



MANITOBA'S EVOLVING ENVIRONMENTAL WORKFORCE: A SNAPSHOT OF ENVIRONMENTAL EMPLOYMENT AND HIRING NEEDS TO 2033

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MANITOBA ENVIRONMENTAL JOB OUTLOOK SNAPSHOT

The province’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 15 workers** in Manitoba are part of the total environmental workforce.

<p>45,350</p> <p>Environmental workers in 2024 (7% of Manitoba’s workforce)</p>	<p>+4,520</p> <p>New jobs by 2033 (9% growth from 2024)</p>	<p>+8,940</p> <p>Job openings due to retirements by 2033 (2% annual retirement rate)</p>
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13,460 Net job openings to 2033
(**30%** of 2024 environmental employment)

<p>Top industries</p> <ul style="list-style-type: none"> Public administration (2,700 net job openings) Construction (1,480) Professional, scientific, and technical services (1,460) 	<p>Top specializations</p> <ul style="list-style-type: none"> Natural resource management (22,590 job openings) Sustainability (21,450) Fisheries & Wildlife (20,890) 	<p>Top occupations</p> <ul style="list-style-type: none"> Home building and renovation managers (470 job openings) Managers in agriculture (450) Other managers in public administration (440)
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CORE ENVIRONMENTAL WORKFORCE

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

<p>12,700</p> <p>Core environmental workers in 2024 (28% of Manitoba’s environmental workforce)</p>	<p>+1,480</p> <p>New jobs by 2033 (12% growth from 2024)</p>	<p>+2,700</p> <p>Job openings due to retirements by 2033 (2.1% annual retirement rate)</p>
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4,140 Net job openings to 2033 (33% of 2024 core environmental employment)

TOP CORE OCCUPATIONS

<p>Administrative officers</p> <p>360 NET JOB OPENINGS</p> <p>Job titles include:</p> <ul style="list-style-type: none"> • Planning officer • Civil emergency measures officer • Renewable energy facilities manager • Natural resources business manager 	<p>Civil engineers</p> <p>350 NET JOB OPENINGS</p> <p>Job titles include:</p> <ul style="list-style-type: none"> • Environmental engineer • Building envelope engineer • Coastal engineer • Noise abatement engineer • Reclamation engineer 	<p>Natural and applied science policy researchers, consultants and program officers</p> <p>270 NET JOB OPENINGS</p> <p>Job titles include:</p> <ul style="list-style-type: none"> • Environmental policy analyst • Environmental impact analyst • Emergency preparedness planner • Fisheries analyst • Industrial hygienist
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INTRODUCTION

Manitoba's economy has shown remarkable resilience in the face of recent challenges. Despite the pandemic, global disruptions and pressure due to inflation the province experienced a stronger-than-expected recovery. Manitoba's real gross domestic product (GDP) expanded in 2022 by **3.9%**, the third highest among the provinces, and continued to stay above the national average in 2023. Employment also increased greatly in 2022 and 2023, with an all-time unemployment low of **4.9%** in 2023.¹

However, Manitoba is not immune to workforce challenges. Consistent with national labour shortage projections, Manitoba also faces significant labour gaps that are expected to continue throughout the next decade. The province's share of this shortfall is estimated at **114,300** job openings (**68%** of anticipated net hiring requirements) over the next five years, driven primarily by retiring workers.² Key sectors like transportation, healthcare, and retail are expected to experience particularly acute shortages.

Canada, along with many nations across the globe, is calling for a more responsible and sustainable way toward economic growth. Shifting policy priorities in pursuit of net-zero 2050 goals, a focus on clean energy, and increased efficiencies through technological innovation will continue to shape the environmental sector in the next decade. Manitoba's abundant natural resources, including hydropower and critical minerals, offer unique opportunities for economic growth.

Driven by rising demand for clean energy, Manitoba plans to significantly boost its generating capacity, leveraging its already strong hydropower as a key economic driver. Further investment into clean energy in the next decade will focus on affordable electric vehicles, plug-in hybrids, geothermal heat pumps, and a continued pledge to low-carbon electricity.³ Further opportunity for expansion of the province's green economy exists in its reserve of key minerals needed in electric vehicle production, presenting prospects for environmental job creation in both traditional and emerging sectors.⁴

Navigating long-term challenges requires strategic investments in workforce development, immigration, and green technologies. 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.

¹Unemployment rate by province and territory, November 2023. Statistics Canada.

<https://www150.statcan.gc.ca/n1/daily-quotidien/231201/mc-a001-eng.htm>

²Manitoba Labour Market Outlook 2022-2026: Outlook at a Glance.

https://www.gov.mb.ca/jec/lmi/outlook/images/mb_labour_market_outlook_2022_26_infographic.pdf

³Manitoba's Energy Roadmap. 2023. Invest Manitoba. https://www.gov.mb.ca/jec/files/mb_energy_roadmap.pdf

⁴Securing Our Critical Mineral Future: Responsible Mining, Opportunity Ready. 2024. Government of Manitoba.

