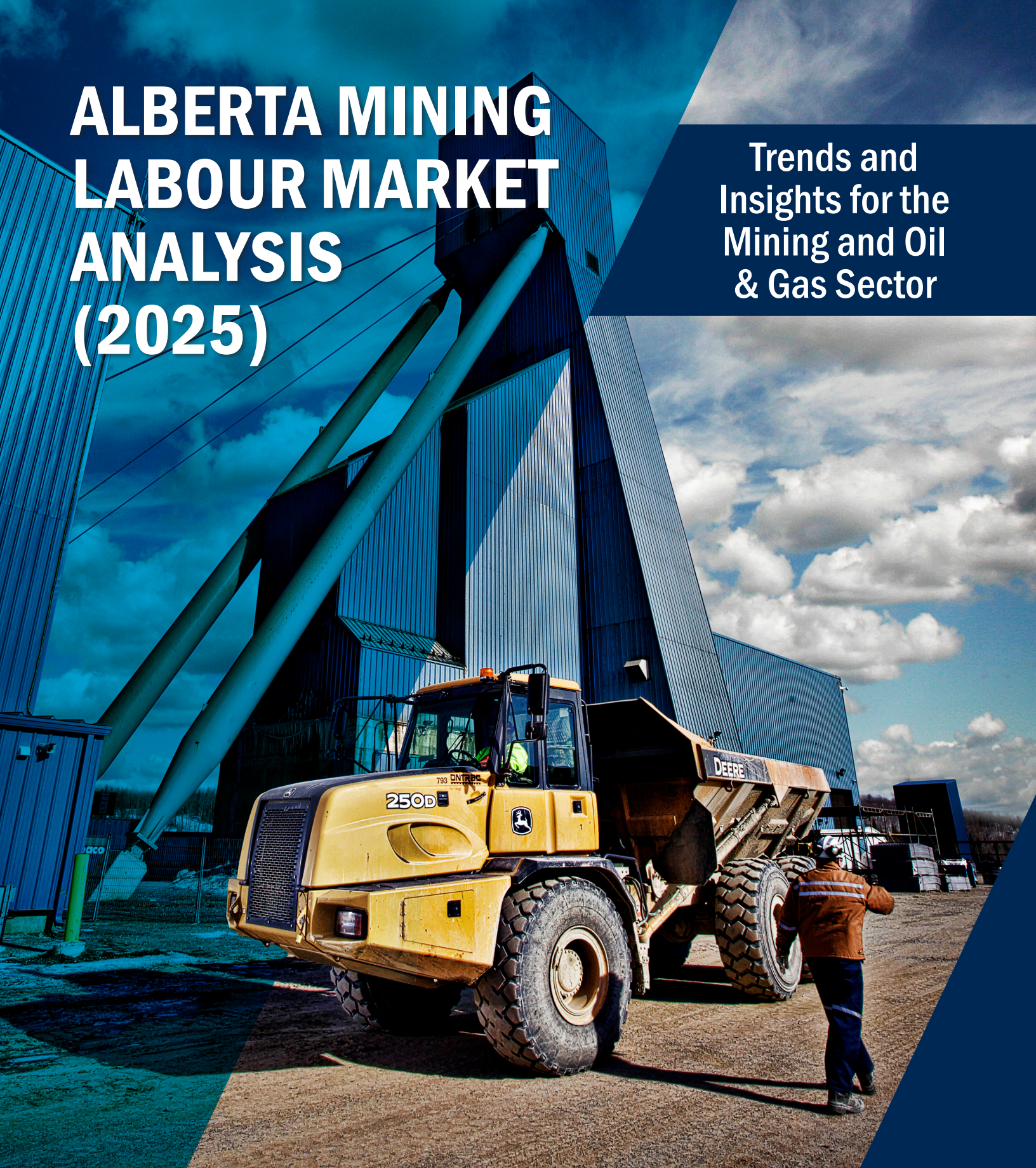


# ALBERTA MINING LABOUR MARKET ANALYSIS (2025)

Trends and  
Insights for the  
Mining and Oil  
& Gas Sector



MINING INDUSTRY  
HUMAN RESOURCES COUNCIL  
CONSEIL DES RESSOURCES HUMAINES  
DE L'INDUSTRIE MINIERE







Research and analysis in this report were conducted by the Mining Industry Human Resources Council (MiHR) in partnership with and funded by contributions from the Government of Alberta.



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Published May 2025



# Acknowledgements

MiHR wishes to convey appreciation to all organizations involved in this project that contributed their valuable time, resources and knowledge to the project Advisory Committee and to the Key Informant Interviews for the development of this analysis.

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Government of Alberta

University of Alberta

Suncor

TPD Workforce Solutions

Alberta Chamber of Resources Mining Industry Advisory Committee (MIAC)

Energy Safety Canada

CST Coal



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## Introduction

This report explores the mining labour market and its importance to Alberta's mining and resources sector. Although Alberta is primarily known as an oil and gas hub, the province is also home to a prominent mining industry. Several critical mining roles are at the heart of the resources extraction sector, which is a major economic growth engine in the province.

The analysis aims to benefit mining industry decision makers (i.e., governments, employers, educators) who have the means to shape workforce development through human resources policies and initiatives. Additionally, key findings are intended to engage career seekers by providing valuable insights about the types of career opportunities and the potential for professional growth in the mining sector.

### **The Importance of Mining to Alberta**

Given the complexity and lack of clear definitions surrounding Alberta's mining industry, the analysis begins with an overview of its primary activities and commodities, and its key role in the province. Mining in Alberta falls into three main categories:

- Oil and gas
- Coal
- Emerging resources and critical minerals



## Oil and Gas

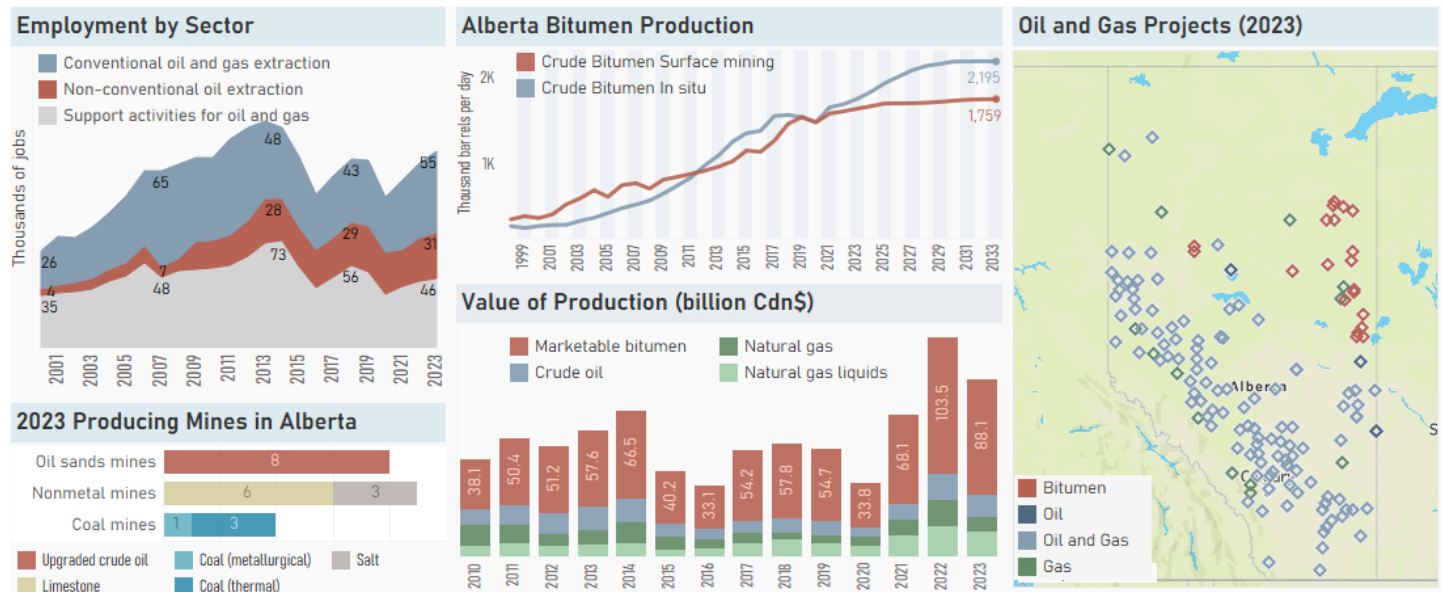
A large share of the oil output in Alberta is produced through mining. The occupations, skills and capital involved in bitumen mining overlap with those found in other mining operations across Canada. Figure 1 presents a factsheet on mining and its relation to Alberta's oil production.

- The map (right) shows the different oil and gas projects in Alberta, and highlighted in red are the bitumen projects. They are largely centred in the Wood Buffalo region.
- The chart of historical and forecasted bitumen production (upper middle) reveals that about half of it is *in situ* production, and half is surface mining. Thus, historically, roughly half of all bitumen production in Alberta has required mining.

- The chart of employment (top left) shows that, in 2023, non-conventional oil extraction (mainly bitumen) represented about 31,000 jobs in terms of direct employment in the province. A portion of support activities is also attributable to mining; accordingly, mining represents an estimated 20% of the Mining and Oil & Gas Sector. Consequently, one of every five jobs in the top left image is directly attributed to mining.

Overall, mining is intrinsically tied to Alberta's oil and gas sector, both in terms of its labour force and the challenges it faces. The health of the mining labour market has broad implications on the oil and gas sector as a whole.

**Figure 1: Factsheet on Mined Bitumen in Alberta**



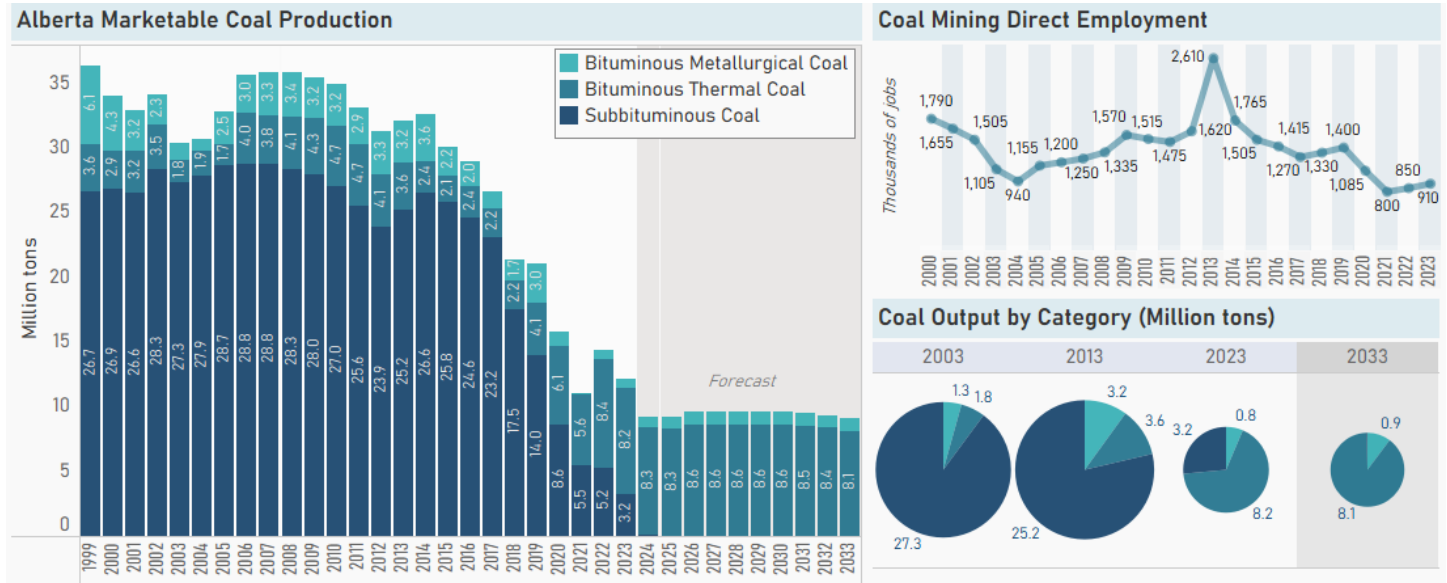
Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, System of National Accounts (2024); Natural Resources Canada, Canada's Minerals and Mining Map (2024); Alberta Energy Regulator, Alberta Energy Outlook (ST98) (2024).

## Coal

Coal is another mined commodity found in Alberta. In 2023, 4 out of the 21 active mines in Alberta produced coal. Figure 2 shows a factsheet for Alberta’s coal mining scene. Over the last decade, coal production has been declining, from about 35 tonnes in 2010 to about 11 tonnes in 2023.

According to the Alberta Energy Regulator, the decline has mainly affected subbituminous coal production, while thermal coal production has expanded and is projected to remain relatively stable for the next decade. While coal mining is considered a declining industry, it still represents a source of employment for many Albertans. In 2023, the coal subsector directly employed roughly 910 people in the province.

**Figure 2: Factsheet on Coal Mining in Alberta**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, System of National Accounts (2024); Alberta Energy Regulator, Alberta Energy Outlook (ST98) (2024).

## Emerging Resources and Critical Minerals

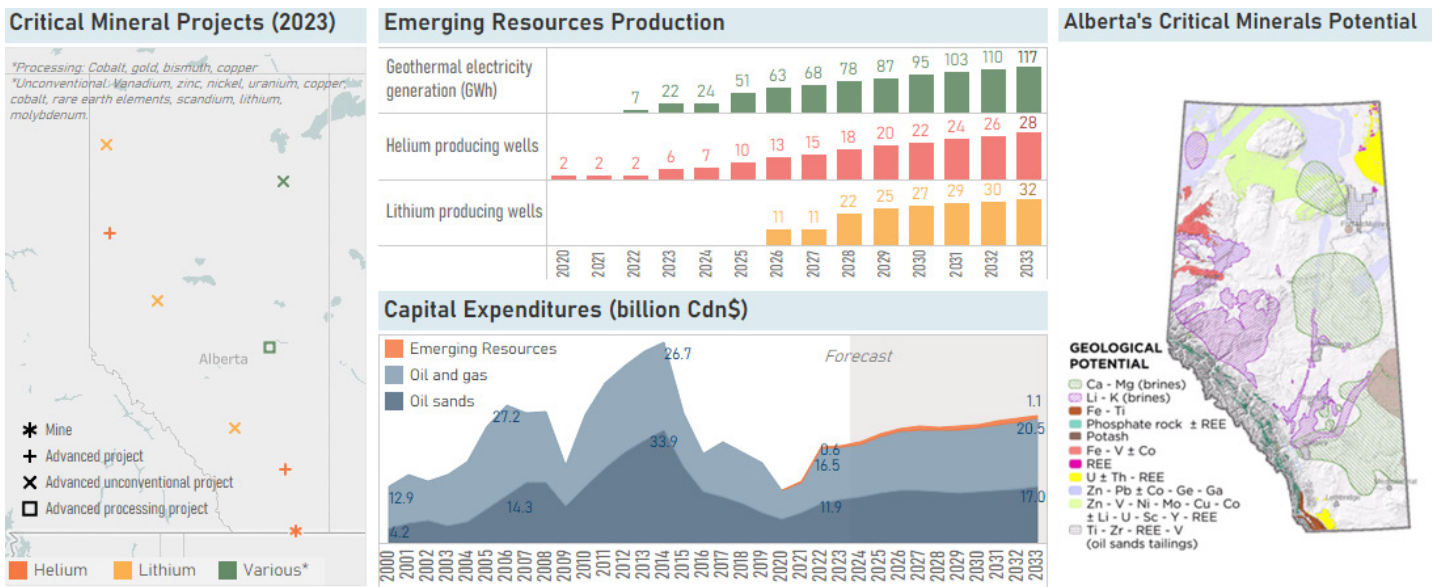
The third category of mining in Alberta is emerging resources and critical minerals. Though it is currently in its early stages, this side of the mining sector has the greatest growth potential due to its role in electric vehicles (EVs) and alternative energy production.

Figure 3 shows a factsheet for Alberta’s emerging resources subsector. Currently, there are few active projects focusing on critical minerals in the province (left map); however, the geological potential (right map) is abundant and points to an untapped source of growth for the mining sector.

Prior to 2020, emerging resources did not attract significant capital investments within the province. Since then, there has been a small but growing share of capital expenditures directed toward emerging resources and critical minerals.



**Figure 3: Factsheet on Emerging Resources in Alberta**



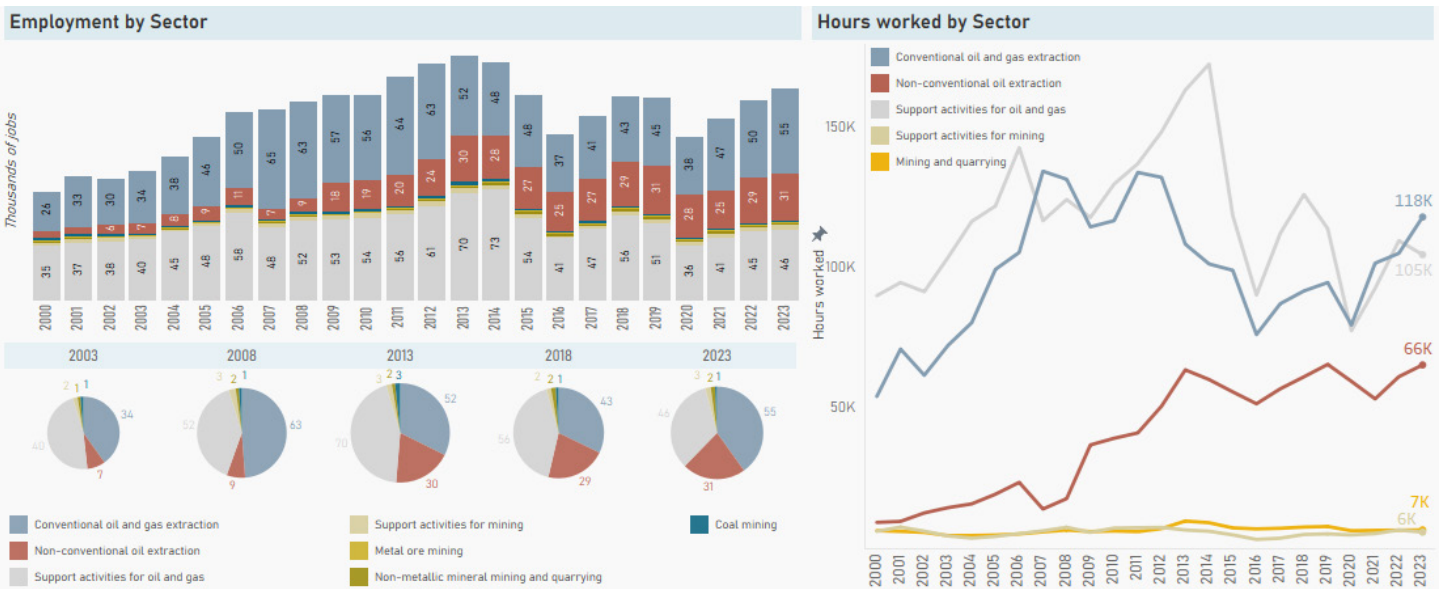
Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Natural Resources Canada, Canada's Minerals and Mining Map (2024); Alberta Energy Regulator, Alberta Energy Outlook (ST98) (2024); Alberta Energy Regulator, Critical Minerals Potential (2022).

