REGIONAL SPOTLIGHT

Western Canada

Close-up on the bio-economy

LABOUR MARKET INTELLIGENCE

BioTalent™ Canada

Igniting the bio-economy's brainpower

BioTalent Canada

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Recently named one of the 50 Best Workplaces in Canada with 10–50 employees and awarded a Great Place to Work® Certification 2021, BioTalent Canada practices the same industry standards it recommends to its stakeholders. These distinctions were awarded to BioTalent Canada following a thorough and independent analysis conducted by Great Place to Work®.

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Report Partners

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About this report

BioTalent Canada's 2021 series of labour market intelligence (LMI) reports, *Close-up on the bio-economy*, aims to provide the perspective bio-economy organizations need to find, recruit, train and retain talented teams based on real, meaningful understanding of the labour market.

Building on the last national LMI study conducted in 2013,[1] the new series gives a much-needed update on the complex, multi-dimensional bio-economy, the companies within it, and the skills and talent they require. Its insights are based on surveys, stakeholder roundtables and interviews, an environmental scan and extensive data analysis.

For the first time, the data offers deeper insights into the labour market conditions specific to individual regions within Canada. This report looks at **Western Canada** (which includes British Columbia and Alberta), including labour supply projections and labour market outlooks based on econometric models to estimate hiring requirements.

The study considered **three time periods** for its economic forecasts: immediate (to explore pandemic-related changes between 2019 and 2020), short term (2021 to 2024) and medium/longer term (2025 to 2029).

1 *Sequencing the Data, 2013. A previous LMI report, Splicing the Data, was published in 2008.*

Other reports in the series

The *Close-up on the bio-economy* LMI series is published as part of BioTalent Canada's mission to provide bio-economy stakeholders with valuable, evidence-based labour market intelligence and job-ready human resources.

It includes:

- **National LMI report**
- **Demand and Supply Outlook**
- **Regional spotlights** (Atlantic Canada, Quebec, Ontario, Prairies, Western Canada)
- **Metro hub spotlights** (Greater Montreal, Greater Toronto Area, Metro Vancouver)
- Research briefs on topics such as bio-economy education and work-integrated learning

Visit biotalent.ca/LMIStudy to download these and other LMI reports, briefs and articles.

Research partners

The following researchers contributed to the development of this research and report:

- DPM Research Inc.
- Prism Economics & Analysis Inc.
- EKOS Research Associates Inc.
- Ipsos

Executive summary

Western Canada's bio-economy is likely to require **18,800 additional workers by 2029**. Companies will be challenged to fill positions due to a highly competitive labour market and an ongoing lack of capital to attract and retain candidates. Distribution, manufacturing, marketing and management capacity will be particularly urgent areas of need across all sub-sectors.

A reflection of Canada's overall bio-economy

Western Canada's bio-economy consists of roughly **3,800 establishments** that collectively employed some **48,000 people** in 2019. Similar to most other regions, its companies are mainly **small or medium-sized businesses**: 75% have 20 employers or fewer, and 58% generate annual total gross revenues of less than $1 million. Western Canada also resembles most other regions in that **bio-health companies** account for more than half (52%) of its bio-economy.

The bio-economy workforce in Western Canada covers a wide range of occupations, with **R&D and manufacturing** together accounting for nearly half of all jobs in the region. The distribution of employees across sub-sectors mirrors the distribution of companies, with bio-health accounting for the largest proportion.

Demand will outpace supply

The Western Canadian bio-economy is **expected to grow modestly** during the 2021 to 2029 forecast period. Current estimates indicate there will not be enough workers to meet labour need by 2029, with significant pressure existing now and mounting throughout the decade. Most of these new hires will be required by the bio-health sub-sector.

Some of the most severe shortages are expected in bio-manufacturing and processing. Forecasts suggest Western Canada employers will be able to fill only 25% of job openings in these areas between now and 2029. The shortage is expected to intensify as Canada seeks to expand its manufacturing sector in response to the lack of capacity highlighted by the COVID-19 pandemic.

While **labour shortages are expected for all bio-economy job functions** throughout the forecast period, four areas stand out as likely to experience persistent, severe shortages until 2029 and beyond:

- Distribution and logistics jobs
- Manufacturing and production jobs
- Management, finance and administration jobs
- Marketing, business development and sales jobs

How Western Canada can address the shortfall

As domestic university degree completions are expected to decline throughout the forecast period, strategies other than recruiting new graduates will be needed to meet the demand for labour — such as recruiting skilled immigrants and looking beyond traditional talent pools.

The Western Canadian bio-economy has a tremendous **opportunity to seek talent from under-represented groups**. On average, women make up one-third (34%) of bio-economy workers in the region overall and visible minorities about one-quarter (22%). Other equity-seeking groups have less representation in Western Canada: internationally educated professionals make up 16% of the regional bio-economy workforce and recent immigrants account for 9%, while workers with disabilities and Indigenous workers represent just 1% and 2% of the workforce, respectively.

As many employers report that **candidates lack essential "soft skills"** such as problem-solving, collaboration and communication, as well as the business development skills that support commercialization, further **expansion of work-integrated learning may be an important lever** for strengthening the talent supply.

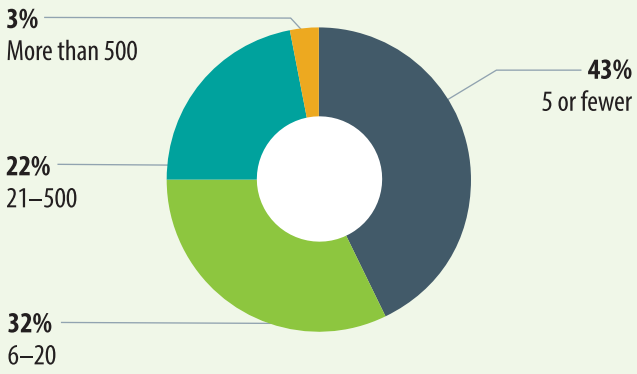
Who makes up the Western Canada bio-economy?*

