



**REGIONAL
SPOTLIGHT**

Quebec

Close-up on the bio-economy

LABOUR MARKET
INTELLIGENCE






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Canada

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BioTalent Canada supports the people behind life-changing science. Trusted as the go-to source for labour market intelligence, we guide bio-economy stakeholders with evidence-based data and industry-driven standards. We are focused on igniting the industry's brainpower, bridging the gap between job-ready talent and employers, and ensuring the long-term agility, resiliency and sustainability of one of Canada's most vital sectors.

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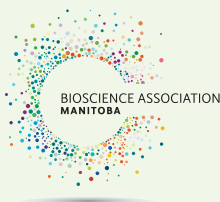


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About this report

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 full LMI study conducted in 2013,¹ this new national report 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 **Quebec**,

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 also 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

Quebec's bio-economy is likely to require **15,500 additional workers by 2029**. Companies will be challenged to fill positions due to a highly competitive labour market and difficulty finding candidates with the right skills. Manufacturing capacity will be a particularly urgent area of need across all sub-sectors.

A reflection of Canada's overall bio-economy

Quebec's bio-economy consists of roughly **2,800 establishments** that collectively employed some **55,000 people** in 2019. Similar to most other regions, its companies are mainly **small or medium-sized businesses**: 64% have 20 employees or fewer, and 49% generate annual total gross revenues of less than \$1 million. As in most other regions, **bio-health companies** account for more than half (58%) of Quebec's bio-economy.

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

High demand in bio-health and bio-industrial

The Quebec bio-economy is **expected to grow slightly** 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, with a significant number also needed in bio-industrial.

Some of the most severe shortages are expected in bio-manufacturing and processing. Forecasts suggest Quebec 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:

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

How Quebec 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 Quebec bio-economy has a tremendous **opportunity to seek talent from under-represented groups**. On average, women make up 40% of bio-economy workers in Quebec overall. Other equity-seeking groups have less representation: internationally educated professionals make up 12% of the bio-economy workforce, visible minorities 11% and recent immigrants 8%. People with disabilities make up 1% of the bio-economy workforce, and representation of Indigenous workers is nearly non-existent.

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



Who makes up the Quebec bio-economy?



THE COMPANIES

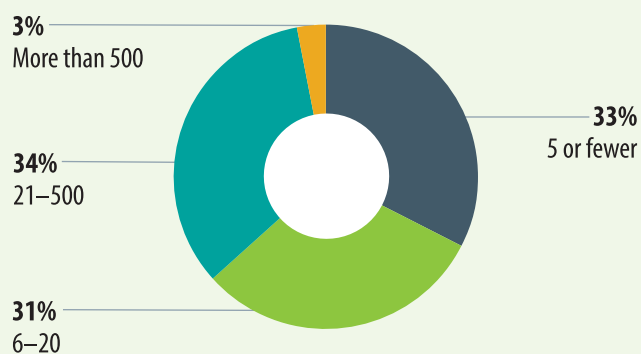
~2,800 bio-economy organizations in Quebec



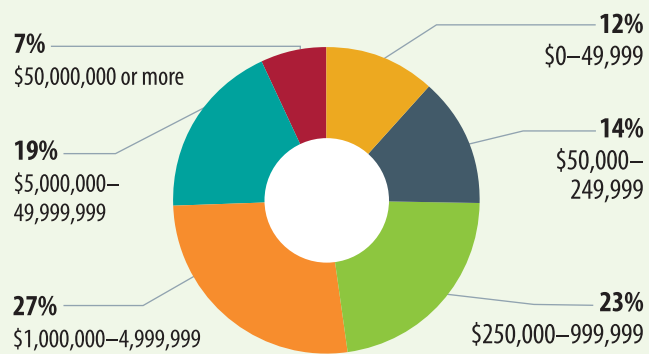
Most are small to medium-sized



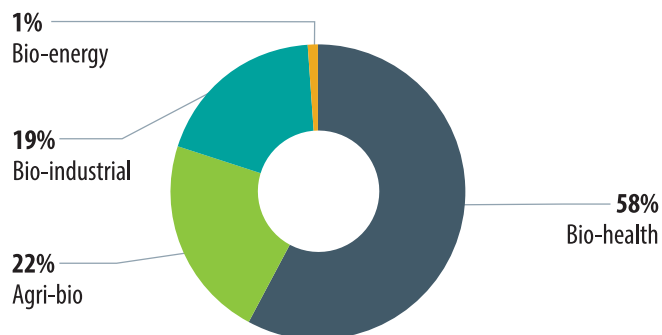
Number of employees*



Annual total gross revenue*



Bio-health is the biggest sub-sector



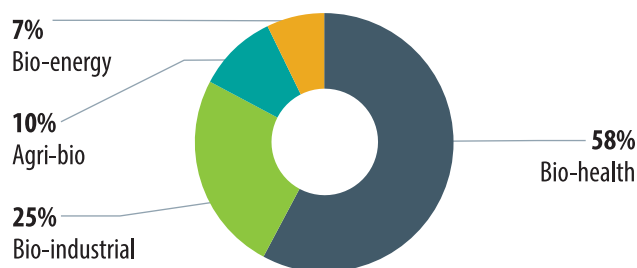
* Percentages may not add up to 100% due to rounding.



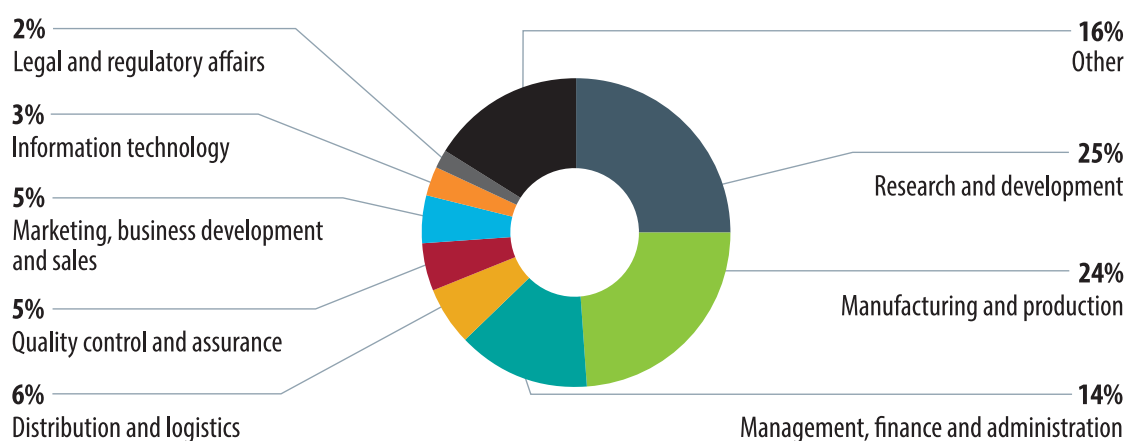
THE PEOPLE

~**55,000 workers**

Most work in bio-health



Jobs are concentrated in R&D and manufacturing



The sector has an opportunity to improve diversity

Women: **40%**

Recent immigrants[†]: **8%**

Visible minorities: **11%**

People with disabilities: **1%**

Internationally trained professionals: **12%**

Indigenous people: **0%**

11%

of undergraduate...

