

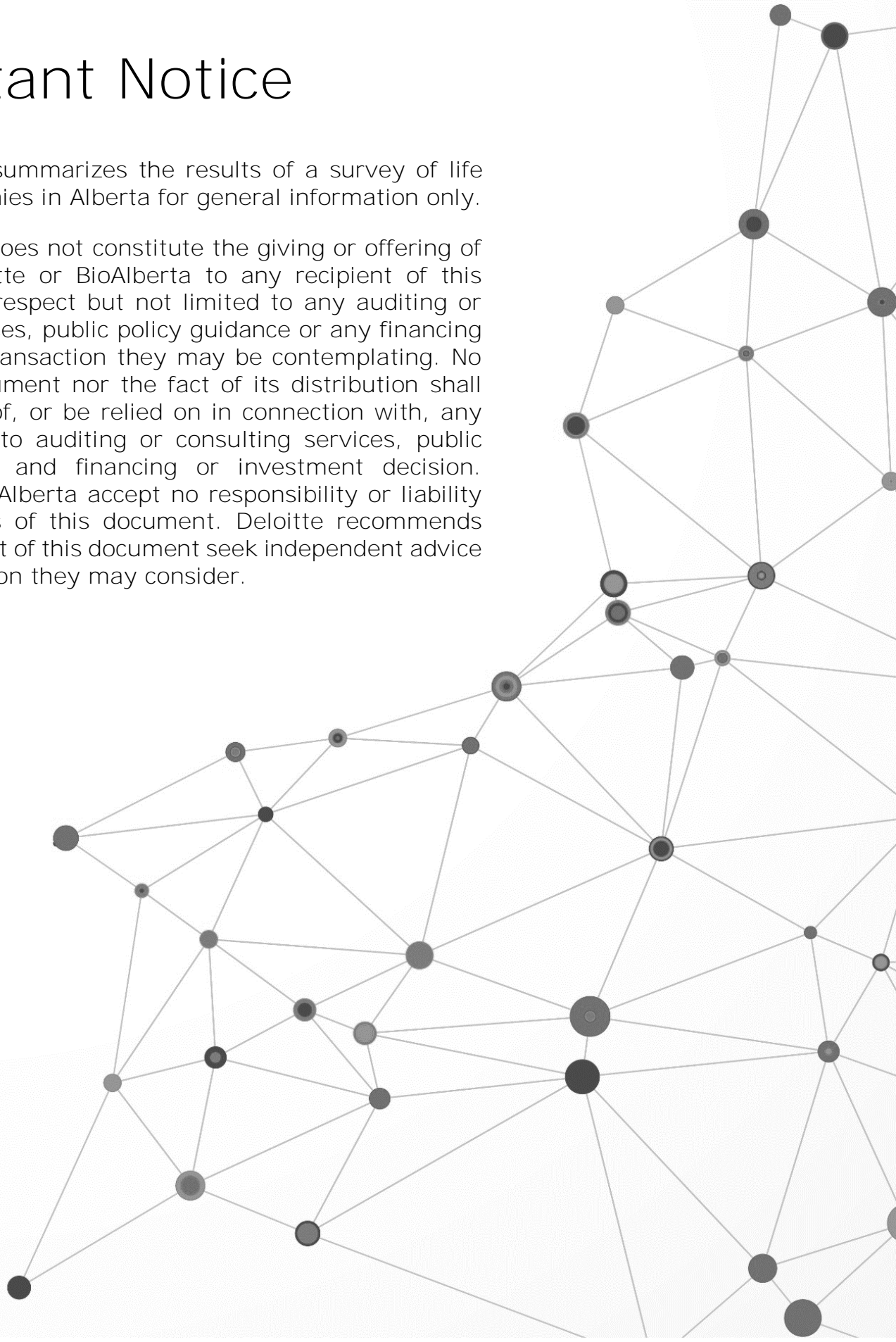


Life sciences in Alberta  
State of the industry 2019

# Important Notice

This document summarizes the results of a survey of life sciences companies in Alberta for general information only.

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# Executive Summary

The BioAlberta state of the **industry ("SOI")** report is a biannual survey of life sciences companies and executives in Alberta. It was developed to review the current status and trends related to the nature, health, economic contribution, innovation, and outlook for **Alberta's life sciences industry**.

**Alberta's life sciences sector is a major source of highly skilled employment, innovation, and economic diversification in Alberta.** Responsible for over \$1 billion in revenues and employing over 15,000 Albertans in 2019, the industry is a significant contributor to Alberta's highly skilled, knowledge and innovation-driven economy. This industry is comprised of a large number of start-ups and small businesses that complement an established set of mature companies. As an industry with a dynamic mix of big and small businesses, the life sciences sector is expected to continue its contribution to innovation, jobs and economic activity. The sector is also well diversified in different markets, with the largest proportion of business coming from within provincial borders, and a healthy mix of interprovincial and international exports across Canada, USA, Europe and Asia.

**This year's survey was sent to more than 300 Alberta companies, a significant growth from the count of 230 organizations noted in the 2017 SOI.** The new stream of companies focusing on cannabis-related products since the nationwide legalization in October 2018 has helped fuel this industry growth. As the cannabis sector continues to evolve, the most significant life sciences subsector in Alberta continues to be medical technology & devices companies, representing 22 percent (22%) of all companies. Cannabis and health biotechnology and pharma companies are the second largest subsectors, both representing 18 percent (18%) of the total respondents. Notwithstanding the addition of the cannabis subsector, the representation of the

aforementioned subsectors continue to make up a **significant portion of Alberta's life sciences industry**, which is consistent to the 2017 SOI report. On the contrary, **this year's** survey saw a decline in the representation of agricultural biotechnology companies, decreasing from 17 percent (17%) to 8 percent (8%).

The industry also reported lower spending in research & development ("**R&D**") compared to prior years. By the end of 2019, the aggregate R&D spending is predicted to decrease by approximately 44 percent (44%) from 2017. The decrease in R&D may simply be a reflection of respondents choosing not to disclose this information when in fact the sector raised a historic level of capital in **this year's report. Respondents expect an aggregate of approximately \$1.2 billion to be raised by the end of 2019, an increase of approximately \$480 million raised in 2017.** As discussed later in the report, the emergence of the cannabis subsector has played a critical role in amassing new capital in the province.

Respondents in **this year's survey** identified the primary issues facing the industry are the need to improve the overall investment climate through attractive incentives for investors, strong funding models and an enhanced **venture capital environment. Based on respondents' data, the sentiment is that financing appears to be in short supply and a globally competitive mechanism may be required to help attract investors.** Current financing sources include angel, venture, corporate and institutional investors. Respondents have also reported **using government programs as well as founders' equity as funding.**

Addressing these challenges will support the industry in continuing to build on its historical strengths as a major source of research, commercialization, highly skilled employment, and sustainable growth and economic diversification in the province.



# Background & Methodology

The intent of this report is to review and communicate the state of the life sciences industry in Alberta. Survey respondents provided feedback on the current status of their company's products, position and growth expectations.

In the spring of 2019, BioAlberta and Deloitte LLP ("Deloitte") surveyed leaders of life sciences companies located in Alberta. Those surveyed represent businesses from small start-ups to large public companies, and included research and development companies, manufacturers, service companies, consultants and distributors of life sciences products.

