NEW BRUNSWICK'S ENGINEERS AND GEOSCIENTISTS: AN ECONOMIC IMPACT REPORT

Prepared for:
Association of Professional Engineers and Geoscientists of New Brunswick (APEGNB)

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EXECUTIVE SUMMARY

This report was prepared to show the economic footprint associated with the engineer and geoscientist workforce in New Brunswick. The work that these professionals do is critical to the economy and at the same time generates significant economic activity through business-related spending and the spending of household income in the province. As the professional workforce becomes more distributed (remote work), it is important to ensure a strong 'case' for engineers and geoscientists to do their work in New Brunswick.

THE ECONOMIC FOOTPRINT OF NEW BRUNSWICK'S ENGINEERS AND GEOSCIENTISTS

In 2021, the business and household spending associated with the 3,799 active engineers and geoscientists in the province:

- ✓ Boosted provincial GDP by $746 million*.
- ✓ Supported $477 million in total income.
- ✓ Supported 5,269 full-time equivalent jobs across the province.
- ✓ Generated $212 million in tax revenue for governments including $121.4 million for provincial and local governments.
- ✓ The income induced by engineers and geoscientists led to $361 million in household spending on goods and services including $85 million on shelter costs, $78 million on transportation and $59 million on food.
- ✓ The average engineer or geoscientist*:
    - Boosts provincial GDP by $196,000/year.
    - Supports $95,000 in household spending on goods and services.
    - Induces an estimated $32,000 in tax revenue for provincial and local governments.
    - Based on these multipliers, an additional 500 engineers and geoscientists in New Brunswick would boost annual GDP by $98 million, total income by more than $62 million and provincial/local tax revenue by $16 million.

**through direct, indirect and induced impacts.*

THE POTENTIAL BENEFITS FROM GROWING THE ENGINEERING SERVICES SECTOR

Only 35% of New Brunswick's engineers and geoscientists work in the engineering services sector. In an average year, between 2017-2021, the province's engineering services sector generated $283 million in provincial GDP and supported nearly 3,000 jobs.

- ✓ The sector generated $169 million worth of interprovincial and international export revenue in 2019[1].
- ✓ Boosting export revenue to the national per capita level would increase provincial GDP annually by $131 million and government tax coffers by $34 million.

[1] Including architectural services.

EXECUTIVE SUMMARY (CONT.)

THE ENGINEER AND GEOSCIENTIST TALENT POOL

There were 3,799 active engineers and geoscientists (APEGNB figure for 2021). New Brunswick ranked 8th among the 10 provinces for engineers/geoscientists as a share of the total workforce (2021 Census).

580 engineers-in-training (2021), the second lowest ratio of EIT to practicing P.Eng's among the 10 provinces (but an increase of 14% since 2015).

148 newly licensed engineers in 2021 down from 190 newly licensed engineers in 2020.

Females are 12.4% of practicing P.Eng's (Engineers Canada data for 2021).

In 2021, New Brunswick ranked 5th among the 10 provinces for the concentration of civil engineers and 3rd for chemical engineers.

Fredericton has one of the most impressive engineering clusters in Canada: Over 100 firms; 1,150 engineers and geoscientists - 13th highest concentration among 150+ urban centres in Canada; #1 for concentration of civil engineers and #3 for electrical engineers.

Engineers and geoscientists work in all major sectors of the economy (including 13% in public administration and 10% in construction).

As of 2021, over 1 in 5 are close to retirement (22%, 850 total).

65 Indigenous engineers/geoscientists (2021 Census) up from only 30 in 2016.

From the 2021 Census, immigrants represented 13% of the engineers/geoscientists workforce, the second lowest share among the 10 provinces (57% in Ontario).

11% of the engineers/geoscientists workforce is a visible minority – the second lowest share in the country (2021 Census).

According to the 2021 Census, 10% of engineers and geoscientists are self-employed.

EXECUTIVE SUMMARY (CONT.)

THE ENGINEER AND GEOSCIENTIST TALENT PIPELINE

The talent pipeline will be critical to growing the workforce in the coming years.

Enrolment in university engineering and related programs has risen strongly in recent years across Canada (+86%). Not in New Brunswick (only +6%).

While the number of engineers-in-training is on the rise in New Brunswick, the province still ranks 9th among the provinces for the ratio of engineers-in-training to practicing engineers.

According to the Census, twice as many natural and applied sciences professionals move out of New Brunswick every year than move in (this includes engineers).

THE CASE FOR ENGINEERS AND GEOSCIENTISTS TO LIVE AND WORK IN NEW BRUNSWICK

There is a strong case for engineers and geoscientists to build their careers in New Brunswick:

Reason #1: The cost of living is lower here (example: average household spending on shelter is 63% higher in Ontario).

Reason #2: Commuting to work times are much lower here (engineers and geoscientists can cut their commute times from an hour or more down to a few minutes).

Reason #3: City, country and waterfront living is open to everyone.

Reason #4: New Brunswick has limited crime and strong social cohesion (example: 82% of adults report having limited stress in their lives).

Reason #5: There are a broad range of career opportunities for engineers and geoscientists.

Reason #6: Engineers and geoscientists can live and work in both English and French.

THE POTENTIAL IMPACT OF A LIMITED LICENSURE INITIATIVE

As of the 2021 Census, there were 2,260 engineering technologists and technicians working in New Brunswick.

Using the same multipliers as developed for engineers and geoscientists, this group contributed an estimated $312 million to the province's GDP in 2021, generated $199 million in employment income and supported over 3,100 total jobs. The work done by these technologists and technicians boosted government coffers by an estimated $82 million.

APRIL 2023 UPDATE: KEY HIGHLIGHTS

Highlight:	Summary:
Operating revenue is up	Operating revenue in NB's engineering services sector rebounded in 2021 to $279 million up from $260 million in the pandemic year of 2020. Annual revenue is still down from its recent high of $323 million in 2018 (Page 15).
	In 2021, New Brunswick ranked 9th out of the 10 provinces for engineering services revenue per capita (Page 16).
Operating profit margins are strong	The engineering services sector operating profit margin was a strong 15.2% in 2021 (Page 15).
Value of exports up 18%	Architectural, engineering and related services export revenue (interprovincial and international) increased in 2019 to $169 million up from $143 million in 2018 (Page 16). On a per capita basis, New Brunswick ranks 6th among the 10 provinces.
Trade deficit declined in 2019	The architectural, engineering and related services trade deficit narrowed in 2019. The province imported $317 million worth of these services and exported $169 million for a deficit of $148 million (Page 19).
The workforce expanded by 15%	There were 4,085 engineers and geoscientists in the New Brunswick workforce in 2021, up 15% between 2016 and 2021 (Page 24).
The Saint John cluster is growing	Fredericton still has the largest cluster of engineers/geoscientists, but Saint John made gains between 2016-2021. There were 1,150 in the Fredericton workforce and 1,105 in the Saint John workforce in 2021 (Page 25).
The % of female engineers is growing	Women as a share of all engineers and geoscientists increased from 12% in 2016 to 15% in 2021 (still 9th among the 10 provinces) (Page 27).
22% of the workforce is 55+	In 2021, 22% of all engineers and geoscientists in New Brunswick were 55 or older (850 in total)(Page 29).
10% are self-employed	In 2021, 10% of New Brunswick engineers and geoscientists were self-employed (up from 8% in 2016)(Page 30).
Indigenous workforce growing	The number of Indigenous persons in the engineering and geoscience workforce more than doubled from 30 to 65 between 2016-2021 (Page 31).
% immigrants nearly doubled	The share of the engineers and geoscientists workforce not born in Canada jumped from 7% in 2016 to 13% in 2021 (545 in total). New Brunswick still ranks 9th out of 10 provinces (Page 32).
% visible minority more than doubled	As of the 2021 Census, 11% of NB engineers and geoscientists were classified as a visible minority, the second lowest share among the 10 provinces in Canada. However, this was up sharply from only 4% in 2016 (Page 35).
Engineers earn a substantial income premium	Engineers earn a 54% average employment income premium compared to all full-time, full year workers across New Brunswick (in Toronto the income premium is only 26%). Among major non-management occupational groups, professional engineers earned the fourth highest average employment income out of more than 200 occupations (Page 35).

1. INTRODUCTION

1.1 Purpose of this report

The purpose of this report is to summarize the economic impact of New Brunswick's engineers and geoscientists across the province. In addition to playing a vital role as engineers and geoscientists, as a group they are a major contributor the provincial economy through the work they do and the spending associated with that work.

The report has three main objectives:

1. To establish the economic footprint of engineers and geoscientists in New Brunswick including GDP, income, employment, household spending and tax impacts.
2. The benefits of ensuring New Brunswick has a strong pipeline of engineers and geoscientists.
3. The desirability of working as an engineer or geoscientist in New Brunswick.

The report has been updated with new Census and other data as of April 2023. There was no change to the economic impact analysis in Section 2.

Why complete a report such as this? There are many reasons. First, it is important for engineers and geoscientists to understand the contribution they are making to New Brunswick's economy and the communities in which they live. Second, it helps governments and other stakeholders understand the important economic impact as they spend their income and pay taxes. Third, it helps the education sector realize the value of the talent they are graduating into the provincial workforce.

Finally, maybe the most important reason is to help determine the economic opportunities associated with expanding the number of engineers and geoscientists working in the province. Across Canada, engineering services is a nearly $13 billion export industry. This includes interprovincial exports (e.g. firms in Ontario doing work in New Brunswick) and international exports (e.g. firms in New Brunswick working on engineering projects in Latin America). An important economic development objective is to ensure New Brunswick firms are capturing a considerable share of this export revenue.

As we look to the future, New Brunswick needs growth industries. After 30 years of average annual real GDP growth of 2.5 percent per year, since 2007 the average annual real GDP growth rate has been less than one percent per year. To be able to sustainably fund public services and invest in public infrastructure, New Brunswick needs to get its economic growth back to 2.0 percent per year or more. The province's engineers and geoscientists could have an important role to play in this objective.

2. THE ECONOMIC FOOTPRINT OF THE ENGINEERS AND GEOSCIENTISTS IN NEW BRUNSWICK

2.1 The economic impact model

The economic impact model used to estimate how the engineer and geoscientist workforce impacts the economy is based on Statistics Canada's Input-Output (I-O) tables which provide a detailed profile of how expenditures in specific sectors flow through the provincial and national economy as well as through international trade. This assessment is based only on the employment income and related spending associated with the workforce itself and not an assessment of the critical economic role engineers and geoscientists play in a successful economy.

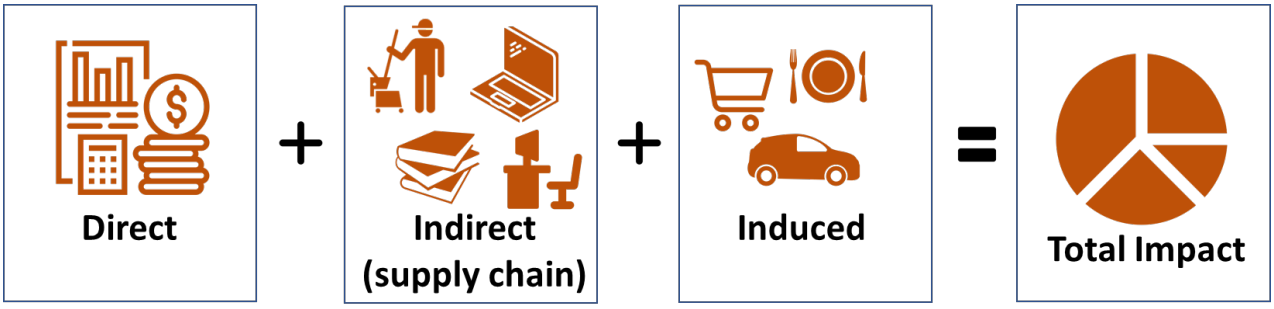
Essentially, much of the work engineers and geoscientists do in New Brunswick could be accomplished from elsewhere in Canada. Employers prefer to have their engineers and geoscientists living in the province and living in the same communities as their clients. However, with the rise of remote working, it is possible that an increasing amount of the vital work engineers and geoscientists do could be handled by professionals living outside the province.

By showing the economic impact of the workforce in New Brunswick and the potential for future growth, this report is making the case that the engineer and geoscientist workforce and talent pipeline should be a focus of government, economic development and post-secondary education stakeholders.

The economic impact model evaluates the direct, indirect and induced economic impact, using the following parameters:

- *Direct impact* measures the value-added to the economy attributed directly from the engineer and geoscientist workforce through the wages earned, and the revenues generated from the workforce spending in New Brunswick.
- *Indirect impact* measures the value-added generated within the regional economy through firm and organizational demand for intermediate inputs or other support services (e.g. the supply chain). For the engineer and geoscientist workforce this includes expenditures such as office space, equipment, technology and other services.
- *Induced impacts* are derived when the engineers, geoscientists and other related workers in the aforementioned industries spend their earnings. These purchases lead to more employment, higher wages and increased income and tax revenues, and can be felt across a wide range of industries.