30%

of master's...

29%

of doctorate...

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

[†] Recent immigrants are those who have been in Canada less than five years.

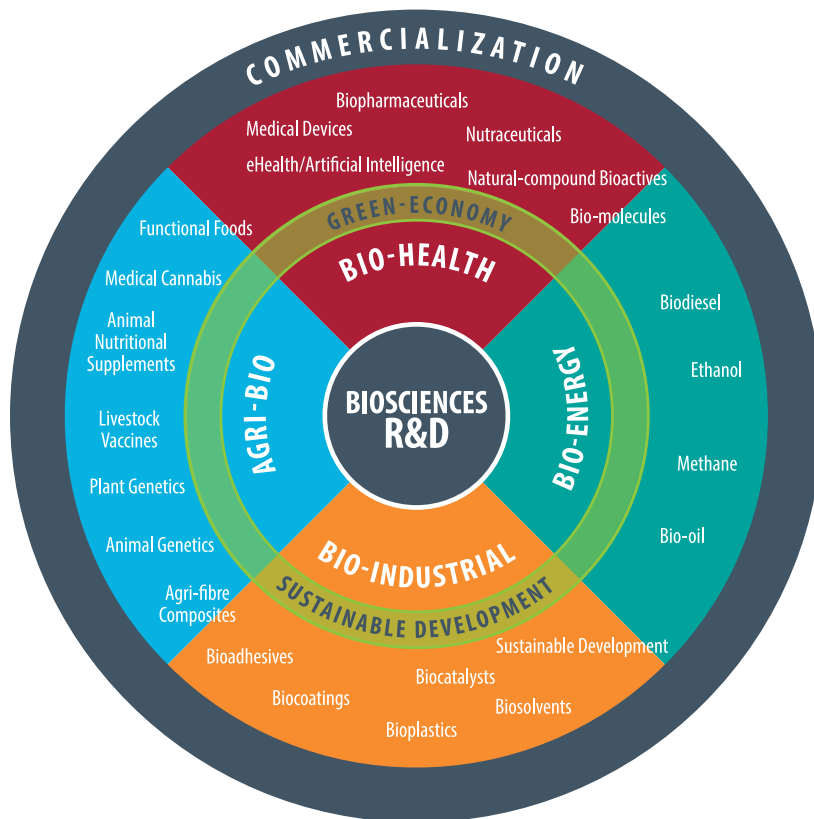


DEFINING THE BIO-ECONOMY

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.



A photograph of two scientists in a laboratory setting. A woman in the foreground wears a white lab coat, a hairnet, a green surgical mask, and purple gloves, holding a small vial. A man in the background wears a white lab coat, a hairnet, a white surgical mask, and glasses, holding a test tube. The background shows laboratory equipment like a large metal pot on a stand.

Profile of the Quebec bio-economy

The Quebec bio-economy contains some 2,800 organizations, accounting for 20% of Canada's bio-economy companies. These organizations collectively employed around 55,000 people in 2019. It includes commercial businesses as well as hospital and university research institutions.

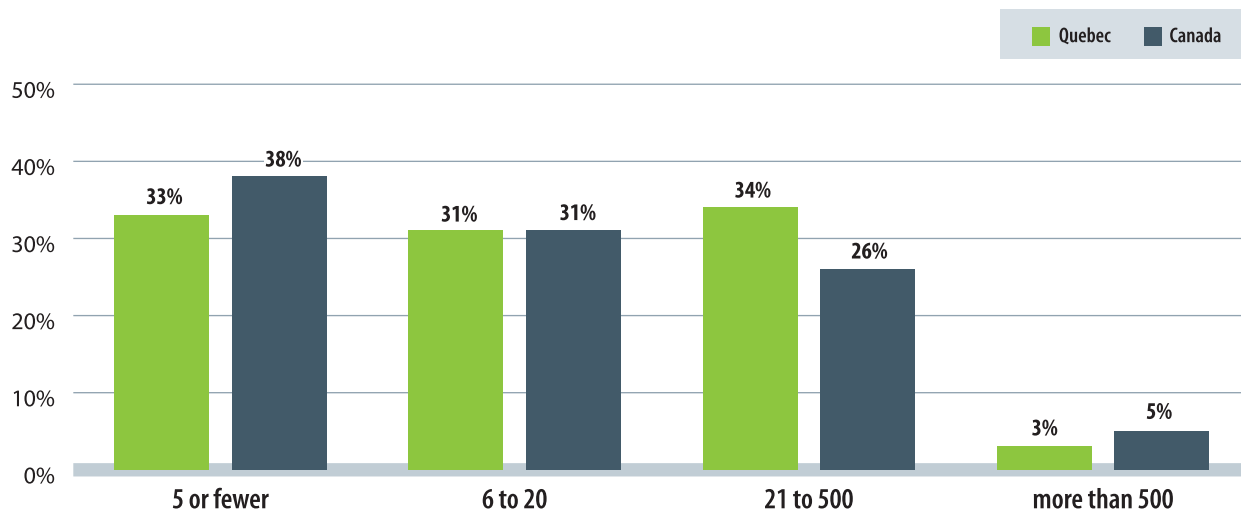
Employers

Quebec's bio-economy companies are of similar size as those in the rest of the country, but with a slightly lower percentage of companies with five or fewer full-time employees and a higher percentage of companies with 21 to 500 employees. Of the organizations surveyed by BioTalent Canada, **around two-thirds (64%) had 20 or fewer full-time employees**. The proportion with more than 500 full-time employees is similar to the rest of Canada, at just 3%.

Revenue figures are generally similar between Quebec and the rest of the country, with the greatest difference being among companies reporting annual total gross revenues of \$5 million to \$50 million in 2020 (19% in Quebec vs. 13% in Canada overall).