The life sciences industry includes companies and organizations that:

- Use biotechnology or biological processes to develop products that improve health and well-being;
- Develop applications to improve the diagnosis, prevention, and treatment of disease;
- Create new agricultural alternatives; and
- Revolutionize traditional industry sectors such as oil and gas or information technology

This year's report includes life sciences companies and organizations active in the following sectors:



Agricultural biotechnology



Medical technology and devices



Environmental biotechnology



Functional foods and natural health products



Health biotechnology and pharmaceuticals



Cannabis



Industrial biotechnology and bioprocessing (also referred to as biofuels, biorefining, clean technology)

The intent of this report is to review and communicate the state of the life sciences industry in Alberta. Survey respondents provided feedback on the current status of their company's products, position and growth expectations. This year's survey was sent to more than 300 Alberta companies, indicating a growth in the overall industry size compared to previous years. Of the total companies surveyed, partial or complete results were compiled from 103, providing a response rate of 33 percent (33%). This group of respondents consists of a variety of Alberta companies and organizations operating in the life sciences industry. In certain cases, respondents have chosen not to answer all questions. Caution should be used in extrapolating these results to the entire population of companies in the industry. The results are intended to stimulate dialogue, provide a current snapshot of the industry, and offer directional support for business leaders and government agencies to help the life sciences industry in Alberta grow.



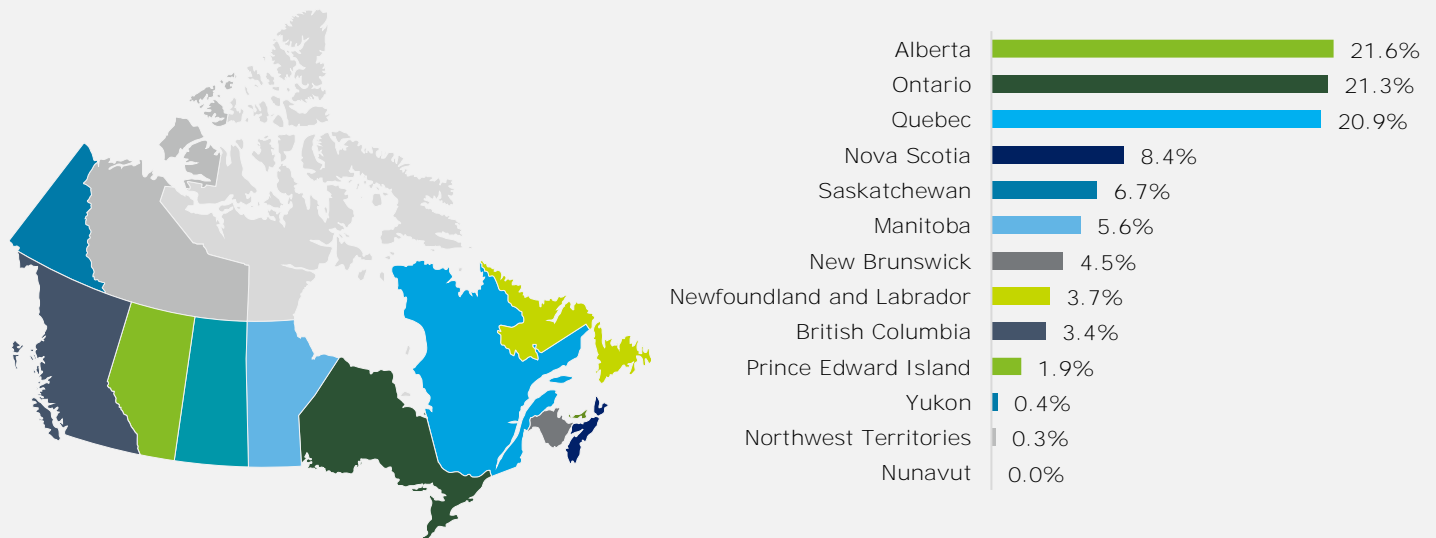
# Cannabis Contributions in Alberta

The life sciences sector in Canada continues to evolve and is undergoing a particular transformative phase with the introduction of The Cannabis Act that came into effect on October 17, 2018. The Act currently permits the sale of cannabis oil, fresh cannabis, dried cannabis, cannabis plant seeds and cannabis plants. Edible cannabis, cannabis extracts and cannabis topicals are also set to become available for legal sale no later than October 17, 2019.

This recent regulatory change has been favorable to the life sciences sector in Alberta, resulting in numerous cannabis companies choosing Alberta for their headquarters. These companies have made a positive impact to our economy through their investments in infrastructure, employment and financing activities. According to Statistics Canada, the most recent information on the cumulative retail trade sales by province and territory is led by Alberta at 22 percent (22%), followed by Ontario and Quebec at 21 percent (21%) each. From legalization in October 2018 to June 2019, Alberta has generated more than \$123.7 million in sales and leads the country in overall retail sales.



## Retail trade sales by province and territory



The most recent survey data also reported 20 percent (20%) Albertans used cannabis in the latest reported quarter, which is above the average for the rest of Canada. There are currently 24 licence holders registered with Health Canada in Alberta. Licence holders are permitted to sell to wholesalers or distributors supplying the provincial and territorial cannabis retailers, and to registered patients. As the life sciences sector continues to evolve and adapt to the changing landscape, cannabis will play an imperative role in driving the growth of the industry, using biology and life sciences as a base to continue developing cannabis-related drugs, products and services.

Since the legalization of the Cannabis Act, there have been multiple significant and notable financing transactions that have taken place in the province. The influx of capital has an important economic impact as it provides companies the resources to continue creating jobs, investing in infrastructure, spending in research and development and providing places for lenders and investors to deploy capital.

Below is a select list of notable transactions involving Alberta-based lenders, investors and companies in the cannabis subsector:

Date	Company	Lender/investor	Deal size	Type
Aug-19	Aurora Cannabis	Bank of Montreal	\$160,000,000	Debt
Apr-19	Westleaf Cannabis Inc.	Canaccord Genuity Corp <sup>1</sup>	\$12,000,000	Convertible debenture
Jun-18	Aurora Cannabis	Bank of Montreal	\$250,000,000	Debt
Feb-18	Sundial Growers Inc.	ATB Financial	\$56,000,000	Debt
Sep-18	Westleaf Cannabis Inc.	ATB Financial	\$24,000,000	Debt
Nov-18	Fire & Flower Cannabis	AltaCorp Capital <sup>2</sup>	\$36,500,000	Equity
Aug-18	Fire & Flower Inc.	AltaCorp Capital <sup>3</sup>	\$27,000,000	Convertible debenture

<sup>1</sup>Led the syndicate of underwriters

<sup>2</sup>Co-led the transaction

<sup>3</sup>Acted as primary underwriter

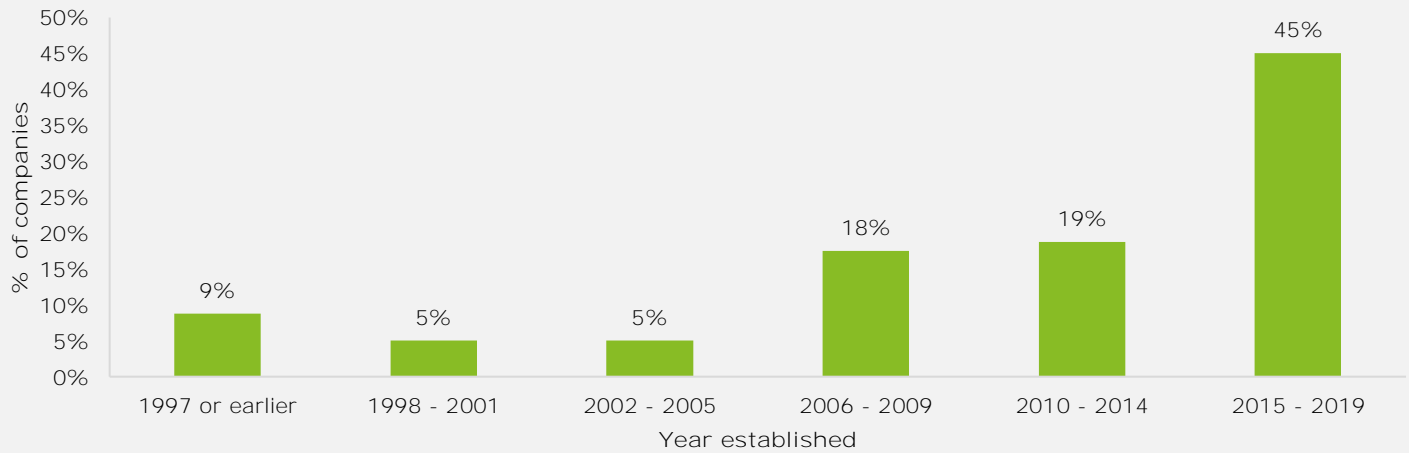
Notwithstanding the nascent nature of the cannabis subsector, its emergence has undoubtedly marked a notable impact on the province and the life sciences industry with new infrastructure, investments, jobs and economic spin-off opportunities. If the cannabis subsector continues to invest in the province and attract external capital, it could become the changing face of Alberta’s life sciences sector and become a significant contributor to a thriving, diversified and prosperous Alberta.





