civil Engineers, Alberta



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

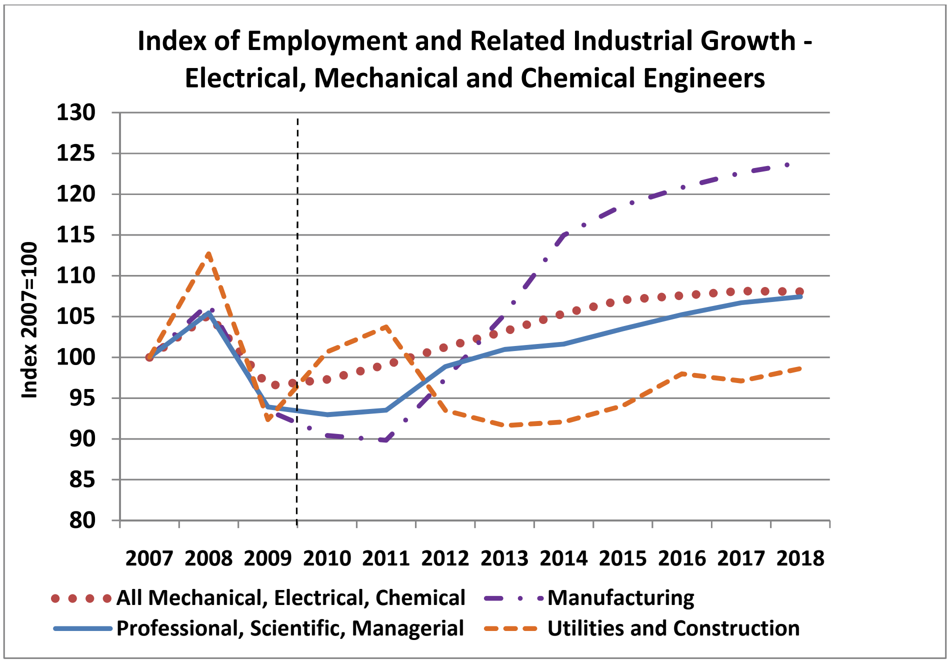
- Excess supply increased as enrolments and graduations slowly rose from 2004 to 2008 and,
  - Lower levels of permanent immigrants have been offset by rising numbers of temporary foreign workers.
- Sustaining these gains is not enough to meet growing labour requirements during the recovery and excess supply falls.
- Annual gains in employment exceeding 2% combine with high levels of retirement to reduce excess supply and tighten markets in most years.
- Rankings may not adequately reflect challenges recruiting engineers with over five years of experience in this and other occupations;
  - Labour requirements are dominated by retirements while additions to the workforce come from new graduates and temporary foreign workers; creating a potential mismatch of skills and experience.

Exhibit C1.4 - Civil Engineers, Alberta

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Civil engineers	2	3	3	3	4	4	4	4	4	4

Electrical, Mechanical and Chemical Engineers - Alberta

Exhibit C2.1 – Electrical, Mechanical and Chemical Engineers, Alberta



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment in these occupations is driven by output, investment and employment in professional, scientific and management services (including engineering consulting services), manufacturing, construction and utilities industries.
- Short term gains in utility projects and construction push a slow recovery.
- Declining levels of conventional oil investment and production offset gains in oil sands and synthetic crude; leaving only moderate gains in employment.

Exhibit C2.2 - Electrical, Mechanical and Chemical Engineers, Alberta

Demographic Supply Side Measures - Mechanical, Electrical, Chemical	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	431	476	462	**476**
Immigrants**	717	711	648	**619**
Replacement Demand(#)***	167	285	109	**127**
Replacement (% of Trend Employment)***	1.8	1.9	1.7	**2.2**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70 % of graduates from CEAB programs

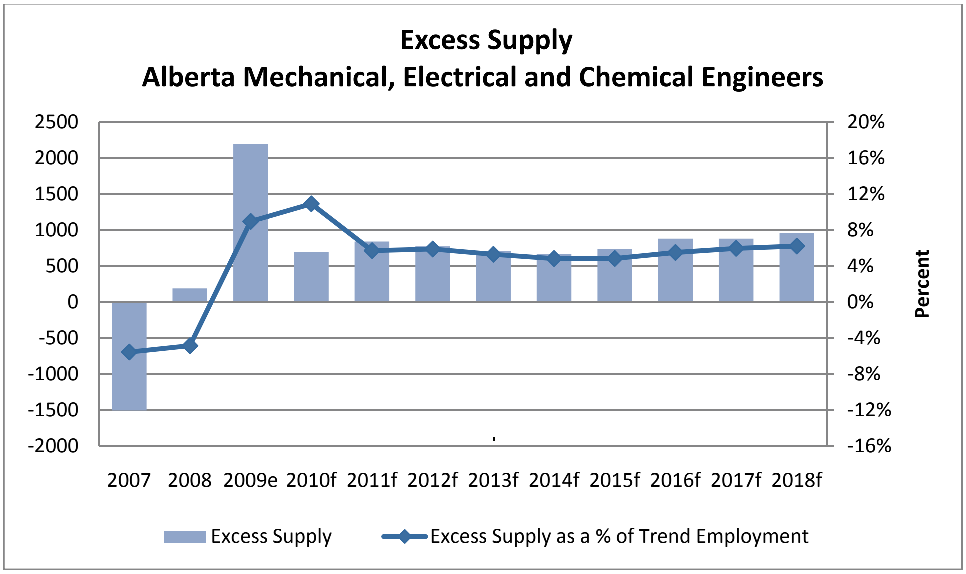
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Immigration and post secondary graduations have been slowly increasing across the decade.
- Immigration has usually provided twice as many engineers as local education.
- The workforce is older than the average for all engineers.

Exhibit C2.3 - Electrical, Mechanical and Chemical Engineers, Alberta



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

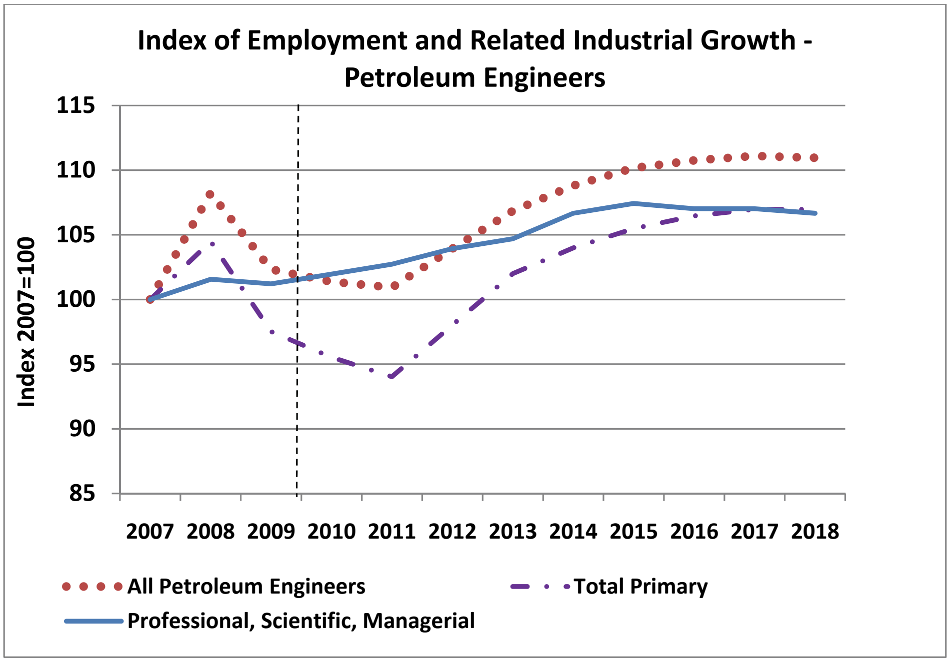
- Job losses during the recession drove excess supply to record levels, but
    - A steady recovery combines with stable additions to the workforce to balance markets.
- Rankings may not adequately reflect challenges recruiting engineers with over five years of experience in this and other occupations;
    - Labour requirements are dominated by retirements while additions to the workforce come from new graduates and temporary foreign workers; creating a potential mismatch of skills and experience.

Exhibit C2.4 - Electrical, Mechanical and Chemical Engineers, Alberta

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Mechanical, Electrical, Chemical	2	3	3	3	3	3	3	3	3	3

Petroleum Engineers - Alberta

Exhibit C3.1 - Petroleum Engineers Alberta



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Industry stakeholders note that many petroleum engineers are identified by their years of experience in the industry, not by their academic qualifications.
- Labour requirements are cyclical and can be met by engineers from other disciplines or consulting at peak conditions.
- Employment is driven by employment in professional, scientific and management services (including engineering consulting services) and primary industries.
- Large employment gains for petroleum engineers, reported in 2007 and 2008, seem to be out of line with related industry activity.
- Recovery is delayed by limits to conventional oil and gas production and the gradual resumption of oil sands work.

Exhibit C3.2 - Petroleum Engineers Alberta

Demographic Supply Side Measures - Petroleum	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	34	44	41	**51**
Immigrants**	63	104	142	**115**
Replacement Demand (#)***	104	152	169	**193**
Replacement (% of Trend Employment)***	1.7	1.9	1.4	**1.7**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

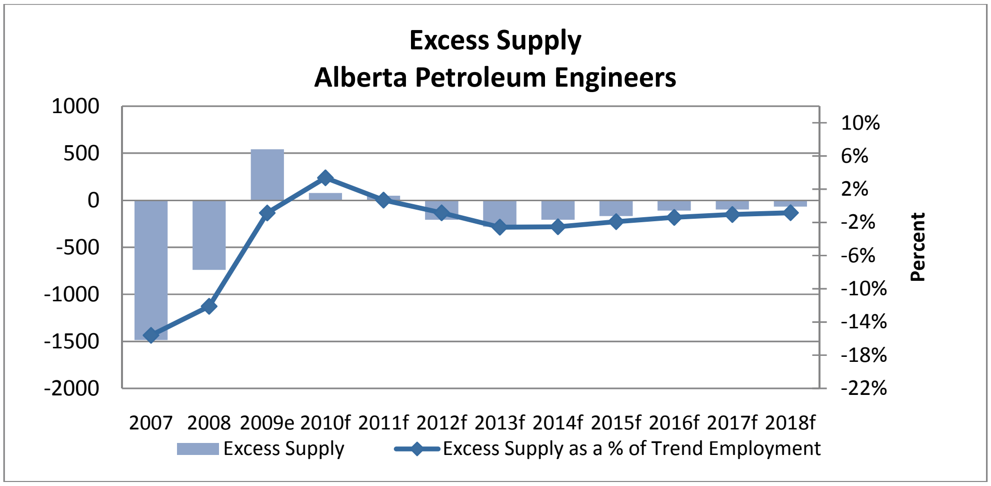
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Enrolments and graduations from Alberta post secondary programs have been rising, but,
    - Immigration of both permanent and temporary engineers has provided the majority of the new work force.
- One impact of the immigrant population is to reduce the age profile to levels below the provincial average for all engineers.

Exhibit C3.3 - Petroleum Engineers, Alberta



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

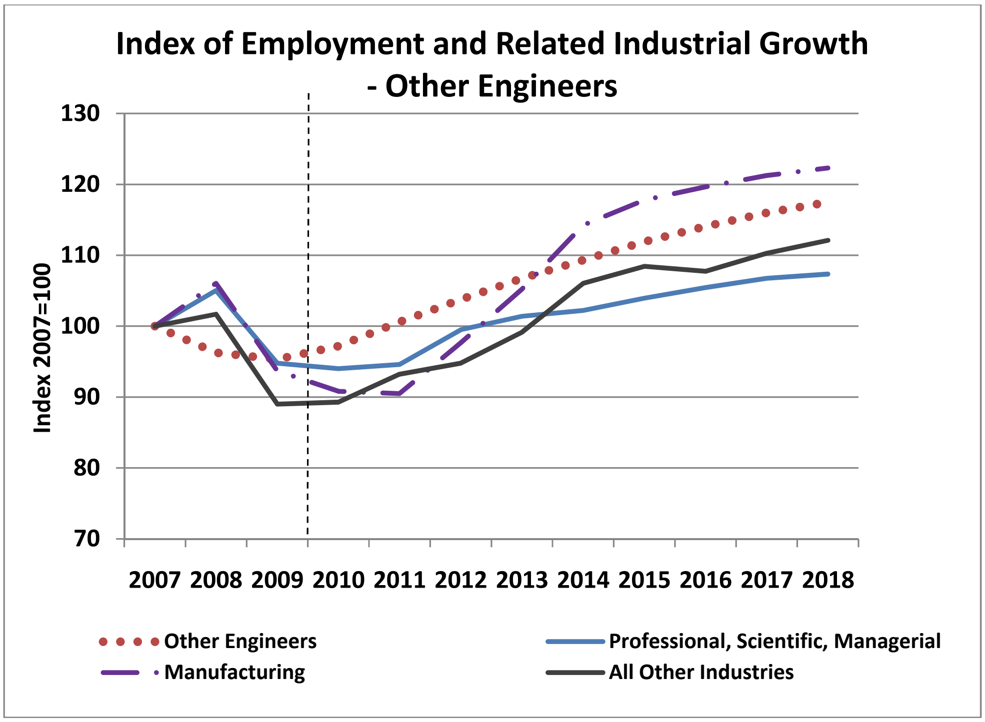
- Significant gains in employment from 2007 to 2008 reduced excess supply to low levels and
    - Expected additions to the work force will not restore balance.
- Slow recovery weakens markets from 2009 to 2013.
- The young age profile of this occupation limits replacement demands later in the scenario.
- Measured additions to the workforce are limited as few graduates complete academic programs in this field and few immigrants arrive in this occupation.
- Rankings do not reflect the supply of and demand for engineers with related training but experience that qualifies them in this occupation;
    - Recruiting will be a challenge for this group in most years

Exhibit C3.4- Petroleum Engineers, Alberta

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Petroleum	2	3	3	3	3	3	3	4	4	3

Other Engineers - Alberta

Exhibit C4.1 – Other Engineers, Alberta



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment is driven by investment and output in manufacturing and other industries.

