ATLANTIC CANADA'S CROSS-SECTORAL AND MULTIDISCIPLINARY ENVIRONMENTAL WORKFORCE: A SNAPSHOT OF EMPLOYMENT AND HIRING NEEDS TO 2033

MARCH 2024

eco canada

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Canada

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ATLANTIC CANADA ENVIRONMENTAL JOB OUTLOOK SNAPSHOT

The region's transition to a low carbon economy requires a thriving environmental workforce across all industries, regions and many occupations.

Total environmental workforce

The **total environmental workforce** includes core environmental workers (those who require environmental-specific knowledge, skills and competencies) and workers employed by environmental goods and services organizations.

We estimate that **1 in 14 workers** in Atlantic Canada are part of the total environmental workforce.

86,270

ENVIRONMENTAL WORKERS IN 2024

7% of Atlantic Canada's workforce

+8,190

NET NEW JOBS BY 2033

9% growth from 2024

+20,720

JOB OPENINGS DUE TO RETIREMENTS

72% of net job openings

28,910

NET JOB OPENINGS TO 2033

34% of 2024 environmental employment

JOB OPENINGS

Top Industries

Public Administration	6,590
Health Care & Social Assistance	4,180
Professional, Scientific & Technical Services	3,660

Top Specializations

Sustainability	6,600
Natural Resource Management	5,870
Fisheries & Wildlife	5,060

Top Occupations

Other Managers In Public Administration	1,220
Administrative Officers	720
Home Building & Renovation Managers	680

Core environmental workforce

Core environmental workers require environmental-specific knowledge, skills and competencies.

JOB OPENINGS

Top Core Occupations

Administrative Officers	720
Civil Engineers	582
Firefighters	470

26,970

CORE ENVIRONMENTAL WORKERS IN 2024

31% of Atlantic Canada's environmental workforce

+2,060

NEW JOBS BY 2033

8% growth from 2024

+6,960

JOB OPENINGS DUE TO RETIREMENTS BY 2033

77% of net job openings

9,020

NET JOB OPENINGS TO 2033

33% of 2024 core environmental employmen

Introduction

The past few years have been incredibly challenging and frustrating for Atlantic Canada and Atlantic Canadians. The region has been hit hard with environmental disasters, a novel but global pandemic, and economic challenges, particularly in Newfoundland and Labrador as its economy was negatively impacted by dropping oil prices.

Across Canada the GDP dropped by 5% between 2019 and 2020, highlighting the impact of COVID on the national economy. This trend continued in Atlantic Canada with a 4% drop in GDP over the same period. While the Atlantic region mirrors the national trend over the past five years (5.8% increase in GDP from 2018 to 2022 in Canada, compared to 4.3% increase in Atlantic), the economies of individual provinces varied greatly:

- Newfoundland and Labrador: **GDP contracted 1.7% from 2018 to 2022**
- Prince Edward Island: **GDP increased 13.0% from 2018 to 2022**
- Nova Scotia: **GDP increased 7.6% from 2018 to 2022**
- New Brunswick: **GDP increased 4.0% from 2018 to 2022**[1]

Unemployment rates reached as high as 17.6% in Newfoundland and Labrador during peak impact of COVID and its public health restrictions in May and June of 2020. Atlantic Canada's employment rate has surpassed pre-pandemic levels with Nova Scotia posting an average unemployment rate in 2023 of 6.4% (unemployment was 7.4% in 2019) and Newfoundland and Labrador with the highest unemployment rate at 9.9% in 2023 (unemployment was 12.2% in 2019).[2]

The region is undergoing an exciting transition to green energy. The completion of Muskrat Falls and transmission of clean, renewable electricity via the Maritime Link, combined with recent developments towards green hydrogen exports demonstrate a shift in the region.

[1] Statistics Canada. Table 36-10-0222-01 Gross domestic product, expenditure-based, provincial and territorial, annual (x 1,000,000)
[2] Statistics Canada. Table 14-10-0287-01 Labour force characteristics, monthly, seasonally adjusted and trend-cycle, last 5 months

AND YET, MANY QUESTIONS AND UNCERTAINTIES REMAIN

- What other green energy opportunities exist in the region?
- Can the region capitalize on its natural resources to develop green energy?
- Are the region's industries prepared to answer the calls for a net-zero economy?
- What jobs will grow or emerge in the context of a digital, diversified, and low-carbon economic transformation?

Canada, along with many nations across the globe, is calling for a more responsible and sustainable way toward economic growth. This report intends to shed light on where environmental jobs and talent exist today and where new opportunities lie ahead for the remainder of this decade.

Our Atlantic Canada environmental labour demand outlook to 2033 kicks off with a review of how this decade started and follows with our employment and hiring projections for the province overall and by industry, occupation, and environmental areas of specialization. This report closes with recommended workforce solutions, such as drawing from unemployed and underemployed workers, to meet hiring needs and bridge labour and skill shortages.

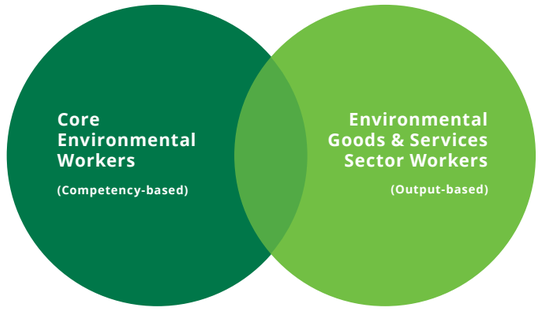
The data and insights from this report can help inform business, policy, program, and career decisions. It can help bust myths and reveal opportunities for industries, employers, government, communities, academia, and individuals. After all, environmental talent in every industry and discipline will be essential for Atlantic Canada to reach a sustainable, prosperous, inclusive and equitable future.

SPOTLIGHT: THE ENVIRONMENTAL WORKFORCE DEFINED

Canada's environmental workforce drives or supports the goals of natural resource management, environmental protection, and sustainability. Our definition includes:

- Core environmental workers (i.e., those in roles requiring specialized environmental competencies) regardless of industry, and
- Those directly employed within the environmental goods and services firms, regardless of occupation.

A Chief Sustainability Officer and Remediation Specialist working in oil and gas; a Conservation Officer in government; a Water and Wastewater Treatment Operator in utilities; an Energy Auditor and Environmental Engineer in construction; and an Environmental Advisor, Accountant, and Human Resource Advisor working in an environmental consulting firm are all included in our definition (see our Career Profiles to explore over 100 roles that are part of Canada's growing environmental workforce).



We also classify environmental workers according to 13 key environmental specializations or sub-sectors, from Air Quality to Fisheries & Wildlife, Natural Resource Management, and Environmental Education & Training (see our sector model for the complete list of specializations/sub-sectors).

This study presents estimates for environmental employment and net hiring requirements in Atlantic Canada from 2024 to 2033. Our labour demand outlook integrates multiple sources of data:

- Online job postings from TalentNeuron,
- Statistics Canada's Census and Labour Force Survey,
- Employment and Social Development Canada's Canadian Occupational Projection System,
- GDP growth in accordance with an average of long-term growth forecasts published by the Parliamentary Budget Office, the Department of Finance Canada, and the Organization for Economic Co-operation and Development (OECD), and
- Sectoral trends for industries within this framework are provided by Stokes Economics.

Environmental employment is estimated by identifying the 2023 EnviroShare—the proportion of environmental workers compared to all workers at the occupational level—and applying these to forecasted employment data. **Net hiring requirements** are derived by combining jobs created from employment growth (expansion demand) and jobs that become available as workers retire (replacement demand).

Numbers have been rounded in many cases for readability.

Refer to **Appendix A** for more information about our labour demand forecast and **Appendix B** for a list of top occupations for environmental workers.

Composition of the Environmental Workforce in Atlantic Canada

Roughly **1 in 14** workers in Atlantic Canada (**86,270**) are in an environmental role in 2024. About **26,970** (or **31%**) are core environmental workers.

Top Occupations

The job families[3] with the most environmental workers are:

- Natural and applied sciences and related occupations (**22,000**)
- Trades, transport and equipment operators and related occupations (**16,600)**
- Business, finance and administration occupations (**12,200**)
- Occupations in education, law and social, community and government services (**10,600**)

More than one-quarter of environmental workers were in Natural and applied sciences and related occupations, a job family that includes scientists, engineers, engineering technologists and technicians, and information technology specialists. This is a stark contrast to the 9% of all Atlantic Canadians working in Natural and applied sciences and related occupations overall. Other top job families for environmental employment were consistent with proportions of total employment: Trades, transport and equipment operators and related occupations (19% environmental workforce vs 18% total workforce), Business, finance and administration occupations (14% environmental workforce vs 15% total workforce), and Occupations in education, law and social, community and government services (12% environmental workforce vs 12% total workforce).[4]

In contrast, Sales and service occupations made up 24% of the total Atlantic Canada workforce, but only 9% of the environmental workforce.