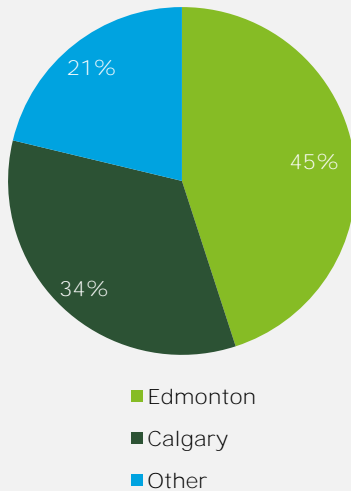
# Overview of Companies

When was your company established?

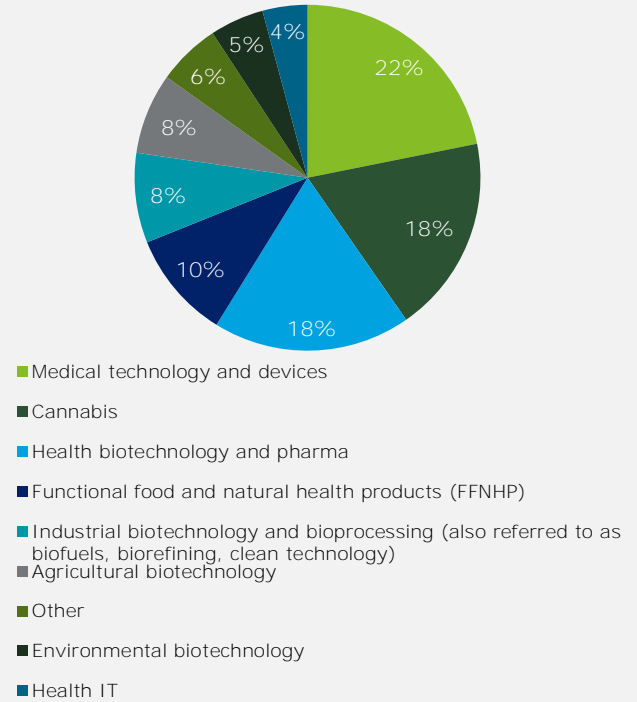


Forty-five percent (45%) of companies in the industry were founded within the past five years, and another thirty-seven percent (37%) within the nine years before that. The emergence of cannabis companies have led the recent growth in early-stage companies. The data suggests this sector has been filled with innovation and entrepreneurship as indicated by the amount of start-up activity seen in the last 10 years.

Where in Alberta is your company located?



In which subsector of the industry would your company be classified?

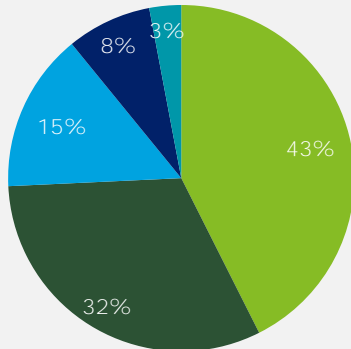


Similar to previous BioAlberta SOI reports, most of **Alberta’s life sciences companies are located in Calgary and Edmonton (79%)**. The remainder of the companies are located in other regions such as Lethbridge, Olds and Red Deer.

The largest life sciences subsector in Alberta is medical technology and devices, accounting for 22 percent (22%) of the survey responses. Followed closely at 18 percent (18%) each are the cannabis and health biotechnology and pharma subsectors. Functional food and natural health products make up the third largest subsector at 10 percent (10%). The overall rank of the subsectors remain largely consistent as reported in previous reports.

*Note: Survey respondents were able to self-classify in more than one subsector.*

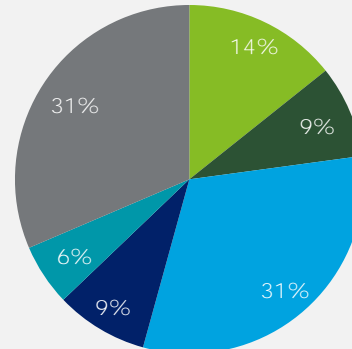
In which category (ies) would your company be classified?



- Research and development
- Manufacturing
- Consulting, contract research or other service provider
- Distributor, wholesaler or retailer
- Other

R&D continues to be the largest category of companies at 43 percent (43%), followed by manufacturing at 32 percent (32%). There has been growth in the manufacturing category, up from 27 percent (27%) in 2017. Consulting, contract research and other service providers remain the third largest category at 15 percent (15%), which is consistent with the trend observed in prior years.

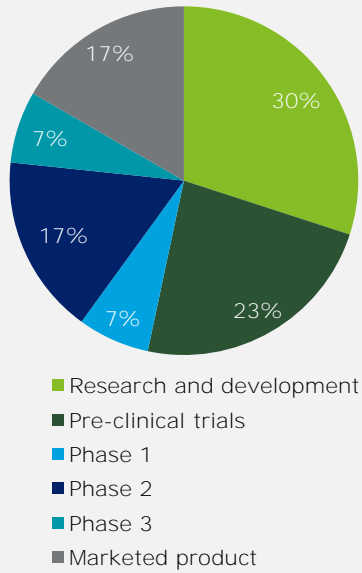
For your medical technology and devices product, in which phase of development is your lead product?



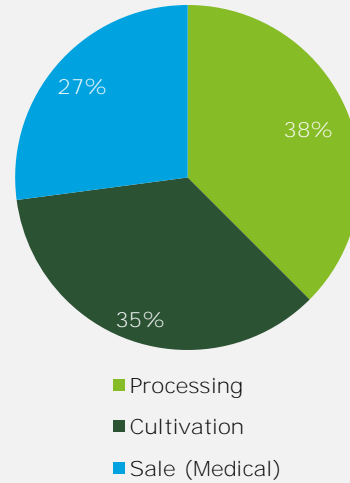
- Research and development
- Product engineering
- Product demonstration or prototype
- Regulatory approval
- Scale-up manufacturing
- Marketed product

Consistent with the 2017 SOI report, companies who report having a product in the market remain significant at 31 percent (31%) in this subsector. Notable growth is observed with companies reporting 31 percent (31%) of their products in the product demonstration or prototype phase, up from 13 percent (13%) in 2017. Fourteen percent (14%) have a product in research and development.

For your health biotechnology and pharmaceutical product, in which phase of development is your lead product?



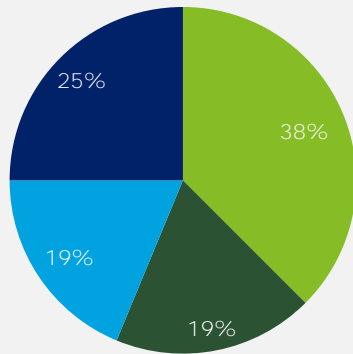
With your Health Canada permitted cannabis license(s), what activities are you licensed to perform?