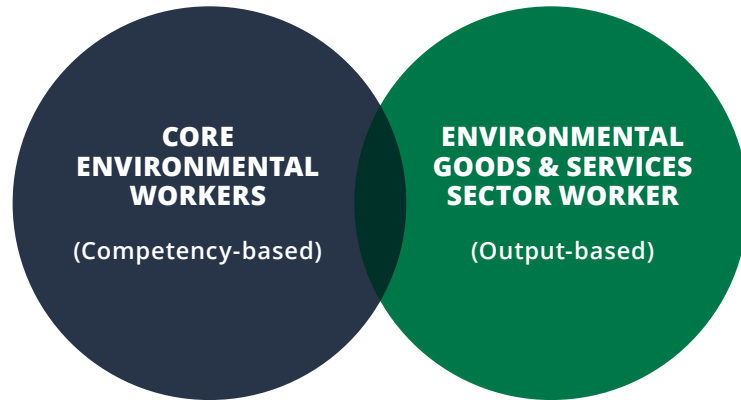
<https://www.gov.mb.ca/iem/explore/files/criticalmineralfuture.pdf>

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 Manitoba 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 methodology and **Appendix B** for a list of all occupations included in our study, including those mapped to core environmental workers.



COMPOSITION OF THE ENVIRONMENTAL WORKFORCE IN MANITOBA

Roughly **1 in 15** workers in Manitoba (**45,350**) are in an environmental role in 2023. About **12,700** are core environmental workers.

TOP OCCUPATIONS

The top job families⁵ in the environmental workforce are:

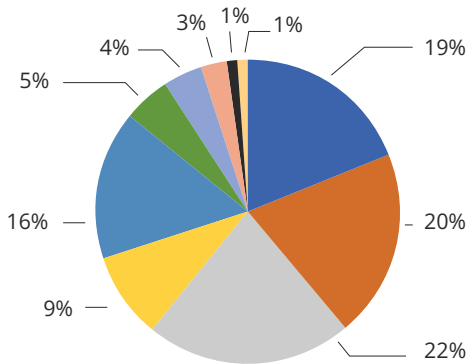
- Natural and applied sciences and related occupations (**9,480**)
- Trades, transport and equipment operators and related occupations (**9,050**)
- Business, finance, and administration occupations (**6,420**)

Over **20%** of environmental workers are in Natural and applied sciences and related occupations, a job family that includes scientists, engineers, engineering technologists and technicians, and information technology specialists. Consistent with Manitoba's total workforce, Trades, transport and equipment operators and related occupations comprise **20%** of Manitoba's environmental workforce.

In contrast, Business, finance and administration occupations make up 22% of the total Manitoba workforce, but only **14%** of the environmental workforce. A similar trend is also seen in the Sales and service occupational group, which account for 16% of Manitoba's total workforce but only **12%** of environmental workers within the province.

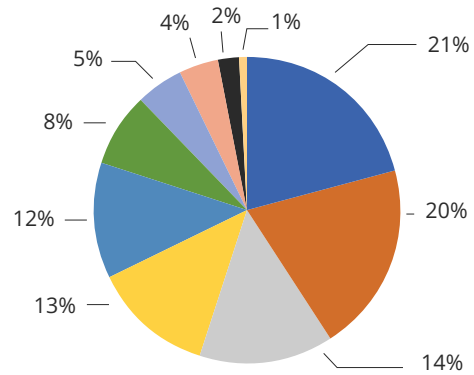
⁵2-digit National Occupational Code (NOC). For more information, see <https://noc.esdc.gc.ca/>.

Total Employment, 2024



- Natural and applied sciences and related occupations
- Trades, transport and equipment operators and related occupations
- Business, finance and administration occupations
- Occupations in education, law and social, community and government services
- Sales and service occupations

Environmental Employment, 2024



- Natural resources, agriculture and related production occupations
- Occupations in manufacturing and utilities
- Health occupations
- Occupations in art, culture, recreation and sport
- Legislative and senior management occupations

Top Occupations by Environmental Employment in 2024

Home building and renovation managers **(920 workers)**
 Civil engineers **(770)**
 Managers in agriculture **(690)**

Top Occupations by Environmental Employment Share in 2023

Meteorologists and climatologists **(100%)**
 Forestry professionals **(89%)**
 Conservation and fishery officers **(81%)**

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 analysis⁶ 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).

TOP INDUSTRIES

The largest industry⁷ employer of environmental workers in 2024 is Public administration, reflecting **14%** of the total number of environmental workers in Manitoba (**6,540 workers**). The Construction and Manufacturing sectors each employ another **10%** of Manitoba's environmental workers.

INDUSTRIES AND OCCUPATIONS CROSSCUT

Industries interact with environmental objectives in different ways, meaning that different environmental workers will be required to fill industry-specific workforce needs. For instance, under the umbrella of Public administration, Police officers (**350**) and Conservation and fishery officers (**380**) are more frequently observed. In contrast, Professional, scientific and technical services see a larger proportion of engineers and specialists. The Construction sector has notable needs for Home building and renovation managers (**910**), Construction managers (**400**) and Electricians (except industrial and power system) (**290**).

⁶ <https://eco.ca/research-and-resources/environmental-job-market-trends/>

⁷ 2-digit North American Industry Classification System (NAICS). For more information, see <https://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=1181553>.