Exhibit C4.2 – Other Engineers Alberta

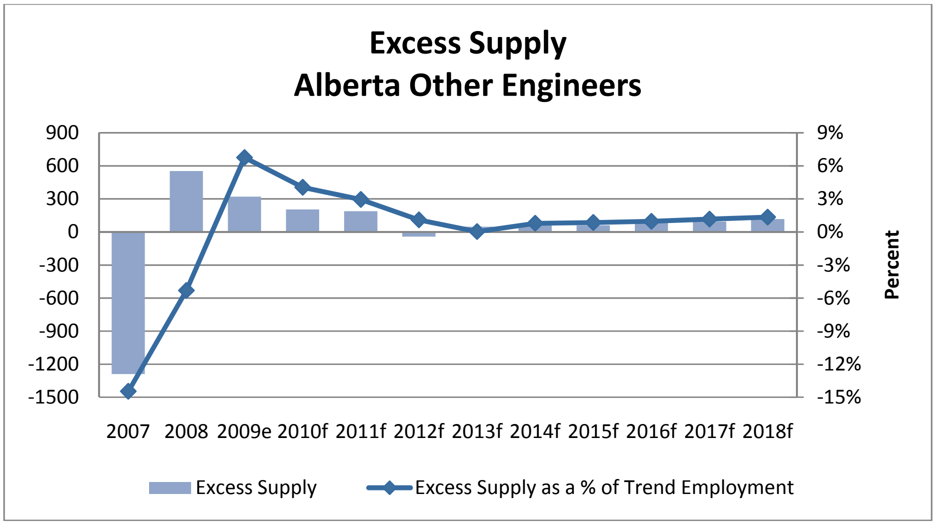
Demographic Supply Side Measures - All Other	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	156	166	164	**183**
Immigrants**	225	206	196	**179**
Replacement Demand (#)***	71	71	102	**105**
Replacement (% of Trend Employment)***	1.8	1.0	1.6	**1.8**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis
*Equals 70% of graduates from CEAB programs
**Includes temporary foreign workers and permanent immigrants
***Replacement demand = retirement and mortality

Key Points:

- Rising numbers of temporary foreign workers from 2000 to 2008 balance lower permanent immigration.
- Graduations from post secondary programs have slowly declined from 2003 to 2008.
- Immigrants out number local graduates and this keeps the age profile below average for all engineers.

Exhibit C4.3 – Other Engineers, Alberta



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

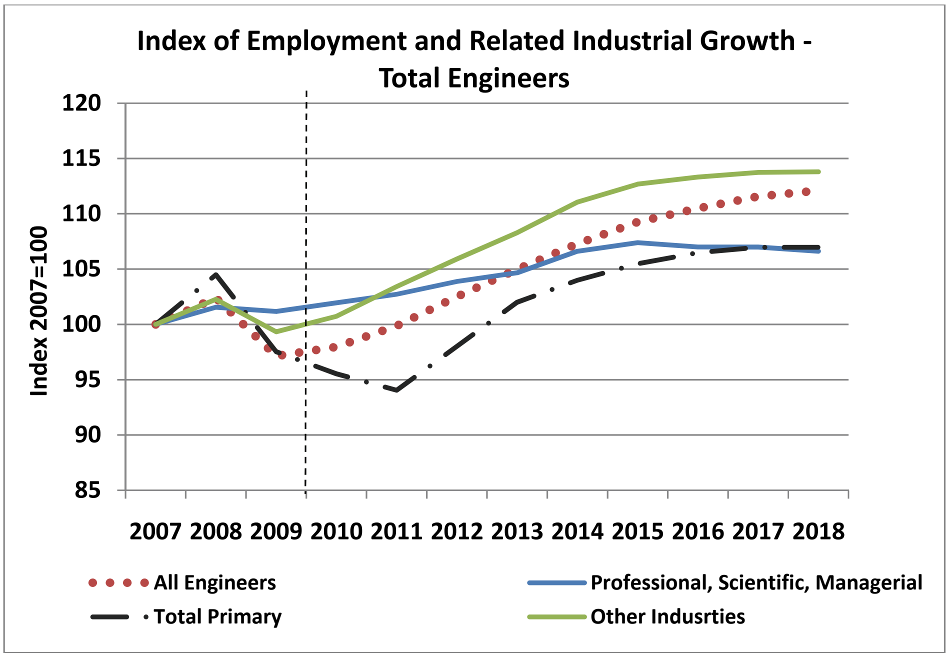
- Established and stable levels of permanent immigration and graduations are not sufficient to meet rising employment and replacement demands during the strongest years of growth.
- Temporary foreign workers are filling the needs in several occupations;
    - This process meets rising labour requirements but does not provide a long term domestic labour force.
- The young age profile helps to limit labour requirements later in the scenario and current levels of entry would balance the market at that time.

Exhibit C4.4 – Other Engineers, Alberta

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Other	2	3	3	3	3	3	3	3	3	3

Total Engineers - Alberta

Exhibit C5.1 – Total Engineers, Alberta



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Average annual growth in engineering employment from 2010 to 2018 is 1.6%, well above the average for all employment in Alberta.
- Overall total employment is tied to employment in professional, scientific and management services (including engineering consulting services) and primary industries.
- Employment growth across the scenario is lower than in other provinces because of declining conventional oil and gas production.

Exhibit C5.2 – Total Engineers, Alberta

Demographic Supply Side Measures – Total Engineers	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	750	839	790	**866**
Immigrants**	1221	1253	1194	**1103**
Replacement Demand (#)***	436	601	611	**663**
Replacement (% of Trend Employment)***	1.8	1.6	1.6	**1.9**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70 % of graduates from CEAB programs

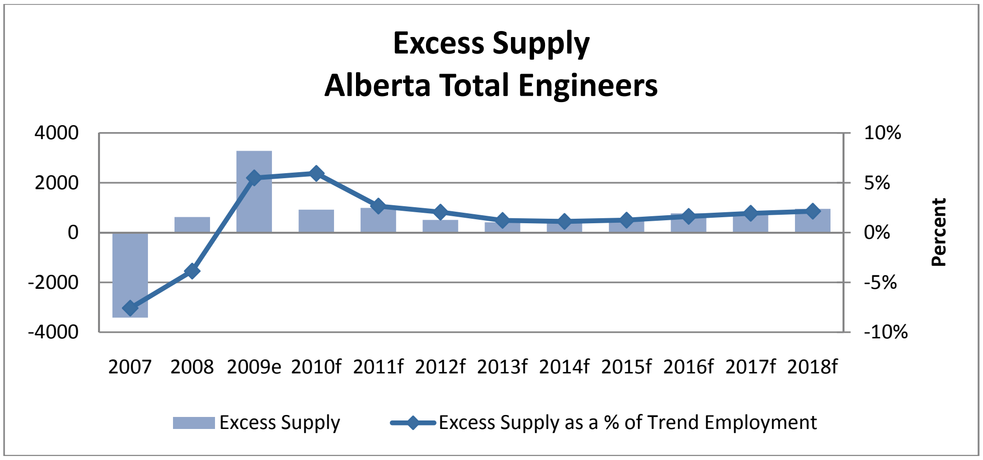
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Immigration dominates local graduates as a source of labour, and
    - Permanent immigration is being replaced by temporary foreign workers.

Exhibit C5.3 – All Engineers Alberta



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- Additions to the workforce largely balance labour requirements and excess supply moves within narrow bounds.
- Average results for all engineers conceal imbalances for some occupations.
- Balanced markets rely on high and continuing levels of immigration.
- Securing a steady supply of temporary foreign workers places a burden on local recruiters.

Exhibit C5.4– Total Engineers, Alberta

Labour Market Rankings - Summary	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total, All Engineers	2	3	3	3	3	3	3	3	3	3

Exhibit C6– Total Engineers, Alberta

Labour Market Rankings - Summary	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Civil engineers	2	3	3	3	4	4	4	4	4	4
Mechanical, Electrical, Chemical	2	3	3	3	3	3	3	3	3	3
Petroleum	2	3	3	3	3	3	3	4	4	3
All Other	2	3	3	3	3	3	3	3	3	3
Total, All Engineers	2	3	3	3	3	3	3	3	3	3

Key Points:

- Tight markets for civil engineers reflect the older age profile and replacement demand.
- Balanced markets with rankings of 3 are consistent with short term recruiting challenges for specialized skills and experience.
- In markets with older age profiles and significant expected retirements, rankings may not adequately reflect challenges recruiting engineers with over five years of experience;
    - Labour requirements are dominated by retirements while additions to the workforce come from new graduates and temporary foreign workers; creating a potential mismatch of skills and experience.

D – Saskatchewan

The Economy

This section introduces provincial results for the overall engineering labour market from 2009 to 2018. Labour market conditions for engineering occupations will depend on key economic background factors. A brief summary of expected conditions is presented here and a complete write-up of the Center for Spatial Economics January, 2010 Provincial forecast is attached in Appendix A.

Saskatchewan's GDP fell by less than 1% in 2009, the mildest downturn among Western provinces. Investments in potash and uranium mining were key drivers of Saskatchewan's recent economic boom prior to the recession and these opportunities are expected to recover with the rise in commodity prices over 2010 and 2011. As demand for exports recover, output is expected to grow by a modest 2.4% in 2010, and then settle at just below 2% percent for the remainder of the forecast period.

Growth in exports of resources, investment in the primary sector and a steady recovery in manufacturing contribute to a level of growth that will necessitate a rise in net immigration to meet employment demand over the forecast period. The ensuing rise in population growth will require increased expenditure in government service industries, especially in the health services sector.

Statistics Canada data for engineering employment is not reliable for individual occupations and the labour market assessment is limited to all engineers. The 2006 Census reports 3270 engineers in Saskatchewan and the Labour Force Survey indicates that employment has increased significantly to 3800 in 2009.

Exhibit D – Saskatchewan

Labour Market	2006c	2009e
	(Census)	(Estimated Trend)
Total Engineers	3270	3806

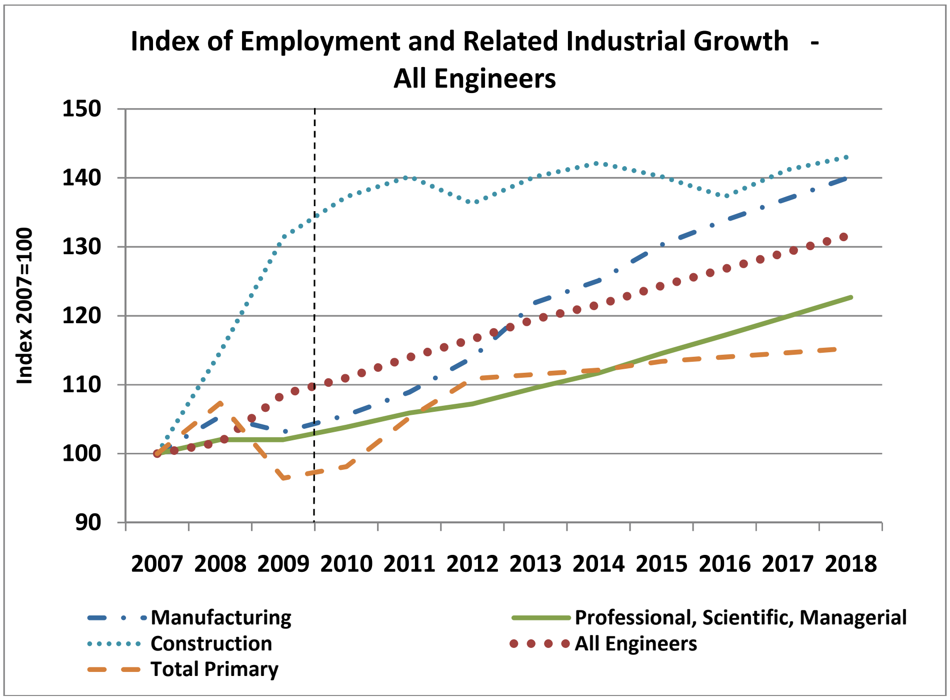
Source: Statistics Canada, Prism Economics and Analysis

Key Points:

- The Labour Force Survey estimates significant increases in engineering employment between 2006 and 2009. Estimates of 'trend employment' dampen the seemingly unrealistic gains.
    - LFS estimates a 20 % increase in 2009 employment

Total Engineers - Saskatchewan

Exhibit D1.1 – Total Engineers Saskatchewan



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Average annual growth in engineering employment from 2010 to 2018 is 0.8%, below the average for all employment in Saskatchewan
- Significant investments in construction related to growth in the resource sector in recent years have contributed to strong employment growth.
- A significant proportion of engineering employment is concentrated in the professional, scientific and management services (including engineering consulting services), along with the manufacturing sectors, which remain relatively flat over the forecast.
- Strong population growth in Saskatchewan supports engineering employment in government services sector over the other sectors, in the second half of the forecast period.

Exhibit D1.2- Total Engineers, Saskatchewan

Demographic Supply Side Measures – Total Engineers	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	226	258	284	**252**
Immigrants**	2	49	51	**29**
Replacement Demand (#)***	39	98	103	**66**
Replacement (% of Trend Employment)***	2.1	2.9	2.9	**2.1**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70 % of graduates from CEAB programs

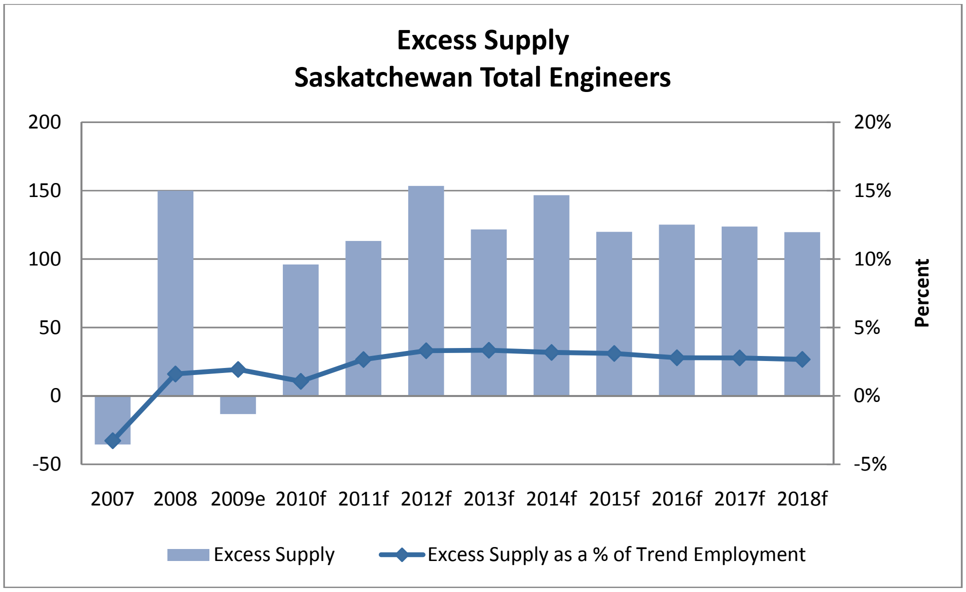
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Graduates from post-secondary programs are the primary source of new engineers in the province.
    - Permanent immigration is negligible; declining to zero in 2008.
- The age profile of engineers in Saskatchewan is average relative to other provinces.