Figure 1: Economic multipliers associated with engineering services



The I-O tables trace the impact of economic activity (output shock) on the provincial and national economies (including imports and exports). In addition to the GDP and employment impacts, the economic impact model estimates the amount of tax revenue supported by the industry as well as consumer spending impacts.

Most of the data included in this report is published by Statistics Canada. Annual revenue, direct gross domestic product (GDP), economic multipliers and other statistics are primarily based on the industry group architectural, engineering and related services [BS541300] (referred to in this report as 'engineering services').

As will be shown below, only approximately 35 percent of the engineer and geoscientist workforce is employed in the engineering services sector. However, it is likely the indirect expenditure profile of engineers and geoscientists in government, manufacturing or other sectors would approximate that in the engineering services sector (i.e. a similar supply chain profile).

Appendix A includes a detailed description of the economic impact model and sources.

2.2 New Brunswick engineers and geoscientists: GDP and employment impacts

To determine the overall economic impact of engineers and geoscientists in New Brunswick, an estimate of the direct wage/salary compensation paid to them is required. According to the Association of Professional Engineers and Geoscientists of New Brunswick (APEGNB), as of 2022, there are 3,799 active engineers and geoscientists working across the province[2]. The Atlantic Canada Geoscience Salary and Benefits Survey 2021 was used to determine the total labour income paid to these engineers and geoscientists[3].

Based on this study, the average engineer or geoscientist reported an annual salary of $99,496 per year. Active P.Eng's reported an average salary of $105,615 and active P.Geo's $94,091 while active engineers-in-training reported earning $61,789 in 2021. Based on the large sample size in the survey, these wage levels are a very good indication of the employment income earned by these professionals. In total, New Brunswick's engineers and geoscientists were paid an estimated $378 million in 2021.

Using the economic multipliers discussed in Section 2.1, the total wages and salaries paid to the engineers and geoscientists combined with indirect and induced economic activity boosted provincial GDP by an estimated $746 million in 2021 (Table 1).

To put this into perspective, this represents nearly 2.4 percent of total provincial GDP and is a contribution larger than the tourism industry in the province[4]. If New Brunswick's engineers and geoscientists were an 'industry', the economic activity induced by this industry would be similar in GDP impact to the total information technology (IT) sector and the entire fishing and seafood processing sector.

While the direct wages/salaries of engineers and geoscientists was an estimated $378 million in 2021, there are indirect and induced income effects. Combined, New Brunswick's engineers and geoscientists boosted employment and related income across the province by an estimated $477 million.

Including the indirect and induced employment effects, New Brunswick's engineers and geoscientists supported an estimated 5,269 full-time equivalent (FTE) jobs across the province. This includes 3,799 active engineers and geoscientists plus an additional 1,470 FTE jobs supported from indirect and induced effects.

[2] P.Eng, P.Geo as well as engineers and geoscientists in training.
[3] Prepared by: ClearPicture.
[4] The provincial GDP from total tourism industries such as restaurants, accommodation and transportation. Source: Statistics Canada Table 24-10-0042-01.

Table 1: Estimated economic impact of the engineers and geoscientists workforce in New Brunswick, 2021

Active engineers and geoscientists in New Brunswick	3,799
Average salary	$99,500
Total employment income	$377,986,000
Impact on provincial GDP*	$746,117,000
Total income supported*	$476,640,000
Total employment supported (FTE)*	5,269

*Direct, indirect and induced effects combined. See Appendix A for sources and methodology.

2.3 New Brunswick engineers and geoscientists: Taxation impacts

Because of the education, training and skills required to do the work, engineers and geoscientists earn well above average employment income. This higher level of income translates into considerable tax revenue for governments. Based on tax multipliers associated with this level of income and the related economic activity, the estimated taxes supported by the engineer and geoscientist workforce in New Brunswick is shown in Table 2.

The household spending induced by the workforce boosted sales tax (HST) by an estimated $41.3 million in 2021 and personal income tax payments of an estimated $103.4 million. Household-based property taxes supported were almost $11 million and that does not include non-residential property taxes which are included in the 'other indirect taxes' estimate. In total, New Brunswick engineers and geoscientists supported an estimated $211.7 million in taxes paid to all levels of government. The provincial and local governments in New Brunswick received an estimated $121.4 million of that tax revenue.

To put this into perspective, just the provincial and local tax revenue induced by the engineers and geoscientists would cover the salaries of 1,500 teachers in New Brunswick or cover 70 percent of the spending on highway maintenance costs across the province every year[5].

Assessing the tax implications associated with the engineers and geoscientists workforce is important as it is not guaranteed to continue at this level into the future.

[5] Sources: Statistics Canada 2016 Census and the New Brunswick government's budget for 2021-2022.

Many of the services that engineers and geoscientists provide to their clients in New Brunswick could be done from other jurisdictions (see Section 3.5).

Ensuring New Brunswick has a strong engineering and geoscience talent pipeline and remains an attractive location for engineers and geoscientists to live are key to ensuring this important economic engine continues into the future.

Table 2: Estimated taxes induced by the engineer and geoscientist workforce in New Brunswick, 2021

All levels of government combined:	
Property taxes (households)	$10,963,000
HST	$41,298,000
Personal income tax	$103,431,000
Other indirect taxes	$55,959,000
Total taxes	$211,650,000
Local and provincial governments only	$121,412,000

*Direct, indirect and induced effects combined. See Appendix A for sources and methodology.

2.4 New Brunswick engineers and geoscientists: Household spending impacts

The income induced by the engineer and geoscientist workforce in New Brunswick mostly turns into household current spending on goods and services and therefore benefits businesses large and small across the province. As shown in Table 3, New Brunswick's active engineers and geoscientists boosted household spending across the province by an estimated $361.4 million in 2021. Total food expenditures were an estimated $58.9 million, including over $15 million on restaurants alone. Shelter costs, including mortgage payments/rent and associated costs of operations and maintenance, were an estimated $85.1 million.

New Brunswick engineers and geoscientists were an important driver of revenue to the communications sector, including telephone and Internet services. In 2021, the income supported by these professionals boosted spending in that sector by an estimated $15.5 million. The veterinarian and pet supplies sector generated an estimated $5.2 million in sales and the household furnishings and equipment sector received a $14.4 million boost as a result of the engineers and geoscientists. Another big winner is the transportation sector as $78.2 million of the total income induced by the engineers and geoscientists went to cover the cost of vehicle purchases, gasoline, maintenance, etc. The health and personal care sector received a $24.8 million boost.

The insurance sector in New Brunswick generated some $28.5 million in sales as a result of the income associated with the engineering and geoscientist workforce. This included homeowner and tenant insurance, vehicle insurance as well as health and life insurance payments.

Table 3: Estimated annual household spending in New Brunswick induced by the engineering and geoscientist workforce, 2021

Total household spending induced by New Brunswick's engineers and geoscientists	$361,369,000
Food expenditures	$58,896,000
Food purchased from stores	43,756,000
Food purchased from restaurants	15,134,000
Shelter	$85,053,000
Communications	$15,494,000
Pet expenses	$5,216,000
Household furnishings and equipment	$14,389,000
Clothing and accessories	$16,059,000
Transportation	$78,166,000
Gas and other fuels (all vehicles and tools)	19,878,000
Maintenance and repairs of vehicles	4,564,000
Health and personal care	$24,822,000
Personal care services	3,142,000
Hair grooming services	2,323,000
Recreation	$24,946,000
Recreational vehicles and associated services	7,620,000
Operation of recreational vehicles	1,838,000
Insurance*	$28,473,000
Gifts of money, support payments and charitable contributions	$9,812,000

**Includes homeowner and tenant insurance, vehicle insurance as well as health and life insurance payments.*
Direct, indirect and induced effects combined. See Appendix A for sources and methodology.

3. THE ENGINEERING SERVICES SECTOR IN NEW BRUNSWICK

3.1 Defining the engineering services sector

As developed above, New Brunswick's 3,799 engineers and geoscientists boosted provincial GDP by an estimated $746 million in 2021, supported employment income of nearly $477 million and with indirect and induced effects included, supported 5,269 total jobs. Engineers and geoscientists are employed in all sectors of the economy. As discussed in Section 4.3, only approximately 35 percent of them are employed in the engineering services sector which generated $279 million in revenue in 2021 (the most recent year for which data is available). The engineering services sector employs not only engineers as there are also many other occupations represented including engineering technicians and technologists, salespeople and administrative services staff.

This section covers the economic contribution and trends related to the engineering services sector.

3.2 Economic impacts

The engineering services sector in New Brunswick generated an average of $283 million in revenue per year between 2017 and 2021 ($279 million in 2021). The 2021 revenue figure reflected a rebound after COVID-19 drove down annual revenue to $260 million in 2020. In 2018, the province's engineering services sector generated $323 million in revenue.

The industry employs approximately 2,100 workers of which 1,200-1,300 are engineers and the rest are engineering technicians and technologists, salespeople, administrative services staff, etc. Adding in supply chain and induced economic impacts, the industry boosted provincial GDP between 2017 and 2021 by an average of $300 million per year, employment income by $182 million and taxes for governments by $78 million. An estimated 2,970 jobs are supported through direct, indirect and induced effects.

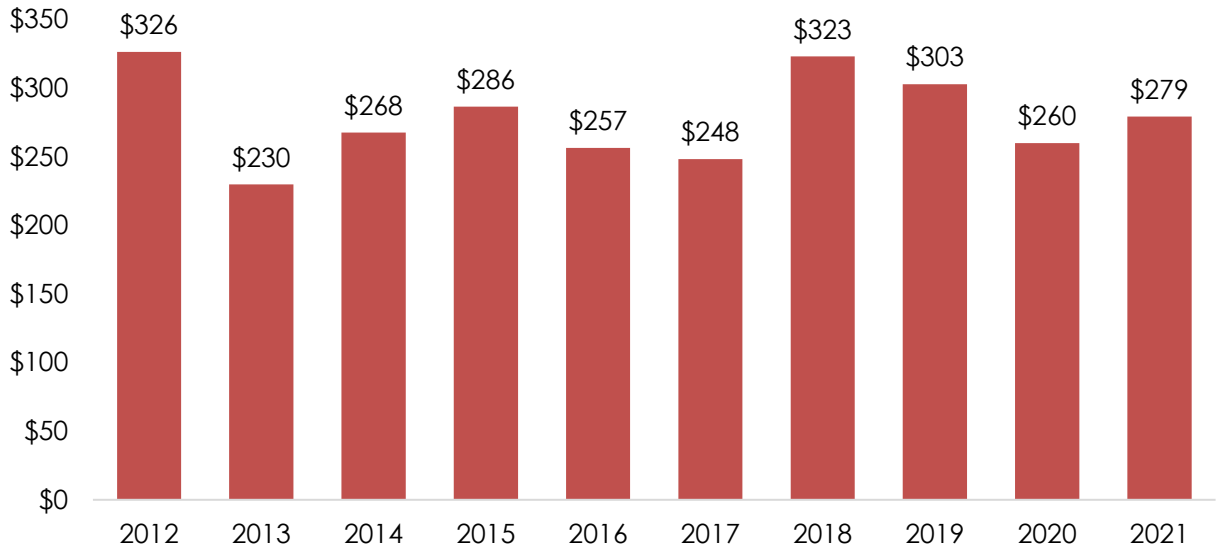
Table 4: Estimated economic impact of the engineering services sector, annual average 2017-2021

Average annual revenue (2017-2021)	$283 million
Estimated direct employment (FTE)	2,100
Total employment supported (FTE)*	2,970
Total employment income*	$182 million
Impact on provincial GDP*	$300 million
Estimated induced taxes*	$78 million

*Direct, indirect and induced effects combined. See Appendix A for sources and methodology.

Figure 2 shows the trend in engineering services operating revenue by year in New Brunswick. Before the pandemic-influenced year in 2020, the sector had topped $300 million in sales in both 2018 and 2019, after a five-year period averaging $258 million per year. In 2021, revenue rebounded somewhat to $279 million.

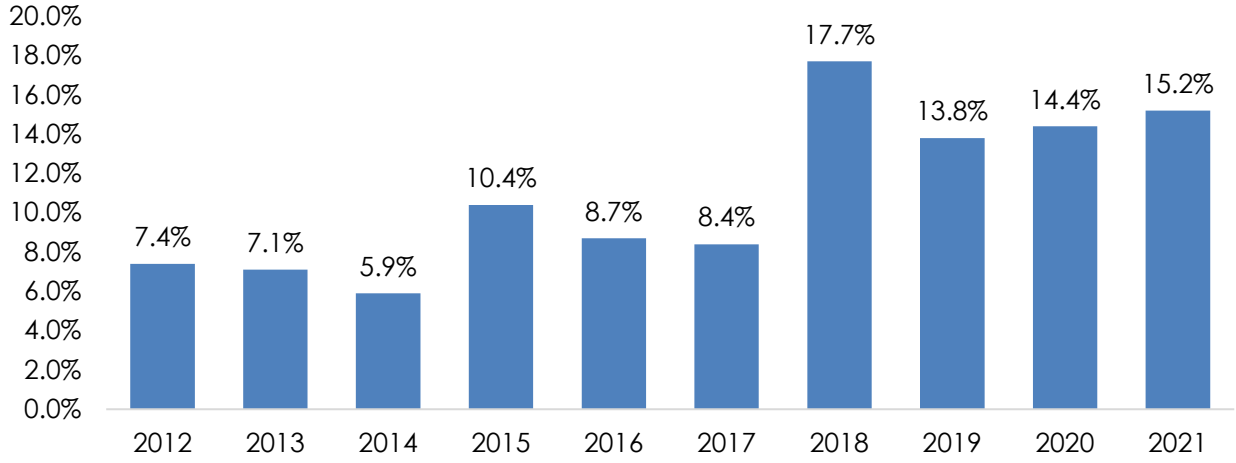
Figure 2: Operating revenue by year, engineering services in New Brunswick (NAICS 54133) $Million



Source: Statistics Canada Table 36-10-0402-01.