THE COMPANIES

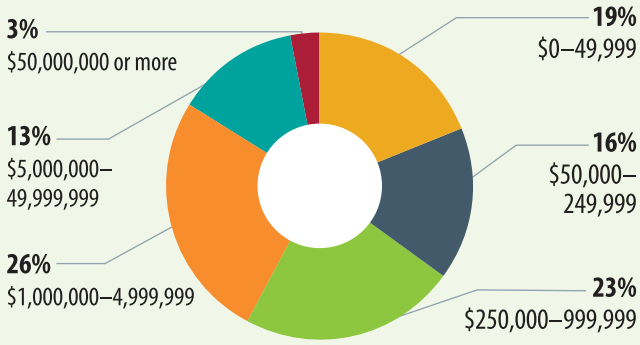
~3,800 bio-economy organizations

Most are small to medium-sized

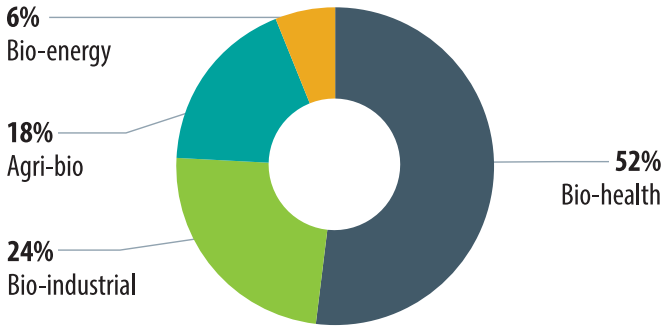
Number of employees



Annual total gross revenue



Bio-health is the biggest sub-sector

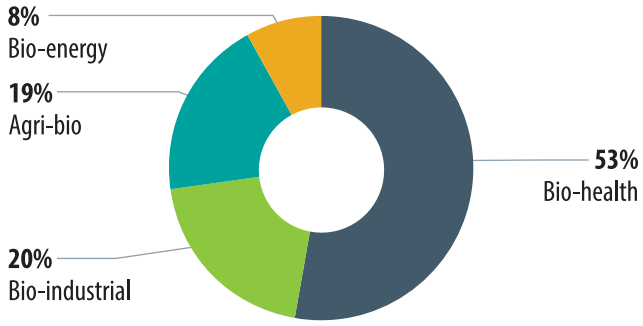


* *Western Canada includes British Columbia and Alberta*

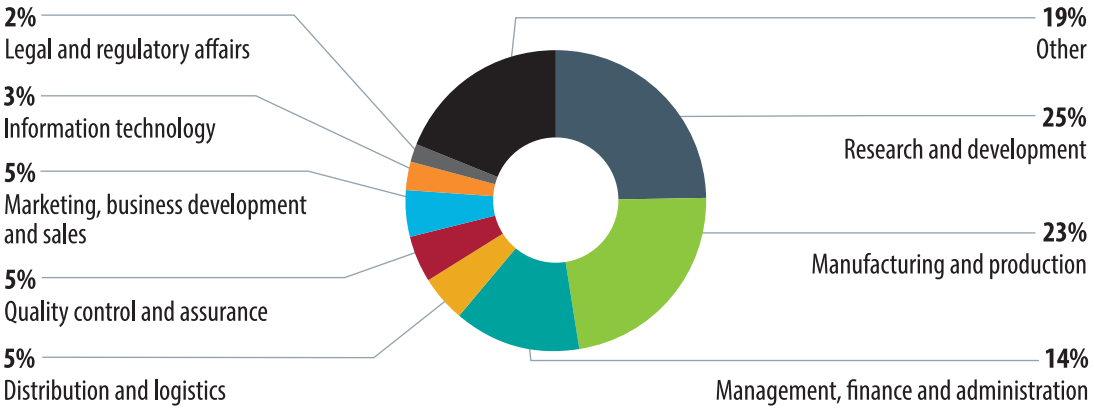
THE PEOPLE

~48,000 workers

Most work in bio-health



Jobs are concentrated in R&D and manufacturing†



The sector has an opportunity to improve diversity

- Women: **34%**
- Recent immigrants*: **9%**
- Visible minorities: **22%**
- Indigenous people: **2%**
- Internationally trained professionals: **16%**
- People with disabilities: **1%**

26% of undergraduate... **20%** of master's... **24%** of doctorate...

...students in Canadian bio-economy-related programs go to school in Western Canada

† *Percentages may not add up to 100% due to rounding.*

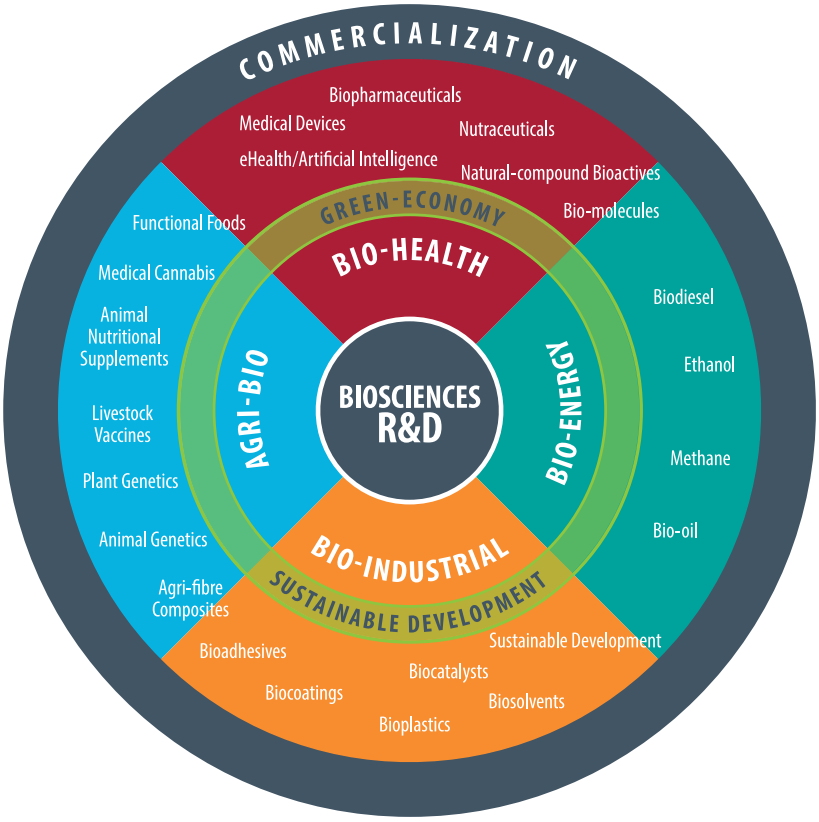
* *Recent immigrants are those who have been in Canada less than five years..*

DEFINING THE BIO-ECONOMY

The bio-economy today

The bio-economy is defined as the economic activity associated with the invention, development, production and use of primarily bio-based products, bio-based production processes and/or biotechnology-based intellectual property. It includes the use of resources from agriculture, forestry, fisheries/aquaculture, organic waste and aquatic biomass.

The field is multidisciplinary in that it cuts across the bio-health, bio-energy, bio-agriculture (agri-bio) and bio-industrial (chemicals and materials) sub-sectors. These four are all rooted in their own foundations of research and development and all have products, processes or intellectual property that are involved in the "green" or sustainable development economy as well, to a greater or lesser extent. The bio-economy sub-sectors share a common objective: the commercialization of resultant bio-products, processes and/or intellectual property.



The **bio-health** sub-sector encompasses the invention, development, manufacturing, commercialization and use of products that improve therapeutics, diagnostics, prevention and health administration, as well as the development and production of nutraceuticals and applications of medical cannabis. Research and development activities contribute to the development of new products, bio-based technologies and intellectual property related to the production of bio-health products and technologies.

The **bio-energy** sub-sector encompasses the invention, development, production, commercialization and use of renewable fuels through the conversion of organic material into heat or power. Research and development activities contribute to the development of new products, bio-based technologies and intellectual property related to the production of bio-energy.

The **bio-industrial** sub-sector encompasses the invention, development, manufacturing, commercialization and use of goods for industrial use, such as bio-chemicals and bio-materials, through the conversion of organic material. Research and development activities contribute to the development of new products, bio-based technologies and intellectual property related to the production of bio-industrial products. Among others, the development and production of biocatalysts are an integral part of this sub-sector.

The **agri-bio** sub-sector encompasses the invention, development, production, commercialization and use of new or modified products resulting from the manipulation, modification or alteration of the natural features of plants and crops, animals and/or other food sources. Research and development activities contribute to the development of new products, bio-based technologies and intellectual property that support improved quality, yield and efficiency in the agricultural sector and food production.

Profile of the Western Canada bio-economy

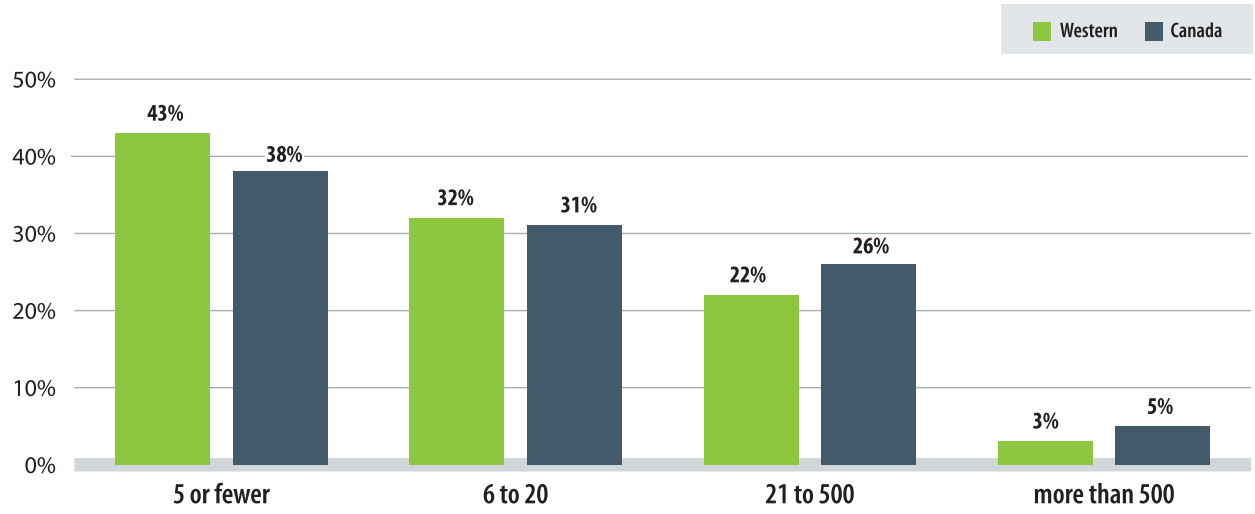
The bio-economy in Western Canada contains some 3,800 organizations, accounting for 28% of Canada's bio-economy companies. These organizations collectively employed around 48,000 people in 2019. It includes commercial businesses as well as hospital and university research institutions.