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 in 2024)
All Industries	45,350	100%	<ul style="list-style-type: none"> • Home building and renovation managers (920) • Civil engineers (770) • Managers in agriculture (690)
Public administration (91)	6,540	14%	<ul style="list-style-type: none"> • Other managers in public administration (520) • Conservation and fishery officers (380) • Police officers (except commissioned) (350)
Construction (23)	4,690	10%	<ul style="list-style-type: none"> • Other managers in public administration (520) • Conservation and fishery officers (380) • Police officers (except commissioned) (350)
Manufacturing (31)	4,580	10%	<ul style="list-style-type: none"> • Manufacturing managers (260) • Mechanical assemblers and inspectors (190) • Industrial engineering and manufacturing technologists and technicians (140)
Professional, scientific and technical services (54)	4,170	9%	<ul style="list-style-type: none"> • Civil engineers (460) • Other professional engineers (240) • Architects (230)
Utilities (22)	1,680	4%	<ul style="list-style-type: none"> • Water and waste treatment plant operators (220) • Power system electricians (190) • Supervisors, petroleum, gas and chemical processing and utilities (130)
Agriculture, forestry, fishing and hunting (11)	1,610	4%	<ul style="list-style-type: none"> • Managers in agriculture (640) • Specialized livestock workers and farm machinery operators (190) • Managers in horticulture (60)
Administrative and support, waste management and remediation services (56)	1,300	3%	<ul style="list-style-type: none"> • Public works and maintenance labourers (70) • Water and waste treatment plant operators (60) • Contractors and supervisors, landscaping, grounds maintenance and horticulture services (60)
Mining, quarrying and oil and gas extraction (21)	580	1%	<ul style="list-style-type: none"> • Geological and mineral technologists and technicians (130) • Underground production and development miners (60) • Contractors and supervisors, oil and gas drilling and services (60)

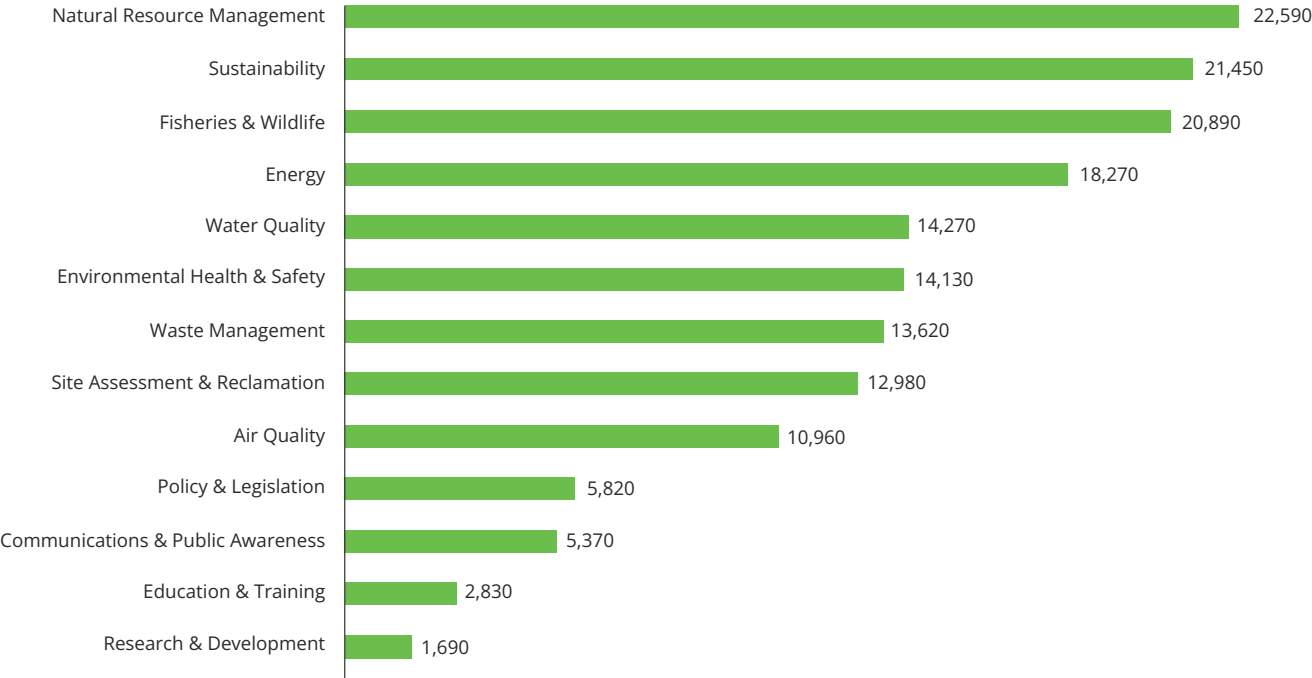
TOP SPECIALIZATIONS

Top specializations for environmental employment in the province are:

- Natural Resource Management (**22,590**)
- Sustainability (**21,450**)
- Fisheries & Wildlife (**20,890**)

Note: A worker or job could be mapped to one or more specializations or sub-sectors.