Exhibit D1.3 - Total Engineers, Saskatchewan



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- Significant employment growth and low levels of immigration kept labour markets tight in 2009.
- Limited employment growth and a steady supply of new entrants maintain balanced markets over the forecast period.
- As the workforce age profile rises later in the decade, the pool of experienced engineers will be restricted and;
    - rankings may not adequately reflect challenges recruiting engineers with over five years of experience.
- Labour requirements are dominated by retirements while additions to the workforce come from new graduates and temporary foreign workers; creating a potential mismatch of skills and experience.

Exhibit D1.4 - Total Engineers, Saskatchewan

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Engineers	4	3	3	3	3	3	3	4	4	4

E – Manitoba

The Economy

This section introduces provincial results for the overall engineering labour market from 2009 to 2018. Labour market conditions for engineering occupations will depend on key economic background factors. A brief summary of expected conditions is presented here and a complete write-up of the Center for Spatial Economics January, 2010 Provincial forecast is attached in Appendix A.

Manitoba experienced a moderate decline in output of 0.9 % in 2009, due primarily to a decline in exports and manufacturing sector activity. In 2010, the manufacturing sector begins to recover and a strong rebound in construction investment spurs growth to 2.6%. In the long-term, growth falls to 2%.

Over the medium-term the utility sector is a key driver of growth with a large number of electric power projects planned by Manitoba Hydro. The manufacturing sector is expected to grow steadily as demand for exports recovers, but will take a few years to recoup the large losses suffered in 2009. Investment related to health and social services will rise with an aging population.

The aging of the population will also slow the growth of the labour force, requiring increased levels of net immigration to prevent serious labour shortages over the forecast period.

Statistics Canada data for engineering employment is not reliable for individual occupations and the labour market assessment is limited to all engineers. The 2006 Census reports 4080 engineers in Manitoba and the Labour Force Survey indicates that employment had fallen slightly by 2009.

Exhibit E – Manitoba

Labour Market	2006c	2009e
	(Census)	(Estimated Trend)
Total, All Engineers	4080	3998

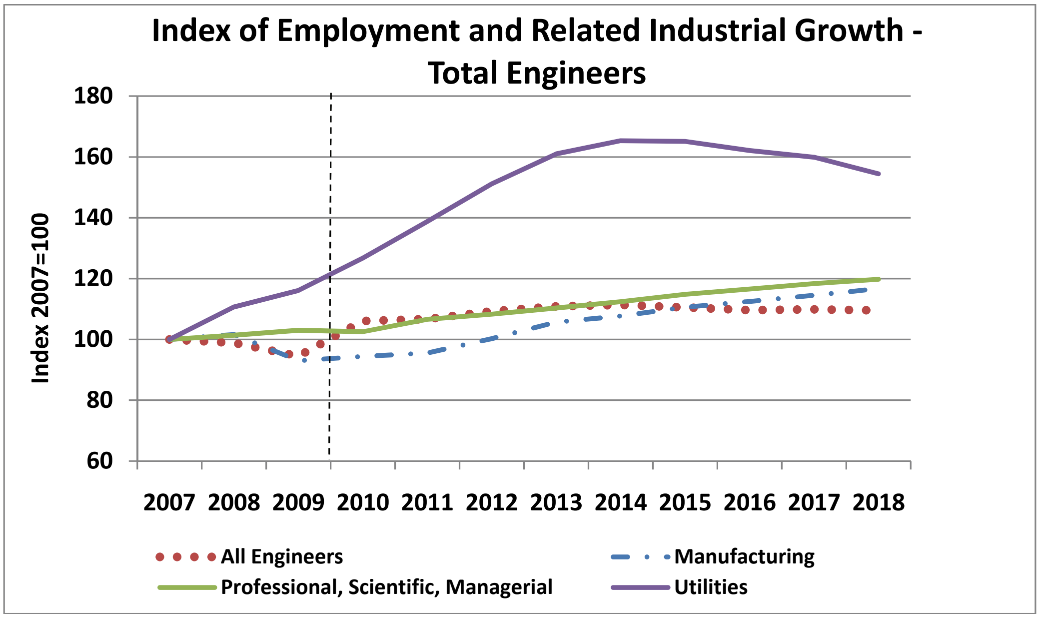
Source: Statistics Canada, Prism Economics and Analysis

Key Points:

- The Labour Force Survey estimates that engineering employment peaked in 2007 before falling sharply over 2008 and 2009. Estimates of 'trend employment' dampen the magnitude of the decline.
    - LFS estimates a 20% decline in employment between 2007 and 2009.

Total Engineers - Manitoba

Exhibit E1.1 – Total Engineers, Manitoba



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Average annual growth in engineering employment from 2010 to 2018 is 2.4%, well above the average for all employment in Manitoba.
- In 2009, the decline in employment related to the manufacturing sector is somewhat off-set by strong growth in professional, scientific, and management services (including engineering consulting services).
- Employment rebounds in 2010 propelled by a sharp increase in utilities sector employment.
- In the medium term, engineering employment grows moderately as employment in the manufacturing sector recovers.
- Total engineering employment peaks in 2014, then declines somewhat over the tail end of the forecast period, as employment in the utilities sector winds down.

Exhibit E1.2- Total Engineers, Manitoba

Demographic Supply Side Measures - Total, All Engineers	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	109	153	111	**152**
Immigrants**	85	79	79	**79**
Replacement Demand (#)***	63	63	72	**92**
Replacement (% of Trend Employment)***	2.2	1.6	1.6	**2.2**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

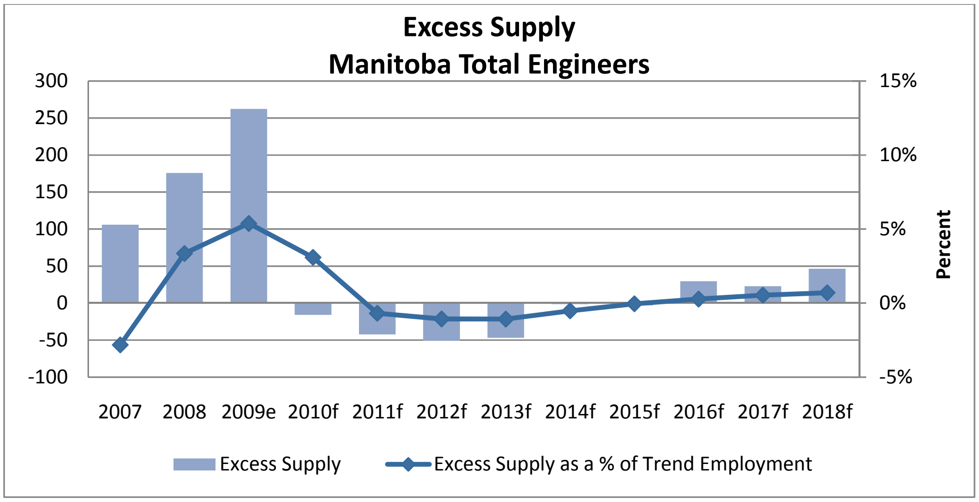
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Graduates from post-secondary programs make up the majority of new engineers in the province.
    - Although permanent immigration is negligible, temporary foreign workers are a small but constant presence in the labour supply.
    - The proportion of temporary foreign workers diminishes as the average annual number of new entrants increases over the forecast period.
- The age profile of engineers in Manitoba is near the average of other provinces, and increases over the forecast period.

Exhibit E1.3 - Total Engineers, Manitoba



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- The sharp decline in manufacturing employment in 2009 combined with the above average number of new entrants in 2008 results in an easing of market conditions in 2009.
- Large investments in the utilities sector stress the provincial labour supply, tightening markets in 2010, and over the medium term.
- As utility sector investments wind down in 2014, excess supply balances out for the remainder of the forecast period.
- As the workforce age profile rises later in the decade the pool of experienced engineers will be restricted and;
    - rankings may not adequately reflect challenges recruiting engineers with over five years of experience.
- Labour requirements are dominated by retirements, while additions to the workforce comes from new graduates and temporary foreign workers; creating a potential mismatch of skills and experience.

Exhibit E1.4 - Total Engineers, Manitoba

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Engineers	2	3	3	3	4	3	3	4	4	4

F – Ontario

The Economy

A brief summary of expected economic conditions is presented here and a complete write-up of the Center for Spatial Economics January, 2010 Provincial forecast is attached in Appendix A.

Ontario is the weakest link in Canada's recession chain, with a large drop of over 3.5% in overall output in 2009. Indeed GDP began to decline in 2008 and recovery is expected to begin in 2010. Weakness in the housing sector and declining exports led the downturn. The recovery path retraces these steps with both housing and exports rising ahead of the rest of the economy. But, in both sectors, the recovery is slow and 2007 peak levels are not regained until 2012.

Labour market impacts are severe with employment falling 2.5% in 2009. Unemployment rose from 6.5% in 2008 to 9% in 2009, the highest level since the last recession, and rises again in 2010. Employment in manufacturing has been falling since 2005 and while it recovers strongly from 2010 to 2012, it does not regain past peak levels during the scenario.

A modest expansion is anticipated from 2013 to 2018 as trend rates of growth hover around 2%. General economic growth is lower than in the past due to slower population growth and the related limits to the labour force. Labour markets will reflect these demographic trends through very low unemployment rates and ongoing recruiting challenges. Higher immigration is the key to economic growth and net immigration rises to record levels across the coming decade.

Manufacturing output and employment losses began in 2005. The 2009 recession marks the bottom of a long slump as shipments and employment begin to improve in 2010. Recovery is strong but the 2001 peak levels for output is not reached until 2015 and employment does not regain the 2005 peak during the scenario. This recovery for manufacturing is driven by new technologies and related investments in new processes early in the recovery. These improvements add big gains in productivity. The recovery in manufacturing from 2010 to 2018, while modest by historical standards, adds enough jobs and activity to raise employment and output growth in Ontario to among the strongest in Canada over this period.

The government sector and construction play an important counter cyclical role in the projection. Infrastructure projects and continuing government investment boost non-residential construction from 2009 to 2011 and this helps to limit the recession. Government deficits grow in 2009 and 2010 and the spending restraint required later to balance the budget slows down the overall economic expansion. Non-residential construction activity continues to be strong across most of the scenario.

The Statistics Canada Census counted 85,000 engineers working in Ontario in 2006 and current estimates for 2009 reach 87,000.

Exhibit F - Ontario

Labour Market	2006c	2009e
	(Census)	(Estimated Trend)
Civil engineers	16447	17620
Mechanical engineers	19145	21070
Electrical and electronics	15053	14830
Industrial and Manufacturing	10248	9899
All Other	24454	23839
Total, All Engineers	85347	87258

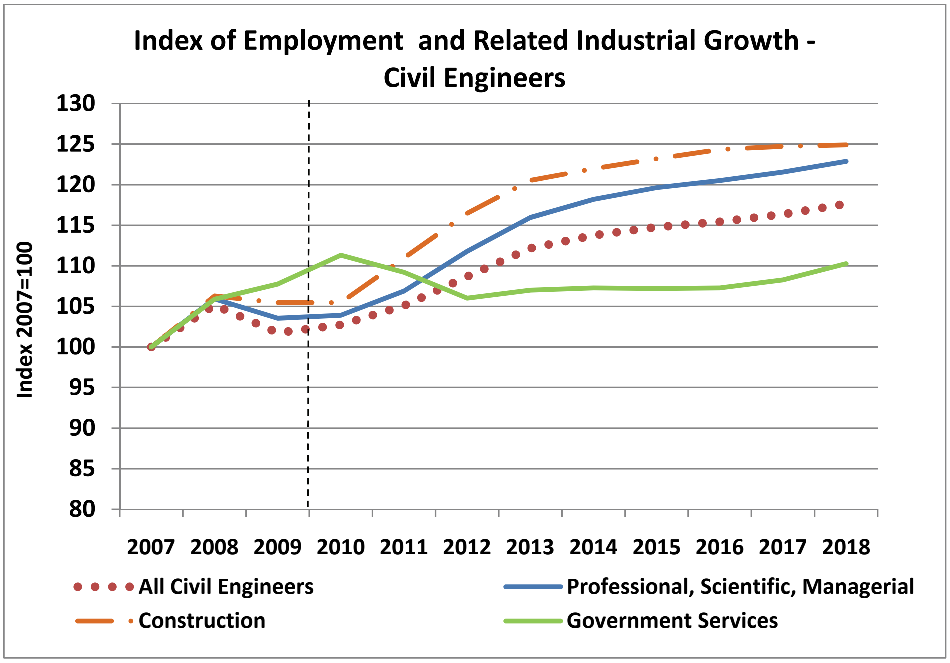
Source: Statistics Canada, Prism Economics and Analysis

Key Points:

- Weakness in manufacturing reduced employment in industrial and electrical engineering from 2006 to 2009.
- Strength in non-residential construction and utilities added to employment.

Civil Engineers- Ontario

Exhibit F1.1 - Civil Engineers, Ontario



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

Employment of civil engineers is driven by investment and employment in professional, scientific and management services (including engineering consulting services), government services and construction.