The structure of this subsector is primarily filled with companies with lead products in the research and development and pre-clinical trial phases. The two phases combine for 53 percent (53%) of the total reported data. Seven percent (7%) of the companies reported a leading product in phase 3 this year, consistent with the 7 percent (7%) reported in 2017. Seven percent (7%) of the companies have a product in phase 1, 17 percent (17%) in phase 2 and 17 percent (17%) reported having a marketed product.

Thirty-eight percent (38%) of the licensed holders reported their licenses are permitted for processing. Thirty-five percent (35%) reported for cultivation and 27 percent (27%) reported for medical sale. Overall, there is a balanced spread of licensed activities within Alberta. Of this group of companies, thirteen of them are licensed to register patents.

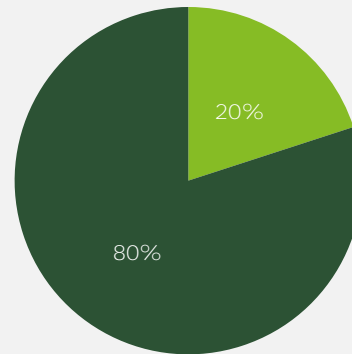
For your agricultural biotechnology, natural health or functional food product, in which phase of development is your lead product?



- Research and development
- Regulatory approval
- Scale-up manufacturing
- Marketed product

The mix of this subsector is well balanced with 38 percent (38%) of the companies in research and development, 19 percent (19%) in scale-up manufacturing, 19 percent (19%) in regulatory approval and 25 percent (25%) have a marketed product. **This year's data presents a different view** compared to 2017 where marketed products represented the majority of 52 percent (52%).

For your health IT product, in which phase of development is your lead product?

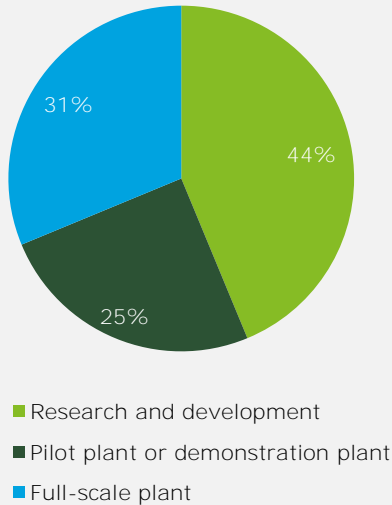


- Product demonstration or prototype
- Marketed product

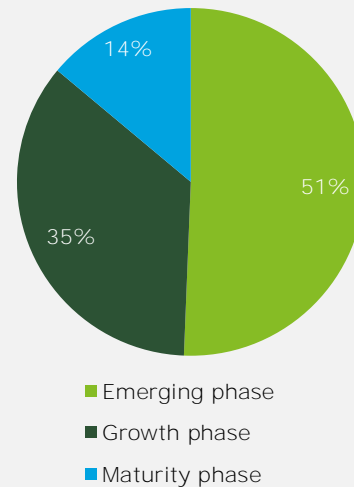
A significant segment of 80 percent (80%) have been marketed and are generating revenues in Alberta. The remaining twenty percent (20%) of the companies are reported in the production demonstration or prototype phase.

*Note: The survey included two other phases as options for respondents: (i) Research and development and (ii) Product engineering. As no respondents selected either of the options, they have been excluded for presentation purposes.*

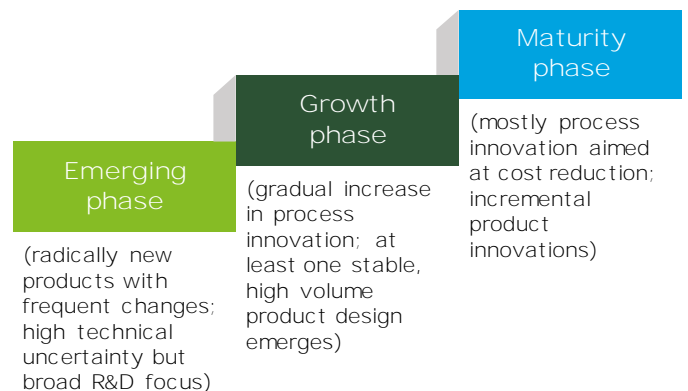
For your environmental biotech, industrial biotechnology, or bioprocessing technology and/or product, in which phase of development is your lead technology or product?



How would you classify your company in its current life cycle?

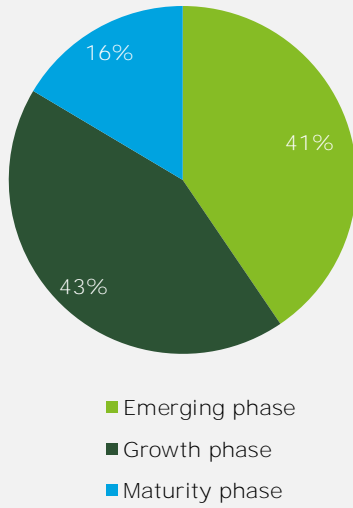


Forty-four percent (44%) of companies in this subsector reported as being in the research and development phase. Another 25 percent (25%) reported having a pilot or demonstration plant and 31 percent (31%) reported having a full-scale plant. The 2019 data in this subsector closely resembles the 2017 SOI where 46 percent (46%) reported in R&D, 23 percent (23%) in pilot or demonstration phase and 31 percent (31%) in full-scale plant.



Fifty one percent (51%) of the companies reported being in the emerging phase, 35 percent (35%) were in the growth phase, while 14 percent (14%) were in the maturity phase. The results continue to suggest that companies across the sector are currently focused on sustainably investing in the development of products, technologies, people, and business operations to expand in the near future.

What phase do you expect your company to be in by 2019?

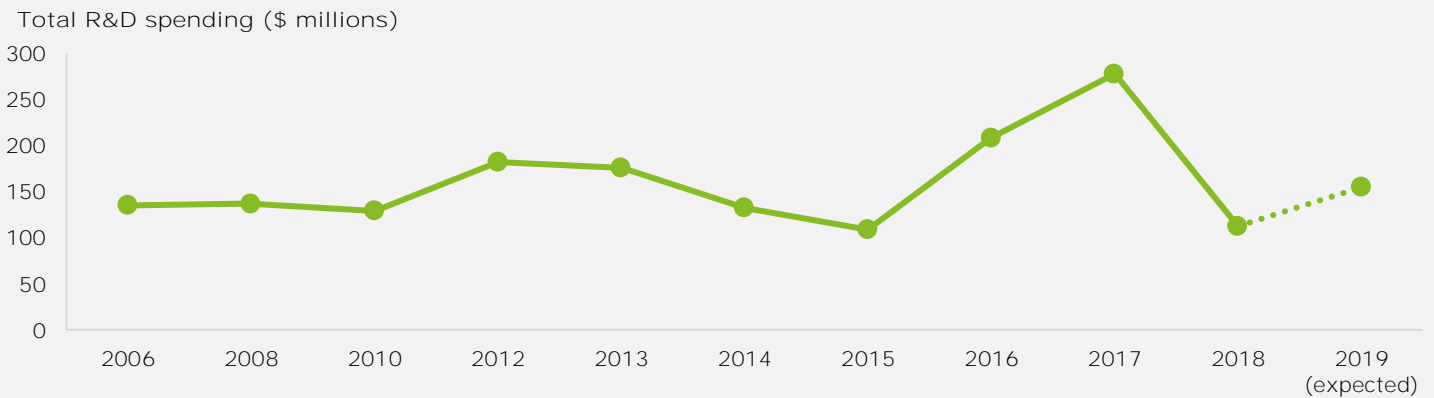


By the end of the year and beyond, respondents expect their business to transition from the emerging to growth phase as indicated by an increase of 8 percent (8%). This signals the life sciences industry will continue to expect a heightened level of commercial activity and needs for investments in novel technologies in the foreseeable future.