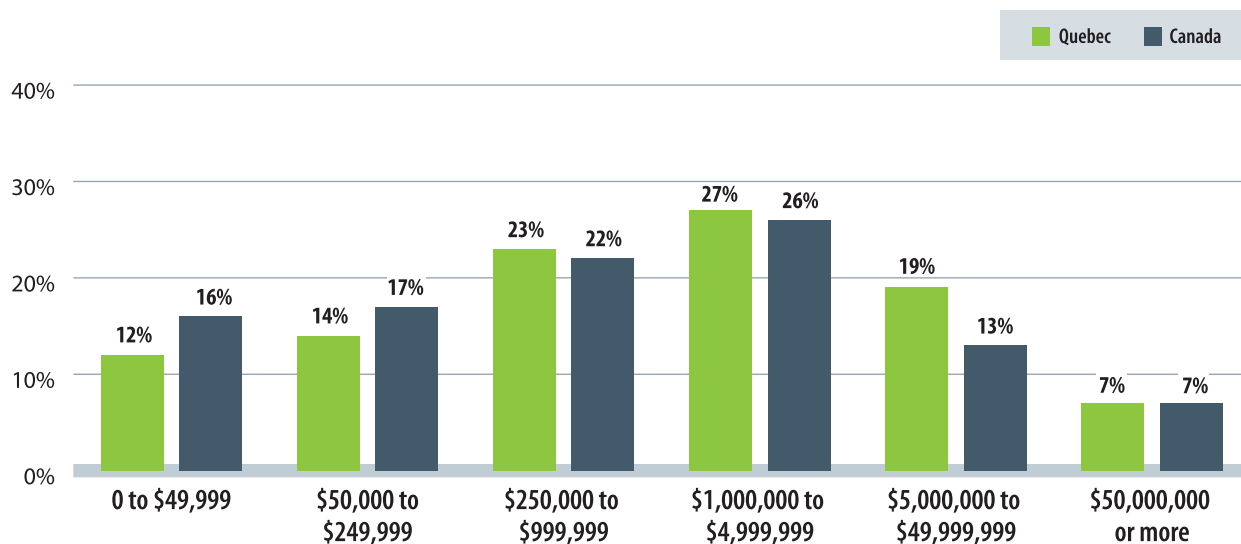
FIGURE 1. Bio-economy companies by number of full-time employees, Quebec vs. national



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, Quebec vs. national



Sources: BioTalent Canada Survey of Employers (2020)

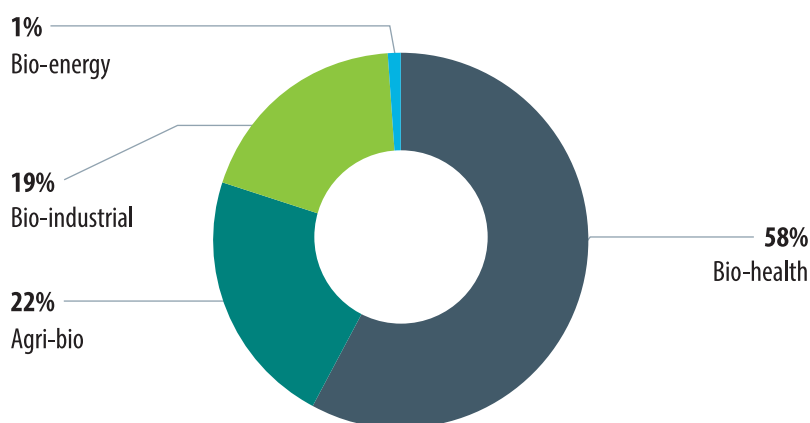


Quebec's bio-energy sector makes up just 1% of its bio-economy.

The overall age of Quebec's bio-economy aligns closely with the national average. **Just under half the companies are 15 years or younger (48%)**, and around one-quarter (26%) have been operating for more than 25 years.

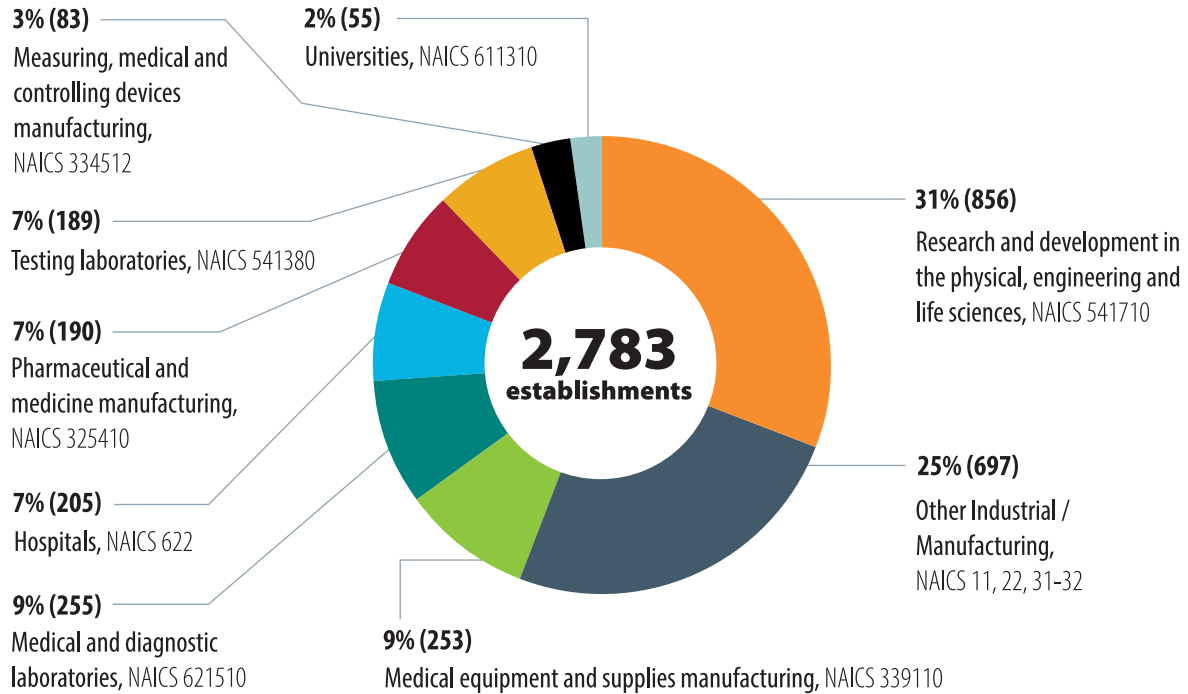
The distribution of Quebec bio-economy companies across the four primary sub-sectors is also similar to the national profile. **Bio-health is by far the largest sub-sector**, accounting for more than half (58%) of all companies in the Quebec bio-economy. The region's bio-energy sub-sector is extremely small, making up just 1% of its bio-economy.