FIGURE 1: 2024 ENVIRONMENTAL EMPLOYMENT BY SPECIALIZATION



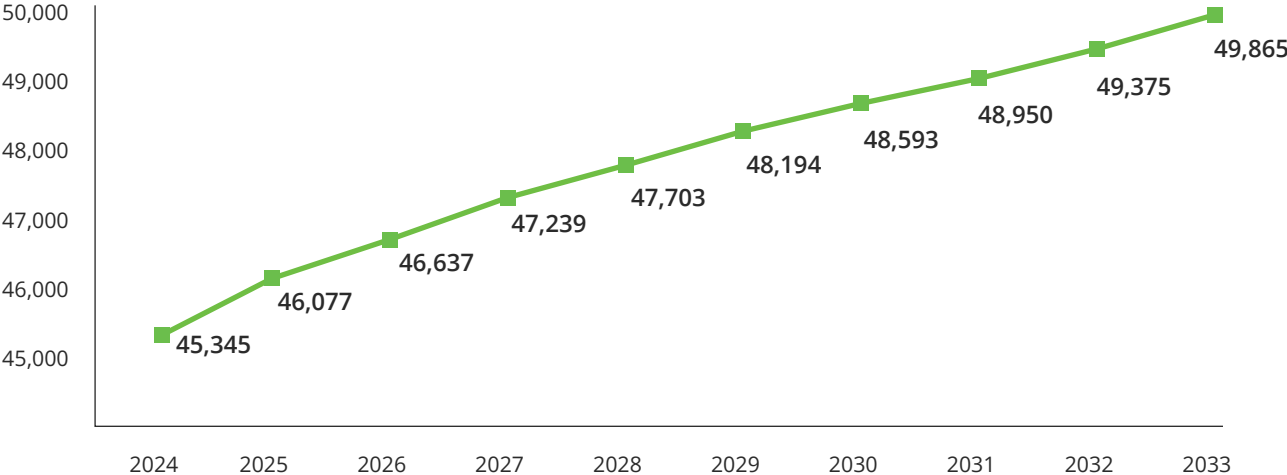
LOOKING FORWARD: ENVIRONMENTAL HIRING NEEDS IN THE NEXT DECADE

Manitoba boasts one of the most balanced economies of the Canadian provinces and territories, with nine industries contributing 5% or more to provincial GDP.⁸ Recovery from the economic impacts of the pandemic has been seen, with total employment increasing by 2.2% in 2023. However, Manitoba’s annual employment growth is expected to slow to around **0.8%** in the coming years due to inflation and high interest rates increasing economic uncertainty.⁹

Our employment forecast indicates steady growth for the province’s **environmental** workforce to 2033, with an estimated **1.1%** year-over-year growth in environmental employment and **4,520 net new environmental jobs** over the next decade.

Investments in sustainability initiatives and clean-tech innovation, emissions reduction technologies, strategic energy management, renewable energy, and energy-efficient buildings and transportation will contribute to the growth of Manitoba’s green economy.

FIGURE 2: ENVIRONMENTAL EMPLOYMENT IN MANITOBA, 2024 TO 2033



⁸ Manitoba Bureau of Statistics. “Gross domestic product (GDP) at basic prices, by industry, chained 2017 dollars, Manitoba”. <https://www.gov.mb.ca/mbs/moreinfo.html?id=45>.

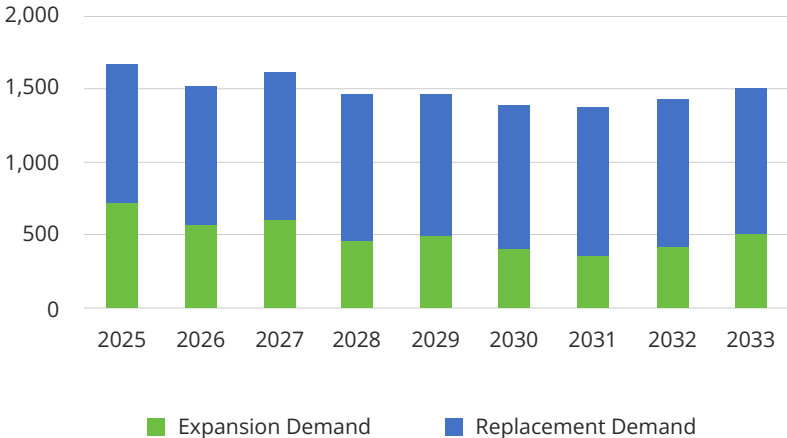
⁹ Manitoba Outlook - Economic, Fiscal, and Borrowing Overview. 2024. Manitoba Finance. https://www.manitoba.ca/finance/pubs/investor_relations_presentation.pdf

When expansion demand is combined with replacement demand, we estimate that **13,460 net environmental job openings will need to be filled by 2033**. This hiring number equates to **30%** of 2024 employment and provides a career stream for new and existing talent.

One cause for concern in the next decade is the replacement of Manitoba’s aging population. With a third of the province’s population aged 55 and over, the proportion of Manitobans aged 65+ is anticipated to increase by **50%** by 2043.^{10,11} This trend is also prevalent in the environmental workforce; we estimate that over two-thirds of the net environmental job openings will be due to retirements.

Though challenges exist, Manitoba is well-positioned to fill the coming labour gaps. The province boasts a diverse and growing population, largely fueled by immigration and high migrant retention rates as well as the highest proportion of youth of all provinces in Canada. In 2022, **39%** of residents were under 30, alleviating some of the pressures of an aging workforce.¹² However, employers will still need to engage and develop both new and experienced workers to meet labour demand through 2033, including increasing participation of workers that have been historically underrepresented in Canada’s workforce.

FIGURE 3: ENVIRONMENTAL NET HIRING REQUIREMENTS TO 2033



¹⁰ Economic Scan - Manitoba: 2022. 2023. Job Bank. <https://www.jobbank.gc.ca/trend-analysis/job-market-reports/manitoba/environmental-scan>.
¹¹ Statistics Canada. 2023. (table). Census Profile. 2021 Census of Population. Statistics Canada Catalogue no. 98-316-X2021001. Ottawa. Released November 15, 2023. <https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E>.
¹²Economic Scan - Manitoba: 2022. 2023. Job Bank. <https://www.jobbank.gc.ca/trend-analysis/job-market-reports/manitoba/environmental-scan>.