Employers

Small and medium-sized companies dominate the region's bio-economy. Of the organizations surveyed by BioTalent Canada, **three-quarters (75%) had 20 or fewer full-time employees**. Only 3% had more than 500 full-time employees. These numbers line up fairly closely with those for Canada overall.

Revenue figures are mostly similar between Western Canada and the country overall. In 2020, **more than half of the bio-economy companies (58%) in Western Canada reported annual total gross revenues of less than $1 million**. Only a handful of the largest players (3%) reported total gross revenues of $50 million or more.

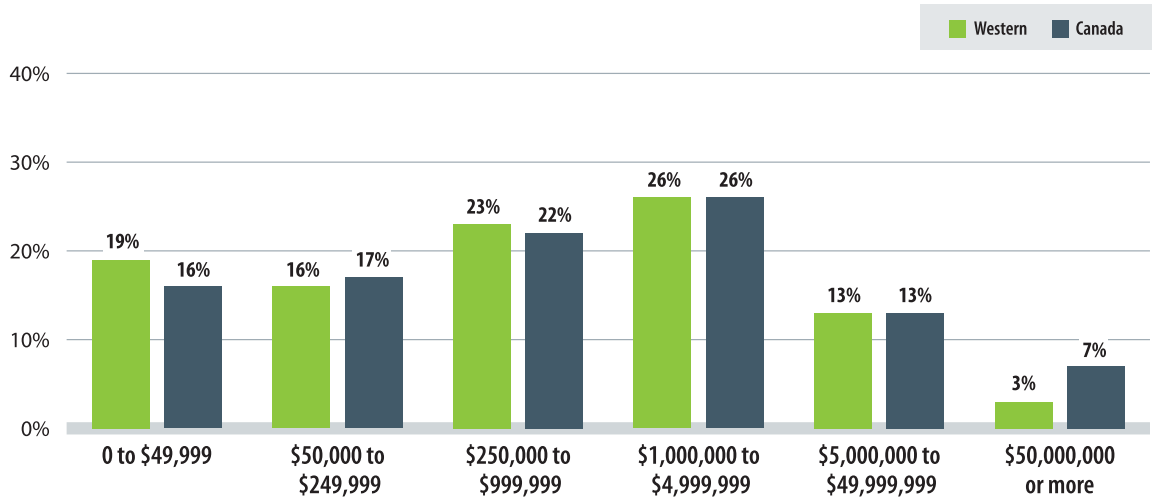
FIGURE 1. Bio-economy companies by number of full-time employees, Western Canada vs. national



Source: BioTalent Canada, Survey of Employers 2020

The overwhelming majority of bio-economy companies are small or medium-sized businesses.

FIGURE 2. Bio-economy companies by annual total gross revenue, Western Canada vs. national

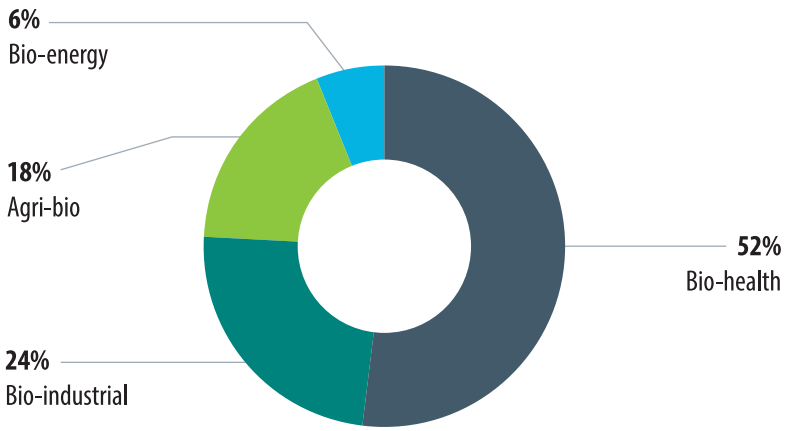


Source: BioTalent Canada, Survey of Employers 2020

Western Canadian bio-economy companies are relatively young, with **about one-half (51%) being less than 15 years old**. More than one-quarter (27%) have been in business for more than 25 years.

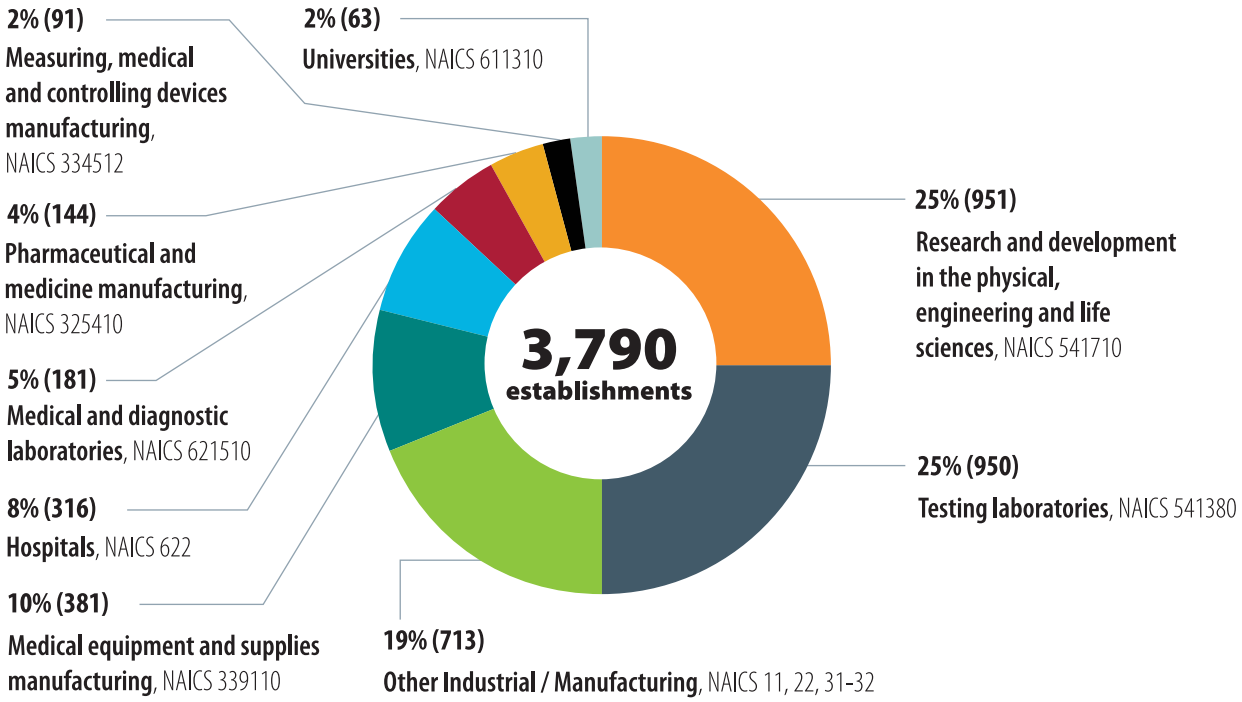
The distribution of Western Canada's bio-economy companies across the four primary sub-sectors is similar to the national profile. **Bio-health is by far the largest sub-sector** in the region, accounting for more than half (52%) of all companies in the Western bio-economy.

FIGURE 3. Companies by primary sub-sector, Western Canada



Source: BioTalent Canada Survey of Employers (2020)

FIGURE 4. Western Canada bio-economy establishments by NAICS industrial sector



Source: BioTalent Canada Modeling and Projections (2020)

Three-quarters of the region's bio-economy companies have 20 employees or fewer.

The North American Industry Classification System (NAICS) gives a different and complementary view of the Western Canadian bio-economy and its areas of focus. Physical, engineering and life sciences R&D (NAICS 541710) and testing laboratories (NAICS 541380) make up half of bio-economy establishments, accounting for 25% each.

Workers

R&D and manufacturing account for nearly half of Western Canada's bio-economy jobs overall (25% and 23%, respectively). In three of the four bio-economy sub-sectors, manufacturing and production account for the largest share of jobs.

Employment in Western Canada's bio-economy is highly concentrated in bio-health. More than one-half (53%) of all employees work in this sub-sector, with 20% in the bio-industrial sub-sector and 19% in the agri-bio sub-sector.