Operating profit margins in the industry have been improving in recent years. In the 2018-2021 timeframe, operating profits ranged from 13.8 percent to 17.7 percent, after a six-year period of eight percent average annual operating profit.

Figure 3: Operating profit margins by year, engineering services in New Brunswick (NAICS 54133)



Source: Statistics Canada Table 36-10-0402-01.

3.2.1 Interprovincial comparison

Adjusted for population size, New Brunswick ranks 9th among the 10 provinces for engineering services revenue (2021). There are three components that influences revenue in this sector including economic growth (requires more in-province engineering services to support infrastructure investment), the types of industry in each province (Alberta's oil and gas sector relies more on engineering services) and export revenue (discussed below).

New Brunswick was one of three provinces that registered a decline in engineering services revenue between 2012 and 2021. Nova Scotia's engineering services sector is on the rise with a 24 percent increase in revenue between 2012 and 2021.

Table 5: Provincial comparison, engineering services statistics (NAICS 54133)

	2021 revenue ($M)	% change	Per capita	Rank (2021)*	Rank (2012)*
Canada	$35,146	21%	$919		
Newfoundland and Labrador	$511	8%	$981	3	2
Prince Edward Island	$30	91%	$184	10	10
Nova Scotia	$477	24%	$481	7	8
New Brunswick	$279	-14%	$353	9	**7**
Quebec	$6,500	14%	$756	5	5
Ontario	$11,932	69%	$806	4	6
Manitoba	$536	44%	$385	8	9
Saskatchewan	$699	-15%	$591	6	4
Alberta	$7,752	-23%	$1,744	1	1
British Columbia	$6,305	70%	$1,212	2	3

*per capita among the 10 provinces.
Source: Statistics Canada Table 21-10-0163-01.

3.3 Engineering services as an export sector

A number of New Brunswick's engineering services firms do work for clients in other provinces and countries. Statistics Canada publishes data on both interprovincial and international exports for the broad sector group "architectural, engineering and related services". The data is lagged several years due to the time required to collect information from the firms involved.

In 2019, the latest year for which data is available, the architectural, engineering and related services sector in New Brunswick generated $113 million worth of interprovincial export revenue and $56 million worth of international export revenue ($169 million in total).

As shown in Figure 4, the amount of export revenue was slightly lower in the 2015-2019 timeframe compared to 2010-2014.

Figure 4: Architectural, engineering and related services export revenue by year, New Brunswick ($Million)

Source: Statistics Canada Table 12-10-0101-01.

Note: Using Statistics Canada, there is no way to extract the export values for just engineering (i.e. remove architectural services). However, based on other sources, it is likely New Brunswick architects generate relatively little revenue outside the province.

Note: New Brunswick's engineering services cluster is made up of both provincially-based firms such as Fundy Engineering and Roy Consultants as well as national/ international firms including Stantec, WSP and Dillon Consulting. To determine 'export' revenue, it must be based on where the work is done and not where the invoice for the work is issued.

New Brunswick's architectural, engineering and related services sector has been an important exporter of services. In 2019, the most recent year data is available, sector exports amounted to $218 per capita ($169 million in total). Table 6 shows the comparison to other provinces. New Brunswick's architectural, engineering and related services sector ranked 6th among the 10 provinces for export revenue on a per capita basis. Interestingly, Newfoundland and Labrador has been a leader in this area, generating $268 million in export revenue in 2019 (ranking that province 2nd among the 10 that year). One concern is that the value of exports from New Brunswick has been declining modestly in recent years while rising in most other provinces.

Table 6: Architectural, engineering and related services revenue by province, 2019

	Export value $M (2019)	% change (2010-2019)	Per capita	Rank
Newfoundland and Labrador	$268	130%	$512	2
Prince Edward Island	$5	17%	$33	10
Nova Scotia	$63	-27%	$65	9
New Brunswick	**$169**	**26%**	**$218**	**6**
Quebec	$2,140	-19%	$252	5
Ontario	$6,070	36%	$417	4
Manitoba	$119	60%	$87	8
Saskatchewan	$186	-27%	$159	7
Alberta	$2,441	-21%	$559	1
British Columbia	$2,304	97%	$452	3

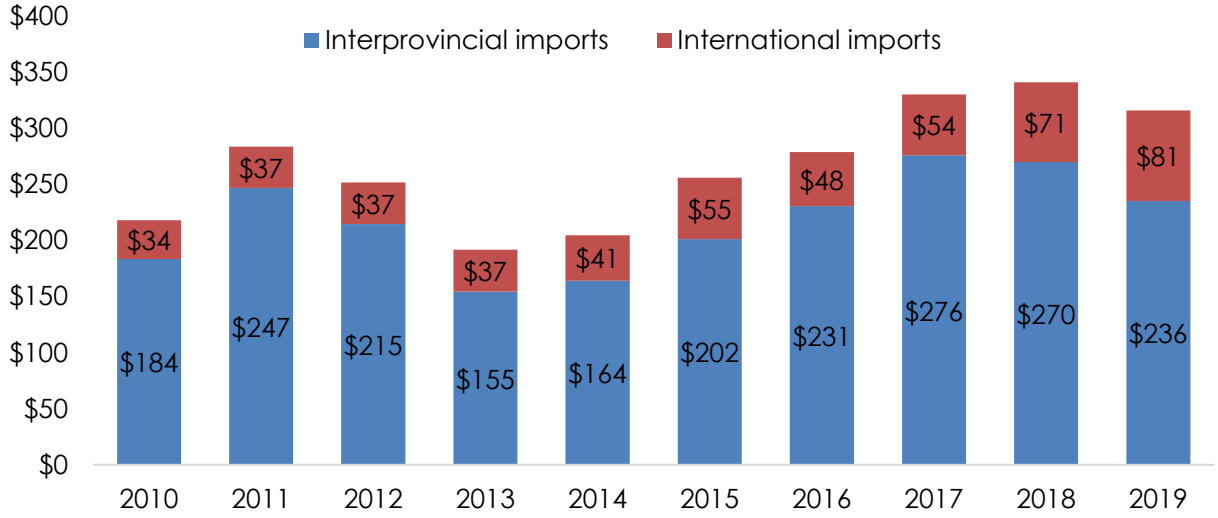
Source: Statistics Canada Table 12-10-0101-01.

3.4 Engineering services imports

New Brunswick also imports engineering services from other jurisdictions. This occurs when a New Brunswick company or organization uses the services of a firm elsewhere in the country or in the world. This also includes intramural work done by the national or international firms using employees and resources based in other provinces (for example, engineers in the Toronto office doing work in New Brunswick). Because the engineers are located elsewhere and therefore the work is being done in the other jurisdiction, it is considered an import (i.e. the money flows out of New Brunswick to pay for the salaries and other costs associated with the work being done in the other jurisdiction). Even though the billing address is in New Brunswick, the GDP, income, taxes and household spending related to the work is occurring in the jurisdiction where the work is being completed.

As shown in Figure 5, New Brunswick imported $317 million worth of architectural, engineering and related services in 2019. The value of imports has been rising. Between 2010 and 2014, the average annual import value was only $230 million per year.

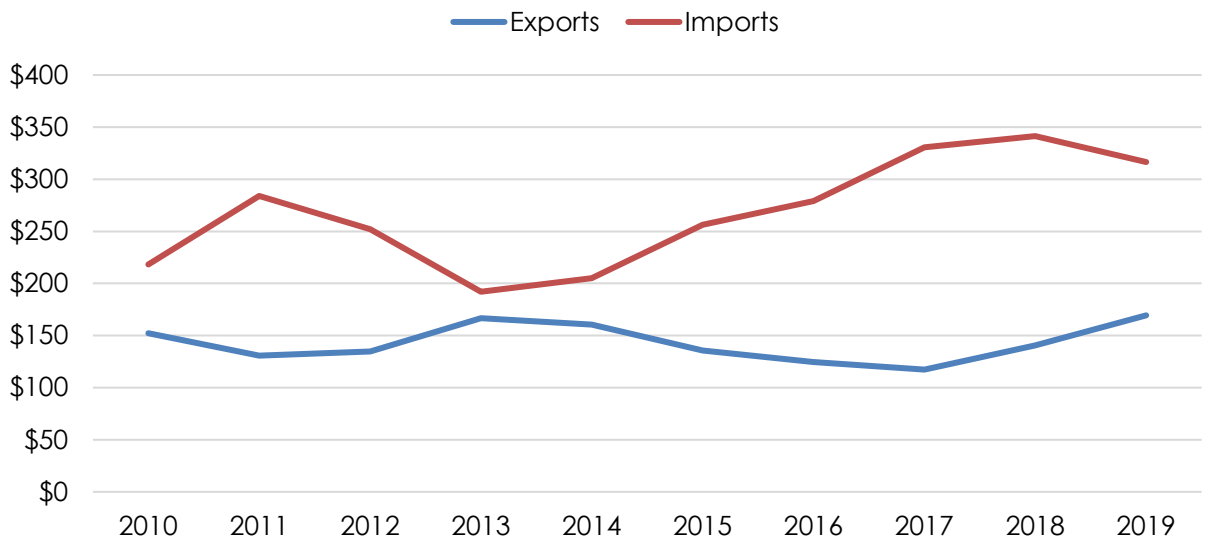
Figure 5: Architectural, engineering and related services imports by year, New Brunswick ($Million)



Source: Statistics Canada Table 12-10-0101-01.

This has resulted in an increasing trade deficit in the area of architectural, engineering and related services. As shown in Figure 6, the trade deficit was only $25 million in 2013, but by 2019 it had risen to $148 million. This was down from an annual deficit of over $200 million in 2017 and 2018.

Figure 6: Imports and exports of architectural, engineering and related services by year ($Million), New Brunswick



Source: Statistics Canada Table 12-10-0101-01.

3.5 Could New Brunswick grow its engineering services sector?

Table 7 shows the potential economic impact under two growth scenarios. The first scenario looks at the potential economic impact of reducing the architectural, engineering and related services trade deficit by either increasing exports or decreasing imports (import substitution). In that scenario, any combination of new exports or import substitution that equals $100 million in revenue would boost provincial GDP by an estimated $106 million, generate nearly $68 million in employment income, support over 1,100 above average wage employment and boost government tax coffers by over $27 million.

If engineering firms in New Brunswick were to boost engineering services exports to the national level on a per capita basis, that would require total export revenue to rise to $264 million/year from the 2018 level of $141 million. Reaching the provincial average export revenue level would boost provincial GDP by nearly $131 million, employment income by nearly $84 million and tax revenues to government of $34 million. Over 1,360 jobs would be supported in this scenario.

Table 7: Potential incremental economic impact under two scenarios

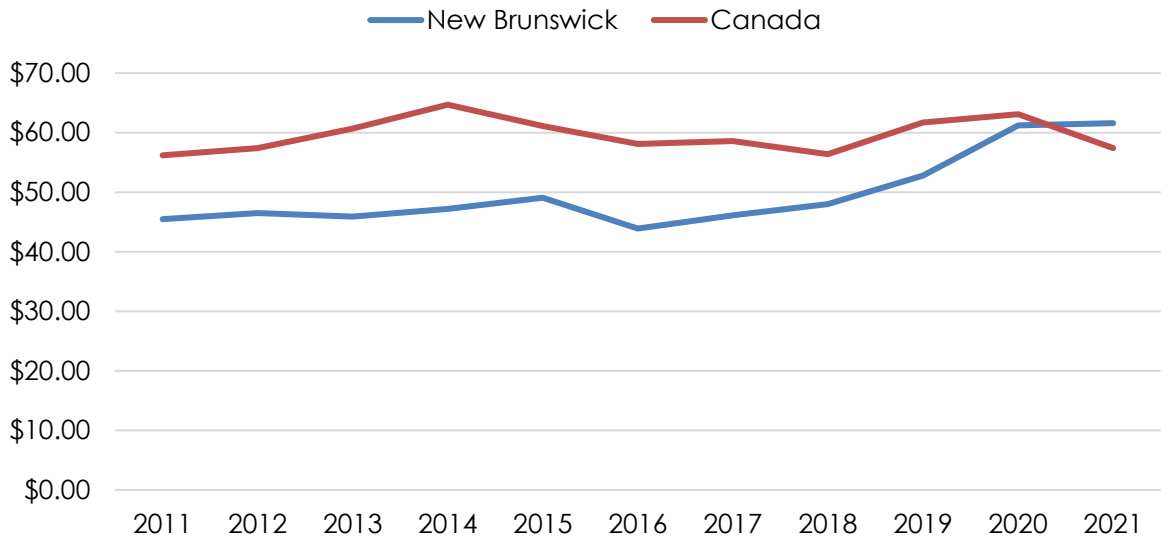
	Reduce the trade deficit by $100 million*	Boost exports to the national level (per capita)**
Annual impacts		
Incremental revenue	$100.0	$123.4
New provincial GDP	$106.0	$130.8
Employment income	$67.8	$83.7
Jobs (FTE)	1,106	1,365
Tax revenues to government	$27.6	$34.0
New household spending	$51.4	$63.4

*Either increase exports, replace imports or a combination of both equalling $100 million/year.
**10 province average – based on 2018 figures.
Source: Developed by Jupia Consultants based on Statistics Canada datasets.