FIGURE 3. Companies by primary sub-sector, Quebec



Source: BioTalent Canada Survey of Employers (2020)

FIGURE 4. Quebec bio-economy establishments by NAICS industrial sector



Source: BioTalent Canada Modeling and Projections (2020)

The North American Industry Classification System (NAICS) gives a different and complementary view of the Quebec bio-economy and its areas of focus. NAICS 541710 refers to physical, engineering and

life sciences R&D — which makes up nearly one-third (31%) of bio-economy establishments. The next largest segment is other industrial/manufacturing (NAICS 11, 22, 31–33), at 25%.

Workers

R&D and manufacturing account for just under half of Quebec's bio-economy jobs overall (25% and 24%, respectively). In the bio-energy and bio-industrial sub-sectors, manufacturing and production account for around 40% of all jobs.

Employment in the Quebec bio-economy is highly concentrated in bio-health. More than half (58%) of all employees work in this sub-sector, with a further quarter (25%) in the bio-industrial sub-sector.

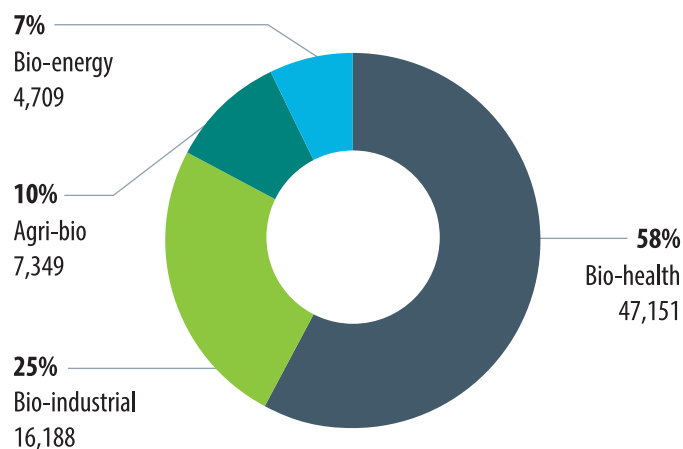
TABLE 1. Employment by job category and sub-sector, Quebec

Job category	Total	Agri-bio	Bio-energy	Bio-health	Bio-industrial
Research and development	25%	27%	24%	29%	16%
Manufacturing and production	24%	29%	39%	14%	40%
Management, finance and administration	14%	15%	16%	14%	14%
Distribution and logistics	6%	6%	4%	6%	6%
Quality control and quality assurance	5%	6%	3%	5%	5%
Marketing, business development and sales	5%	8%	5%	5%	4%
Information technology	3%	3%	1%	4%	2%
Legal and regulatory affairs	2%	1%	2%	2%	1%
Other	16%	5%	6%	21%	13%

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, Quebec



Source: BioTalent Canada Modeling and Projections (2020)

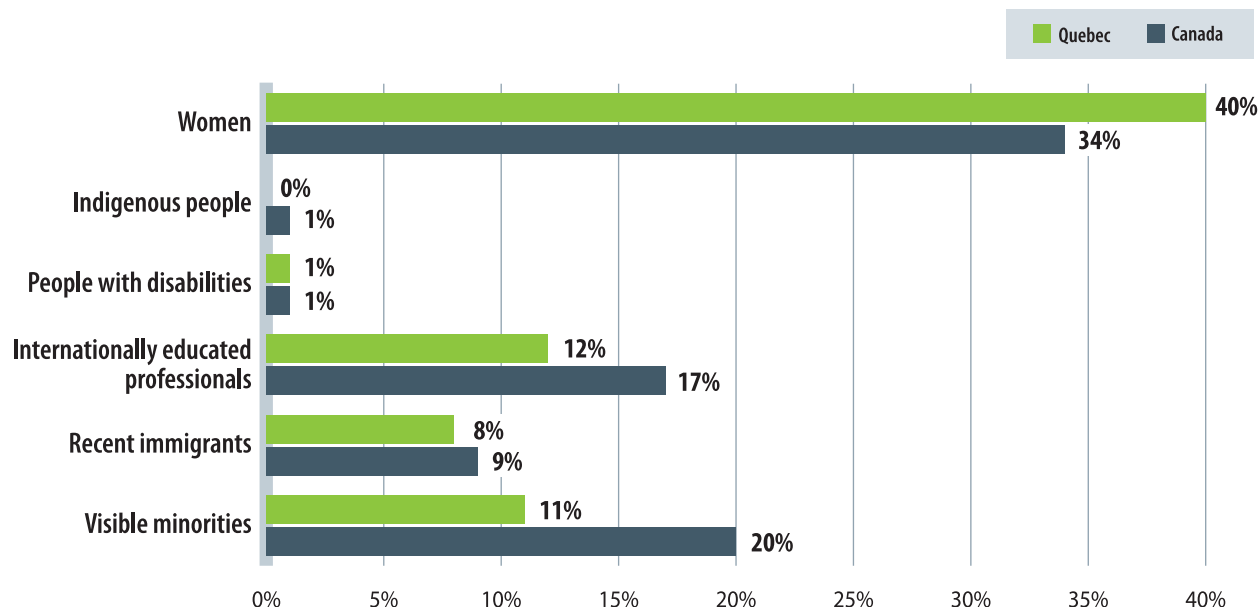
Equity and diversity in the workforce

Representation of equity-seeking groups in the Quebec bio-economy is generally lower than that of Canada overall, with one exception: **women make up an average of 40% of Quebec's bio-economy workforce** compared to 34% nationally. In Quebec, internationally educated professionals (IEPs) make up 12% of the bio-economy workforce, visible minorities 11% and recent

immigrants (those who have been in Canada less than five years) 8%. People with disabilities represent 1% of the workforce, and there is only negligible representation of Indigenous workers in the Quebec bio-economy. These findings suggest under-represented populations could be important sources of new talent for the bio-economy going forward.

Women make up an average of 40% of Quebec's bio-economy workforce.

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



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.

Immune Biosolutions

Two generations innovating side-by-side

Immune Biosolutions aims to be Canada's next anchor company in life sciences — and knows it needs a strong corporate culture to reach that goal. Success hinges on marrying the knowledge and expertise of its senior researchers with the capacity of next-generation recruits to fuel growth at high speed.

Company profile: Immune Biosolutions

Location: Sherbrooke

Employees: 42

Sub-sector: Bio-health

Immune Biosolutions is an early-stage biopharmaceutical company focused on the discovery, engineering and development of humanized chicken antibodies that target intractable membrane proteins with validated therapeutic potential.



Q: What's your focus at Immune Biosolutions?