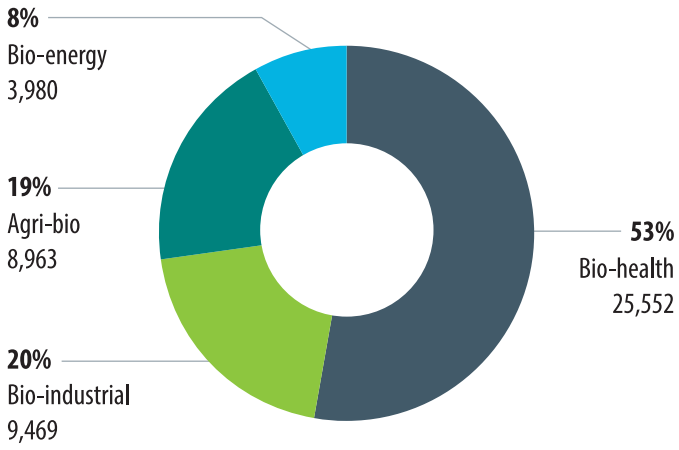
TABLE 1. Employment by job category and sub-sector, Western Canada

Job category	Total	Agri-bio	Bio-energy	Bio-health	Bio-industrial
Research and development	**25%**	20%	22%	29%	19%
Manufacturing and production	**23%**	34%	38%	11%	38%
Management, finance and administration	**14%**	20%	17%	12%	12%
Distribution and logistics	**5%**	6%	5%	5%	5%
Quality control and quality assurance	**5%**	5%	4%	5%	5%
Marketing, business development and sales	**5%**	6%	3%	5%	4%
Legal and regulatory affairs	**2%**	1%	3%	2%	1%
Information technology	**3%**	2%	2%	4%	1%
Other	**19%**	5%	6%	28%	14%

Percentages may not add up to 100% due to rounding.

Source: BioTalent Canada Modeling and Projections (2020)

FIGURE 5. Bio-economy employment estimates by sub-sector, Western Canada



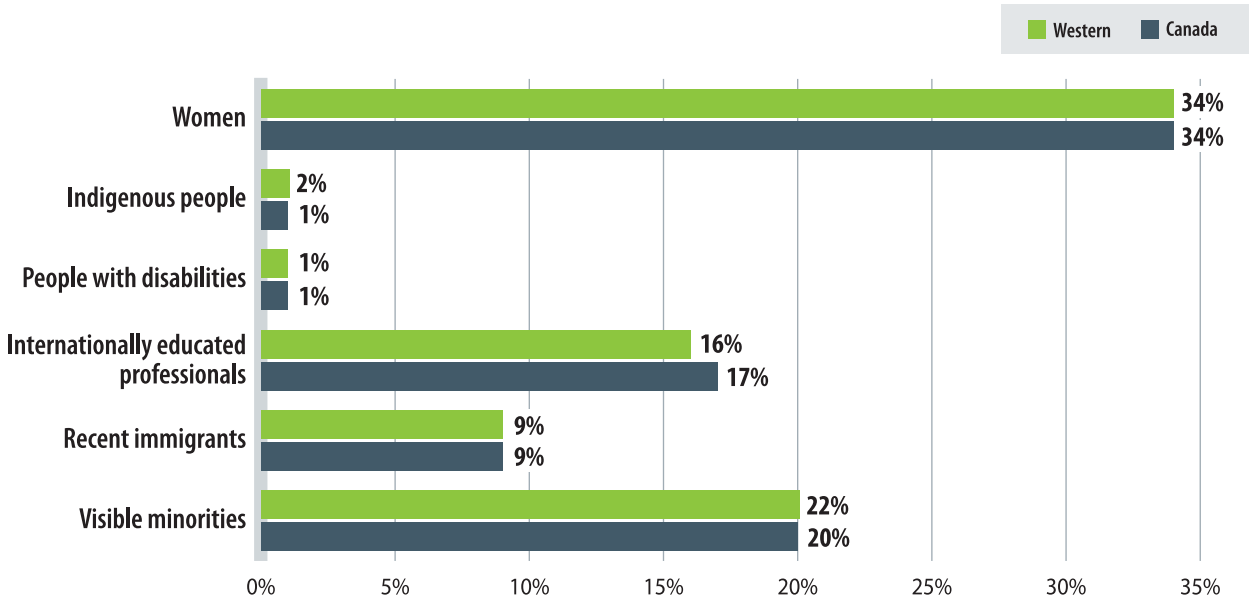
Source: BioTalent Canada Modeling and Projections (2020)

Equity and diversity in the workforce

Representation of equity-seeking groups in the Western Canada bio-economy is similar to that of Canada overall. On average, **women account for roughly one-third (34%) of bio-economy workers** in the region, while visible minorities account for about one-quarter (22%). Other groups have less representation: internationally educated professionals (IEPs) make up 16% of the bio-economy workforce and recent immigrants (those who have been in Canada less than five years) 9%. People with disabilities represent 1% of the workforce and 2% of workers are Indigenous. These findings suggest under-represented populations could be important sources of new talent for the bio-economy going forward.

Focusing on under-represented groups could open up new pools of talent.

FIGURE 6. Average proportions of workers by equity-seeking group status, Western Canada



Source: BioTalent Canada, Survey of Employers 2020

For deeper perspective on the bio-economy labour market in other regions across Canada, see our series of regional LMI spotlights at biotalent.ca/LMIStudy.

Variational AI

Data-driven drug discovery

For Vancouver-based start-up Variational AI, the future of drug discovery is most definitely digital. Its innovative machine-learning platform generates novel and optimized molecules — with the potential to eventually cut pre-clinical drug discovery times from years to months. The challenge lies in proving that potential to chemists, biologists and clinicians.

Company profile: Variational AI

Location: Vancouver

Employees: 5

Bio-economy sub-sector: Bio-health

Since September 2019, Variational AI's team of experienced AI/machine learning and business specialists has been collaborating with biopharmaceutical partners to apply generative AI to drug discovery and bring new therapeutics to market.

Q: What makes Variational AI's solution different from conventional drug discovery platforms?

HANDOL KIM, CO-FOUNDER AND CEO: We use a generative artificial intelligence (AI) platform to discover novel small model therapeutics in a fraction of the time it takes with status quo techniques. Our AI can search the entirety of chemical space and rapidly generate new drug-like molecules with optimized properties such as potency, synthesizability and selectivity. What makes us unique is that we can do this with less data than other AI-for-drug-discovery approaches.

Q: What are the implications of your approach for the life sciences field?

HK: Our ultimate goal is to redefine the unit economics of drug development and create therapeutics for unmet medical needs faster while improving patient outcomes across a broad range of disease areas. There's a big advantage to adopting and mastering these technologies because they'll deliver outsized market share to the winners. Life sciences is being disrupted by digitalization just like other industries. AI and machine learning are becoming integral and strategic differentiators. We in Canada need to adopt computationally and digitally based drug discovery methods to maintain our competitive status. Global leaders already have this focus.

"Canada needs to take computationally and digitally based drug discovery methods far more seriously if we want to be competitive."

Q: Does the newness of your approach create HR challenges?

HK: It's hard to find people who understand both the chemical and computational domains. Experts in one area are sometimes suspicious or dismissive of the other. Many chemists who have been around drug discovery for decades are understandably skeptical. I mean, there is still no approved AI-discovered drug and developing drugs is extremely difficult. I'd say, too, the Canadian educational system is structured so that by the time someone's finished their PhD they've optimized and focused their skillset and cheminformatics and AI are not seen as essential — yet. At the same time, machine learning researchers are often naïve about how difficult drug discovery is, especially with respect to the quality and amount of training data needed. We're seeing indications this may be starting to change and we couldn't be happier.

Q: What occupations do you need the most in the short term, and where do you look for talent?

HK: We need cheminformaticians, computational chemists, medicinal chemists and synthetic chemists. We use the talent placement agency Mitacs for grad students and post-docs. We also search LinkedIn for candidates with biopharmaceutical experience or PhDs in organic or synthetic chemistry. Life Sciences BC and the Pharmaceutical BioScience Society (PBSS) job board are great for finding people with very specific skills. But word of mouth and networking have the highest impact. We use our own professional network, our board, our observers and the local ecosystem. It's easiest to hire where there's already a critical mass of talent — Boston, the San Francisco Bay Area, Montreal and, of course, Vancouver! We prefer to hire from within Canada, but we'll hire the right person from anywhere.