TOP INDUSTRIES

The largest growth will come from expansion in the Public administration sector (**1,220** new environmental jobs) followed by Health care and social assistance (**940**), Professional, scientific and technical services (**680**), Construction (**540**), and Transportation and warehousing (**380**).

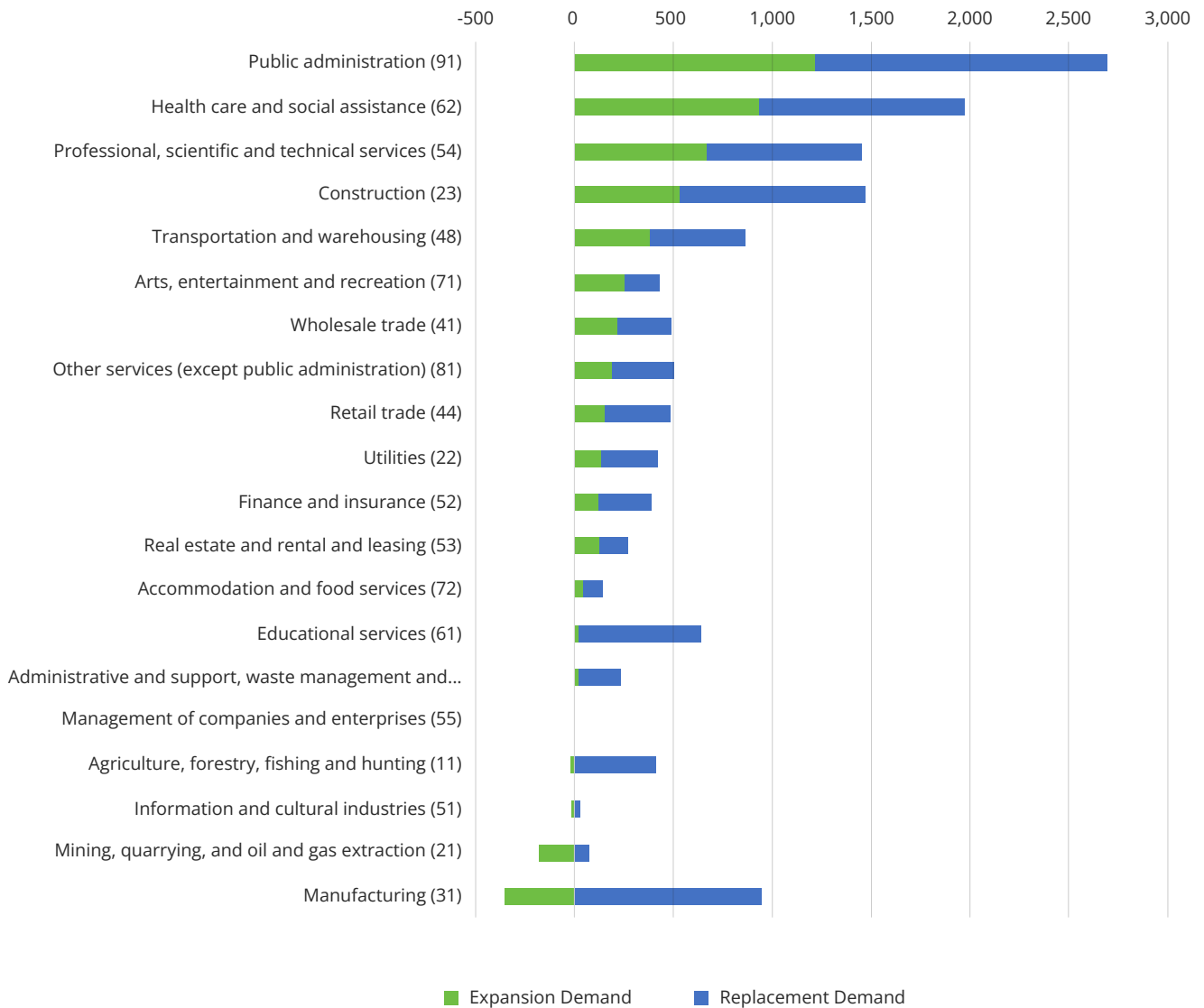
Some of the smaller industry employers will see above-average growth rates, led by Arts, entertainment and recreation (**26%** increase from 2024 employment) and Real estate and rental and leasing (**19%** increase). Management of companies and enterprises is expected to see the largest decrease in environmental work (**21%** decrease from 2024 employment), followed by the Mining, quarrying, and oil and gas extraction sector (**31%** decrease).

