Preface

In times of prosperity and of recession, Albertan employers require access to workers with the right skill sets. This report draws on a review of relevant literature, current data, and 40 interviews with industry stakeholders to examine the state of skills in seven key sectors of Alberta's economy. It explores actions that employers are taking to invest in their current and future workforce and shares insights on the role that post-secondary education can play in ensuring key Alberta sectors have access to the skills they need to thrive.

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The report was reviewed externally by the project Advisory Committee (Dr. Kazem Mashkournia, Dean of Arts, Science and Upgrading, Grande Prairie Regional College; Michael Crowe, Vice-President, Academic, Lakeland College; Dr. Terry Chapman, Interim Vice-President, Academic, Medicine Hat College; Dr. Misheck Mwaba, Vice-President Academic, Bow Valley College; and Dr. Paulette Hanna, Vice-President Academic, Red Deer College). Thank you as well to Norma Schneider, Vice-President, Teaching & Learning and Chief Academic Officer, NorQuest College, for leading the Advisory Committee.

The Conference Board is solely responsible for the contents of this report, including any errors or omissions.
Highlights

- Albertan employers face a variety of challenges in recruiting and developing workers—from labour supply issues to concerns about skills, including the work-readiness of new graduates and the adaptability of current employees.

- We heard from employers across seven of Alberta’s major industrial sectors who emphasized the need for a post-secondary education (PSE) system that was responsive to labour market needs and agile enough to keep up with evolving workplaces and technologies.

- Employers in multiple sectors highlighted a growing need for soft skills (such as problem-solving, communication, intercultural competency, continuous learning, and resiliency), as well as multidisciplinary skill sets (often including technology skills).
To meet some of their skills needs, employers are changing their recruitment strategies, providing internal training and development opportunities, and leveraging external industry-based training programs.

Employers from all sectors can partner with PSE institutions to further address their skills needs. Employers told us they were working with PSE institutions to target under-represented population groups; offer work-integrated learning opportunities; develop shorter-term programming for re-skilling; ensure workers are equipped with the necessary soft skills; raise awareness of career options; and develop tailored industry training.

With the shift to a skills-based economy, where re-skilling and up-skilling are increasingly the norm, more broad-based partnerships (e.g., between industry, government, communities, and PSE) can play a role in meeting workers' ongoing training needs.
Introduction

In times of prosperity and of recession, Albertan employers require access to workers with the right skill sets. However, they face a variety of challenges in obtaining the workers with the skills they need. This report continues the Conference Board’s October 2018 Building Skills Connections Series: Alberta in a Nutshell.¹ The first report in the series provided a broad overview of skills supply and demand in the province and explored the disruptors that are shaping future skills needs. The goal here is to examine the state of skills in seven key sectors of Alberta’s economy.

This report examines skills needs in the following Alberta sectors:

- oil, gas, and mining
- finance, insurance, and real estate
- health and medical
- agriculture and agri-food
- renewable energy and environmental products and services
- technology
- creative and cultural industries

These sectors were selected in consultation with the project partners, based in part on their need for skilled workers with the appropriate credentials. Representing about half of Alberta’s GDP, these sectors provide a generous cross-sampling of growth sectors with PSE skills demands.²

¹ Kachulis and McKean, Building Skills Connections Series: Alberta in a Nutshell.
² Statistics Canada, table 36-10-0402-01.
Based on a review of relevant literature, current data, and over 40 interviews with Alberta employers, labour market experts, and industry associations, this report explores actions that employers are taking to invest in their current and future workforce. It also shares insights on the role that post-secondary education (PSE) can play in ensuring that key Alberta industries have access to the skills they need to prosper. We argue that while PSE and industry are already making important efforts to tackle skills challenges collaboratively, opportunities exist to build stronger connections—not just to invest in the future labour pipeline but also to meet evolving skills needs among current workers.

3 See Appendix A, “Interviewee Profile.”
CHAPTER 1

Alberta’s Oil, Gas, and Mining Sector.

Sector Snapshot

<table>
<thead>
<tr>
<th>GDP</th>
<th>Employment</th>
<th>Workers</th>
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<tbody>
<tr>
<td>25.7%</td>
<td>6.1%</td>
<td>140,300</td>
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</table>

Demographics

- Men: 78.5%
- Women: 21.5%
- Indigenous: 5.8%
- Non-Indigenous: 94.2%

Alberta accounts for 77% of Canada’s crude oil and gas production and 80% of its oil and gas workers.

Notes: This information applies only to Alberta. Oil, gas, and mining sector refers to NAICS 21 (mining, quarrying, and oil and gas extraction).

The oil, gas, and mining sector corresponds with the mining, quarrying, and oil and gas extraction sector in the North American Industry Classification System (NAICS).

Subsectors include the following:

- **Oil and gas extraction**: for example, exploring for crude petroleum and natural gas; drilling, completing, and equipping wells; and operating equipment such as separators and emulsion breakers.
- **Mining and quarrying (except oil and gas)**: includes coal mining, metal ore mining, and non-metallic mineral mining and quarrying.
- **Support activities for mining, and oil and gas extraction**: for example, providing mining and oil and gas support services on a contract or fee basis (e.g., contract drilling).

### Sectoral Skills Needs

Attracting workers with the right skills is a priority for the oil, gas, and mining sector both in Alberta and in Canada more broadly. Canada’s oil and gas industry is unlikely to rehire all of the workers laid off during the 2015–16 downturn. While two of our interviewees said they were reducing or eliminating hiring in Alberta, results of a nationwide survey show that employers otherwise count talent attraction and retention, as well as the loss of experienced workers, among their top workforce challenges.