New Brunswick's engineering services sector has a good story to tell. Operating profits have been above the national average in recent years. Labour productivity in the engineering services sector has been rising and is now higher than the country overall (Figure 7).

The business case is strong but is predicated on having a strong accounting talent pool. Without that strong talent pool and a demonstrated talent pipeline, the sector will not reach its full potential in New Brunswick.

Figure 7: Labour productivity per hour, architectural, engineering and related services



*real GDP created per hour worked. Source: Statistics Canada Table 36-10-0480-01.

Why should government support a growing engineering services sector?

There is a clear case for government to support the growth of the engineering services sector in New Brunswick. A growth spurt (either increased exports or import substitution) would generate millions of dollars in new tax revenue each year and create high paying jobs for New Brunswickers.

4. A PROFILE OF THE ENGINEERING AND GEOSCIENCE WORKFORCE

There are two sources of information used to profile engineers and geoscientists in New Brunswick: the Engineers Canada annual report (published in 2022 using 2021 data) and the 2021 Census published by Statistics Canada.

4.1 Engineers Canada members (2021)

Engineers Canada's annual National Membership Report collects information from the provincial and territorial engineering regulators about their membership in order to paint a picture of the engineering profession in Canada. The 2022 report captures data from January 1, 2021, to December 31, 2022. Engineering members are categorized based on the definition of practice in each jurisdiction.

In 2021, as shown in Table 8, New Brunswick had 5,931 people who were 'members' which includes Practicing P.Eng.'s (exclusive), Temporary License Holders, License to Practice Holders, Restricted License Holders, Non-Practicing P.Eng.'s, Life Members and Engineers-in-Training. It does not include students or Internal Trade Applicants. This represented two percent of the national total.

Using the Engineers Canada report, females made up 12.4 percent of total engineering members and 13.4 percent of total practicing P.Eng.'s (exclusive). For the latter, this was slightly lower than the national level (14.5%) and ranked New Brunswick 7th among the 10 provinces.

New Brunswick had 885 total license to practice holders which was 26 percent of the total across the country. However, only four provinces and two territories had individuals in this category.

In 2021, there were 580 engineers-in-training in New Brunswick, the third lowest amount relative to the total practicing P.Eng.'s (exclusive) among the 10 provinces across the country (Figure 8). The good news is the number of engineers-in-training has increased in recent years (up 15 percent between 2015 and 2021).

In 2021, there were 148 newly licensed engineers in New Brunswick, 1.8 percent of the national total (slightly above the province's 1.6 percent share of total engineers). Females represented 19 percent of newly licensed engineers across the province.

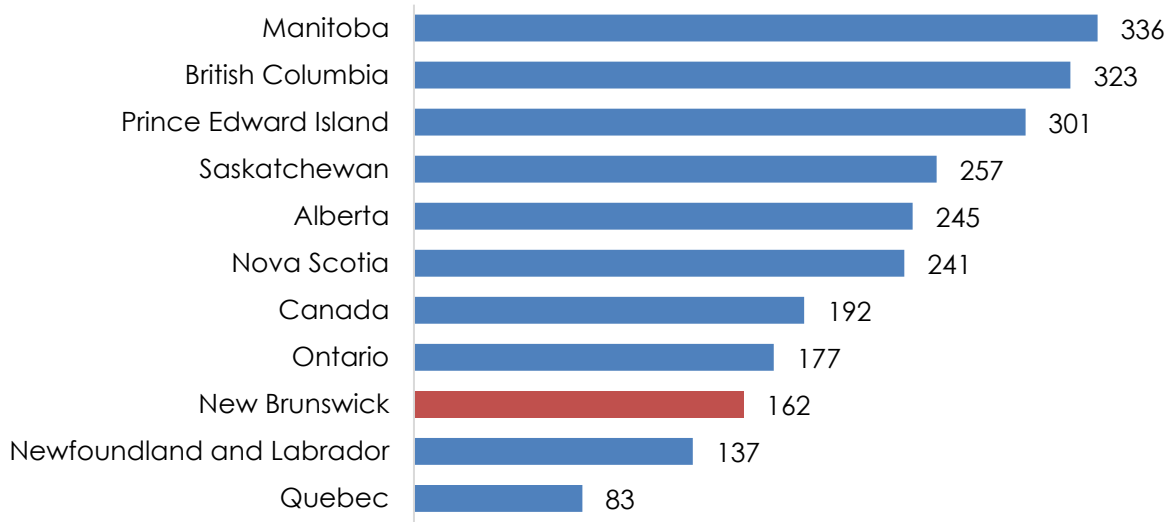
Table 8: Profile of New Brunswick engineers, Engineers Canada report (2021)

Category	#	% of national total
Engineering members (male)	5,193	2.0%
Engineering members (female)	736	1.7%
Engineering members (gender unknown)	2	0.2%
% of members who are women	12.4%	
TOTAL Engineering members *	5,931	2.0%
Member categories		
Practicing P.Eng.'s (exclusive) (male)	3,102	1.6%
Practicing P.Eng.'s (exclusive) (female)	480	1.5%
Practicing P.Eng.'s (exclusive) (gender unknown)	1	0.1%
Total Practicing P.Eng.'s (exclusive)	3,583	1.6%
Total License to Practice Holders	885	25.7%-
Total Reduced Fee Members, Non-Practicing or Retired	291	1.1%
Total Life Members	592	9.6%
Engineers-in-Training (male)	433	1.3%
Engineers-in-Training (female)	146	1.6%
Engineers-in-Training (gender unknown)	1	0.7%
Total Engineers-in-Training	580	1.4%

**The category Members, includes Practicing P.Eng.'s (exclusive), Temporary License Holders, License to Practice Holders, Restricted License Holders, Non-Practicing P.Eng.'s, Life Members and Engineers-in-Training. It does not include students or Internal Trade Applicants.*

Source: Engineers Canada National Membership Report.

Figure 8: Engineers in training per 1,000 practicing P.Eng.'s (exclusive) (2021)



Source: Engineers Canada National Membership Report.

4.2 Breakdown of engineers and geoscientists by occupation (2021 Census)

The information in this section is based mostly on Statistics Canada. Some data comes from the 2021 Census and other from more recent surveys. It is meant to provide a general view of the profile of the workforce. Using National Occupation Code (NOC) classifications, there are 14 occupational groups that are associated with professional engineers and geoscientists (Table 9). Civil engineers accounted for one in three engineers and geoscientists in the 2021 Census. Mechanical engineers (710 in total) and electrical and electronics engineers (610) accounted for another 32 percent of the total.

A tool called Location Quotient (LQ) analysis allows for a comparison of the concentration of engineers and geoscientists between jurisdictions. LQ analysis uses the share of total employment in specific occupations at the national level and then compares that share to provincial and local jurisdictions with the national level as an index set at 1.00). For example, from the 2021 Census there were 32,775 people classified as engineering managers across the country. Engineering managers represented 0.11 percent of all workers nationally. In New Brunswick, there were 395 engineering managers or 0.06 percent of the total workforce. As a result, the LQ value in New Brunswick for engineering managers was 0.56 (0.06% over 0.10%). To put this another way, relative to the size of the workforce, there were 44 percent fewer engineering managers working in New Brunswick in 2021 .

Adjusted for size, there are only two categories of engineers where New Brunswick has close to the national level of concentration: civil engineers (LQ=0.93) and chemical engineers (LQ=0.91). All other categories of engineers (and geoscientists) have a lower concentration here compared to the country overall. Within New Brunswick, Fredericton has a relatively high concentration as detailed below.

Compared to the other nine provinces, New Brusnwick ranks 5th for the concentration of civil engineers, 3rd for chemical engineers and 8th among the 10 provinces for the overall concentration of engineers and geoscientists in the workforce.

Alberta has the highest concentration of engineers among the 10 provinces, followed by Ontario and British Columbia.

Table 9: Engineers and geoscientists by occupational group, New Brunswick (2021)

NOC:	#	% of total	% change 2016-2021	LQ CAN=1.00*
Engineering managers	395	10%	+61%	0.56
Geoscientists and oceanographers	105	3%	0%	0.40
Civil engineers	1,380	34%	+18%	0.93
Mechanical engineers	710	17%	+6%	0.57
Electrical and electronics engineers	610	15%	+17%	0.60
Chemical engineers	235	6%	-2%	0.91
Industrial and manufacturing engineers	135	3%	-7%	0.37
Metallurgical and materials engineers	30	1%	0%	0.49
Mining engineers	15	0%	-57%	0.20
Geological engineers	65	2%	+86%	0.78
Petroleum engineers	20	0%	-56%	0.16
Aerospace engineers	15	0%	0%	0.12
Computer engineers (except software engineers)	260	6%	+8%	0.46
Other professional engineers, n.e.c.	110	3%	+69%	0.78
Total	4,085		+15%	0.63

**Using Location Quotient (LQ) analysis.*
Source: Statistics Canada 2021 Census

4.3 New Brunswick's engineers and geoscientists: Regional view

As of June 2022, there were 186 engineering services firms in New Brunswick with employees and another 175 sole proprietors[6]. Most of the firms were relatively small, only four had more than 50 employees, another 34 had between 20 and 49 employees and 21 had between 10 and 19 employees. Around the province, the Fredericton region has the most engineering services firms with 54 employers and another 40 sole proprietors. Saint John is second with 23 employers and 17 sole proprietors.

In terms of where engineers and geoscientists are employed, the Fredericton region has the largest number and concentration. As of the 2021 Census, there were 1,150 working in the Fredericton region or 29 percent of the total workforce around the province. When compared to the other 150+ urban centres across Canada, Fredericton ranks 13th (or in the top 8%) for the concentration of engineers and geoscientists (as a share of total employment).

[6] To be included in the Statistics Canada location counts, a firm must have at least $30,000 in annual revenue.

The capital city ranks first for the concentration of civil engineers and 3rd for the concentration of electrical engineers. The region has slipped a bit in the ranking since 2016. At that time, the Census ranked Fredericton 7th in the country.

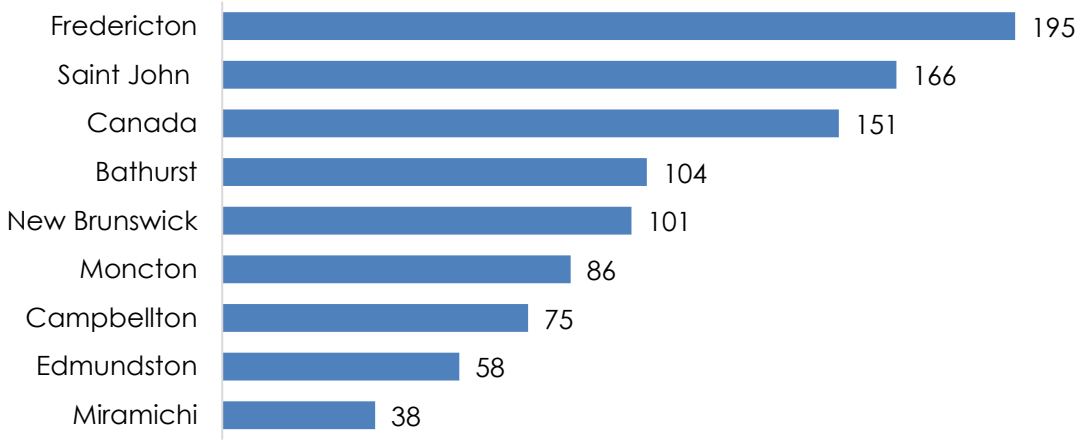
The Saint John region had the second most engineers and geoscientists in 2021 with 1,105 followed by the Moncton region with 725. Figure 9 below shows all New Brunswick urban centres by the concentration of engineers and geoscientists. Both Fredericton and Saint John have a higher concentration of engineers and geoscientists than the national level.

Table 10: The Fredericton engineering cluster, 2022

- 54 engineering firms (with employees) and another 10 sole proprietors**
- 1,150 professional engineers and geoscientists*
- Ranks 13th among more than 150 urban centres across Canada for the concentration of engineers and geoscientists*
- Ranks #1 for the concentration of civil engineers*
- Ranks 3rd for the concentration of electrical engineers*

Source: *Statistics Canada 2021 Census, **2022 business counts.