[3] 1-digit National Occupational Code (NOC). For more information, visit https://noc.esdc.gc.ca/.

[4] Total workforce based on 2023 data.

The top occupations[5] for environmental employment are completely different than the top occupations by environmental employment share:

- Professional occupations in advertising, marketing and public relations (**1,900**), Civil engineers (**1,640**), and Other managers in public administration (**1,500**) round out the top three occupations for environmental employment.
- The highest environmental employment shares are observed for Forestry professionals (**88%**), Conservation and fishery officers (**82%**), and Water and waste treatment plant operators (**75%**).

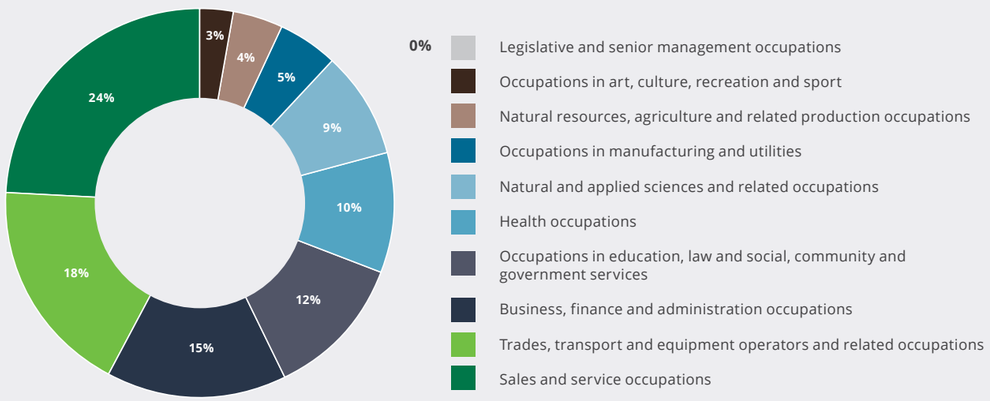
Most of the occupations listed above involve core environmental workers (i.e., those in roles requiring environmental-specific competencies), exceptions include Professional occupations in advertising, marketing and public relations, and Other managers in public administration.

Top three environmental occupations vary by region:

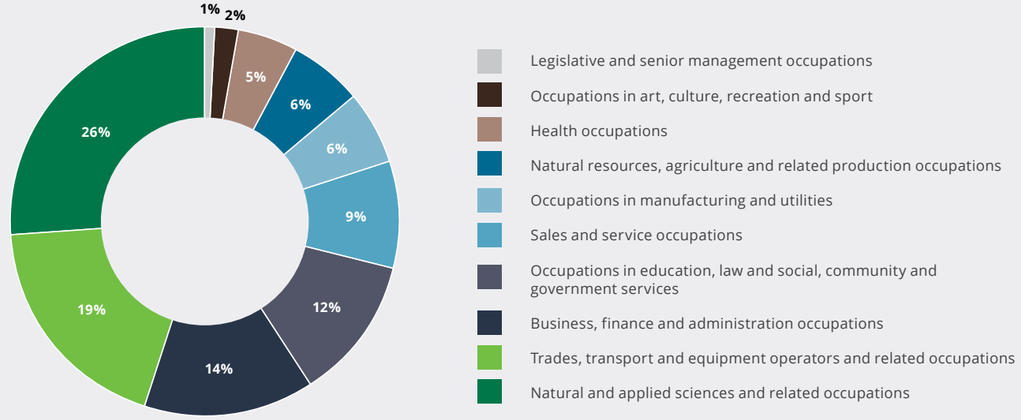
- Professional occupations in advertising, marketing and public relations was among the top three occupations in Canada (**44,870**) and Atlantic Canada (**1,900**), as well as within New Brunswick (**540**) and Nova Scotia (**1,050**)
- Civil engineers was among the top three occupations in Canada (**38,890**) and Atlantic Canada (**1,640**), as well as within Nova Scotia (**810**)
- Home building and renovation managers was among the top three occupations in Canada (**32,670**) and Prince Edward Island (**140**)
- Other managers in public administration was among the top three occupations in Atlantic Canada (**1,500**), as well as within New Brunswick (**580**) and Prince Edward Island (**140)**
- Conservation and fishery officers was among the top three occupations in Newfoundland and Labrador (**430**) and Prince Edward Island (**110**)
- Underground production and development miners was among the top three occupations in Newfoundland and Labrador (**650**)
- Biologists and related scientists was among the top three occupations in New Brunswick (**520**)

[5] 5-digit National Occupational Code (NOC). For more information, visit https://noc.esdc.gc.ca/.

Total Employment 2023



Total Employment 2024



SPOTLIGHT: THE RISE OF GREEN MARKETING

Green marketing involves genuine efforts by businesses to promote products and services as environmentally friendly. Companies adopting green marketing practices incorporate sustainability into their operations, production, and supply chains. This can include the use of eco-friendly materials, energy-efficient processes, and a commitment to reducing their overall environmental impact. Green marketing aims to attract and appeal to consumers who prioritize sustainability, fostering a positive image and building brand loyalty through authentic environmental stewardship.

ECO Canada monitors trends in job postings for environmental workers across Canada. Our most recent job posting analysis[6] reveals that from 2021 to 2023 there were more than 1,000 environmental job ads each year for Professional occupations in advertising, marketing and public relations and 40% of all job ads in this occupation reflected a demand for environmental workers in 2023.

Our outlook for this occupation suggests that this trend will continue. We estimate that one in five workers in this occupation are in environmental roles and project 20,400 net job openings for environmental workers in this occupation through 2033 across Canada. Roughly 63% of those job openings (12,910) will be in Ontario, 15% will be in British Columbia (3,150) and 13% in Alberta (2,750).

[6] https://eco.ca/research-and-resources/environmental-job-market-trends/

Table 1. Top Occupations by Industry

INDUSTRY (NAICS)	ENVIRONMENTAL EMPLOYMENT IN 2024	INDUSTRY SHARE OF ENVIRONMENTAL EMPLOYMENT IN 2024	TOP OCCUPATIONS (BASED ON ENVIRONMENTAL EMPLOYMENT)
ALL INDUSTRIES	**86,270**	**100%**	• **Professional occupations in advertising, marketing and public relations (1,900)** • **Civil engineers (1,640)** • **Other managers in public administration (1,500)**
Public administration (91)	16,500	19%	• Other managers in public administration (1,480) • Conservation and fishery officers (920) • Government managers – economic analysis, policy (710)
Health care and social assistance (62)	9,480	11%	• Nurse aides, orderlies and patient service associates (1,310) • Light duty cleaners (730) • Registered nurses and registered psychiatric nurses (700)
Professional, scientific and technical services (54)	8,770	10%	• Civil engineers (720) • Lawyers and Quebec notaries (370) • Other professional occupations in social science (340)
Construction (23)	8,350	10%	• Home building and renovation managers (1,280) • Construction managers (890) • Contractors and supervisors, heavy equipment operator crews (500)
Manufacturing (31-33)	5,490	6%	• Manufacturing managers (390) • Construction millwrights and industrial mechanics (270) • Supervisors, forest products processing (200)
Educational services (61)	5,370	6%	• University professors and lecturers (700) • Professional occupations in advertising, marketing and public relations (470) • Post-secondary teaching and research assistants (450)
Utilities (22)	3,620	4%	• Power system electricians (480) • Water and waste treatment plant operators (400) • Electrical power line and cable workers (400)
Retail trade (44)	3,550	4%	• Retail and wholesale trade managers (490) • Retail sales supervisors (300) • Retail salespersons and visual merchandisers (220)
Agriculture, forestry, fishing and hunting (11)	3,480	4%	• Managers in aquaculture (430) • Forestry technologists and technicians (410) • Managers in agriculture (380)
Transportation and warehousing (48)	3,450	4%	• Railway conductors and brakemen/women (390) • Railway yard and truck maintenance workers (300) • Deck officers, water transport (240)
Mining, quarrying and oil and gas extraction (21)	3,410	4%	• Underground production and development miners (700) • Petroleum engineers (260) • Geological and mineral technologists and technicians (240)
Other services (except public administration (81)	2,500	3%	• Professional occupations in advertising, marketing and public relations (360) • Automotive service technicians, truck and bus mechanical repairers (100) • Religious leaders (100)
Administrative and support, waste management and remediation services (56)	2,460	3%	• Security guards and related security service occupations (240) • Public works and maintenance labourers (230) • Water and waste treatment plant operators (180)
Wholesale trade (41)	2,230	3%	• Technical sales specialists - wholesale trade (250) • Sales and account representatives - wholesale trade (non-technical) (220) • Retail and wholesale trade managers (150)

Top Industries

In 2024, the largest industry employer of environmental workers is Public administration, reflecting **almost one fifth** of the total number of environmental workers in Atlantic Canada (**16,500** workers).