These challenges are no less real in Alberta: projections by the Centre for Spatial Economics (C4SE) point to a number of cumulative labour shortages in the province’s oil, gas, and mining sector by 2025, including 338 primary production managers; 340 underground miners, oil and gas drillers, and related workers; 246 mine service workers and operators in oil and gas drilling; and 68 supervisors in oil and gas.

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3. Excludes agriculture.
drilling and service.\textsuperscript{5} In other words, skills are critical to the future of the sector—regardless of whether employers are currently experiencing labour shortages.\textsuperscript{6}

While employers are concerned about the impending retirement of senior employees, a related demographic challenge, highlighted in a 2018 report of Canada’s Economic Strategy Table for resources of the future, is the need to attract and develop highly skilled talent to help facilitate the modernization of the sector. This would involve re-skilling existing workers as well as attracting new ones—including more women, youth, and Indigenous workers.\textsuperscript{7} The Mining Industry Human Resources Council echoes this, citing immigrants as another group that could be further engaged.\textsuperscript{8}

Another concern? Attracting workers has not gotten any easier. Our interviewees confirm that since the downturn, potential new recruits are concerned about instability and uncertainty in the sector. Workers seeking stability (including those previously laid off from oil and gas jobs) may be deterred by the sector’s reliance on regularly changing oil prices.\textsuperscript{9} Further, in a recent survey of past and current oil and gas workers, almost half of respondents impacted by the downturn said they did not see, or were unsure about, the oil and gas industry as a viable career option.\textsuperscript{10} Among respondents currently working in oil and gas, 45 per cent felt their job was at risk and 35 per cent were not sure whether they would remain in the sector.\textsuperscript{11} Alberta workers’ uncertainty may be exacerbated further by the provincially mandated cuts in oil production announced in December 2018.\textsuperscript{12}

\textsuperscript{5} Ibid., 20, 41.
\textsuperscript{6} Confidential interviews with oil, gas, and mining sector employers and labour market experts, September–December 2018; Mining Industry Human Resources Council, Canadian Mining Labour Market Outlook 2016, 13–14.
\textsuperscript{8} Mining Industry Human Resources Council, Canadian Mining Labour Market Outlook 2016, 32–42.
\textsuperscript{9} Interview findings; Underwood, “Former Alberta Oilpatch Workers Hesitant to Return as Activity Picks Up.”
\textsuperscript{10} PetroLMI, Workforce Insights, 10.
\textsuperscript{11} Ibid.
\textsuperscript{12} Bellefontaine, “Alberta Premier Announces 8.7% Oil Production Cut to Increase Prices.”
In the meantime, skills needs in the sector are changing. Automation has introduced new efficiencies, and improvements to the manufacturing process and an emphasis on real-time data analytics continue to change workplace processes, procedures, and dynamics. Interviewees pointed to a need for more technology-driven skills, including expertise in big data and autonomous vehicles. A changing regulatory environment has also impacted the sector, increasing the need for skills pertaining to environmental impact (including measurement, mitigation, reporting, and renewable energy) and stakeholder engagement.

Soft skills, too, remain as important as ever. Several interviewees emphasized the need for strong communications skills—for instance, the ability to negotiate contracts (sometimes in adversarial situations) and the willingness to communicate on the phone or via in-person meetings rather than just by e-mail. Other skills highlighted include business writing, intercultural competency, business literacy, resiliency, and continuous learning (i.e., the willingness to build new skills). One interviewee also suggested that multidisciplinary skill sets (e.g., engineering and information technology or engineering and data analysis) are becoming increasingly valuable.

All of these skills requirements have important implications for PSE institutions, which are supplying a growing proportion of Canada’s oil and gas workers. In 2006, 58 per cent of those employed in the oil and gas industry held a post-secondary credential. By 2016, this had risen to 68 per cent, with a particularly notable gain in workers with university degrees (jumping from 19 per cent in 2006 to 26 per cent in 2016). Further, over the 10-year span, the proportion of workers with less than high school was halved (falling from 16 per cent in 2006 to 8 per cent in 2016). Interviewees, while acknowledging the continued need for some lower skilled roles, linked this to an overall shift to higher skilled labour in the sector.

13 PetroLMI, A Workforce in Transition; Bickis, “Economy May Be Improving, But.”
14 Interview findings.
15 Interview findings; PetroLMI, A Workforce in Transition, 10.
16 Interview findings.
17 PetroLMI, Canada’s Oil and Gas Workforce at a Glance, 2.
18 Interview findings.
CHAPTER 2

Alberta’s Finance, Insurance, and Real Estate (FIRE) Sector.

Sector Snapshot

14.5% GDP

4.7% Employment

107,600 Workers

Demographics

56.6% Women

43.4% Men

3.6% Indigenous

96.4% Non-Indigenous

Growth in financial services employment, 2006–16 (per cent)

Notes: This information applies only to Alberta. FIRE sector refers to NAICS S2 (finance and insurance) and S3 (real estate and rental and leasing).

The finance, insurance, and real estate (FIRE) sector corresponds with two major sectors in the North American Industry Classification System.

These sectors include the following:

- **Finance and insurance**: includes monetary authorities; credit intermediation and related activities; securities, commodity contracts, and other financial investment and related activities; insurance carriers and related activities; and funds and other financial vehicles.
- **Real estate and rental and leasing**: includes real estate; rental and leasing services; and lessors of non-financial intangible assets (except copyrighted works).¹

## Sectoral Skills Needs

Projections indicate that by 2025, Alberta’s FIRE sector can expect surpluses in several occupations, including insurance, real estate, and financial brokerage managers; insurance adjusters and claims examiners; and insurance agents and brokers.² One area where shortages are expected is in management positions.³ Despite so many surpluses, technological disruptors will continue to transform the sector and place new skills demands on workers.