**Employment and Hours Worked in Mining**

As evident in the above data, mining is in the fabric of Alberta's economy. Importantly, mining activities represent a major source of employment for the

province. Figure 4 visualizes how Alberta's mining workforce fits into the broader natural resources sector. MiHR estimates that mining activities account for about 20% (or 1 of every 5) jobs in the Mining and Oil & Gas Sector.

**Figure 4: Factsheet on Employment and Hours Worked by Sector**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, System of National Accounts (2024).

## Study Overview

This project provides a diagnostic on the health of Alberta's mining labour market. The objectives of this report are as follows:

- Diagnose the occupations that have the highest need for new labour market entrants.
- Understand the optimal strategy to achieve a balanced labour market.
- Highlight important trends affecting critical occupations.
- Spotlight select demographic groups of interest (i.e., youth, women, Indigenous peoples and immigrants).
- Perform a health check on Alberta's overall mining labour market.

In view of these objectives, this report focuses on the fundamental question:

### ***How sustainable is the labour market for Alberta's critical mining occupations?***

At its core, this question is about labour supply (i.e., the availability of labour). The study examines the ability of Alberta's labour supply to meet the ever-shifting labour demand and identifies factors that may influence this capacity. A limited labour supply can derail projects, drive up recruitment costs and ultimately undermine the sector's competitiveness.

## Mining Sector Definition

The analysis in this report uses data aligned with the *North American Industry Classification System (NAICS)*<sup>1</sup> to define the mining sector. Due to the substantial overlap between the mining and the oil and gas sectors in Alberta, this study adopts the broader sectoral definition of Mining, Quarrying and Oil and Gas Extraction [NAICS 21]. In this report, MiHR refers to the Mining and Oil & Gas Sector, which

is inclusive of activities that fall within the following three sub-sectors:

- **Oil and Gas Extraction [NAICS 211]:** includes establishments involved in oil and gas extraction, from exploration and drilling to production and preparation for shipment, encompassing activities like shale and oil sands mining.
- **Mining and Quarrying [NAICS 212]:** describes the activities at operating mines across Alberta, including both surface and underground mining operations and on-site processing activities.
- **Support Services [NAICS 213]:** includes the activities of organizations providing support services for a wide range of mining activities, usually on a contract or fee basis.

## Critical Occupations

The occupational data presented in this report are aligned with the *National Occupational Classification (NOC)*<sup>2</sup> system to define critical occupations. Based on feedback from the project's Advisory Committee, MiHR has identified 10 critical occupations in Alberta's mining sector using the NOC system. The following occupations are highlighted throughout this report:

- Mechanical Engineers (NOC 21301)
- Mining Engineers (NOC 21330)
- Welders and Related Machine Operators (NOC 72106)
- Industrial Electricians (NOC 72201)
- Construction Millwrights and Industrial Mechanics (NOC 72400)
- Heavy-duty (HD) Equipment Mechanics (NOC 72401)

1 For more information on NAICS codes, visit the [Statistics Canada website](#).

2 For more information on NOC codes visit the [Government of Canada website](#).



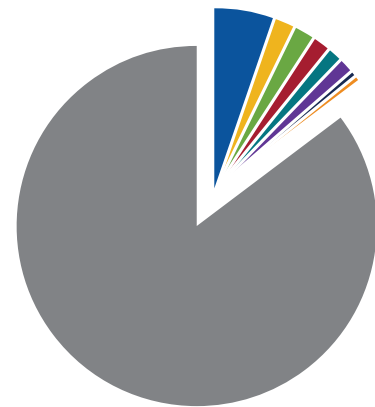
- Heavy Equipment Operators (73400)
- Supervisors, Mining and Quarrying (NOC 82020)
- Underground Mine Service and Support Workers (NOC 84100)
- Central Control and Process Operators, Mineral and Metal Processing (NOC 93100)

The 10 critical occupations were selected due to their high prevalence in the Mining and Oil & Gas.

Combined, they represent about 15% of the sector’s labour force (Figure 5). Moreover, most of these occupations are also highly specific to mining, with a significant portion of the labour force concentrated in the Mining and Oil & Gas Sector. For example, about a third of all Heavy Equipment Operators work in the Mining and Oil & Gas Sector (Figure 6). While these 10 occupations are critical to mining, they also share the labour pool with other sectors such as Construction and Manufacturing.

**Figure 5: Critical Occupations’ Share of the Mining and Oil & Gas Sector Labour Force (2021)**

NOC	Occupation Title	Prevalence
73400	Heavy Equipment Operators	5.5%
72400	Construction Millwrights and Industrial Mechanics	1.9%
72401	Heavy-duty Equipment Mechanics	1.8%
72106	Welders and Related Machine Operators	1.8%
21301	Mechanical Engineers	1.5%
72201	Industrial Electricians	1.2%
82020	Supervisors, Mining and Quarrying	0.7%
21330	Mining Engineers	0.4%
84100	Underground Mine Service and Support Workers	0.1%
93100	Central Control and Process Operators, Mineral and Metal Processing	0.1%
	All other occupations	85.1%



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census (2021).



**Figure 6: Industry Share of Labour Force in Critical Occupations by Sector (2021)**

Occupation Title	21- Mining and Oil & Gas	23 Construction	31-33 Manufacturing	41 Wholesale Trade	54 Professional, scientific, technical	48-49 Transportation & Warehousing	Other Sectors
Underground Mine Service and Support Workers	97%	0%	0%	0%	0%	0%	3%
Supervisors, Mining and Quarrying	92%	5%	0%	1%	0%	0%	2%
Mining Engineers	77%	4%	0%	3%	10%	0%	6%
Central Control and Process Operators, Mineral / Metal Processing	41%	9%	41%	4%	0%	0%	4%
Heavy Equipment Operators	34%	47%	3%	2%	1%	3%	11%
Industrial Electricians	31%	29%	25%	2%	4%	4%	5%
Construction Millwrights and Industrial Mechanics	27%	11%	30%	6%	4%	2%	20%
Mechanical Engineers	20%	6%	14%	3%	41%	4%	11%
Heavy-Duty Equipment Mechanics	16%	13%	5%	15%	1%	8%	42%
Welders and Related Machine Operators	12%	16%	30%	3%	2%	2%	35%

Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021).

## Key Data Sources

This report’s analysis and insights draw on occupation-level data gathered and aggregated from the following sources:

- Public Sources:** The study features data from Statistics Canada’s Census of Population, Labour Force Survey (LFS), System of National Accounts (SNA), and Occupational and Skills Information System (OaSIS). Together, these data sources describe Alberta’s Mining and Oil & Gas Sector and its labour force characteristics. They also underpin the forecasting and analysis presented in this report.
- Key Informant Interviews:** During the third quarter of 2024, MiHR conducted three key informant interviews with stakeholders representing various perspectives from Alberta’s Mining and Oil & Gas Sector. The objective was to qualitatively explore the challenges facing the sector and identify specific initiatives aimed at mitigating these challenges. The findings from these interviews are summarized in Chapter II of this report.









## Chapter 1: Forecasting the Labour Market

MiHR's labour market projections aim to assess the sustainability of Alberta's labour market for 10 critical mining occupations. This section presents a 10-year forecast for Alberta's mining labour force, determining whether the province's talent pool is able to meet future mining workforce requirements for these essential roles.

The analysis begins by developing a forecast of labour supply, drawing on demographic trends, labour force participation rates and occupational shifts. Next, it builds a projection of labour demand, considering industry growth, commodity price fluctuations and broader macroeconomic conditions. Finally, the analysis identifies potential gaps between supply and demand, spotlighting areas where workforce challenges may arise.

The goal of this chapter is to answer the primary research question outlined in the introduction: ***How sustainable is the labour market for Alberta's critical mining occupations?***

A labour market is sustainable when it is robust enough to support growth, adapt to economic and technological shifts and meet long-term industry needs. Conversely, a market is not sustainable when it faces chronic labour shortages, escalating wage inflation and counterproductive poaching between competitors. Resolving this may require a deliberate policy intervention (e.g., a collaborative workforce development



initiative), as the market is unlikely to fix long-term labour shortages for certain occupations.

## Estimating the Labour Supply Outlook

Understanding Alberta’s existing labour supply is central to evaluating the labour market sustainability of the mining sector. Labour supply is inherently complex, as measuring potential sources of workers can be ambiguous and difficult to define. MiHR has developed a model that captures the primary factors that push and pull on the labour supply.

MiHR’s Labour Market Analysis (LMA) framework is built on several key assumptions, including population growth, labour force participation, unemployment rates and occupational choices. These assumptions reflect a conservative, status quo condition informed by recent historical trends. For more details on the methodology and key assumptions, refer to Appendix A.

Using this framework, the LMA model seeks to answer essential questions about labour supply in Alberta:

- a.) What is the overall labour supply available in Alberta?
- b.) What share of this labour pool is allocated to the Mining and Oil & Gas Sector?

- c.) For each critical occupation, what is the labour supply available in the Mining and Oil & Gas Sector?

The following sections answer these questions, exploring the availability of workers over the next decade for 10 critical occupations.

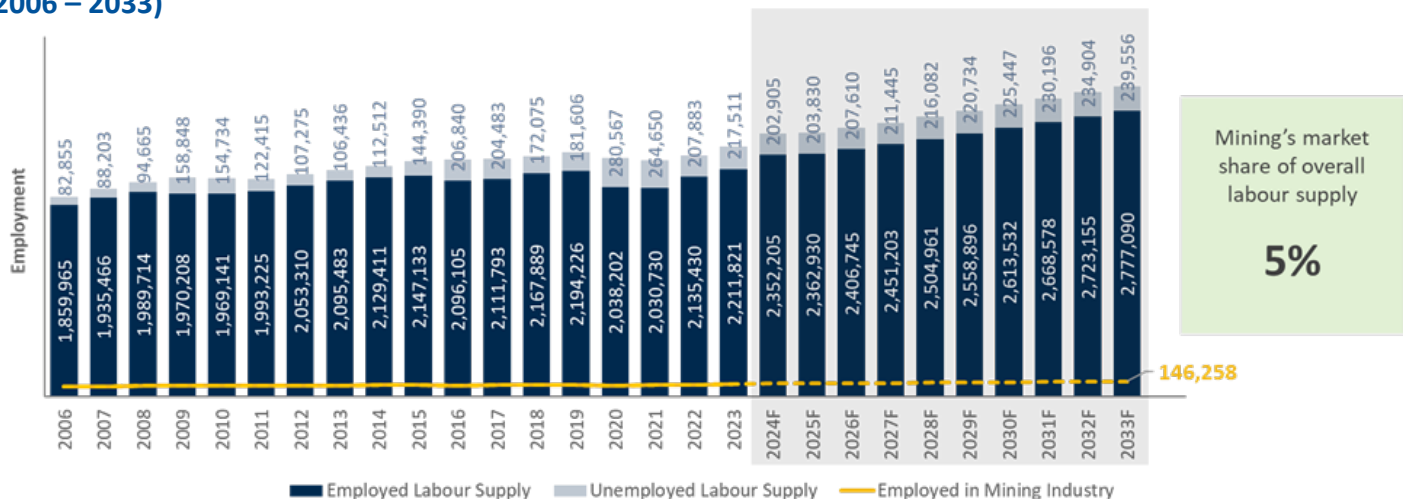
### a) Overall Industry Labour Supply

Figure 7 estimates the overall labour supply in Alberta for all occupations, covering historic data (2000 – 2023) and projections over the next decade (2024 – 2033). The overall labour supply includes both employed and unemployed individuals across all sectors, including the Mining and Oil & Gas Sector. By 2033, the labour supply is expected to grow by 24%, increasing from 2,429,331 workers in 2023 to 3,016,646 – largely on the strength of population growth from immigration to the province.

### b) Mining’s Share of the Overall Labour Supply

Figure 7 also shows that of the 3,016,646 workers, the Mining and Oil & Gas Sector is forecasted to directly employ 146,258 workers in 2033, which translates to about 5% of the overall available labour supply. Historically, this share has remained stable and difficult to change, as efforts to increase mining’s share are always countered by competition from other sectors.

**Figure 7: Historic and Forecasted Labour Supply for Alberta’s Mining and Oil & Gas Sector, All Occupations (2006 – 2033)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024).

### c) Mining's Labour Supply by Occupation

Table 1 presents an occupational breakdown of mining's labour supply in 2033. This is based on the projected overall labour supply and the share allocated to the Mining and Oil & Gas Sector. Mining's labour supply represents MiHR's estimate of the number of Alberta-based workers the mining sector can reasonably expect to employ.

The sector's share of the labour supply varies by occupation. As shown previously in Figure 6, when the sector has a smaller share, like with Welders and Heavy-duty Equipment Mechanics, it faces stiff competition from other sectors like Construction and Manufacturing.

The following section builds on this labour supply estimate by developing a corresponding forecast of labour demand for critical occupations.

**Table 1: Mining and Oil & Gas Sector Labour Supply by Occupation (2033)**

Occupation	Overall Labour Supply (2033)	Mining's Share of Labour Supply (%) (2033)	Mining's Labour Supply (2033)
<b>All occupations</b>	<b>3,016,646</b>	<b>5%</b>	<b>146,258</b>
Heavy Equipment Operators	25,809	28%	7,248
HD Equipment Mechanics	15,186	15%	2,279
Construction Millwrights	11,377	24%	2,757
Welders and Related Machine Operators	24,311	10%	2,439
Mechanical Engineers	11,342	19%	2,132
Industrial Electricians	7,224	27%	1,922
Supervisors, Mining and Quarrying	1,161	87%	1,010
Mining Engineers	797	67%	534
Underground Miners	167	81%	136
Central Control and Process Operators	315	23%	71

Note: Mining's Labour Supply = Overall Labour Supply x Mining's Share of Labour Supply. Any discrepancies in calculation are due to rounding. Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024).



## Forecasting Labour Demand Scenarios

The next step is to determine labour demand, which reflects the workforce the mining sector requires to optimally run operations. MiHR’s employment forecast estimates the optimal level of employment in Alberta’s Mining and Oil & Gas Sector over the next decade (2024–2033).

MiHR employs a time-series econometric model, which considers historic patterns and various leading explanatory variables to predict future employment levels in the mining sector. The best fitted model with the lowest prediction error was selected. To account for the industry’s inherent volatility in response to changes in economic conditions, three scenarios for employment projections are presented:

- A **baseline scenario** representing moderate industry growth.
- An **expansionary scenario** representing substantial industry growth.
- A **contractionary scenario** representing a slowing industry.

For more technical details on MiHR’s labour demand forecasting methodology, refer to Appendix A.

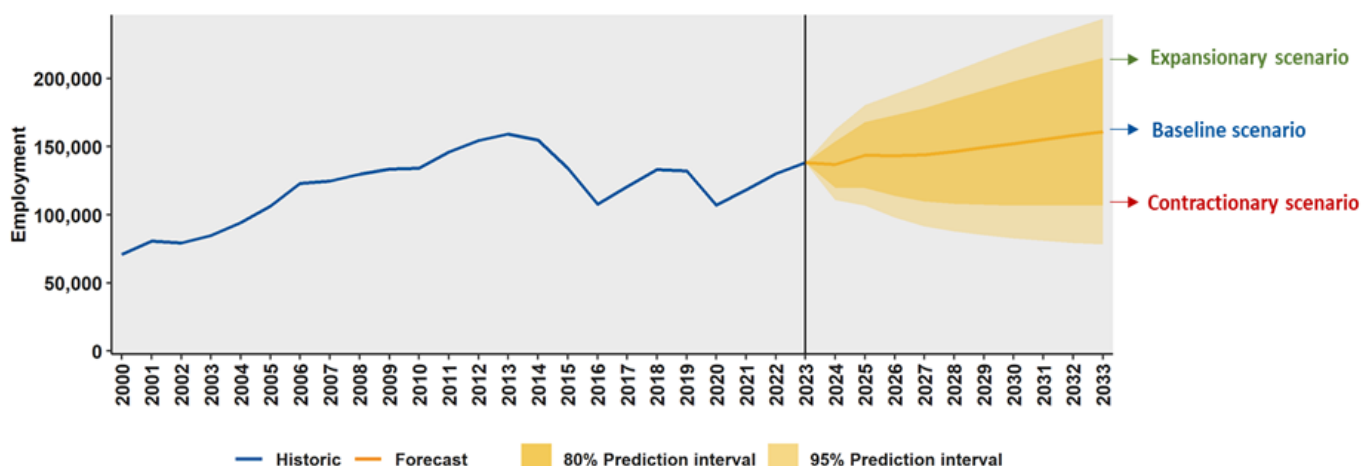
## Mining Employment Outlook

Figure 8 estimates that Mining and Oil & Gas Sector employment will grow by 16% under the baseline forecast, from 138,210 workers in 2023 to 160,980 in 2033. This growth is largely driven by elevated oil prices. A projection by Alberta’s Energy Regulator<sup>3</sup> indicates that crude oil prices are expected to remain higher in the post-pandemic world, as global demand for energy continues to rise (Figure 9). As a major contributor to Canada’s energy sector, Alberta is well positioned to benefit from this trend. High oil prices would fuel growth in Mining and Oil & Gas Sector employment to sustain the increasing needs of the energy sector.

In the expansionary scenario, employment is projected to increase to 215,306 workers, representing a 56% rise. Conversely, under the contractionary scenario, employment is projected to decline to 106,654, reflecting a 23% decrease in workers.

Table 2 presents the labour demand forecast for the 10 critical occupations for each scenario. Assuming that the prevalence of these occupations and mining’s share of the workforce remains relatively stable, Heavy Equipment Operators are projected to employ the largest number of workers.

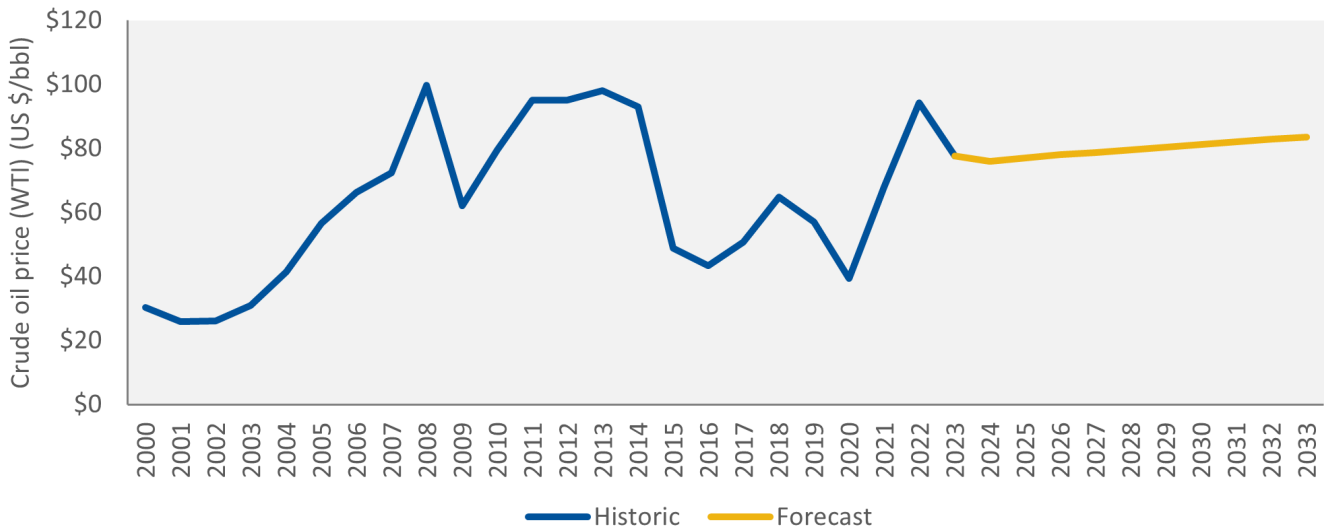
**Figure 8: Historic (2000 – 2023) and Forecasted (2024 – 2033) Employment for Alberta’s Mining and Oil & Gas Sector, All Occupations**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, System of National Accounts (2024).

