

BioAlberta's Labour Market Information Study - *Summary Report*



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Summary

An overview of key findings from the BioAlberta LMI Study includes:

Current Profile of Alberta Life Sciences Industry

- **Number of Establishments:** In 2022, the estimated number of establishments (e.g., companies, hospital research, university research) engaged in life sciences related activity in Alberta is approximately 1,900.
- **Workforce size:** The life sciences sector is comprised of establishments that employed an estimated 23,200 workers across Alberta in 2022.
- **Subsector:** Most life sciences sector employment in Alberta is associated with the bio-health subsector. In 2022, bio-health accounted for approximately one-half (46%) of Alberta life sciences sector workers. Agri-biotech (30%) employees account for slightly less than one-third of the workforce, while bio-industrial accounts for an additional 17%. Bio-energy (7%) comprises the smallest proportion of the life sciences with respect to employment.
- **Job Function:** Research and development (R&D) is the most common job function within the life sciences sector, accounting for more than one-in-four employees (29%). Manufacturing and production (20%) is the next most common job function and includes skilled trades, equipment operators and select engineering occupations. Management, finance and administration job functions (13%) as a grouping is quite varied in level and responsibilities ranging from C-suite positions through to administrative support.

Employment outlook for the Alberta Life Sciences Sector

- **Employment projections – Overall:** The Alberta life sciences sector is expected to see employment gains in the both the short-term and medium-longer term. In the short-term, annual employment growth between 2022 and 2025 is estimated at 2.5%. Total employment growth in the medium/long-term outlook is projected at 1.3% annually between 2026 and 2030. Total life sciences sector employment is expected to reach approximately 24,400 workers by 2025 and approximately 26,100 workers by 2030.
- **Employment projections – Bio-health:** Alberta’s bio-health employment decreased by an estimated 14.3% from 12,200 workers in 2019 to approximately 10,500 employed in 2020. Bio-health employment in 2021 decreased again but less rapidly by approximately 2.8%, but then started to reverse to a growth trend

as of 2022 which is expected to continue through to the end of the decade. Bio-health employment is expected to reach approximately 11,300 workers by 2025 and 12,300 workers by 2029.

- **Employment projections – Bio-industrial:** Alberta’s bio-industrial employment decreased by an estimated 18.7% across two years from 4,800 workers in 2019 to approximately 3,900 employed in 2021. Bio-industrial employment in 2022 remained steady and is now expected to be on a positive growth trend as of 2023 through to the end of the decade. Alberta’s bio-industrial employment is expected to reach approximately 4,150 workers by 2025 and 4,400 workers by 2030.
- **Employment projections – Agri-biotech:** Alberta’s agri-biotech employment has remained relatively steady between 2018 and 2021 experiencing less fluctuation compared to the other life sciences subsectors during the early stages of the COVID pandemic. Employment in agri-biotech fell by approximately 6.4% from 7,300 in 2019 to 6,800 in 2021. Growth in employment is expected between 2022 to 2024 with an average increase of approximately 2.5%. As of 2025 through to the end of the decade relatively weaker employment growth of less than 1% annually is projected for the subsector based in part on macroeconomic conditions. Alberta’s agri-biotech employment is expected to reach approximately 7,400 workers by 2025 and 7,700 workers by 2029.
- **Employment projections – Bio-energy:** Alberta’s bio-energy employment decreased by an estimated 19.0% across two years from 2,000 workers in 2019 to approximately 1,600 employed in 2021. Bio-energy employment in 2022 again decreased by approximately 3.8%, but as of 2023 is now expected to be on a positive growth trend through to the end of the decade. Alberta’s bio-industrial employment is expected to reach approximately 1,600 workers by 2025 and 1,700 workers by 2030.

Hiring Requirements for Alberta Life Sciences Sector

- **Hiring Requirements – Overall:** Taking into account both the growth or expansion of the Alberta life sciences sector and the need to replace talent due to exits from the workforce (e.g., retirements), the hiring requirement for the Alberta life sciences sector is estimated at approximately 6,900 additional workers between 2023-2030. Hiring requirements will be largely driven by replacement demand making up over one-half (58%) of the requirement.
 - Over this period, the largest proportions of these hires will be in the functional areas of research and development (22%), manufacturing and production (21%), and management, finance and administration (16%).

- **Hiring Requirements – Bio-health:** The hiring requirement for bio-health during the 2023-2030 period is estimated to be approximately 3,400 workers. This requirement will be relatively equal according to expansion (46%) and the need to replace talent exiting the workforce (e.g., retirements) (54%).
 - The largest proportion of the hiring requirement will occur with workers in occupations outside of the primary job functions, as seen in the ‘Other’ category, many of which are clinical positions (32%), followed by a further one-quarter (26%) for research and development jobs. Additional requirements will be for management, finance and administration functions (13%) and manufacturing/production (13%).
- **Hiring Requirements – Bio-industrial:** The hiring requirement for bio-industrial subsector during the 2023-2030 period is estimated to be approximately 1,200 workers. This requirement will be largely due to the need to replace talent exiting the workforce (e.g., retirements) (57%).
 - The largest proportion of the hiring requirement will occur with workers in manufacturing job functions (36%) followed by relatively equal proportions of management, finance and administration functions (15%) and research and development (18%).
- **Hiring Requirements – Agri-biotech:** The hiring requirement for agri-biotech subsector during the 2023-2030 period is estimated to be approximately 1,800 workers. Approximately 65% of total hiring requirement will result from replacement demand.
 - The largest proportion of the hiring requirement will occur with workers in manufacturing job functions (23%) followed by management, finance and administration functions (22%) and research and development (19%).
- **Hiring Requirements – Bio-energy:** The hiring requirement for bio-energy subsector during the 2023-2030 period is estimated to be approximately 430 workers. This requirement will be driven by the need to replace talent exiting the workforce (e.g., retirements) (64%).
 - The largest proportion of the hiring requirement will occur with workers in manufacturing job functions (40%).

Labour Market Outlooks for Alberta Life Sciences Sector

- In 2023 the labour market is expected to be noticeably tighter for employers hiring in many of the job functions. After 2024, the labour market for most job functions will return to conditions similar to what have been experienced by employers over the past decade. This is largely due to the relatively younger age demographic of Alberta combined with the anticipated level of both domestic and international immigration to the province.

- It is projected that the labour market will be noticeably looser and make hiring easier for those with job openings within the R&D sector. This loosening of the labour market in the R&D function is expected to occur throughout the forecast period (2023-2030).

1.0 Introduction

Alberta's life sciences industry is a thriving and competitive sector that contributes to diverse sectors of Alberta's economy. This report focuses on understanding the labour market that supports Alberta's life sciences industry, an increasing area of concern for employers in the life sciences.

In a recent *State of the Industry Report* for the Alberta life sciences industry¹, one of the top challenges cited by Alberta life sciences employers was their need to access top qualified talent to support their business, address market demand, and enable their business to grow and scale. Overall, the race for talent is persistent, and likely to increase with growing competitiveness from other industries and sectors attempting to recruit from the same candidate pool.

This report examines trends and provides forecasts and estimates of hiring requirements for the Alberta life sciences industry according to various sub-sectors and occupational areas up to 2030. This research supports BioAlberta's mission to *promote, advocate and proactively facilitate the growth of Alberta's life sciences industry* by focusing on understanding the "people factor" and the important role the labour force has in supporting industry growth.

1.1 Overview of Report Content

This report provides Alberta-specific findings for the life sciences labour market focusing on employment outlooks, future hiring requirements, potential talent supply, and overall labour market outlooks for the industry:

- Profile of the Current Alberta Life Sciences Industry (Section 2)
- Employment Outlook for the Life Sciences Industry (Section 3)
- Future Hiring Requirements for the Life Sciences Industry (Section 4)
- Potential Talent Supply for the Life Sciences Industry (Section 5)
- Labour Market Outlook for the Life Sciences Industry (Section 6)

1.2 Defining Industry Sub-sectors and Occupations

The BioAlberta LMI study has integrated many of the same methods and definitions that were developed for a large-scale national study of the Canadian bio-economy that was recently undertaken by BioTalent Canada² (a partner of BioAlberta). This compatibility of methods and definitions allows for comparability of the current Alberta findings with

¹ Deloitte/BioAlberta (2021). Life Sciences in Alberta: State of the Industry

² BioTalent Canada (2021). Close-up on the bio-economy: Labour market intelligence.

larger, national trends or issues identified in other regions and provinces through current BioTalent Canada research.³

Industry Definition

The BioTalent Canada definition of the “*bio-economy*” was used as a starting point for the Alberta life sciences industry LMI study to define the sectors and sub-sectors to be included in labour market forecasting models. This 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.⁴

By using the term *bio-economy*, there is the inherent acknowledgement of the interdependencies across the multiple and diverse economic sectors that rely on biological resources. This focus moves beyond solely inputs to consider bio-based production processes and technologies, as well as the environmental impact of outputs. Furthermore, an economic focus also considers the impact of knowledge, research and innovation on the production process. The emphasis on *economy* has significant implications, as it broadens the scope (and complexity) of understanding influential factors and ultimately quality solutions to current issues such as talent recruitment and retention.

The Alberta life sciences industry’s success is based on innovation and growth. Fundamental to this success is the significant role that R&D activities play in the industry. Alberta life sciences industry’s R&D activities are housed in various types of organizations and networks including private companies, research institutes, hospitals and academic institutions.

Additional considerations include:

³ The methods, definitions and study approach were reviewed by a Study Advisory group to determine their applicability to the Alberta context and to make some adjustments to better reflect the Alberta life sciences industry.

⁴ BioTalent Canada (2022) Bio-economy Definition. <https://www.biotalent.ca/bio-economy-facts/>

- Although the life sciences industry requires products or by-products from the primary sectors (e.g., agriculture, forestry), these sectors are excluded with the current study definition.
- Raw inputs/primary materials for the life sciences industry primarily consist of biological resources (e.g., animals, plants, microorganisms, derived organic matter); however, this is not the case in many innovations where data-driven technologies are impacting the subsectors (e.g., bio-health, agri-biotech).
- The life sciences can encompass end-products (ready for commercialization) as well as the production of ideas (R&D, innovation). For the current study, industry products can be either material or immaterial.
- Knowledge, research and innovation are considered as potentially impacting all stages of the production process.
- Establishments in the life sciences may primarily produce new technologies, apply innovative technologies or may also use established technologies or production processes.

Sub-Sectors

The overall scope has a wide lens and encompasses diverse groups of activities. The current study uses four industrial sub-sectors to understand and develop estimates for the Alberta life sciences industry. These include the following:⁵

- **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 including medical devices.
- **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.
- **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

⁵ BioTalent Canada (2022) Bio-economy Sub-sectors. <https://www.biotalent.ca/bio-economy-facts/>

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.

- **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.

Occupational Groups

Occupations in the life sciences are diverse and numerous. The sector itself spans multiple industrial sectors, each with their own suite of occupations. Added to this is the complexity of the prominent role of research and development (R&D) throughout the life sciences which contributes to additional layers of occupational groupings.

In alignment with previous national-level research, the current BioAlberta study uses occupational groupings that were developed according to typical organizational functions. The extent to which all functional areas are present in each company will depend on a number of factors, such as specific areas of activity or company size. The typical organizational functions include:

- **Research and Development:** Includes activities undertaken to innovate and introduce new intellectual property, processes, products and/or services.
- **Manufacturing (Production):** Processing materials into finished products via the use of various tools/equipment and/or processes.
- **Distribution:** Involves movement of goods from manufacturer to point of sale.
- **General Management/Finance/Administration:** Management of a company or organization as a whole, or internal management of departments and/or units.
- **Legal and Regulatory:** Centered on provision of legal services, compliance, and adherence to regulatory requirements.
- **Quality Control and Quality Assurance:** Quality management of processes and/or products.
- **Marketing/Business Development/Sales/Communications:** Promotion and awareness raising about organizations and their products, selling of products, and improved business opportunities.
- **Information Technology:** Installation, maintenance, and monitoring of computers/computer networks/systems.

1.3 Overview of Methods

The methods used for the current study are based on the methods developed and implemented for the larger, national LMI study recently conducted by BioTalent Canada. Working with a study advisory committee developed by BioAlberta, the research team made a few minor adaptations to the national study methods, primarily to the occupations and sub-industries to be included to better reflect the Alberta life sciences industry context.

Industries and occupations for the Canadian economy are formally defined by the North American Industry Classification System (“NAICS”) and the National Occupational Classification (“NOC”). Unfortunately, these classifications do not align directly with what is defined as the life sciences industry or the bio-economy. The methods employed by the current study to estimate life-sciences industry employment for Alberta include the following steps or methods:

- Initially develop a **base estimate** for employment using conventional NAICS and NOC labour force estimates based on the Labour Force Survey (LFS) which produces a high-level (4-digit NAICS) estimate of the size and occupational composition of the related industries.
- Develop a **core estimate** for employment using the size of the 6-digit NAICS Alberta workforce using the Canadian Business Counts (“CBC”), which details the distribution of businesses earning revenues greater than \$30,000 at a 6-digit NAICS level. This dataset only provides a range in the number of employees employed by a business, so the method uses an approach that fits employee counts to known 4-digit counts for Alberta using a Monte Carlo simulation.⁶ This produces the **Core Estimate**, an estimate of the labour force calculated as the share of the Base Estimate.
- The **core estimate** of employment is further refined through two additional estimation procedures:
 - The Input-Output accounts published by Statistics Canada provides data on commodities used or produced exclusively by the life sciences portion of the base industry, which were used to estimate what share life sciences activities account for of the larger industry.
 - The Census includes information on the educational background of workers in each industry and occupation. The life sciences share was estimated by

⁶ A Monte Carlo simulation is a mathematical technique which is used to estimate the possible outcomes of an uncertain event. Unlike a normal forecasting model, a Monte Carlo simulation predicts a set of outcomes based on an estimated range of values versus a set of fixed input values. A Monte Carlo simulation builds a model of possible results by leveraging a probability distribution, such as a uniform or normal distribution, for any variable that has inherent uncertainty.

employing the share of people in the labour force who had education backgrounds relative to the life sciences, as defined through 4-digit Classification of Instructional Program (“CIP”) code.