Canada-wide, technological innovations are increasing the FIRE sector’s efficiency, while also shifting skills demands. Automation of repetitive tasks and the availability of online services in banking, insurance, investment, and real estate will decrease the demand for certain roles, both lower- and higher-skilled. Emerging technologies like blockchain, fintech, and insurtech will push traditional financial services institutions to reassess their business models to remain competitive and will also create a need for employees with specific

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³ Ibid., 8.
technology-based skill sets—for instance, data science, cyber security, or software engineering. Our interviewees highlighted a need for more employees with skills in IT, engineering, electronics, and AI, as well as increased digital fluency in general.

At the same time, increased automation of repetitive tasks in the sector will create room for a greater emphasis on human skills, such as critical thinking, empathy, and creativity, according to a recent report by the Toronto Financial Services Alliance (TFSA). The report stresses the importance of diverse, multi-functional teams to solve problems and highlights a need for more cross-disciplinary skill sets, such as technology specialists with some business acumen and business specialists with some technology skills. It also identifies a set of key “future proof” skills going forward, grouped into four categories:

1. human experience skills (e.g., emotional intelligence, collaboration)
2. reimagination skills (e.g., creativity, curiosity);
3. pivoting skills (e.g., willingness to change, ability to learn/adopt new skills quickly);
4. future currency skills (e.g., adaptability, learning agility).

For those in management positions, interviewees highlighted a need for leadership skills as well as skills in people management, project management, and transformation management (i.e., managing organizational change). One interviewee noted the unique skill set required for leaders working in a not-for-profit context and reporting to a board of directors. Specific skills were also identified for workers in client-facing roles, namely, sociability, persuasiveness, flexibility, and the ability to provide advice and spot opportunities.

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6 Toronto Financial Services Alliance and PwC Canada, Unlocking the Human Opportunity, 4.
7 Ibid., 4.
8 Ibid., 15.
9 Interview finding.
10 Interview findings.
Overall, FIRE sector interviewees placed a heavy emphasis on soft skills. Some called for soft skills more generally, while others singled out skills such as adaptability; creativity; problem-solving (including the ability to identify solutions to “wicked problems”); communication (including a willingness to use traditional communication methods, such as the telephone, and the ability to discern which communication methods are appropriate under different circumstances); and language skills (referring either to fluency in more than one language or to fluency in English, particularly for client-facing employees like tellers). One interviewee stressed the need for an understanding of social context and the social and ethical ramifications of business decisions. Knowledge of the working world—including realistic expectations about advancement—was also identified as important for new recruits.

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11 Interview findings. See also McKean, Are Canada’s Business Schools Teaching Social and Emotional Skills?
12 Defined by design theorists Horst Rittel and Melvin Webber as problems that cannot be definitively described and have “no ‘solutions’ in the sense of definitive and objective answers.” See Rittel and Webber, “Dilemmas in a General Theory of Planning.”
13 Interview finding.
CHAPTER 3

Alberta’s Health and Medical Sector.

Sector Snapshot

- 5% GDP
- 12% Employment
- 274,100 Workers

Demographics

- 82.1% Women
- 17.9% Men
- 94.2% Non-Indigenous
- 4.2% Indigenous

Alberta Health Services is the province’s largest employer, with more than 110,000 employees.

Notes: This information applies only to Alberta. Health and medical sector refers to NAICS 621 (ambulatory health care services), 622 (hospitals), and 623 (nursing and residential care facilities). For some calculations, NAICS 624 (social assistance) was also included.

Sources: Alberta College of Family Physicians, Understanding Who’s Who in Alberta’s Health Care; Government of Alberta, Industry Profiles 2018: Health Care and Social Assistance Industry; Statistics Canada, tables 36-10-0402-01 and 98-400-X2016359; Alberta Health Services, “About AHS.”
The health and medical sector corresponds with the health and social assistance sector in the North American Industry Classification System. Subsectors include the following:

- **Ambulatory health care services**: includes offices of physicians, dentists, and other health practitioners; out-patient care centres; medical and diagnostic laboratories; home health care services; and other ambulatory health care services, such as ambulance services.
- **Hospitals**: includes general medical and surgical hospitals, psychiatric and substance-abuse hospitals, and specialty hospitals.
- **Nursing and residential care facilities**: includes nursing care facilities; residential developmental handicap, mental health, and substance abuse facilities; community care facilities for the elderly; and other residential care facilities such as transitional homes for women.
- **Social assistance**: includes individual and family services; community food and housing, and emergency and other relief services; vocal rehabilitation services; and child day-care services.1

**Sectoral Skills Needs**

Canada’s Economic Strategy Table for health and biosciences has pointed to a nationwide skills shortage in the sector, including at the executive level.2 This is also the case in Alberta, where a cumulative shortage of 822 managers in health care is expected by 2025.3 Alberta can expect considerable shortages in other health professions, including:

- 5,434 nurse supervisors and registered nurses;
- 5,391 assisting occupations in support of health services;
- 4,147 other technical occupations in health care;
- 2,322 medical technologists and technicians.4

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1 Statistics Canada, “North American Industry Classification System (NAICS) Canada 2017 Version 3.0.” Because the NAICS groups social assistance with health care, it is reflected in the sector’s labour statistics. However, social assistance is not included in this report’s qualitative analysis.
4 Ibid., 13.
In addition, there will be shortages of optometrists, chiropractors, and other health-diagnosing and -treating professionals; pharmacists, dietitians, and nutritionists; therapy and assessment professionals; and technical occupations in dental health care. One interviewee also highlighted a need for more emergency services personnel (e.g., 911 operators) in their community.