<sup>3</sup> [Alberta Energy Regulator](#)

**Figure 9: Historic (2000 – 2023) and Forecasted (2024 – 2033) Crude Oil Prices**



Source: Alberta Energy Regulator (2024). Alberta Energy Outlook 2024 (ST98).

**Table 2: Mining and Oil & Gas Sector Labour Demand by Occupation, Three Economic Growth Scenarios (2033)**

Occupation	Contractionary Labour Demand (2033)	Baseline Labour Demand (2033)	Expansionary Labour Demand (2033)
<b>All occupations</b>	<b>106,654</b>	<b>160,980</b>	<b>215,306</b>
Heavy Equipment Operators	5,313	8,020	10,726
HD Equipment Mechanics	1,698	2,563	3,428
Construction Millwrights	2,009	3,032	4,055
Welders and Related Machine Operators	1,772	2,675	3,578
Mechanical Engineers	1,562	2,357	3,153
Industrial Electricians	1,376	2,077	2,777
Supervisors, Mining and Quarrying	740	1,117	1,494
Mining Engineers	385	581	777
Underground Miners	103	156	209
Central Control and Process Operators	53	80	107

Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024).



## Finding Critical Labour Market Gaps

This section compares the labour supply and demand forecasts to identify critical labour gaps in Alberta’s Mining and Oil & Gas Sector. MiHR defines a labour market gap as an imbalance, whereby the sector struggles to meet its labour demand with the local labour supply. This type of imbalance requires employers to increase recruitment expenses, raise wages, hire out-of-province workers or invest in capital and innovation that will mitigate labour needs.

### Labour Gaps by Occupations

Table 3 and Figure 10 present the forecasted labour supply and demand for 10 critical occupations and highlight the resulting labour gaps.

Labour gaps vary by occupation. The largest gap is projected for Heavy Equipment Operators, at 772 workers in excess of supply. However, the degree of effort required to fill the gap also differs by occupation. For instance, filling the gap of 48 Mining Engineers may be more challenging than addressing the gap of 236 Welders due to differences in specialization and readiness of skilled workers.

Additionally, Table 4 shows how the labour gap fluctuates under different economic scenarios. The expansionary scenario, with higher industry growth, projects a larger gap across occupations as demand increases more rapidly. In contrast, the contractionary scenario forecasts a labour surplus across occupations, reflecting reduced workforce needs as the mining sector contracts.

**Table 3: Mining and Oil & Gas Sector Labour Market Gaps by Occupation, Baseline Scenario (2033)**

Occupation	Mining’s Labour Supply (2033)	Mining’s Labour Demand (2033)	Mining’s Labour Gap (2033)
<b>All occupations</b>	<b>146,258</b>	<b>160,980</b>	<b>14,722</b>
Heavy Equipment Operators	7,248	8,020	772
HD Equipment Mechanics	2,279	2,563	284
Construction Millwrights	2,757	3,032	274
Welders and Related Machine Operators	2,439	2,675	236
Mechanical Engineers	2,132	2,357	225
Industrial Electricians	1,922	2,077	154
Supervisors, Mining and Quarrying	1,010	1,117	107
Mining Engineers	534	581	48
Underground Miners	136	156	20
Central Control and Process Operators	71	80	8

Source: Mining Industry Human Resources Council, Alberta Labour Market Analysis, 2024.

**Figure 10: Mining and Oil & Gas Sector Labour Market Gaps by Occupation, Baseline Scenario (2033)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024).

**Table 4: Mining and Oil & Gas Sector Labour Market Gaps by Occupation, Three Economic Growth Scenarios (2033)**

Occupation	Contractionary Labour Gap (2033)	Baseline Labour Gap (2033)	Expansionary Labour Gap (2033)
<b>All occupations</b>	<b>-39,604</b>	<b>14,722</b>	<b>69,048</b>
Heavy Equipment Operators	-1,935	772	3,478
HD Equipment Mechanics	-581	284	1,149
Construction Millwrights	-749	274	1,297
Welders and Related Machine Operators	-667	236	1,139
Mechanical Engineers	-571	225	1,020
Industrial Electricians	-546	154	855
Supervisors, Mining and Quarrying	-270	107	484
Mining Engineers	-149	48	244
Underground Miners	-33	20	72
Central Control and Process Operators	-19	8	35

\*Negative labour gap implies surplus

Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024).

## Workforce Adjustments

In the previous section, the labour gaps for critical occupations were assessed as a point-in-time snapshot for 2033. To gain a deeper understanding of these gaps, it is also important to examine the cumulative hiring needs and workforce deficits across the entire forecast period (2024–2033). This approach provides a comprehensive view by explicitly accounting for labour market inflows and outflows, such as new entrants into the labour force, as well as exits due to retirements or transfers to other sectors.

### Hiring Requirements

Hiring requirements describe the cumulative workforce adjustments needed to maintain the optimal level of employment over the next decade. This is calculated as the sum of the following components, each of which creates hiring pressures for the sector:

- 1) Net change in labour demand:** the number of workers required due to sectoral expansion or contraction, reflecting changes in labour demand.
- 2) Mining labour force exits:** the number of individuals exiting the labour force altogether.

The primary reason for labour force exits is retirement, though there may be other causes such as returning to school, parental leave or other similar factors. MiHR's exit model considers demographic factors (e.g., age, educational levels) to estimate the share of Alberta's workers likely to withdraw from the labour force over time. MiHR projects the annual labour force exit rate to range between 1% and 2%.

- 3) Mining industry exits:** the number of individuals leaving the Mining and Oil & Gas Sector to work in another sector. Given the limited data available on industry exits, MiHR has relied on existing literature to estimate an annual industry exit rate of about 7% over the forecast period.<sup>4,5</sup>

Table 5 provides the cumulative hiring requirements over the forecasted period in the Mining and Oil & Gas Sector for 10 critical occupations, under each of the three economic growth scenarios. Under the baseline scenario, Alberta's Mining and Oil & Gas Sector will need to hire 148,079 additional workers over the next decade to accommodate growing labour needs and to replace workers exiting the sector.



4 Xuyang Chen and Maxime Fougère. (2009). *Inter-provincial and Inter-industry Labour Mobility in Canada, 1994-2005, the Survey of Labour and Income Dynamics (SLID)*.

5 U.S. Bureau of Labour Statistics. (2023). *Occupational Separations*



**Table 5: Mining and Oil & Gas Sector Cumulative Hiring Requirements by Occupation, Three Economic Growth Scenarios (2024 – 2033)**

Occupation	Contractionary Cumulative Hiring Requirements	Baseline Cumulative Hiring Requirements	Expansionary Cumulative Hiring Requirements
<b>All occupations</b>	<b>65,340</b>	<b>148,079</b>	<b>230,817</b>
Heavy Equipment Operators	3,255	7,377	11,499
HD Equipment Mechanics	1,040	2,358	3,675
Construction Millwrights	1,231	2,789	4,347
Welders and Related Machine Operators	1,086	2,461	3,836
Mechanical Engineers	957	2,168	3,380
Industrial Electricians	843	1,910	2,977
Supervisors, Mining and Quarrying	453	1,028	1,602
Mining Engineers	236	535	834
Underground Miners	63	143	224
Central Control and Process Operators	32	73	114

Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024).

### Workforce Deficits

Table 6 outlines the inflow and outflow components of the forecasted *Workforce Deficit*, that is, the residual hiring needs not met by locally available talent. Though they report different numbers, workforce deficits shown in Table 6 are consistent with the labour gaps presented in Table 5. Labour gaps describe how labour demand and labour supply will diverge in net terms and in a particular year, whereas workforce adjustments describe the cumulative inflows (entries) and outflows (exits) that will occur over the entire forecast period.

In Table 6, the cumulative workforce deficit for the forecast period is calculated as:

$$\text{Workforce Deficit} = \text{Hiring Requirements} - \text{Expected Alberta Entries}$$

Here, *Expected Alberta Entries* refer to the number of “natural” entrants that MiHR estimates will enter Alberta’s mining sector under status quo conditions through 2033. MiHR’s model projects a cumulative workforce deficit of approximately 7,750 workers in the Mining and Oil & Gas Sector. This shortfall indicates that mining employers will likely need to address the deficit by recruiting talent from out-of-province and from other sectors.

**Table 6: Mining and Oil & Gas Sector Cumulative Inflows and Outflows by Occupation, Baseline Scenario (2024 – 2033)**

Occupation	Cumulative Net Change in Labour Demand	Cumulative Exits	Cumulative Hiring Requirements	Cumulative Expected Alberta Entries	Cumulative Workforce Deficit
<b>All occupations</b>	<b>22,770</b>	<b>125,309</b>	<b>148,079</b>	<b>140,328</b>	<b>7,750</b>
Heavy Equipment Operators	1,134	6,243	7,377	6,954	423
HD Equipment Mechanics	363	1,995	2,358	2,187	171
Construction Millwrights	429	2,360	2,789	2,646	143
Welders and Related Machine Operators	378	2,082	2,461	2,340	121
Mechanical Engineers	333	1,835	2,168	2,046	122
Industrial Electricians	294	1,616	1,910	1,844	66
Supervisors, Mining and Quarrying	158	870	1,028	969	58
Mining Engineers	82	452	535	512	23
Underground Miners	22	121	143	131	13
Central Control and Process Operators	11	62	73	69	5

Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024).



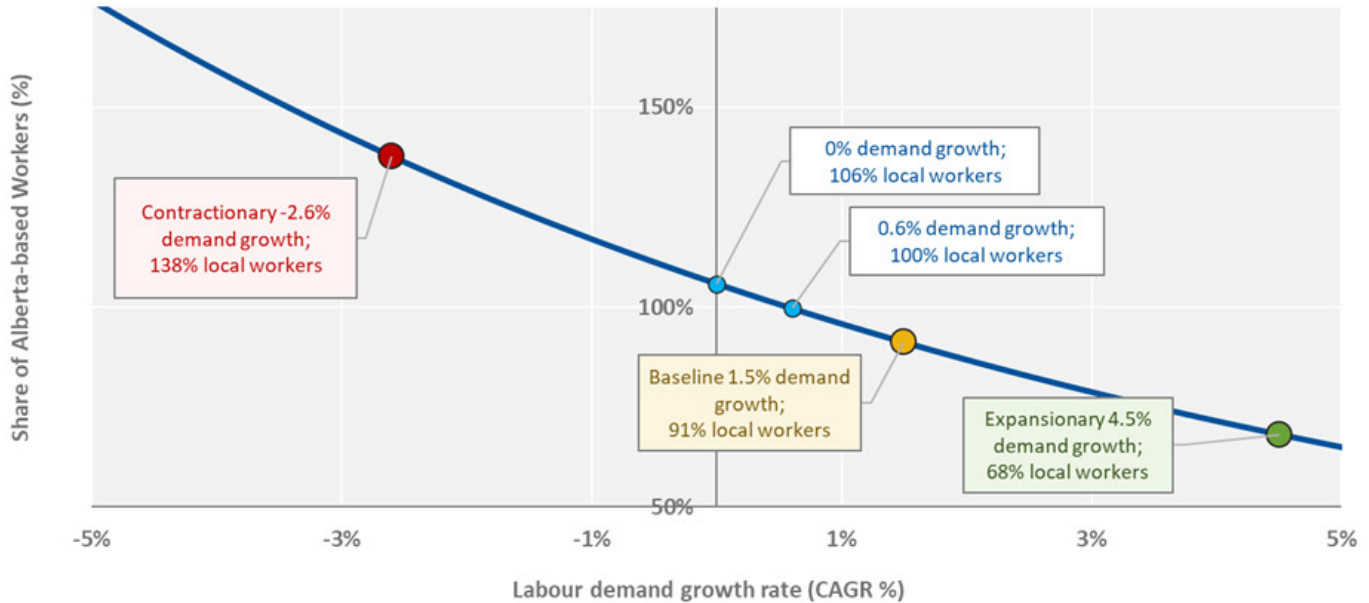
## Addressing the Primary Research Question

Based on MiHR's assumptions and current conditions, all 10 critical occupations project a gap in 2033, though the magnitude of these gaps varies by occupation. If the objective is to achieve full reliance on Alberta-based workers for these 10 critical occupations, the province's labour market will likely face challenges in sustaining its future growth without out-of-province support. Alberta's labour supply alone cannot sustain the anticipated growth in labour demand over the forecasted period.

Figure 11 demonstrates an inverse relationship between the Mining and Oil & Gas Sector's labour

demand growth (x-axis) and the share of Alberta-based workers projected to fulfill that demand (y-axis). Under the baseline demand scenario of 1.5% growth per year, 91% of the sector's workforce is estimated to be Alberta-based. In the expansionary scenario, with a more rapid 4.5% growth per year, the share of local workers falls to 68%. For the sector to achieve full reliance on Alberta-based workers, the labour demand growth rate must be capped at 0.6% per year. This trend emphasizes how higher growth will intensify competition for local labour, underscoring the challenges of sustaining workforce needs with Alberta's labour pool alone.<sup>6</sup>

**Figure 11: Mining and Oil & Gas Sector Labour Demand Growth and Share of Alberta-based Workers (2033)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024)

Several factors shape Alberta's labour supply and its ability to respond to growth, e.g., Alberta's population growth, labour force participation rate, and the share of workers entering mining-relevant occupations.

Figure 12 visualizes the points of attrition in Alberta's labour supply for the 10 critical occupations. At the top, the graph illustrates the overall population, with

each subsequent layer below representing a potential stage of attrition for the mining sector. The layers progress until reaching mining sector employment in the bottom left-hand corner. This visualization helps quantify where individuals are most likely to deviate from a career path in mining.

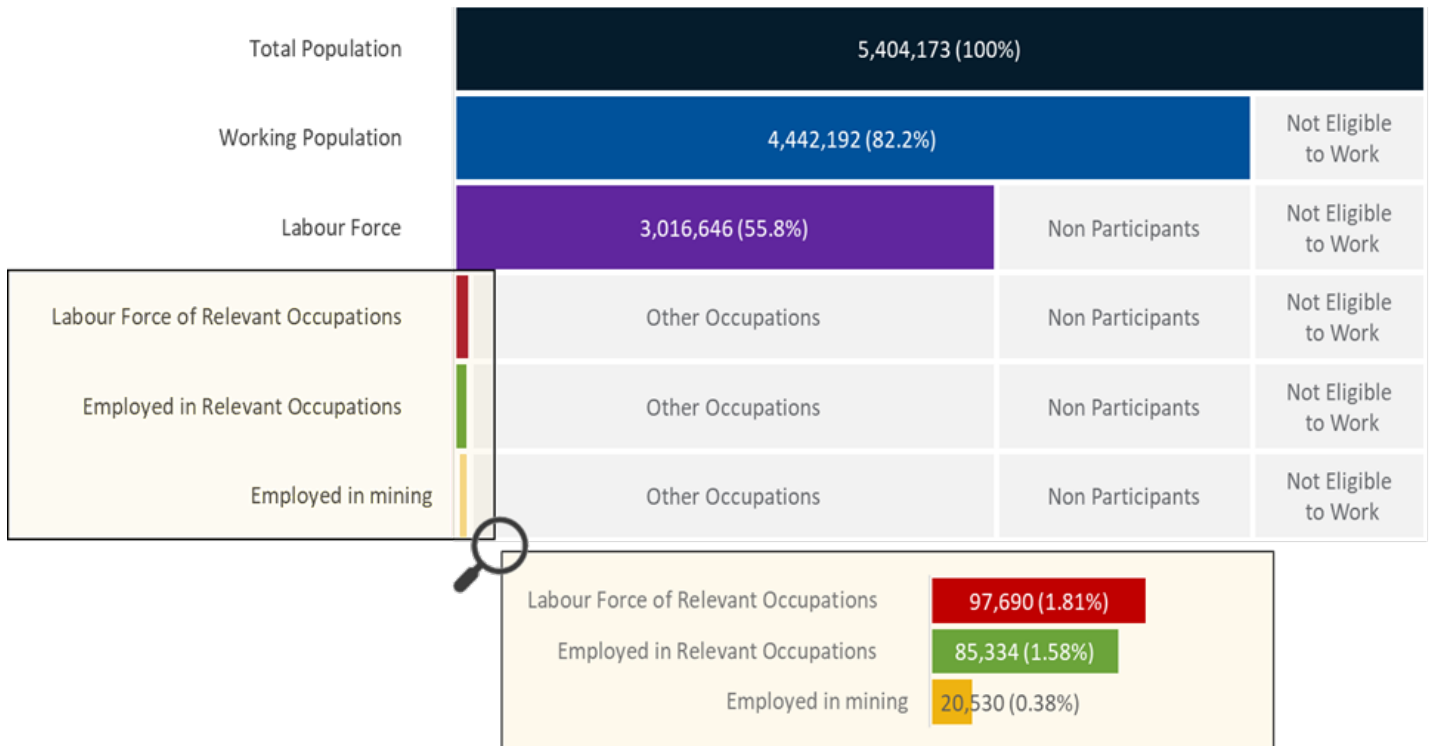
<sup>6</sup> MiHR's projection assumes an inelastic labour supply. This means that wage incentives would have a minimal effect on the availability of local labour supply in the short term.



As shown in the graph, the largest drop-off occurs at the stage where individuals make occupational choices. Out of approximately three million workers in Alberta’s overall labour force, only 97,690 are in

the 10 occupations, representing just 3.2% of the total workforce. Of these workers, only 21% (20,530 workers) are employed in the Mining and Oil & Gas Sector.

**Figure 12: Labour Supply Deconstructed, 10 Critical Occupations (2033)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024).

Overall, there are two major points of attrition in Alberta’s labour supply, each of which requires a tailored strategy to address:

**1) People are not choosing the relevant occupations:** Occupational choices represent the largest point of attrition, contributing to a limited labour pool where too many sectors compete over too few candidates. Addressing this challenge will require collaboration with other sectors to grow the occupational labour pool such that it can sustain the growth of all sectors. This involves labour force development by investing in career awareness, skills training and investment in relevant education programs within the province. In essence, this approach seeks to “grow the whole pie” to support

sustainable and competitive labour pools for all sectors.

**2) People are not choosing the mining sector:** Even when potential candidates choose a mining-relevant occupation, they often elect to work in other industries. Addressing this challenge requires strategies to attract workers into the sector, such as offering competitive wages and benefits, investing more in recruitment efforts and intensifying advertising campaigns centred on mining.

The strategies required to address these challenges may vary by occupation, depending on occupational trends such as education pathways, wage levels and employment conditions.



## Chapter 2: Key Informant Interviews

In 2024, MiHR conducted a series of key informant interviews with stakeholders across Alberta’s mining labour market to better understand the challenges and opportunities facing the sector. These interviews included conversations with representatives from the University of Alberta’s engineering department, a postsecondary institution training the next generation of mining professionals, and from TPD, a recruitment services provider.

Stakeholders offered their insights into the main challenges facing Alberta’s mining labour market. This section explores these interviews, highlighting areas where the mining industry is experiencing labour market pressures and developing potential strategies to address them.