Q: Does the cost of U.S. talent affect your HR plans?

HK: It's the cost of doing business. Uprooting someone from Boston to work in Vancouver is expensive and they won't be productive for six months. I'd rather pay someone 30 percent more to stay where they are and contribute right away. This is possible because we're primarily computational. Before the pandemic, our technical team wasn't so keen on remote work. But we found we could often be more productive working remotely than having everyone on site. The pandemic solidified the idea that a decentralized team can work well.

Western Canada labour market outlook

Estimates suggest the Western Canada bio-economy will need an additional 18,800 workers by 2029.[2] Based on anticipated conditions, labour supply will not be sufficient to meet that demand.

While other regions in Canada expect to see a significant post-pandemic downturn in bio-economy employment in 2021, Western Canada does not. Employment in the region's bio-economy is expected to grow by just under 2.0% in the short term and by 1.2% annually over the medium/longer term. By the end of the decade, the sector **will employ nearly 55,000 people**.

Youth (those under 25 years old)[3] have historically been critical to the labour supply. Yet the youth share of the population in Western Canada has been declining steadily since 2000 and will likely continue to do so, while the share of individuals aged 55 years and older continues to rise. This combined trend is concerning for the future bio-economy because **a strong supply of youth is needed to age into the workforce and replace older workers**. This makes immigration key to meeting labour demand. Currently, only 9% of Western Canada's bio-economy workers are recent immigrants and 16% are IEPs, suggesting an opportunity to expand recruitment from these populations.

Although the COVID-19 pandemic led to a slight drop in immigration, with just 68,400 immigrants coming to Western Canada in 2020, numbers are expected to increase to nearly 100,000 annually by 2029. The number of immigrants arriving with post-secondary degrees has grown steadily since 2003 and is expected to rise to 30,000 by 2029. **The number of international students is also on the rise**, particularly in architecture, engineering and related technologies.

For more detail on bio-economy labour needs in Canada, read our demand and supply outlook at biotalent.ca/LMIStudy.

2 *While this report focuses primarily on private sector employers, all forecasts and modelling include actual and potential workers from the public, education and private sectors.*

3 *The definition of "youth" varies depending on the source. While BioTalent Canada typically defines "youth" as under 30, the source data for this report defines youth as under 25.*

Employment demand and skills requirements

While employment in the Western Canada bio-economy is expected to grow over the forecast period, the individual sub-sectors will experience their own patterns of expansion and contraction.

TABLE 2. Employment outlooks by sub-sector, Western Canada

Year	Overall	Bio-health	Bio-industrial	Agri-bio	Bio-energy
% change 2019 to 2020	**+0.3%**	+2.0%	+9.0%	-8.4%	-11.8%
Employment 2020	▲ **48,100**	▲ 26,100	▲ 10,300	▼ 8,200	▼ 3,500
Employment 2024	▲ **51,800**	▲ 27,450	▲ 10,400	▲ 10,000	▲ 4,000
Employment 2029	▲ **55,000**	▲ 29,200	▲ 11,000	▲ 10,800	▼ 3,900

Source: BioTalent Canada Modeling and Projections (2020)

Bio-health

Western Canada's bio-health sub-sector grew by an estimated 2% in 2020, largely due to increased pharmaceutical and medicine manufacturing. The region is home to several companies focused on R&D in pharmaceuticals, therapeutics and other biologics, industries that have benefited from record levels of venture capital investment in 2020. Employment is expected to grow by 1.3% annually between 2021 and 2024 and, following a dip in 2025, will reach annual growth of 1.5% through the rest of the decade. The bio-health sub-sector is expected to employ approximately 27,450 workers by 2024 and **29,200 workers by 2029**.

Bio-industrial

Employment in the Western Canada bio-industrial sub-sector grew by 9.0% in 2020 with increased demand for soap and cleaning products due to the COVID-19 pandemic. While a decline of 8.3% is expected in 2021, employment growth should resume between 2022 and 2024, with an annual increase of 3.1%. Relatively weaker medium/long-term employment growth of 1.3% annually is projected for 2025 to 2029. Bio-industrial employment is expected to reach approximately 10,400 workers by 2024 and **11,000 workers by 2029**.

Agri-bio

Western Canada agri-bio employment fell by 8.4% in 2020, mainly due to contractions associated with laboratory testing services and animal food manufacturers in the region. These losses should be temporary: agri-bio employment is expected to grow by 11.0% in 2021 and then 3.1% annually over the short term, reaching 10,000 workers by 2024. Relatively weaker growth for the sub-sector is predicted for the rest of the forecast period (1.6% annually), with total employment reaching **10,800 workers by 2029**.

Bio-energy

The bio-energy sector in Western Canada contracted by 11.8% in 2020, with most job losses being in the oilseed processing industry. Employment is expected to return to near pre-pandemic levels with 10.5% growth in 2021. The remainder of the short term (to 2024) will see modest growth of less than 1% annually, followed by a decline of 0.5% annually between 2025 and 2029 due to competition from alternative energy sources and overall lower energy consumption. Bio-energy employment is expected to total approximately 4,000 workers by 2024 before falling to **3,900 workers by 2029**.

The Western Canada bio-manufacturing gap

COVID-19 highlighted a significant gap in the Canadian bio-economy: bio-manufacturing and processing capacity. Canada was initially unable to produce sufficient personal protective equipment (PPE) to meet its needs and had no domestic capacity to develop and manufacture vaccines. Commitments have been made to build facilities to remedy this, but those facilities will require skilled people to operate them — a supply of talent does not currently exist.

Estimates suggest Canada will need an additional 4,760 bio-manufacturing workers by 2029 (1,220 in bio-industrial and 1,740 in agri-bio), even without taking into account expansion growth due to recently announced investments. Only 25% of those positions will be fillable by predicted supply during this time period.

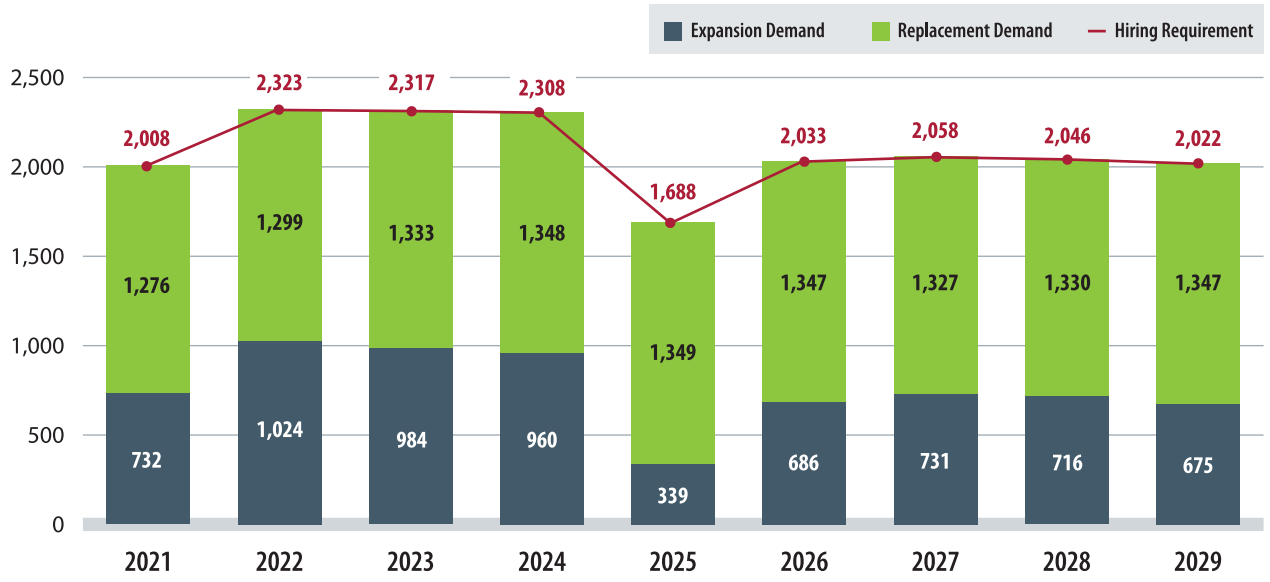
To fill the shortages, the bio-economy will need to develop new strategies, such as training workers from other sectors and more actively recruiting from outside traditional labour pools, including people from demographic groups under-represented in the bio-economy such as Indigenous persons, newcomers to Canada and persons with disabilities.