TABLE 3: ENVIRONMENTAL NET HIRING REQUIREMENTS TO 2033, BY INDUSTRY

Industry (NAICS)	Environmental Employment in 2024	Expansion Demand 2024-2033	Replacement Demand to 2024-2033	Net Hiring Requirements 2024-2033	Net Hiring Requirements as a % of Environmental Employment in 2024
All Industries	45,350	4,520	8,940	13,460	30%
Public administration (91)	6,540	1,220	1,480	2,700	41%
Health care & social assistance (62)	5,030	940	1,040	1,980	39%
Construction (23)	4,690	540	940	1,480	32%
Professional, scientific and technical services (54)	4,170	680	780	1,460	35%
Transportation and warehousing (48)	2,320	380	490	870	38%
Manufacturing (31)	4,580	-350	950	600	13%
Other services (except public administration) (81)	1,720	190	320	500	29%
Wholesale trade (41)	1,560	220	270	490	31%
Retail trade (44)	1,900	160	330	490	26%
Utilities (22)	1,680	140	290	430	26%
Arts, entertainment and recreation (71)	1,000	260	170	430	43%
Agriculture, forestry, fishing and hunting (11)	1,610	-20	420	400	25%
Finance and insurance (52)	1,460	130	270	400	27%
Real estate and rental and leasing (53)	670	130	150	270	40%
Administrative and support, waste management and remediation services (56)	1,300	30	210	240	18%
Accommodation and food services (72)	750	50	100	160	21%
Information and cultural industries (51)	450	-20	40	20	4%
Management of companies and enterprises (55)	30	-10	0	-10	-33%
Mining, quarrying, and oil and gas extraction (21)	580	-180	80	-100	-17%

While some industries will experience high expansion demand through 2033, net hiring requirements in other sectors such as Agriculture, forestry, fishing and hunting and Manufacturing are a result of the need to replace an aging workforce.

FIGURE 4: ENVIRONMENTAL NET HIRING REQUIREMENTS TO 2033, BY INDUSTRY



Construction and Professional, scientific and technical services are the second and third largest industries for environmental net hiring to 2033.

The second greatest replacement demand is anticipated in the Manufacturing industry with a replacement demand that is **one and a half times** greater than net hiring requirements to 2033 (**950**). This sector is expected to shrink in the next decade, with an **8%** decrease in environmental employment to 2033 (**-350**) due to technological advancement and increased automation, resulting in less expansion of traditional roles within the Manufacturing industry.¹³

While decreased expansion demand in the Mining, quarrying, and oil and gas extraction sector is reflected in environmental employment projections, the number of environmental job openings the Utilities sector is expected to increase by **8%** to 2033.

TOP OCCUPATIONS

Net hiring requirements are highest for:

- Home building and renovation managers (**470 jobs**),
- Managers in agriculture (**450**), and
- Other managers in public administration (**440**)

TABLE 4: ENVIRONMENTAL NET HIRING REQUIREMENTS, BY OCCUPATION

Occupation (NOC)	2023 Enviro-Share	2024 Environmental Employment	Expansion Demand 2024-2033	Replacement Demand 2024-2033	Net Hiring Requirements 2024-2033	Net Hiring Requirements as a % of 2024 Environmental Employment
All occupations	6.6%	45,350	4,520	8,940	13,460	30%
Home building and renovation managers (70011)	22%	920	210	260	470	51%
Managers in agriculture (80020)	12%	690	180	270	450	65%
Other managers in public administration (40019)	75%	520	230	210	440	85%
Administrative officers (13100)	13%	660	160	200	360	55%
Civil engineers (21300)	60%	770	200	150	350	45%

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

¹³ Industrial Projections (2022-2031). 2022. [Canadian Occupational Projection System \(COPS\)](#).

TOP SPECIALIZATIONS

The top three specializations for 2024 employment (Natural Resource Management, Sustainability, and Fisheries & Wildlife) are also expected to see the highest expansion demand, replacement demand, and net hiring requirements to 2033.

TABLE 5: ENVIRONMENTAL NET HIRING REQUIREMENTS, BY ENVIRONMENTAL SPECIALIZATION

Specialization or Sub-sector	2024 Environmental Employment	Expansion Demand 2024-2033	Replacement Demand 2024-2033	Net Hiring Requirements 2024-2033
Natural Resource Management	22,590	2,390	4,280	6,670
Sustainability	21,450	2,050	3,940	5,990
Fisheries & Wildlife	20,890	2,280	3,910	6,190
Energy	18,270	1,740	3,310	5,050
Water Quality	14,270	1,440	2,690	4,140
Environmental Health & Safety	14,130	1,680	2,700	4,370
Waste Management	13,620	1,370	2,520	3,890
Site Assessment & Reclamation	12,980	1,360	2,370	3,730
Air Quality	10,960	1,120	2,090	3,210
Policy & Legislation	5,820	810	1,040	1,850
Communications & Public Awareness	5,370	640	890	1,530
Education & Training	2,830	430	470	900
Research & Development	1,690	220	240	460



SPOTLIGHT: CORE ENVIRONMENTAL WORKERS

The EnviroShare¹⁴ for core environmental workforce occupations (i.e., those roles requiring specialized environmental competencies) is **27%**, as opposed to **7%** for all occupations. The three occupations with the highest EnviroShares (Meteorologists and climatologists, Forestry professionals, and Conservation and fishery officers) are also core environmental occupations.

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

- Civil engineers (**770 jobs**)
- Administrative officers (**660**)
- University professors and lecturers (**590**)

Looking ahead to 2033, the highest net hiring requirements for core environmental workers are expected to be for Administrative officers (**360** job openings), Civil engineers (**350**), Natural and applied science policy researchers, consultants, and program officers (**270**).

These three core occupations are also anticipated to see the largest expansion demand in the next decade, with Natural and applied science policy researchers, consultants and program officers expected to see **38%** growth (**190**) from 2024 employment levels.