While efforts since the early 2000s have brought Alberta’s number of physicians per population over the Canadian average, there is currently a need for increased supply in rural and remote areas. Family medicine physicians are over-represented in Edmonton and Calgary, while the percentage of physicians practising in rural areas has declined. One interviewee observed a shortage of certain health professions (e.g., nurses, health care aides) in smaller communities.

Beyond specific occupations, interviewees spoke to skills needs in the sector. They highlighted a need for workers with administrative leadership skills (the ability to manage limited resources, manage relationships with stakeholders, etc.) and business skills (e.g., project management, accounting) for those at the management level. Strategic planning, program evaluation, and change management were identified as important skills for those in supervisory roles.

Resilience skills (both personal and professional) came up in multiple contexts. For example, one interviewee emphasized the importance of critical thinking and analysis skills for workers who wish to grow and adapt as the health sector changes. Another highlighted the need for coping and stress management skills among workers in front-line emergency response roles, recommending that PSE institutions provide students in this field with mental health training and tools to recognize and prevent PTSD.

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5 Ibid., 12–13.
6 Confidential interviews with health and medical sector employers, September–December 2018.
8 Interview finding.
9 Interview findings.
10 Interview finding.
The health care sector is evolving in part due to the adoption of new technologies. The Economic Strategy Tables call for investment in “future-oriented skills development” that accounts for developments like precision medicine, the use of robots to perform remote surgeries, and the use of wearable devices to diagnose.11 Others have highlighted a need for more expertise in mobile health, robotic and process automation, artificial intelligence (AI), and genetics12 as well as digital theory, information systems, and networking.13 In short, there is a growing need for a wide variety of technology skills in Alberta’s health and medical sector.

The health care sector is also shifting to new approaches to care, in part to remain cost- and labour-effective while addressing the needs of an aging population. This includes the use of e-health, more home care, and the potential transfer of some tasks traditionally performed by doctors to nurses and pharmacists.14 One interviewee described their organization’s shift in focus from acute care to community services (e.g., outpatient care, primary and continuing/home care, addictions, mental health) and highlighted the need for competencies in this area.15

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12 Nasir, Morra, and Kelleher, “Canada Needs a Health-Care Moonshot.”
13 Interview findings.
14 Government of Canada, “Industrial Summary: Health Care.”
15 Interview finding.
Alberta’s Agriculture Sector.

**Sector Snapshot**

- **Alberta accounts for 18% of Canada’s agricultural employment.**
- **1.6% GDP**
- **2.3% Employment**
- **52,100 Workers**

**Demographics**

- **71.2% Men**
- **28.8% Women**
- **97.3% Non-Indigenous**
- **2.7% Indigenous**

Notes: This information applies only to Alberta. Agriculture sector refers to NAICS 111 (crop production), 112 (animal production), 114 (fishing, hunting, and trapping), and 1151–1152 (support activities for crop and animal production).

The agriculture and agri-food industry corresponds most closely with the agriculture, forestry, fishing, and hunting sector in the North American Industry Classification System.

Subsectors include the following:

- **Crop production**: includes oilseed and grain farming; vegetable and melon farming; fruit and tree nut farming; greenhouse, nursery and floriculture production; and other crop farming.
- **Animal production and aquaculture**: includes cattle ranching and farming; hog and pig farming; poultry and egg production; sheep and goat farming; aquaculture; and other animal production.
- **Forestry and logging**: includes timber tract operations; forest nurseries and gathering of forest products; and logging.
- **Fishing, hunting, and trapping**: includes salt water and freshwater fishing, and hunting and trapping.
- **Support activities for agriculture and forestry**: includes support activities for crop production, animal production, and forestry.\(^1\)

Agriculture and agri-food also overlaps with the food and beverage manufacturing sector. Associated activities include, but are not limited to, grain and oilseed milling, sugar and confectionery product manufacturing, fruit and vegetable preserving, specialty food manufacturing, and dairy product manufacturing.\(^2\)

### Sectoral Skills Needs

Canada’s agriculture sector will face numerous challenges—from climate change, to stricter global regulations, to more protectionism south of the border.\(^3\) Another major challenge will be talent: nationally, labour

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1. Statistics Canada, “North American Industry Classification System (NAICS) Canada 2017 Version 3.0.” Because NAICS groups forestry and logging with agriculture, these industries are reflected in some labour statistics for the sector. However, forestry and logging are not included in this report’s qualitative analysis.

2. Statistics Canada, “North American Industry Classification System (NAICS) Canada 2017 Version 3.0.” Note that food and beverage manufacturing are not included in the labour statistics cited in this report, but they are included in the report’s qualitative analysis.

shortages in agriculture have doubled in the past decade and are expected to double again, reaching 113,800 people by 2025. The sector is having difficulty recruiting and retaining workers due to a variety of factors, including the seasonal nature of many employment opportunities, lower compensation, the rural location of many operations, outdoor work, long hours, and negative perceptions about working in agriculture.\(^4\) Given the sector’s aging workforce, attracting younger workers will be especially important to the sector’s sustainability.\(^5\)

Temporary foreign workers (TFWs) will also continue to play a role in helping Canada’s agriculture sector meet its labour needs. In 2017, TFWs represented 4.5 per cent of agriculture workers in Alberta and 20.6 per cent of agriculture workers in Canada as a whole.\(^6\) They have filled approximately three-quarters of the sector’s labour gap to date. The Conference Board predicts that, with the labour gap in agriculture increasing, the need for TFWs will rise.\(^7\)