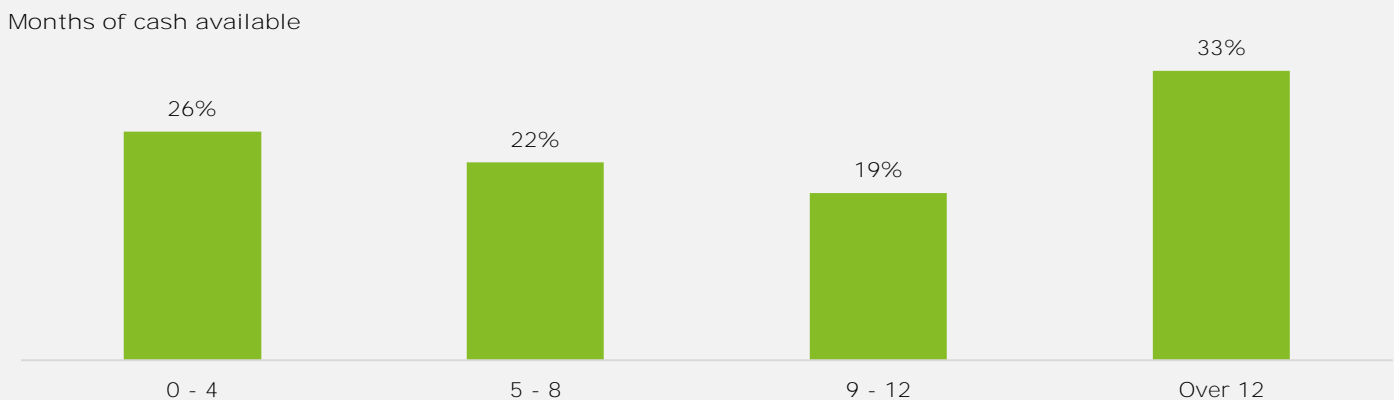
# Research and Development Spending

How much is your company spending on research and development?



There has been a decline recently in the level of investment in research and development based on the data collected from respondents. After a peak year in 2017, R&D spending reported a decrease. However, companies expect this trend will improve through 2019, as represented by a 37 percent (37%) year over year increase from 2018 to 2019. The general decrease compared to 2017 may also be contributed by a combination of lower responses and undisclosed financial information from respondents compared to prior years.

How many months of cash do you have available?



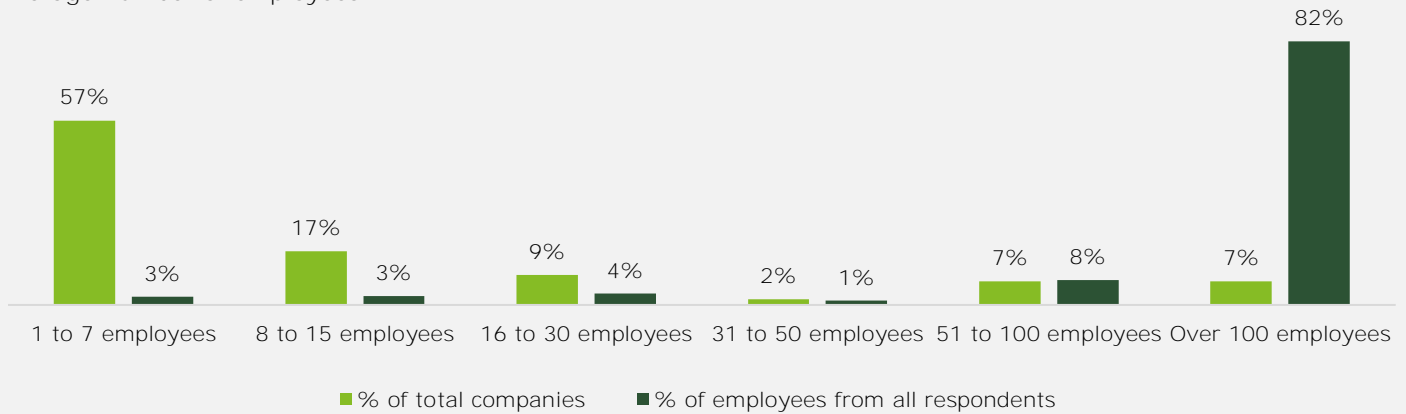
Thirty-three percent (33%) of companies reported having over 12 months of cash available on hand to fund operations, representing a number of mature companies operating in the industry. The remaining companies reported having cash available for less than 12 months. Access to capital and investments remain an issue for a large group of companies in the sector.



# Human Resources

In 2018, what was the average number of people employed at your company?

Average number of employees



The largest segment of companies employed fewer than 7 people (57%), suggesting the industry consists of a number of start-ups, small scale and owner-management companies in Alberta. Of the total number of companies reported, 7 percent (7%) of the companies were accountable for providing jobs to a significant portion (82%) of all employees in the sector.

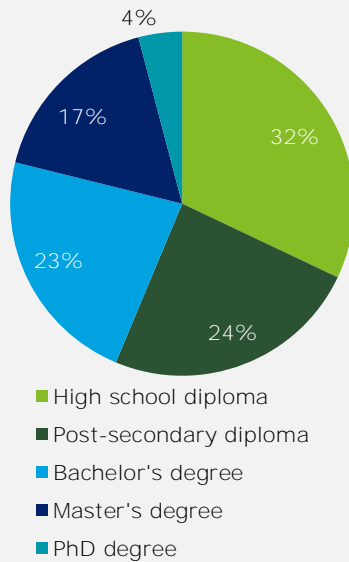
How many people did you employ in your company in 2018 and what are your expectations for 2019?

Number of employees



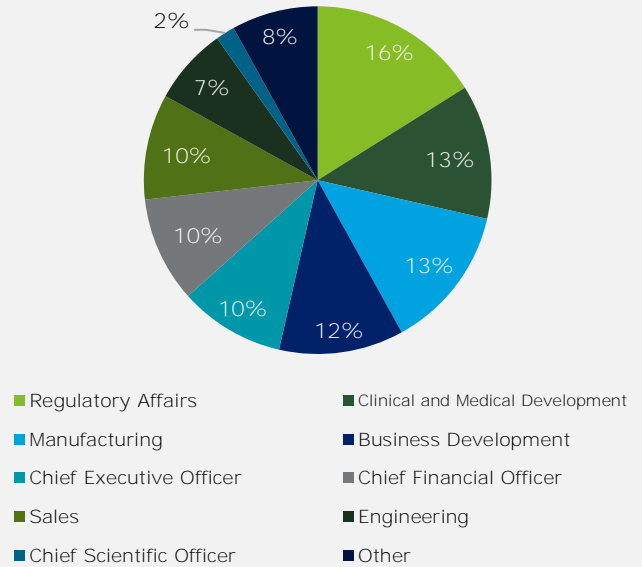
Total employment figures in 2018 reported a decrease of 19 percent (19%) in comparison to 2017. One possible explanation for this decrease may be attributed to the change in number of reporting companies. The 2017 SOI report contained information from 165 companies whereas this year's report is limited to 103 companies. Companies do expect a modest increase of 9 percent (9%) in total employees by the end of 2019, bring the total count to over approximately 3,600 jobs. Assuming a combined induced and indirect economic multiplier of four, the life sciences industry is expected to contribute approximately 15,000 jobs in Alberta in 2019.

What percentage of your employees have a high school diploma, a post-secondary diploma, or some other form of post-secondary education?



The life sciences industry employs individuals from a full range of educational backgrounds. It will be imperative for the province to attract and retain a skilled workforce, such as PhD and Masters degree holders, in order to continue driving the growth of this industry.

Which of the following executive positions are the most challenging for your company to fill?



Regulatory affairs reported to be the most challenging positions for life sciences firms to hire, with 16 percent (16%) of firms reporting clinical and regulatory affairs as the most difficult, and 13 percent (13%) apiece for manufacturing and clinical and medical development. Closely followed is business development, representing 12 percent (12%) of the total data. This represents a shift as business development executives have historically been the most challenging area to fill.