FRÉDÉRIC LEDUC, CEO: We discover and develop immunotherapies — using antibodies to retool patients' immune systems so they can fight infectious diseases and combat cancer cells. We have an antibody treatment for COVID-19 in development. We've also developed several platforms to remove bottlenecks in drug discovery and want to expand that. Our goal is to become Canada's next life sciences anchor company.

Q: What's your biggest HR challenge when it comes to achieving that goal?

MELODY LOUBAT, HUMAN RESOURCES ADVISOR: First of all, there is just the sheer speed of growth. We recently hired 15 people in just a few weeks. And we're also finding there are generational differences that we need to be aware of and manage well. Most new hires are from Gen Z and Gen Y, and they have different work habits and expectations than our senior researchers. With two shifts running every 24 hours, we need to maintain synergy across our teams.

“It’s been a ‘marathon of sprints.’”

Q: How do you build a culture that brings out the best in both generations?

ML: You need to keep a dialogue open and be proactive. The key is to ask people what they’re looking for instead of just assuming you know.

FL: We try to do as much as possible. We hold weekly HR meetings and conduct regular surveys. We partner with BioTalent Canada, Montreal Invivo and Pharma Biodevelopment, which provide talent development programs, news and services to support our sector. We have an incubator that provides HR and coaching resources, knowledge transfer and training. We also have an external HR consultant who is also a university professor and understands the recent grad mindset. And we hired Melody, who’s focused on building the team dynamic.

ML: Our interview process looks for the right fit. Scientists are very open-minded and can learn new skills quickly, but you can’t train them for fit. It helps that we’re starting to build a stronger brand as an employer.

Q: What positions do you most need to fill in the near or long term?

FL: Over the next two years we’ll need scientists with management skills, leadership skills, expertise in project and risk management, communications, problem solving, ethics. Canadian universities turn out great scientists but there’s always a gap in their skill set. We also need more entrepreneurs. That quality is incredibly useful. And we need people with expertise in artificial intelligence, which puts us into competition with Google and Facebook. Then there are the non-science business roles — buyers, accountants, business development.

Q: Has remote work expanded your recruitment pool?

FL: With remote work you can reach more people, but it’s also made recruitment more expensive. Candidates know the salaries they can command, even if those aren’t based on where they live. A potential Chief Medical Officer candidate can demand a salary that’s pegged to the cost of living in Boston, where a lot of the talent is, even if they’re located somewhere with a lower cost of living.

Q: Is diversifying your workforce a specific goal?

ML: We strongly believe diversity drives innovation. And we’ll be recruiting outside Canada soon, so it will continue to grow.

FL: We’re 42 people right now from 10 different countries. Our two independent board members are women, and one is a woman of colour. Diversity reflects who we are, as scientists and people.



Quebec labour market outlook

Estimates suggest the Quebec bio-economy will need an additional 15,500 workers by 2029.² Based on anticipated conditions, labour supply will not be sufficient to meet that demand.

While the overall economy in Quebec declined as a result of COVID-19, losses were concentrated mainly in the food services, tourism and retail sectors. Employment in the regional bio-economy overall actually expanded by around 4% in 2020. Employment in Quebec's bio-economy is expected to grow at around 1.0% per year in the short term, reaching a total of 58,600 workers by 2024. It will then weaken to 0.7% per year over the medium/longer term, with the sector **employing more than 59,500 workers by 2029**.

Youth (those under 25 years old)³ have historically been critical to the labour supply, but the youth share of the population in Quebec 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 8% of Quebec bio-economy workers are recent immigrants and 12% are IEPs, suggesting an opportunity to expand recruitment from these populations.

Immigration to Quebec has been declining since 2016, with an especially significant drop in 2020 as a result of the COVID-19 pandemic. However, these numbers are expected to rise again, reaching 2016 levels by the end of the decade. The number of immigrants arriving with post-secondary degrees has trended upward since 2000 and is expected to rise above 20,000 a year by 2029. **The number of international students is also on the rise**, particularly in 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 Quebec 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, Quebec

Year	Overall	Bio-health	Bio-industrial	Agri-bio	Bio-energy
% change 2019 to 2020	+4.1%	+7.0%	+3.5%	(-3.5%)	(-6.8%)
Employment 2020	▲ 57,500	▲ 34,500	▲ 14,100	▼ 5,300	▼ 3,600
Employment 2024	▲ 58,600	▲ 35,100	▶ 14,100	▲ 5,600	▲ 3,800
Employment 2029	▲ 59,500	▲ 36,000	▲ 14,300	▲ 5,700	▼ 3,500

Source: BioTalent Canada Modeling and Projections (2020)

Bio-health

Bio-health grew more in 2020 than any other sub-sector in Quebec, largely due to increased pharmaceutical and medicine manufacturing. Employment is expected to remain above pre-pandemic levels throughout the forecast period, despite a slight contraction in 2025. The sub-sector is expected to employ approximately 35,100 workers by 2024 and **36,000 workers by 2029**.

Bio-industrial

Employment in Quebec's bio-industrial sub-sector grew in 2020. Following a decline in 2021, employment is expected to grow modestly in the short term (1.4% per year), reaching 14,100 workers by 2024. Over the longer term, annual growth is expected to weaken to 0.2% over the medium/longer terms, with the sub-sector employing **14,300 workers by 2029**.

Agri-bio

Agri-bio employment in Quebec fell in 2020, largely due to reduced demand for laboratory testing services and contractions in associated fields such as construction, engineering, energy and manufacturing. Employment in the sub-sector is expected to recover, growing annually by 1.3% in the short term, reaching 5,600 workers by 2024. Growth will be weaker between 2025 and 2029, at just 0.2% per year, employing **5,700 workers by 2029**.

Bio-energy

Bio-energy employment in Quebec fell in 2020 but is expected to return to close to pre-pandemic levels by 2021. In line with the national trends driven by competition from alternative energy sources and a decline in energy consumption overall, employment in the sub-sector is expected to see very little growth between 2022 and 2024, then fall to **3,500 workers by 2029**. However, this analysis does not account for the recently proposed new biofuel plant in Varennes, expected to be operational by 2023 and create 100 new jobs.



The Quebec 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 Quebec will need an additional 3,970 bio-manufacturing workers by 2029 (1,540 in bio-health manufacturing alone), 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.