Factors like the shift toward fewer, larger farms and the adoption of new technologies have allowed the sector to increase its output, even as the number of workers continues to decline.\(^8\) However, these changes have also given rise to new skills needs. Several interviewees emphasized a growing need for business, human resources, and leadership skills among farmers, given the transition to larger, non-family-run operations.\(^9\)

The transition to larger farms is also increasing the need for middle managers. For example, an interviewee from Alberta’s dairy sector emphasized the need for herd managers with industry-specific skills (e.g., knowledge of cow feeding, care, and reproduction), often obtained through a PSE program at the college level. Demographic shifts (and the expected retirements in the sector) will also contribute to the

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5 Interview findings.
6 Custom data from ESDC and IRCC.
7 Meyer-Robinson and Burt, Sowing the Seeds of Growth, 2.
8 Interview findings; Government of Canada, “Industrial Summary: Agriculture.”
9 Interview findings.
need for more managers in the coming decade, ideally managers with experience.\textsuperscript{10}

\section*{Emerging Trends in Alberta's Agriculture Sector}

Emerging trends, such as the growing interest in urban farming and the legalization of cannabis, are also impacting skills needs in the sector.\textsuperscript{11} Cannabis legalization in particular has resulted in new offerings in Alberta PSE, including the Cannabis Education Program at Mount Royal University and the Cannabis Production Program at Olds College.\textsuperscript{12} It is also leading to increased opportunities in hemp, of which Alberta is already a major supplier.\textsuperscript{13}

Technological advancements are transforming agriculture too. These include robotics; automation (e.g., automated milking systems); precision farming (e.g., precision seeding equipment); and drones.\textsuperscript{14} One interviewee pointed to a need for more workers with a combination of agricultural knowledge and technology skills (e.g., engineering, big data, coding) in order to increase innovation in the sector. Technology skills are also needed for current farming operations—for instance, there is a need for workers with the ability to operate and fix farm equipment and to use and manage electronic records.\textsuperscript{15}

Workers with practical experience in the agriculture sector would be an asset too. The proportion of Albertans living in rural areas is decreasing, and fewer Albertans are growing up on farms. Urban students are enrolling in agriculture programs—for instance, they make up the majority of students in the University of Alberta's Bachelor of Science...
programs in agriculture and animal health—but they are unlikely to have had previous hands-on experience in the sector, which can make it challenging for them to find work.\textsuperscript{16}

On the agri-food side, skills shortages are a critical challenge. Canada’s Economic Strategy Table for Agri-food has highlighted “tight labour markets, restricted access to foreign workers, and evolving skillsets for the sector” as major obstacles the sector must overcome before it can fulfill its potential. Ongoing shortages are present at all skill levels, and the sector is operating under capacity despite its use of TFWs.\textsuperscript{17} This is a concern for Alberta, which was Canada’s third-largest agri-food exporter in 2016 and is home to over 22,000 food and beverage manufacturing workers.\textsuperscript{18}

\begin{table}
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\caption{Agricultural fields with harvesters}
\end{table}

\textsuperscript{16} Interview findings; Canadian Agricultural Human Resource Council, Agriculture 2025; Robinson and Gregory, Development of a 3-Day Animal Science Mini-Internship Program.

\textsuperscript{17} Canada’s Economic Strategy Tables, Report: Agri-Food, 4.

\textsuperscript{18} Government of Alberta, “About the Industry.”
CHAPTER 5

Alberta’s Renewable Energy and Environmental Products and Services Sector.

Sector Snapshot

- Employment: 3.2%
- Workers: 74,238

Demographics

- Men: 75.3%
- Women: 24.7%
- Indigenous: 6.3%
- Non-Indigenous: 93.7%

Demand for environmental workers
(by number of English-language environmental job ads posted 2014–17)

- ON
- BC
- AB

Growth in Alberta’s Renewable Energy Sector

The province plans to generate 30% of its energy from renewable sources by 2030, resulting in at least 7,200 jobs.

Notes: This information applies only to Alberta. Renewable energy and environmental products and services sector refers to the environmental sector in 2015.

The renewable energy and environmental products and services sector overlaps with multiple sectors.

These include the following NAICS sectors:

- **Utilities**: for example, various types of electric power generation (including hydroelectric, solar, and wind).
- **Professional, scientific, and technical services**: for example, environmental consulting services.
- **Administrative and support, waste management, and remediation services**: includes the cleanup of contaminated mine sites, buildings, soil, and ground water.¹

It is important to note that environmental occupations do not align neatly with NAICS and are present across sectors. ECO Canada reports that environmental workers are most concentrated in natural and applied sciences and related occupations, but are also present in management occupations; natural resources, agriculture, and related production occupations; occupations in manufacturing and utilities; and others.²

**Sectoral Skills Needs**

Environmental employment falls under a variety of occupational sectors across the workforce. For example, workers in natural and applied sciences and related occupations account for close to 40 per cent of the total environmental workforce in Canada. Management occupations are also well represented, accounting for approximately 24 per cent of environmental workers, as are trades, transport, and equipment operators and related occupations, which make up approximately 13 per cent of environmental workers.³ Nationally, the environmental subsectors with the highest projected employment growth (between 2015 and 2024)
include policy and legislation (65 per cent growth); waste management (54 per cent growth); communications and public awareness (52 per cent growth); and air quality (47 per cent growth).4

Renewable energy is also a growing sector in the province. Under Alberta’s Climate Leadership Plan, the province aims to source 30 per cent of its energy from renewable sources such as wind, hydro-electric, biothermal, and solar by 2030. In addition to generating $10.5 billion in investment in the province’s economy, this effort is also expected to create at least 7,200 new jobs, including more than 140 full-time equivalent jobs in wind and 900 jobs in solar (the fastest-growing electricity sources in Canada).5