- Stimulus to infrastructure added work in 2009 and 2010.
- Government restraint will limit employment later in the scenario.
- Employment growth for civil engineers is below the overall average for all engineering occupations across the 2007 to 2018 period.
- Industry stakeholders noted that demand is strong for structural engineers and that this group is a component of and markets are related to civil work

Exhibit F1.2- Civil Engineers, Ontario

Demographic Supply Side Measures - Civil engineers	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	474	461	465	**483**
Immigrants**	447	399	399	**385**
Replacement Demand (#)***	279	457	426	**449**
Replacement (% of Trend Employment)***	2.6	2.2	2.2	**2.6**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

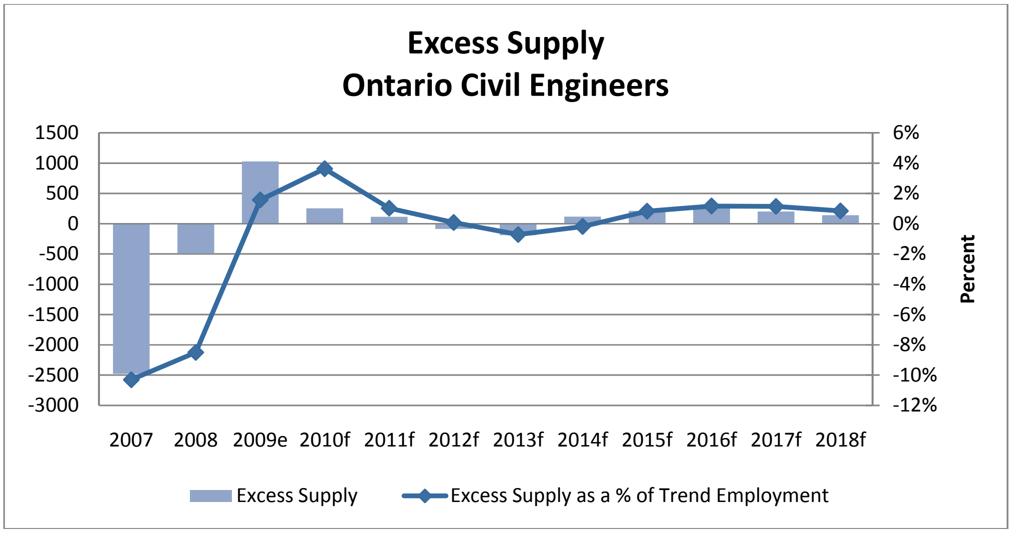
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Permanent immigration has fallen steadily from 2,000 in 2000 to over 350 in 2008 and the annual arrival of temporary foreign workers has remained at levels near 150.
- Enrolments and graduation from Ontario post secondary programs has risen steadily, and will continue to grow until 2012 at least,
- The age profile for civil engineers is older than the overall pattern for all engineers.

Exhibit F1.3 - Civil Engineers, Ontario



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

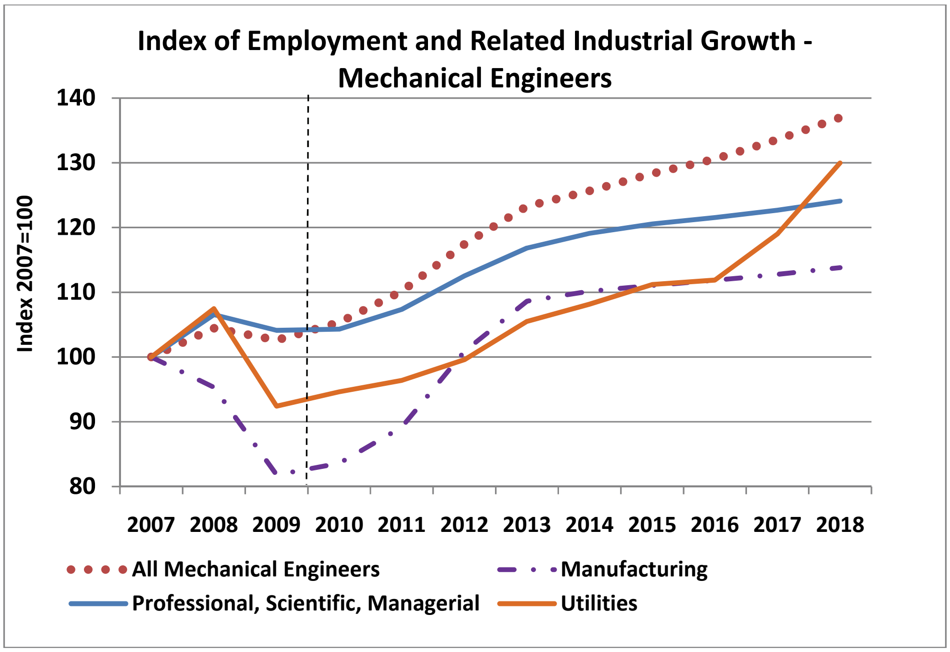
- Excess supply has been low as additions to the workforce have lagged while employment has trended up.
- Additions to the workforce fall below labour requirements at the strongest point of the recovery.
- Labour markets grow steadily tighter as the recovery ends and a modest expansion takes hold.
- Replacement demands combine with rising employment and run ahead of additions to the work force – especially later in the scenario.

Exhibit F1.4 - Civil Engineers, Ontario

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Civil engineers	3	3	4	4	4	4	4	4	4	4

Mechanical Engineers - Ontario

Exhibit F2.1 - Mechanical Engineers, Ontario



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment of mechanical engineers is driven by output and investment in professional, scientific and management services (including engineering consulting), along with the manufacturing and utilities industries.
- A relatively large proportion of mechanical engineers work in manufacturing and some job opportunities are tied to the cycle.
- Investment in new manufacturing processes drives employment up from 2011 to 2014.
- Increased demand is driven by the utilities sector towards the end of the scenario.
- Industry stakeholders note that graduates and immigrants entering the workforce as mechanical engineers may add training and gain industrial experience in areas like petroleum, environmental, and other areas.
- Portable skills and specialization may imply higher labour requirements and suggest higher rankings than measures shown here.

Exhibit F2.2 - Mechanical Engineers, Ontario

Demographic Supply Side Measures - Mechanical engineers	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	809	898	708	**884**
Immigrants**	942	709	702	**691**
Replacement Demand (#)***	316	466	442	**454**
Replacement (% of Trend Employment)***	2.3	2.0	2.0	**2.3**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

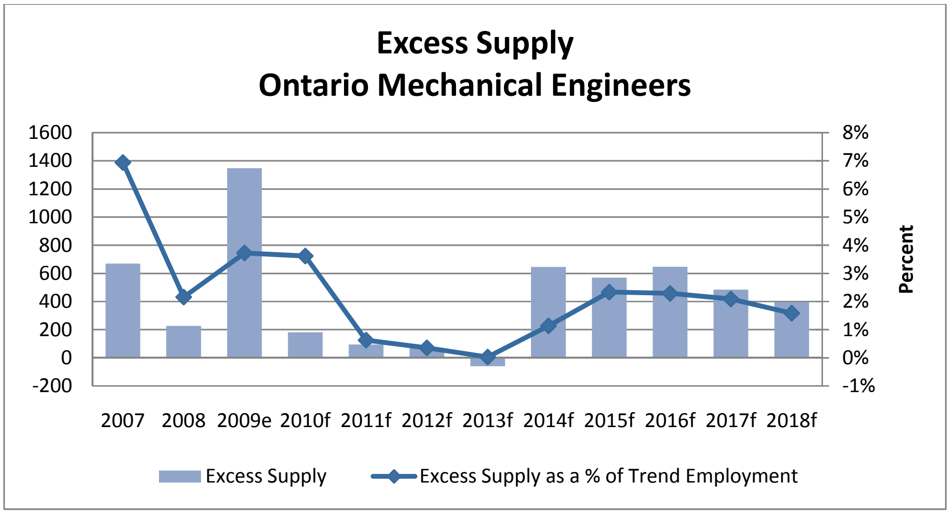
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- The number of new permanent immigrants has fallen from a peak of 2,900 in 2001 to 340 in 2008.
    - Modest increases in temporary foreign workers have partly offset the decline.
- Enrolments and graduates from post secondary programs have increased and trends will raise the number of grads to record levels in 2012.
- The age profile for mechanical engineers is slightly older than the average for all engineers.

Exhibit F2.3 - Mechanical Engineers, Ontario



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

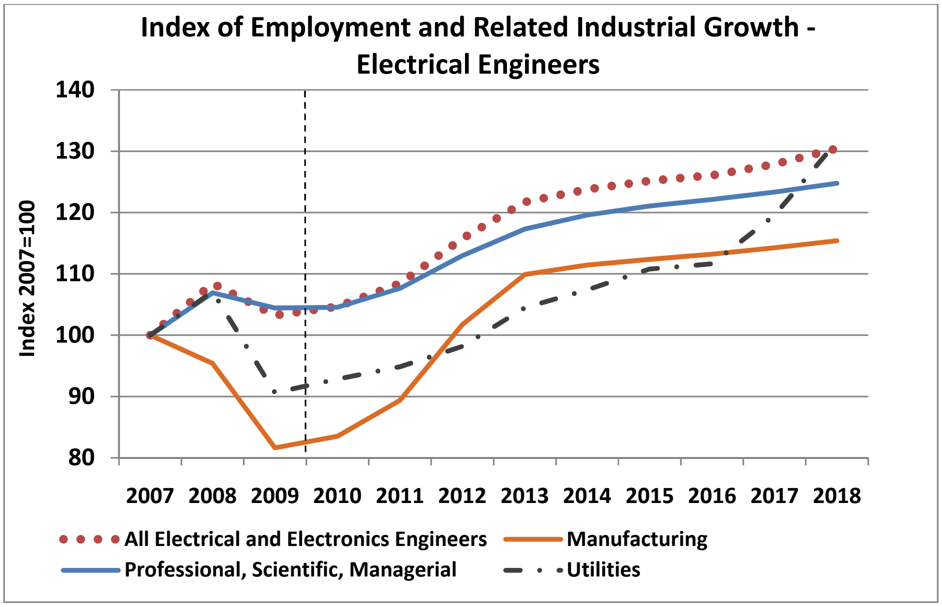
- Recession, especially in manufacturing, added to excess supply in 2009 but recovery quickly absorbs the available new workforce.
- Limited numbers of new entrants are not sufficient to meet labour requirements as markets improve from 2011 to 2013.
- If current levels of immigration and post secondary graduations are assumed, replacement demands will add to requirements and create tight markets later in the scenario.

Exhibit F2.4 - Mechanical Engineers, Ontario

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Mechanical engineers	3	3	4	4	4	3	4	4	4	4

Electrical and Electronics Engineers - Ontario

Exhibit F3.1 - Electrical and Electronics Engineers, Ontario



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment is driven by investment and employment in professional, scientific and management services (including engineering consulting services), along with manufacturing and utilities industries.

Exhibit F3.2 - Electrical and Electronics Engineers, Ontario

Demographic Supply Side Measures - Electrical and Electronics	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	781	811	652	**748**
Immigrants**	735	516	509	**540**
Replacement Demand(#)***	363	235	285	**311**
Replacement (% of Trend Employment)***	2.2	1.8	1.8	**2.2**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

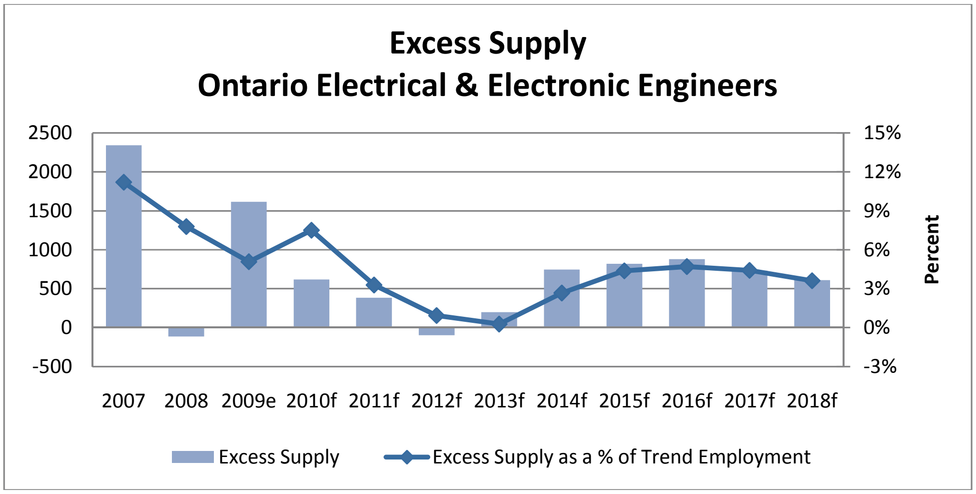
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Both permanent and temporary immigration have declined steadily since 2000:
    - Permanent immigration dropped from 3,000 to 420.
    - Annual arrivals of temporary foreign workers have averaged fewer than 400.
- Gradual increase in enrolments and graduations from post secondary programs gradually rise and compensate for lower immigration.
- The age profile for electrical engineers is close to the average for all engineers.

Exhibit F3.3 - Electrical and Electronics Engineers, Ontario



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

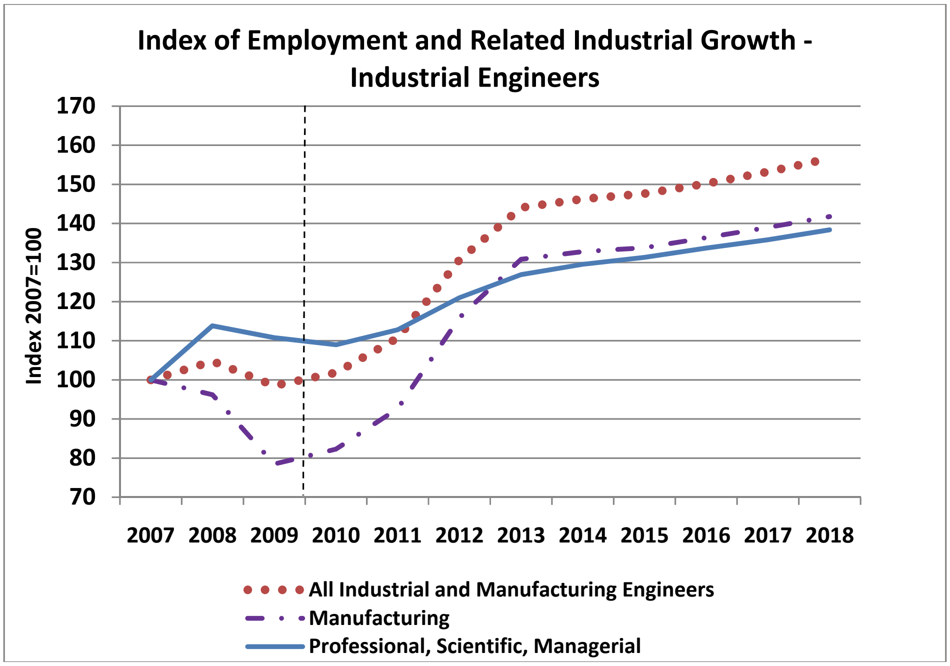
- The cyclical drop in employment in 2009 restores more normal levels of excess supply and the additions to the workforce keep pace with requirements from that point forward.
- There is a risk of tighter markets in 2012 and 2013 as the recovery reaches its strongest point.
- Replacement demands related to retirements will create tight market, especially for experienced engineers later in the scenario.