Industries and Occupations Crosscut

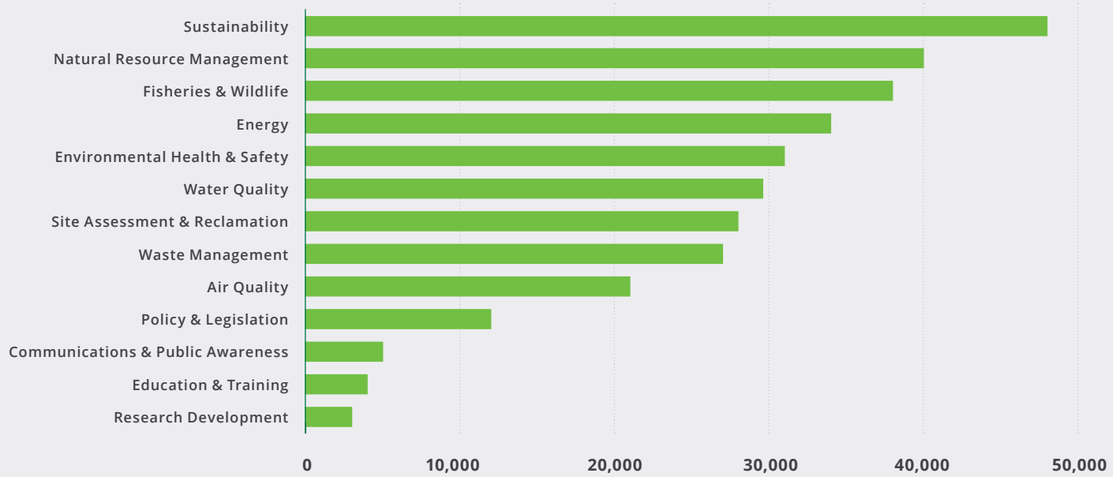
Industries interact with environmental objectives in different ways thereby requiring different environmental workers to achieve the desired results. As such, the top occupations employed in Atlantic Canada's key industries are very different. For instance, under the umbrella of Construction, managerial roles are more frequently observed. In contrast, the Professional, scientific and technical services sector has a larger proportion of engineers and specialists. The Utilities sector has notable needs for Power system electricians and Waste and water treatment operators.

TOP SPECIALIZATIONS

The top specializations for environmental employment in Atlantic Canada are:

Sustainability	46,420
Natural Resource Management	40,170
Fisheries & Wildlife	36,920

Figure 1. Environmental Employment by Specialization, 2024



Looking Forward: Environmental Hiring Needs in the Next Decade

Our employment forecast indicates a small but consistent growing demand for the region's environmental workforce from 2024 to 2033 with an estimated 1% year-over-year growth in environmental employment. Approximately **8,200 net new environmental jobs** will be added in the next decade, with about 70% of expansion demand generated in the first five years. This trend is consistent across almost every province in Atlantic Canada, with Prince Edward Island expected to have somewhat slower growth in the first five years (45% compared to 70% or higher in each other province).

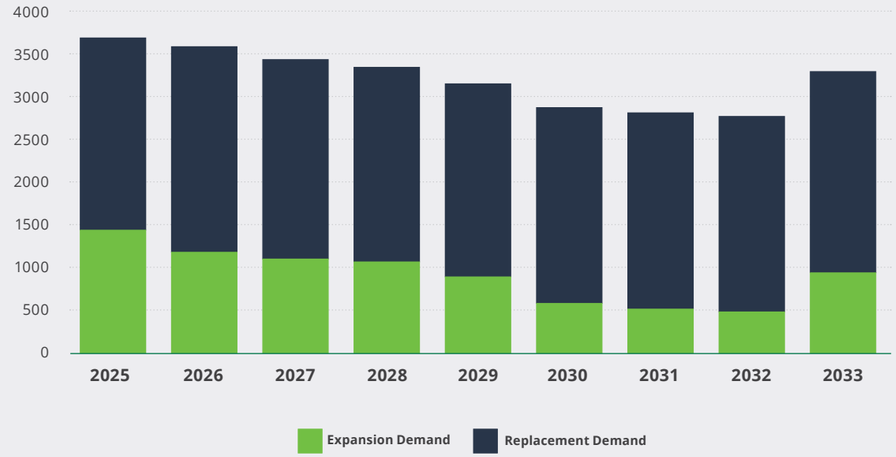
Technology and innovation investments for both traditional sectors such as agriculture and emerging sectors such as ocean technology, combined with efforts towards net zero will help drive green growth in the region.

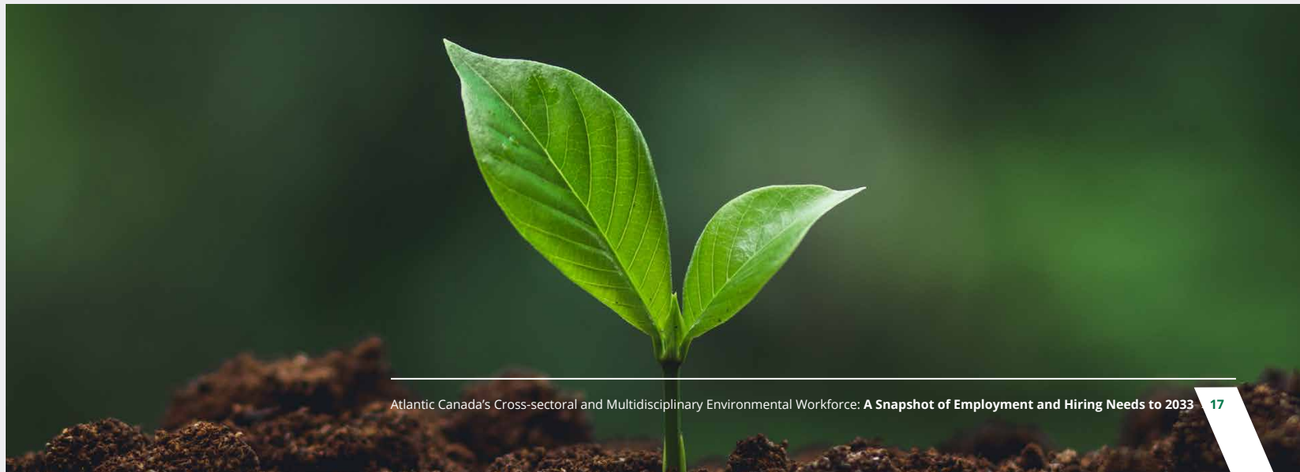
When expansion demand is combined with replacement demand, we estimate that **28,910 net environmental job openings will need to be filled by 2033.** This hiring number equates to over 34% of 2024 employment and provides a career stream for new and existing talent. A cause for concern is Atlantic Canada's aging population. This trend is also prevalent in the environmental workforce where we could see over 24% of the current workforce retire in the next nine years. Employers must engage and develop both new and experienced workers to meet labour demand through 2033.

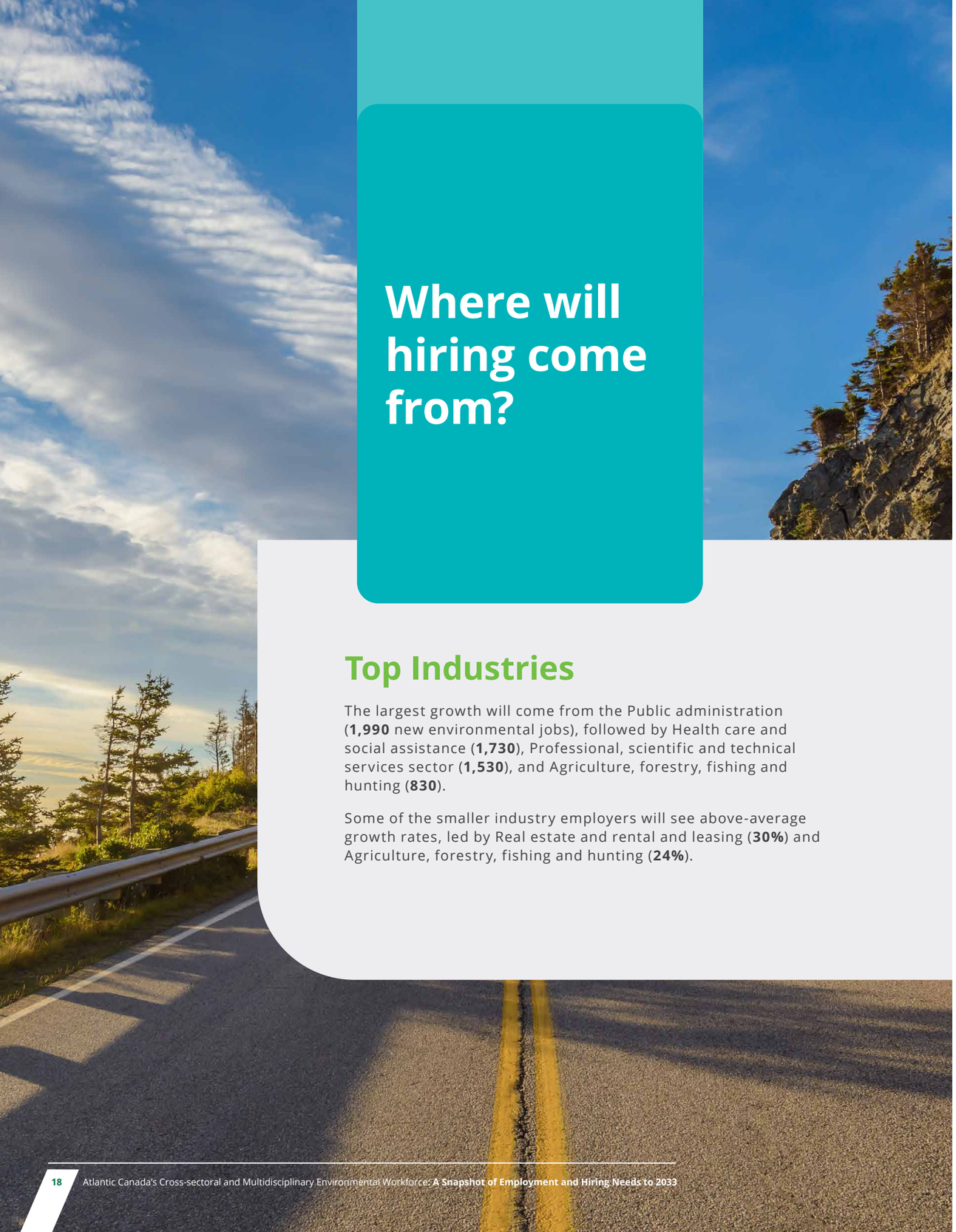
Figure 2. Environmental Employment in Atlantic Canada, 2024 to 2033