In solar alone, new opportunities range from engineering, architecture, and installation to traditional trades including electrical work and plumbing, with additional skills needs in sales, marketing, accounting, project management, shipping, and logistics.6 In renewable energy as a whole, there is a growing need for workers from a range of backgrounds, including geologists, biologists, computer specialists, lawyers, archaeologists, and those with skills in stakeholder consultation.7 With renewable energy activity increasing in Alberta, stakeholders have highlighted opportunities for traditional energy workers to retrain and transition to the sector.8

While Canada’s environmental workforce is projected to grow at a steady pace,9 interviewees said they encountered challenges in finding and attracting talent. Unlike work in agriculture—which, while rural, tends to occur in a controlled or domesticated environment—work in some renewable energy and environmental occupations takes place in a harsh outdoor environment and requires a high degree of self-sufficiency and adaptability. Employers hiring in these situations can face unique obstacles. One interviewee observed that domestic and

4 Ibid.
9 ECO Canada, Canadian Environmental Employment, 15.
international job candidates alike who come from urban settings tend to have fewer coping skills for dealing with weather challenges, long hours, or dangerous wildlife (e.g., bear or cougar attacks).\textsuperscript{10} These realities diminish the labour pool of qualified candidates.

Domestic recruits tend to come from local regions and communities, resulting in an even smaller labour pool. Meanwhile, larger projects are often found in isolated areas, as dictated by the location of the natural resources. In general, the employers we interviewed noted that people are not always willing to move away from their home communities for work.\textsuperscript{11} Further, a lack of provisions for families connected to remote projects as well as male-biased hiring practices and workplace cultures contribute to the severe under-representation of women in the sector.\textsuperscript{12}

When it comes to skills needs, employers are currently struggling to find workers who have both practical and theoretical competencies. One interviewee suggested that college graduates tend to have stronger hands-on problem-solving skills, but are not as proficient when it comes to writing skills and technical knowledge. On the other hand, university graduates tend to have stronger writing skills and a better theoretical foundation but fewer hands-on skills.\textsuperscript{13}

Employers also report that recent PSE graduates underperform when it comes to soft skills—for example, project management, teamwork, thinking independently, working under pressure, resolving conflicts, and communicating effectively. Some employers attempt to address this deficit through training once graduates have already been hired. One interviewee reported spending as much as 80 per cent of in-house training on soft skills.\textsuperscript{14}

\textsuperscript{10} Confidential interviews with renewable energy and environmental products and services sector employers, September–December 2018.
\textsuperscript{11} Interview findings.
\textsuperscript{12} Baruah and Gaudet, Creating and Optimizing Employment Opportunities, 17.
\textsuperscript{13} Interview findings.
\textsuperscript{14} Interview finding.
In addition, interviewees mentioned the need for senior talent, suggesting that this is difficult to find without recruiting internationally; and the need for workers with the ability to integrate technology into their day-to-day work. While this does not require specialization in IT, it does require knowledge of the latest technologies and the ability to propose technology-based solutions.\textsuperscript{15}

\textsuperscript{15} Interview findings.
CHAPTER 6

Alberta’s Technology Sector.

Sector Snapshot

2.8% GDP

2.1% Employment

48,835 Workers

Demographics

Men 72.2%

Women 27.8%

Indigenous 2.1%

Non-Indigenous 97.9%

Technology companies represent 7.2% of businesses in Alberta.

Notes: This information applies only to Alberta. Technology sector refers to NAICS code 334 (computer electronic product manufacturing) excluding 3345 (navigational, measuring, medical, and control instruments manufacturing); 4173 (computer and communications equipment and supplies merchant wholesalers); 5112 (software publishers); 517 (telecommunications); 518 (data processing, hosting, and related services); 5415 (computer systems design and related services); and 8112 (electronic and precision equipment repair and maintenance).

Sources: Lamb and Seddon, The State of Canada’s Tech Sector; Statistics Canada, tables 36-10-0402-01, 98-400-X2016290, and 98-400-X2016359.
The technology sector corresponds with a number of North American Industry Classification System sectors.

These include the following:

- **Manufacturing**: for example, computer electronic product manufacturing.
- **Wholesale trade**: for example, computer and communications equipment and supplies merchant wholesalers).
- **Information and cultural industries**: for example, telecommunications and data processing, hosting, and related services.
- **Professional, scientific, and technical services**: for example, computer systems design and related services.
- **Other services (except public administration)**: for example, electronic and precision equipment repair and maintenance).

**Sectoral Skills Needs**

Not surprisingly, demand for technological expertise is growing faster than supply. By 2025, this sector in Alberta is expected to have a cumulative shortage of 148 computer and information systems managers, 1,426 computer and information systems professionals, and 376 technical occupations in computer and information systems.¹

Specific in-demand occupations will include information systems analysts and consultants, which will have a 509-worker shortage, and computer programmers and interactive media developers, which will have a 514-worker shortage. Software engineers and designers, computer network technicians, and user support technicians will be in short supply too.³ One interviewee highlighted retention as a challenge, suggesting that Alberta’s talented STEM grads migrate to Toronto or Silicon Valley.⁴

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³ Ibid., 28–30.
⁴ Confidential interview with technology sector employer, September–December 2018.
Nationally, skills shortages in key emerging technologies, including virtual reality (VR) and augmented reality (AR), 3D printing, blockchain, AI, and 5G mobile technology, are expected in the next few years. Interviewees identified a number of current skills shortages in Alberta’s emerging tech sector. Senior developers are not easy to find, nor is leadership talent to fill C-suite roles in technology companies. Technical skills shortages in human interface, software development, VR and AR, application of AI, and game design and rendering were also highlighted. Further, business development, sales, and marketing skills specific to the technology sector are in short supply.