Figure 9: Engineers and geoscientists per 10,000 total workers, 2021



Source: Statistics Canada 2021 Census. For CMA and CA areas.

4.4 Employment by industry

The 2016 Census provided a detailed analysis of the industries in which New Brunswick's engineers and geoscientists were employed. Statistics Canada has not yet updated this data from the 2021 Census.

The largest employment sector in 2016 was professional, scientific and technical services which employed 35 percent of the total. This industry group includes the engineering services sector.

This means that 65 percent the workforce was employed in other sectors of the economy (Figure 10). The public sector is a major employer as 13 percent of the province's engineers and geoscientists were employed in public administration.

The manufacturing sector employed 16 percent of the workforce and construction another 10 percent.

Figure 10: Where New Brunswick's engineers and geoscientists work, by sector (% of total)

Source: Statistics Canada 2016 Census.

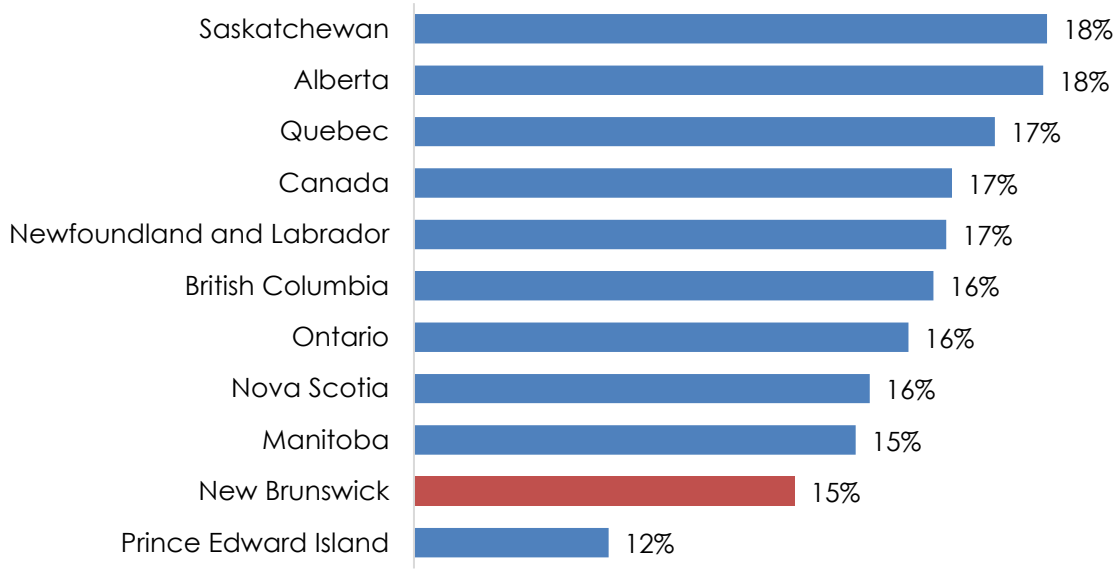
At the time of the 2021 Census, there were 100 geoscientists in the New Brunswick workforce.

4.5 Female engineers and geoscientists (Census)

As of the 2016 Census, New Brunswick had the lowest share of women in the engineers and geoscientists workforce among the 10 provinces across the country (less than 12%). By 2021, the share had increased to 15 percent (9th among the 10 provinces). Note these numbers do vary slightly from the Engineers Canada data covered above in Section 4.1.

There is good news in the universities. Among those enrolled in engineering programs in New Brunswick universities, females accounted for 26 percent in 2020 – the second highest share of female students among the 10 provinces. Further, New Brunswick ranks third among the 10 provinces in the growth of female enrolment in engineering programs in recent years (relative to overall enrolment)[7].

Figure 11: Female engineers and geoscientists, % of total (2021)



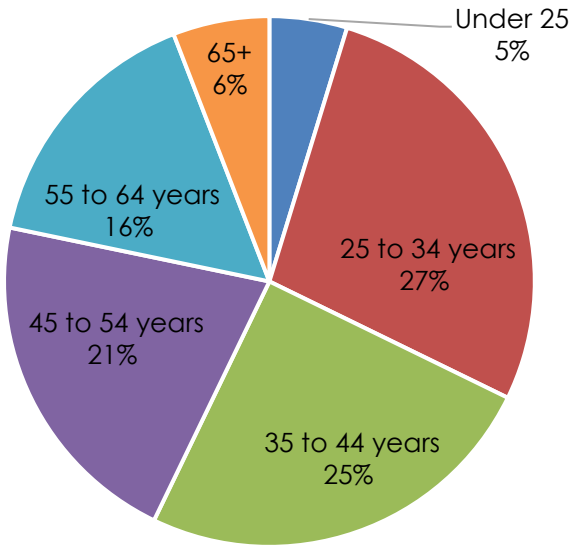
Source: Statistics Canada 2021 Census

[7] Source: Enrolment and Degrees Awarded Report 2020, Engineers Canada.

4.6 Engineers and geoscientists by age group

Of the more than 3,900 engineers and geoscientists in the New Brunswick workforce as of the 2021 Census, 850 (22%) were over the age of 55 and likely to retire in the next decade or so. Drilling down into specific occupations, New Brunswick's geoscientists are even older. Of the 100 geoscientists, 40 (or 40%) were over the age of 55 at the time of the 2021 Census. Figure 12 shows the breakdown by age group.

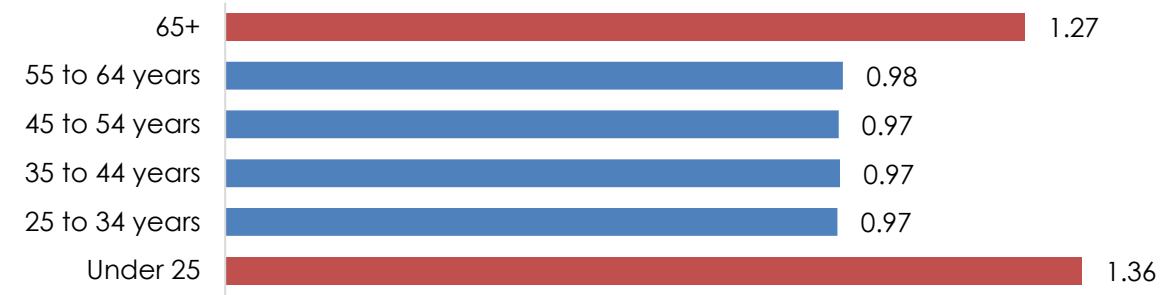
Figure 12: Engineers and geoscientists by age group, New Brunswick (2021)



Source: Statistics Canada 2021 Census

The aging workforce is an issue across Canada. Figure 13 shows the breakdown of New Brunswick's engineers and geoscientists by age group relative to the breakdown across the country. In fact, as of the 2021 Census, New Brunswick had a larger share of engineers under the age of 25 (185 in total).

Figure 13: Engineers and geoscientists by age group, Index, New Brunswick (Canada = 1.00)

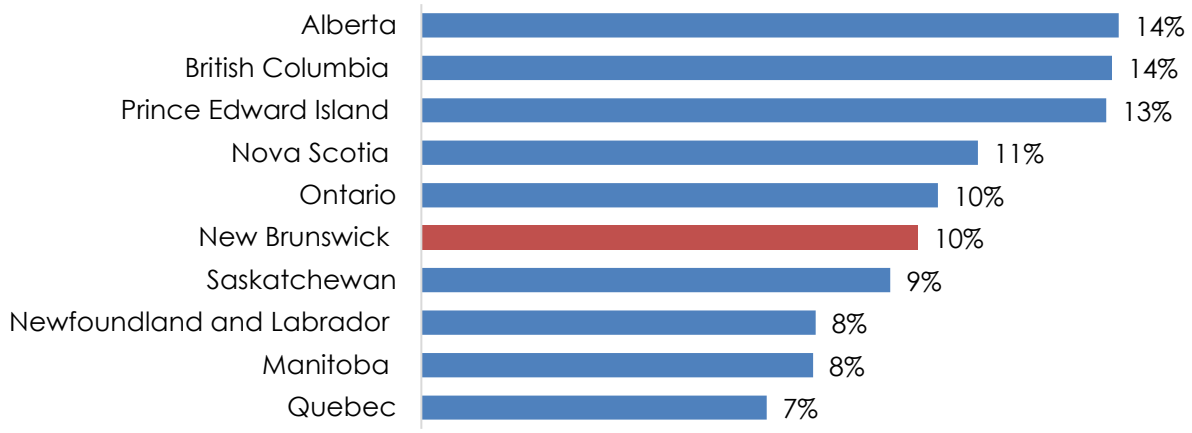


Source: Statistics Canada 2021 Census

4.7 Self-employment

On the Census, people are asked whether they are self-employed. This can include a person working just for themselves or a person who owns a company with many employees. In New Brunswick, around 10 percent of all engineers and geoscientists were self-employed at the time of the 2021 Census, similar to the national level of 10 percent. This was an increase from only eight percent in 2016. New Brunswick ranked 6th among the 10 provinces for its engineers and geoscientists self-employment rate.

Figure 14: Engineers and geoscientists, self-employment rate, New Brunswick (2021)



Source: Statistics Canada 2021 Census

Table 11 shows the self-employment rate by detailed occupational group. Geoscientists are far more likely to be self-employed as one in three of the 100 geoscientists reported working for themselves.

Table 11: Engineers and geoscientists, self-employment rate by occupational group, New Brunswick (2021)*

Occupation:	Rate:	Occupation:	Rate:
Engineering managers	10%	Metallurgical & materials engineers	40%
Geoscientists and oceanographers	33%	Mining engineers	0%
Civil engineers	11%	Geological engineers	15%
Mechanical engineers	5%	Petroleum engineers	50%
Electrical and electronics engineers	13%	Aerospace engineers	0%
Chemical engineers	0%	Computer engineers	8%
Industrial & manufacturing engineers	15%	Other professional engineers, n.e.c.	10%
Total	10%		

**Statistics Canada does not report numbers less than 5.*
Source: Statistics Canada 2021 Census

4.8 Indigenous workforce

In New Brunswick, Indigenous persons represented 3.8 percent of the total workforce in 2021 (all occupations). There were 65 Indigenous persons in the engineering and geoscience workforce, or just 1.6 percent of the total. This was considerably higher than the 30 reported in the 2016 Census.

It is important to point out that Statistics Canada reports workforce data in increments of five and therefore there could be one or two persons in the occupational groups shown in the table as zero.

Nova Scotia has a larger Indigenous engineering and geoscience workforce with 145 working in related occupations in 2021. Most other provinces also have a relatively small share of their Indigenous population working as engineers and geoscientists.

Table 12: Engineers and geoscientists, Indigenous workforce, New Brunswick (2021)

Jurisdiction	Workforce	Indigenous	Share
New Brunswick	4,090	65	1.6%
Bathurst	155	0*	0.0%
Campbellton	45	0*	0.0%
Edmundston	65	0*	0.0%
Fredericton	1,215	0*	0.0%
Miramichi	55	10	18.2%
Moncton	755	10	1.3%
Saint John	1,140	30	2.6%

**Statistics Canada does not report numbers less than 5.*
Source: Statistics Canada 2021 Census

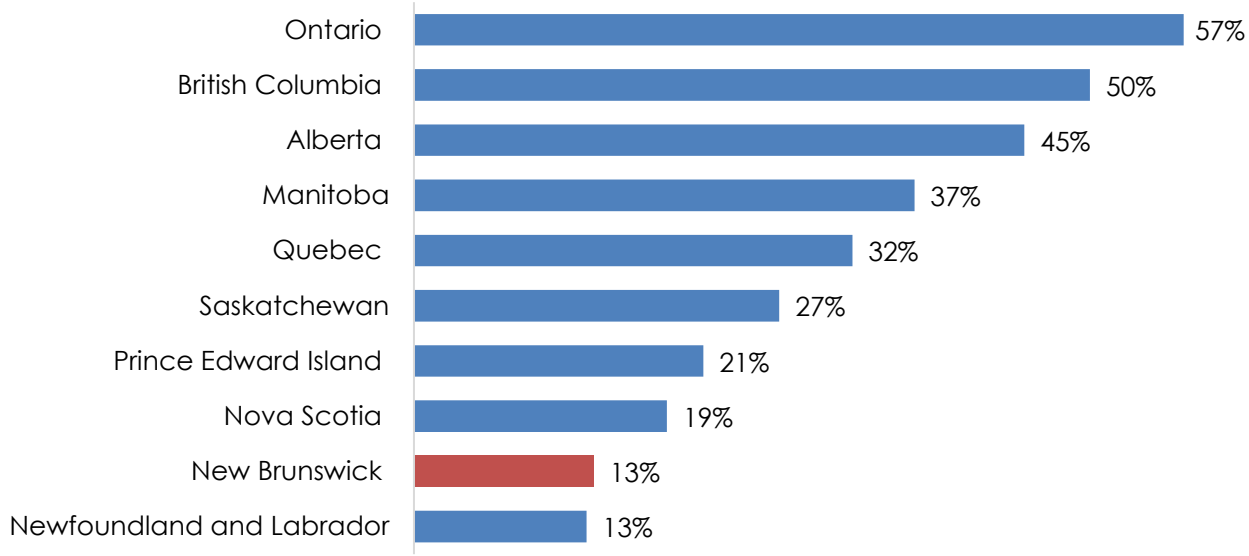
There have been initiatives in recent years to encourage more First Nations and Indigenous people to join the engineering workforce, but success has been relatively limited. For the past six years, Engineers Canada has been collecting data regarding Indigenous students' enrolment and degrees awarded at Canadian universities. Indigenous people are still greatly underrepresented in engineering education, accounting for only 0.6 percent of reported undergraduate students. This is around eight times lower than the 4.9 percent of people in Canada who identify as Indigenous. The enrolment data specifically in New Brunswick has not been made public.