	ENVIRONMENTAL EMPLOYMENT		
	2024	2033	2024 to 2033 % changed
Canada	**1,413,710**	**1,550,000**	**9%**
Atlantic	**86,270**	**94,460**	**9%**
NL	18,630	19,800	6%
PEI	5,920	6,650	12%
NS	34,920	38,110	9%
NB	26,800	29,900	10%

Figure 3. Environmental Net Hiring Requirements to 2033







Where will hiring come from?

Top Industries

The largest growth will come from the Public administration (**1,990** new environmental jobs), followed by Health care and social assistance (**1,730**), Professional, scientific and technical services sector (**1,530**), and Agriculture, forestry, fishing and hunting (**830**).

Some of the smaller industry employers will see above-average growth rates, led by Real estate and rental and leasing (**30%**) and Agriculture, forestry, fishing and hunting (**24%**).

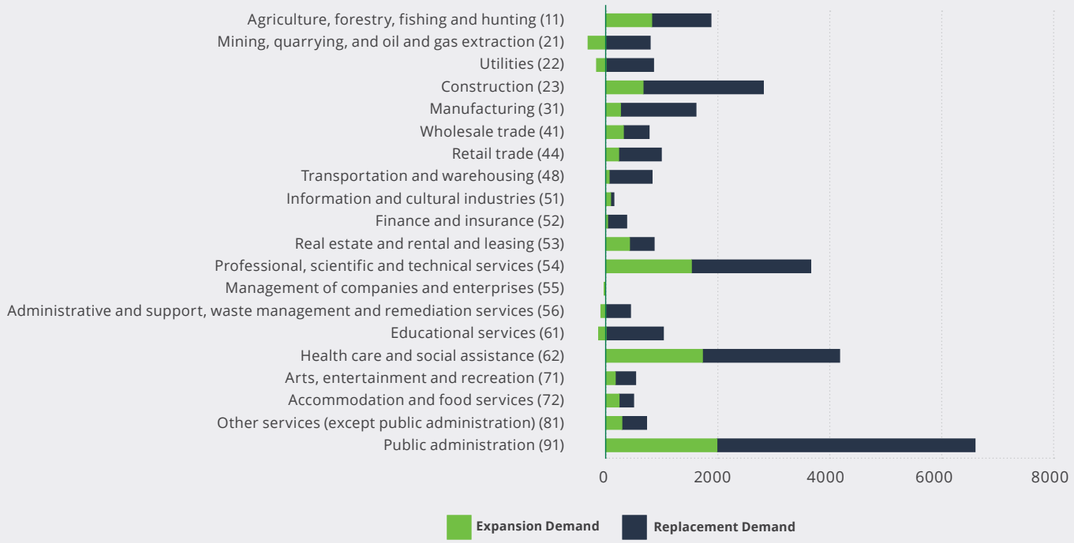
Table 3. Environmental Net Hiring to 2033, by Industry

INDUSTRY	ENVIRONMENTAL EMPLOYMENT IN 2024	EXPANSION DEMAND 2024-2033	REPLACEMENT DEMAND 2024-2033	NET HIRING REQUIREMENTS 2024-2033	NET HIRING REQUIREMENTS AS A % OF ENVIRONMENTAL EMPLOYMENT IN 2024
ALL INDUSTRIES	**86,270**	**8,190**	**20,720**	**28,910**	**34%**
Public administration (91)	16,500	1,990	4,600	6,590	40%
Health care and social assistance (62)	9,480	1,730	2,450	4,180	44%
Professional, scientific and technical services (54)	8,770	1,530	2,130	3,660	42%
Construction (23)	8,350	670	2,150	2,820	34%
Agriculture, forestry, fishing and hunting (11)	3,480	830	1,060	1,890	54%
Manufacturing (31)	5,490	270	1,350	1,620	29%
Retail trade (44)	3,550	240	760	1,000	28%
Educational services (61)	5,370	-140	1,020	880	16%
Real estate and rental and leasing (53)	1,460	430	440	870	60%
Transportation and warehousing (48)	3,450	70	760	830	24%
Wholesale trade (41)	2,230	320	460	780	35%
Other services (except public administration) (81)	2,500	290	440	730	29%
Utilities (22)	3,620	-170	850	680	19%
Arts, entertainment and recreation (71)	1,880	180	360	540	29%
Accommodation and food services (72)	1,430	240	260	500	35%
Mining, quarrying, and oil and gas extraction (21)	3,410	-320	790	470	14%
Finance and insurance (52)	1,930	40	340	380	20%
Administrative and support, waste management and remediation services (56)	2,460	-90	440	350	14%
Information and cultural industries (51)	830	90	60	150	18%
Management of companies and enterprises (55)	80	-10	0	-10	-13%

Source: Statistics Canada

While some industries will experience high expansion demand through 2033, others, like Mining, quarrying, and oil and gas extraction, may undergo a contraction combined with a significant replacement demand due to an aging workforce.

Figure 4. Environmental Net Hiring Requirements to 2033, by Industry



Among the top industries employing environmental workers replacement demand accounts for the majority of the environmental net hiring to 2033.

- Public administration replacement demand is **70%** of net hiring requirements (**6,590**)
- Health care and social assistance replacement demand is **59%** of net hiring requirements (**4,180**)
- Professional, scientific and technical services replacement demand is **58%** of net hiring requirements (**3,660**)
- Construction replacement demand is **76%** of net hiring requirements (**2,820**)

Top Occupations

Net hiring requirements are highest for:

- Other managers in public administration (**1,220 job openings**)
- Home building and renovation managers (**690**)
- Civil engineers (**580**)

Table 4. Environmental Net Hiring Requirements, by Occupation

OCCUPATION (NOC)	ENVIROSHARE IN 2023	ENVIRONMENTAL EMPLOYMENT IN 2024	EXPANSION DEMAND 2024-2033	REPLACEMENT DEMAND 2024-2033	NET HIRING REQUIREMENTS 2024-2033	NET HIRING REQUIREMENTS AS A % OF ENVIRONMENTAL EMPLOYMENT IN 2024
ALL OCCUPATIONS	**7%**	**86,270**	**8,190**	**20,720**	**28,910**	**34%**
Other managers in public administration (40019)	63%	1,500	480	740	1,220	81%
Home building and renovation managers (70011)	22%	1,280	210	480	680	53%
Civil engineers (21300)	56%	1,640	220	360	580	35%
Professional occupations in advertising, marketing and public relations (11202)	23%	1,900	160	240	400	21%
Conservation and fishery officers (22113)	82%	1,270	10	230	240	19%

Refer to **Appendix B** for the 100 occupations with the greatest environmental net hiring requirements to 2033.

Top occupations with the greatest environmental net hiring vary by region with Professional occupations in advertising, marketing and public relations being the occupation with the largest net hiring requirement to 2033 across Canada (20,410 net jobs to 2033), however, this occupation did not register among the top three occupations in the Atlantic, or among any Atlantic Provinces.