### **University of Alberta**

The University of Alberta (U of A) plays a critical role in shaping the future workforce of Alberta’s mining sector through its world-class engineering programs. As a top-tier mining education provider, the U of A balances cutting-edge technical instruction with experiential learning opportunities to ensure graduates are industry-ready. U of A has a unique perspective of labour market issues at the postsecondary level and their impact on the future talent pipeline.

## Main Challenges

### *Declining Enrolments*

U of A highlighted the decline of mining and petroleum engineering programs, which have experienced a significant drop in enrolment in recent years. For most engineering students, mining is not a highly sought-after engineering specialization, and is often viewed as a fallback option for those unable to secure their preferred fields. Mining engineering enrolment at U of A contracted from roughly 111 in 2018 to just 68 students in 2024. Despite this, there is cause for optimism: “out of the 26 students currently going out for work terms, mining was the first choice for 60% of them. This is encouraging.”

To compensate for falling enrolments in mining engineering, employers frequently hire engineering students based on general aptitude rather than their specialization. This points to a disconnect between graduating students and Alberta’s mining sector.

### *Limited Exposure and Awareness of the Industry*

A lack of industry awareness was cited as a key issue in attracting students to the mining engineering field. Young people with limited exposure to the mining world are often uninformed and tend to dismiss mining as a viable and dynamic career option. On the other hand, students familiar with the industry, through family connections or proximity to mining regions, are more likely to pursue mining education. Without targeted outreach and education initiatives, students often perceive mining as outdated or irrelevant.

### *Mismatch Between Student and Employer Expectations*

U of A also pointed to the discrepancy between industry needs and the priorities of the younger generations. For example, students entering the labour market increasingly place a high value on work-life balance and location flexibility. These values can be at odds with traditional mining roles that often require site-based work in remote locations. In one instance, a U of A student with a placement

role declined to continue with the company following graduation because they did not want to leave Edmonton, preferring to stay in the city despite the opportunity for career growth.

### *Challenges in Co-op Placements*

Co-op programs, while valuable, face specific timing and planning challenges. Students typically have a narrow timeframe to actively search for roles, which sometimes leads to a misalignment between the timing of students seeking placements and employers posting opportunities. Students who fail to secure mining-specific placements often turn to other industries or jurisdictions.

Furthermore, many co-op placements begin with less technical and more isolated roles, such as haul truck operation, which may not provide the early technical experience that students need to thrive. As remarked by a U of A representative, “the biggest challenge is how can we ensure students to get the field experience in these co-op placements.”

In Alberta, aside from the oil sands, there is only one active metallurgical coal mine where students can gain field experience. As a result, co-op opportunities are limited.

## Solutions and Initiatives

### *Early Career Exposure Programs*

A lack of exposure to the sector means that most people are not inclined to pursue postsecondary education programs that lead to careers in mining. To address this lack of awareness and broaden interest across engineering disciplines, U of A has initiatives focused on K-12 youth as well as first-year university students.

U of A’s DiscoverE summer camp introduces youth aged 6 to 18 to engineering, science and technology through hands-on workshops and engaging activities. Designed to inspire curiosity, the program provides a foundation for exploring engineering disciplines in an accessible and fun environment. There are



one-to-two-day camps specific to each discipline, including a day for mining, providing students with hands-on, real-world experiences that showcase the industry’s dynamic opportunities.

At the university level, “Engineering First” nights provide first-year students with opportunities to network with industry professionals, often sparking interest in disciplines they might not have previously considered.

These interactions can have a dramatic impact, shaping academic and career trajectories early in a student’s engineering journey. For example, a former award-winning student—now in a Master’s program and in a prestigious internship in the US—decided to change her specialization from Chemical to Electrical Engineering after speaking to people at the career fair and Engineering First night. As noted by U of A, providing first-year students with these resources “is the best thing we can do, knowing we have a very small window to influence or educate students on what engineering is, and what each engineering discipline does.”

### **Curriculum Modernization**

Incorporating the latest technology into the curriculum is key to appealing to students, making mining disciplines more attractive by demonstrating their relevance to the evolving, tech-driven future of the industry.

U of A is continuously modernizing its engineering programs to align with industry needs. For example, its engineering programs recently began utilizing open-source Python, a widely-used programming language that allows students to perform essential data processing and automation skills, in order to simulate real-world work. Similarly, the mining engineering program emphasizes the use of leading industry software to perform deposit assessments, ensuring that graduates are prepared to operate in high-tech environments.

### **Enhancements to Co-op Programs**

A significant challenge is ensuring that co-op programs adequately expose students to experiences that are relevant to a real job (e.g., field work). To supplement co-op offerings, U of A offers other avenues for experiential learning, such as job shadowing, field trips and virtual tours.

Additionally, there is a need to better align employer recruitment schedules with the periods when students look for jobs. By addressing this timing disconnect, and by expanding field work opportunities, employers can better support students and reinforce mining as a viable long-term career.

### **Promoting Flexibility and Broad Career Options**

The mining sector struggles to attract younger workers who increasingly prioritize work-life balance. To address this, U of A emphasizes to students the diversity of opportunities within mining, including roles in project planning, feasibility studies and operational oversight, many of which can be conducted offsite. Highlighting these pathways helps align the sector with modern workforce values, making careers more appealing to the next generation of workers.



## TPD Workforce Solutions

TPD is a recruitment services provider that specializes in helping employers optimize their hiring processes and attract top talent. In Alberta's Mining and Oil & Gas Sector, TPD's work focuses on addressing recruitment challenges in remote regions, streamlining hiring practices and aligning employer strategies with the expectations of a new generation of workers. TPD shared their on-the-ground perspective of Alberta's mining labour market, particularly concerning geographic remoteness, industry perceptions and youth engagement.

### Main Challenges

#### *Remote Locations and Relocation Barriers*

TPD cited that the remoteness of mining work was a major barrier for many prospective candidates. Fly-in, fly-out (FIFO) positions have become less common, with employers increasingly seeking to permanently relocate workers closer to the work sites. Therefore, persuading candidates to move to rural regions has become especially important, though their preference for urban living creates a significant challenge.

Part of the problem is that qualified candidates can find their preferred job position elsewhere in Canada, closer to large urban centres. A TPD representative put it succinctly: "I can have the same job in Hinton as in Fort McMurray as in Vancouver." For many, geography is the deciding factor when making life-changing career decisions.

#### *Reputation and Awareness Issues*

Reputational issues were mentioned as a major obstacle for engaging potential candidates, particularly with younger generations: "Teenagers, when asked about career paths, never say 'mining'. They picture guys with pickaxes."

Potential entrants tend to view mining as physically demanding, environmentally harmful and technologically stagnant. There is also a general lack of awareness about career opportunities in mining. As a result, mining-relevant occupations tend to be

overlooked and not considered seriously as a career option.

Perceptions about life in the remote regions where mining takes place also plays a significant role. Candidates weigh not only job opportunities, pay and job satisfaction, but also consider the prospective community they would be living in, the cost of living, the available amenities and the overall lifestyle the community would offer them.

For example, Fort McMurray has conventionally been known for its high cost of living (e.g., expensive rental prices), which can deter people from considering employment in the area. Despite affordability having improved markedly over the past decade (average rent prices fell from \$2,067 in 2013 to \$1,375 in 2023), there is a lingering stigma tied to the area's cost of living.

As noted by TPD, due to these awareness and reputational issues, the number of young workers joining the mining sector has been too small to offset retirements.

#### *Generational Preferences*

TPD indicated that younger workers, particularly Gen Z, have priorities and preferences that differ from previous generations. Young people place a large emphasis on work-life balance, mental health, caring for the environment and aligning day-to-day work with their personal values. Consequently, young career seekers do not perceive resource extraction (i.e., Mining and Oil & Gas) as being compatible with their values and priorities, and thus exclude the sector as an option.

Although mining can offer opportunities for youth to contribute to tech innovation and the green economy, awareness of these aspects is limited.

#### *Cyclical nature of the Industry*

Cyclical nature represents another challenge to mining employers that require a steady labour pool. TPD pointed out that the volatile nature of the sector contributes to workforce attrition, as workers are

often lured by other industries offering more stable employment.

The boom-and-bust nature of Alberta's Mining and Oil & Gas Sector hinders retention, as workers hired during boom periods often face uncertainty during downturns. This instability also deters potential candidates from committing to long-term careers in the sector due to concerns over job security.

### ***Immigration and Certification Challenges***

TPD noted that immigration can help mitigate labour shortages in the province, though a significant portion of the immigrant labour force remains underutilized.

For instance, the Red Seal Program presents a barrier to capitalizing on the skilled immigrant labour pool. Certification requires more than simply passing a test; candidates must also demonstrate a proven track record of skills and experience. The length of this process may act as a barrier, potentially discouraging qualified immigrant candidates (who cannot afford the time commitment) from pursuing the program.

Another obstacle is limited language proficiency among some immigrant workers. Despite having valuable skills, education and training from their home countries, many newcomers struggle to apply them in Alberta due to language barriers. Strong language skills are vital not only for successful interviews and effective teamwork, but also for long-term career advancement.

## **Solutions and Initiatives**

### ***Relocation Support and Marketing***

Given that geography is a major barrier for potential workers, TPD stressed the importance of offering a sound relocation strategy for new employees. This includes adopting a smarter approach to marketing remote roles to new candidates, framing it not just as a job but as a lifestyle upgrade: "Sell them on the beautiful area, schooling, attractions, community, highlight the affordable housing costs. Convince them it's more than a job, convince them to build a life there."

A strong strategy may also include providing relocation supports, such as covering moving costs or offering temporary accommodation for one or two months. Additionally, helping candidates navigate relocation (e.g., by sharing digital resources such as Facebook groups and real estate platforms) is a strategic way for companies to differentiate themselves in a competitive environment.

### ***Engaging the Next Generation***

TPD recommends tailoring recruitment strategies to Gen Z values by emphasizing the mining sector's alignment with their priorities, such as sustainability, innovation and career growth. They stress the importance of reframing mining as a technology-driven field that is critical to the green economy and full of exciting opportunities.

Countering a poor reputation among the youth must begin well before the stage where they have established their career path. More often than not, critical career paths are shaped during grades K-12, suggesting that initiatives to boost mining's image would be more effective at earlier stages of a student's life. It is crucial for students to understand the indispensable role of mining in modern technology and sustainability. A collaboration between industry and government aimed at educating students could address misconceptions and promote the critical role of mining in the green economy.

### ***Reducing Turnover and Optimizing Recruitment***

Due to some of the issues mentioned earlier (remoteness, the boom-and-bust nature of the industry, etc.), mining often has difficulty retaining employees compared to other industries. Therefore, it is important to have an informed strategy for reducing turnover. Although turnover is inevitable, TPD recommends that companies take the employees' perspective. "People don't leave companies when they are happy". Frequently, the root causes of employee dissatisfaction can be miscommunication or minor oversights that are easily fixed. Better understanding the reasons employees



choose to leave can help identify small changes that can potentially yield great results in terms of reducing turnover rate.

Likewise, there are small changes to the recruitment process that can have a profound impact on recruitment outcomes. TPD suggests companies optimize their hiring practices: “There is no need to have eight interviews; you don’t need to have a month between phase 1 and phase 2 [of recruitment]. Agile companies are going to win the war for talent.” Minimizing bureaucratic delays, reducing the number of interview rounds and prioritizing the candidate experience can help companies respond quickly and decisively to applications, making them better positioned to secure skilled workers.



## Comments from Other Stakeholders

In addition to the in-depth interviews conducted with TPD and the University of Alberta, MiHR also received feedback from various other stakeholders and industry experts, from a range of viewpoints. The following section discusses some of the common themes and pressing issues that were most often highlighted.

## Main Challenges

### *Aging Workforce and Shrinking Talent Pipeline*

A frequently cited problem for workforce sustainability is the aging population. Like many other industries, mining faces an aging workforce, with a large contingent of workers entering their retirement years. Between 2011 and 2023, the share of workers aged 55 and older in Mining, Quarrying and Oil and Gas Extraction (NAICS 21) increased from 13% to 18%. This issue is magnified by the declining numbers of students entering mining-relevant programs (e.g., trades programs like RAMP) and fewer younger workers ready to step into critical roles in mining operations (especially for equipment operations). Rather than developing new talent, companies tend to compete over a small pool of regional talent, creating gaps in critical operational positions.

Low student retention was also cited as a significant issue. Some stakeholders noted that Alberta has become a training ground for Engineers-in-Training (EITs) who often leave the province for other opportunities after obtaining their P.Eng. designation. Many younger workers are drawn to urban environments, while FIFO arrangements, once a standard in Alberta, are increasingly seen as a temporary solution rather than a pathway to long-term employment.

### *Housing and Infrastructure*

The housing market in remote communities has been an ongoing concern. One workforce planner remarked that stagnation in the housing market “traps workers in the region where properties are difficult to sell, especially with the absence of a new oil boom on the horizon.” This, in addition to a lack of infrastructure, further impacts the desire to commit to these communities long-term.

There is also the perception that investment in local communities has dwindled. Insufficient healthcare services, overcrowded classrooms, and limited recreational options adds further difficulty in attracting and retaining talent, as candidates

tend to prefer areas with better infrastructure and more amenities.

### ***Narrowing Wage Gap***

Over the last decade, Alberta's competitive edge in offering high wages has gradually diminished<sup>7</sup>. Other provinces have seen wages increase at a faster rate than in Alberta, narrowing the wage gap and making it harder to retain a quality workforce.

For instance, an employer representative noted that tradespeople now opt for roles closer to home, even at slightly lower pay, undermining Alberta's ability to attract talent to remote areas. This is particularly evident with more experienced workers, who are less likely to relocate to remote areas, creating a gap in mid-career professionals willing to fill essential roles.

In general, opportunities with similar incentives, and often more desirable locations, are now available across Canada, further reducing the province's competitive advantage.

## **Solutions and Initiatives**

### ***Effective Strategies for Younger Generations***

Attracting youth is essential for counterbalancing the aging workforce. Suggestions from workforce planners included targeted youth attraction campaigns and increased youth programming to generate interest and encourage young people to consider careers in the sector. To engage the next generation of workers, it is critical for the sector to emphasize sustainability, innovation, and long-term career viability.

Another key strategy to improving youth recruitment is to address generational preferences for work-life balance and mental health. While the nature of operational work requires on-site presence,

introducing hybrid solutions where feasible and modernizing workplace practices can help employers better align with today's workforce expectations.

### ***Strengthening the Pipeline through Improved Training Opportunities***

Feedback from the sector emphasized the importance of expanding apprenticeship opportunities and encouraging more young people to pursue trades. This includes offering dual-ticket certifications, which would be more attractive for prospective apprentices and increase the pool of qualified candidates in essential roles.

Additionally, providing upskilling opportunities for the current workforce, such as transitioning Heavy Equipment Operators (HEOs) into technicians and potentially engineers, could help reduce reliance on new graduates and build a more experienced workforce internally. Prioritizing employee development can improve retention and address critical labour shortages.

### ***Investing in Housing, Infrastructure and Regional Connectivity***

To improve the attractiveness of working in remote regions, industry members advocated for greater investment in housing and local infrastructure such as healthcare services, education facilities and recreational amenities. In addition, housing subsidies and compensation packages tied to homeownership could also incentivize long-term commitments to remote regions.

Support for families is also critical, especially by addressing the current childcare shortages and overcrowded classrooms – which are major concerns for working parents.

<sup>7</sup> Refer to Chapter III of this report for supporting wage statistics and analysis.



## Summary of Recurring Themes

Several recurring themes emerged across these interviews, underscoring the industry's most pressing issues.

- 1) Remoteness and Relocation Issues:** The remoteness of many Alberta mining job sites, coupled with workers' preference for urban living, presents a significant barrier to recruitment, necessitating effective marketing strategies and relocation support to attract talent to these regions.
- 2) Lack of Investment in Infrastructure and Housing:** For mining communities, stagnation in the housing market, coupled with a lack of infrastructure and investment in local services like healthcare and education, makes it challenging to attract and retain talent, as workers increasingly seek areas with better amenities and long-term stability.
- 3) Poor Industry Reputation:** A key challenge in addressing recruitment issues in Alberta's mining sector is the negative perceptions surrounding the industry, which exacerbate difficulties in attracting students and job seekers to relevant careers.
- 4) Lack of Exposure to Mining:** The lack of awareness about the mining industry, particularly among youth, leads to misconceptions and a limited understanding of career opportunities, hindering efforts to attract talent to the sector.
- 5) Declining Enrolments:** Declining enrolments in mining-relevant programs, as seen at institutions like the University of Alberta's engineering department, reflect the lack of interest in mining careers, exacerbating the industry's recruitment challenges.
- 6) Barriers to Accessing the Immigrant Workforce:** Despite the potential to alleviate labour shortages, many skilled immigrant workers remain underutilized due to certification barriers and language proficiency issues.
- 7) Cyclicity and Job Security:** The boom-and-bust cycles of Alberta's Mining and Oil & Gas Sector creates concerns about long-term stability and disrupts retention, as workers often leave during slower periods, and recruitment becomes more difficult during growth cycles.
- 8) Narrowing Wage Gap:** A narrowing wage gap between Alberta and other provinces challenges Alberta's historical advantage and amplifies recruitment challenges.
- 9) Need for Workforce Development:** Long-term development and training are necessary to promote labour market stability and reduce the reliance on poaching of skilled workers within the region; competing over a limited number of workers depletes the local talent pool and leaves critical roles unfilled.





## Chapter 3: Occupational Trends

Thus far, this report has highlighted several aspects of Alberta's mining labour market, starting with a quantitative analysis of critical mining occupations, followed by insights from key informants with firsthand knowledge of the most pressing issues facing the Mining and Oil & Gas Sector. This section expands on the main themes discussed by providing additional analysis related to the critical occupations that support mining in Alberta.

### Challenges with Remoteness

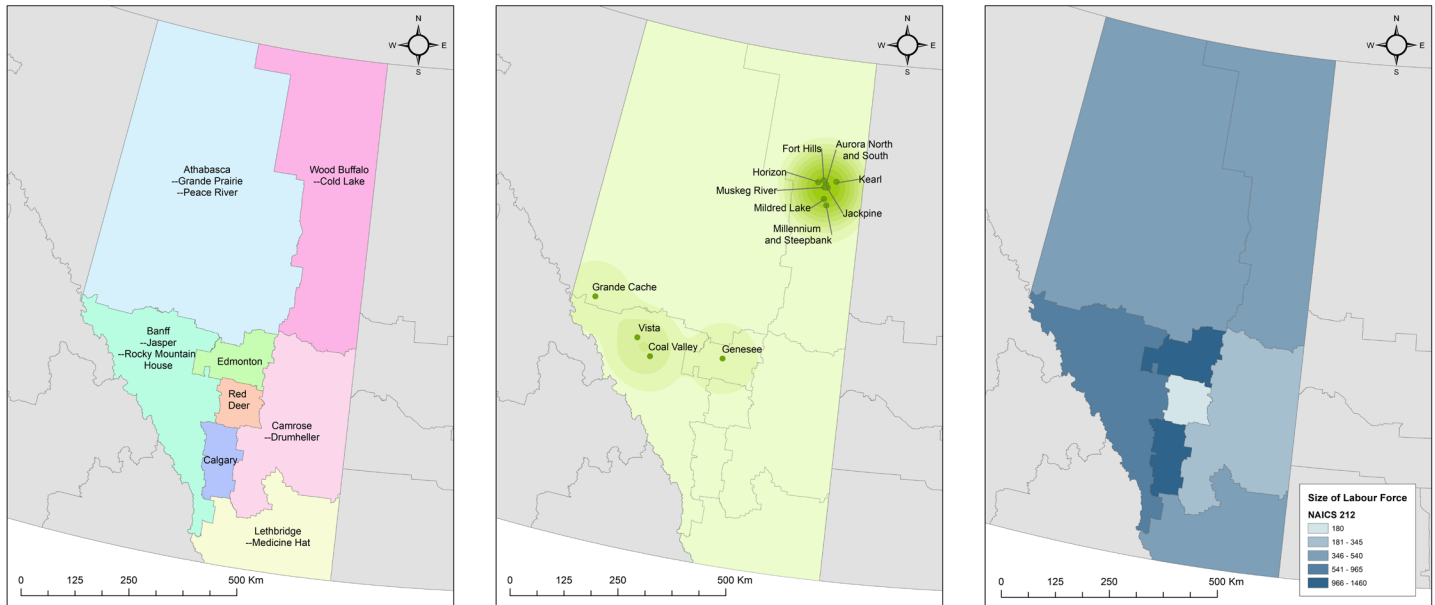
Key informants highlighted recruitment issues related to the remote nature of mining work. Figure 13 provides a visualization of economic regions in Alberta (left), contrasting the locations of producing mines (middle) to the place of residence for workers in Mining and Quarrying (NAICS 212) (right).