Expansion and replacement

Approximately two-thirds (64%) of the 18,800 additional workers needed in the Western Canada bio-economy between 2021 and 2029 will be to replace retirees or individuals leaving the workforce for other reasons — in other words, to fill r*eplacement demand*. A portion will also be needed to fill new jobs as their industries grow (*expansion demand*).

While **replacement demand will be the main driver of Western Canada's hiring requirements**, it is somewhat below the national bio-economy outlook of 77%. Conversely, expansion demand is expected to account for a somewhat larger share of hiring requirement than the national outlook, at 36%. Expansion demand is projected to be lowest in 2025, when bio-economy employment overall contracts to pre-pandemic levels and the economic recovery results in higher interest rates, which will likely reduce investment (including in labour) in the bio-economy.

FIGURE 7. Hiring requirement outlook by demand type, Western Canada



Source: BioTalent Canada Modeling and Projections (2020)

TABLE 3. Hiring requirements by sub-sector from 2021 to 2029, Western Canada

Sub-sector	Workers needed	Demand type	Key roles
Bio-health	9,250	Mostly replacement	▸ R&D (26%) ▸ Management, finance and administration (16%) ▸ Manufacturing and production (13%)
Bio-industrial	3,250	Mostly replacement but with a significant proportion due to expansion (40%) post-2021	▸ Manufacturing and production (38%) ▸ R&D (17%) ▸ Management, finance and administration (14%)
Agri-bio	5,090	Even replacement and expansion until 2021, then 60% replacement	▸ Manufacturing and production (34%) ▸ Management, finance and administration (24%) ▸ R&D (14%)
Bio-energy	1,360	Virtually all replacement	▸ Manufacturing and production (46%) ▸ Management, finance and administration (19%) ▸ R&D (18%)

Source: BioTalent Canada Modeling and Projections (2020)

Across all four sub-sectors in Western Canada, employers will need to hire for manufacturing, R&D and management roles. Manufacturing and production is the most needed job category in bio-industrial, agri-bio and bio-energy, while R&D tops the list in the bio-health sub-sector.

All four-sub-sectors in the region will need to hire for manufacturing, R&D and management roles.

TABLE 4. Hiring requirements by job function, Western Canada

Job function	2021	2022	2023	2024	2025	2026	2027	2028	2029	Total	%
Manufacturing and production	560	640	610	600	440	480	480	480	470	**4,760**	**25%**
Research and development	280	460	470	480	350	450	460	450	450	**3,850**	**20%**
Management, finance and administration	690	380	380	370	280	320	320	320	320	**3,380**	**18%**
Distribution and logistics	240	150	140	130	90	120	120	110	110	**1,210**	**6%**
Marketing, business development and sales	190	120	120	120	70	100	90	90	90	**990**	**5%**
Quality control and assurance	90	120	120	110	70	100	110	100	100	**920**	**5%**
Information technology	50	60	60	50	30	50	50	50	50	**450**	**2%**
Legal and regulatory affairs	50	40	40	40	30	40	40	40	40	**360**	**2%**
Other	(-130)	360	380	410	330	390	410	400	400	**2,950**	**16%**
Total	**2,020**	**2,330**	**2,320**	**2,310**	**1,690**	**2,050**	**2,080**	**2,040**	**2,030**	**18,870**	**100%**

Source: BioTalent Canada Modeling and Projections (2020)

Anticipated employment demand can be combined with expected supply to model where labour needs will be most acute throughout the forecast period. Overall, **59% of surveyed companies across all sub-sectors in Western Canada already report some or significant challenges recruiting and retaining qualified staff**. The outlook suggests these will continue and likely worsen through to 2029.

Overall labour market ratings by job category are calculated by comparing hiring requirements in each forecast year to the number of expected new bio-economy workforce entrants in the same year. A three-tiered rating scale shows the severity of the hiring challenges:

Level 1

Labour supply is **greater than 75%** of labour demand.
Low to moderate labour shortages are expected.

Level 2

Labour supply is **between 25% and 75%** of labour demand.
Moderate to serious labour shortages are expected.

Level 3

Labour supply is **less than 25%** of labour demand.
Serious to severe labour shortages are expected.

Tables 5–9 show that **manufacturing and production; management, finance and administration; distribution and logistics; and marketing, business development and sales are expected to face the most serious labour shortages throughout the forecast period**. This is true across all sub-sectors except bio-energy, which is expected to face only moderate-to-serious labour shortages for most positions. At the other end of the spectrum, the bio-industrial sub-sector is expected to face serious-to-severe labour shortages for nearly every functional area throughout the forecast period.

Some of the shortages could be mitigated by more active recruitment of new graduates from relevant fields, but this will not fully address demand. Additional strategies, such as recruiting skilled immigrants and looking beyond traditional pools to attract candidates with a wider variety of backgrounds, will be required.

TABLE 5. Overall bio-economy labour market ratings outlook by job function, Western Canada

Job function	2021	2022	2023	2024	2025	2026	2027	2028	2029
Manufacturing and production	3	3	3	3	3	3	3	3	3
Management, finance and administration	3	3	3	3	3	3	3	3	3
Distribution and logistics	3	3	3	3	3	3	3	3	3
Marketing, business development and sales	3	3	3	3	3	3	3	3	3
Quality control and assurance	3	3	3	3	2	3	3	3	3
Legal and regulatory affairs	3	2	2	2	2	2	2	2	2
Research and development	2	2	2	2	2	2	2	2	2
Information technology	2	2	2	2	2	2	2	2	2
Other	1	2	2	2	2	2	2	2	2
Overall	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**

Source: BioTalent Canada Modeling and Projections (2020)

TABLE 6. Bio-health labour market ratings outlook by job function, Western Canada

Job function	2021	2022	2023	2024	2025	2026	2027	2028	2029
Distribution and logistics	3	3	3	3	3	3	3	3	3
Manufacturing and production	3	3	3	3	2	3	3	3	3
Management, finance and administration	3	3	3	3	2	3	3	3	3
Quality control and assurance	3	3	3	3	2	3	3	3	3
Marketing, business development and sales	3	3	3	2	2	2	2	2	2
Research and development	2	2	2	2	2	2	2	2	2
Information technology	2	2	2	2	1	2	2	2	2
Legal and regulatory	1	2	2	2	2	2	2	2	2
Other	1	2	2	2	2	2	2	2	2
Overall	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**

Source: BioTalent Canada Modeling and Projections (2020)

TABLE 7. Bio-industrial labour market ratings outlook by job function, Western Canada

Job function	2021	2022	2023	2024	2025	2026	2027	2028	2029
Legal and regulatory	3	3	3	3	3	3	3	3	3
Information technology	3	3	3	3	3	3	3	3	3
Distribution and logistics	1	3	3	3	3	3	3	3	3
Manufacturing and production	1	3	3	3	3	3	3	3	3
Quality control and assurance	1	3	3	3	3	3	3	3	3
Marketing, business development and sales	1	3	3	3	3	3	3	3	3
Management, finance and administration	1	3	3	3	2	2	2	2	2
Research and development	1	3	3	2	2	2	2	2	2
Other	1	3	3	3	3	3	3	3	3
Overall	**1**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

Source: BioTalent Canada Modeling and Projections (2020)

TABLE 8. Agri-bio labour market ratings outlook by job function, Western Canada

Job function	2021	2022	2023	2024	2025	2026	2027	2028	2029
Distribution and logistics	3	3	3	3	3	3	3	3	3
Manufacturing and production	3	3	3	3	3	3	3	3	3
Management, finance and administration	3	3	3	3	3	3	3	3	3
Marketing, business development and sales	3	3	3	3	3	3	3	3	3
Quality control and assurance	3	3	3	3	3	3	3	3	3
Legal and regulatory	3	3	3	3	2	2	2	2	3
Information technology	3	3	3	3	2	2	2	2	2
Research and development	3	2	2	2	2	2	2	2	2
Other	3	2	2	2	1	1	1	1	1
Overall	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

Source: BioTalent Canada Modeling and Projections (2020)

TABLE 9. Bio-energy labour market ratings outlook by job function, Western Canada