	NET HIRING REQUIREMENTS 2024-2033					
	Canada	Atlantic	NL	PEI	NS	NB
Professional occupations in advertising, marketing and public relations (11202)	20,410	400				
Home building and renovation managers (70011)	18,290	680				*
Other managers in public administration (40019)	15,740	1,220	*	*	*	*
Administrative officers	12,250	720			*	
Occupational health and safety specialists	10,140	580	*			
Civil engineers	9,080	580		*		*

Top Specializations

Two of the top three specializations for expansion demand were in the top three for 2024 employment:

- **Sustainability** (4,170)
- **Natural Resource Management** (3,610)

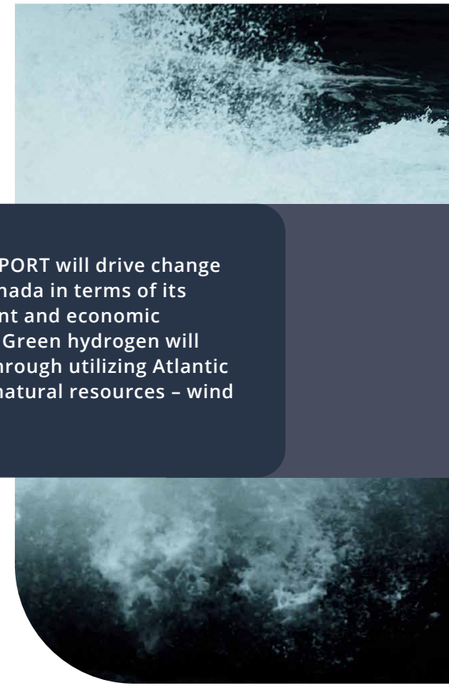
Rounding out the **top three** specializations for expansion demand is **Environmental Health & Safety** (3,260).

The top three specializations for replacement demand are:

- Sustainability (**2,430**)
- Natural Resource Management (**2,270**)
- Fisheries & Wildlife (**1,940**)

Net hiring requirements are highest for:

- Sustainability (6,600)
- Natural Resource Management (**5,870**)
- Fisheries & Wildlife (**5,060**)



HYDROGEN EXPORT will drive change for Atlantic Canada in terms of its carbon footprint and economic opportunities. Green hydrogen will be produced through utilizing Atlantic Canada's rich natural resources – wind and water.

Table 5. Environmental Net Hiring Requirements, by Environmental Specialization

SPECIALIZATION	2024 ENVIRONMENTAL EMPLOYMENT	EXPANSION DEMAND	REPLACEMENT DEMAND	NET HIRING REQUIREMENTS TO 2030
Sustainability	46,430	4,170	2,430	6,600
Natural Resource Management	40,170	3,610	2,270	5,870
Fisheries & Wildlife	36,920	3,120	1,940	5,060
Environmental Health & Safety	30,480	3,260	1,600	4,860
Energy	33,650	3,060	1,690	4,750
Waste Management	26,010	2,570	1,410	3,980
Water Quality	27,160	2,530	1,400	3,930
Site Assessment & Remediation	26,500	2,560	1,280	3,840
Air Quality	21,490	2,010	1,050	3,060
Policy & Legislation	12,450	1,180	660	1,830
Communications & Public Awareness	5,960	720	280	1,000
Education & Training	5,570	570	170	740
Research & Development	4,070	470	140	610

Core Environmental Workforce Net Hiring Requirements

The EnviroShare for core environmental workforce occupations (i.e., those roles requiring specialized environmental competencies) in Atlantic Canada is **22%**, as opposed to **7%** for all occupations. The three occupations with the highest EnviroShares (Forestry professionals, Conservation and fishery officers and Water and waste treatment plant operators) are also core environmental occupations.

The three occupations with the highest number of core environmental workers vary somewhat from the overall environmental workforce, including:

- Civil engineers (**1,640** workers)
- Conservation and fishery officers (**1,270**)
- Administrative officers (**1,240**)

Looking ahead to 2033, the highest net hiring requirements for core environmental workers are expected to be for Administrative officers (**720** job openings), Civil engineers (**580**), and Firefighters (**470**). These occupations also have the largest increases in new jobs (expansion demand).

As a result of retirements, deaths, and provincial outmigration Administrative officers (**430**), Civil engineers (**360**), and Government managers – economic analysis, policy development and program administrators (**300**) are predicted to see the greatest replacement demand among core environmental workers.

Table 6. Environmental Net Hiring Requirements, by Top Core Environmental Occupation

OCCUPATION (NOC)	ENVIRONMENTAL EMPLOYMENT IN 2024	EXPANSION DEMAND 2024-2033	REPLACEMENT DEMAND 2024-2033	NET HIRING REQUIREMENTS 2024-2033	ENVIROSHARE IN 2023
Administrative officers (13100)	1,240	290	430	720	13%
Civil engineers (21300)	1,640	220	360	580	56%
Firefighters (42101)	630	200	270	470	40%
Biologists and related scientists (21110)	1,150	140	250	390	48%
Public and environmental health and safety professionals (21120)	910	50	280	330	53%
Contractors and supervisors, mechanic trades (72020)	670	80	230	310	19%
Engineering managers (20010)	510	150	150	300	34%
Construction managers (70010)	1,080	10	280	290	25%
Civil engineering technologists and technicians (22300)	460	150	130	280	29%
Other professional engineers (21399)	870	80	200	280	35%
Forestry technologists and technicians (22112)	930	80	190	270	73%
Construction millwrights and industrial mechanics (72400)	720	30	230	260	12%
Conservation and fishery officers (22113)	1,270	10	230	240	82%
Professional occupations in business management consulting (11201)	480	110	140	250	10%
Government managers - economic analysis, policy development and program administration (40011)	730	-60	300	240	36%
Police officers (except commissioned) (42100)	450	60	160	220	11%
Technical occupations in geomatics and meteorology (22214)	610	110	100	210	49%
Facility operation and maintenance managers (70012)	520	20	180	200	23%
Managers in social, community and correctional services (40030)	340	50	130	180	12%
University professors and lecturers (41200)	710	-70	260	190	11%

SPOTLIGHT: CLEAN HYDROGEN EXPORT RACE IN ATLANTIC CANADA

EVERWIND

EVERWIND FUELS

Two projects in Atlantic Canada – one in Nova Scotia and one in Newfoundland and Labrador.

1 Point Tupper (Nova Scotia)[7]

- Project is a green energy hub, consisting of wind farms, solar PV, and a plant to generate and export carbon-free hydrogen and ammonia.
- Three phases are planned. Phase 1: Green ammonia from onshore wind and solar PV. Phase 2: Onshore wind. Phase 3: Green fuels from offshore wind.
- Certified green by the European Commission for Renewable Fuels of Non-Biological Origin (RFNBO).
- $125M loan from Government of Canada (following final due diligence) to support clean power generation and clean hydrogen production.
- Recent Economic Impact Assessment estimated 5,190 full-time equivalent jobs in Nova Scotia during the construction period and 820 full-time equivalent jobs in Nova Scotia per year in operations for Phase 1. A further 16,880 full-time equivalent jobs in Nova Scotia are expected during the construction phase of Phase 2, with 2,400 full-time equivalent jobs per year during the operations of Phase 2.

2 Burin Peninsula Green Fuels Project (Newfoundland and Labrador)[8]

- Project is a 2-3 gigawatt wind farm to produce green hydrogen and ammonia.
- Project is in planning, development, and approval stage.
- Government of Newfoundland and Labrador awarded EverWind with the exclusive right to pursue the project's development.
- Approximately 5,000 jobs estimated during the project's construction phase, with an additional 750 direct and indirect jobs during the project's 30 year operations phase.
- Construction phase of the project is set to begin in late 2025.

[7] https://everwindfuels.com/point_tupper_economic_infographic.pdf ; https://everwindfuels.com/projects/point_tupper ; https://www.prnewswire.com/news-releases/the-government-of-canada-announces-funding-to-accelerate-clean-energy-development-in-atlantic-canada-301992417.html

[8] https://everwindfuels.com/projects/burin_peninsula

WORLD ENERGY GH_2[9]

Project Nujio'qonik

- Project consists of 3+ gigawatt renewable electricity through wind projects in Port au Port and Codroy Valley, and a plant in Stephenville for processing hydrogen.
- Project is in planning, development, and approval stage. The Environmental Impact Statement (EIS) is currently under review.
- Approximately 2,200 jobs estimated during the project's construction phase, with an additional 300 during the project's operation phase, and 4,200 indirect jobs.
- $128 loan from Government of Canada to support clean power generation and clean hydrogen production.
- World Energy has signed MOUs with Qalipu First Nation and the Town of Stephenville, and has purchased the Port of Stephenville and secured 266,000 acres of Crown Land.