- These estimation approaches are then compiled into the **bio-share industry estimate**, the size of the workforce for each industry defined at the 6-digit NAICS level. The Bio-Share Industry Estimate is developed by comparing the Life Sciences Employment Estimate to the total employment for industries at the 4-digit NAICS level reported in the Labour Force Survey.
- **Future employment** is forecasted based on the Bio-Share Industry Estimate extended based on both the Stokes Economics Provincial Economic forecasts and on specific industry forecasts, where available.
- The Canada Occupation Projection System (“COPS”) forecast is used to estimate **occupation-level retirements** modified by each province’s demographics in the forecast year.
- **Detailed occupation and industry estimates** are then aggregated into job functions and industry subsectors for reporting purposes.

2.0 Current Profile of Alberta Life Sciences Industry

This section provides an overview of key characteristics of Alberta life sciences industry including both employers and the current workforce according to the definitions selected for the study as outlined in Section 1.3.

2.1 Life Sciences Establishment Counts

Overall, the estimated number of establishments (e.g., companies, hospital research organizations, university research organizations) engaged in life sciences related activity in Alberta is approximately 1,912. As illustrated in Table 2.1, the two largest proportions of these establishments are within the sectors defined as veterinary services (NAICS 541940) (27%) and testing laboratories (NAICS 541380) (23%). Approximately an additional one-quarter of establishments are divided between “other industrial/manufacturing” sectors (NAICS 11, 22, 31-32) (12%), and R&D in the physical, engineering and life sciences (NAICS 541710) (11%).

Table 2.1: Alberta life-sciences establishment count estimates by industrial sector

NAICS CODE	Industry (NAICS)	ALBERTA	
		# Establishments	Overall %
541940	Veterinary services	514	27%
541380	Testing laboratories ⁷	441	23%
11, 22, 31-32	Other Industrial / Manufacturing	226	12%
541710	Research and development in the physical, engineering and life sciences	214	11%
339110	Medical equipment and supplies manufacturing	193	10%
621510	Medical and diagnostic laboratories ⁸	157	8%
622	Hospital sector	75	4%
334512	Measuring, medical and controlling devices manufacturing	57	3%
325410	Pharmaceutical and medicine manufacturing	23	1%
611310	Universities sector	12	1%
TOTAL		1,912	100%

Source: BioAlberta LMI Study, 2022

⁷ Testing laboratories (NAICS 541380) are establishments primarily engaged in providing physical, chemical and other analytical testing services which often support R&D activities.

⁸ In contrast to testing laboratories, medical and diagnostic laboratories (NAICS 621510) are establishments primarily engaged in providing analytic or diagnostic services which are generally provided to the medical profession, or to the patient on referral from a health practitioner.

2.2 Current Life Sciences Employment Estimates

The Alberta life sciences industry is comprised of establishments that employed approximately 23,192 workers across Alberta region in 2022. These establishments are associated with a wide range of industrial sectors. Table 2.2 provides the overall employment estimates by industry code as of 2022, alongside the share of total life sciences employment found in each industry.

One of the largest contributors to Alberta's life sciences industry are testing laboratories, which provide analytical testing services and accounted for 20% of total life sciences employment in the province. Testing laboratories are primarily engaged in providing physical, chemical and other analytical testing services which often support R&D activities (under the broader category of professional, research and technical services (NAICS 541). The study methods involved developing employment estimates by mapping current employees educational background in the life sciences to specific industrial sectors, and then combining this result with the proportion of establishments that reported conducting activities within the life sciences and bio-economy definition (see methods overview in Section 1.3). Other major sources of life sciences employment are the hospital sector (16%), various manufacturing industries with a bio focus (16%), and veterinary services (15%). Employment in R&D establishments including business and universities combined make up 18% of employment. Manufacturing specific to the health sector including pharmaceuticals, medical equipment, and medical devices account for approximately 11% of the sector employment combined.

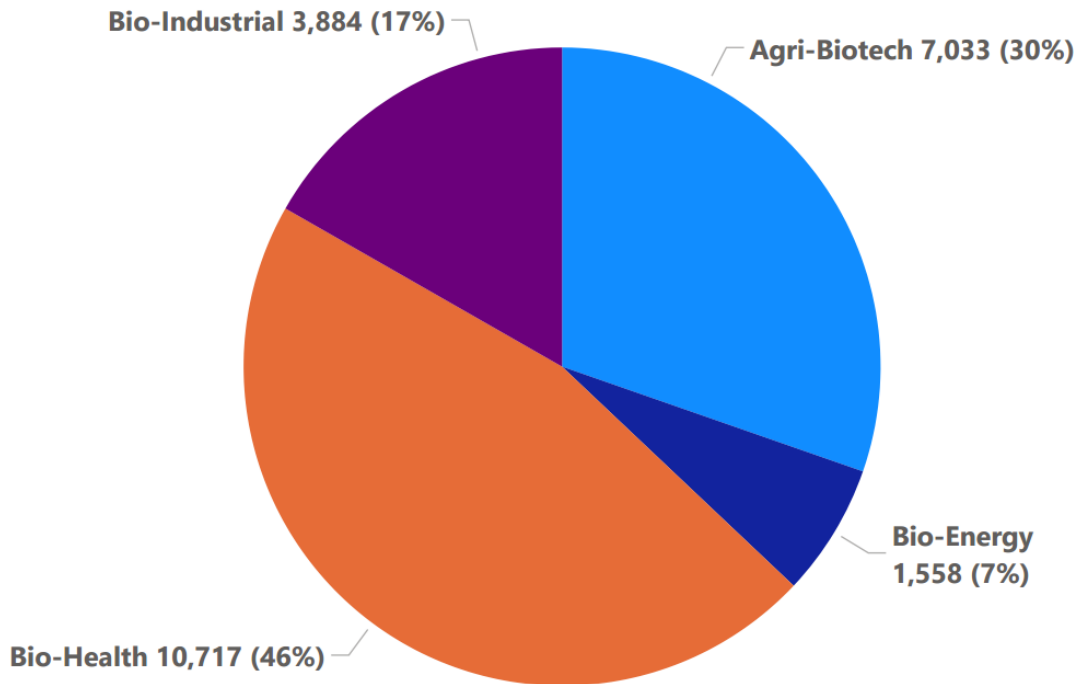
Table 2.2: Alberta life-sciences employment estimates by industrial sector, 2022

NAICS CODE	Industry (NAICS)	ALBERTA	
		Employment	Overall %
541380	Testing laboratories	4,626	20%
622	Hospital sector	3,694	16%
11, 22, 31-32	Other Industrial / Manufacturing	3,628	16%
541940	Veterinary services	3,386	15%
541710	Research and development in the physical, engineering and life sciences	2,557	11%
611310	Universities sector	1,717	7%
339110	Medical equipment and supplies manufacturing	1,395	6%
621510	Medical and diagnostic laboratories	986	4%
325410	Pharmaceutical and medicine manufacturing	633	3%
334512	Measuring, medical and controlling devices manufacturing	570	2%
TOTAL		23,192	100%

Source: BioAlberta LMI Study, 2022

Alberta’s life sciences employment can also be estimated for each of the four primary subsectors based on the industry-level categorizations undertaken. As outlined in Figure 2.1, most life sciences employment in Alberta is associated with the bio-health subsector. In 2022, bio-health accounted for slightly less than one-half (46%) of life sciences workers. Agri-biotech (30%) was second largest, followed by bio-industrial (17%) and bio-energy (7%) sub-sectors which comprise smaller portions of the life sciences sector with respect to employment.

Figure 2.1 – Alberta Life Sciences Employment Estimates by Subsector, 2022



Source: BioAlberta LMI Study, 2022

2.3 Life Sciences Employment Estimates by Job Function

Life sciences employment can be categorized based on the roles of workers as determined by job function. As illustrated in Table 2.3, research and development (R&D) (29%) and manufacturing and production (20%) are the two most common job function categories overall for the sector. Management, finance and administration job functions (13%) as a grouping is quite varied in level and responsibilities ranging from C-suite positions through to administrative support. The job function category of 'Other Job Functions', which accounts for 21% of employment, includes all roles and employment not included in the selected eight job function categories.

The distribution of employment according to job function by subsector differs across sub-sectors. R&D employment is the largest proportion for all sectors, except for bio-industrial which has a larger proportion of employment in the manufacturing and production job function category. The other main difference in job function proportions across sub-sectors is in the “other” job function category which is substantially higher for both bio-health and agri-bio. This is due to various clinical job functions (human health, animal health under veterinary services) that contribute to these subsectors but are not classified in the eight primary job functions categories.

Table 2.3 – Alberta Life Sciences Employment by Job Function and Subsector, 2022

JOB FUNCTION CATEGORY	TOTAL	BIO-HEALTH	BIO-INDUSTRIAL	AGRI-BIO	BIO-ENERGY
Research and Development	29%	29%	25%	29%	32%
Manufacturing and Production	20%	14%	32%	19%	32%
Management, Finance and Administration	13%	11%	13%	16%	15%
Distribution and Logistics	4%	4%	6%	4%	5%
Quality Control and Assurance	4%	5%	5%	4%	5%
Marketing, Business Development, and Sales	4%	4%	6%	4%	3%
Legal and Regulatory Affairs	2%	2%	1%	1%	1%
Information Technology	3%	3%	3%	2%	2%
Other	21%	28%	10%	20%	6%

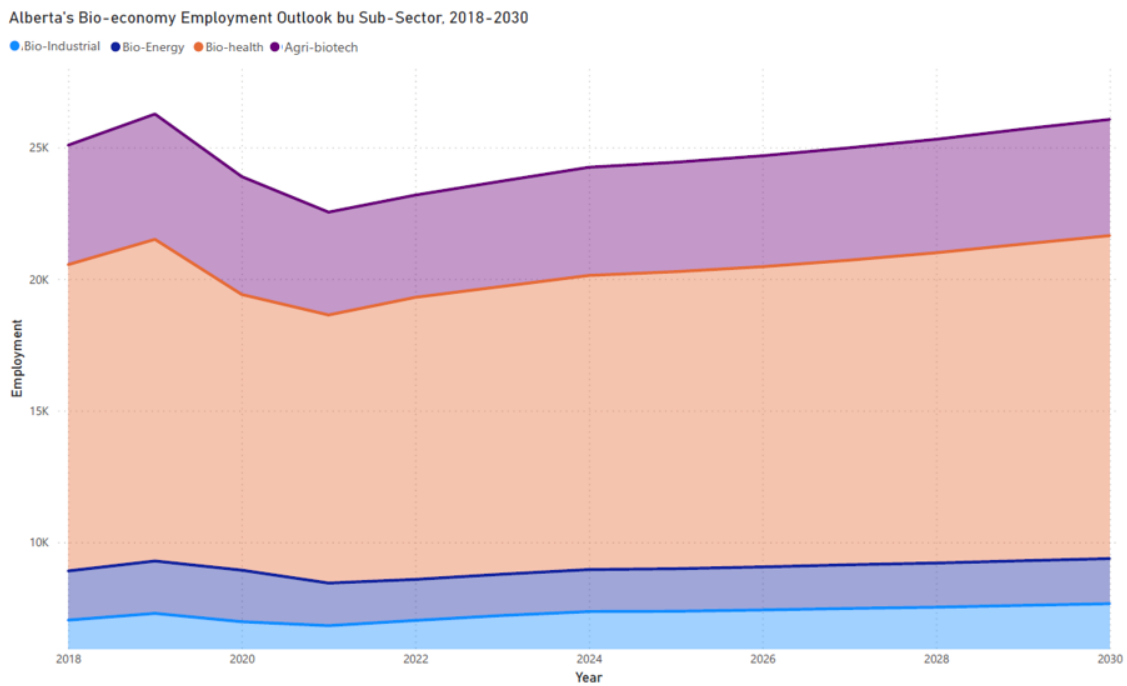
Source: BioAlberta LMI Study, 2022

3.0 Life Sciences Employment Outlook

3.1 Overall Employment Outlook for the Alberta Life Sciences

Looking ahead, Figure 3.1 presents the overall life sciences employment outlook for Alberta up to 2030. In the recent past, life sciences employment in Alberta peaked in 2019 at approximately 26,300, before falling quite rapidly over the next two years to a low of 22,500 in 2021, an overall decrease of approximately 14%. In the short term, life sciences employment is expected to grow on average annually 2.5% between 2022 and 2025, resulting in 24,400 employed by 2025. The longer-term trend for life sciences employment between 2026 and 2030 indicates that growth will slow to an annual average of 1.3%, resulting in approximately 26,100 employed by 2030.