Exhibit F3.4- Electrical and Electronics Engineers, Ontario

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Electrical and Electronics	2	3	3	4	4	3	3	4	4	4

Industrial Engineers - Ontario

Exhibit F4.1 – Industrial Engineers, Ontario



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment is driven primarily by investment in manufacturing and professional, scientific and management services (including engineering consulting services) industries.
- A sharp decline in manufacturing jobs in 2009 was cushioned somewhat by the professional, scientific and management services (including engineering consulting services) sector.
- Big gains in employment from 2011 to 2015 are linked to the recovery in manufacturing investment.
- Employment gains across the scenario rebuild jobs for this occupation and reach the past peak employment level from 2005, by 2011.

Exhibit F4.2 – Industrial Engineers, Ontario

Demographic Supply Side Measures - Industrial and Manufacturing	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	129	67	79	**71**
Immigrants**	298	163	176	**220**
Replacement Demand (#)***	177	166	195	**199**
Replacement (% of Trend Employment)***	2.0	1.8	1.8	**2.0**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

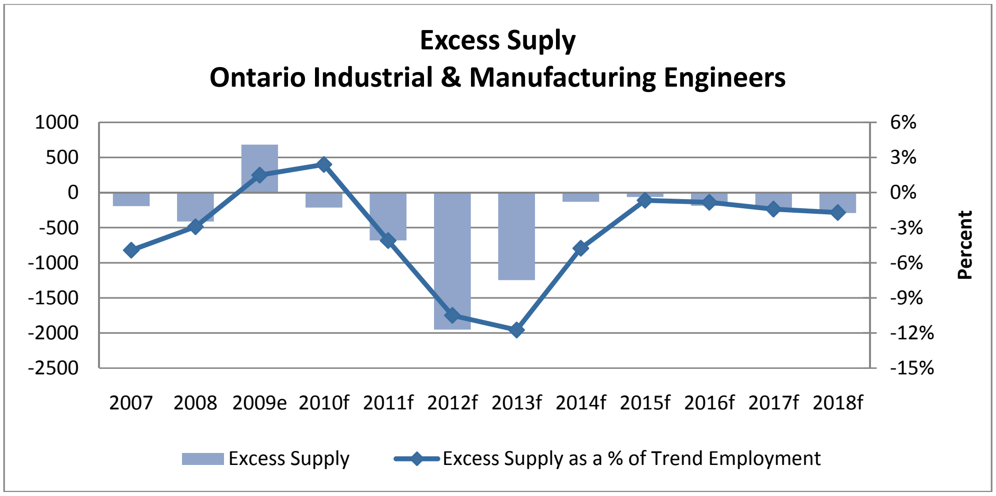
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Permanent immigration has declined since 2000 and annual arrivals of temporary foreign workers have been largely unchanged.
- There are few post secondary programs training this workforce.
- Industry stakeholders comment that engineers trained in other specializations gain industrial / manufacturing experience and fill jobs in these markets.
- The age profile for industrial engineers is close to the average for all engineers.

Exhibit F4.3 – Industrial Engineers, Ontario



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

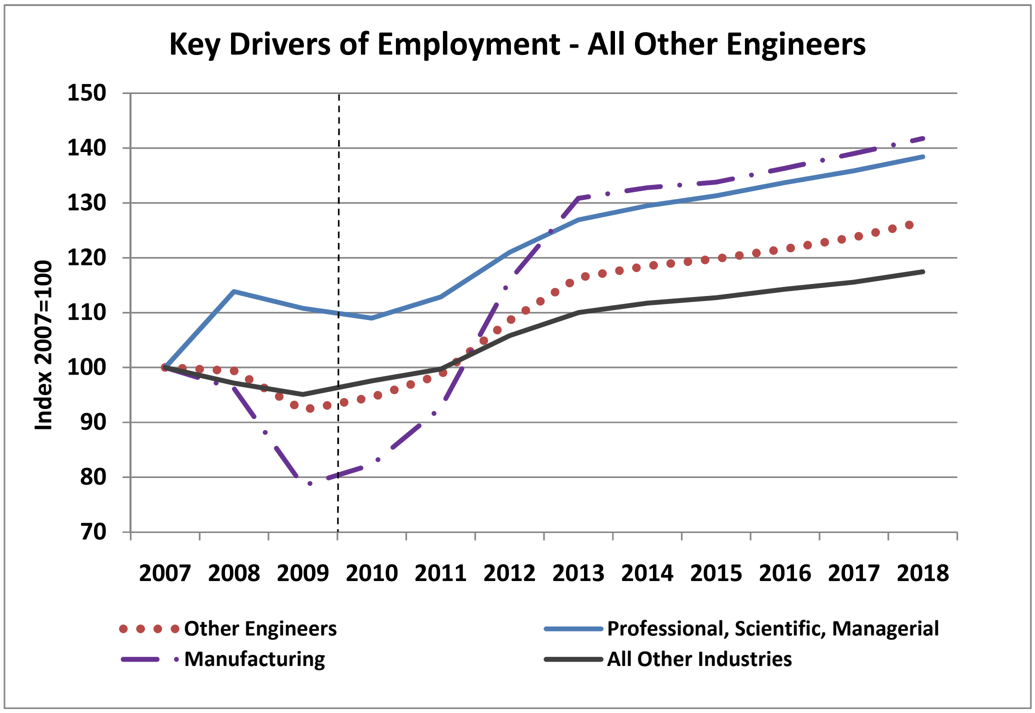
- Excess supply has always been limited for this occupation.
- Recession contributed to an increase in unemployment in 2009.
- The strong recovery in manufacturing and the shift to investment and new technologies will require more industrial engineers than are likely to be available.
- Projected labour shortages are driven by the expected recovery in manufacturing investments in new processes and technologies.
- Industry stakeholders note that tight markets in these specializations are focused among experienced engineers.
- Recruiting patterns that focus on temporary foreign workers that qualify later for permanent status may fit this occupation.

Exhibit F4.4 – Industrial Engineers, Ontario

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Industrial and Manufacturing	2	3	4	4	4	4	4	4	4	4

All Other Engineers - Ontario

Exhibit F5.1 – All Other Engineers, Ontario



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment is driven primarily by investment in manufacturing and professional, scientific and management services (including engineering consulting services) industries.
- This group includes a wide range of engineering specialties including; mining, geological, petroleum, aerospace, computer and others.

Exhibit F5.2 – All Other Engineers, Ontario

Demographic Supply Side Measures - All Other	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	1207	1075	804	**1099**
Immigrants**	614	527	584	**561**
Replacement Demand(#)***	227	353	416	**380**
Replacement (% of Trend Employment)***	1.5	1.6	1.6	**1.6**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

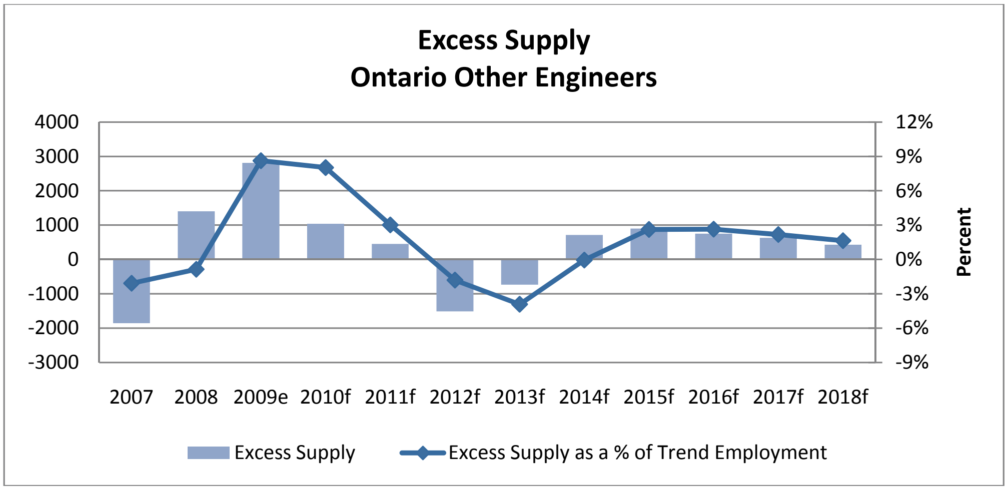
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Both permanent and temporary immigration have been declining since 2000:
    - Permanent immigration fell from over 2,200 in 2001 to over 360 in 2008.
    - Annual arrivals of temporary foreign workers fell from 800 to 470.
- Post secondary programs in Ontario have increased enrolments and graduations but these gains have not balanced lower levels of immigration.
- The age profile for this occupation is younger than average.

Exhibit F5.3 – All Other Engineers, Ontario



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

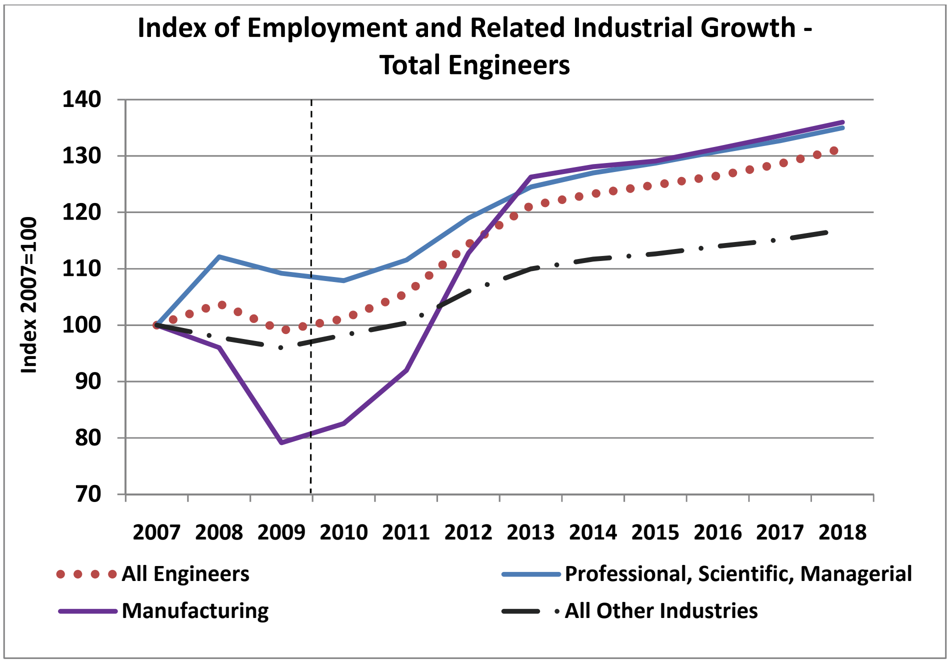
- As the economic recovery reaches its strongest point in 2012, labour requirements exhaust the current pattern of workforce additions.
- Labour requirements are limited by relatively low levels of retirements and projected levels of graduates from Ontario programs should meet overall demands.
- This category averages together several smaller occupations, and overall measures may conceal specific market conditions.

Exhibit F5.4– All Other Engineers, Ontario

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Other	2	3	3	4	3	3	3	3	3	3

Engineers Total - Ontario

Exhibit F6.1 – Total Engineers, Ontario



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Average annual growth in engineering employment from 2010 to 2018 is 3.2%, well above the average for all employment in Ontario and higher than in most other provinces.
- Engineering employment is tied to investment and output in professional, scientific and management services (including engineering consulting services) and manufacturing industries.
- Following the sharp decline in 2009, growth resumes in line with investment in the professional, scientific and management services (including engineering consulting services) industry.
- Employment growth for engineers in Ontario from 2009 to 2018 is among the highest in Canada.
- For many occupations a portion of these gains are needed to rebuild employment to earlier peak levels.

Exhibit F6.2 – Total Engineers, Ontario

Demographic Supply Side Measures – Total Engineers	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	3747	3702	3163	**3664**
Immigrants**	3208	2459	2517	**2541**
Replacement Demand(#)***	1434	1541	1533	**1785**
Replacement (% of Trend Employment)***	2.1	1.6	1.6	**2.1**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

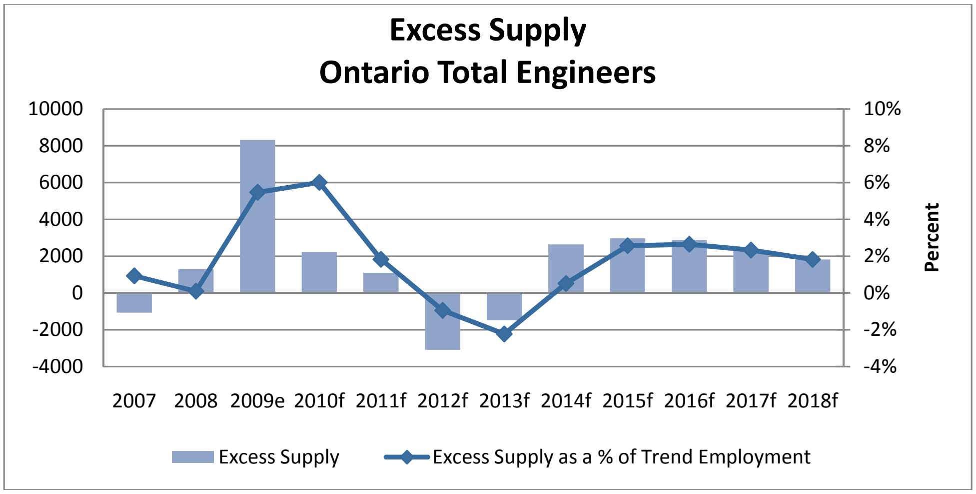
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Immigration has declined dramatically for most Ontario occupations since 2000.
- High levels at the start of the decade exceeded requirements.
- Temporary foreign workers have partly replaced the decline in permanent immigration for some occupations.
- In some cases the correction, and lower levels of immigration, may contribute to shortages during the recovery.
- Post secondary programs in Ontario have steadily expanded and slowly replace immigration as the most important source of supply.

Exhibit F6.3 – Total Engineers, Ontario



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- At the peak of the recovery in 2012 and 2013 there is a risk that labour requirements will exceed the number of added engineers.
- While manufacturing activity leads the recovery process, the entire Ontario economy is projected to steadily gain momentum as employment growth accelerates from 2010 to 2012.
- These employment gains might exceed the current trends in immigration and graduations.
- Industry stakeholders confirm concerns that labour markets will be tight; especially for experienced engineers
- In some markets engineers who originally graduated in one specialty move to other areas; acquiring skills and experience in specific industries.
- This process will help to balance some markets but may also be associated with shortages and recruiting problems in others.