GREEN ENERGY HUB – PORT OF BELLEDUNE / CROSS RIVER INFRASTRUCTURE PARTNERS LLC[10]

- Production plant in Belledune to be powered by wind.
- Production facility to produce hydrogen and ammonia for export.
- MOU signed with Niedersachsen Ports GmbH & Co. KG Wilhelmshaven, Germany.
- Further developments may include solar and storage, as well as small modular reactors for nuclear energy.
- Identified partners include Indigenous communities Pabineau First Nation and Ugpi'ganjig Eel River Bar First Nation.
- Includes a Community Workforce Development Committee, with representatives from Pabineau and Eel River Bar First Nations, for information sharing, exploring opportunities and challenges related to green energy developments at Belledune.

[9] https://worldenergygh2.com/faqs/ ; https://toronto.citynews.ca/2024/02/28/export-development-canada-lends-newfoundland-hydrogen-project-128m/ ; https://www.cbc.ca/news/canada/newfoundland-labrador/nl-wind-hydrogen-project-traction-1.7129862

[10] https://portbelledune.ca/green-energy-hub/

Key Challenges to Hydrogen Development for Export

- All projects are currently in the early stages of planning, development and approvals. Timelines are expected to shift as projects move ahead.
- Projects must pass through environmental assessment stages and acquire necessary permits or licenses.
- Labour challenges are likely if projects are greenlit simultaneously, squeezing the supply of workers in construction.
- Challenges and protests from residents, such as those on Newfoundland's west coast, highlight the need for public engagement and transparency with local community to ensure projects are well received.
- Hydrogen is a new export in the region and development for export can take time.
- Canada-Germany Hydrogen Alliance identified 2025 as the goal for clean hydrogen export; however, projects in Atlantic Canada are not yet close to production.
- Opportunity for Atlantic Canada to be a leader in green hydrogen hinges on being in market before competition grows.

Opportunities

- Could attract new talent, such as youth, seeking work that contributes to a positive environmental outcome.
- Partnering with community stakeholders and Indigenous peoples can help drive local development.
- Current and planned projects in Prince Edward Island are focused on green hydrogen to meet the province's goal of becoming net zero by 2040, rather than for exporting. However, hydrogen export could be a possibility in the future.
- Miawpukek First Nation, located on the south coast of Newfoundland, has entered into MOU's with several wind and hydrogen proponents, including FFI, Read Earth Energy, and Source3.[11]
- New Brunswick also identifies Saint John Port Authority as another potential energy export hub for green hydrogen.[12]

[11] https://atlantichydrogen.ca/member/miawpukek-first-nation

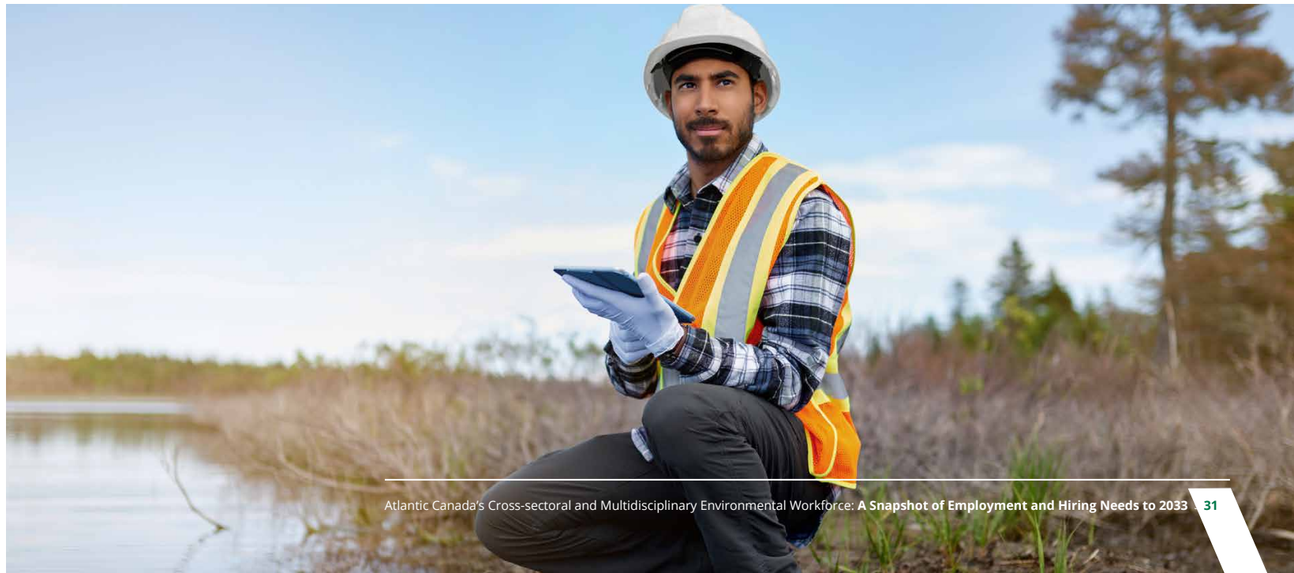
[12] https://www2.gnb.ca/content/dam/gnb/Departments/en/pdf/Hydrogen-hydrogene/hydrogen-roadmap-e.pdf

Key Occupations

A variety of jobs will be required during the construction phase, including scientists, engineers, technicians, trades, and labourers to build production facilities and associated wind farms for renewable energy to utilize for electrolysis and hydrogen production. There will be a sharp reduction in the number of required workers during the operation phase.

- Engineering managers (NOC 20010)
- Geoscientists and oceanographers (NOC 21102)
- Chemists (21101)
- Other professional occupations in physical sciences (NOC 21109)
- Biologists and related scientists (NOC 21110)
- Public and environmental health and safety professionals (NOC 21120)
- Land surveyor (NOC 21203)
- Civil engineers (NOC 21300)
- Mechanical engineers (NOC 21301)
- Electrical and electronics engineers (NOC 21310)
- Chemical engineers (NOC 21320)
- Chemical technologists and technicians (NOC 22100)
- Geological and mineral technologists and technicians (NOC 22101)
- Biological technologists and technicians (NOC 22110)
- Land survey technologists and technicians (NOC 22213)
- Technical occupations in geomatics and meteorology (NOC 22214)
- Engineering inspectors and regulatory officers (NOC 22231)
- Occupational health and safety specialists (NOC 22232)
- Construction inspectors (NOC 22233)
- Civil engineering technologists and technicians (NOC 22300)
- Mechanical engineering technologists and technicians (NOC 22301)
- Construction estimators (NOC 22303)
- Electrical and electronics engineering technologists and technicians (NOC 22310)
- Industrial instrument technicians and mechanics (NOC 22312)
- Construction managers (NOC 70010)
- Contractors and supervisors, machining, metal forming, shaping and erecting trades and related occupations (NOC 72010)
- Contractors and supervisors, electrical trades and telecommunications occupations (NOC 72011)
- Machinists and machining and tooling inspectors (NOC 72100)
- Structural metal and platework fabricators and fitters (NOC 72104)
- Ironworkers (NOC 72105)
- Welders and related machine operators (NOC 72106)
- Electricians (except industrial and power system) (NOC 72200)
- Industrial electricians (NOC 72201)
- Power system electricians (NOC 72202)
- Electrical power line and cable workers (NOC 72203)
- Construction millwrights and industrial mechanics (NOC 72400)
- Heavy-duty equipment mechanics (NOC 72401)
- Heating, refrigeration and air conditioning mechanics (NOC 72402)
- Electrical mechanics (NOC 72422)
- Concrete finishers (NOC 73100)
- Construction trades helpers and labourers (NOC 75110)
- Utilities managers (NOC 90010)

It is important to note that the specific roles and job titles may vary depending on the size and scope of each project.



Appendix A: Methodology

The purpose of this research is to estimate employment of, and project labour market requirements for environmental workers. This analysis estimates the demand for skilled trade workers in the environmental workforce using an analysis of quarterly job postings from a broad range of job posting boards provided by TalentNeuron.[13] The process for doing so is two-fold: first, it identifies which job postings relating to each occupation (5-digit NOC) are for environmental positions using a keyword search. Second, it applies environmental shares to an industry and occupation model of the Canadian economy to develop an estimate of current and future labour dynamics for each occupation.

JOB SHARE ANALYSIS

The core dataset for the analysis is the job posting database, an aggregation of job postings collected from a broad array of job posting websites in French and English from across Canada, maintained by TalentNeuron. The data points collected from job listings include (but are not limited to):

- Job location (Province)
- 8-digit level 2010 O*NET-SOC occupation
- Posting company
- Job title
- Full text of the job listing

ECO Canada identifies postings for environmental positions by applying a filter of sentence fragments related to environmental activity to the TalentNeuron dataset. The text in each job posting is searched to see if each fragment can be found in the job posting and the results are tracked by post and fragment. Postings with enough matched fragments to meet a fragment-specific minimum match threshold are counted as matches for each linked area of focus.