Figure 3.1: Alberta Life Sciences Employment Outlook by Subsector, 2018-2030



Source: BioAlberta LMI Study, 2022

Table 3.1 – Alberta Life Sciences Employment by Subsector, 2018-2030

YEAR	TOTAL	BIO-HEALTH	BIO-INDUSTRIAL	AGRI-BIO	BIO-ENERGY
2018	25,089	11,636	4,539	7,046	1,868
2019	26,269	12,218	4,758	7,302	1,991
2020	23,892	10,472	4,478	6,985	1,957
2021	22,542	10,184	3,905	6,835	1,618
2022	23,191	10,717	3,885	7,032	1,557
2023	23,724	10,933	4,003	7,220	1,568
2024	24,248	11,173	4,110	7,369	1,596
2025	24,438	11,286	4,156	7,381	1,615
2026	24,685	11,406	4,214	7,431	1,634
2027	24,986	11,569	4,268	7,490	1,659
2028	25,309	11,787	4,309	7,536	1,677
2029	25,701	12,031	4,369	7,605	1,696
2030	26,065	12,270	4,414	7,669	1,712

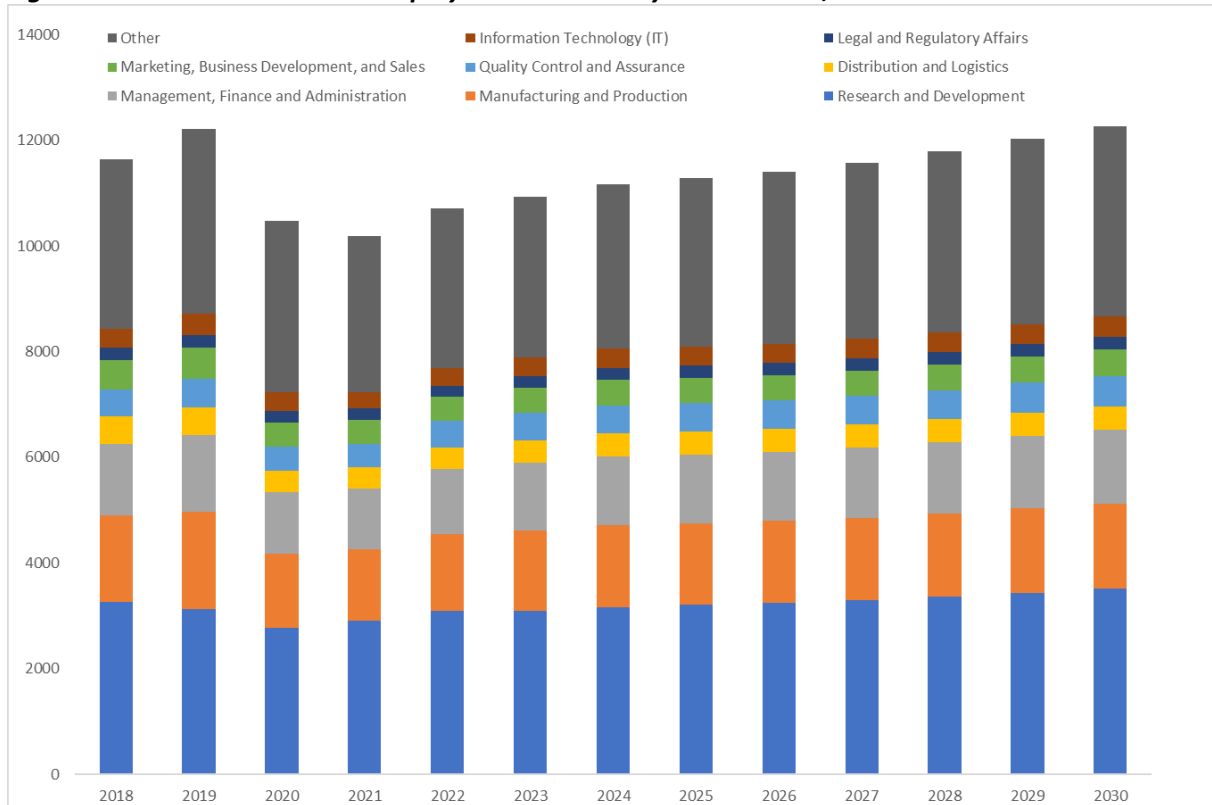
Source: BioAlberta LMI Study, 2022

While these trends describe the life sciences as a whole, employment growth within each of the four subsectors depends on a distinct set of factors. As outlined in the Table 3.1, the rates of employment growth within each subsector vary with the bio-health and agri-bio sectors expected by 2030 to have similar or higher employment levels as found in the peak year of 2019. In contrast, the bio-industrial and bio-energy subsectors are expected to remain under the peak employment levels by 2030. The employment outlooks by each subsector are presented in the following sections.

3.2 Alberta Bio-Health Employment Outlook

As illustrated in Figure/Table 3.2, Alberta’s bio-health employment decreased by an estimated 14.3% from 12,200 workers in 2019 to approximately 10,500 employed in 2020. Bio-health employment in 2021 decreased again but less rapidly by approximately 2.8%, but then started to reverse to a growth trend as of 2022 which is expected to continue through to the end of the decade. The short-term employment outlook for bio-health balances rising R&D investment against regulatory challenges, such as the PMPRB reforms, leading to 2.6% annual employment growth between 2022 and 2025. Moderate medium/long-term employment growth of 1.7% annually is projected from 2026 through to 2030 due to continued increases in health spending, including associated R&D and production activities, as the population ages. Alberta bio-health employment is expected to reach approximately 11,300 workers by 2025 and 12,300 workers by 2030.

Figure 3.2: Alberta Bio-health Employment Outlook by Job Function, 2018-2030



Source: BioAlberta LMI Study, 2022

Table 3.2: Alberta Bio-health Employment Outlook by Job Function, 2018-2030

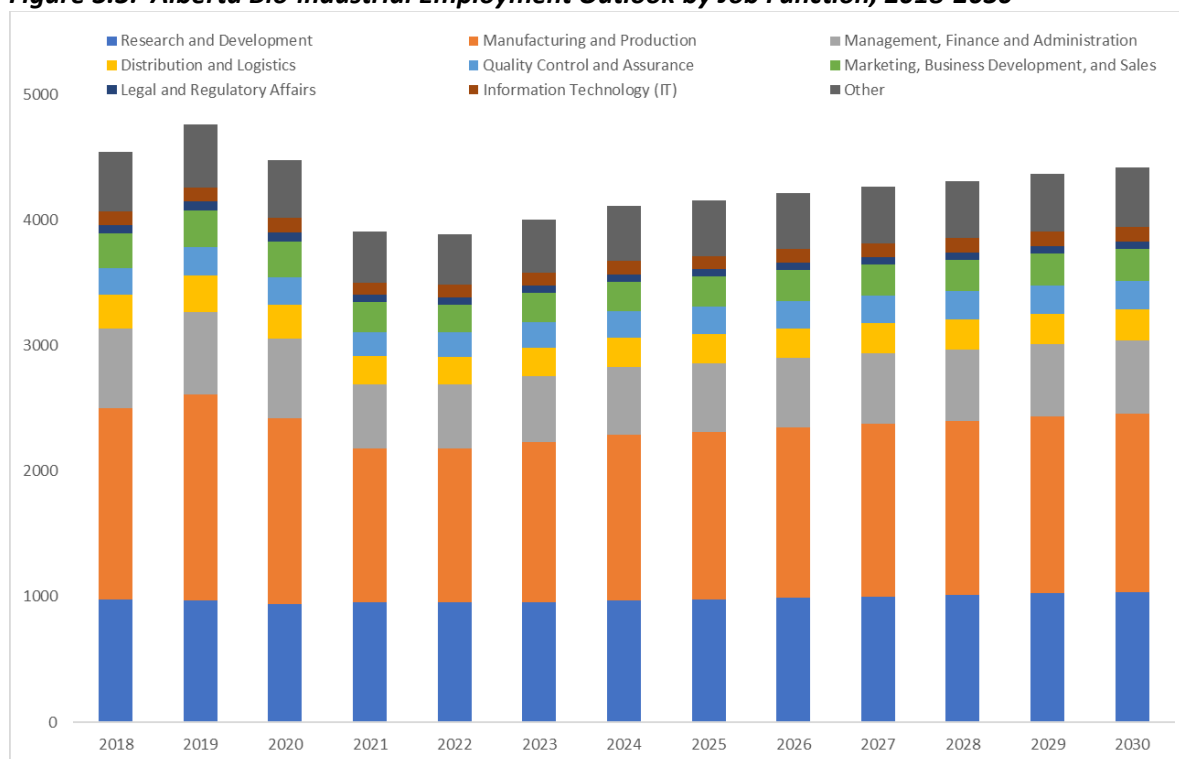
Job Function	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Research and Development	3,259	3,132	2,768	2,898	3,093	3,100	3,162	3,202	3,245	3,299	3,365	3,436	3,506
Manufacturing and Production	1,639	1,827	1,401	1,356	1,456	1,518	1,551	1,547	1,545	1,551	1,568	1,591	1,610
Management, Finance and Administration	1,359	1,454	1,164	1,157	1,231	1,273	1,299	1,307	1,315	1,327	1,349	1,374	1,397
Distribution and Logistics	511	523	403	400	411	427	434	434	434	437	439	448	452
Quality Control and Assurance	519	546	462	448	493	524	535	537	538	544	551	560	571
Marketing, Business Devt, Sales	546	591	455	446	458	470	481	479	478	480	486	491	499
Legal and Regulatory Affairs	241	232	231	216	215	221	225	227	230	234	238	243	248
Information Technology (IT)	357	404	342	309	337	360	366	366	365	367	371	378	384
Other	3,205	3,509	3,246	2,954	3,023	3,040	3,120	3,187	3,256	3,330	3,420	3,510	3,603
TOTAL	11,636	12,218	10,472	10,184	10,717	10,933	11,173	11,286	11,406	11,569	11,787	12,031	12,270

Source: BioAlberta LMI Study, 2022

3.3 Alberta Bio-Industrial Employment Outlook

As illustrated in Figure/Table 3.3, Alberta's bio-industrial employment decreased by an estimated 18.7% across two years from 4,800 workers in 2019 to approximately 3,900 employed in 2021. Bio-industrial employment in 2022 remained steady, and is now expected to be on a positive growth trend as of 2023 through to the end of the decade. Alberta's bio-industrial employment is expected to reach approximately 4,150 workers by 2025 and 4,400 workers by 2030.

Figure 3.3: Alberta Bio-industrial Employment Outlook by Job Function, 2018-2030



Source: BioAlberta LMI Study, 2022

Table 3.3: Alberta Bio-industrial Employment Outlook by Job Function, 2018-2030

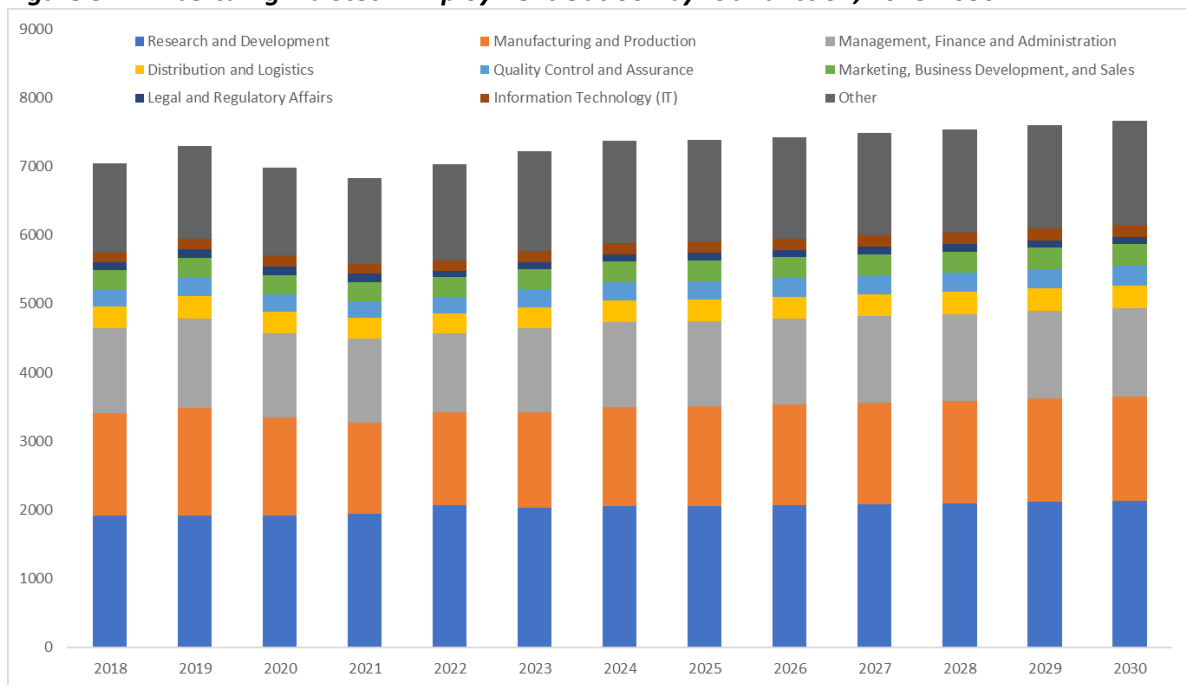
Job Function	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Research and Development	977	971	941	954	954	953	970	977	989	1,001	1,011	1,027	1,038
Manufacturing and Production	1,527	1,638	1,479	1,225	1,228	1,278	1,317	1,335	1,355	1,372	1,387	1,406	1,420
Management, Finance and Administration	631	660	633	514	509	525	541	548	556	562	567	575	580
Distribution and Logistics	272	291	269	220	216	225	232	234	237	242	244	246	249
Quality Control and Assurance	209	225	223	192	196	206	212	213	216	219	222	225	227
Marketing, Business Development, Sales	274	290	281	238	224	232	238	243	247	250	252	256	257
Legal and Regulatory Affairs	71	71	72	62	55	56	57	56	57	58	58	59	59
Information Technology (IT)	104	111	118	97	102	106	109	108	110	112	112	113	115
Other	474	501	462	403	401	422	434	442	447	452	456	462	469
TOTAL	4,539	4,758	4,478	3,905	3,885	4,003	4,110	4,156	4,214	4,268	4,309	4,369	4,414

Source: BioAlberta LMI Study, 2022

3.4 Alberta Agri-biotech Employment Outlook

As illustrated in Figure/Table 3.4, Alberta’s agri-biotech employment has remained relatively steady between 2018 and 2021 experiencing less fluctuation compared to the other life sciences subsectors during the early stages of the COVID pandemic. Employment in agri-biotech fell by approximately 6.4% from 7,300 in 2019 to 6,800 in 2021. Growth in employment is expected between 2022 to 2024 with an average increase of approximately 2.5%. As of 2025 through to the end of the decade relatively weaker employment growth of less than 1% annually is projected for the subsector based in part on macroeconomic conditions. Alberta’s agri-biotech employment is expected to reach approximately 7,400 workers by 2025 and 7,700 workers by 2030.