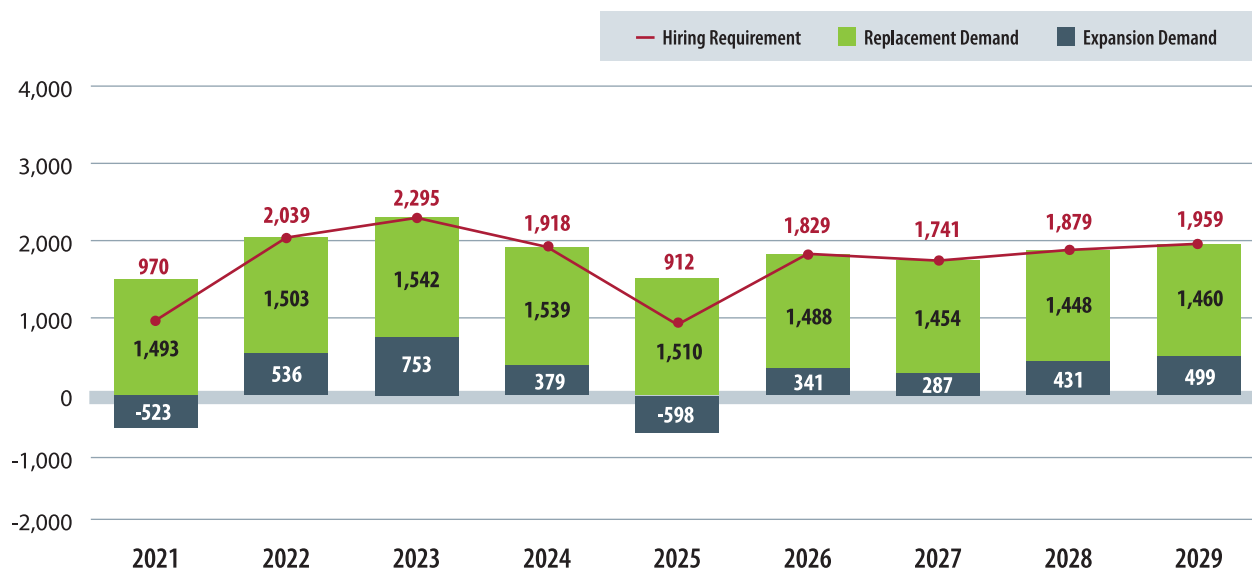
To fill the shortages, the bio-economy will need to develop new strategies, such as training workers from other sectors and more actively recruiting from outside traditional labour pools, including people from demographic groups under-represented in the bio-economy such as Indigenous persons, newcomers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

Expansion and replacement

Most of the requirement for 15,500 additional workers across Quebec's bio-economy between 2021 and 2029 will be to replace retirees or individuals leaving the workforce for other reasons — in other words, to fill *replacement demand*. Yet a portion will also be needed to fill new jobs as their industries grow (*expansion demand*).

While **replacement demand is expected to remain relatively stable across the forecast period, expansion demand is expected to fluctuate slightly**. 2021 will see negative expansion demand as the bio-economy contracts to pre-pandemic levels. Expansion demand will peak in 2023 before falling again into the negatives in 2025 as the economic recovery results in higher interest rates, which will likely lead to reduced investment (including in labour) in the bio-economy. After that, expansion demand will grow slightly through to the end of the forecast period.

FIGURE 7. Hiring requirement outlook by demand type, Quebec



Source: BioTalent Canada Modeling and Projections (2020)

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

Sub-sector	Workers needed	Demand type	Key roles
Bio-health	9,400	Mostly replacement	<ul style="list-style-type: none"> ▶ Other, including nursing and related medical professions (26%) ▶ R&D (23%) ▶ Manufacturing and production (16%)
Bio-industrial	3,600	Nearly all replacement	<ul style="list-style-type: none"> ▶ Manufacturing and production (43%) ▶ Management, finance and administration (16%) ▶ R&D (14%)
Agri-bio	1,700	Mostly replacement	<ul style="list-style-type: none"> ▶ Manufacturing and production (30%) ▶ Management, finance and administration (19%) ▶ R&D (19%)
Bio-energy	840	All replacement	<ul style="list-style-type: none"> ▶ Manufacturing and production (44%) ▶ Management, finance and administration (21%) ▶ R&D (19%)

Source: BioTalent Canada Modeling and Projections (2020)

Manufacturing and R&D roles are among the top three areas where employers need to hire in all four sub-sectors in Quebec. Notably, the most needed job category in bio-health is “other”, which includes nursing and related medical professions. Just over one-quarter (26%) of

anticipated bio-health job openings fall under this category. Overall, manufacturing and production roles are the most critically needed, making up one quarter (25%) of the sector’s hiring needs from 2021 to 2029 (see Table 4).

TABLE 4. Hiring requirements by job function, Quebec

Job function	2021	2022	2023	2024	2025	2026	2027	2028	2029	Total	%
Manufacturing and production	680	480	560	460	240	380	360	390	420	3,970	25%
Research and development	(-230)	460	510	430	180	440	420	460	480	3,150	20%
Management, finance and administration	110	330	370	320	160	300	280	300	310	2,480	16%
Distribution and logistics	30	120	140	110	40	110	100	110	110	870	6%
Marketing, business development and sales	130	100	120	100	30	100	80	90	100	850	5%
Quality control and assurance	60	90	110	80	20	80	90	100	100	730	5%
Information technology	(-20)	50	60	50	<10	50	50	50	50	340	2%
Legal and regulatory affairs	(-60)	30	30	30	10	30	30	30	30	160	1%
Other	280	370	400	350	230	340	340	350	360	3,020	19%
Total	980	2,030	2,300	1,930	910	1,830	1,750	1,880	1,960	15,570	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, **64% of surveyed companies across all sub-sectors**

reported already experiencing 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.
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Tables 5–9 show that **nearly all job categories are expected to face serious-to-severe labour shortages throughout the forecast period**. This is true across all sub-sectors except bio-energy, which will have very few hiring needs throughout the forecast period. Yet even with these limited needs, some roles in that sub-sector will still be difficult to hire for.