Exhibit F6.4– Total Engineers, Ontario

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total, All Engineers	2	3	3	4	4	3	3	3	4	4

Engineers – Ontario Summary

Exhibit F7– Total Engineers, Ontario

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Civil engineers	3	3	4	4	4	4	4	4	4	4
Mechanical engineers	3	3	4	4	4	3	4	4	4	4
Electrical and Electronics	2	3	3	4	4	3	3	4	4	4
Industrial and Manufacturing	2	3	4	4	4	4	4	4	4	4
All Other	2	3	3	4	3	3	3	3	3	3
Total, All Engineers	2	3	3	4	4	3	3	3	4	4

Key Points:

- Engineering labour markets were returning to more balanced conditions from 2006 to 2008, recovering from an influx of immigrants that peaked in 2001.
- Recession in 2008 and 2009 weakened most markets.
- The recovery is generally modest and labour requirements are not growing rapidly by historical standards but:
  - Manufacturing grows out of a deep slump with a period of strong investment.
  - This change will require engineers in related fields.
- At the end of the scenario, from 2014 to 2018, growth is limited. However, at current levels of immigration and graduations, markets remain tight because of replacement demands related to increasing rates of retirements. Recruiting will be especially difficult for experienced engineers.

G – Quebec

The Economy

A brief summary of expected economic conditions is presented here and a complete write-up of the Center for Spatial Economics January, 2010 Provincial forecast is attached in Appendix A.

The Quebec economy has avoided the worst impacts of the recession with GDP declining just 1.5%, less than for Canada as a whole, in 2009. Recovery will also be moderate, with gains of 2.7% in 2010. Declining exports and weak housing led the decline and improvements in export will lead the recovery. Medium and long term prospects for growth in Quebec are modest, largely due to limited population growth.

Cyclical changes in employment have been limited and unemployment remains well below historical peaks across the recession. This is partly related to economic strength but also reflects the slowing growth in the labour force. Unemployment will remain far below past levels due to demographics and this implies long term recruiting challenges. Increasing immigration will be an important response to labour requirements.

Manufacturing and primary industries, like mining, stand out as leaders in both the recovery to 2013 and the later trend growth in the economy. Improvements are partly due to projected strong investment in new technologies and processes. These gains are also related to major utility projects that expand electrical generation and distribution capacity. In primary industries and manufacturing these gains are making up lost ground as these industries declined over the past decade. Relatively strong output and employment growth bring these sectors back to previous peaks between 2013 and 2015.

The government and non-residential construction sectors follow a counter cyclical path. Infrastructure projects, financed by government, help to limit the impact of recession and non-residential construction projects (including some industrial and utility expansion) provide jobs in 2009 and 2010. As the recovery gains momentum after 2011, government spending is cut back to reduce the accumulated deficits. This post-recession slowdown holds back construction from 2011 to 2013, but non-residential projects – especially in utilities – provide work late in the scenario.

The Statistics Canada Census counted 40,600 engineers working in Quebec in 2006 and current estimates for 2009 reach near 44,000.

Exhibit G – Quebec

Labour Market	2006c	2009e
	(Census)	(Estimated Trend)
Civil	9210	12010
Mechanical	6320	5990
Electrical	8160	9475
All Other	16775	16457
Total, All Engineers	40465	43932

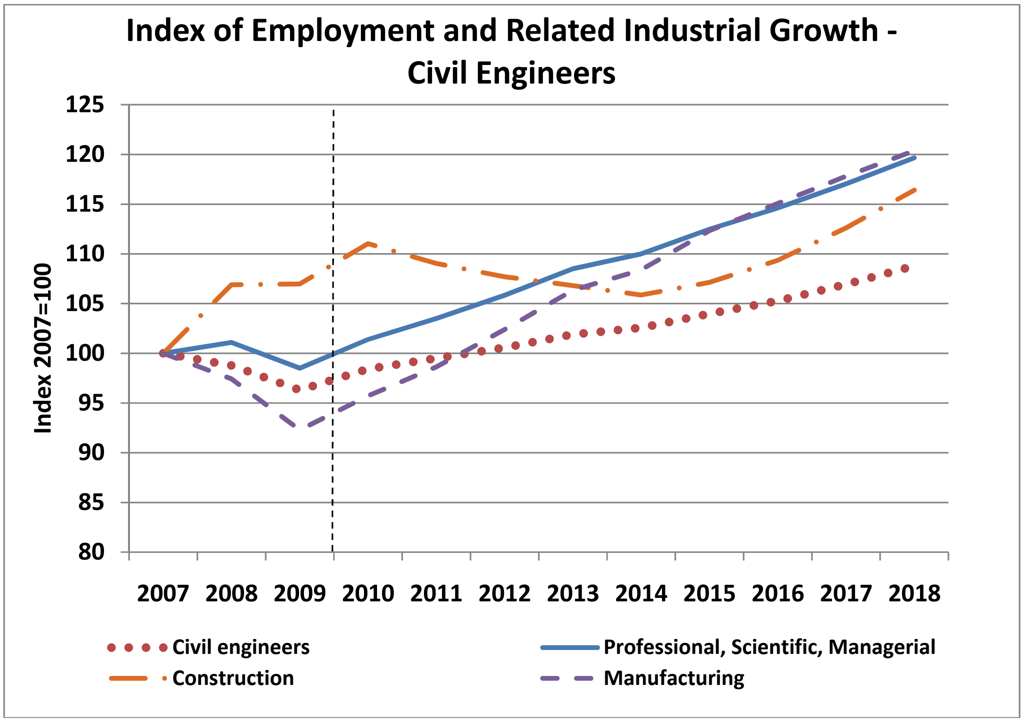
Source: Statistics Canada, Prism Economics and Analysis

Key Points:

- Labour Force survey estimates for these occupations are variable from year to year and may contain measurement errors.

Civil Engineers – Quebec

Exhibit G1.1 – Civil Engineers, Quebec



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Infrastructure spending on roads, bridges and other construction projects has added to employment demands.
- Large government projects and other infrastructure initiatives may raise demands for civil engineers by more than measures included in the scenario.
- Later in the scenario overall growth for civil engineers is projected to be lower than for other engineering occupations, mostly due to restraint in government budgets after the recovery.

Exhibit G1.2- Civil Engineers, Quebec

Demographic Supply Side Measures – Civil	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	293	319	418	**389**
Immigrants**	170	218	249	**236**
Replacement Demand (#)***	151	151	353	**345**
Replacement (% of Trend Employment)***	2.4	2.4	2.2	**2.4**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

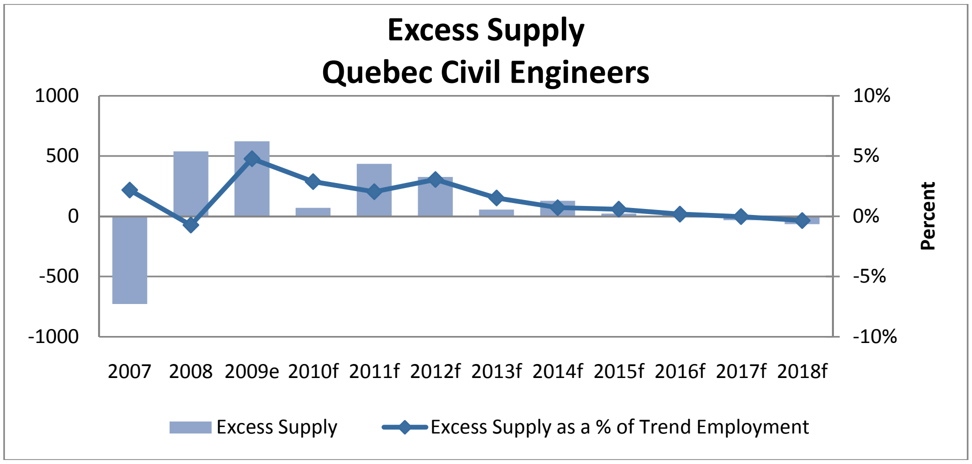
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Both permanent and temporary immigration have been limited, but stable sources of new civil engineers since 2000.
- Enrolments and graduations from post secondary programs have been growing steadily since 2000 and will reach a peak in 2011.
- Trends in enrolments will cause a significant decline in graduates later in the scenario.
- The age profile for civil engineers is older than for other engineering occupations.

Exhibit G1.3 – Civil Engineers, Quebec



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- The recession and limited recovery has added to excess supply in 2009 and 2010.
- The expected jump in graduations in 2010 and 2011 will help to ease current shortages but immigration and enrolments levels later in the scenario are not sufficient to match labour requirements across the longer term:
    - The major long term source of requirements is replacing retiring civil engineers.

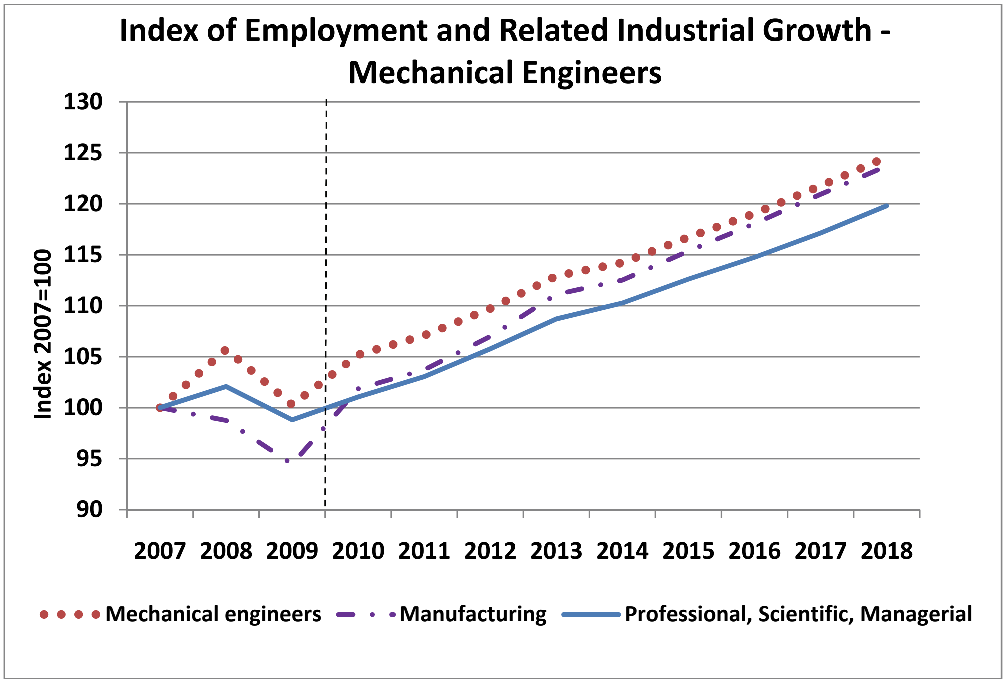
Exhibit G1.4 - Civil Engineers, Quebec

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Civil engineers	3	3	3	3	4	3	4	4	4	4

- Tight markets late in the scenario are related to retirements.
- Recruiting challenges will be most severe for experienced civil engineers.

Mechanical Engineers - Quebec

Exhibit G2.1 – Mechanical Engineers, Quebec



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Recession in manufacturing and primary industries prompted a big drop in employment in 2009.
- Relatively strong growth in employment for mechanical engineers is related to the recovery in manufacturing and steady gains in the professional, scientific and management services (including engineering consulting services) sector.
- Industry stakeholders note that mechanical engineers often move into industrial and other specialities (e.g. environmental engineering) in the years following graduation. Labour requirements related to these changes are not counted in the measures used here and demand may be understated.

Exhibit G2.2 - Mechanical Engineers, Quebec

Demographic Supply Side Measures - Mechanical	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	544	449	561	**477**
Immigrants**	257	254	266	**245**
Replacement Demand (#)***	46	46	97	**106**
Replacement (% of Trend Employment)***	1.5	1.5	1.3	**1.5**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

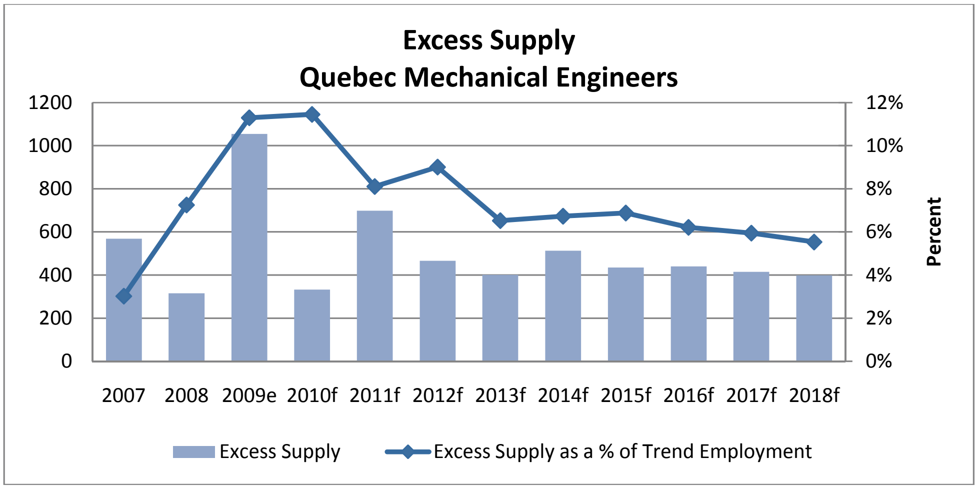
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Permanent immigration peaked in 2003 and has fallen by 50% since then:
    - Temporary immigration is not a factor.
- Post secondary graduations rose steadily to a peak in 2006 and enrolment changes will drive graduations back up to record levels in 2011.
- The age profile for mechanical engineers is younger than for other engineers.

Exhibit G2.3 - Mechanical Engineers, Quebec



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- Employment gains are stronger than average but retirements are limited.
- Current high and rising post secondary graduations will meet requirements and sustain normal levels of excess supply across the scenario.