Figure 3.4: Alberta Agri-biotech Employment Outlook by Job Function, 2018-2030



Source: BioAlberta LMI Study, 2022

Table 3.4: Alberta Agri-biotech Employment Outlook by Job Function, 2018-2030

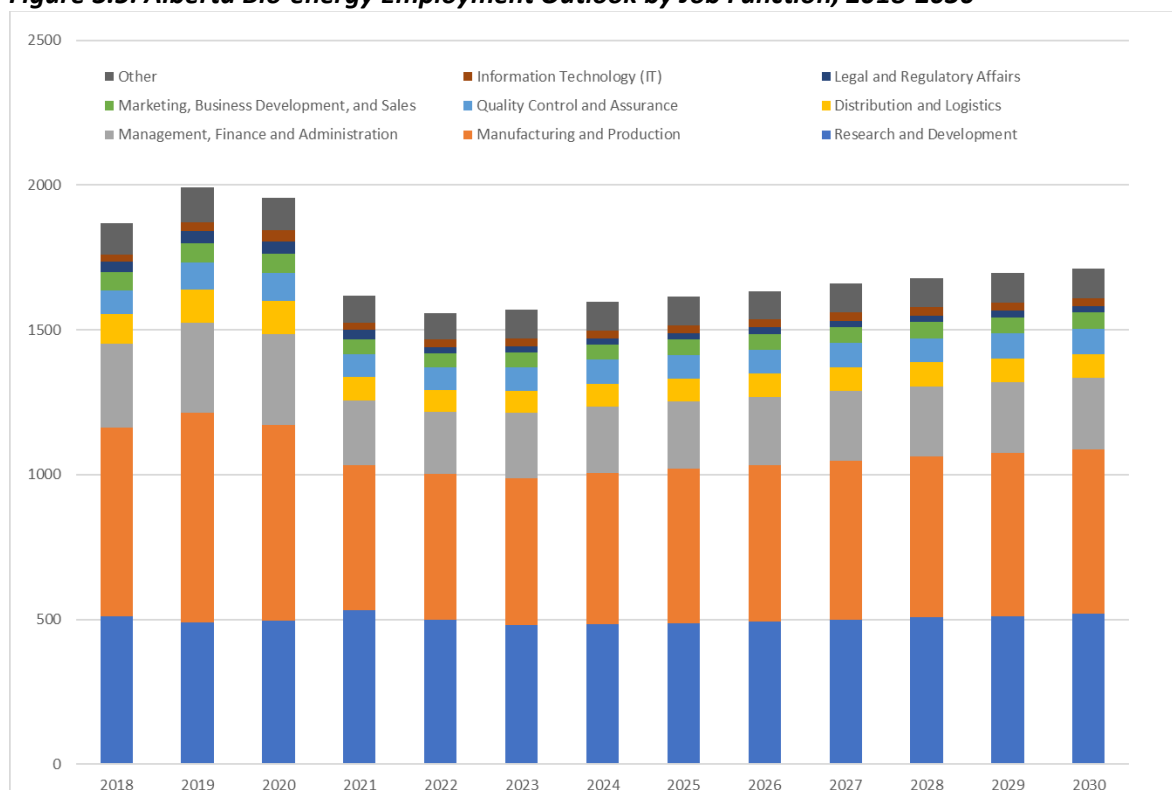
Job Function	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Research and Development	1,915	1,918	1,914	1,937	2,072	2,027	2,060	2,059	2,070	2,085	2,098	2,119	2,137
Manufacturing and Production	1,495	1,570	1,431	1,333	1,347	1,398	1,434	1,445	1,461	1,476	1,486	1,501	1,512
Management, Finance and Administration	1,235	1,290	1,223	1,224	1,152	1,218	1,243	1,244	1,253	1,261	1,268	1,279	1,289
Distribution and Logistics	318	340	318	302	289	304	312	313	316	320	323	325	329
Quality Control and Assurance	244	259	255	239	246	261	267	270	272	275	278	279	283
Marketing, Business Development, Sales	279	294	281	286	279	292	299	302	304	306	308	312	315
Legal and Regulatory Affairs	121	121	124	117	100	106	109	108	108	110	110	110	112
Information Technology (IT)	142	152	164	141	147	159	162	162	164	165	166	167	168
Other	1,297	1,358	1,275	1,256	1,400	1,455	1,483	1,478	1,483	1,492	1,499	1,513	1,524
TOTAL	7,046	7,302	6,985	6,835	7,032	7,220	7,369	7,381	7,431	7,490	7,536	7,605	7,669

Source: BioAlberta LMI Study, 2022

3.5 Alberta Bio-Energy Employment Outlook

As illustrated in Figure/Table 3.5, Alberta's bio-energy employment decreased by an estimated 19.0% across two years from 2,000 workers in 2019 to approximately 1,600 employed in 2021. Bio-energy employment in 2022 again decreased by approximately 3.8%, but as of 2023 is now expected to be on a positive growth trend through to the end of the decade. Alberta's bio-industrial employment is expected to reach approximately 1,600 workers by 2025 and 1,700 workers by 2030.

Figure 3.5: Alberta Bio-energy Employment Outlook by Job Function, 2018-2030



Source: BioAlberta LMI Study, 2022

Table 3.5: Alberta Bio-energy Employment Outlook by Job Function, 2018-2030

Job Function	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Research and Development	511	490	496	531	500	480	484	488	494	500	507	512	519
Manufacturing and Production	650	724	675	503	501	508	521	531	539	549	557	563	568
Management, Finance and Administration	290	309	315	222	217	225	231	233	236	240	240	243	246
Distribution and Logistics	102	117	115	81	73	76	78	80	81	82	83	84	84
Quality Control and Assurance	83	93	94	79	79	80	82	81	81	83	84	85	86
Marketing, Business Development, Sales	62	67	69	51	49	53	53	54	55	55	56	56	56
Legal and Regulatory Affairs	38	40	42	32	21	22	22	22	22	22	22	22	22
Information Technology (IT)	25	30	39	26	26	27	27	27	27	28	28	28	28
Other	107	121	112	93	91	97	98	99	99	100	100	103	103
TOTAL	1,868	1,991	1,957	1,618	1,557	1,568	1,596	1,615	1,634	1,659	1,677	1,696	1,712

Source: BioAlberta LMI Study, 2022

4.0 Future Hiring Requirements for Alberta Life Sciences

4.1 Alberta Life Sciences Hiring Requirement Outlook

The labour market model for the life sciences converts employment forecasts into outlooks for labour demand by life sciences employers. Labour demand is classified into two distinct measures:

1. **Expansion demand** – labour demand driven by output growth in the life-sciences.
2. **Replacement demand** – labour demand driven by the need to replace workers exiting the life sciences' workforce due to retirement or death.⁹

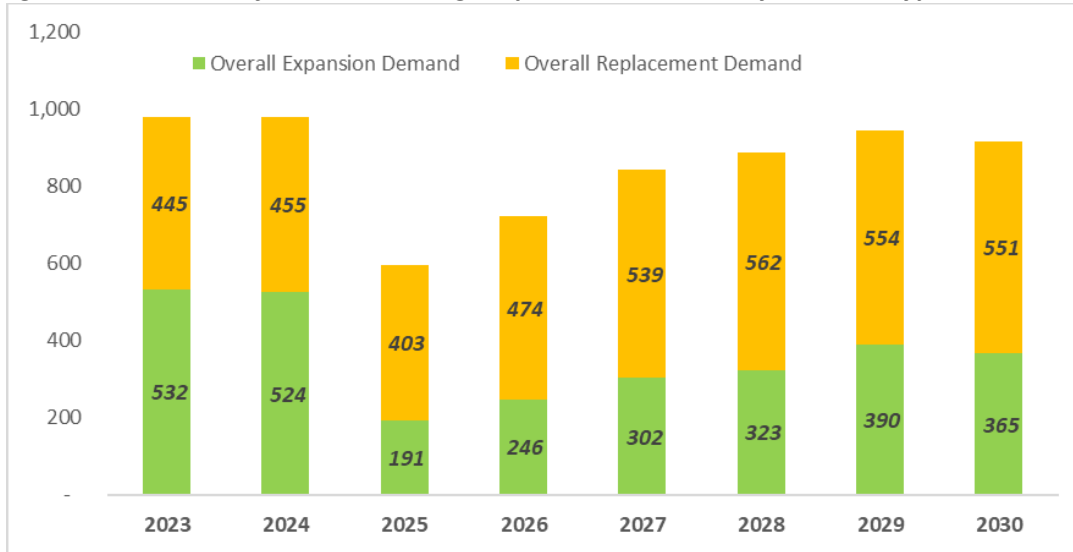
Taken together, these measures form total labour demand, referred to as **hiring requirement** in this report. Hiring requirement represents the total number of new job openings across life sciences establishments. Hiring requirement is projected on an annual basis for each year between 2023 and 2030. As with employment, outlooks for hiring requirements are presented for Alberta life sciences overall, followed by each of the four subsectors separately.

As illustrated in Figure 4.1, **Alberta life sciences overall will need to hire approximately 6,900 workers over the forecast period (2023-2030)** to meet the employment projections outlined previously in Section 3.0. This outlook includes hiring requirements due to both expansion and replacement demand. Replacement demand will be the main driver, accounting for more 58% of hiring requirement (on average 500 hires per year). Replacement demand is approximately 2% of the total life sciences annually. For example, in 2023 the replacement demand is predicted at 445 out of the total 2022 workforce size of 23,191 which accounts for approximately 1.9% of the life sciences' workforce. Expansion demand is expected to account for a smaller share of hiring requirement at 42% (on average 360 hires per year). Expansion demand is projected to be lowest in 2025, when life sciences employment is expected to contract overall, primarily due to macro-economic conditions.

It should be noted that all projections and forecasts are “points in time”. As a result, changes in the sector environment can have a significant impact on the accuracy of forecasts. Specifically, estimates of expansion demand which is a major driver for the forecasting models can vary significantly and quickly based on large changes in investments (added or moved out), changes in regulations and policies, and shifting priorities for the life sciences industry, or in sectors that are closely related to the life sciences. This potential volatility should be kept in mind when reviewing forecast results that were developed in late 2022 for this report.

⁹ This measure of replacement demand does not account for workers exiting as part of turnover.

Figure 4.1: Alberta Life Sciences Hiring Requirement Outlook by Demand Type, 2023-2030



Source: BioAlberta LMI Study, 2022

Table 4.1 lists the total hiring requirement by job function for each forecast year. Nearly half (45%) of total projected job openings over the forecast period will be for R&D roles or manufacturing and production roles. Nearly one-fifth (16%) of projected job openings will be for management, finance, and administration roles. The remaining categories of primary job function are expected account for 5% or fewer of total projected job openings over the forecast period. The “other” category is substantial at approximately 23% which as noted below in the subsector analyses are being largely driven by the bio-health subsector and agri-biotech (both of which rely heavily on clinical positions to support areas such as clinical trials and services in human and animal health).