As a result of retirements, deaths, and provincial outmigration Administrative officers (**200**), University professors and lecturers (**190**), and Civil engineers (**150**) are predicted to see the greatest replacement demand among core environmental workers.

¹⁴ EnviroShare measures the proportion of environmental workers to total employment within an occupation or industry.

TABLE 6: ENVIRONMENTAL NET HIRING REQUIREMENTS, BY TOP 20 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
All Occupations	12,700	1,430	2,700	4,120	27%
Civil engineers (21300)	770	200	150	350	60%
Natural and applied science policy researchers, consultants and program officers (41400)	500	190	80	270	34%
University professors and lecturers (41200)	590	60	190	250	19%
Contractors and supervisors, mechanic trades (72020)	510	30	140	170	21%
Human resources professionals (11200)	310	110	50	160	9%
Police officers (except commissioned) (42100)	350	50	110	160	11%
Biologists and related scientists (21110)	470	50	90	140	44%
Other professional engineers (21399)	500	30	100	130	45%
Professional occupations in business management consulting (11201)	310	50	80	130	11%
Water and waste treatment plant operators (92101)	350	50	80	130	77%
Facility operation and maintenance managers (70012)	210	50	70	120	22%
Mechanical engineers (21301)	190	90	30	120	20%
Firefighters (42101)	330	10	100	110	27%
Forestry professionals (21111)	160	70	40	110	89%
Urban and land use planners (21202)	300	70	40	110	58%
Civil engineering technologists and technicians (22300)	300	40	70	100	31%
Government managers - economic analysis, policy development and program administration (40011)	180	40	60	100	35%
Manufacturing managers (90010)	260	30	70	100	14%
Architecture and science managers (20011)	140	60	30	90	27%

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.¹⁵ 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).

¹⁵ 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 jobs¹⁶ 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.¹⁷

Mathematically, the job posting counts and the totals are both arranged in $p \times n$ 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 $p \times n$ matrix for each year and quarter calculated by:

$$W = J \circ T$$

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 $p \times n$ matrix (**L**) for each year and quarter to create the Environmental Workforce (**E**):

$$E = W \circ L$$

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 $i \times n$ 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 $i \times n$ Environmental Workforce by Industry matrix (**É**) is:

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

The total size of the environmental workforce is be calculated as the grand sum of \dot{E} .

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.

¹⁶ 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.

¹⁷ 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 skilled trades, as many opportunities are hired through word of mouth, personal connections, or union halls.
- 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)	EnviroShare in 2023	Environmental Employment in 2024	Expansion Demand 2024-2033	Replacement Demand 2024-2033	Net Hiring Requirements 2024-2033
All Occupations	6.6%	45,350	4,520	8,940	13,460
Senior managers - financial, communications and other business services (00012)	9%	80	30	20	50
Other business services managers (10029)*	14%	70	20	20	40
Financial and investment analysts (11101)	8%	120	40	20	60
Financial advisors (11102)	3%	60	30	20	50
Human resources professionals (11200)*	9%	310	110	50	160
Professional occupations in business management consulting (11201)*	11%	310	50	80	130
Professional occupations in advertising, marketing and public relations (11202)	18%	980	40	110	150
Supervisors, finance and insurance office workers (12011)	9%	90	50	20	60
Supervisors, supply chain, tracking and scheduling coordination occupations (12013)	6%	120	40	40	80
Procurement and purchasing agents and officers (12102)	11%	170	60	40	100
Accounting technicians and bookkeepers (12200)	4%	240	0	50	50
Insurance adjusters and claims examiners (12201)	9%	110	40	20	70
Administrative officers (13100)*	13%	660	160	200	360
Accounting and related clerks (14200)	2%	130	30	10	40

Occupation (NOC)	EnviroShare in 2023	Environmental Employment in 2024	Expansion Demand 2024-2033	Replacement Demand 2024-2033	Net Hiring Requirements 2024-2033
Engineering managers (20010)*	34%	310	-10	60	50
Architecture and science managers (20011)*	27%	140	60	30	90
Computer and information systems managers (20012)*	9%	140	30	40	70
Geoscientists and oceanographers (21102)*	54%	130	30	30	60
Biologists and related scientists (21110)*	44%	470	50	90	140
Forestry professionals (21111)*	89%	160	70	40	110
Agricultural representatives, consultants and specialists (21112)	19%	100	40	20	60
Architects (21200)*	31%	240	40	40	80
Landscape architects (21201)*	47%	210	50	30	80
Urban and land use planners (21202)*	58%	300	70	40	110
Cybersecurity specialists (21220)	18%	80	30	10	40
Business systems specialists (21221)	12%	80	30	10	40
Information systems specialists (21222)	8%	260	110	40	150
Civil engineers (21300)*	60%	770	200	150	350
Mechanical engineers (21301)*	20%	190	90	30	120
Electrical and electronics engineers (21310)*	35%	320	20	60	70
Other professional engineers (21399)*	45%	500	30	100	130
Geological and mineral technologists and technicians (22101)	52%	230	5	40	50
Technical occupations in geomatics and meteorology (22214)*	49%	260	10	30	40
User support technicians (22221)	6%	220	80	40	120
Occupational health and safety specialists (22232)	36%	440	160	120	280
Construction inspectors (22233)	23%	140	40	40	80