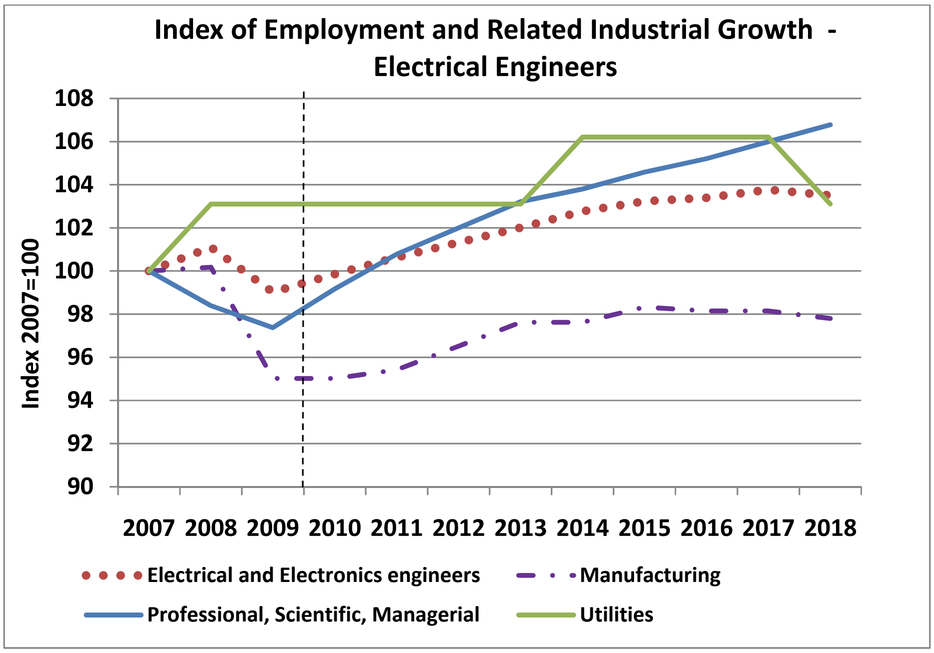
Exhibit G2.4 - Mechanical Engineers, Quebec

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Mechanical	1	3	2	2	2	3	3	3	3	3

- Enrolment patterns will boost graduations in 2011 and new entrants may exceed labour requirements at that time.
- As graduations trend back to stable levels later in the scenario, markets balance.

Electrical Engineers - Quebec

Exhibit G3.1 – Electrical and Electronics Engineers, Quebec



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Recession in manufacturing and primary industries reduced employment significantly in 2009.
- Employment for electrical engineers is driven by employment in professional, scientific and management services (including engineering consulting services), along with utilities and primary industries.
- Employment growth across the scenario is less than for other engineering occupations.

Exhibit G3.2 – Electrical and Electronics Engineers, Quebec

Demographic Supply Side Measures - Electrical	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	513	449	429	**449**
Immigrants**	386	378	401	**380**
Replacement Demand (#)***	152	152	133	**182**
Replacement (% of Trend Employment)***	1.8	1.8	1.2	**1.8**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

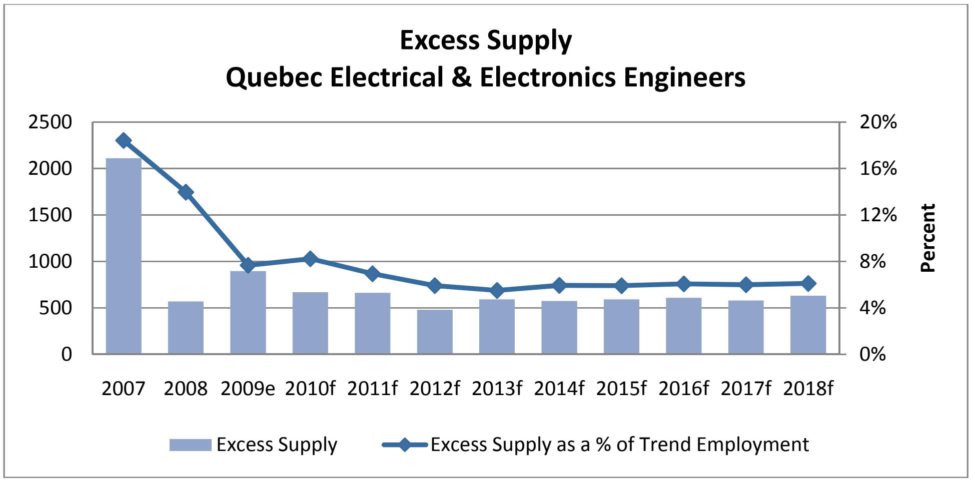
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Permanent immigration has declined modestly since a peak in 2003.
- Temporary immigration has increased to partly fill the gap.
- Post secondary programs increased enrolments and graduations to a peak in 2006 and trends will prompt another peak in graduations in 2011.
- The age profile for electrical engineers is younger than the average levels for other engineers.

Exhibit G3.3 - Electrical and Electronics Engineers, Quebec



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- Current levels of immigration and graduations meet the longer trend labour requirements and sustain excess supply.

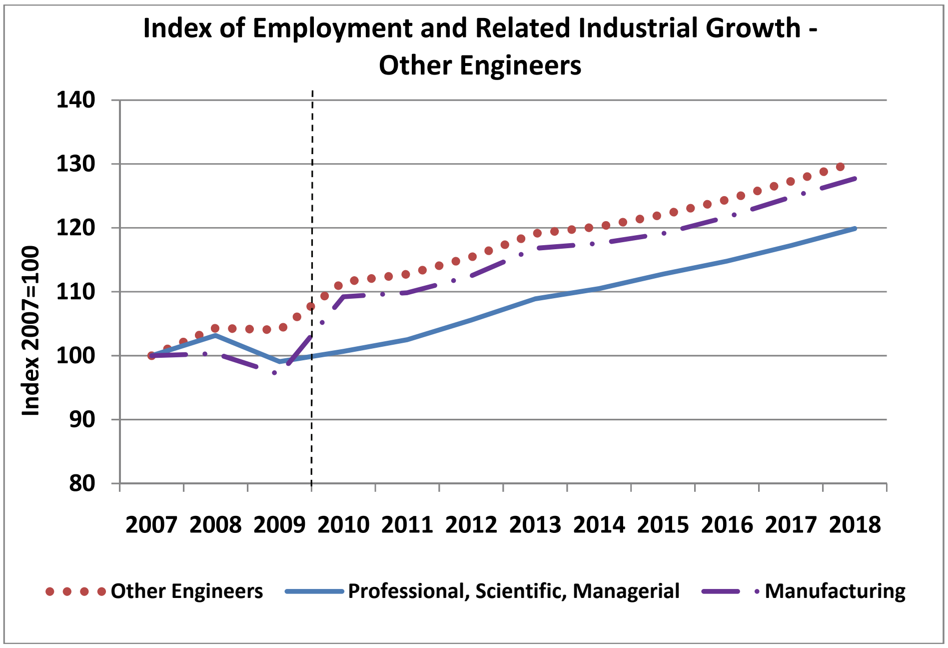
Exhibit G3.4- Electrical and Electronics Engineers, Quebec

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Electrical	2	2	2	3	3	3	3	3	3	3

- The recession weakened markets and recovery will slowly restore more balanced conditions.

Other Engineers - Quebec

Exhibit G4.1 – Other Engineers, Quebec



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- This group contains several different occupations including mining, geological, computer and other engineers.
- Job losses in 2009 were less severe than in other engineering occupations. Employment is driven by investment and output in manufacturing, professional, scientific and management services (including engineering consulting services), along with other industries.
- Employment growth from 2009 to 2018 will exceed the average for the other engineering occupations.

Exhibit G4.2 – Other Engineers Quebec

Demographic Supply Side Measures - All Other	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	736	692	465	737
Immigrants**	676	793	837	755
Replacement Demand (#)***	250	250	171	247
Replacement (% of Trend Employment)***	1.6	1.5	1.0	1.6

Source: statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

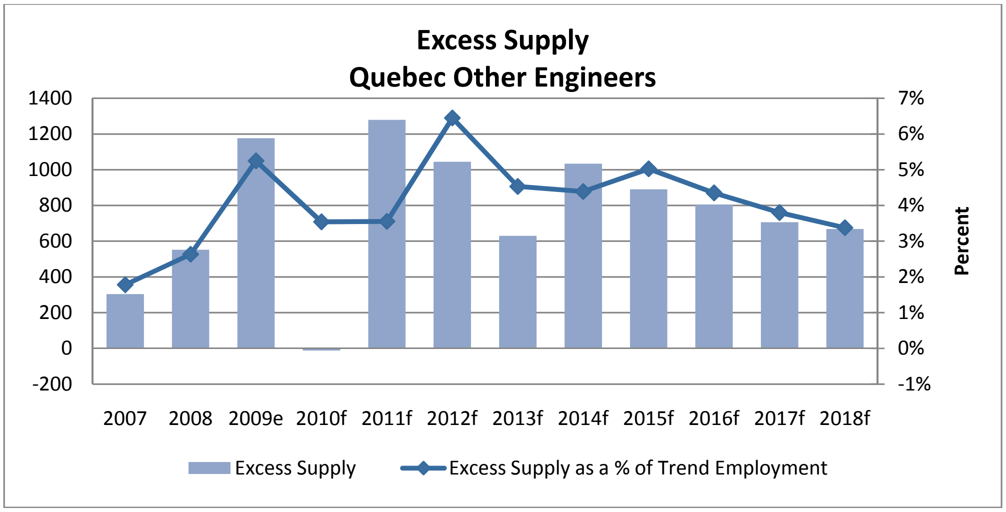
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Permanent immigration peaked in 2004 and has fallen since then:
  - Temporary immigration has increased to fill the gap.
- Post secondary enrolment patterns held the number of graduations nearly constant from 2004 to 2007, but there may be a decline in 2007 and 2008.
- Enrolment trends will prompt a surge in graduations in 2010 and 2011.
- The age profile for these occupations is close to average for all engineers.

Exhibit G4.3 – Other Engineers, Quebec



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- Rising graduations will add to the workforce in 2010 and 2011; adding to the pool of excess supply.
- Limited labour requirements and relatively low replacement demands will keep excess supply high across the scenario.
- After 2011 employment demand and limited requirements related to retirements will be filled by current levels of immigration and graduation trends.

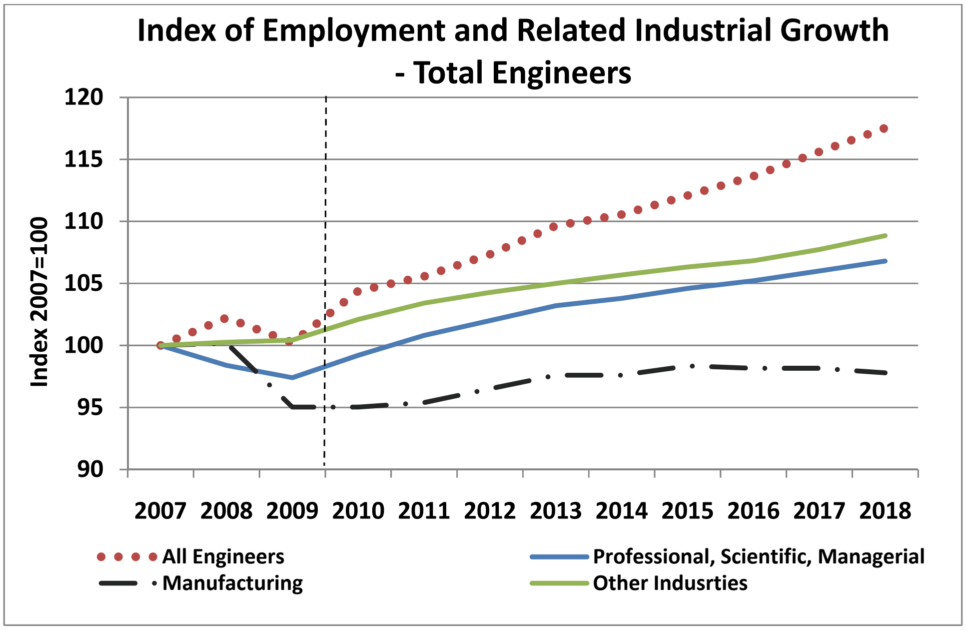
Exhibit G4.4 – Other Engineers, Quebec

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Other	2	3	2	2	3	3	3	3	3	3

- Measures reported here cover a wide range of occupations and markets. It is possible that local conditions will cause market disruptions that are not captured in the wider measures reported here.

Total Engineers - Quebec

Exhibit G5.1 – Total Engineers, Quebec



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Average annual growth in engineering employment from 2010 to 2018 is 1.8%, above the average for all employment in Quebec.
- Overall total employment is tied to employment in professional, scientific and management services (including engineering consulting) and primary industries. The recession cuts jobs temporarily. Growth in employment for engineers in Quebec is lower than the general, national projection from 2010 to 2018.

Exhibit G5.2 – Total Engineers, Quebec

Demographic Supply Side Measures – Total Engineers	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	2087	2050	1873	**2161**
Immigrants**	1488	1643	1753	**1616**
Replacement Demand (#)***	599	599	739	**836**
Replacement (% of Trend Employment)***	1.8	1.8	1.5	**1.8**

Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

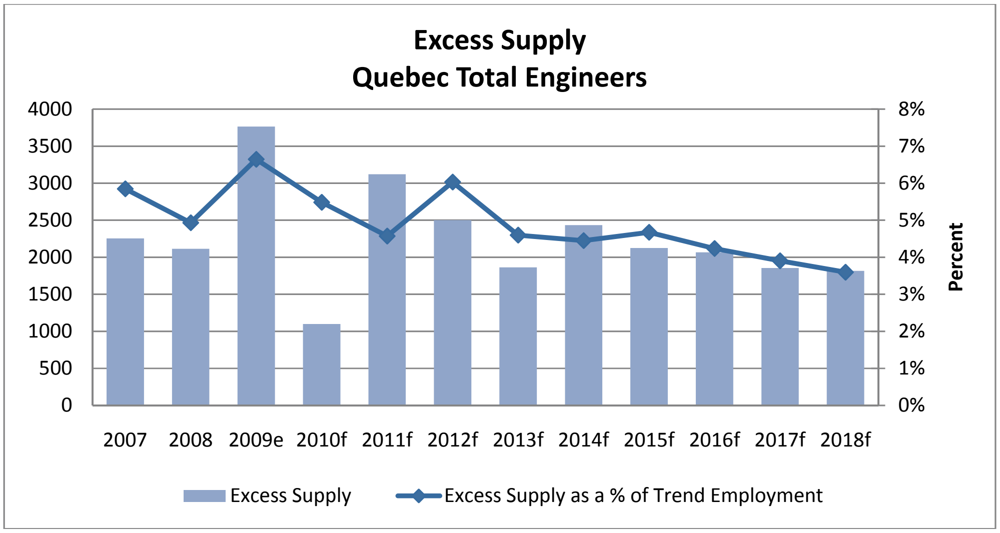
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- Patterns of enrolment and graduations from Quebec programs created a peak in grads in 2007 and further increases in 2011 and 2012.
- Immigration is holding at recent levels.