Table 4.1: Alberta Life Sciences Hiring Requirement Outlook by Job Function, 2023-2030

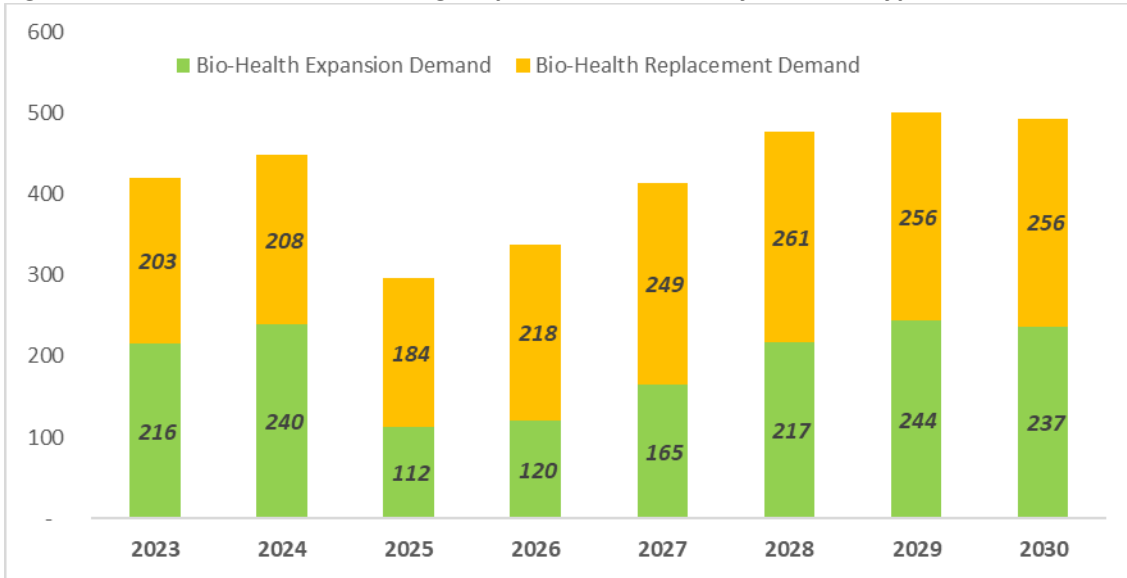
Job Function	2023	2024	2025	2026	2027	2028	2029	2030	TOTAL	%
Research and Development	48	226	148	182	219	230	245	239	1,537	22.4%
Manufacturing and Production	268	220	125	145	165	172	183	170	1,448	21.1%
Management, Finance and Administration	211	154	90	111	122	130	141	135	1,094	16.0%
Distribution and Logistics	62	44	22	30	40	37	43	41	319	4.7%
Quality Control and Assurance	78	48	23	30	40	39	39	45	342	5.0%
Marketing, Business Development, Sales	57	44	24	29	30	34	37	36	291	4.2%
Legal and Regulatory Affairs	17	13	4	8	13	11	13	13	92	1.3%
Information Technology (IT)	49	21	7	13	17	18	21	20	166	2.4%
Other	187	209	151	172	195	214	222	217	1,567	22.9%
TOTAL	977	979	594	720	841	885	944	916	6,856	100.0%

Source: BioAlberta LMI Study, 2022

4.2 Alberta Bio-health Hiring Requirement Outlook

The hiring requirement outlook for the bio-health subsector mirrors trends seen for the Alberta life sciences at large. As illustrated in Figure 4.2, the hiring requirement is expected to total approximately 3,400 workers over the forecast period (2023-2030). Slightly over one half (54%) of these job openings will result from replacement demand. Hiring requirement is projected to total between 400 and 500 job openings in each forecast year except 2025-26, when long-term macroeconomic outlooks project a rise in interest rates that limit growth. Expansion demand is expected to be greatly reduced in 2025-26, causing hiring requirement to fall despite consistent levels of replacement demand of over 180 job openings annually over the forecast period due to replacement. Expansion demand will be stronger in the medium/long-term outlook, a result of trends identified in the employment outlook.

Figure 4.2: Alberta Bio-health Hiring Requirement Outlook by Demand Type, 2023-2030



Source: BioAlberta LMI Study, 2022

As illustrated in Table 4.2, when the hiring requirement in bio-health is analysed according to job functions, one-quarter (26%) of job openings among Alberta bio-health employers will be for R&D roles, reflecting the high levels of research activity associated with the subsector. A further one-third (32%) of the requirement will be for occupations outside of the primary job functions, as seen in the ‘Other’ category. The high levels of hiring requirement for this category are associated with nursing and related medical professions that do not have a full-time research capacity. The manufacturing and production and management, finance and administration job functions are expected to account for a combined 25% of total projected hiring requirement over the forecast period.

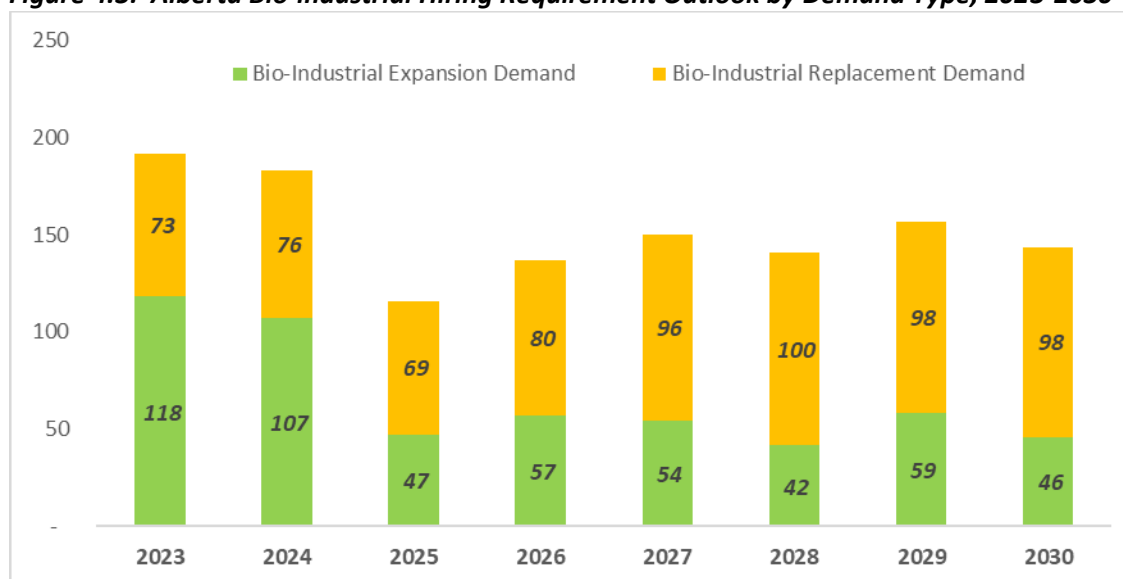
Table 4.2: Alberta Bio-health Hiring Requirement Outlook by Job Function, 2023-2030

Job Function	2023	2024	2025	2026	2027	2028	2029	2030	TOTAL	%
Research and Development	60	117	89	98	120	133	139	137	893	26.4%
Manufacturing and Production	93	64	24	30	43	56	60	56	426	12.6%
Management, Finance and Administration	72	58	36	40	47	59	61	60	433	12.8%
Distribution and Logistics	24	15	7	10	15	14	21	17	123	3.6%
Quality Control and Assurance	42	23	10	13	18	20	21	24	171	5.1%
Marketing, Business Development, Sales	21	19	7	8	12	15	16	17	115	3.4%
Legal and Regulatory Affairs	8	6	4	6	7	8	10	8	57	1.7%
Information Technology (IT)	28	11	4	6	9	11	14	13	96	2.8%
Other	71	134	115	126	143	161	158	160	1,068	31.6%
TOTAL	419	447	296	337	414	477	500	492	3,382	100.0%

Source: BioAlberta LMI Study, 2022

4.3 Alberta Bio-industrial Hiring Requirement Outlook

Alberta's bio-industrial hiring requirement is expected to total approximately 1,200 workers between 2023 and 2030, as illustrated in Figure 4.3. Approximately 57% of total hiring requirement will result from replacement demand, however this share increases for the forecast years following 2025. Expansion demand is expected to generate an average of over 100 job openings annually between 2023 and 2024. Weaker medium/long-term employment trends will limit expansion demand to fewer than 60 job openings annually between 2025 and 2029.

Figure 4.3: Alberta Bio-industrial Hiring Requirement Outlook by Demand Type, 2023-2030


Source: BioAlberta LMI Study, 2022

The largest proportion of job openings (36%) among Alberta bio-industrial employers will be for manufacturing and production roles (see Table 4.3). In comparison, just 18% of job openings will be for R&D roles; similar to the share accounted for by the management, finance, and administration job function (15%). No other primary job function is expected to account for more than 6% of total projected hiring requirement.

Table 4.3: Alberta Bio-industrial Hiring Requirement Outlook by Job Function, 2023-2030

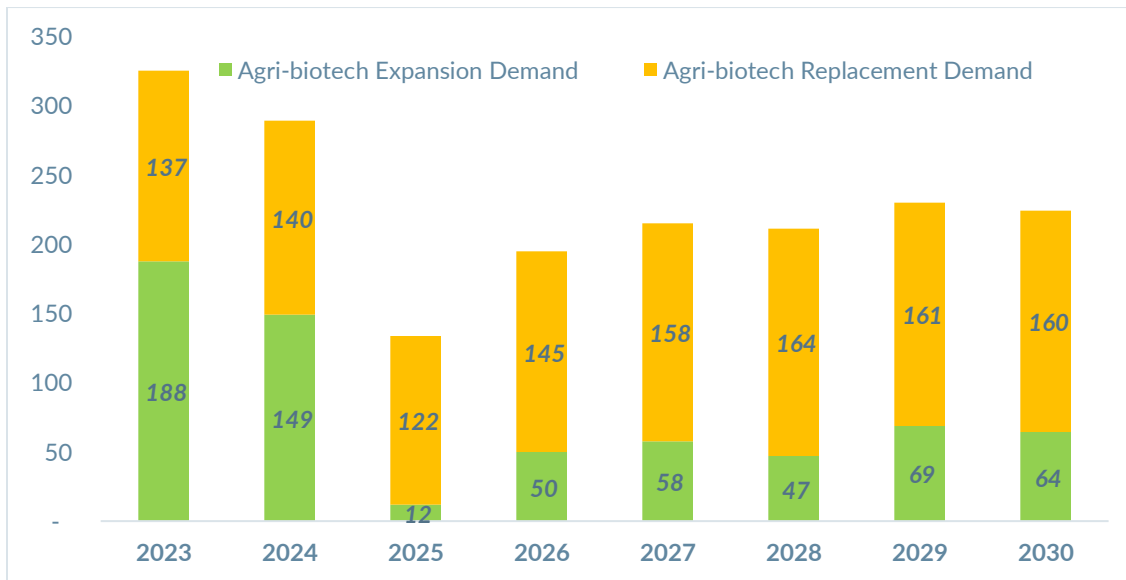
Job Function	2023	2024	2025	2026	2027	2028	2029	2030	TOTAL	%
Research and Development	14	33	21	28	33	30	35	31	225	18.4%
Manufacturing and Production	77	67	44	49	50	50	52	48	437	35.8%
Management, Finance and Administration	29	29	19	22	21	21	23	20	184	15.1%
Distribution and Logistics	11	11	5	7	10	8	9	9	70	5.7%
Quality Control and Assurance	14	9	4	6	9	8	8	8	66	5.4%
Marketing, Business Development, Sales	11	10	8	9	8	8	10	8	72	5.9%
Legal and Regulatory Affairs	2	1	0	1	2	1	1	1	9	0.7%
Information Technology (IT)	5	4	1	3	3	2	3	3	24	2.0%
Other	29	19	14	13	14	13	16	16	134	11.0%
TOTAL	192	183	116	138	150	141	157	144	1,221	100.0%

Source: BioAlberta LMI Study, 2022

4.4 Alberta Agri-biotech Hiring Requirement Outlook

Alberta’s agri-biotech hiring requirement is expected to total 1,800 workers between 2023 and 2030 (see Figure 4.4). Approximately two-thirds (65%) of total hiring requirement will result from replacement demand. Expansion demand is expected to generate an average of 170 job openings annually between 2023 and 2024. Weaker medium/long-term employment trends will limit expansion demand over the latter half of the decade to an average of 50 job openings annually in the 2025-2030 period. In contrast, replacement demand levels will remain relatively stable in the range of 150 job openings annually over the forecast period.

Figure 4.4: Alberta Agri-biotech Hiring Requirement Outlook by Demand Type, 2023-2030



Source: BioAlberta LMI Study, 2022

The largest proportions of job openings among agri-biotech employers will be for manufacturing and production roles (23%) and management, finance, and administration roles (22%) (see Table 4.4). R&D roles are expected to account for 19% of job openings.