Occupation (NOC)	EnviroShare in 2023	Environmental Employment in 2024	Expansion Demand 2024-2033	Replacement Demand 2024-2033	Net Hiring Requirements 2024-2033
Civil engineering technologists and technicians (22300)*	31%	300	40	70	100
Mechanical engineering technologists and technicians (22301)*	16%	80	40	10	50
Managers in health care (30010)	12%	130	5	40	40
Nursing coordinators and supervisors (31300)	9%	100	30	30	60
Registered nurses and registered psychiatric nurses (31301)	4%	560	10	90	100
Nurse aides, orderlies and patient service associates (33102)	1%	170	40	30	70
Government managers - health and social policy development and program administration (40010)*	22%	100	20	40	50
Government managers - economic analysis, policy development and program administration (40011)*	35%	180	40	60	100
Other managers in public administration (40019)	75%	520	230	210	440
Managers in social, community and correctional services (40030)*	11%	170	10	50	50
Lawyers and Quebec notaries (41101)*	10%	190	60	40	90
University professors and lecturers (41200)*	19%	590	60	190	250
Post-secondary teaching and research assistants (41201)	10%	260	60	20	80
College and other vocational instructors (41210)	7%	230	-5	50	50
Religious leaders (41302)	5%	70	20	30	40
Natural and applied science policy researchers, consultants and program officers (41400)*	34%	500	190	80	270

Occupation (NOC)	EnviroShare in 2023	Environmental Employment in 2024	Expansion Demand 2024-2033	Replacement Demand 2024-2033	Net Hiring Requirements 2024-2033
Education policy researchers, consultants and program officers (41405)	9%	130	20	20	40
Other professional occupations in social science (41409)	66%	320	-60	100	50
Police officers (except commissioned) (42100)*	11%	350	50	110	160
Firefighters (42101)*	27%	330	10	100	110
Paralegals and related occupations (42200)	14%	90	30	20	50
Social and community service workers (42201)	6%	460	30	80	110
Recreation, sports and fitness program and service directors (50012)	21%	120	20	40	60
Program leaders and instructors in recreation, sport and fitness (54100)	5%	160	60	20	80
Retail and wholesale trade managers (60020)	4%	420	20	130	150
Retail sales supervisors (62010)	3%	240	60	40	100
Cleaning supervisors (62024)	20%	420	-30	80	50
Technical sales specialists - wholesale trade (62100)	11%	400	30	90	110
Sales and account representatives - wholesale trade (non-technical) (64101)	3%	240	80	40	120
Security guards and related security service occupations (64410)	4%	140	30	30	60
Store shelf stockers, clerks and order fillers (65102)	2%	160	30	20	50
Food and beverage servers (65200)	3%	120	30	10	40
Food counter attendants, kitchen helpers and related support occupations (65201)	3%	280	80	30	110
Construction managers (70010)*	21%	530	-30	100	70

Occupation (NOC)	EnviroShare in 2023	Environmental Employment in 2024	Expansion Demand 2024-2033	Replacement Demand 2024-2033	Net Hiring Requirements 2024-2033
Home building and renovation managers (70011)	22%	920	210	260	470
Facility operation and maintenance managers (70012)*	22%	210	50	70	120
Managers in transportation (70020)	15%	110	30	20	50
Contractors and supervisors, other construction trades, installers, repairers and servicers (72014)	5%	100	20	20	40
Contractors and supervisors, mechanic trades (72020)*	21%	510	30	140	170
Supervisors, motor transport and other ground transit operators (72024)	9%	150	30	40	60
Welders and related machine operators (72106)	3%	90	20	20	40
Electrical power line and cable workers (72203)	19%	160	30	30	60
Heavy-duty equipment mechanics (72401)	8%	240	-5	40	40
Railway carmen/women (72403)	31%	170	5	40	40
Automotive service technicians, truck and bus mechanics and mechanical repairers (72410)	6%	270	20	50	80
General building maintenance workers and building superintendents (73201)	8%	190	20	60	90
Transport truck drivers (73300)	2%	260	-10	50	40
Heavy equipment operators (73400)	9%	210	30	40	70
Railway yard and track maintenance workers (74200)	38%	320	40	60	100
Utility maintenance workers (74204)	29%	120	40	20	70

Occupation (NOC)	EnviroShare in 2023	Environmental Employment in 2024	Expansion Demand 2024-2033	Replacement Demand 2024-2033	Net Hiring Requirements 2024-2033
Public works maintenance equipment operators and related workers (74205)	8%	60	20	20	40
Public works and maintenance labourers (75212)	30%	220	30	40	60
Managers in agriculture (80020)	12%	690	180	270	450
Managers in horticulture (80021)	13%	70	20	30	50
Landscaping and grounds maintenance labourers (85121)	4%	100	30	10	40
Manufacturing managers (90010)*	14%	260	30	70	100
Utilities managers (90011)*	39%	170	20	40	70
Supervisors, mineral and metal processing (92010)	24%	110	10	30	40
Supervisors, motor vehicle assembling (92020)	15%	80	20	30	50
Supervisors, other mechanical and metal products manufacturing (92023)	9%	100	30	30	60
Power engineers and power systems operators (92100)	23%	250	10	40	50
Water and waste treatment plant operators (92101)*	77%	350	50	80	130
Chemical plant machine operators (94110)	18%	80	40	30	70
Mechanical assemblers and inspectors (94204)	9%	210	-10	60	50



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