Unsurprisingly, most workers live in Calgary and Edmonton, indicating that many must travel should they be needed at the mine site. While this may seem obvious to those in the mining sector, it highlights a geographical challenge that is more severe in mining than in other industries, many of which enjoy the advantage and freedom to establish themselves in population centres with more available workers.

Appendix B shows the geographical distribution of workers across critical occupations, providing a clear reference for readers of this report, especially career

seekers, by highlighting the major workforce regions associated with their field.

**Figure 13: Geographic Distribution of Producing Mines and Labour Force in Mining and Quarrying (except oil and gas) by Economic Region**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Natural Resources Canada, Principal Mineral Areas, Producing Mines, and Oil and Gas Fields in Alberta (2024), Statistics Canada, Census of Population (2021).

## Negative Perceptions and Housing Costs

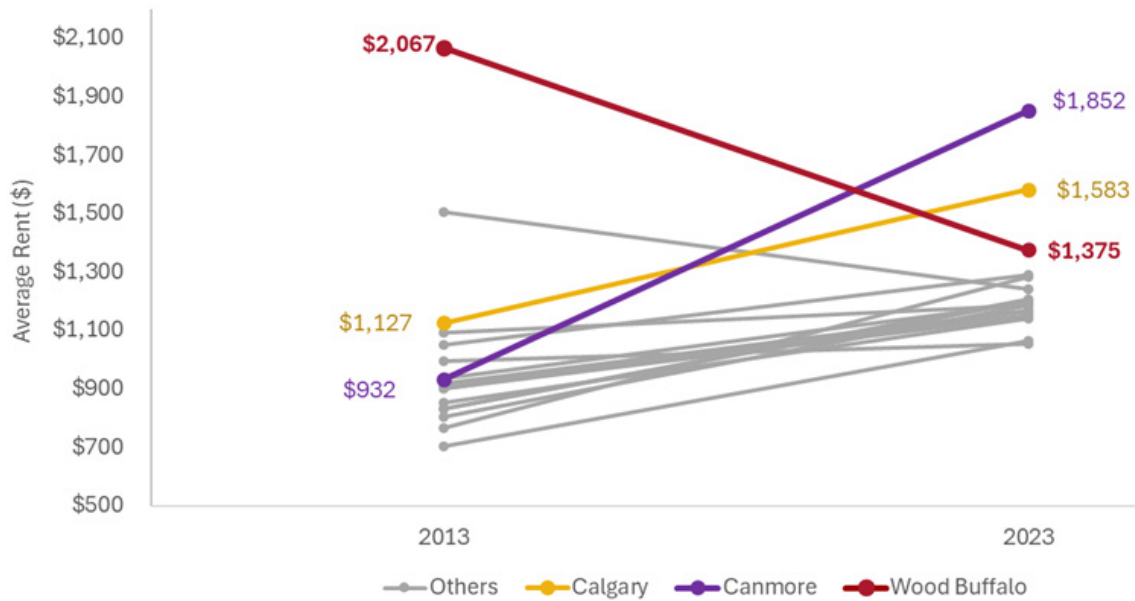
Key informants also suggested the mining industry is hindered by a less than favourable reputation. Reputational challenges go beyond the mining sector itself, also extending to the places where people would need to relocate to participate in the mining industry. For example, the long-standing perception that the Wood Buffalo region has a high cost of housing presents a barrier that mining employers must overcome to attract new talent.

Housing affordability and availability is examined in Figures 14, 15 and 16. Over the past decade, the average rent has increased for most regions in the province. In contrast, average rent in the Wood Buffalo region has dramatically decreased over this same period (Figure 14). Vacancy rates have also eased from a tight period in the early 2000's (Figure 15) further supporting the case that housing accommodations are more accessible compared to

their historical benchmark. Despite being the most expensive region a decade ago, the decline of rental expenses in recent years may not be well known among prospective candidates.

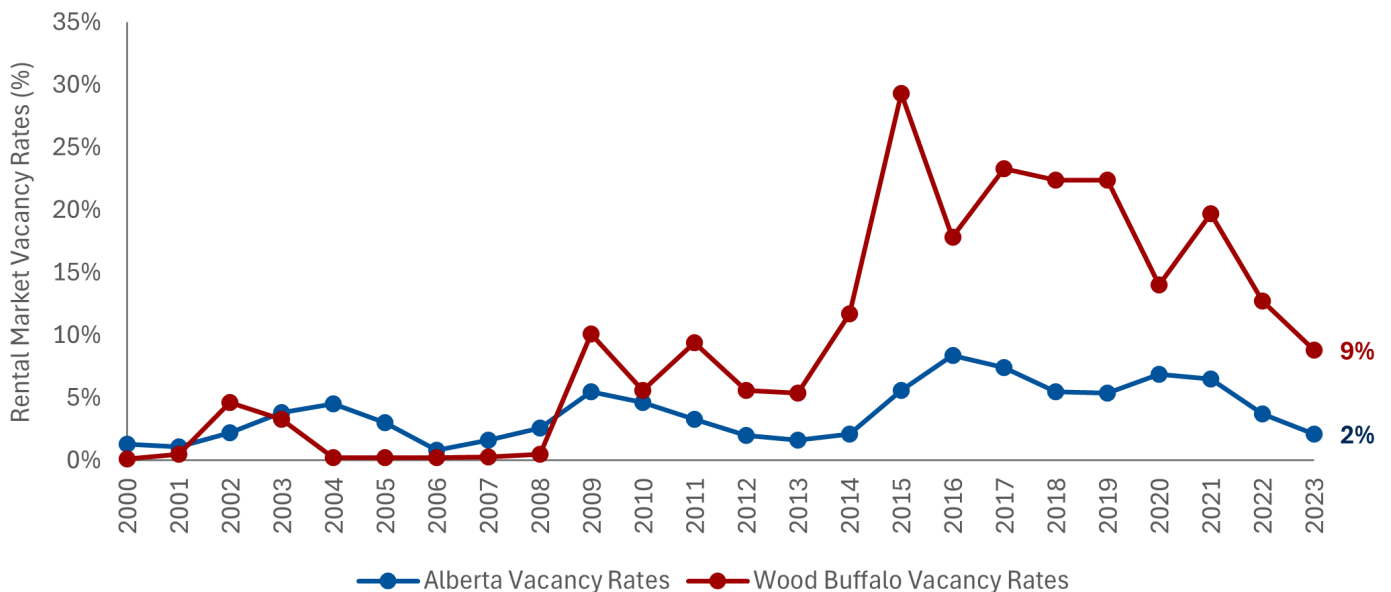
However, while rental expenses are down, the cost of owning a home in Wood Buffalo remains among the highest in the province. Figure 16 shows the cost of shelter for both renters and owners in various Alberta regions. Wood Buffalo displays the highest cost of shelter for owners, representing a potential obstacle for workers and families looking to relocate.

**Figure 14: Average Rent Wood Buffalo vs. Other Regions in Alberta**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Canada Mortgage and Housing Corporation (CMHC), Rental Market Report (2024).

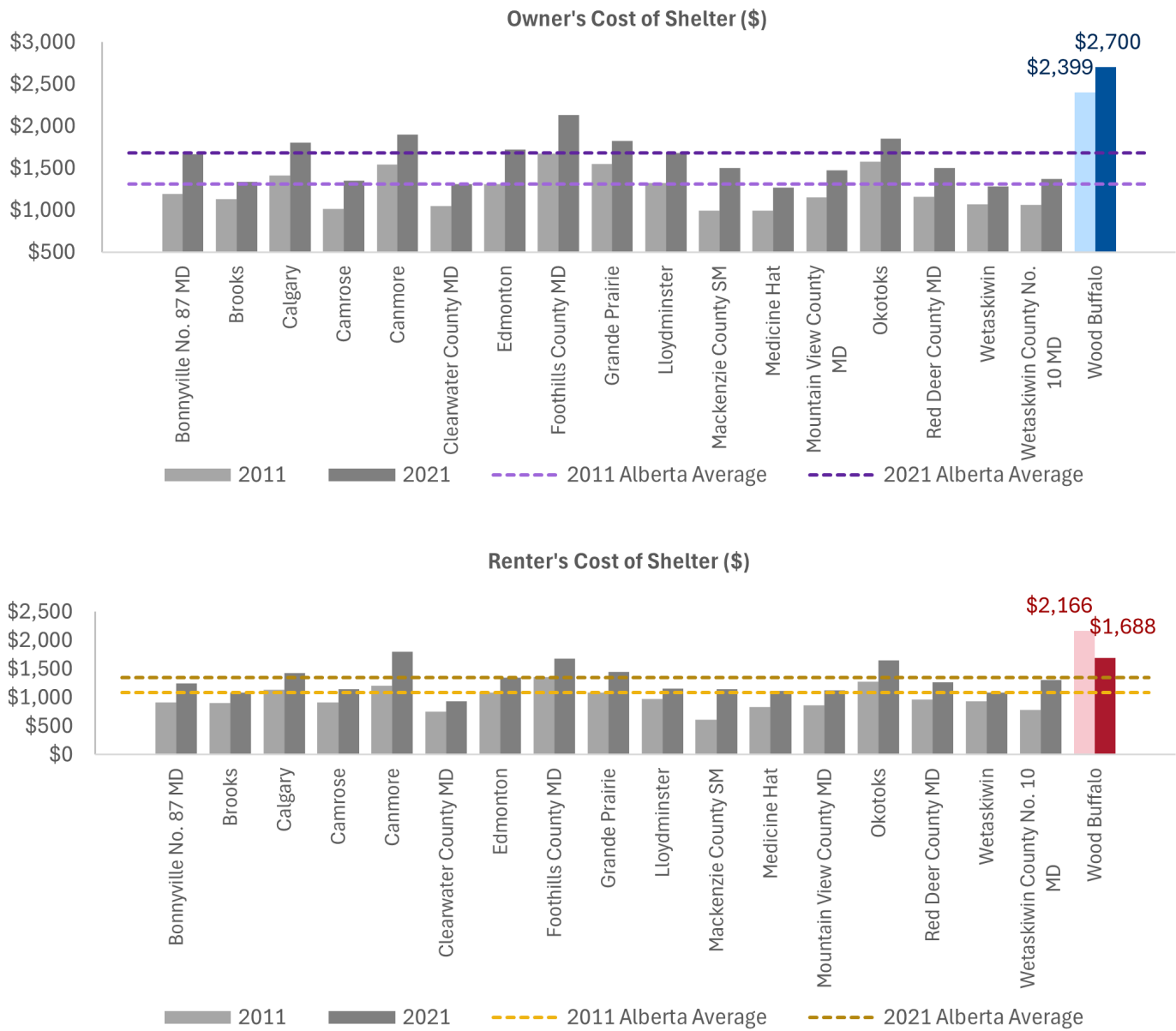
**Figure 15: Wood Buffalo vs. Alberta Vacancy Rates**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Canada Mortgage and Housing Corporation (CMHC), Rental Market Report (2024).



**Figure 16: Cost of Shelter for Owners and Renters, 2011 and 2021**



\* Shelter costs include, as applicable, rent, mortgage payments (principal and interest), property taxes, condominium fees, payments for electricity, fuel, water and other municipal services

Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2011, 2021).

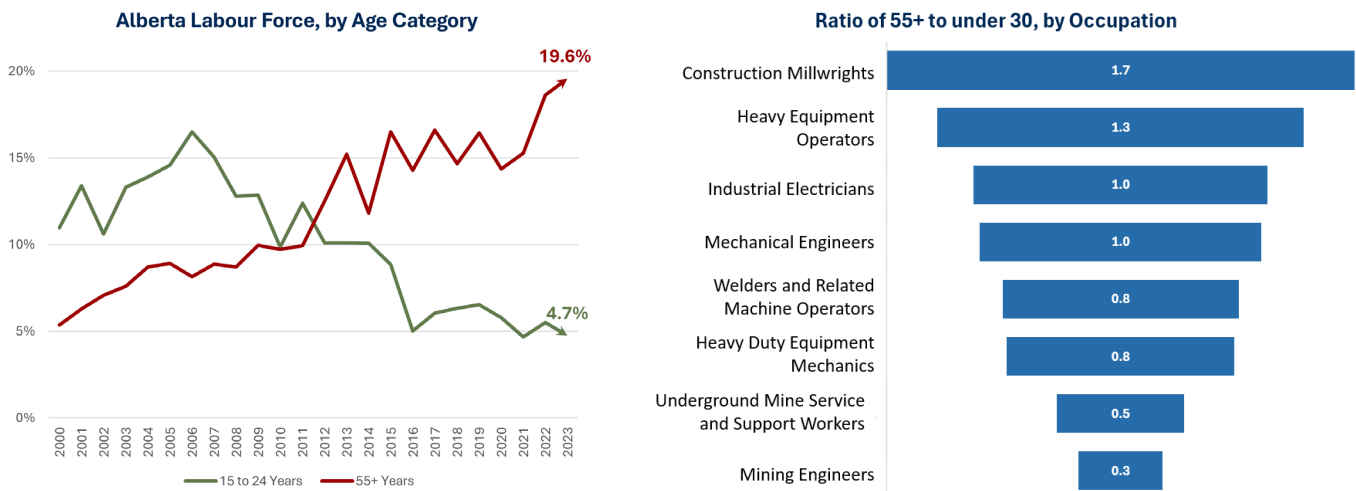


## Aging Labour Force

An aging population continues to be a concern for many sectors, including Alberta’s Mining and Oil & Gas Sector. As shown by Figure 17 (left), from 2012 to 2023, the province’s mining workforce experienced a widening age gap. The share of workers under 25 years old declined from 12.5% to 4.7%, while the share of workers aged 55 years and older increased from 12.5% to 19.6%. A wave of retiring workers can result in a potential shortage of skilled workers given that older workers have decades of experience and are not easily replaced.

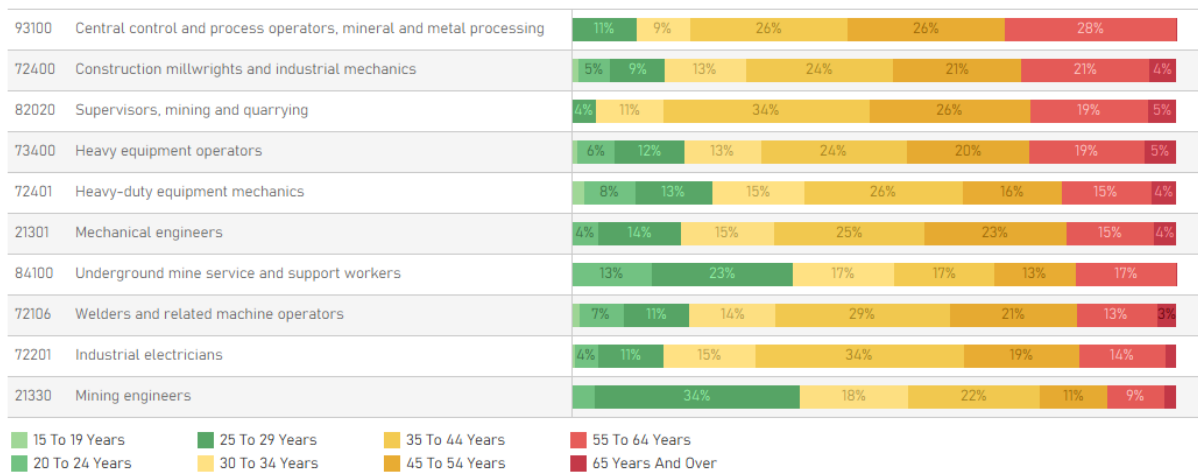
Figure 17 (right) ranks the ratio of older workers (55+) to younger workers (under 30) in critical occupations to illustrate how certain roles are more reliant on older workers. Figure 18 illustrates the age distribution of critical occupations in more detail. While some occupations naturally lean toward older workers (e.g., Supervisors), the figure shows how the youngest generations of workers are relatively absent in certain roles, representing the potential for labour market tightness and succession pressures in the future.

**Figure 17: Age Trends in the Mining and Oil & Gas Sector**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Labour Force Survey (2024), Census of Population (2021).

**Figure 18: Age Distribution by Occupation, 2021**



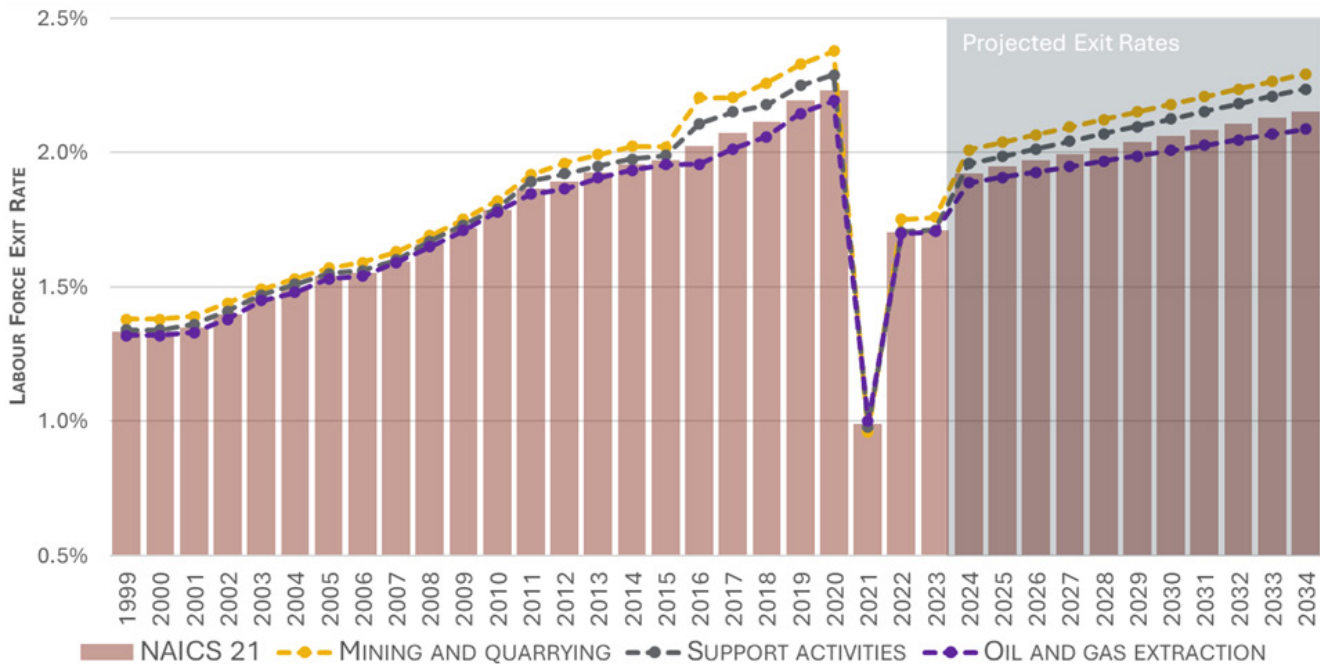
Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021).