Some 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, Quebec

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

Source: BioTalent Canada Modeling and Projections (2020)

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

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

Source: BioTalent Canada Modeling and Projections (2020)

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

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

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	2	3	2	2	2	2	2	2
Information technology	3	2	2	2	2	2	2	2	2
Research and development	1	2	2	2	2	2	2	2	2
Legal and regulatory	2	2	2	1	1	2	N/A	2	1
Other	2	2	2	2	2	1	1	2	2
Overall	3	3	3	3	3	2	2	3	3

Source: BioTalent Canada Modeling and Projections (2020)

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

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

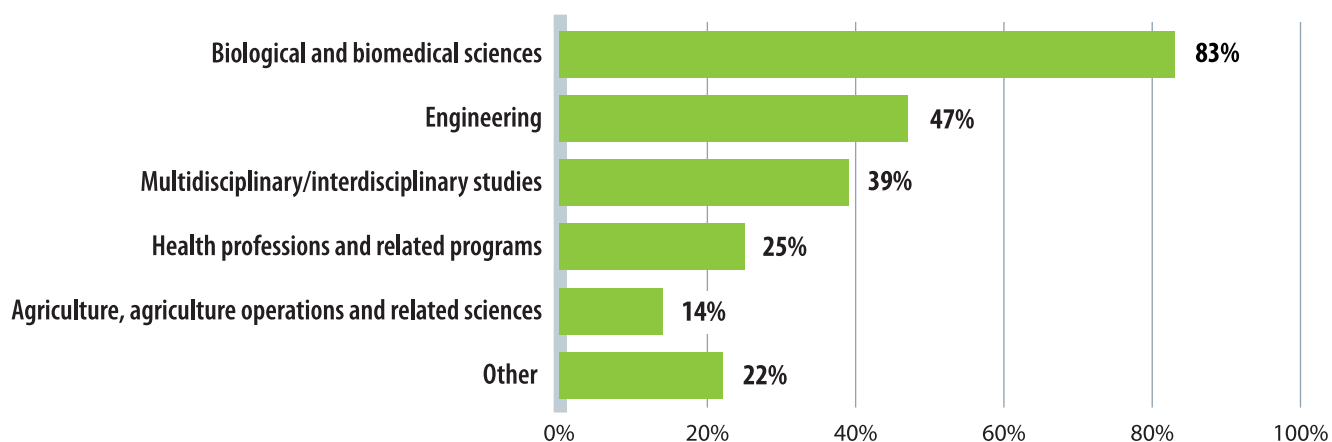
Source: BioTalent Canada Modeling and Projections (2020)

Education and the talent supply

Bio-economy employers seek a wide range of educational backgrounds. **Biological and biomedical science programs are at the top of the list:** more than 80% of Quebec bio-economy employers recruit from these fields, and almost half (47%) recruit from engineering programs. Many also look for workers with backgrounds in multi- or interdisciplinary backgrounds, indicating the need for staff with specialized technical skills who also understand the broader business context.

Quebec offers a wide range of post-secondary programs related to the bio-economy. However, it is difficult to determine an exact count because of the overlap between college and CEGEP programs — and the impossibility of distinguishing between CEGEP programs designed to prepare students for university and those that are equivalent to technical college diploma programs. At the university level, Quebec accounts for a much larger proportion of Canada's enrolments in master's and doctorate programs than enrolments in undergraduate programs.

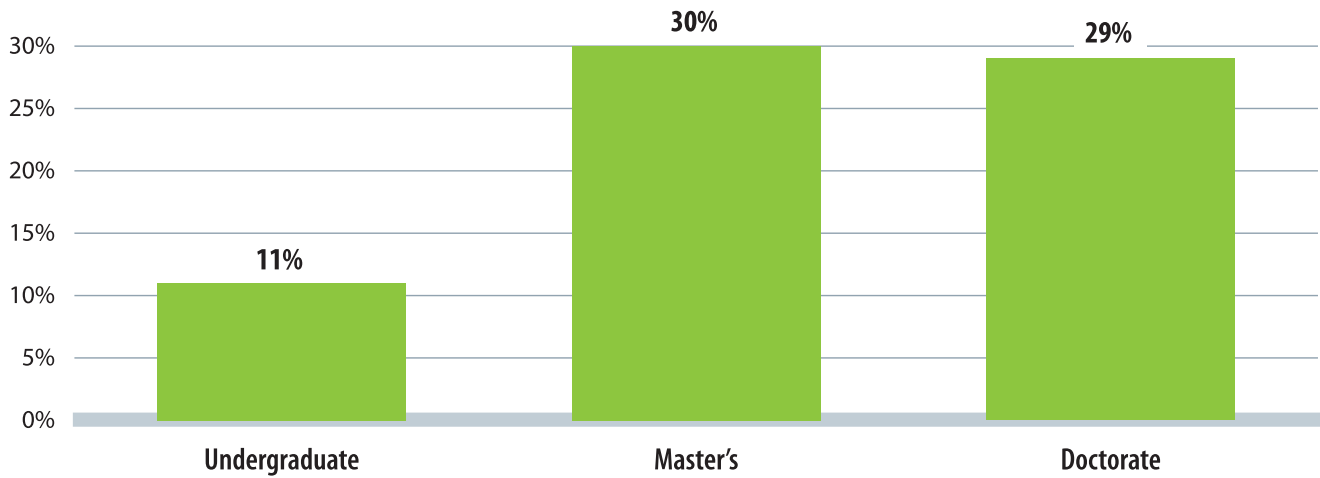
FIGURE 8. Top fields of study sought by bio-economy employers, Quebec



Note: This data should be interpreted with caution given small sample size for this survey question (n=36).

Source: BioTalent Canada, Survey of Employers 2020

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

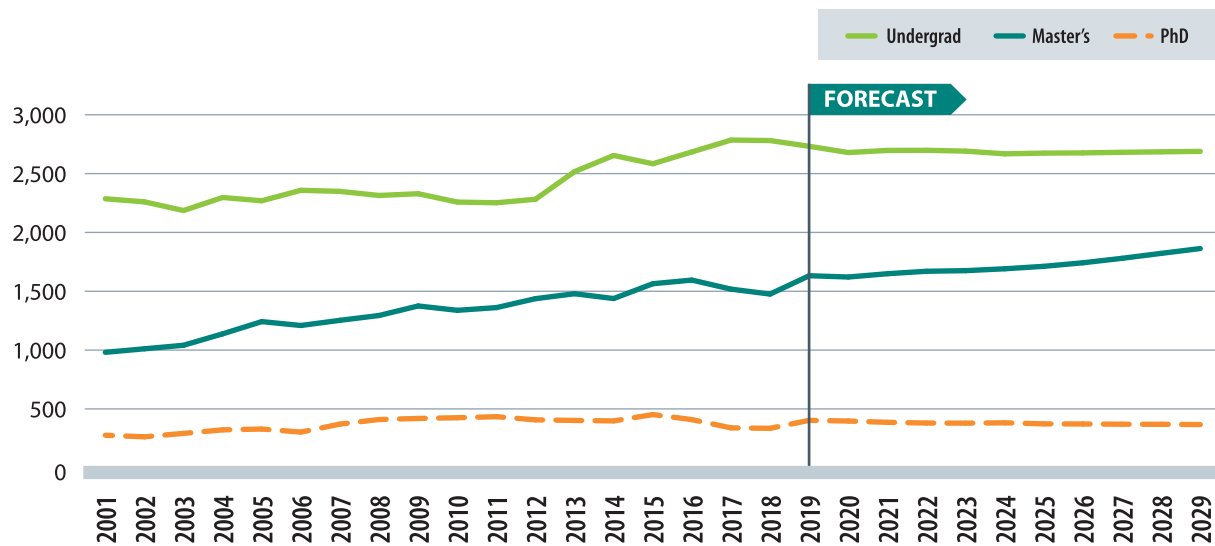


Source: Customized PSIS data, Statistics Canada 2019

In line with the decline in the post-secondary-aged (20–24 years old) segment of the population, **domestic enrolment in undergraduate university programs is expected to decrease slightly in the long term**, with degree completions falling by 3% by 2029. During the same period, domestic master's completions will rise by 26% and doctorate completions will see no significant year-over-year change.