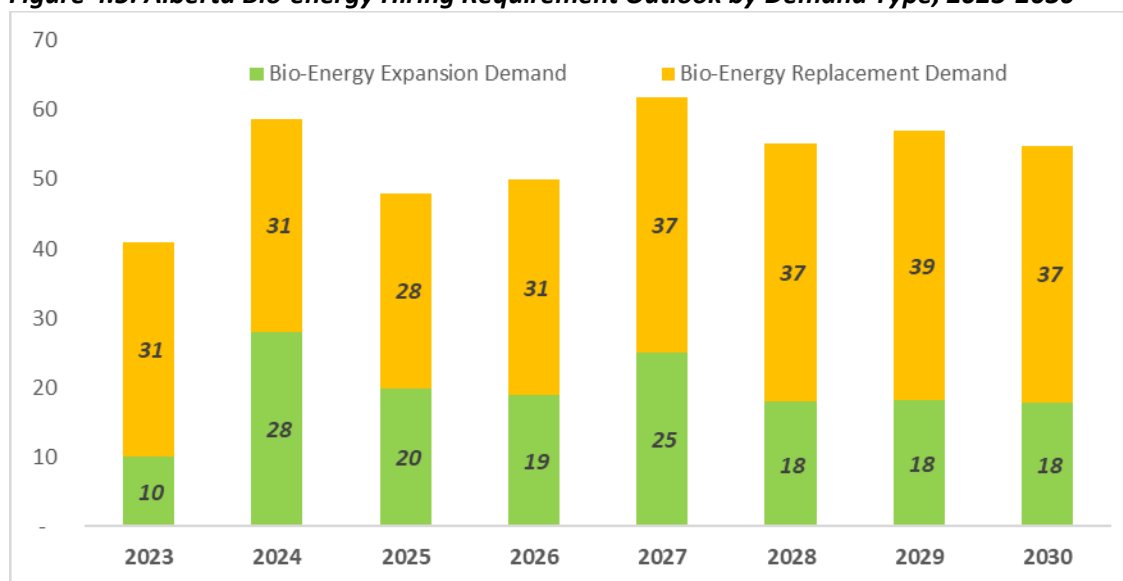
Table 4.4: Alberta Agri-Biotech Hiring Requirement Outlook by Job Function, 2023-2030

Job Function	2023	2024	2025	2026	2027	2028	2029	2030	TOTAL	%
Research and Development	-14	65	27	44	52	51	57	55	337	18.5%
Manufacturing and Production	79	65	36	46	49	45	50	46	416	22.8%
Management, Finance and Administration	96	56	27	41	43	43	46	46	398	21.8%
Distribution and Logistics	22	14	7	10	12	11	10	12	98	5.4%
Quality Control and Assurance	20	12	7	9	9	9	9	11	86	4.7%
Marketing, Business Development, Sales	19	14	9	9	9	9	10	10	89	4.9%
Legal and Regulatory Affairs	8	4	0	2	3	2	2	3	24	1.3%
Information Technology (IT)	14	5	2	4	3	4	4	3	39	2.1%
Other	80	53	19	31	35	37	42	38	335	18.4%
TOTAL	324	288	134	196	215	211	230	224	1,822	100.0%

Source: BioAlberta LMI Study, 2022

4.5 Alberta Bio-energy Hiring Requirement Outlook

Alberta's bio-energy hiring requirement is expected to total approximately 430 workers between 2023 and 2030 (see Figure 4.5). Approximately two-thirds (64%) of total hiring requirement will result from replacement demand. Expansion demands are expected to be relatively stable as of 2025 with an average of 20 job openings each year.

Figure 4.5: Alberta Bio-energy Hiring Requirement Outlook by Demand Type, 2023-2030


Source: BioAlberta LMI Study, 2022

As illustrated in Table 4.5, the largest proportions of job openings (40%) among bio-energy employers will be for manufacturing and production roles. A further 18% of expected job openings are accounted for by the management, finance, and administration job function, while R&D roles are projected to account for 20%.

Table 4.5: Alberta Bio-energy Hiring Requirement Outlook by Job Function, 2023-2030

Job Function	2023	2024	2025	2026	2027	2028	2029	2030	TOTAL	%
Research and Development	-13	11	11	13	15	16	14	16	83	19.5%
Manufacturing and Production	19	24	22	20	23	21	21	20	170	39.9%
Management, Finance and Administration	14	11	8	8	10	7	11	9	78	18.3%
Distribution and Logistics	5	4	3	3	3	3	3	3	27	6.3%
Quality Control and Assurance	2	4	1	1	4	2	2	2	18	4.2%
Marketing, Business Development, Sales	5	1	1	3	1	2	1	1	15	3.5%
Legal and Regulatory Affairs	0	1	0	0	0	0	0	0	1	0.2%
Information Technology (IT)	2	0	0	0	1	0	0	1	4	0.9%
Other	7	3	3	1	4	3	6	3	30	7.0%
TOTAL	41	59	49	49	61	54	58	55	426	100.0%

Source: BioAlberta LMI Study, 2022

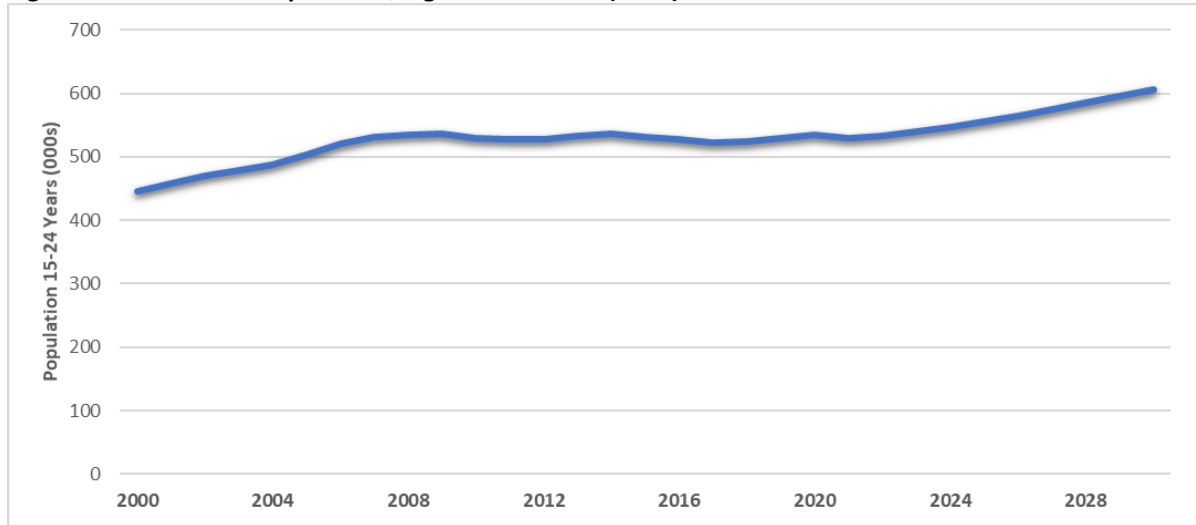
5.0 Talent Supply for Alberta Life Sciences

Interpreting labour supply trends for the Alberta life sciences requires understanding supply dynamics overall, with a particular emphasis on post-secondary graduates as new entrants. The life sciences sector is dependent on the higher education sector for its skilled labour. The analysis of new entrants to the domestic labour supply for the life sciences focused on technical programs science, technology, engineering, and health programs. The cost of educating labour for the sector is borne by government and students in higher education which is an expensive undertaking and will tend to moderate future growth, especially at the graduate level. Projections for the sector considered the ability to grow the supply which should continue to be moderate.

5.1 Supply Drivers – Youth Population

As illustrated Figure 5.1, Alberta’s youth population aged 15-24 years grew substantially between 2000 and 2009, and then remained relatively steady until 2021. As of 2022, the youth population is expected to start to grow again with a projected high of 607,000 young people by 2030. This age group drives domestic post-secondary enrollments which comprise the skilled labour supply for the life sciences sectors for Alberta.

Figure 5.1: Alberta’s Population, Age 15-24 Years (000s)



Source: Stokes Provincial Forecast, 2022

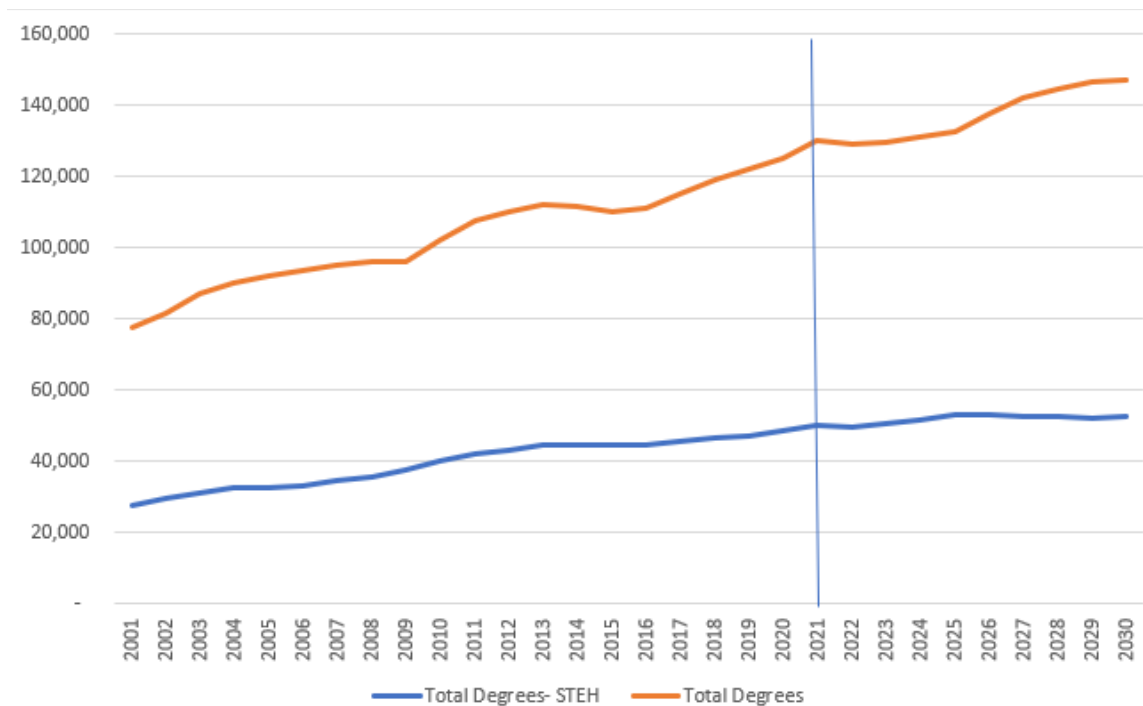
5.2 Alberta Life Sciences Labour Supply Outlook by Study Level - University

The projections of domestic Alberta graduates by study level (undergraduate, Master’s, PhD) are presented in this section, based on *science, technology, engineering, and health* programs (STEH). Actual enrollment and completions for the period are 2001 to 2021

using Statistics Canada Post-Secondary Information System (PSIS) data and the forecast period ranges from 2022 to 2030.

As illustrated in Figure 5.2, enrollment in both STEH and total degrees has steadily increased over the past 20 years with STEH enrollments making up between 35-40% of total enrollments. STEH enrollments as a proportion of total enrollments tended to peak in 2013-2017 at approximately 40% of total enrollments. While the projected enrollments are expected to continue to grow as of 2022 onwards, the proportion of STEH enrollments to total are expected to slowly decrease between 2025 and 2030, as total enrollments grow at a faster rate, while STEH enrollments are expected to level off.

Figure 5.2: Alberta Domestic Degree Enrolments in All Degree Programs vs. STEH Programs (2011-2030)



Source: PSIS and BioAlberta LMI Study 2022

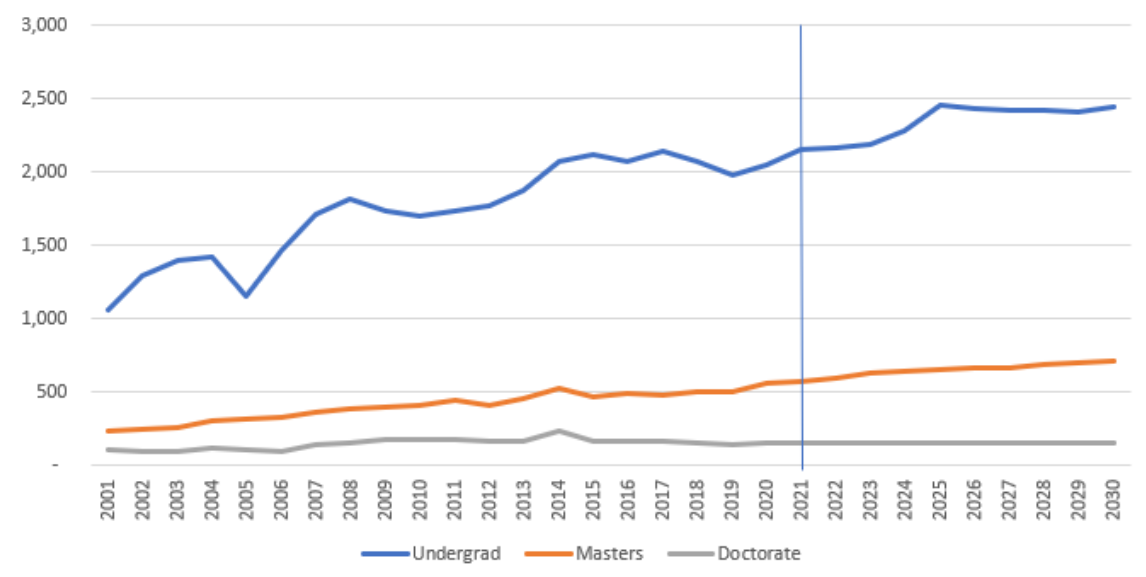
The number and level of degree completions by domestic students for those post-secondary programs in Alberta that closely align with the various occupational roles in the life sciences industry are a good indicator of supply of new entrants for the Alberta life sciences labour market each year. As outlined in Figure 5.3:

- Graduates from STEH programs aligned with the life sciences industry at the undergraduate level are forecasted to increase after 2021, peaking in 2025 and

remaining relatively steady thereafter. In the long-term there is a projected increase of 14% from 2,148 in 2021 to 2,477 in 2030.