Some further filtering is required on the job posting data before being used to compare to occupational employment data, however, since job posts in the TalentNeuron dataset are mapped to the 2010 O*NET-SOC occupation hierarchy, rather than the 5-digit 2021 NOC hierarchy. This does allow the potential for higher detail since the 8-digit O*NET-SOC has 1110 classifications compared to the 516 5-digit NOC codes. However, this hierarchy does not have unique mappings to the NOC hierarchy. We have developed a concordance which allows us to align O*NET-SOC many occupations to NOC occupations. Where no direct unique match is available we used additional text analysis to attribute occupations within environmental positions. In attributing totals to occupations, however, this approach is too computationally intensive and non-unique matches were distributed according to their distribution in the Canadian economy.

The research team also assigns individual job posts to industries using an algorithm based on the following rules in the following order:

- where a job post contains industry-specific language, it was assigned to that industry; and
- where the job post was posted by a company with a known industry categorization, the post is assigned to that company's industry.

In cases where the company posting the job ad is a federally registered corporation, it is categorized into an industry based on its name and NAICS classification in the national corporation register. Some small businesses are classified based on identifiers within the business name (for example, a posting company called "AAA plumbing" would be classified within the Plumbing, heating and air-conditioning contractors NAICS).

[13] For more information about TalentNeuron, visit https://www.talentneuron.com/.

ESTIMATING AND FORECASTING ENVIRONMENTAL LABOUR FORCE DYNAMICS

The environmental workforce is defined in this analysis as the environmental share of jobs[14] times the number of jobs for each occupation (5-digit NOC) and province/territory. To estimate this share, the research team compares characteristics of identified environmental positions with their prevalence in TalentNeuron's full database. This allows the researchers to estimate an occupation and province/territory-specific share of total positions linked to each environmental area of focus. The result is the EnviroShare, a province/territory and occupation-specific proportion of employment considered to be environmental.[15]

Mathematically, the job posting counts and the totals are both arranged in *p* X *n* matrices (**J** and **T**), where *p* is the number of provinces and *n* the number of 5-digit NOC occupations. The workforce share matrix (**W**) is a similar *p* X *n* matrix for each year and quarter calculated by:

$$W = J \odot T$$

To estimate the number of jobs, the research team uses quarterly occupational employment data from the Labour Force Survey (LFS). Each share is calculated with respect to the labour force composition within that quarter and then annualized based on a weighted average reflecting each quarter's contribution to the annual labour force. This data is augmented by projections from Census data where detailed occupation data was outside the survey. Employment estimates were organized into the same *p* X *n* matrix (**L**) for each year and quarter to create the Environmental Workforce (**E**):

$$E = W \odot L$$

For industry matches, the approach is somewhat more complicated. Industry-level job posting totals are not available within the TalentNeuron database. As such, the industry categorizations from the job posting analysis is counted within occupations, such that industry data is organized into an *in x p* matrix, where *i* is the number of two-digit NAICS industries and *n* the number of 5-digit NOC occupations. This matrix (**I**) is the share of each industry within the job posts for each 5-digit NOC and province/territory. The *in x p* Environmental Workforce by Industry matrix (**Ė**) is:

$$\dot{E} = E \odot I$$

The total size of the environmental workforce is be calculated as the grand sum of Ė.

The research team projects future environmental employment by extending occupation and industry-level share trends over a labour market forecast provided by Prism Economics. That forecast is built on the macroeconomic model provided by Stokes Economics and deaths and retirement distributions based on the Canada Occupation Projection System ("COPS") forecast maintained by Employment and Social Development Canada, as well as Prism's computable general equilibrium model of occupational and industry labour dynamics.

Prism's model provides a forecast of **employment change** and **job replacement**, representing the labour demand for environmental jobs. The baseline jobs forecast will further be adjusted to reflect observed changes in environmental job shares over time. All variables are forecasted at the five-digit NOC and two-digit NAICS levels, in keeping with the underlying share estimates of environmental employment.

[14] This measure reflects the proportion of positions advertised online that indicate that either the employer engages in the production/provision of environmental goods/services or the job requires environmental-related knowledge, skills or aptitudes. This is used as a proxy for the proportion of current employment with these characteristics and may overstate the true environmental employment share if the newly advertised positions reflect an increase in the demand for environmental work.

[15] For example, suppose that the total number of job postings for NOC 21300 (Civil engineers) in Ontario in the current period is 4,000 and the number of job postings that are considered to be environmental within that NOC and region is 800. Then the enviroshare is 20%.

CHALLENGES AND LIMITATIONS

Job posting analysis provides us with an opportunity to collect large amounts of data about the demand for different types of workers. However, the methodology also has limitations:

- Not all jobs are posted online. The job posting database does not gather information about jobs that are hired through other means (e.g., signs in the window, temporary employment agencies, headhunters, union halls, etc.). This may be especially common for Red Seal Trades, as many opportunities are hired through word of mouth, personal connections, or union halls. As this is our first foray into environmental Red Seal Trades modelling, we have very little information about the impact that this may have on employment estimates and projections. To address this concern, we are incorporating information about the number of apprenticeships from the RAIS and certification skills requirements from Prism's CANTRAQ model.
- There is no standardized multiplier to adjust job posting data to actual labour market (employment) data. For example, job postings appear more frequently for certain occupations that have higher turnover rates. In this instance, a higher number of job postings does not translate directly into higher employment.
- The vendor job posting data collection processes and algorithms vary and are not systematically linked to Government of Canada hierarchies for occupations and industries. The quality of the job posting data mapping to NOC and NAICS varies with the processes and algorithms used. This impacts the quality of the employment estimates based on the job posting analysis.
- The number of job postings within a particular region of Canada can be very small. When the sample of job postings for an occupation is small, environmental shares are estimated with lower confidence levels and can vary widely from period to period.
- Hiring demand for environmental workers does not directly measure environmental work within the current labour force. Rather, it is a proxy for the environmental employment share. At the present time, given the growing interest in environmental activity throughout the economy, we assume that the share of job postings that are considered environmental is greater than the share of employment that is considered environmental. It is also reasonable to assume, however, that workers currently employed may be increasingly required to gain additional skills and knowledge related to environmental activity and would thereby be considered environmental workers.

A key assumption of ECO Canada's analysis is that job postings reflect the occupations at large. As such, we are planning on conducting further work to refine this methodology to take these issues into account.

Appendix B: 100 Top Occupations – EnviroShare, Environmental Employment in 2024 and Net Hiring Requirements to 2033

Occupations marked with an asterisk (*) have been mapped to core environmental workers.