4.9 Immigrants in the engineering and geoscience workforce

In 2016, there were 265 engineers and geoscientists in the New Brunswick workforce who were born outside of Canada. That represented seven percent of the total workforce in the province at the time. By the 2021 Census, the number had doubled to 545 in the workforce, or 13 percent of the total.

As shown in Figure 15, New Brunswick still ranks 9th out of the 10 provinces for the share of the engineering and geoscience not born in Canada. In Ontario and British Columbia, over half of the workforce is an immigrant.

Figure 15: Immigrants as a share of the total engineers and geoscientists workforce (2021)



Source: Statistics Canada 2021 Census

Based on recent permanent resident admission data from the Department of Immigration, Refugees and Citizenship Canada (IRCC), Canada attracts a considerable number of engineers and geoscientists each year. As shown in Table 13, before the pandemic, in 2018 and 2019, over 5,000 new permanent residents per year were admitted in an engineering or geoscience occupational group. The country attracted 4,460 in 2022. New Brunswick attracted 60 persons with engineering as their intended occupation in 2021 (1.3% of the national total).

Table 13: Permanent residents admitted to Canada under engineering and geoscience-related occupations

	2017	2018	2019	2020	2021	2022
0211 - Engineering managers	210	285	305	190	255	320
2113 - Geoscientists and oceanographers	105	150	125	70	105	70
2131 - Civil engineers	655	745	815	475	635	860
2132 - Mechanical engineers	805	1,000	1,040	705	870	875
2133 - Electrical and electronics engineers	755	1,085	940	460	630	730
2134 - Chemical engineers	200	260	260	135	155	195
2141 - Industrial & manufacturing engineers	295	405	510	320	430	395
2142 - Metallurgical & materials engineers	35	50	50	35	35	45
2143 - Mining engineers	25	20	20	30	35	15
2144 - Geological engineers	10	30	35	15	45	35
2145 - Petroleum engineers	95	165	155	80	85	105
2146 - Aerospace engineers	100	105	85	50	65	65
2147 - Computer engineers	550	785	735	385	470	620
2148 - Other professional engineers, n.e.c.	100	110	110	80	105	130
Totals	3,940	5,195	5,185	3,030	3,920	4,460

*IRCC rounds to the nearest 5 for data privacy reasons. There could have been one or two admitted in this NOC code. Source: IRCC.

4.10 Interprovincial migration

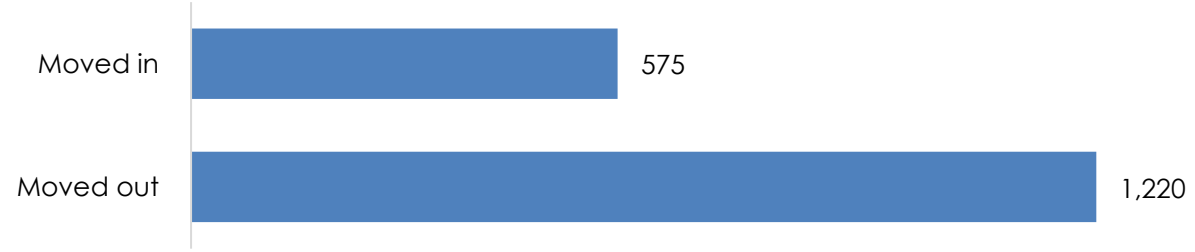
This data has not been published for the 2021 Census.

In 2016, only six percent (575 in total) of New Brunswick's workforce in engineering and other natural and applied sciences lived in another province five years earlier (in 2011). The top sources of migrant professionals were Ontario (195), Nova Scotia (155) and Quebec (80). This includes people working in other occupations such as biologists and other scientists.

On the flip side, over 1,200 engineering and other natural and applied sciences professionals who worked in New Brunswick in 2011 were employed in another province in 2016 (a 12% outward interprovincial migration rate). The top destinations for New Brunswick natural and applied sciences professionals were Ontario (325), Nova Scotia (280) and Alberta (260).

This means there were nearly twice as many moving out to other provinces as moving in over the five-year period.

Figure 16: Migration of engineers and other natural and applied sciences professionals, to and from New Brunswick (2011 to 2016)*



**excluding international migration.*
Source: Statistics Canada 2016 Census

4.11 Visible minorities in the workforce

New Brunswick also has a relatively small share of visible minorities in the engineering and geoscience workforce. As of the 2021 Census, 11 percent of the workforce was classified as a visible minority, the second lowest share among the 10 provinces in Canada.

This was well above the only four percent share in 2016. South Asian, Chinese and Black are the three top visible minorities in the engineers and geoscientists workforce.

Table 14: Visible minority population as a share of the workforce

	Engineers and geoscientists	Total workforce
Ontario	48%	34%
Alberta	42%	27%
British Columbia	40%	35%
Manitoba	32%	25%
Saskatchewan	25%	15%
Quebec	22%	16%
Prince Edward Island	16%	10%
Nova Scotia	13%	10%
New Brunswick	**11%**	**6%**
Newfoundland and Labrador	8%	4%

Source: Statistics Canada 2021 Census.

4.12 Language considerations

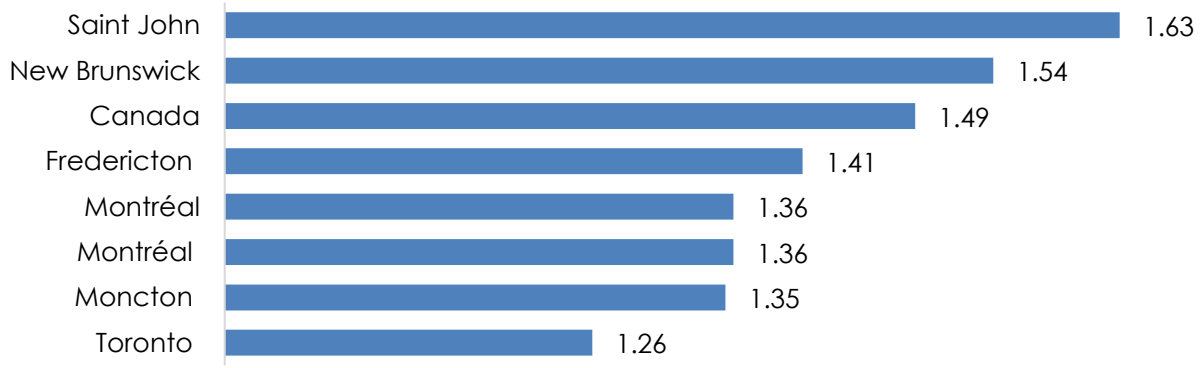
New Brunswick has another relatively unique consideration and that is related to language. Twenty-four percent of the provinces engineers and geoscientists indicated French was their first official language spoken in the 2016 Census. The share of the workforce that is bilingual (French and English) was not published in the Census data. It is also important to ensure the engineering and geoscience workforce can service customers in both English and French.

4.13 Income comparison

Professional engineers in New Brunswick earn a substantial employment income premium over most other occupational categories. According to the 2021 Census, professional engineers working full time and year round eared a 54 percent premium over the average for all full time and year round workers across the province. In fact, among major non-management occupational groups, professional engineers earned the fourth highest average employment income out of more than 200 occupations. Only health treating and consultation services professionals (doctors, dentists, etc.), lawyers and occupations in front line public protection services (police, fire, etc.) earned more.

Engineers in the Saint John area earn particularly high income relative to other workers in the region. As of the 2021 Census, they earned a 63 percent income premium over the average employment income for all full time, full year workers.

Figure 17: Average employment income premium (overall average for full time/full year workers = 1.00)



Source: Statistics Canada 2022 Census.

5. ENGINEERS: SUPPLY AND DEMAND PROFILE

5.1 Canada-wide

According to the Canadian Occupational Projection System (COPS), the country is mostly expected to produce more engineers than it will need between 2019 and 2028. Table 15 provides the estimated demand and supply for 10 engineering-related occupations through 2028. The descriptions for each of the 10 National Occupational Codes (NOC) are as follows:

NOC:	Title:
0211	Engineering managers & Architecture and science managers
2131	Civil engineers
2132	Mechanical engineers
2133	Electrical and electronics engineers
2134	Chemical engineers
2141	Industrial and manufacturing engineers/Metallurgical and materials engineers
2143	Mining engineers; Geological engineers & Petroleum engineers
2146	Aerospace engineers & Other professional engineers, n.e.c.
2147	Computer engineers (except software engineers and designers)

Workforce demand comes from expansion (new jobs above the current level), retirements (replacement demand) and emigration (workers lost to leaving the country). Between 2019 and 2018, the COPS model projects there will be 96,900 job openings.

Workforce supply comes from school leavers (university), immigration and 'other', such as those changing careers. Over the 10-year period, COPS is estimating there will be 119,600 net job seekers in these 10 engineering-related occupations.

This results in a projected surplus of 22,700 more job seekers than jobs available over the decade.

Table 15: Supply and demand profile, Canada's engineering workforce (2019-2028)

Demand 2019-2028

NOC:	Expansion Demand:	Retirements:	Other Replacement Demand:	Emigration:	Projected Job Openings:
0211	4,300	9,000	1,100	800	15,200
2031	6,200	10,000	1,400	1,200	18,900
2132	3,200	6,400	800	900	11,300
2133	3,500	7,700	1,200	900	13,300
2134	600	2,500	300	200	3,600
2141	700	3,500	500	400	5,000
2143	600	3,400	500	500	5,100
2146	3,800	8,600	1,100	800	14,200
2147	4,400	4,700	600	500	10,300
Total	27,300	55,800	7,500	6,200	96,900

Supply 2019-2028

NOC:	School Leavers:	Immigration:	Other:	Projected Job Seekers:
0211	2,200	3,400	12,200	17,900
2031	30,100	9,700	-13,200	26,500
2132	19,300	8,200	-14,400	13,200
2133	17,000	8,800	-9,200	16,600
2134	5,100	2,200	-1,900	5,500
2141	7,600	3,800	-4,800	6,600
2143	12,900	3,200	-5,800	10,300
2146	14,700	2,500	-6,500	10,700
2147	8,600	6,000	-2,200	12,300
Total	117,500	47,800	-45,800	119,600

Surplus/deficit projection

0211	+2,700
2031	+7,600
2132	+1,900
2133	+3,300
2134	+1,900
2141	+1,600
2143	+5,200
2146	-3,500
2147	+2,000
Total	+22,700

Source: ESDC Canadian Occupational Projection System (COPS).

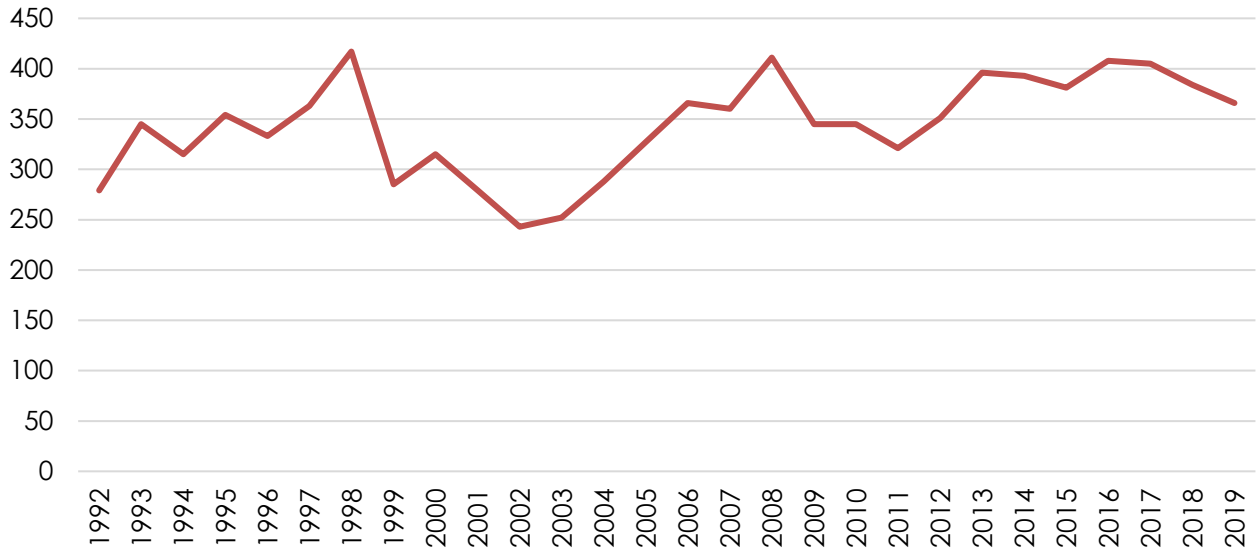
5.2 New Brunswick

While the COPS model does not publish province-specific forecasts for the detailed occupational groups, there is some concern the New Brunswick supply and demand profile is not as robust as the rest of the country.