- Master’s completions are expected to consistently increase over the forecast period by 26% from 570 in 2021 to 718 completions by 2030.
- PhD completions show small changes over time with a 4% overall increase from 152 in 2021 to 158 in 2030.

Figure 5.3: Alberta Forecast of Life Sciences Industry-Aligned Degree Completions by Study Level



Source: PSIS and BioAlberta LMI Study 2022

5.3 Alberta Life Sciences Labour Supply Outlook by Program Area (University)

Alberta Domestic Undergraduate Completions

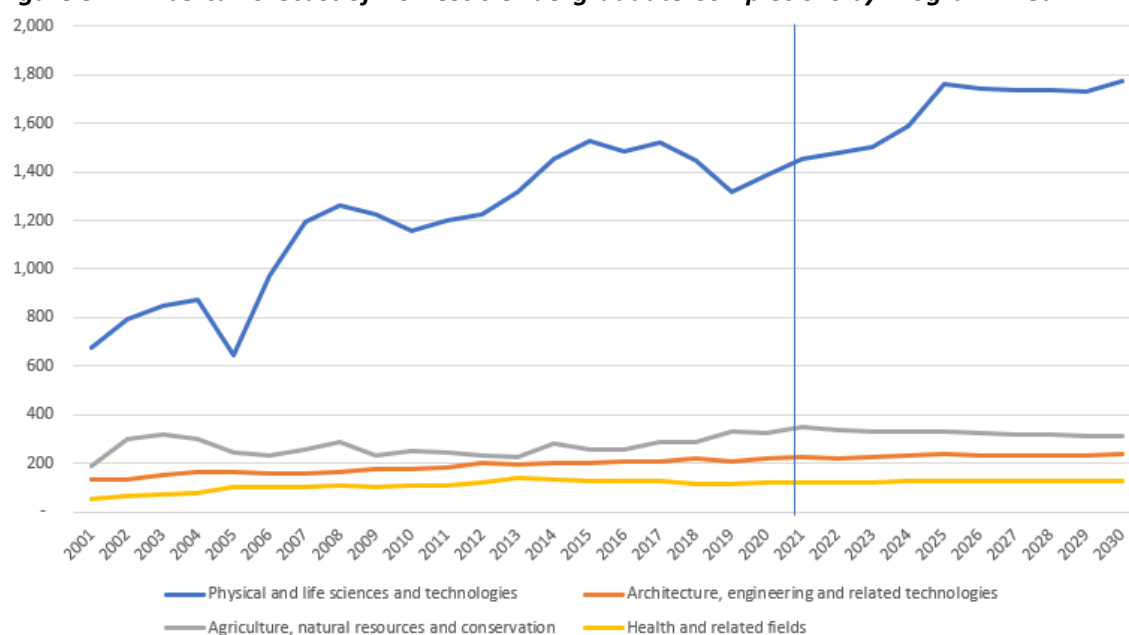
The forecasts for undergraduate completions are driven by domestic population growth (actual and forecasted) in the 15-24 years age group, along with actual and forecasted unemployment rates and post-secondary education (PSE) enrollments in STEH programs.

- Graduates of *Physical and Life Sciences* make up the largest share of graduates overall for the life sciences industry supply of graduates - completions are expected to grow in the short-term, peaking in 2025 at 1,761.
- The number of graduates from *Health and related fields* is forecasted to remain relatively constant throughout the forecast period with an average of approximately 127 graduates each year between 2022 and 2030. However, given

the COVID-19 pandemic, these figures could increase if there is more interest by students and/or more investments in bio-health PSE programs.

- The number of graduates of *Agriculture, Natural Resources & Conservation* is expected to decline slightly over the forecast period, from 340 in 2021 to 313 in 2030.
- The number of graduates of *Natural Resources & Conservation* and *Architecture & Engineering* programs is expected remain relatively constant at over the forecast period at 233 graduates per year.

Figure 5.4: Alberta Forecast of Domestic Undergraduate Completions by Program Area



Source: PSIS and BioAlberta LMI Study 2022

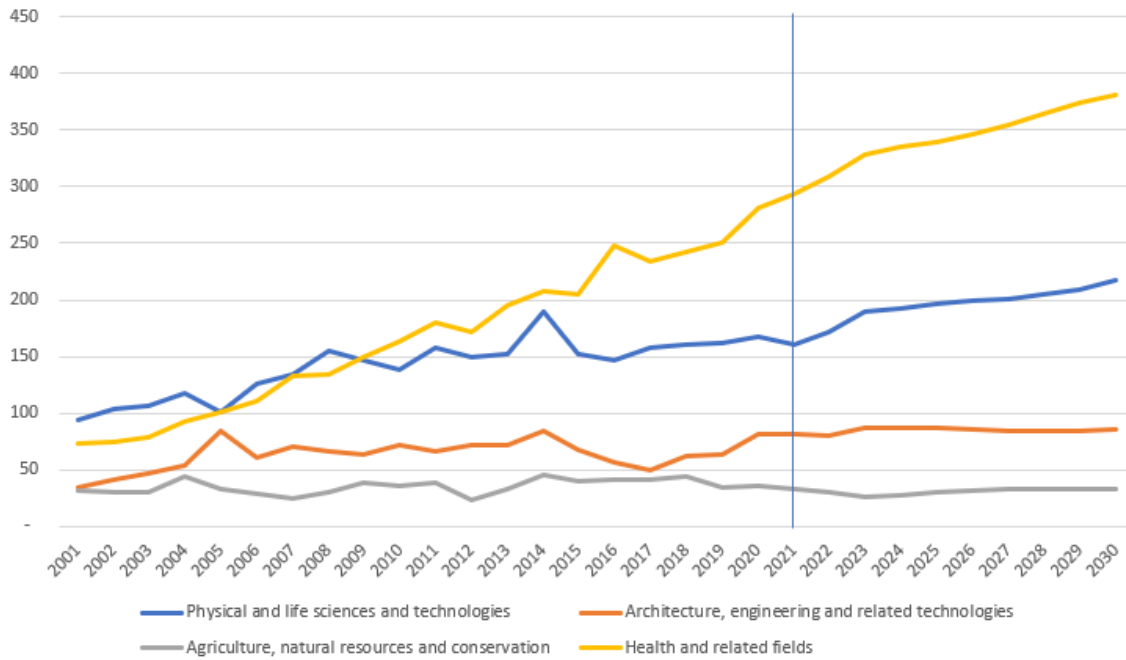
Alberta Domestic Master’s Completions

The forecasts for completion of Master’s degree programs are driven by domestic population growth (actual and forecasted) in the 25-44 years age group, along with actual and forecasted unemployment rates and PSE enrollments in STEH programs.

- Master’s graduates of *Health and related fields* are projected to grow by 30% over the forecast period, from 294 in 2021 to 381 by 2030.
- *Physical & Life Sciences & Technologies* graduates are expected to increase incrementally from year to year, rising from 161 in 2021 to 217 by 2030 for an overall increase of 35% over the period.

- *Agriculture, Natural Resources & Conservation* completions are projected to remain relatively constant at an average of 31 graduates per year.
- Completions from *Architecture, Engineering and related technologies* programs are projected to remain relatively constant at an average of 85 graduates per year.

Figure 5.5: Alberta Forecast of Domestic Master’s Completions by Program Area



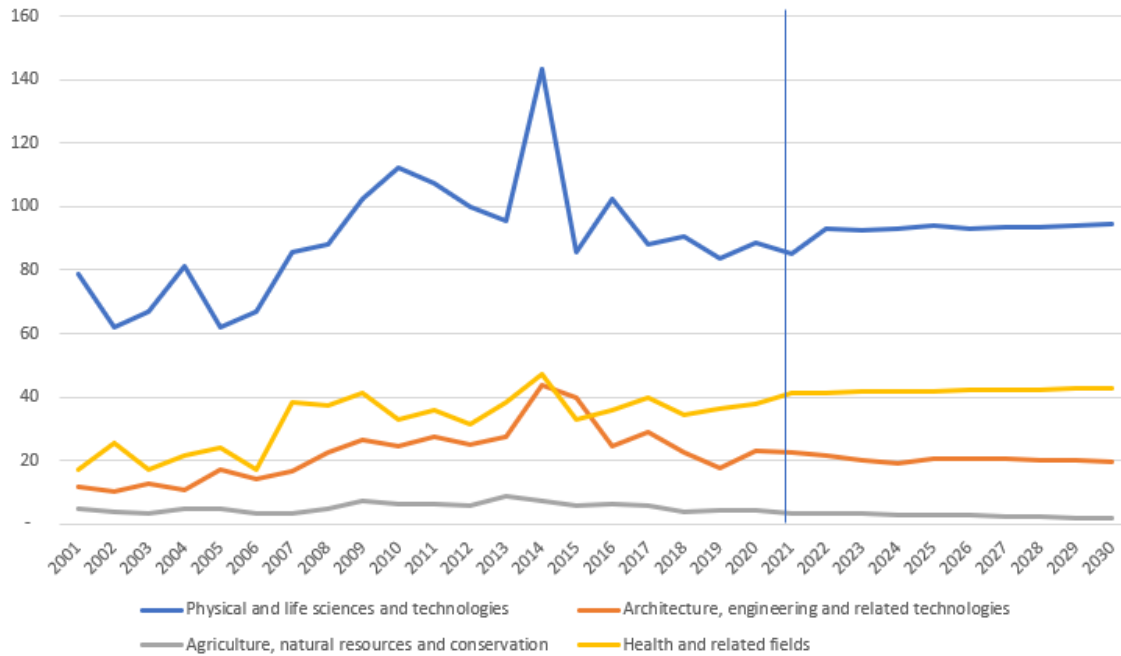
Source: PSIS and BioAlberta LMI Study 2022

Alberta Domestic PhD Completions

Forecasting PhD completions at the provincial level for Alberta is challenging given the small number of graduates and the erratic nature of completions due to differences in time to completion, program requirements, and research involved. However, historic trends for actual domestic PhD completions of life sciences sector-related degree programs indicate growth in annual graduates since 2000.

PhD enrollments and completions are driven by Master’s enrollments and completions, government funding levels to universities for PhD students, and the availability of a pool of qualified candidates to intake into programs. The number of domestic graduates is unlikely to show large departures from 2021 numbers. Declines in domestic students in the future may lead to increases in international student intake.

Figure 5.6: Alberta Forecast of Domestic PhD Completions by Program Area



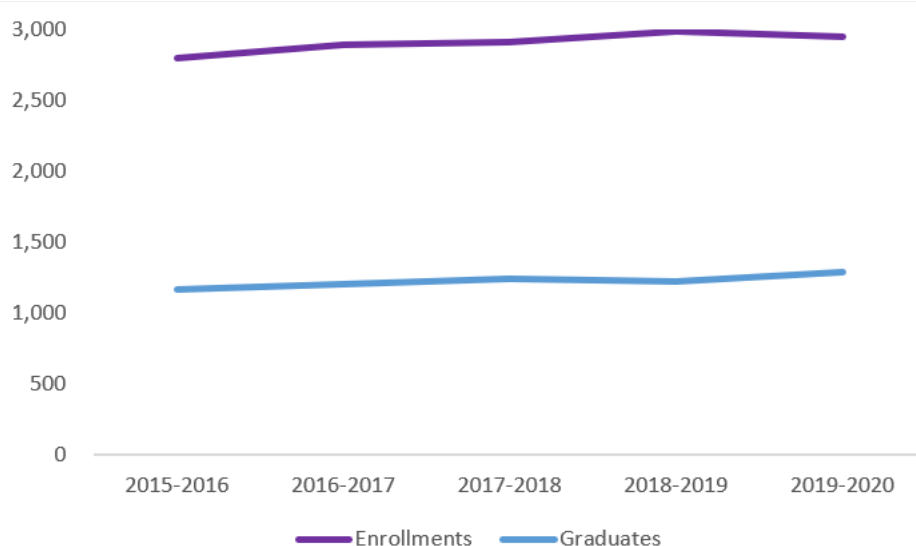
Source: PSIS and BioAlberta LMI Study 2022

5.4 Alberta Life Sciences Labour Supply Outlook (College)

College level graduates are making an increasingly valuable contribution to the life sciences sector, particularly in relation to labour supply for more technical positions in the industry. The study examined available data from Statistics Canada for Alberta colleges for programs that are related to the life sciences and various roles and occupations identified with the sector. Note that the data available for the study covers a five-year period from scholastic year 2015-2016 to 2019-2020 inclusive, and does not include projections given the limitations with the databases involved.

Overall, the patterns found among Alberta college enrollments and graduations from programs related to the life sciences showed small incremental increases of approximately 1%-3% for most years. Enrollments increased from 2,793 in 2015-16 to 2,949 in 2019-2020, while graduates also increased from 1,164 in 2015-16 to 1,287 in 2019-2020 (see Figure 5.7). Within these years, international students made up 5%-6% of the enrollments and graduations annually.

Figure 5.7: Alberta College Enrollment and Graduates from Life Sciences Related Programs



Source: PSIS and BioAlberta LMI Study 2022

As illustrated in Tables 5.1 and 5.2, the largest proportions of enrollments and graduates are within the program areas of “Engineering and Science Technologies/Technicians”, “Natural Resources and Conservation”, and “Health Professions and Related Programs”.