## Retirements and the Labour Force Exit Rate

The rise in retirements is evident in MiHR’s projected “labour force exit rate,” defined as the annual percentage of mining workers expected to leave the labour force entirely. While the vast majority of these exits are due to retirement, they may also include

other reasons, such as returning to school, starting maternity or paternity leave, etc. As shown in Figure 19, MiHR anticipates the labour force exit rate will continue to increase to above 2% by 2034, based on the age distribution of the labour force and historical trends.

**Figure 19: Share of Labour Force Participants Exiting the Mining, Oil & Gas Labour Market, 1999-2034**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024).

## Declining Enrolment in Mining-Relevant Fields

The mining sector depends on the post secondary education system to ensure there is a reliable and sustainable source of new graduates to enter critical occupations. Thus, a disruption to the pipeline of enrolments in certain fields of study is detrimental to a healthy labour market.

Mining engineers are an example of an occupation experiencing disruption to its postsecondary pipeline. Figure 20 (left) shows what people employed as mining engineers chose to study in university. Unsurprisingly, the *Mining and Mineral Engineering*

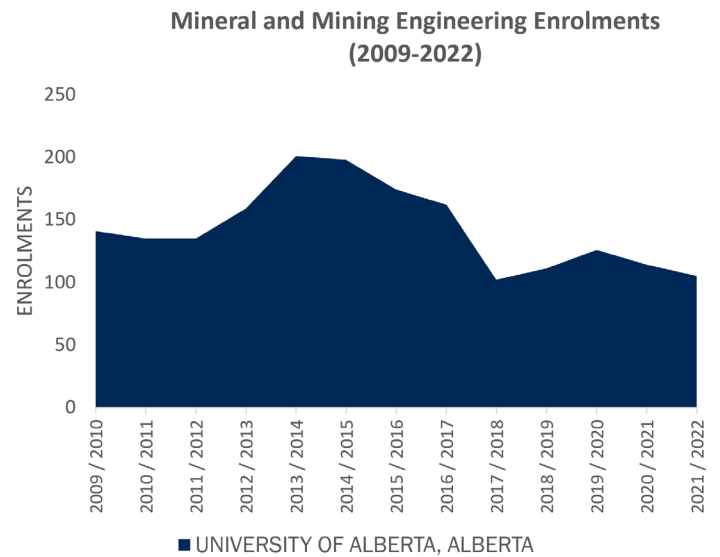
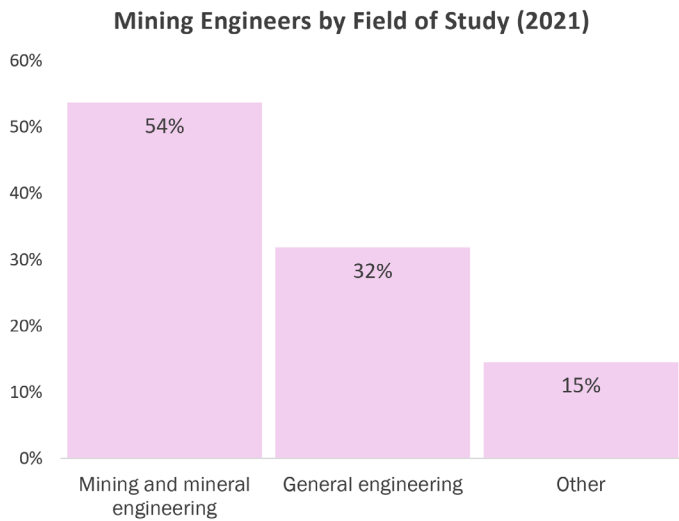
specialization is the most common field of study (at 54%).<sup>8</sup> Notably, enrolments in this field have experienced a significant decline, falling by half of their levels from 2017/18 to 2021/22, as shown by Figure 20 (right). Furthermore, only the University of Alberta is represented as having enrolments in *Mining and Mineral Engineering*, indicating the lack of diverse program options for students entering this field.

By contrast, the primary field of study for heavy duty equipment mechanics – *Heavy/Industrial Equipment Maintenance Technologies* – is supported by several competing school programs, ensuring continual enrolment growth in the field (Figure 21).

<sup>8</sup> Interestingly, for 32%, the pathway to Mining Engineering was through General Engineering rather than a more specialized engineering field. This result may suggest that a large number of students chose to be a Mining Engineer after graduation, otherwise they would have made that their main specialization.

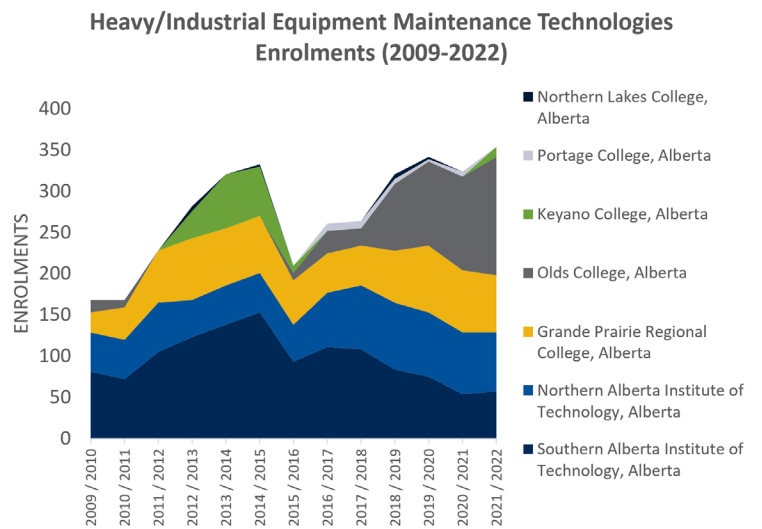
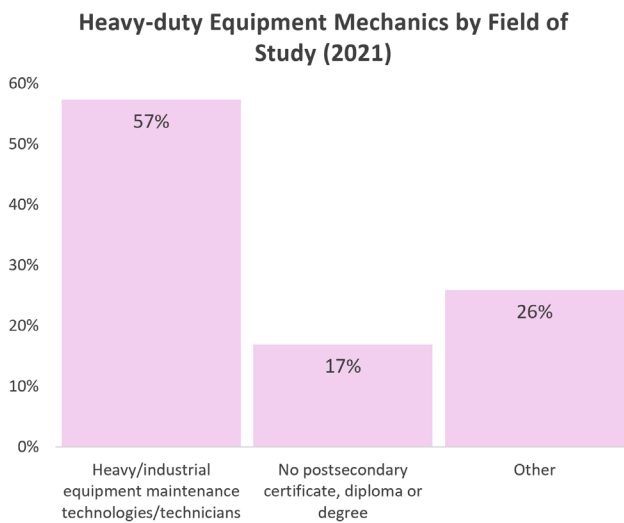


**Figure 20: Enrolment Trends in Mining Engineering**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021), Postsecondary Student Information System (2023).

**Figure 21: Enrolment Trends in Heavy-duty Equipment Mechanics**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021), Postsecondary Student Information System (2023).

Figure 22 shows the field of study breakdown for all 10 critical mining occupations, revealing the most common educational pathways for each role. In several cases, the mining sector relies on people with *No postsecondary education* (e.g., Heavy Equipment Operators). At the same time, more and more workers pursue a post-secondary education, resulting

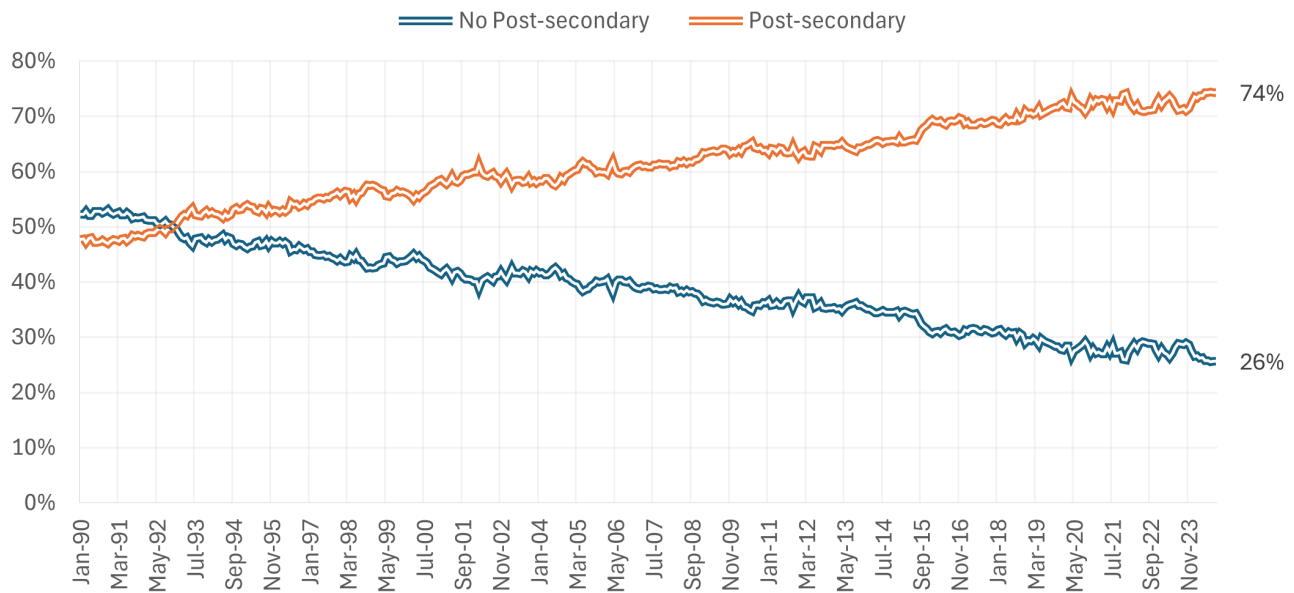
from an increasing dependency on the postsecondary system given its growing prevalence in modern society. Figure 23 shows the rise of post-secondary education in Alberta. In the early 90's, about half of all people held a postsecondary education; this has steadily risen to about three quarters in 2024.

**Figure 22: Major Fields of Study Among Various Occupations (2021)**

Occupation	Overlapping Fields of Study	%
<b>Mechanical Engineers (NOC 21301)</b>	<i>Mechanical engineering</i>	55%
	<i>General engineering</i>	28%
	<i>Other</i>	17%
<b>Mining Engineers (NOC 21330)</b>	<i>Mining and mineral engineering</i>	54%
	<i>General engineering</i>	32%
	<i>Other</i>	15%
<b>Welders and Related Machine Operators (NOC 72106)</b>	<i>Precision metal working</i>	73%
	<i>No postsecondary</i>	16%
	<i>Other</i>	11%
<b>Industrial Electricians (NOC 72201)</b>	<i>Electrical and power installers</i>	71%
	<i>No postsecondary</i>	6%
	<i>Other</i>	23%
<b>Construction Millwrights and Industrial Mechanics (NOC 72400)</b>	<i>Heavy equip. maintenance technicians</i>	51%
	<i>No postsecondary</i>	20%
	<i>Other</i>	29%
<b>Heavy-Duty Equipment Mechanics (NOC 72401)</b>	<i>Heavy equip. maintenance technicians</i>	57%
	<i>No postsecondary</i>	17%
	<i>Other</i>	26%
<b>Heavy Equipment Operators (73400)</b>	<i>No postsecondary</i>	73%
	<i>Ground transportation</i>	8%
	<i>Other</i>	19%
<b>Supervisors, Mining and Quarrying (NOC 82020)</b>	<i>No postsecondary</i>	47%
	<i>Precision metal working</i>	6%
	<i>Other</i>	47%
<b>Underground Mine Service and Support Workers (NOC 84100)</b>	<i>No postsecondary</i>	68%
	<i>Precision metal working</i>	13%
	<i>Other</i>	19%
<b>Central Control and Process Operators, Mineral and Metal Processing (NOC 93100)</b>	<i>No postsecondary</i>	39%
	<i>Energy systems technicians</i>	17%
	<i>Other</i>	43%

Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021).

**Figure 23: Educational Attainment in Alberta, Postsecondary vs. Non-Postsecondary (1990-2024)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Postsecondary Student Information System (2023).

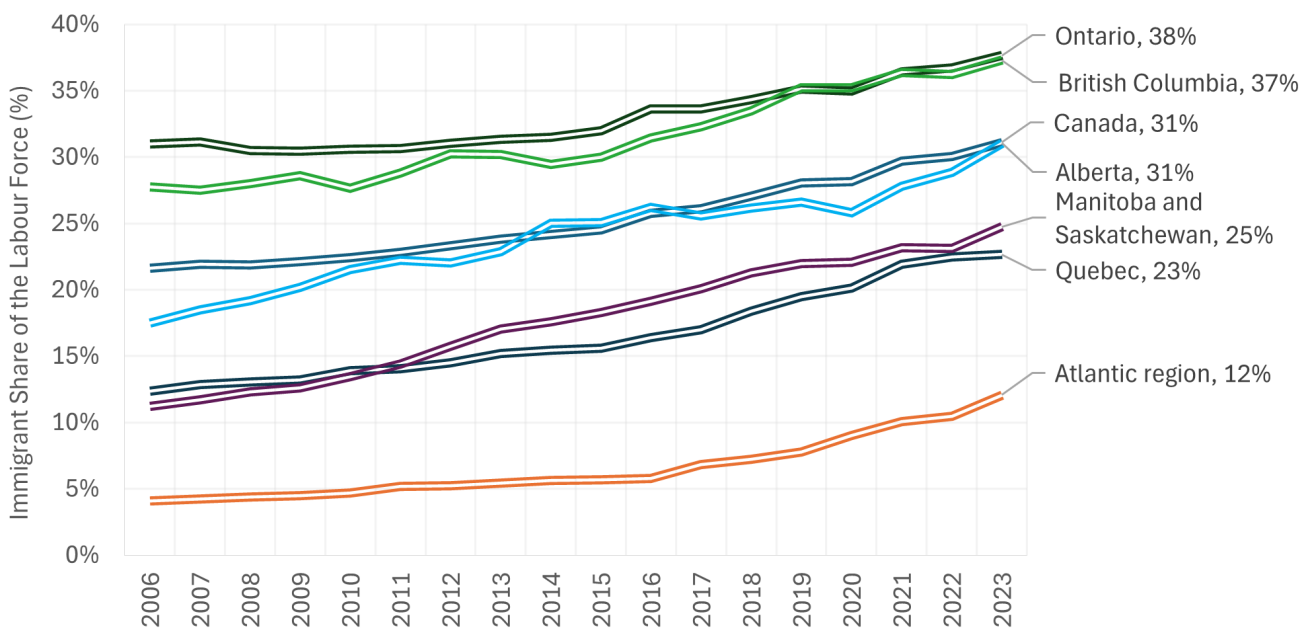
## Challenges with Diverse Population Groups

Historically, Alberta’s Mining and Oil & Gas Sector has not been able to tap into the full potential of certain demographic groups in its workforce. Finding ways to better connect with these groups has become increasingly critical for the sector to alleviate labour market pressures. Recent workforce trends in the sector highlight the underrepresentation of women and immigrants. In contrast, Indigenous peoples demonstrate a greater attachment to, not only the mining sector, but critical occupations as well.

## Immigrants in Mining

Key informants indicated that the sector has struggled to incorporate immigrants. A failure to leverage this group represents a missed opportunity given that immigrants represent an increasing share of the overall labour force. As shown by Figure 24, immigrants represented about 31% of Alberta’s overall labour force in 2023, a dramatic increase from about 17% in 2006. Consequently, a continued inability to attract immigrants will not be sustainable if these trends persist.

**Figure 24: Immigrant Share of the Labour Force (2006-2023)**



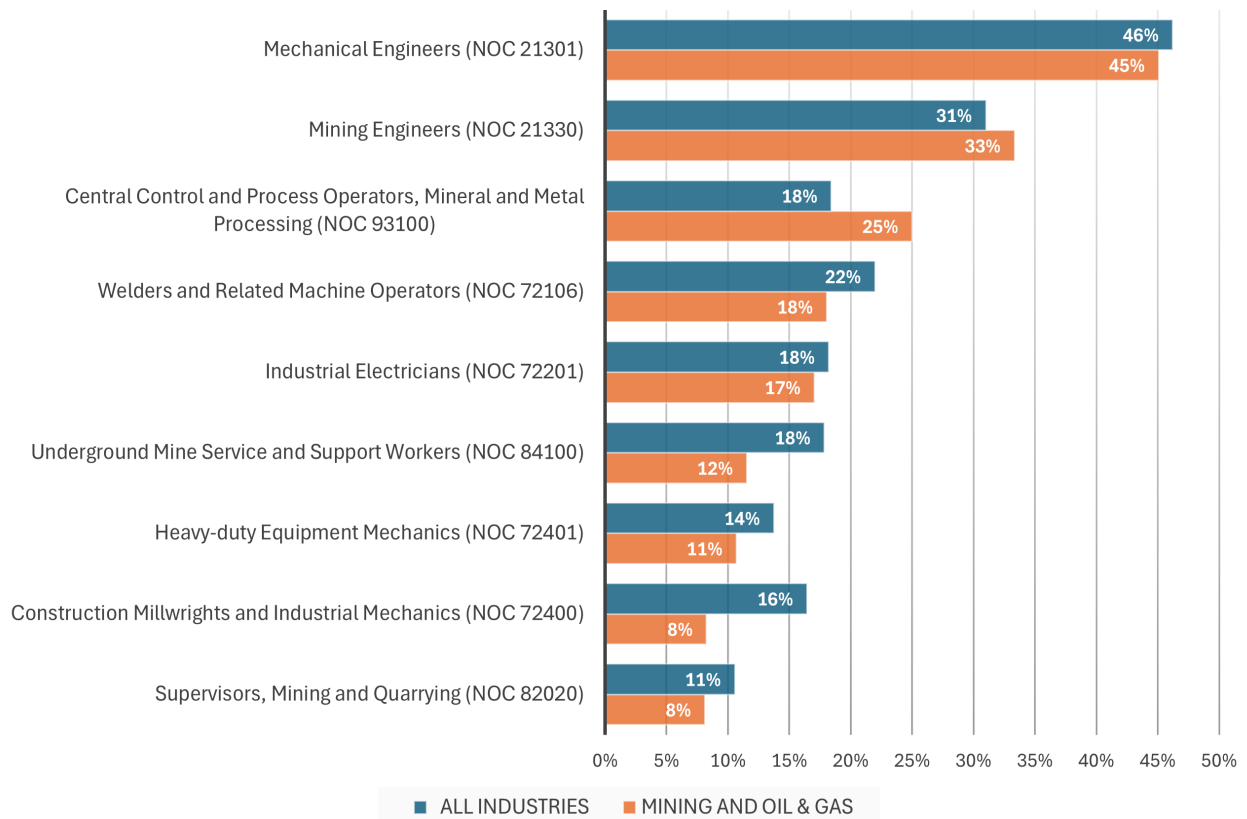
Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Labour Force Survey (2024).