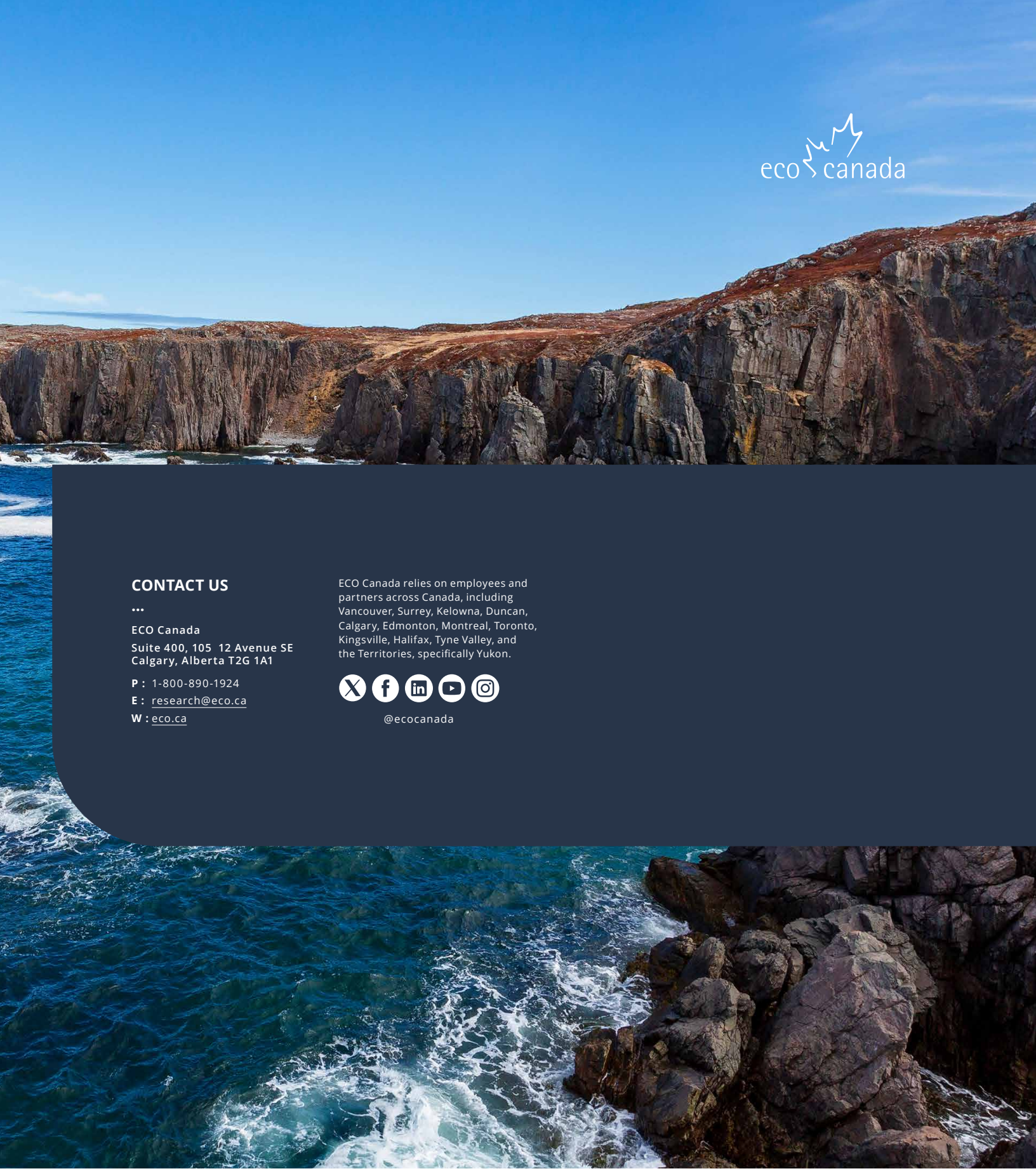
OCCUPATION (NOC)	2023 ENVIROSHARE	2024 ENVIRONMENTAL EMPLOYMENT	EXPANSION DEMAND 2024-2033	REPLACEMENT DEMAND 2024-2033	NET HIRING REQUIREMENTS 2024-2033
ALL OCCUPATIONS	**7%**	**86,270**	**8,190**	**20,720**	**28,910**
Senior government managers and officials (00011)*	26%	330	20	120	140
Other business services managers (10029)*	14%	200	60	40	100
Financial auditors and accountants (11100)	7%	630	70	120	190
Human resources professionals (11200)*	7%	480	90	70	160
Professional occupations in business management consulting (11201)*	10%	480	110	140	240
Professional occupations in advertising, marketing and public relations (11202)	23%	1,900	160	240	400
Supervisors, finance and insurance office workers (12011)	7%	150	60	40	100
Procurement and purchasing agents and officers (12102)	11%	370	60	70	130
Administrative officers (13100)*	13%	1,240	290	430	720
Administrative assistants (13110)	5%	560	10	160	170
General office support workers (14100)	5%	360	40	80	120
Engineering managers (20010)*	34%	510	150	150	300
Architecture and science managers (20011)*	31%	330	-20	150	130
Computer and information systems managers (20012)*	9%	340	40	80	120
Chemists (21101)	18%	190	50	50	100
Biologists and related scientists (21110)*	48%	1,150	140	250	390
Public and environmental health and safety professionals (21120)*	53%	910	50	280	330
Cybersecurity specialists (21220)	15%	200	70	50	130
Information systems specialists (21222)	5%	460	60	90	150

Database analysts and data administrators (21223)	9%	160	70	20	90
Civil engineers (21300)*	56%	1,640	220	360	580
Mechanical engineers (21301)*	24%	640	70	110	180
Electrical and electronics engineers (21310)*	28%	540	40	120	160
Petroleum engineers (21332)*		270	70	60	130
Other professional engineers (21399)*	35%	870	80	200	280
Chemical technologists and technicians (22100)*	16%	280	40	70	110
Geological and mineral technologists and technicians (22101)	56%	610	90	160	250
Forestry technologists and technicians (22112)*	73%	930	80	190	270
Conservation and fishery officers (22113)*	82%	1,270	10	230	240
Technical occupations in geomatics and meteorology (22214)*	49%	610	110	100	210
User support technicians (22221)	8%	470	150	90	240
Occupational health and safety specialists (22232)	34%	800	290	290	580
Construction inspectors (22233)	23%	510	-20	140	120
Civil engineering technologists and technicians (22300)*	29%	460	150	130	280
Mechanical engineering technologists and technicians (22301)*	15%	220	70	30	100
Industrial engineering and manufacturing technologists and technicians (22302)*	19%	270	60	100	160
Construction estimators (22303)	15%	200	60	40	100
Electrical and electronics engineering technologists and technicians (22310)	16%	280	100	70	161
Nursing coordinators and supervisors (31300)	7%	180	40	70	107
Registered nurses and registered psychiatric nurses (31301)	3%	720	80	160	240
Licensed practical nurses (32101)	6%	380	80	90	170
Nurse aides, orderlies and patient service associates (33102)	6%	1,390	250	370	620
Other assisting occupations in support of health services (33109)	14%	280	50	80	130
Government managers – health and social policy development and program administration (40010)	18%	240	20	110	130

Government managers - economic analysis, policy development and program administration (40011)*	36%	730	-60	300	240
Other managers in public administration (40019)	63%	1,500	480	740	1,220
Administrators – post-secondary education and vocational training (40020)	16%	250	30	100	130
Managers in social, community and correctional services (40030)*	12%	340	50	130	180
Lawyers and Quebec notaries (41101)*	10%	490	30	100	130
University professors and lecturers (41200)*	11%	710	-70	260	190
Post-secondary teaching and research assistants (41201)	10%	460	90	40	130
College and other vocational instructors (41210)	7%	380	40	90	130
Natural and applied science policy researchers, consultants and program officers (41400)*	15%	340	70	60	130
Health policy researchers, consultants and program officers (41404)	18%	420	120	80	200
Other professional occupations in social science (41409)	66%	770	-10	350	340
Police officers (except commissioned) (42100)*	11%	450	60	160	220
Firefighters (42101)*	40%	630	200	270	470
Paralegals and related occupations (42200)	13%	300	50	80	120
Registrars, restorers, interpreters and other occupations related to museum and art galleries (53100)	46%	610	70	160	230
Retail and wholesale trade managers (60020)	4%	650	80	280	360
Accommodation service managers (60031)	5%	200	40	90	130
Retail sales supervisors (62010)	2%	320	70	70	140
Technical sales specialists - wholesale trade (62100)	8%	400	80	90	170
Retail salespersons and visual merchandisers (64100)	1%	310	40	50	90
Sales and account representatives - wholesale trade (non-technical) (64101)	4%	350	90	60	150
Security guards and related security service occupations (64410)	7%	450	60	70	130
Light duty cleaners (65310)	7%	880	280	340	620

Janitors, caretakers and heavy-duty cleaners (65312)	4%	270	50	100	150
Construction managers (70010)*	25%	1,080	10	280	290
Home building and renovation managers (70011)	22%	1,280	210	480	690
Facility operation and maintenance managers (70012)*	23%	520	20	180	200
Managers in transportation (70020)	12%	190	50	50	100
Contractors and supervisors, machining, metal forming, shaping and erecting trades and related occupations (72010)	15%	190	40	70	110
Contractors and supervisors, mechanic trades (72020)*	19%	670	80	230	310
Contractors and supervisors, heavy equipment operator crews (72021)	23%	730	150	260	410
Contractors and supervisors, mechanic trades (72020)*	19%	670	80	230	310
Supervisors, railway transport operations (72023)	58%	230	20	80	100
Supervisors, motor transport and other ground transit operators (72024)	16%	290	50	120	170
Electricians (except industrial and power system) (72200)	9%	590	60	80	140
Industrial electricians (72201)	17%	500	30	160	190
Electrical power line and cable workers (72203)	34%	610	-20	130	110
Plumbers (72300)	12%	320	90	20	110
Construction millwrights and industrial mechanics (72400)*	12%	720	30	230	260
General building maintenance workers and building superintendents (73201)	15%	630	-10	230	220
Transport truck drivers (73300)	2%	280	40	60	100
Heavy equipment operators (73400)	7%	460	80	110	190
Public works maintenance equipment operators and related workers (74205)	8%	170	50	40	90
Public works and maintenance labourers (75212)	30%	570	-20	120	100
Managers in agriculture (80020)	12%	460	-40	190	150
Managers in aquaculture (80022)	33%	430	-30	200	170
Supervisors, logging and forestry (82010)	44%	460	20	170	190
Underground production and development miners (83100)	28%	740	-70	230	160
Silviculture and forestry workers (84111)	44%	380	50	90	140

Manufacturing managers (90010)*	14%	410	30	130	160
Utilities managers (90011)*	39%	510	-30	150	120
Supervisors, petroleum, gas and chemical processing and utilities (92011)	25%	400	70	170	240
Supervisors, food and beverage processing (92012)	10%	180	50	60	110
Supervisors, forest products processing (92014)	27%	280	20	120	140
Power engineers and power systems operators (92100)	22%	570	40	120	160
Water and waste treatment plant operators (92101)*	75%	800	-40	210	170



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