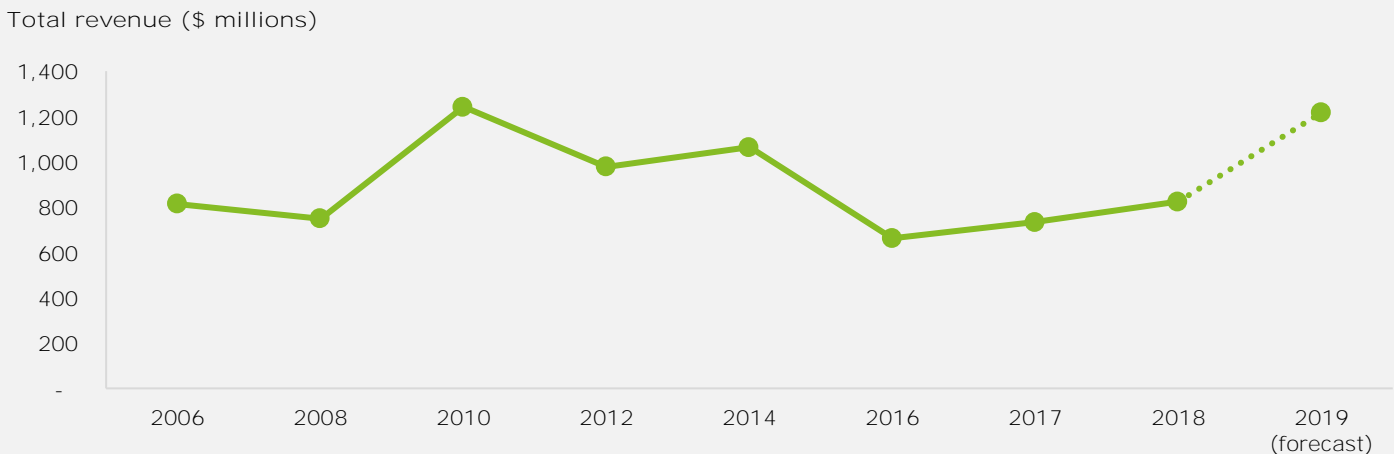
# Revenue

What is your reported revenue (product, sales and services) for your fiscal year ending 2018?



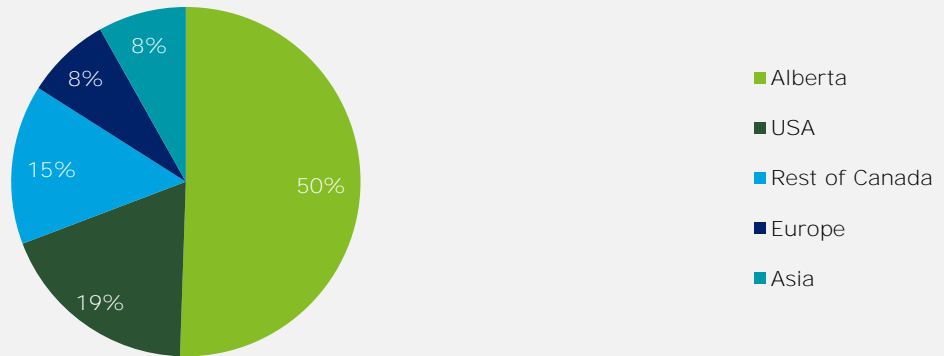
A majority 71 percent (71%) of the sector is small businesses with annual revenue of \$1 million or below. Of the 71 percent (71%), 64 percent (64%) report annual revenues of under \$500,000. Only a total 11 percent (11%) reported revenues equal or above \$10 million. Within this 11 percent (11%), 5 percent (5%) earned above the \$50 million threshold.

What were your revenues for 2018 and forecast for 2019?



Aggregate revenues reported by respondents in 2018 were at \$824 million. Respondents expressed an optimistic outlook and expect revenues to rise by 61 percent (61%) to reach \$1,327 million. A significant portion of that growth can be contributed to the addition of cannabis related services.

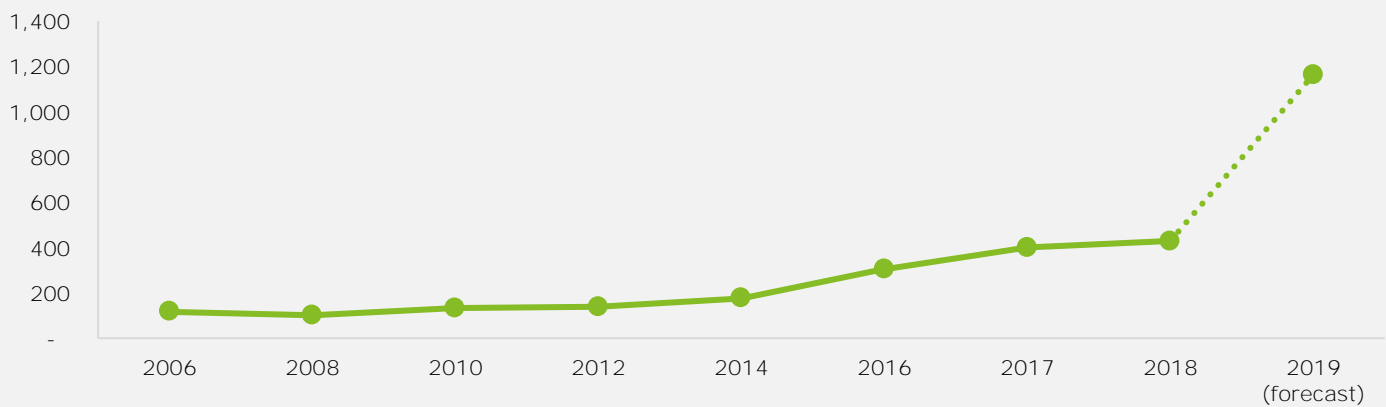
What percentage of your 2018 fiscal revenue was earned in each of the following regions?



From the data collected from respondents, Alberta life sciences companies reported an average of 50 percent (50%) of total revenues was generated within the province. Followed by this are the USA and the rest of Canada, reporting an average of 19 percent (19%) and 15 percent (15%), respectively. Companies also have a presence in other international markets. The distribution suggests Alberta life sciences companies have strong roots within the province but may need to explore other interprovincial and international markets to remain competitive on a national and global scale.

How much capital did you raise in the fiscal year ending 2018 and estimate raising in 2019?

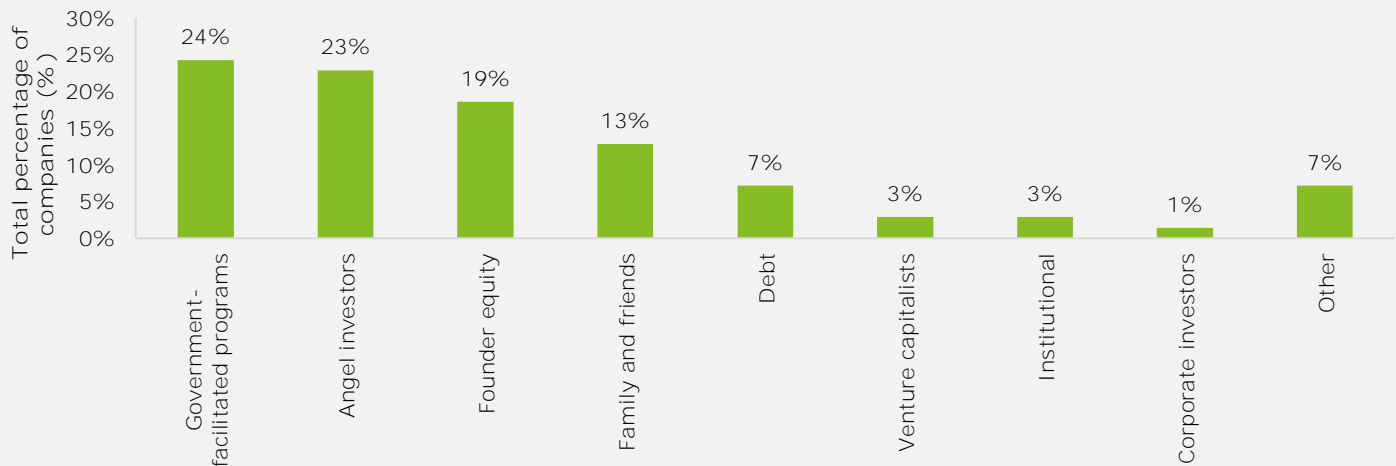
Total capital (\$ millions)