Representation varies widely depending on the occupation. Figure 25 shows immigrant representation across 10 critical occupations in Alberta. Certain fields such as engineers have a higher percentage of immigrants in their ranks (roughly 30% to 45%), whereas others like trades occupations show lower levels of immigrant participation historically (roughly 10% to 20%).

There are also occupations where the Mining and Oil & Gas Sector is underperforming other sectors. Notably, across several trades occupations (i.e., Welders, Industrial Electricians, Heavy-duty Mechanics and Construction Millwrights), immigrant representation in the Mining and Oil & Gas Sector is markedly lower compared to other sectors. This underperformance suggests that there are major barriers for immigrants specific to the sector.



**Figure 25: Immigrant Representation in Alberta's Workforce by Occupation (2021)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021).

## Women in Mining

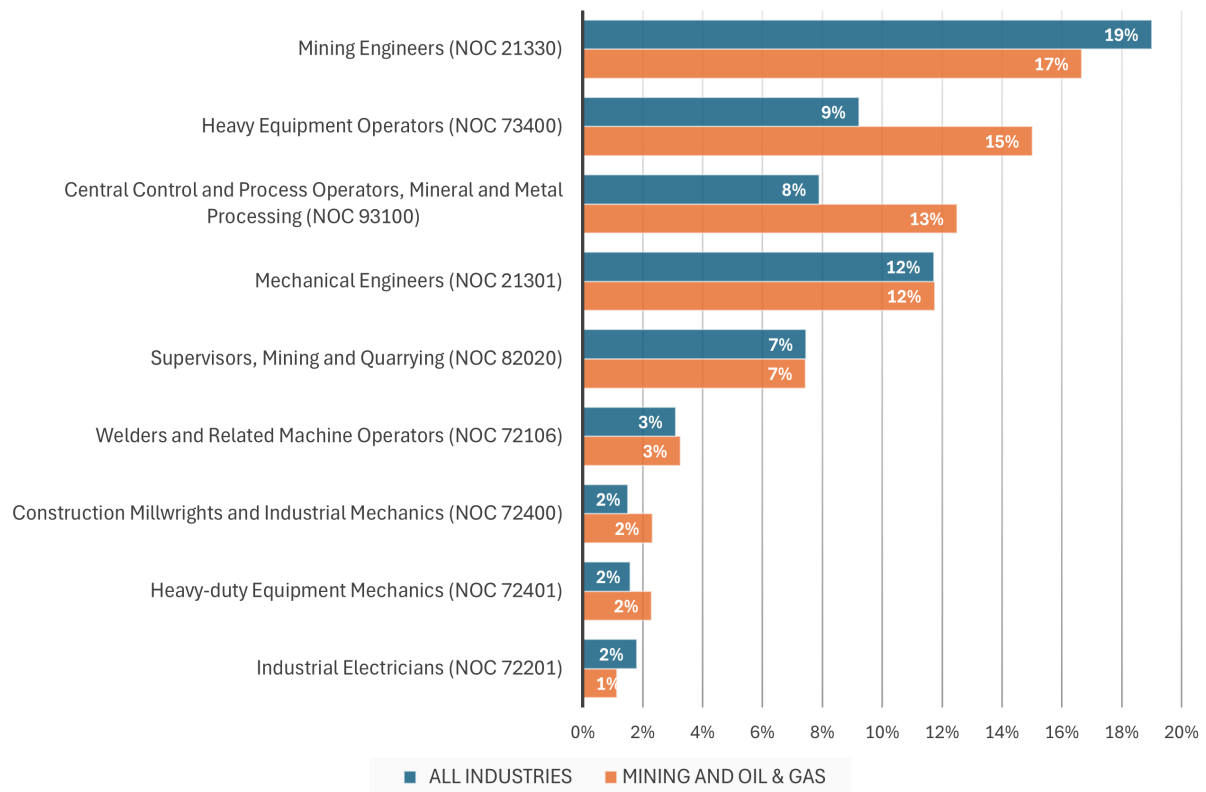
Given that women are roughly 50% of the overall labour force in Alberta, their participation has the potential to fill the sector's labour and talent shortages. Figure 26 shows that women's representation is typically well below the 50% mark in mining-critical occupations. Moreover, women's presence in the Mining and Oil & Gas Sector is strongly influenced by their career choices.

There are occupations where women are broadly underrepresented, regardless of sector. For example, in 2021, women held only 2% of Heavy-duty Equipment Mechanic positions. This share is about the same in the Mining and Oil & Gas Sector as in other industries, suggesting the challenge is not sector specific. Rather, not enough women pursue this career path (e.g., Trades occupations).

On the other hand, there are occupations where women's representation varies by sector. For example, in Heavy Equipment Operator and Central Control and Process Operator roles, the Mining and Oil & Gas Sector outperforms other sectors. Nonetheless, women still make up only about 15% of these roles.



**Figure 26: Women’s Representation in Alberta’s Workforce by Occupation (2021)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021).

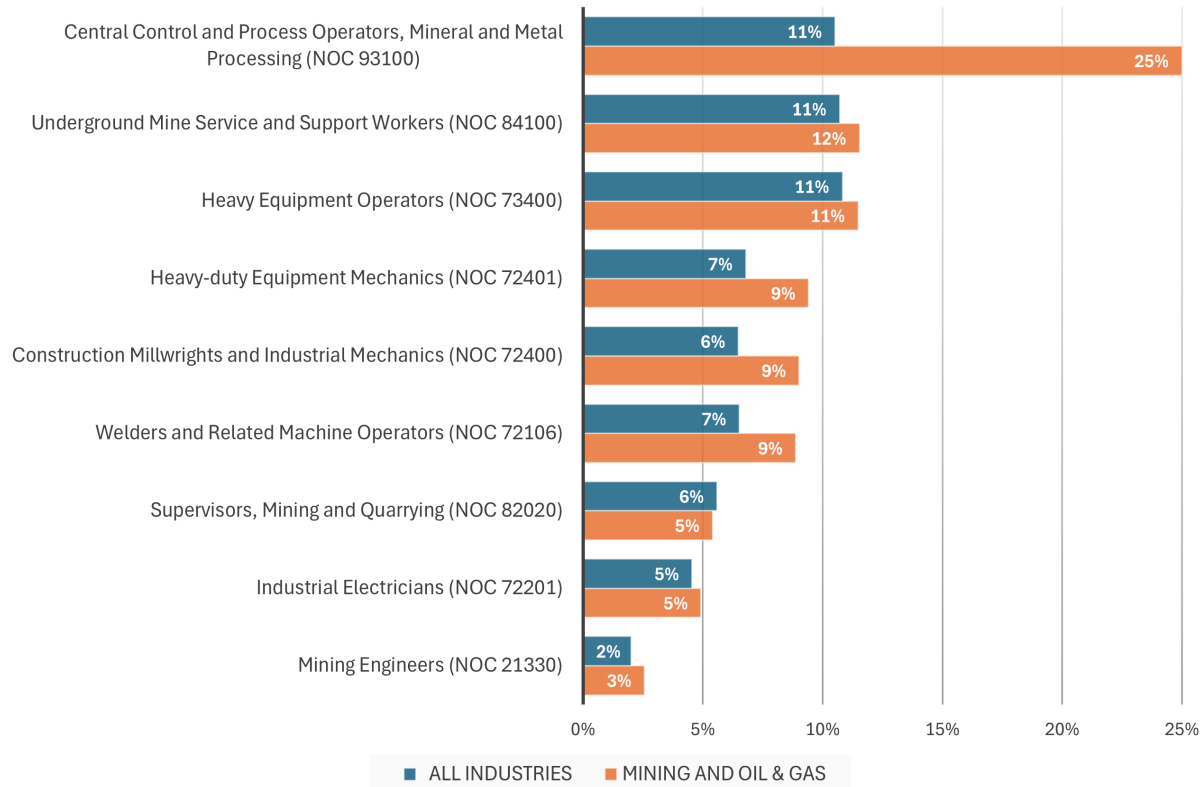


### Indigenous Peoples in Mining

Indigenous peoples are relatively well represented in the mining industry. In Alberta, they represent roughly 7% of the mining and oil & gas labour force, which is slightly higher than 5.6% observed in the overall labour force.

As shown in Figure 27, Indigenous peoples have a strong presence in several critical mining occupations. For example, they hold a quarter of Central Control and Process Operator Positions in the Mining and Oil & Gas Sector. In almost every critical occupation, the Mining and Oil & Gas Sector outperforms other industries in terms of Indigenous representation.

**Figure 27: Indigenous Representation in Alberta’s Workforce by Occupation (2021)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021).

## Wide Industry Cycles and Volatility

Seasonal and cyclical employment fluctuations also present a challenge to the Mining and Oil & Gas Sector and disrupt its ability to preserve workforce stability through the cycles. The ongoing struggle of shrinking and expanding the workforce can be costly, especially as it negatively affects employee retention and increases the costs associated with replacing the workers who have been let go.

Some occupations are more volatile than others. Figure 28 shows unemployment rates for critical mining occupations from 2001 to 2024. Each unemployment trend varies in its intensity, with some displaying a high degree of seasonality (e.g., Heavy Equipment Operators), while others show

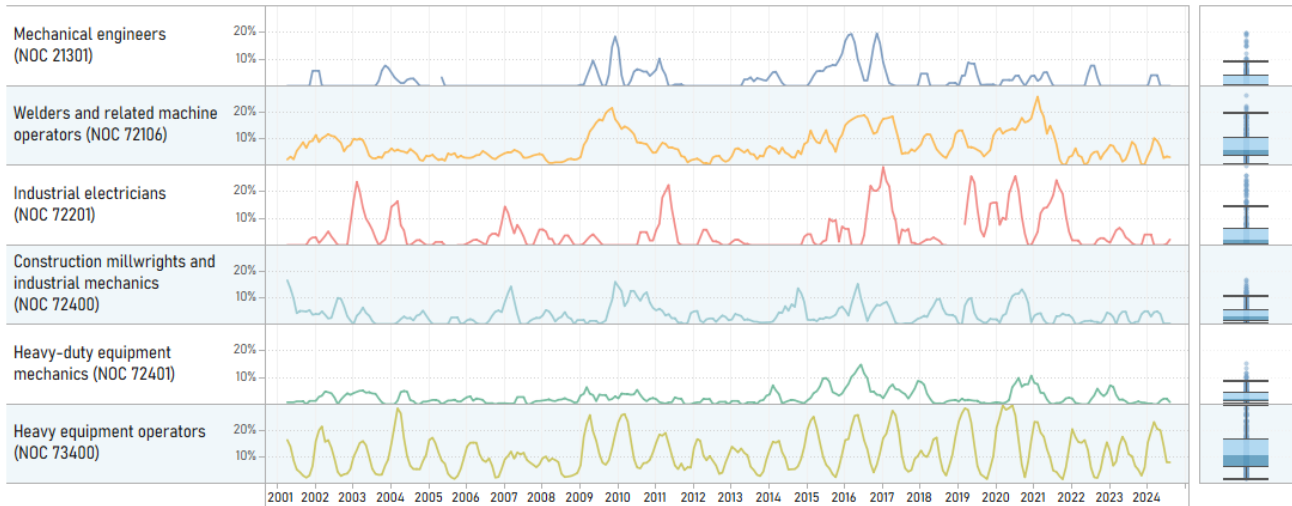
sporadic periods of high unemployment that last two to three years (e.g., Welders). In certain occupations (e.g., Industrial Electricians) – whether through regular seasonality or business cycle activity – the unemployment can fluctuate sharply between extremes, shifting from less than 1% to considerably high levels, often above 20%.

Lastly, Figure 29 illustrates the number of vacancies in critical mining occupations. In several cases such as Welders, Heavy-duty Equipment Mechanics and Heavy Equipment Operators, vacancies have risen from their pre-COVID era levels. This trend not only signifies a continued demand for these roles, but also a heightened degree of difficulty in filling them during a volatile period.





**Figure 28: Alberta Unemployment Rates in Critical Occupations (All Industries) (2001-2024)**



\* Figures reflect three-month moving averages.

Mining Engineers, Supervisors, and Underground Mine Service and Support Workers have been omitted due to insufficient data.

Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Labour Force Survey (2024).

**Figure 29: Alberta Vacancies in Critical Occupations (All Industries) (2015-2024)**

	2015			2016			2017			2018			2019			2020			2021			2022			2023			2024									
Occupation (NOC)	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2								
Mechanical engineers (NOC 21301)	15	50	35	35	90	35	160	105	170	165	180	35	65	130	110	110	140	65	95	100	110	70	110	70													
Mining engineers (NOC 21330)																																					
Welders and related machine operators (NOC 72106)	160	100	75	80	55	165	105	220	410	315	275	280	490	370	360	45	350	15	400	150	150	150	130	435	285	405	500	595	490	840	780	695	770	635	25	630	500
Industrial electricians (NOC 72201)	70	75	60	15	20	50	75	275	410	315	275	340	490	370	360	45	350	15	400	150	150	150	130	435	285	405	500	595	490	840	780	695	770	635	25	630	500
Construction millwrights and industrial mechanics (NOC 72400)	80	125	235	130	110	270	215	280	410	315	275	340	490	370	360	45	350	15	400	150	150	150	130	435	285	405	500	595	490	840	780	695	770	635	25	630	500
Heavy-duty equipment mechanics (NOC 72401)	410	275	235	130	110	270	215	280	410	315	275	340	490	370	360	45	350	15	400	150	150	150	130	435	285	405	500	595	490	840	780	695	770	635	25	630	500
Heavy equipment operators (NOC 73400)	975	715	390	140	190	385	1125	730	685	445	910	995	585	630	670	310	455	280	310	485	635	565	720	670	1180	540	2,230	1,385	2,405	1,830	1,280	1,550	2,385	1,320	985	485	1,100
Supervisors, mining and quarrying (NOC 82020)																																					
Underground mine service and support workers (NOC 84100)																																					

\* Figures reflect three-month moving averages.

Mining Engineers, Supervisors, and Underground Mine Service and Support Workers have been omitted due to insufficient data.

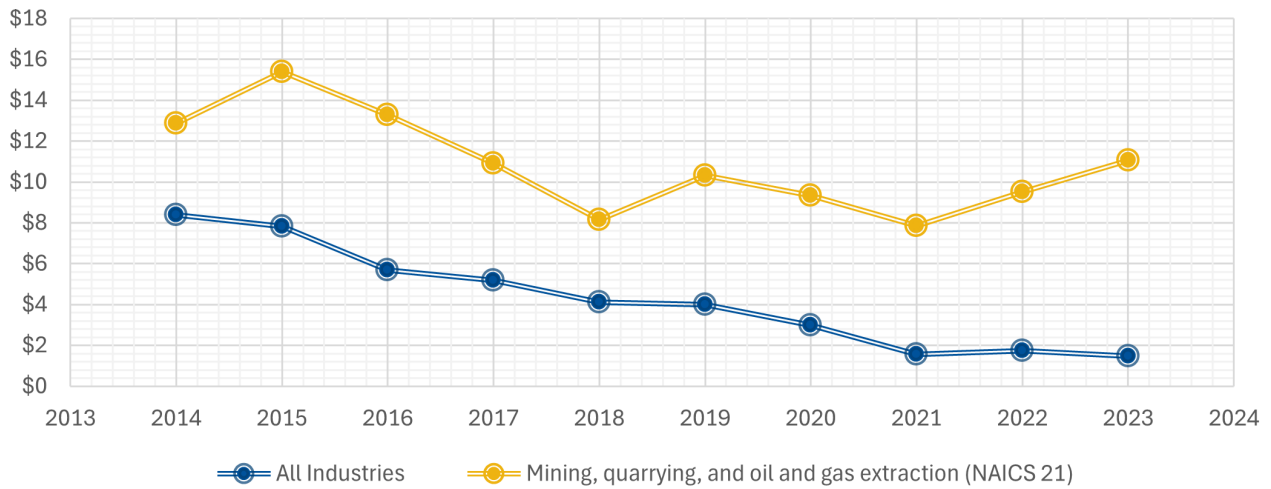
Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Labour Force Survey (2024).

## Narrowing Wage Gap

Alberta's Mining and Oil & Gas Sector has a long-standing reputation as an industry that pays well relative to its competitors. However, key informants indicated that Alberta's wage advantage has been falling in recent years. As shown in Figure 30, the wage premium paid to Albertan workers (above non-Albertan) has fallen from \$8 per hour in 2014 to less than \$2 per hour in 2023. In the Mining and Oil & Gas Sector, the wage premium fell from \$13 per hour to \$11 per hour over the same period, reaching a low of \$8 per hour in 2021.

Despite this trend, the Mining and Oil & Gas Sector is consistently the highest paid industry in the province (Figure 31) and supports wages that are considerably greater than the average for all industries. Figure 32 reveals that annual incomes in critical mining occupations are all above the Alberta average, further evidence that the sector demands high paying roles. It is also important to note that, while wages are comparatively high, ongoing issues with labour tightness, scarce labour pools and remote work are contributing factors that push wages above their expected range.

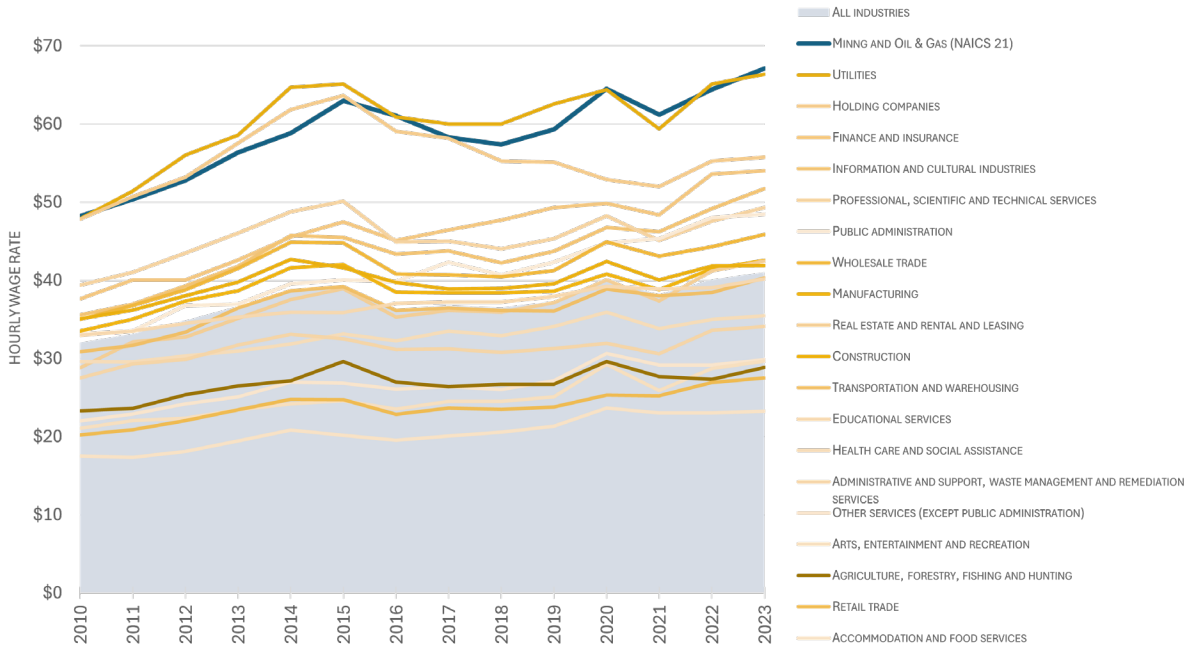
**Figure 30: Average Wage Premium (Alberta minus Canada), All Industries and Mining and Oil & Gas Sector (2014-2023)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Labour Force Survey (2024).