Job function	2021	2022	2023	2024	2025	2026	2027	2028	2029
Distribution and logistics	3	3	3	3	3	2	2	2	2
Manufacturing and production	3	3	3	3	2	2	2	2	2
Quality control and assurance	3	3	3	3	2	2	2	2	2
Management, finance and administration	3	2	2	2	2	2	2	2	2
Marketing, business development and sales	3	2	2	2	2	1	2	1	1
Legal and regulatory	3	2	2	2	1	1	1	1	1
Research and development	2	2	2	2	2	2	2	2	2
Information technology	1	2	2	2	2	1	1	1	N/A
Other	3	3	2	2	2	2	2	2	1
Overall	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**

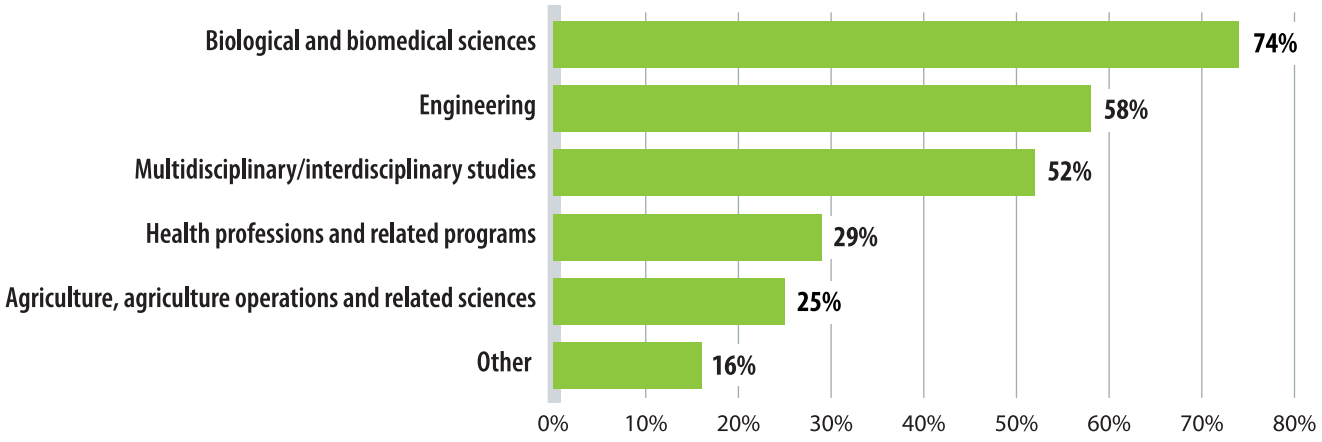
Source: BioTalent Canada Modeling and Projections (2020)

Education and the talent supply

Bio-economy employers seek a wide range of educational backgrounds. **Biological and biomedical sciences are at the top of the list**, with nearly three-quarters (74%) of employers recruiting workers from these fields. More than half (58%) also look for workers with multi- or interdisciplinary backgrounds, indicating the need for staff with specialized technical skills who also understand the broader business context.

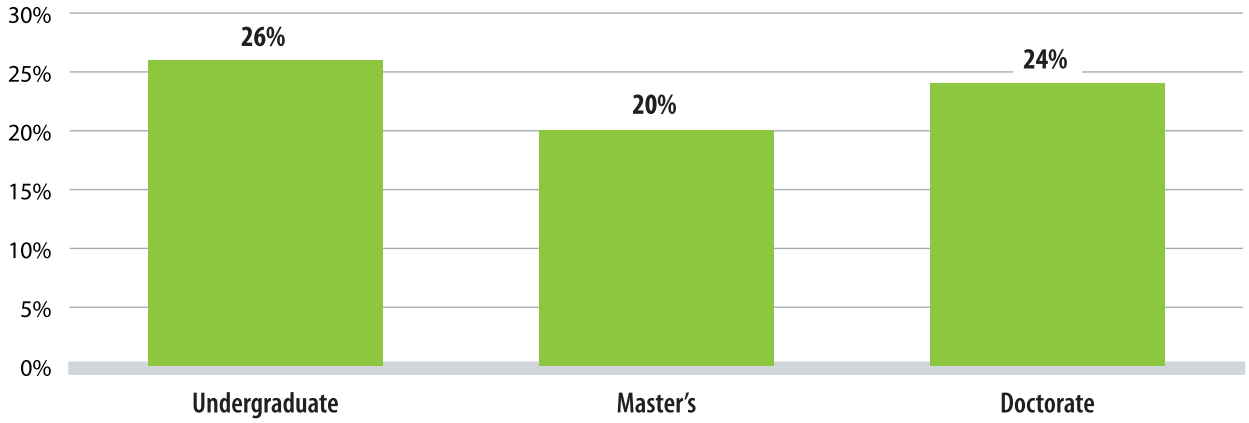
Western Canada is home to many of the country's university and college-level programs related to the bio-economy, with a strong proportion of student enrolment numbers reflecting that distribution. In 2016–2017, one-fifth of Canada's master's students and around one-quarter of undergraduate and doctorate students in bio-economy-related programs were enrolled in Western Canadian institutions.

FIGURE 8. Top fields of study sought by bio-economy employers, Western Canada



Source: BioTalent Canada, Survey of Employers 2020

FIGURE 9. Western Canada's share of total enrolment in bio-economy-related university programs in Canada

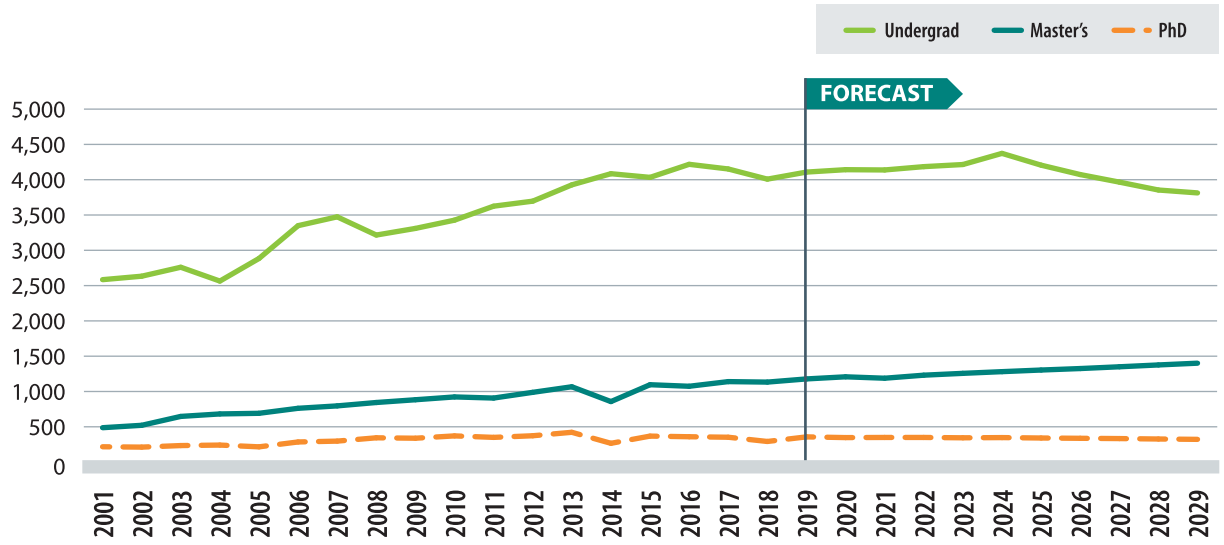


Source: Customized PSIS data, Statistics Canada 2019

In line with the decline in the post-secondary-aged (20–24 years old) segment of the population, **domestic enrolment in post-secondary education is expected to decrease slightly** in the long term, with undergraduate degree completions dropping by 5% by 2029 compared to 2018. Conversely, master's and doctorate completions are expected to increase during this period — by 24% and 10%, respectively.

Western Canada attracts many of the international students coming to the country, and these students make up a large and growing share of the region's post-secondary enrolments. Some of them are likely to remain in Canada as immigrants, particularly following changes to federal immigration rules in 2005 that made it easier for students to work and convert to "landed" status.