Based on the age profile of the engineer and geoscientist workforce, New Brunswick is likely to see a similar level of retirements compared to the rest of the country income the coming decade but the province does not have as large as a local talent pipeline (university graduates) or immigrant talent pipeline (as discussed in Section 4.8 above).

Through the 2019-2020 year, over the previous 10 years New Brunswick universities have graduated an average of 375 people per year with degrees in architecture, engineering and related technologies. This followed a period in the early 2000s when there were less than 300 graduates per year. In the mid 1990s, New Brunswick universities were graduating a similar level of engineers and architects – even as there were very few retiring from the workforce.

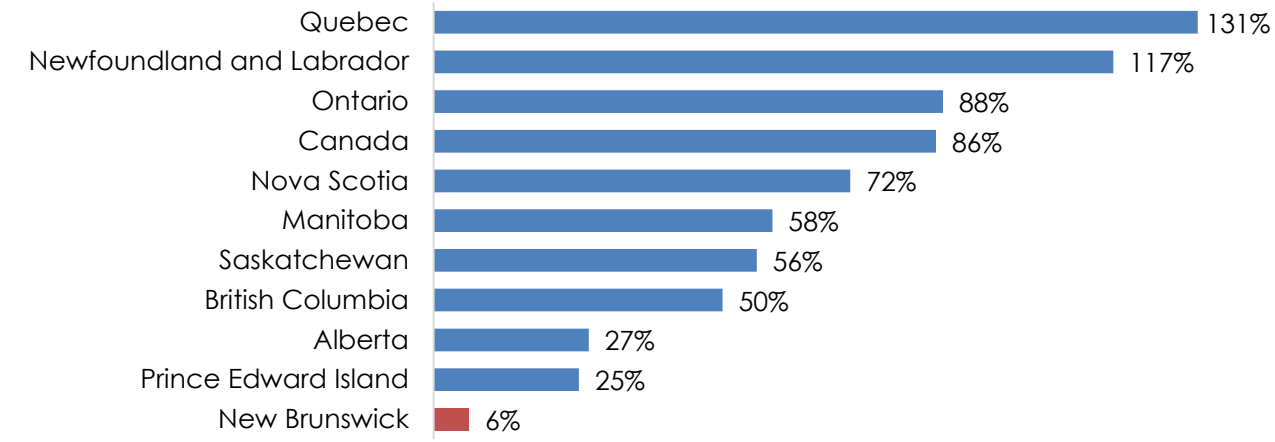
Figure 18: Annual university graduates with degrees in architecture, engineering and related technologies, New Brunswick



Source: Statistics Canada Table: 37-10-0183-01.

As shown in Figure 19, every province in Canada has seen a fairly significant increase in the number of persons graduating with university degrees in engineering and architecture, with the exception of New Brunswick. Across Canada, there was an 86 percent increase between 2009 and 2019 compared to only six percent in New Brunswick.

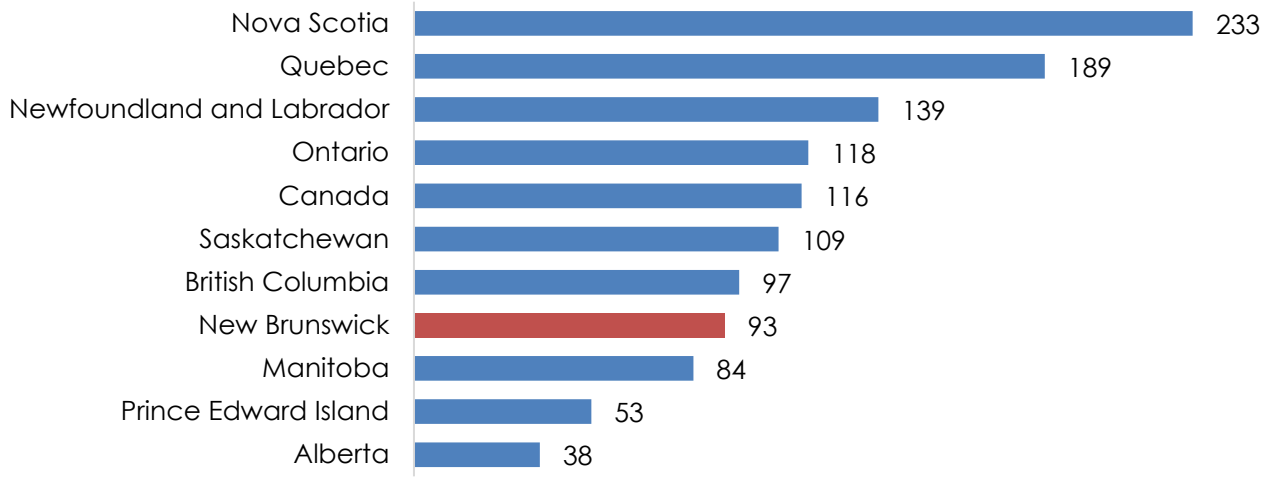
Figure 19: Increase in the number of persons graduating with university degrees in engineering and architecture, 2009 to 2019



Source: Statistics Canada Table: 37-10-0183-01.

New Brunswick used to have an above average ratio of annual university graduates in engineering and architecture relative to the size of the workforce. Now, the province graduates considerably below average, although still more than Manitoba, Prince Edward Island and Alberta, relative to the size of the workforce.

Figure 20: Number of annual university graduates in engineering and architecture per 1,000 in the provincial workforce



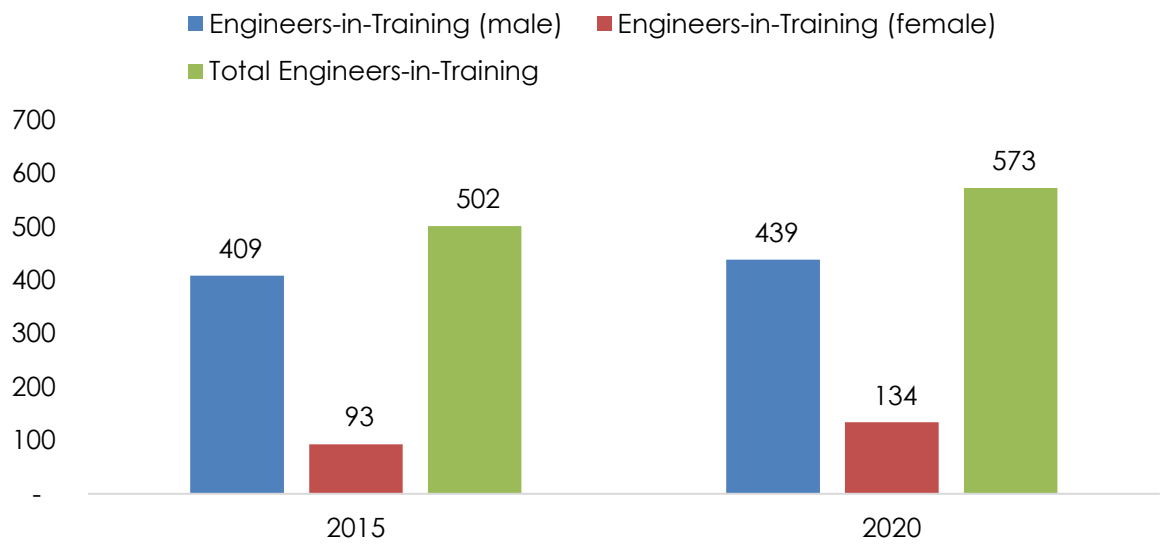
Source: Statistics Canada Table: 37-10-0183-01 and the 2016 Census.

Provinces with a smaller talent pipeline will need to attract engineers from provinces that are graduating a 'surplus', such as Nova Scotia. It is possible that engineering firms and investment will gravitate to those jurisdictions with the strongest talent pipeline.

The good news is that the data from Engineers Canada summarized in Section 4.1 shows there has been solid growth in the number of newly licensed engineers in the province in recent years.

In addition, the number of engineers-in-training in the province is on the rise, up 14 percent overall between 2015 and 2020 (up 44% among females).

Figure 21: Engineers-in-Training, New Brunswick



Source: Engineers Canada.

Boosting the size of the talent pipeline in the years ahead will be key to meeting the demand for engineering and geoscience talent (replacement and growth demand).

6. THE CASE FOR ENGINEERS AND GEOSCIENTISTS TO LIVE IN NEW BRUNSWICK

A main reason New Brunswick is attracting talent from across Canada and around the world is the quality of life offered to residents. The province offers reasonable living costs. Housing costs are among the most competitive in Canada. Many people own a house in the city and a cottage on the water for far less than they would pay for a modest house in the large urban centres. Other costs such as commuting to work, parking and entertainment are all highly competitive compared to other provinces. The province also offers a wide range of recreational opportunities with thousands of kilometres of hiking and biking trails and excellent winter indoor and outdoor activities, such as ice fishing and skiing. There is limited crime, and the province has strong social cohesion. There are good reasons the province's urban centres are rated as top locations to live. Maclean's magazine ranked Fredericton and Moncton in the top 10 best communities to live in Canada among 400+ cities in 2021. Saint John ranked 12th.

Reason #1: The cost of living is lower here

The overall cost of living in New Brunswick is lower than other provinces, particularly the larger provinces and the biggest cities in Canada. According to Statistics Canada, shelter costs can be much higher in other provinces compared to New Brunswick. Shelter costs include the cost of owning or renting a dwelling along with other costs such as utilities, property taxes and insurance. As shown in Table 16, the average household in Ontario spends 63 percent more on shelter than the average in New Brunswick and the average household in British Columbia spends 74 percent more. Even at the higher income quintiles, the cost of shelter is much lower in New Brunswick compared to the larger provinces.

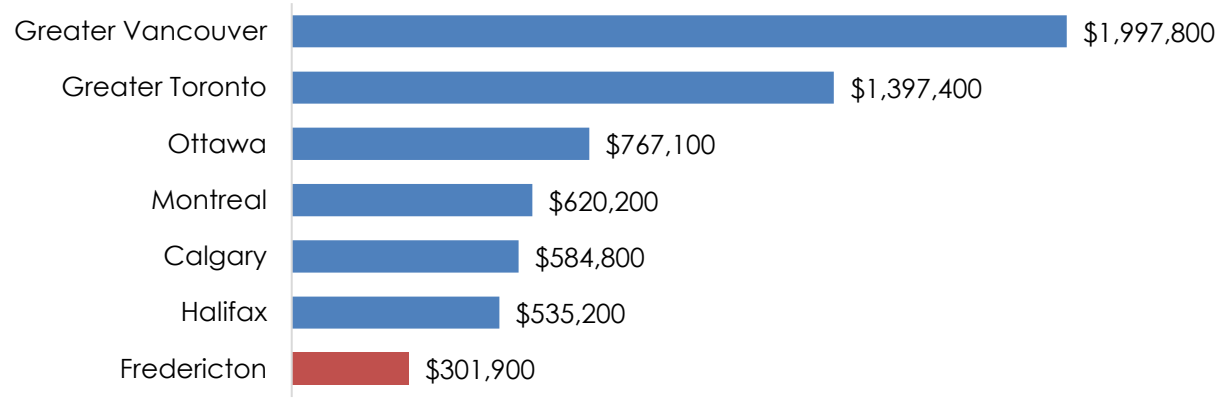
Table 16: Average household expenditures on shelter by province, 2019

Province:	Shelter costs:	% higher than New Brunswick
New Brunswick	$13,696	
Prince Edward Island	$14,048	+3%
Newfoundland and Labrador	$14,417	+5%
Quebec	$15,821	+16%
Nova Scotia	$16,028	+17%
Manitoba	$17,411	+27%
Saskatchewan	$19,436	+42%
Ontario	$22,364	+63%
Alberta	$22,591	+65%
British Columbia	$23,874	+74%

Source: Statistics Canada. Table 11-10-0223-01

Although housing prices in general have been rising across the country in the past couple of years, the price advantage in New Brunswick compared to Canada's larger urban centres is still very significant. As shown in Figure 22, the average price for a single-family dwelling in Fredericton is a fraction of the price in Vancouver, Toronto and Ottawa and 44 percent less than in Halifax.