Technology’s rapid pace of change renders technical skills out of date quickly in an environment where tech companies are looking for people who can contribute to the organization’s future. Interviewees felt that rather than focusing solely on deep technical knowledge, PSE programs should emphasize soft skills as well. Critical thinking skills, complex problem-solving, curiosity, collaborative approaches, and design thinking help companies adapt and power through rapid technological shifts.

Developing great learners who are curious and inquisitive will yield employees who are flexible and adaptable. The ability to work effectively with people from different educational and cultural backgrounds is also key but is often missing from recent graduates’ skill sets. These skills support inclusive workplaces as well as international collaborations, which are more and more critical to the tech sector.

6 Interview findings.
7 Interview findings; Tibando and Do, *Understanding the Talent Gap*, 7.
8 Interview findings.
9 Interview findings.
10 Interview findings.
In 2016, the cultural sector contributed $5.7 billion to Alberta’s economy—more than the agriculture, forestry, and utilities sectors.
Creative and cultural industries correspond with two North American Industry Classification System sectors.

These sectors are:

- **Information and cultural industries**: for example, publishing industries, motion picture and sound recording industries, and broadcasting.
- **Arts, entertainment, and recreation**: for example, performing arts, spectator sports, and heritage institutions.¹

### Sectoral Skills Needs

The creative and cultural industries are facing pressures to change traditional business models, resulting in a demand for workers with broader skill sets.² Some organizations are finding a need to do more with less revenue, which means employing fewer people to cover the same amount of work.³ For instance, a worker may require both sales and technical skills because the technical job may now cover a broader range of duties than in the past—while a journalist may have roles in multiple mediums rather than specializing in one.⁴ One interviewee pointed to a need for business skills in some creative roles, but suggested that many people working in the sector prefer the creative side of the work, and therefore focus their personal development and experiences on their craft. As a result, there are gaps in skills such as accounting, administration, and producing.⁵

Managerial skills are also in high demand. By 2025, Alberta can expect some shortages of managers in arts, culture, recreation, and sport.⁶ This is also a challenge Canada-wide: a comprehensive study of human resources in Canada’s cultural sector found that a deficit in managerial

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² Confidential interviews with creative and cultural industries employers, September–December 2018. See also, Campbell and Hughes, Cultural HR Study 2010, 20–23.
³ Interview findings. See also, Campbell and Hughes, Cultural HR Study, 20–21.
⁴ Interview findings.
⁵ Interview finding.
skills was a top employer concern.\textsuperscript{7} One of our interviewees noted that management roles (and other senior-level roles in the creative and cultural sector) tend to require experience and skills sets that are not easily obtained through PSE but are typically acquired on the job.\textsuperscript{8}

While the creative and cultural sector faces skills gaps, it will also experience considerable occupational surpluses in the coming years. By 2025, Alberta will see surpluses in writing, translating, and public relations professionals; creative and performing artists; technical occupations in libraries, archives, museums, and art galleries; photographers, graphic arts technicians and technical and coordinating occupations in motion pictures, broadcasting, and the performing arts; creative designers and craftspersons; athletes, coaches, referees, and related occupations; and tour and recreational guides and casino occupations.\textsuperscript{9}

\textsuperscript{7} Campbell and Hughes, \textit{Cultural HR Study}, 20.
\textsuperscript{8} Interview finding.
Opportunities
Employers in Alberta are taking action on various fronts to address skills issues in the short term.

Some examples from interviewees include the following:

- **Changing recruitment strategies.** These range from increasing efforts to attract skilled talent from elsewhere in Canada and abroad (i.e., ex-pats) to outsourcing work to countries with low labour costs. Some companies are also forgoing the required credential or experience where there is a dearth of candidates or taking a competency-based approach and removing PSE credentials from recruitment criteria. Further, some are striving to create more inclusive work environments, while also updating the language around inclusivity in their job postings.¹

- **Providing internal training and development opportunities.** Some employers mentioned strategic onboarding efforts: CIBC, for instance, provides a year-and-a-half-long in-house training program for new recruits. Other employers said they offer executive training and leadership development programs; training on specific competencies; cross-training in different areas; and mentorship. Some employers also described informal learning opportunities, such as exposing junior staff to different types of projects and having them work with more experienced colleagues.²

- **Use of external training programs.** In the health sector, technical training courses have been established by manufacturers or vendors of medical products. In the agriculture sector, training resources are available from the Canadian Agricultural Human Resource Council (CAHRC), Farm Management Canada, and Farm Credit Canada.³ Another example from agriculture is Alberta Pork’s workshops and webinars for employers on issues such as recruitment, retention, and the TFW Program.⁴

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¹ Interview findings.
² Interview findings.
³ Canadian Agricultural Human Resource Council, “About CAHRC”; Farm Management Canada, “Who We Are”; Farm Credit Canada, “About FCC.”
⁴ Interview findings; Alberta Pork, “Introducing the Alberta Pork App.”
By partnering with PSE institutions, however, employers from all sectors can help to address their skills needs in the medium and long terms as well. The following are some of the promising practices of Alberta industries working with the higher education system, as shared by the interviewees:

- **Focusing on under-represented population groups**, such as Indigenous learners. In the finance sector, Chartered Professional Accountants (CPA) Alberta and the Aboriginal Financial Officers Association (AFOA) of Alberta partnered to establish the No Limits program, which involves providing Indigenous Albertans with support and resources (including funding) to pursue post-secondary education in management or accounting. This both increases managerial capacity within Indigenous communities and promotes better representation of Indigenous workers in management and accounting professions outside of Indigenous communities. ⁵