As in the rest of Canada, international students make up a large and growing share of Quebec's post-secondary enrolments, particularly in engineering and related technology programs, as well as physical and life sciences. Some of them are likely to remain in Quebec 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, Quebec



Source: BioTalent Canada Modeling and Projections (2020)

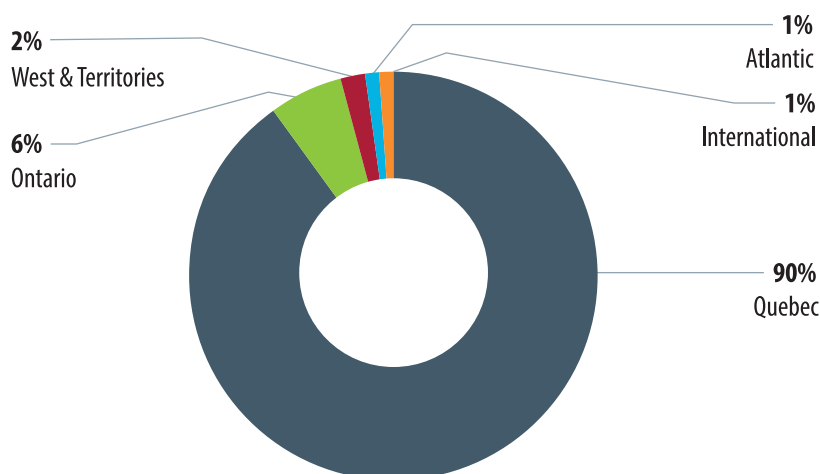
Quebec student immigration programs

The **Programme de l'expérience Québécoise** enables international students who have graduated and have prior work experience in Quebec to acquire a work permit for post-graduate employment. These graduates may also opt to become residents. As well, provincial policies have been increasingly prioritizing educational credentials and work experience — particularly in STEM fields — over language requirements, in an effort to attract more highly qualified immigrants.

With a significant share of the country's bio-economy companies and bio-economy-related post-secondary programs, the tendency of graduates to stay in the province where they studied is generally beneficial to Quebec employers. **Approximately 90% of the 2015 graduates from Quebec universities in bio-economy related fields of study were working in the same region in 2018.** Ontario work opportunities attracted approximately 6% of Quebec's 2015 graduates.

Quebec's language requirements likely have an effect on graduate mobility both into and out of the province. On one side, Francophone workers may appreciate being able to work in their first language, making them less likely to look for opportunities elsewhere. On the other, candidates from outside the province may be hesitant or unable to pursue jobs in Quebec if their French skills are not sufficient.

FIGURE 11. Work regions for Quebec graduates in bio-economy related fields of study



Source: Statistics Canada, National Graduate Survey 2018

Skills and training needs

Like those elsewhere in Canada, Quebec 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 (82%) of bio-economy companies in Quebec offer some form of in-house training to ensure employees have the required learning, including onboarding training and job shadowing/rotations. About one-third (35%) of Quebec employers actively support continuing education.

Work-integrated learning is less common in Quebec than in other parts of the country.

Work-integrated learning (WIL) — including co-ops, work placements, internships and clinical placements — appear to be **less common in Quebec than in other parts of the country.** However, there are a few well-established co-op programs, and many students have access to opportunities for gaining experience in their professors' laboratories or university research centres. Some WIL approaches being used in Quebec include:

- ▶ A *careers centre* that offers soft skills development, job interview preparation, CV assistance and other services to support the transition from school to industry
- ▶ *Programs designed to help students build their soft skills*, including certificate programs, MBAs and other specialized technical training



HR challenges in Quebec

Bio-economy employers in Quebec rank HR among their top five obstacles to company development. More than three-quarters report skills and labour shortages in research and technical areas (76%) and nearly two-thirds report management-level skills and labour shortages (57%). Among their HR-specific difficulties, **almost half (45%) of Quebec bio-economy employers list a lack of qualified candidates with required specialized skills sets/experience as a top challenge.**

Main issues

45%

Lack of qualified candidates with required specialized skill sets or experience

25%

Lack of qualified candidates with practical/non-academic skills

24%

Lack of applicants

22%

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

19%

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, adaptability and collaboration.
- ▶ **Business skills:** Companies looking to grow and commercialize innovations from R&D want more employees to have stronger business development knowledge and skills.

How are companies recruiting?

Quebec bio-economy employers rely on similar methods for hiring as employers across the country: more than three-quarters (77%) rely primarily on job banks or other online resources, with the same percentage using personal

contacts and employee referrals. Like the bio-economy overall, employers in Quebec could connect with a larger, more diverse talent pool if they expanded their approaches to include strategies with broader reach.





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Conclusion

With nearly half of all Quebec bio-economy companies saying they find it hard to access qualified candidates, and with seemingly fewer work-integrated learning (WIL) opportunities for students than in other regions, the struggles many firms face today to fill manufacturing and R&D roles are likely to persist and intensify in the years to come.

While Quebec employers are well-positioned to recruit graduates thanks to a high concentration of post-secondary institutions in the region, they struggle to find candidates with the right mix of technical and essential soft skills. **Closer relationships between employers and institutions to develop stronger WIL programs could improve this situation.**

As well, Quebec employers could mitigate some of their hiring challenges and improve organizational diversity by **adjusting their recruitment strategies** to reach more immigrants to Canada and other under-represented groups.

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 Western Canada, the Prairies, Ontario 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

Acknowledgements

BioTalent Canada wishes to thank all partners and stakeholders who participated to make this research possible.

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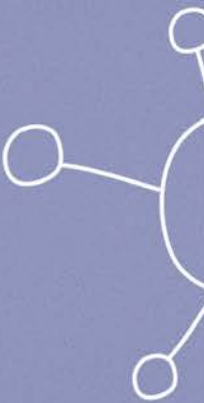
 Funded in part by the Government of Canada's
Sectoral Initiatives Program.

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