Figure 22: Average selling price, single family benchmark, July 2022



Seasonally adjusted. Source: CREA

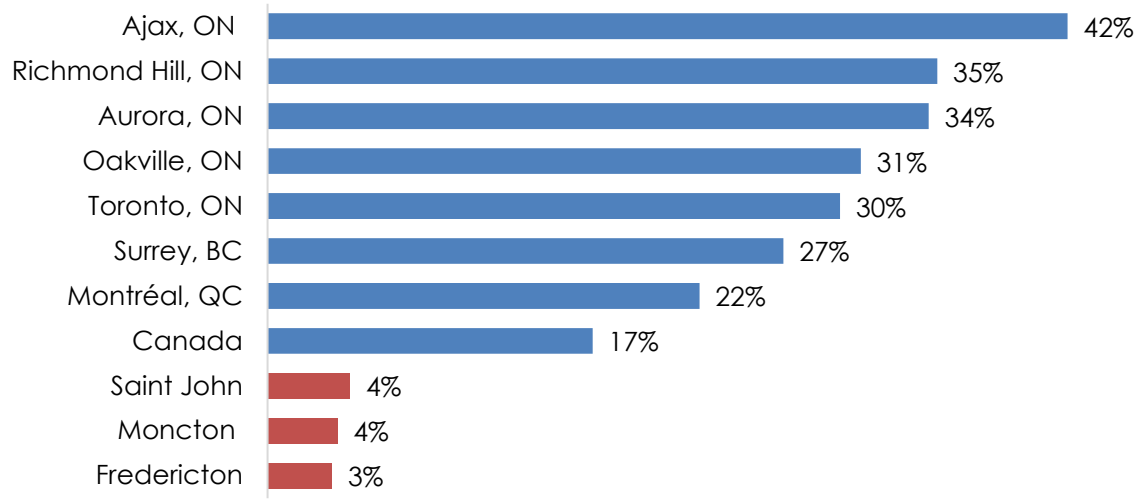
Reason #2: Commuting to work times are much lower here

If an engineer or geoscientist chooses to live in one of New Brunswick's seven urban centres, they can expect to spend far less time commuting to work, shop or eat out for that matter. Among those living in the City of Moncton, 56 percent spend less than 15 minutes getting to work each day. Compared with Canada's largest cities and the municipalities surrounding them, commute times can be 70-80% less in New Brunswick's cities.

Figure 23 shows selected cities in Canada and the share of workers who spend at least 45 minutes on the one-way daily commute to work. Over 40 percent of all commuters living in Ajax spend at least 45 minutes on the commute. Over one-third of all commuters living in Richmond Hill and Aurora spend 45 minutes or more on the commute. Even in the City of Toronto, where housing prices are sky high, 30 percent of all commuters spend at least 45 minutes getting to work. Contrast that with Moncton, where only four percent spend this much time on the daily commute.

For engineers and geoscientists looking to cut their commute times from an hour to 1.5 hours a day down to a few minutes, New Brunswick provides a great alternative.

Figure 23: One-way daily commute to work of at least 45 minutes



Source: Statistics Canada 2016 Census.

Reason #3: City, country and waterfront living is open to everyone

In New Brunswick, people can live in a city, in the country or even on a waterfront property and still be in close proximity to their place of work. An engineer could also do what many people do and own a house in the city and a cottage in the country or on the water.

Residents in the Saint John region are either living on the water or within minutes of the Bay of Fundy. People living in Moncton are a short commute from both the Bay of Fundy and the Northumberland Strait. People living in Fredericton are close to the majestic St. John River and numerous lakes and other rivers.

Reason #4: New Brunswick has limited crime and strong social cohesion

Canada as a country has a strong sense of social cohesion. In Statistics Canada's community health survey, people are asked if they have a strong or very strong sense of belonging to the local community. Among the 10 provinces, New Brunswick ranks third for the share of the population with a strong or very strong sense of belonging. Only 18 percent of New Brunswickers say their lives are quite a bit or extremely stressful, again near the lowest in Canada among the 10 provinces[8].

Canada also has very low crime compared to many other countries around the world and New Brunswick features relatively little crime. For example, the province's homicide

[8] Source: Statistics Canada Table 13-10-0096-01.

rate of only 1.79 per 100,000 is nearly 70 percent lower than the rate across the United States.

Reason #5: There are a broad range of career options

Even though New Brunswick is a small province, there are many potential career options for engineers and geoscientists. They can choose to work for small, exciting start up firms of which there is a growing number across the province, or they can work for a large, established firm. The public sector has a high demand for engineers and geoscientists and many work in their own practice or are owners in a larger accounting firm. With the rise of remote work, engineers and geoscientists that can choose where they want to live in Canada should take a long hard look at New Brunswick.

Reason #6: Live and work in both English and French

Canada is a bilingual country. New Brunswick is the only officially bilingual province in Canada. Engineers and geoscientists can live and work in both official languages. They can raise their children to be bilingual, opening up more doors for them in their future careers.

7. THE IMPACT OF A LIMITED LICENSURE INITIATIVE

7.1 Limited licensing report findings

In 2021, the APENGNB commissioned a report on the potential of a limited licensing and/or the regulation of engineering and geoscience technicians and technologists in the province.

Currently, New Brunswick is one of just three Canadian provinces and territories without a limited license option for skilled individuals who do not fully meet the requirements to be a professional engineer or geoscientist. The report concluded there is "stakeholder support and a strong overall business case for APEGNB to offer a limited engineering/geoscience license, similar to that offered across most other Canadian jurisdictions". The reasons for the strong business case included:

1. There is a growing trend in Canada toward the streamlining and amalgamation of regulation across related and similar professions under one regulatory body, driven by a growing appetite in government and the public to reduce administrative burden, duplication, and unnecessary redundancy.
2. A general limited license offered through APEGNB would serve to increase role clarity as well as to create consistency and alignment related to professional standards and scope of practice across the engineering and geoscience professions.
3. A general limited license would facilitate the transferability of licensing and practice rights to other jurisdictions. Most provinces with limited licenses allow out-of-province professionals to transfer limited licenses from other provinces where the licensee is regulated by the provincial engineering regulator.
4. Limited licensing of engineering and geoscience professionals fits within APEGNB's core mandate, which is public safety and protection.
5. APEGNB has a strong track record as a regulatory body in the fields of engineering and geoscience and is well positioned to ensure that consistent, high standards of education and experience are applied across limited licensees.

The main challenge in pursuing a limited license is the potential for push-back by some professional engineers who are concerned that limited licensees would encroach on their scope of practice.

7.2 Potential impact on APEGNB membership

The summary occupational profile of engineering technologists and technicians across the province is shown in Table 17. Using data from the 2021 Census, an indication of the potential impact on APEGNB membership can be developed.

It is possible there are trained engineering technologists and technicians classified in a number of different occupational codes (using the National Occupation Coding, NOC, system). The principal occupational codes are shown in Table 17. As of the 2021 Census there were 2,260 people working as geological and mineral technologists and technicians; civil engineering technologists and technicians; mechanical engineering technologists and technicians; industrial engineering and manufacturing technologists and technicians; and electrical and electronics engineering technologists and technicians.

Table 17: Engineering technologists and technicians workforce in New Brunswick (2021)

Occupational group:	Workforce:
NOC 2212 Geological and mineral technologists and technicians	140
NOC 2231 Civil engineering technologists and technicians	710
NOC 2232 Mechanical engineering technologists and technicians	460
NOC 2233 Industrial engineering and manufacturing technologists and technicians	200
NOC 2241 Electrical and electronics engineering technologists and technicians	750
Total	2,260

Source: Statistics Canada 2021 Census.

7.3 Economic contribution of New Brunswick's engineering-related technologists and technicians

New Brunswick's engineering-related technologists and technicians are also making an impressive contribution to the provincial economy. Table 18 shows the summary economic impact profile using a similar economic multipliers as developed for the engineers and geoscientists in Section 2.1 above.

In 2021, the work completed by the 2,260 engineering-related technologists and technicians boosted provincial GDP by an estimated $312 million, generated $199 million in employment income and supported a total of 3,135 full time equivalent jobs. With direct, indirect and induced effects, these workers generated an estimated $82 million in taxes for government of which $47.9 went to provincial and local governments.

Table 18: Economic impact summary, New Brunswick's engineering-related technologists and technicians

Engineering-related technologists and technicians (2021)	2,260
Average wages/salaries (2021)	$69,900
Total employment income	$157,974,000
Impact on provincial GDP*	$311,829,000
Total income supported*	$199,205,000
Total employment supported (FTE)*	3,135
Total induced taxes	$82,082,000
Local and provincial governments only	$47,874,000
Total household spending induced by NB's engineering-related technologists and technicians*	$151,029,000
Food expenditures	$64,736,000
Food purchased from stores	$48,095,000
Food purchased from restaurants	$16,635,000
Shelter	$93,486,000
Communications	$17,030,000
Pet expenses	$5,733,000
Household furnishings and equipment	$15,816,000
Clothing and accessories	$17,651,000
Transportation	$85,916,000
Gas and other fuels (all vehicles and tools)	$21,849,000
Maintenance and repairs of vehicles	$5,017,000
Health and personal care	$9,167,000
Personal care services	$3,454,000
Hair grooming services	$2,553,000
Recreation	$27,419,000
Recreational vehicles and associated services	$8,376,000
Operation of recreational vehicles	$2,020,000
Insurance**	$31,296,000
Gifts of money, support payments and charitable contributions	$10,785,000

**Direct, indirect and induced effects combined. See Appendix A for sources and methodology.*
***Includes homeowner and tenant insurance, vehicle insurance as well as health and life insurance payments.*

8. CONCLUSION: GROWING THE ENGINEERING AND GEOSCIENCE WORKFORCE

In conclusion, there are many good reasons to focus on growing the engineer and geoscientist workforce in New Brunswick combined with an economic development initiative to encourage engineering firms to provided export-focused services from their operations in New Brunswick.

The ability to grow the economic impact of engineers and geoscientists will be based on the strength of the talent pipeline. There are a number of ways the province could strengthen this talent pipeline in the years ahead:

- Boost the engineering and geoscience talent pipeline in the province's universities (domestic and international students).
- Continue to encourage young women into the profession.
- Attract a larger share of the immigrants coming to Canada with engineering or geoscience backgrounds.
- Work deliberately to attract more visible minorities and Indigenous persons into the workforce.
- Continue to ensure a bilingual workforce.
- Continue to promote self-employment as a career avenue for young people considering the profession.

APPENDIX A: THE ECONOMIC IMPACT MODEL AND SOURCES

The data sources used in the preparation of this report include:

Statistic:	Source/Description:
Engineers and geoscientists in New Brunswick (2022)	Association of Professional Engineers and Geoscientists of New Brunswick (APEGNB)
Total compensation estimates	Atlantic Canada Geoscience Salary and Benefits Survey 2022. Prepared by ClearPicture.
Various industry and occupational statistics	Statistics Canada Table: 14-10-0202-01.
Direct, indirect and induced GDP, employment and income estimates	Uses Statistics Canada Input-Output multiplier and impact estimates at the M industry level. Provincial Input-Output Multipliers, 2018. Catalogue no. 15F0046XDB. Industry Accounts Division. Statistics Canada. Includes multipliers for: output, gross domestic product (GDP) at market prices, taxes on products, labour income, wages and salaries, employers' social contributions, labour income of unincorporated sector, taxes on production and employment.
HST paid	Based on the ratio of HST collected to total provincial personal income in 2020 (Source: provincial budget documents and Statistic Canada).
Personal income taxes paid	Derived using several sources including Statistics Canada personal tax-related tables and its Survey of household spending (SHS) for 2019.
Property taxes paid (from employment income)	Derived using Statistics Canada's Survey of household spending (SHS) for 2019.
Indirect taxes	Source: Statistics Canada Input-Output tables. These indirect taxes are levied on the business activity (not employment income) and include such tax areas as: business property taxes, fuel taxes, vehicle license fees, land transfer taxes, and any sales taxes arising out of the corporate activity.

Statistic:	Source/Description:
Household spending impacts	Derived using Statistics Canada's Survey of household spending (SHS) for 2019.
Interprovincial and international exports	Source: Statistics Canada Table 12-10-0101-01.
Various labour market characteristics	Statistics Canada 2021 Census (except where noted).
Community Health Survey data	Statistics Canada Table 13-10-0096-01
Crime statistics	Source: Statistics Canada Table 35-10-0177-01.

APPENDIX B: ABOUT JUPIA CONSULTANTS INC.

New Brunswick, Canada-based Jupia Consultants Inc. is a full-service research and planning support consultancy specializing in the area of economic development. The firm has more than 20 years' experience working with companies, communities, industry associations, economic development agencies and government departments.

This report was prepared by David Campbell. David is the President of Jupia Consultants Inc. and has more than 25 years' experience as a consultant working with industry, not-for-profit organizations and governments across Canada. His focus areas include economic development strategy, economic impact analysis, population growth, cluster development and investment attraction. David was formerly Chief Economist with the Government of New Brunswick. In that role, he led the development of economic policy and economic development strategy for the provincial government.

David is a columnist with Brunswick News, a published author, and writes weekly for the It's the Economy, Stupid blog as well as co-presenting the weekly podcast Insights with Don Mills and David Campbell. In recent years, he has had the opportunity to collaborate with multiple think tanks and policy research organizations including the Conference Board of Canada, Public Policy Forum and the Donald J. Savoie Institute at the Université de Moncton.

For more information visit www.jupia.ca.