- **Offering more work-integrated learning (WIL) options** to ease transitions and ensure that new graduates are job-ready. Alberta Chambers of Commerce (ACC), for instance, is providing students with the opportunity to gain experience and solve real business problems through the pilot ACC Business Apprenticeship Program. ⁶ Beyond co-op, internships, and other work placements, interviewees also spoke favourably of experiential learning based on campus (e.g., simulation facilities, guest speakers from industry). Examples include Lakeland College’s Student-Managed Farm (which teaches farm management skills by having students participate in running a multi-million-dollar farm) and Olds College’s Smart Farm (which exposes students to the latest farming technology). One interviewee also recommended that PSE provide opportunities for exchange within Canada—for instance, to First Nations or immigrant communities—so students can better understand the social and cultural contexts of their work. ⁷ Industry players can also endow internship programs, as Alberta Pork did through its $25,000 endowment donation to the University of Alberta’s Animal

⁵ AFOA Alberta, “About No Limits.”
⁶ Alberta Chambers of Commerce, ACC Business Apprenticeship Program.
⁷ Interview finding.
Science Mini-Internship program (which allows students to experience three days on a community-based farm) in 2018.\textsuperscript{8,9}

- **Developing shorter term programming** as an option to facilitate re-skilling. Bow Valley College, for example, introduced Pivot-Ed (an initiative that supports re-skilling and up-skilling through short-term courses and micro-credentials), and was established as the first Canadian hub for IBM Skills Academy (a computer training program that allows learners to build or reinforce skills in high-demand areas like data analytics, cloud computing, and cybersecurity).\textsuperscript{10}

- **Emphasizing the soft skills** needed to succeed and adapt to changing work environments. Skills mentioned include critical thinking, analysis skills, presentation skills, writing and research skills, an understanding of social context and ethics, and stress management/coping skills. One interviewee highlighted the University of Calgary and Beaver Drilling’s Avatar program, a joint professional development program that cultivates soft skills such as critical and creative thinking.\textsuperscript{11} The conscious reduction of siloes between disciplines (e.g., STEAM\textsuperscript{12} instead of STEM) is another proven method for building soft skills as well as cross-disciplinary skill sets (e.g., science and business, engineering and data analysis).\textsuperscript{13}

- **Raising awareness of career options** and the associated education and skills requirements. Industry attendance at career fairs and other student events helps companies stay connected with PSE partners and promote career opportunities to students. Further, industry participation on college program advisory committees not only allows for input on the skills curricula, but also helps to ensure students are made aware of the employment opportunities available to them. These opportunities

\textsuperscript{8} Interview findings; Alberta Pork, “Ag Student Internships Help Raise the Next Generation of Producers”; University of Alberta, “Animal Science Mini-Internship Program.”

\textsuperscript{9} Industry-led WIL programs also abound—for example, the Cattlemen’s Young Leaders development program matches young people interested in beef with a mentor in their field of interest (e.g., sustainable ranching) and provides funding for them to participate in industry events. Cattlemen’s Young Leaders, “Program Description.”

\textsuperscript{10} Interview findings; Bow Valley College, “Introducing Pivot-Ed”; Bow Valley College, “IBM Skills Academy”; Academica Group, “BVC Established as First Canadian Hub for the IBM Skills Academy.”

\textsuperscript{11} University of Calgary, “The Avatar.”

\textsuperscript{12} Refers to science, technology, engineering, arts, and mathematics.

\textsuperscript{13} The University of Waterloo’s Knowledge Integration program—a transdisciplinary undergraduate program structured around core skills—was highlighted as a successful example. Interview findings; University of Waterloo, “About the Department of Knowledge Integration.”
could be further embedded in university programs to provide the same level of benefits to students. Awareness initiatives are also taking place at the K–12 level: Agriculture in the Classroom Canada, for instance, brings sector-specific education into the K–12 classroom and promotes agriculture as a desirable career choice.14

• **Developing industry training in partnership with PSE and other organizations.** Alberta Health Services, for instance, offers training developed through Harvard University’s Business School. FIRE sector employers partner with other businesses, credit unions, local colleges, and chambers of commerce. In the oil, gas, and mining sector, workers can pursue professional designations (e.g., Certified Mineral Landman [CML], Professional Surface Landman [PSL]) through organizations such as the Canadian Association of Petroleum Landmen (CAPL).15

**Next Steps**

Forthcoming research from the *Building Skills Connections Series* will share findings from a provincial survey of employers, shedding additional light on the skills, credentials, and occupations that Albertan employers are seeking. It will also expand on the approaches employers and PSE institutions can take to ensure Alberta has the well-educated, highly skilled workforce it needs now and in the future.

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14 Agriculture in the Classroom Canada, “About Us.”
15 Canadian Association of Petroleum Landmen, “Professional Designations.”
# APPENDIX A

## Interviewee Profile

### Table 1

**Interviewees by Industry Sector**

(number; \( n = 41 \))

<table>
<thead>
<tr>
<th>Sector</th>
<th>Interviewees</th>
</tr>
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<tr>
<td>Oil, gas, and mining</td>
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<td>7</td>
</tr>
<tr>
<td>Health and medical</td>
<td>5</td>
</tr>
<tr>
<td>Agriculture and agri-food</td>
<td>6</td>
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<tr>
<td>Renewable energy and environmental products and services</td>
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<td>Technology</td>
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</tr>
<tr>
<td>Creative and cultural industries</td>
<td>3</td>
</tr>
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</table>

Source: The Conference Board of Canada.
APPENDIX B

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