FIGURE 10. Domestic degree completions by study level, Western Canada



Source: BioTalent Canada Modeling and Projections (2020)

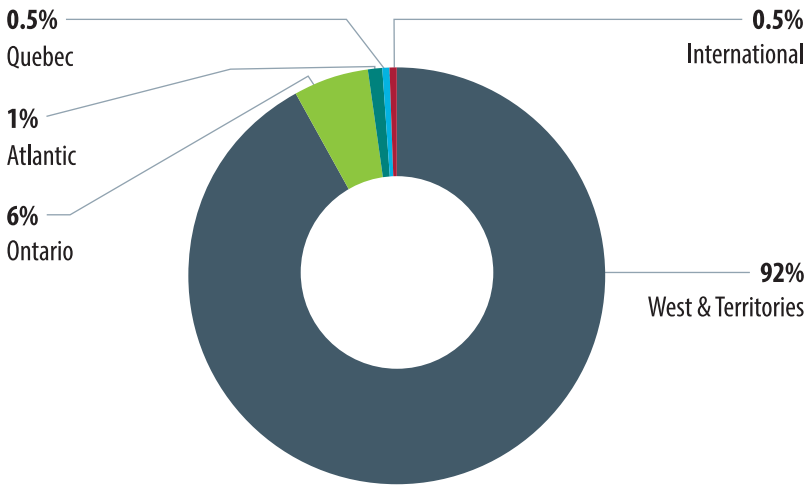
Western Canada student immigration programs

In British Columbia, international students with graduate degrees can apply for permanent residency through the **Provincial Nominee Program**, even without a job offer in hand. In Alberta, immigrants with a post-graduation work permit can apply for permanent residency through the Opportunity stream of the **Alberta Immigrant Nominee Program**.

More than 90% of the 2015 graduates from Western or Prairie universities in bio-economy related fields of study were working in the same region in 2018.

Ontario work opportunities attracted approximately 6% of Western/Prairie 2015 graduates.

FIGURE 11. Work regions for Western and Prairie university graduates in bio-economy related fields of study



Source: Statistics Canada, National Graduate Survey 2018

Skills and training needs

As in the rest of the country, Western Canadian bio-economy companies sometimes have **challenges finding candidates with not only strong technical skills but also "soft skills"** and other highly specific or niche skill sets. The vast majority (84%) of Western Canadian bio-economy companies offer some form of in-house training to ensure employees receive the required learning, which often takes the form of job shadowing, rotation programs and other hands-on training. More than one-third (36%) of Western Canadian employers actively support continuing education, while 44% of employers use online training to upskill their employees.

Work-integrated learning (WIL) — including co-ops, work placements, internships and clinical placements — are also highly valued by Western Canadian employers. Anecdotal evidence suggests these programs help support alignment between the sector's skills needs and the training offered by post-secondary institutions.

While **co-op is the dominant form of WIL in Western Canada** (with Vancouver being home to many bio-health companies willing to take on students), other innovative approaches being used in the region include:

- *Technical programs* that emphasize job-readiness, providing students and new graduates with the knowledge needed to support their transition into the industry
- *Professional graduate programs* specializing in addressing skills gaps areas seen in students from traditional science backgrounds, such as entrepreneurship and business development

HR challenges in Western Canada

Western Canadian bio-economy employers rank HR among their top five obstacles to company development. More than half report skills and labour shortages in research and technical areas (57%) as well as management-level skills and labour shortages (54%). Among their HR-specific challenges, **more than one-third (35%) of the region's bio-economy employers mentioned a lack of qualified candidates with specialized skills as their top challenge**.

Main issues

35%

Lack of qualified candidates with required specialized skill sets or experience

34%

Insufficient capital or resources to pay competitive wages to attract and retain qualified candidates

28%

Lack of qualified candidates with practical/non-academic skills

14%

Insufficient resources to train scientists in business and management

11%

Loss of candidates and employees to large, well-known organizations

Source: BioTalent Canada, Survey of Employers 2020

What are the skills gaps?

- **Soft skills:** The most critical skills gaps among candidates and new employers are problem-solving, communication, collaboration and interpersonal skills, along with the ability to follow standard operating procedures (SOPs).
- **Business skills:** Companies looking to grow and commercialize innovations from R&D want more employees to have stronger business development knowledge and skills, including executive-level talent with start-up experience.

How are companies recruiting?

Western Canadian bio-economy employers rely on similar methods for hiring as employers across the country: personal contacts and employee referrals (71%) and job banks or other online resources (59%). However, compared to the national data, employers in the Western region are more likely to use company websites for recruitment (51% vs. 41% nationally) and less likely to use online job banks (mentioned by 67% of employers nationally). Like the bio-economy overall, Western Canadian employers could connect with a larger, more diverse talent pool if they expanded their approaches to include strategies with broader reach.

The HR context by sub-region

British Columbia and Alberta are large and populous provinces, with sub-regional differences in economic conditions and concentrations of bio-economy activity. Some of the more notable trends include:

Vancouver

Home to several well-established bio-health companies

- Competition from other companies is a major recruitment challenge, especially for attracting entry-level talent.
- The local technology industry is a key competitor for talent as it often offers higher compensation for entry-level positions.
- A strong student biotech association helps connect graduates to employers.
- The Immigrant Employment Council of BC's Facilitating Access to Skilled Talent (FAST) program helps newcomers to Canada translate their skills and experience to the bio-economy.

Northern British Columbia

Focused mainly on forestry and biomass (wood pellets and pellet production)

- Mills rely on a wide range of talent, from general labourers to occupations related to trades, transportation and equipment operation.
- Recruitment is not usually a challenge, with many people attracted to the affordability of living in smaller centres — but employers compete for the same talent with nearby oil refineries and chemical plants.
- Retainment can be an issue, with some people in high-demand trades staying for only a year or two before leaving.

Alberta

Focused primarily on bio-health but also includes some bio-industrial companies

- Finding entry-level talent is relatively easy given the supply of graduates from universities and colleges in the province, but employers note a lack of industry experience among PhD graduates, including the business skills needed to develop products.
- Bio-industrial companies have difficulties finding and retaining talent due to competition from the oil and gas sector, which requires many of the same skills.

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Conclusion

Companies in most sub-sectors of Western Canada's growing bio-economy are already struggling to fill manufacturing, distribution, marketing and management roles. Their challenges are expected to worsen throughout the decade due to an aging population, a highly competitive labour market and a lack of capital to attract and retain candidates.

While employers are well positioned to recruit graduates thanks to a large number of post-secondary institutions in the region, **they compete for talent not just with each other** (especially in larger hubs such as Vancouver) but also **with the oil and gas sector**, which requires many of the same skills.

With many immigrants choosing to settle in Western Canada, employers could mitigate some of their hiring challenges and improve organizational diversity by adjusting their recruitment strategies to reach more of these immigrants.

The region **may be a model for bio-economy employers elsewhere in Canada in terms of meeting the need for a mix of technical and essential soft skills**. Western Canadian employers have turned to in-house training to address some of these issues, with 84% offering training to current employees. Employers have also embraced work-integrated learning (WIL) and are working with post-secondary institutions to enhance and expand WIL programming.

See our **national LMI report** for more information on labour market conditions for Canada's bio-economy, including recommended actions employers can take to address the labour shortages expected over the next decade. Our **demand and supply outlook** takes a closer look at anticipated hiring needs along with the supply available to bio-economy employers, while additional regional spotlights provide more details on the labour market outlooks for the Prairies, Ontario, Quebec and Atlantic Canada. For these and other reports, visit biotalent.ca/LMIStudy.

A ready mechanism

BioTalent Canada is prepared to support employers that lack the internal human resource capacity for talent recruitment, retention and development. BioTalent Canada has delivered numerous successful programs that have contributed to the growth of Canada's bio-economy labour market and to building a stronger, more sustainable sector. These include:

- Wage subsidy programs, including the Student Work Placement Program, Science and Technology Internship Program – Green Jobs, Science Horizons Youth Internship Program, Career Starter Program and BioReady™ Paid Internship Program
- Job matching platforms, including the bio-economy-specific job board, The PetriDish™
- Programs for internationally educated professionals, including the BioSkills Recognition Program and BioReady™ designation
- Skills courses, including the Essential and Technical Skills Fundamentals courses
- National Occupational Standards, a set of profiles documenting the skills, education and credentials required for specific bio-economy roles, to help employers recruit and retain the right talent, even with limited in-house human resource capacity

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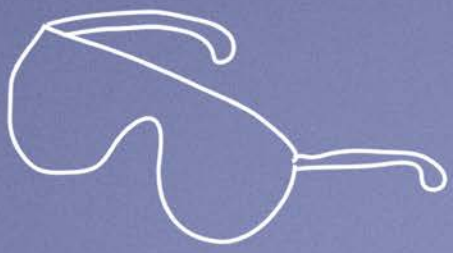

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