Table 5.1: Alberta College Enrollment for Life Sciences Related Programs by Program Area

Program Area (CIP)	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Engineering and science technologies/technicians	1,215	1,206	1,212	1,164	1,137
Natural resources and conservation	774	885	846	852	861
Health professions and related programs	366	387	363	432	432
Veterinary medicine, animal science and other related programs	120	168	192	204	222
Plant and soil science	78	78	78	93	78
Physical sciences (including chemistry, geology)	63	51	51	30	12
Nutrition and food science/technology	57	63	60	63	63
Totals*:	2,673	2,838	2,802	2,838	2,805

Source: PSIS and BioAlberta LMI Study 2022

* Note that totals when presented by Program Area are slightly under overall totals due to rounding and some cross-program coding.

Table 5.2: Alberta College Graduates from Life Sciences Related Programs by Program Area

Program Area (CIP)	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Engineering and science technologies/technicians	594	573	528	540	510
Natural resources and conservation	294	288	348	327	363
Health professions and related programs	201	219	219	204	243
Veterinary medicine, animal science and other related programs	42	48	69	78	84
Plant and soil science	24	36	27	24	45
Physical sciences (including chemistry, geology)	15	12	21	27	24
Nutrition and food science/technology	0	24	24	15	18
Totals*:	1,170	1,200	1,236	1,215	1,287

Source: PSIS and BioAlberta LMI Study 2022

* Note that totals when presented by Program Area are slightly under overall totals due to rounding and some cross-program coding.

6.0 Alberta Life Sciences Labour Market Ratings Outlook

The labour market model for Alberta life sciences can also be used to project labour market conditions for the sector. Bringing together forecasts of labour demand and supply for the life sciences allows for a targeted assessment of potential human resource challenges for life sciences employers. Assigning a rating based on these forecasts provides a method of quickly gaining insights into these challenges that are comparable across job function and subsector. The forecast of labour demand used to develop these ratings is taken from the hiring requirement outlooks detailed previously in Section 4. The forecast of labour supply projects the annual number of workforce entrants to the life sciences' workforce. Forecasts of workforce entrants to the bio-economy are based on the sector's historic share of total workforce entrants and incorporate projections of available supply from domestic and international sources.

Labour market ratings are assigned by comparing the size of hiring requirement in each forecast year to the level of expected new life sciences workforce entrants in the same year. These ratings are presented from the perspective of employers. For example, a “tightening” of the labour market is equivalent to finding it more challenging for an employer to recruit new employees. A simple three-tiered rating scale illustrating the direction of tightness is used based on the following criteria:

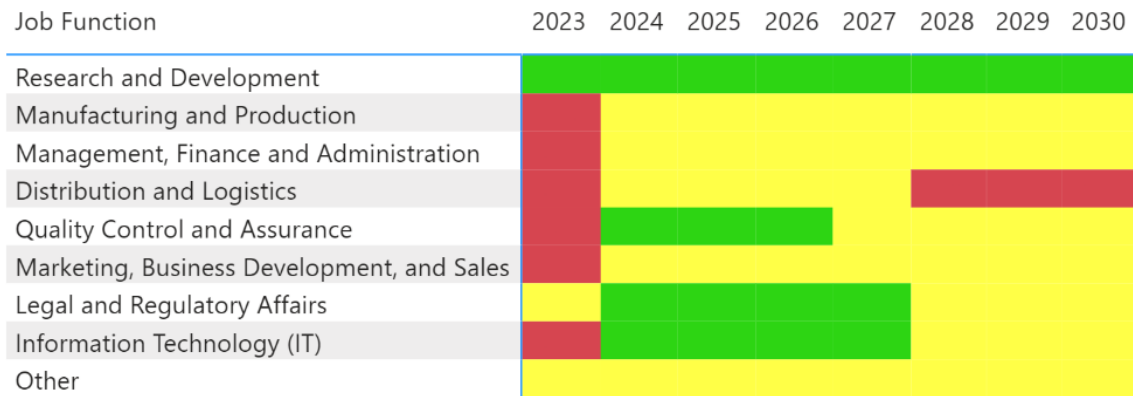
1. **Level 1** – Noticeable increased loosening of the labour market
2. **Level 2** – Similar labour market conditions.
3. **Level 3** – Noticeable increased tightening of the labour market

As illustrated in Figure 6.1, in 2023 the labour market is expected to be noticeably tighter for employers hiring in many of the job functions. ***After 2024, the labour market for most job functions will return to conditions similar to what have been experienced by employers over the previous decade.*** This is largely due to the relatively younger age demographic of Alberta combined with the anticipated level of both domestic and international immigration to the province. ***It is projected that the labour market will be noticeably looser and make hiring easier for those with job openings within the R&D sector. This loosening of the labour market in the R&D function is expected to occur throughout the forecast period (2023-2030).***

This analysis assumes the life sciences capture a similar share of workforce entrants as it has in the past, which means that employers can mitigate potential shortages by increasing recruitment of qualified personnel. Supply projections indicate that domestic graduates alone will not be able to satisfy hiring requirements even if recruitment is significantly increased. However, immigrants with relevant credentials are expected to represent a large pool of labour over the forecast period and could alleviate shortages with increased recruitment efforts.

As previously indicated, the forecasting models used in this study should be considered a “point in time” with one of the main drivers being predicted expansion demand that can vary significantly and quickly based on changes in investments, regulations, and priorities.

Figure 6.1: Alberta Life Sciences Labour Market Ratings Outlook by Job Function, 2023-2029

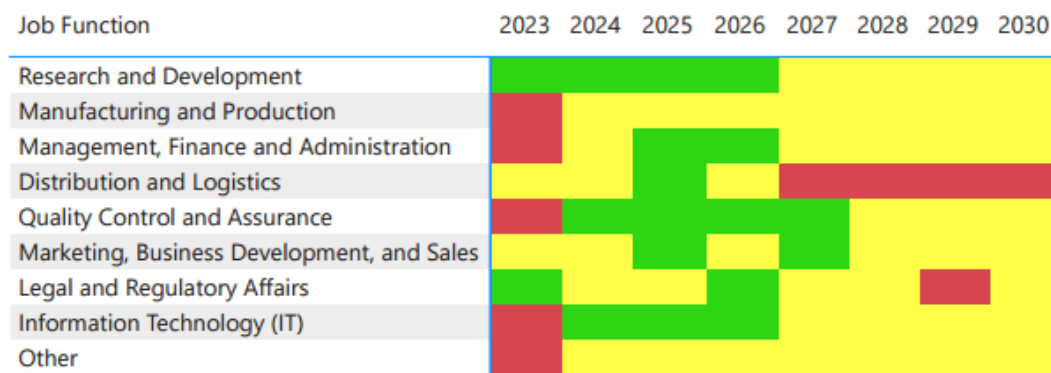


Source: BioAlberta LMI Study, 2022

6.1 Alberta Bio-health Labour Market Ratings Outlook

Labour market ratings for Alberta bio-health reveal the potential for employers in the subsector to face challenges meeting labour demand for some job functions in 2023, but **as of 2024 will likely experience similar levels of labour market tightness for most job occupations, and even some loosening for some job functions** (see Figure 6.2). As outlined in the hiring requirement outlook, weaker expansion demand will result in a reduction of labour shortages in 2025 -2026, reflected here in lower ratings for most job functions. R&D roles are not expected to face shortages during the forecast period, mainly due to high historic rates of bio-health workforce entrants for these positions. Elsewhere, labour shortages are projected for distribution and logistic job functions, reflecting the high levels of hiring requirement combined with the low historic rates of bio-health workforce entrants, meaning labour demand will outpace supply.

Figure 6.2: Alberta Bio-health Labour Market Ratings Outlook by Job Function, 2021-2029

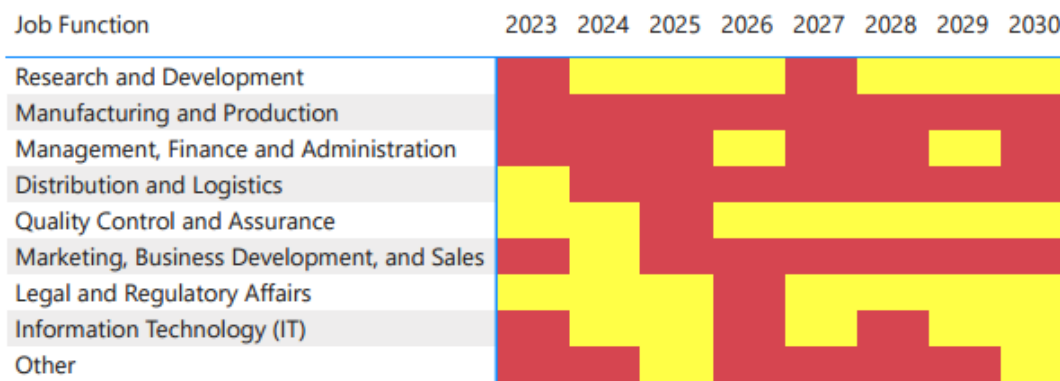


Source: BioAlberta LMI Study, 2022

6.2 Alberta Bio-industrial Labour Market Ratings Outlook

Bio-industrial employers are expected to experience consistent and severe tightening of the labour market for most of the job functions (see Figure 6.3). All job functions other than R&D, quality control and assurance, and legal/regulatory affairs are projected to face shortages between 2023 and 2030 as a result of low historic rates of workforce entrants limiting forecasts of labour supply. Manufacturers across all industries are expected to face recruitment challenges in the future for manufacturing and production roles due to a combination of an aging workforce and a lack of interest in pursuing these roles among youth.

Figure 6.3: Alberta Bio-industrial Labour Market Ratings Outlook by Job Function, 2021-2029

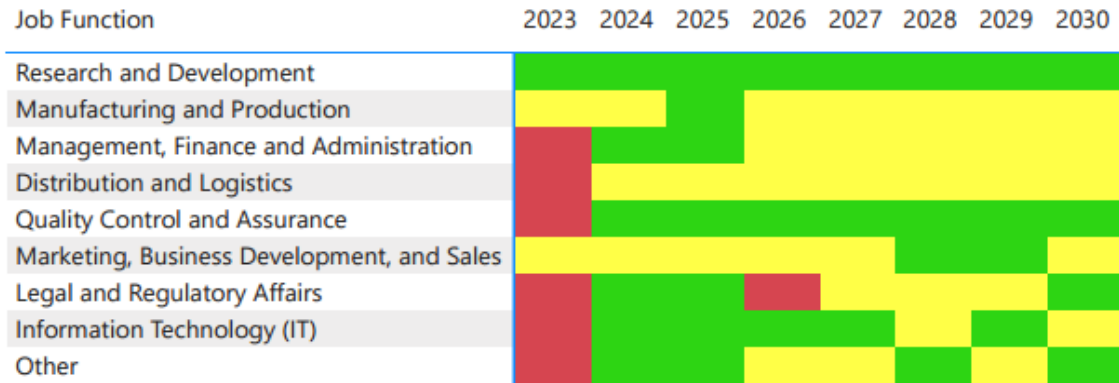


Source: BioAlberta LMI Study, 2022

6.3 Alberta Agri-biotech Labour Market Ratings Outlook

Agri-biotech employers are expected to experience few difficulties meeting labour demand over the forecast period (see Figure 6.4). **After 2023, the labour market will overall be similar or noticeably looser for these employers to meet their hiring requirements compared with the previous decade.**

Figure 6.4: Alberta Agri-biotech Labour Market Ratings Outlook by Job Function, 2021-2029

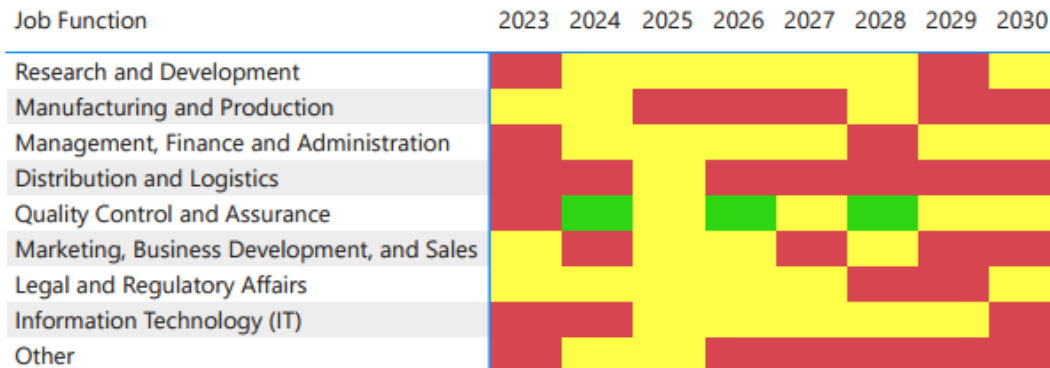


Source: BioAlberta LMI Study, 2022

6.4 Alberta Bio-energy Labour Market Ratings Outlook

Bio-energy employers are expected to see more consistently moderate labour shortages over the forecast period as a result of the weak employment growth outlook leading to modest labour demands (see Figure 6.5). The most noticeable tightening in the labour market will likely occur in 2023-24 and then again towards the end of the decade from 2028-30. The predicted tightening is largely due to the low historic rates of bio-energy workforce entrants for many of these job functions such as distribution and logistics, and manufacturing and production.

Figure 6.5: Alberta Bio-energy Labour Market Ratings Outlook by Job Function, 2021-2029



Source: BioAlberta LMI Study, 2022

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The Province of Alberta is working in partnership with the Government of Canada to provide employment support programs and services.