The life sciences industry in Alberta continues to make history with its significant level of capital raised in 2018. In 2018, companies reported approximately \$430 million of capital raised. This was largely driven by the emergence of the cannabis subsector where investors and lenders saw growth opportunities in the province. A record-breaking of over \$1 billion in capital is estimated in 2019. This historic level of capital is the result of momentum pharmaceutical partnership deals and continued investments in a growing cannabis subsector. This upward trend suggests the industry is positioned for growth and should be expected to make a significant economic impact.

# Financing

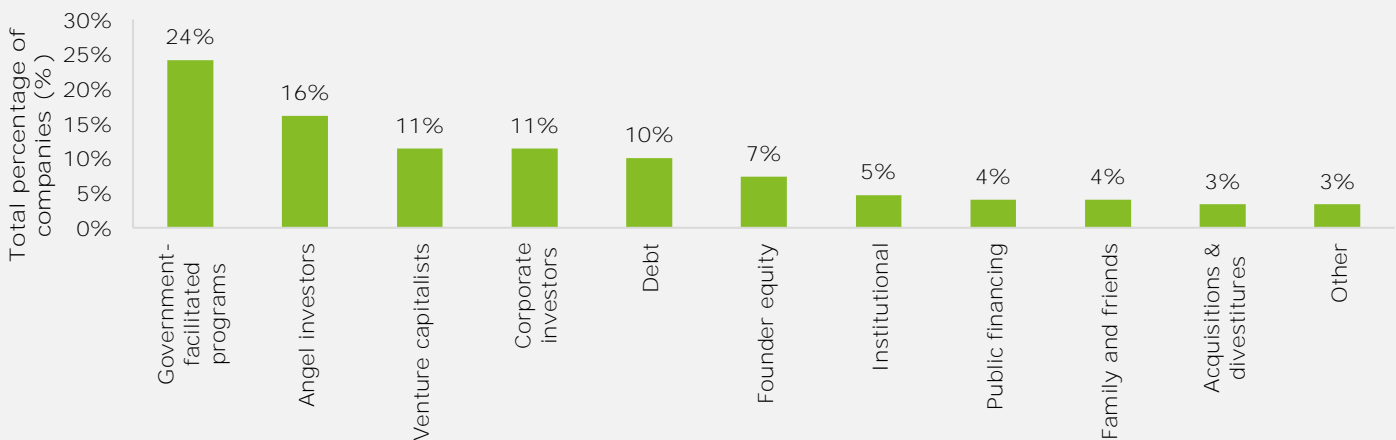
## What sources did you use to raise capital in 2018?



Government-facilitated funding programs continue to be the most significant source of capital for the industry at 24 percent (24%), followed by angel investors at 23 percent (23%) and founder equity at 19 percent (19%). This trend remains consistent with prior year surveys. The financial market in Alberta life sciences industry is heavily dependent **on personal and government capital over investors' capital**. This data indicates that companies are potentially facing barriers in obtaining capital from outside investors such as venture capitalists.

*Note: Survey respondents were able to select multiple categories.*

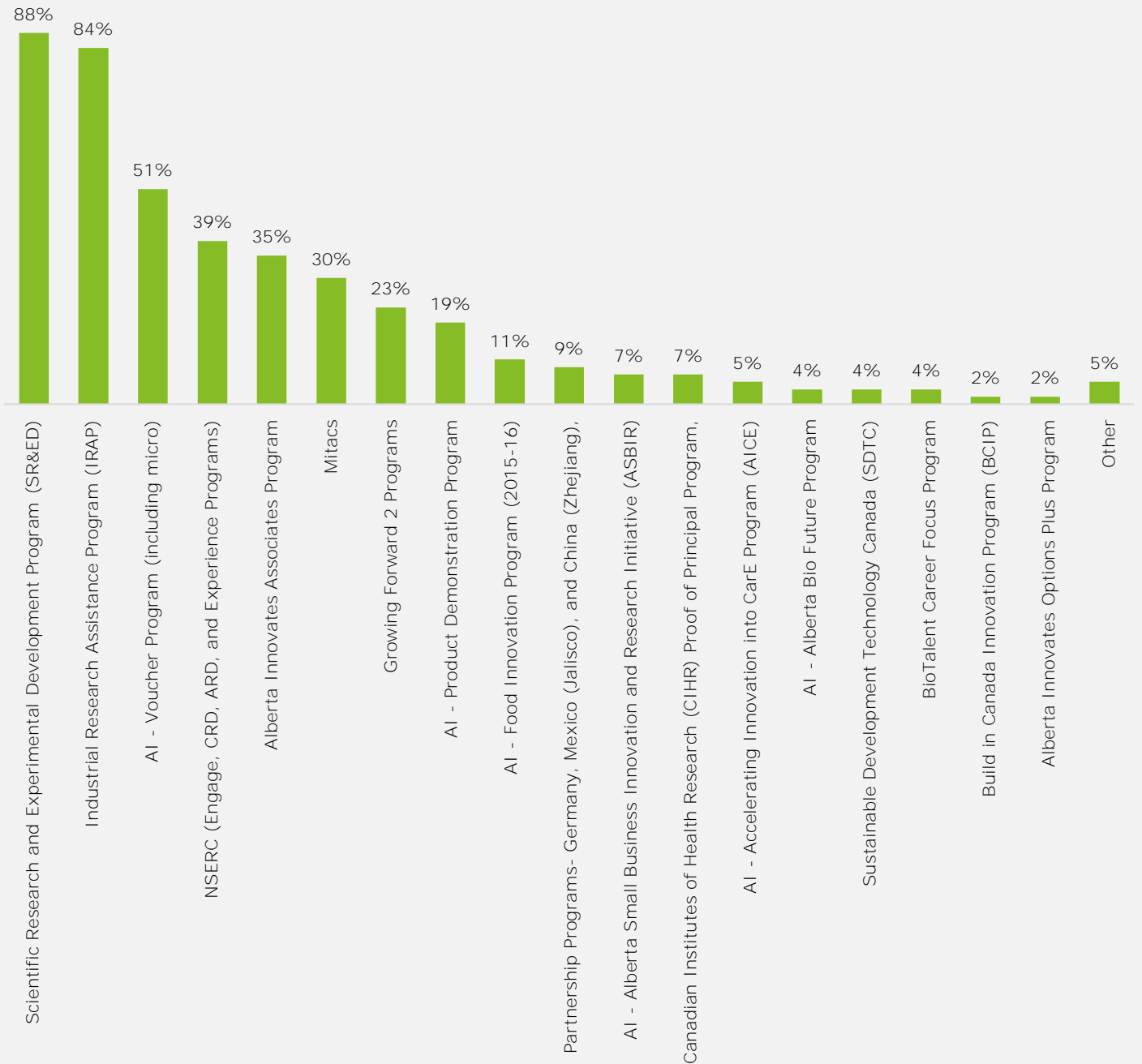
## Which sources of capital do you intend to pursue in the future?



Going forward, government programs are expected to be the primary source of capital pursued by companies in the industry, accounting for an average of 24 percent (24%) of all respondents. In addition, we note companies express a strong desire to attract outside investments from venture capital at 11 percent (11%) and corporate investors at 11 percent (11%).