Exhibit G5.3 – Total Engineers, Quebec



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- After a brief jump in excess supply in 2009, labour markets settle into a balanced pattern where new entrants balance labour requirements.

Exhibit G5.4– Total Engineers, Quebec

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total Engineers	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

- Markets will balance given expected trends in employment, retirements and current levels of immigration and graduations.

Exhibit G6– Total Engineers, Quebec

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Civil engineers	3	3	3	3	4	3	4	4	4	4
Mechanical	1	3	2	2	2	3	3	3	3	3
Electrical	2	2	2	3	3	3	3	3	3	3
All Other	2	3	2	2	3	3	3	3	3	3
Total Engineers	2	3	2	3	3	3	3	3	3	3

Key Points:

- Tighter markets for civil engineers are related to the older age profile and higher retirement demands for this occupation.
- Increasing graduations in 2011 and 2012 combine with stable levels of immigration so that the annual gains in the workforce are either ahead of or balancing labour requirements for entry level engineers across the scenario.
- Labour market conditions will be tighter for experienced engineers as retirements rise

H – Atlantic Canada

The Economy

A brief summary of expected economic conditions is presented here and a complete write-up of the Center for Spatial Economics January, 2010 Provincial forecast is attached in Appendix A.

Economic conditions in the Maritime Provinces (New Brunswick, Nova Scotia and Prince Edward Island) have held up well during the recession. While other provinces had major economic losses, activity in the Maritimes paused – with no overall decline. Government stimulus and related infrastructure projects are one reason for the limited impacts of the recession. Recovery will be slow, partly because governments will have to limit spending and investments after 2011 to reduce deficits and debt accumulated during the recession.

Major projects are a big part of the story. Project cancellations in New Brunswick will remove important opportunities. In Nova Scotia there are numerous and smaller projects in government, manufacturing, utilities and resource initiatives that will prompt growth during the recovery. Jobs are created and labour markets impacted first by the start up of major construction projects and then by the operations of new manufacturing, mining, and utility facilities.

The economic cycle has been much more volatile in Newfoundland and Labrador. Weak exports and housing markets prompted a deep recession in 2009. But prospects for recovery are also good as there are several major projects planned that will boost the economy in 2010 and beyond. Production schedules for several major resource operations will also stop and start the provincial economy over the scenario period.

Demographic factors play a common role across all of Atlantic Canada. Older age profiles and very limited population growth will restrict each economy. Much will depend on immigration as a source of new workers. These demographic changes will reduce unemployment and limit recruiting opportunities for many employers. Tight labour markets will become more common.

It is not yet possible to track individual engineering markets in each of the Atlantic Provinces. Statistics Canada Census reported 9,350 engineers in Atlantic Canada in 2006 and growth to 9,600 by 2009 based on trends taken from the Labour Force Survey.

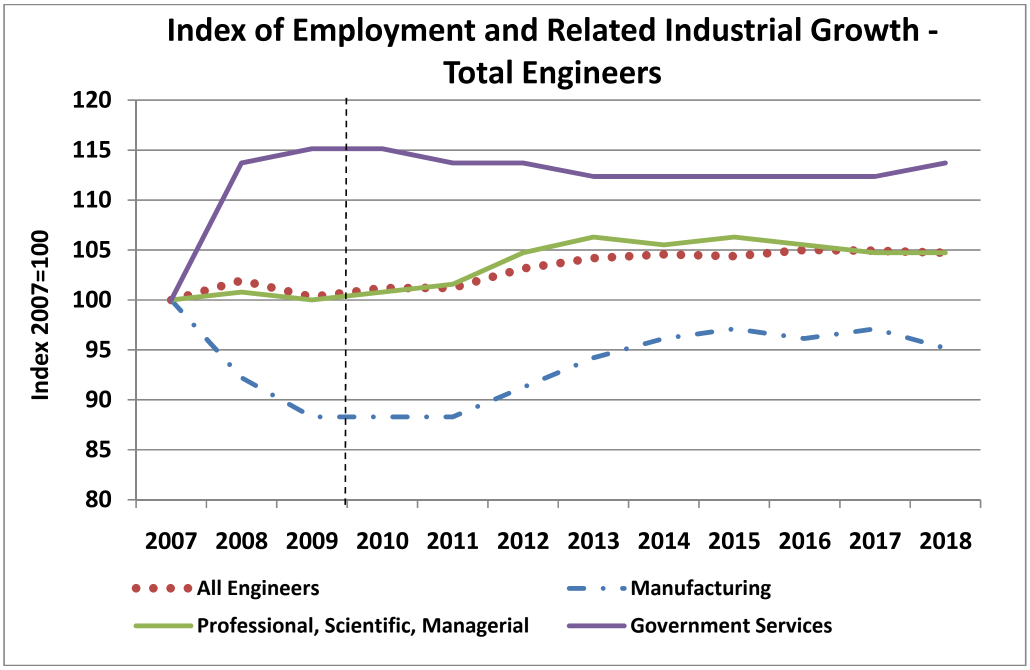
Exhibit E – Atlantic Canada

Labour Market	2006c	2009e
	(Census)	(Estimated Trend)
Total, All Engineers	9350	9605

Source: Statistics Canada, Prism Economics and Analysis

Total Engineers – Atlantic Canada

Exhibit H1.1 - Total Engineers, Atlantic Canada



Source: Statistics Canada, C4SE, Prism Economics and Analysis

Key Points:

- Employment is driven by output and investment in key engineering-intensive industries including manufacturing, utilities, primary industries (including mining, oil and gas), construction, government, along with professional, scientific and management services (including engineering consulting services).
- Long term employment trends for engineers across all the Atlantic Provinces includes the impacts of major construction projects and operations. For example:
    - Government stimulus projects boost activity in 2009 but fade later in the scenario.
    - Manufacturing (and other primary industries like mining) dropped to very low levels in 2009, but recover some lost ground by 2014.
- The overall pattern of limited long term growth expected for engineering from 2009 to 2018 partly reflects the effects of combining specific projects that are scheduled for each province. These projects may well boost local engineering activity.

Exhibit H1.2- Total Engineers, Atlantic Canada

Demographic Supply Side Measures - Total, All Engineers	2007	2008	2009	2010 – 2018 (Annual Average)
Graduates Entering the Labour Force*	517	536	426	521
Immigrants**	140	74	85	97
Replacement Demand (#)***	198	242	224	214
Replacement (% of Trend Employment)***	2.4	2.2	2.2	2.4

Source; Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

*Equals 70% of graduates from CEAB programs

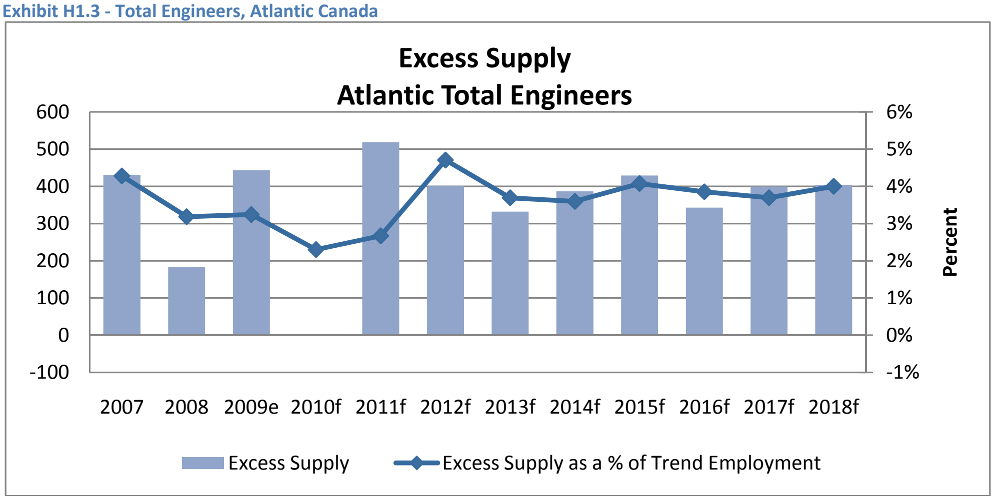
**Includes temporary foreign workers and permanent immigrants

***Replacement demand = retirement and mortality

Key Points:

- There has been a steady increase in graduations from post graduate programs and this source has dominated the new entrants into engineering occupations.
- Recent enrolment trends will generate a peak in graduations in 2011 and 2012.
- Immigration has been predominantly temporary workers and these numbers have been declining since 1999.
- The age profile for engineers in Atlantic Canada is older than in other provinces.
- Rising replacement demand related to retirement will restrict the supply of experienced engineers and add to recruiting difficulties. Where demand for engineering services hits abrupt peaks related to projects, demand may be met through outside consulting services.

Exhibit H1.3 - Total Engineers, Atlantic Canada



Source: Statistics Canada, Citizenship and Immigration Canada, Prism Economics and Analysis

Key Points:

- During 2010 employment gains in the recovery coincide with a brief lull in graduates from local programs and excess supply falls below normal levels.
- Excess supply jumps up in 2011 and 2012 as new graduates join the labour market
- Later in the scenario trends in graduations and limited immigration provides the needed number of new engineers to meet labour requirements.
- Measuring excess supply across all of Atlantic Canada might conceal spikes of demand as big projects ramp up or shut down in specific regions and industries.

Exhibit H1.4 - Total Engineers, Atlantic Canada

Labour Market Rankings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
All Engineers	3	3	3	3	3	3	3	4	3	3

- Over most of the projection the number of graduates and arriving immigrants exceeds labour requirements.
- Labour market measures take consulting activity into account through general trends in professional and scientific services. Major resource and infrastructure projects in Atlantic Canada will require intensive engineering activity at various periods in the scenario. Results presented here would allow for extensive imports of these services.

3. Conclusions and Implications

Conclusions

The conclusions drawn by this study reflect both the economic model which underpins our assessment of current and projected labour market conditions, and the important input received from validation meetings. These meetings brought an industry perspective to bear on the conclusions from the economic model.

10. It is clear that there is an asymmetry between the way that employers and engineers look at the engineering labour and the way that standard economic statistics describe that market. Both employers and engineers ascribe a high degree of importance to general business experience, and to specialized, technical experience. Indeed, experience is so important in the engineering profession that the measurement of both the supply and the demand for engineers needs to be parsed in terms of experience categories.

11. It is clear from our analysis of specific engineering labour markets that many of these markets are characterized by a surplus of recent graduates, who have little or no experience, but a shortage of experienced engineers with five or more years of practical experience and the specialized, experience-based technical skills that employers require. This concurrence of a labour surplus with a skills shortage was discussed in the reports produced by the Engineering and Technology Labour Market Study. [10]

12. The difficulties that many employers experience in recruiting engineers with specific experience and skills has led to a sharp increase in the use of foreign-trained engineers brought into Canada by employers under the Temporary Foreign Worker program. Increasing the supply of domestic graduates, by itself, will not address employers' skills needs. New graduates are not a substitute for experienced engineers with 5-10 years of experience and specialized technical skills.

13. The difficulty that many employers have in recruiting engineers with specialized skills and experience also has led to an increase in off-shoring. Our analysis suggests that skill shortages are at least as important as cost factors, if not more important, in driving the increase in off-shoring.

14. The traditional academic fields of study - civil, mechanical, chemical, electrical - are just the starting point. As graduates move into specific industries, they evolve into aerospace, systems, transportation, structural, industrial, manufacturing, petroleum, and other specialized engineers, to list but a few examples. In some

[10] "Engineering and Technology Labour Market Study, Final Report", Engineers Canada and the Canadian Council of Technicians and Technology, May, 2009. See Page 1 and Page 8 http://etlms.engineerscanada.ca/e/pub_pr.cfm

cases, university curricula now reflect these specializations. In most cases, however, specializations are developed through experience.

15. Standard economic statistics which measure supply and demand in the engineering labour market attach too little weight to experience and to specialized skills and too much weight to generic qualifications. In this report, therefore, it is common for our analysis to show a 'balance' between supply and demand (a '3' ranking) for the four large (and generic fields), namely, civil, electrical, mechanical and chemical, but shortages (a '4' ranking) in the more specialized fields, e.g., petroleum engineers.

16. The consulting sector – which employs a large share of professional engineers – plays a critical role in meeting industry's needs for specialized skills and developing those skills within the profession. Consulting also promotes the mobility of these skills across regions and industries.

17. Within the consulting sector, the internationalization of engineering services has taken on increased importance. This was described in the report *Canada's Consulting Engineering Sector in the International Economy* that was part of the Engineering and Technology Labour Market Study.[11] A central finding of that study was that the internationalization of engineering services increased the premium on specialized skills.

18. This report points to three challenges for the engineering profession.

The first, and most important, is addressing the graduation-to-work transition, or more specifically, the chronic and serious under-supply of junior engineer jobs which are also integral to the internship or EIT programs of the provincial and territorial associations. This situation sets up a contradiction between the interests of each firm and the engineering industry as a whole. It is rational business strategy for an individual employer to require 5-10 years experience for new hires, but at the system level, this business strategy leads to the serious problems that now confront the profession and employers as a whole. There are no simple solutions to the graduation-to-work transition challenge, but addressing this challenge must now become a priority for the profession. This may have implications for industry/profession relations, government/profession relations, the structuring of university programs, and the regulation of professional practices.

The second challenge is to better understand the business and specialized skill needs of industry and reflect those needs in traditional undergraduate and graduate programs, in combined MBA-engineering programs, in engineering management programs, and in continuing professional development programs. The profession

[11] See, http://etlms.engineerscanada.ca/media/Canada's%20Consulting%20Engineering%20Sector%20in%20the%20International%20Economy1.pdf

may also need to consider options for credentialing specialized skills, as has been done in other professions, e.g., law.

The third challenge is to facilitate the movement of experienced engineers from declining sectors when they have lost their jobs into growing sectors. Engineers who have lost their jobs owing economic restructuring have considerable business experience, but are likely to lack some of the specialized skills that are needed by growing sectors.

Improvements to the next update might add insight in these areas and better meet user needs. Changes might include;

- Added market details that track more specializations and new disciplines including;
  - Engineering Managers
- Extended consultations with stakeholders and
  - The addition of rankings that track conditions for experienced engineers based on stakeholder input.
- Added details tracking licensing and registrations in the Provincial Associations including;
  - Engineer in training programs and other internships
  - Permanent immigrants with engineering qualifications and temporary foreign workers securing permanent status
- Added details linking employment to engineering consulting including improved links from key industry drivers, imports and exports of engineering services.