*Note: Survey respondents were able to select multiple categories.*

Which governmental support initiatives have you used?



The largest sources of government financing were from the Scientific Research & Experimental Development (SRED) program at 88 percent (88%). This was followed by the Industrial Research Assistance Program (IRAP) at 84 percent (84%). Other notable government funding programs include the Alberta Innovates Voucher Program at 51 percent (51%), NSERC at 39 percent (39%) and the Alberta Innovates Associates Program at 35 percent (35%).

*Note: the percentages of companies accessing funding from all sources adds to greater than 100 percent as many companies have accessed more than one source of funding.*

# Issues Facing the Industry

**Alberta's life sciences sector offers tremendous economic potential.** In order to grow the life sciences sector in Alberta, our entrepreneurs, start-ups, and other local businesses require a collaborative, open and accessible environment that supports them from ideation through commercialization. By creating such an environment, it would strengthen the Alberta life sciences ecosystem, increase employment opportunities, attract external investments and the revenues created within the province. However, in order for the life sciences sector to achieve these positive provincial impact, there remains a number of challenges that will be resolved in order for the industry to continue its growth.

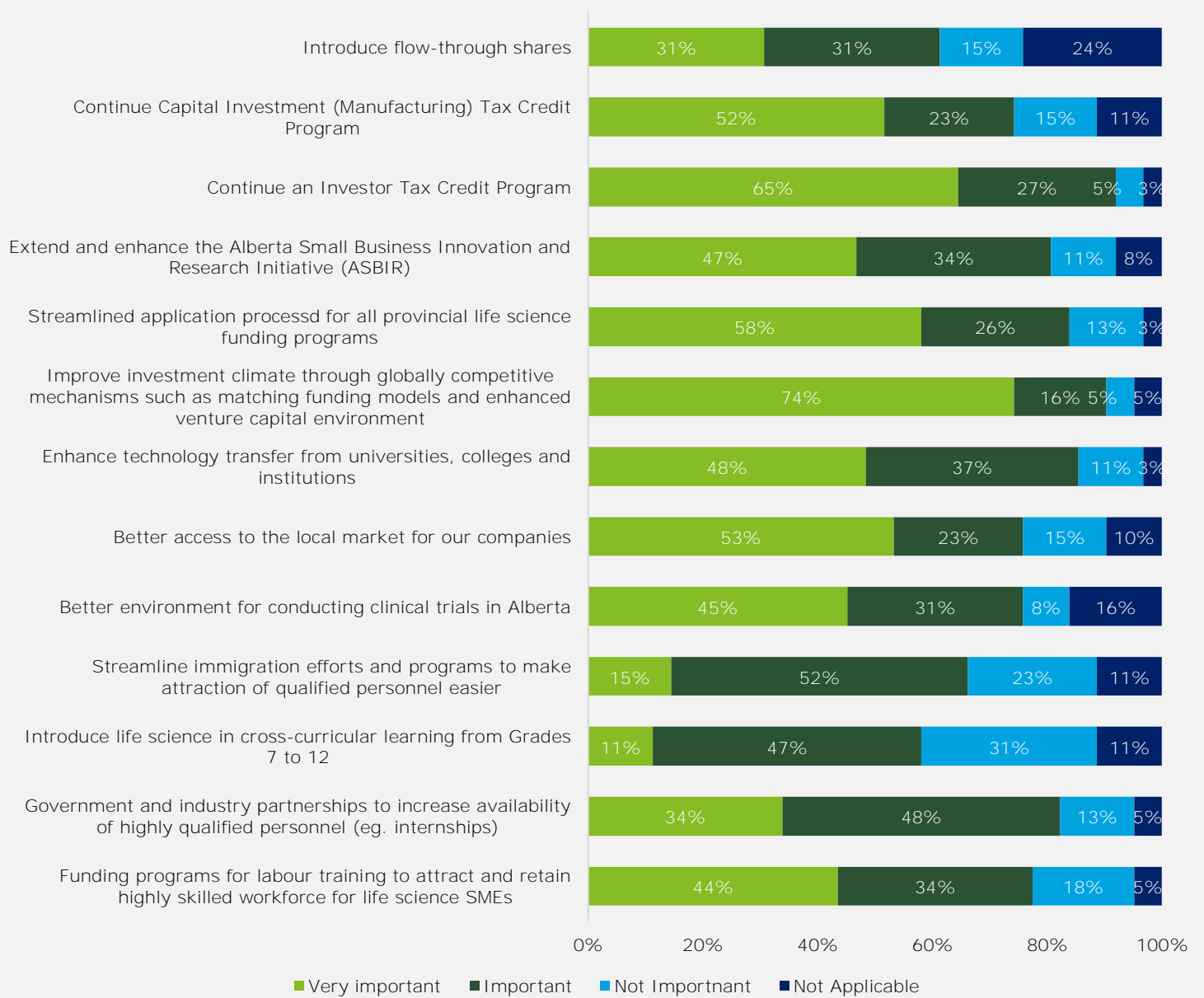


**The top three most important issues identified by this year's respondents are:**

1. Continuing an Investor Tax Credit Program;
2. Improving investment climate through globally competitive mechanisms such as matching funding models and enhanced venture capital environment; and,
3. Enhancing established funding programs.

The major themes **from this year's survey continues to be that life sciences companies are in need of improvements** in access to financing and funding. Life sciences is an innovator sector. Continued and sustained research and development in this industry will be a key driver in making Alberta a competitive destination for companies and investors. Moving forward, it will be imperative to create an environment that incentivizes investments to the industry, provide greater access to private and public capital and continue improving existing funding programs to position Alberta as an innovative and vibrant life sciences hub globally.

Importance placed on the following issues:





# Industry Participation

BioAlberta and Deloitte would like to thank all of the survey participants who agreed to be acknowledged in this report.

48Hour Discovery Inc.	KuSu Inc.
Advanced Orthomolecular Research	Metabolomic Technologies Inc.
AirTerra Inc.	MindLab Interactive AI Inc.
Akshaya Bio Inc.	Mmhg Inc.
Alberta Research Chemicals Inc.	Nanalysis Corp.
Alberta Rhodiola Rosea Growers Organization Inc.	Nanostics Inc.
Aquila Diagnostic Systems Inc.	Nova Green Inc.
ATI-Composites Cda Inc.	Pacylex Pharmaceuticals
Aurteen Inc.	Parvus Therapeutics Inc.
BioNeutra North America Inc.	Pekisko Holdings Inc.
BioRefinex Canada Inc.	Pixineers Inc.
Creative Protein Solutions	priMED Medical Products
Dynalife	Rane Pharmaceutical Inc.
Elsius Biomedical Corporation	Salu Design Group Inc.
Entos Pharmaceuticals	Sinoveda Canada Inc.
Exciton Technologies Inc.	Symbiotic EnviroTek Inc.
Expander Energy	Tangent Design Engineering Ltd.
IGY Inc.	Think Tank Innovations
IMBiotechnologies Ltd	VaxAlta Inc.
Just Biofiber Structural Solutions Corp.	W A Grain & Pulse Solutions
KMT Hepatech Inc.	Willow Biosciences Inc.

## Companies with publicly available information

Asia Cannabis Corp.	Oncolytics Biotech Inc.
Aurora Cannabis Inc.	Quest PharmaTech Inc.
CanadaBis Capital Inc.	Resverlogix Corp.
Hemostemix Inc.	RMMI Corp.
High Tide Inc.	SugarBud Craft Growers Corp.
Imaging Dynamics Company Ltd.	Vibe Bioscience Ltd.
Innovotech Inc.	Westleaf Inc.
Maple Leaf Green World Inc.	Willow Biosciences Inc.
Medical Services International Inc.	XORTX Therapeutics Inc.







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