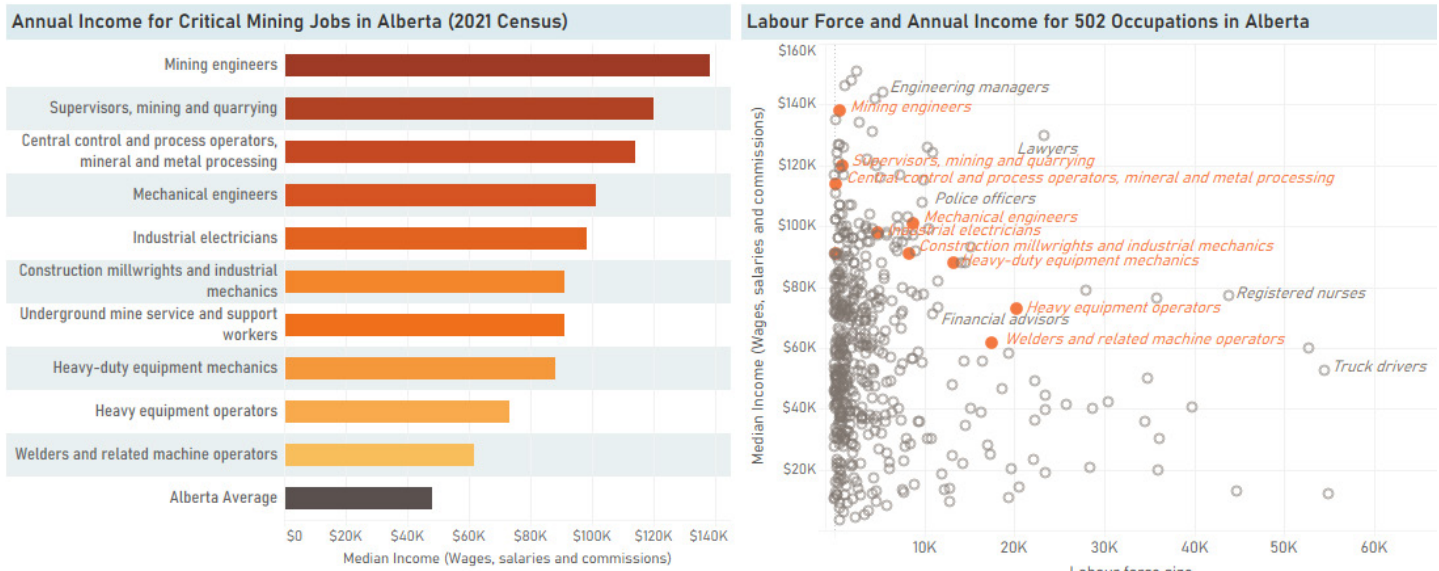


**Figure 31: Hourly Wage Rates in Alberta by Industry (2010-2023)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Labour Force Survey (2024).

**Figure 32: Annual Income by Critical Occupation**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021).



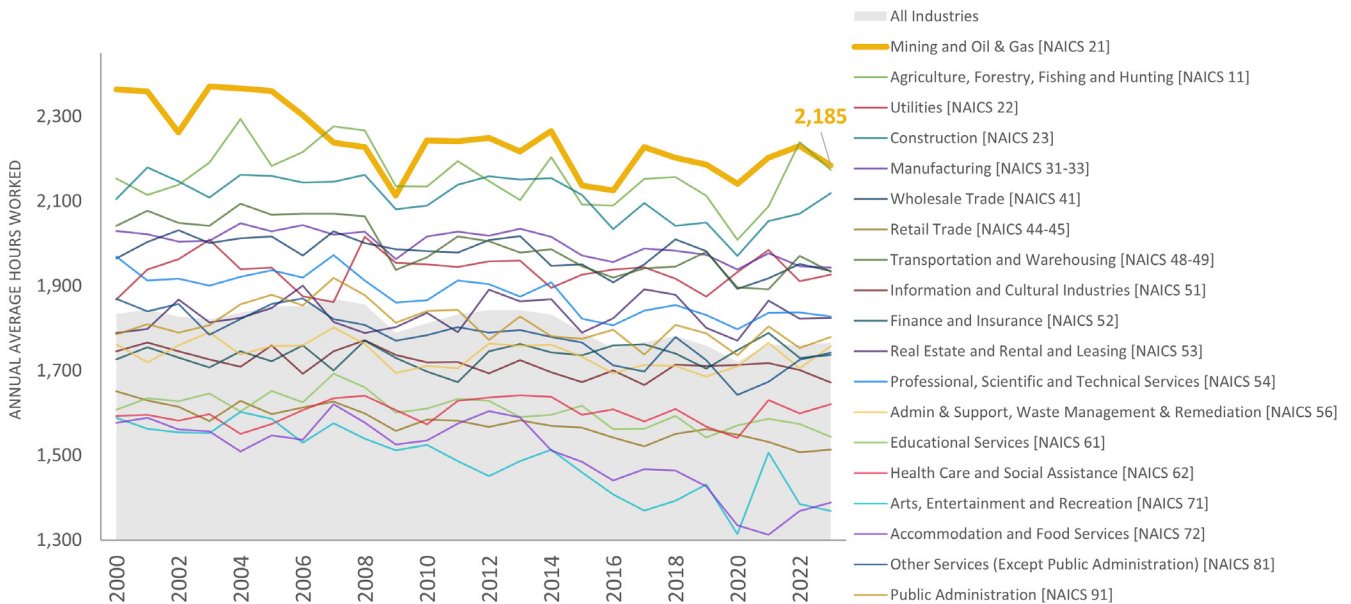


## Shrinking Hours of Work

Across many industries, the average hours of work per year have trended downward over the past two decades (Figure 33). Alberta’s Mining and Oil & Gas Sector follows a similar trend, though workers in this sector work more hours relative to other sectors in the province. Despite working more hours than other sectors, the downtrend is significant:

in 2023, the average number of hours worked was 2,185, down from 2,364 in 2000. The net loss of 179 hours per year represents 22 days per year for the average worker.<sup>9</sup> This result is likely due to several factors, including societal shifts in the workplace, people working fewer hours on the whole and new technologies changing the nature of work to be less labour intensive.

**Figure 33: Annual Average Hours Worked in the Mining and Oil & Gas Sector, 2000 – 2023**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Labour Productivity Measures- Provinces and Territories (2024).

<sup>9</sup> This calculation assumes a standard eight-hour workday. In other words, the average worker in the mining sector is working 22 – eight-hour workdays less in 2023 than they were in 2000.

## Need for Workforce Development

Effective and deliberate workforce development is expected to be increasingly valuable, especially amid labour market tightness, demographic challenges and other issues discussed in this report. It is therefore vital that contemporary training and skills are aligned with the modern workplace so that workers can adapt to changing demands, environments and technologies.

## Workplace Skills and Abilities Analysis

MiHR has developed an analysis that seeks to quantify the skills and abilities that are most prevalent across the sector. This analysis leverages the Occupational and Skills Information System (OaSIS)<sup>10</sup> skills taxonomy to determine the ‘skills’ and ‘abilities’ that are important to the mining sector.

- **Skills:** OaSIS defines ‘skills’ as the “developed capabilities that an individual must have to be effective in a job, role, function, task or duty.”
- **Abilities:** OaSIS defines ‘abilities’ as the “Innate and developed aptitudes that facilitate the acquisition of knowledge and skills to carry out expected work.”

Findings serve as a reference point for how skills and abilities distribute among the labour force and provide mining stakeholders (i.e., career seekers, employers, educators, governments) and workforce planners with information to make better decisions, anticipate skills gaps and align labour supply skill sets with industry demand.

### OaSIS Skills

Figure 34 compares how 33 OaSIS skills differ between the Mining and Oil & Gas Sector and other sectors in Alberta. The percentages represent the share of workers that require a moderate or high proficiency in each skill.

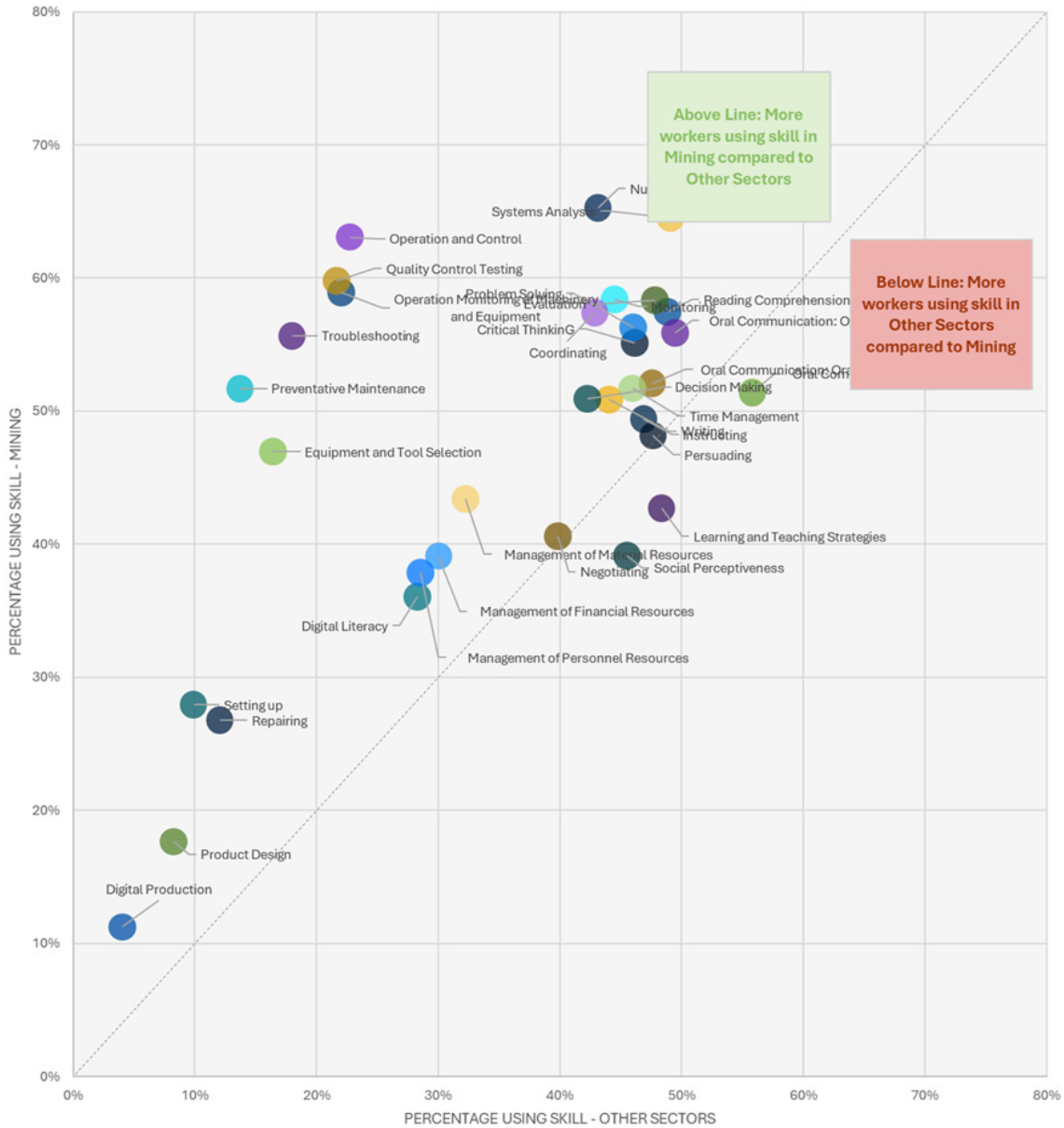
The graph shows a 45-degree parity line: along the line, mining sector workers use a given skill at the same rate as workers in other sectors. Skills above the line are utilized by mining workers at a higher rate compared to other sectors. Notable skills above the line include Operation and Control, Troubleshooting and Preventative Maintenance.

The OaSIS database evaluates the different workforce skills used across occupations, rating the required level of proficiency on a scale of 0 to 5. Figure 35 and Table 7 show the average level required of workers in the Mining and Oil & Gas Sector relative to the level required in other sectors.



<sup>10</sup> OaSIS is a database developed by Employment and Social Development Canada (ESDC) that provides ratings for worker characteristics (e.g., skills, abilities, work environment) associated with occupations.

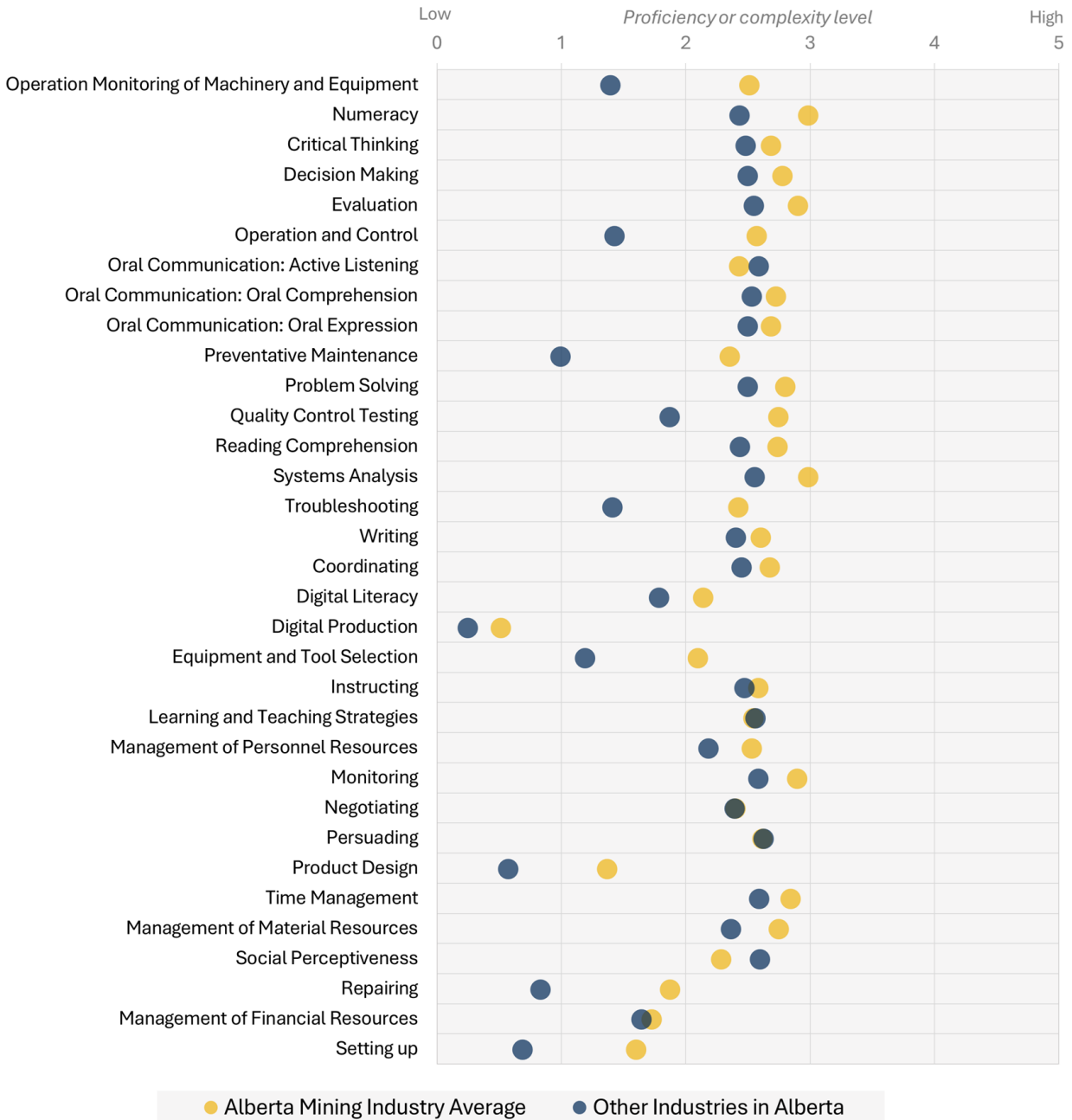
**Figure 34: Comparison of Skills Prevalence in Alberta’s Mining and Oil & Gas Sector and Other Sectors (2021)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021), Employment and Social Development Canada, Occupational and Skills Information System (OaSIS) (2024).



**Figure 35: Average Skill Level Required, Alberta Mining and Oil & Gas Sector and Other Sectors (2021)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021), Employment and Social Development Canada, Occupational and Skills Information System (OaSIS) (2024).

**Table 7: Skill Level Requirements for 10 Critical Occupations**

		Alberta Average	Alberta Mining and Oil & Gas	Mechanical engineers	Mining engineers	Welders and related machine operators	Construction millwrights and industrial mechanics	Industrial electricians	Heavy-duty equipment mechanics	Heavy equipment operators	Supervisors, mining and quarrying	Underground mine service and support workers	Central control and process operators, mineral and metal processing
Foundational Skills	Digital Literacy	1.8	2.1	4.0	4.0	0.5	2.0	3.0	2.0	1.0	2.0	0.0	2.0
	Numeracy	2.5	3.0	5.0	5.0	2.0	3.0	3.0	3.0	2.0	3.0	1.0	2.0
	Oral Communication: Active Listening	2.6	2.4	3.0	3.0	2.0	2.0	2.0	2.0	1.0	3.0	1.0	2.0
	Oral Communication: Oral Comprehension	2.5	2.7	5.0	5.0	2.0	2.0	3.0	2.0	2.0	3.0	1.0	2.0
	Oral Communication: Oral Expression	2.5	2.7	5.0	4.0	2.0	2.0	3.0	2.0	1.0	3.0	2.0	2.0
	Reading Comprehension	2.5	2.7	5.0	5.0	2.5	2.0	3.0	2.0	1.0	3.0	1.0	2.0
	Writing	2.4	2.6	4.0	4.0	1.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Interpersonal Skills	Coordinating	2.5	2.7	4.0	4.0	2.0	2.5	3.0	2.0	2.0	3.0	2.0	1.0
	Instructing	2.5	2.6	4.0	3.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0	2.0
	Negotiating	2.4	2.4	3.0	3.0	1.0	1.5	2.0	1.0	1.0	3.0	1.0	1.0
	Persuading	2.6	2.6	4.0	3.0	2.0	2.0	2.0	2.0	1.0	3.0	1.0	2.0
	Social Perceptiveness	2.6	2.3	3.0	3.0	1.0	1.5	2.0	2.0	1.0	3.0	1.0	2.0
Planning Skills	Monitoring	2.6	2.9	4.0	5.0	2.0	2.0	3.0	2.0	2.0	4.0	2.0	2.0
	Time Management	2.6	2.8	4.0	4.0	2.0	2.5	2.0	3.0	2.0	4.0	1.0	2.0
Process Analysis Skills	Critical Thinking	2.5	2.7	5.0	5.0	2.0	3.0	3.0	2.0	1.0	3.0	1.0	2.0
	Decision Making	2.5	2.8	5.0	5.0	2.0	2.0	3.0	2.0	2.0	3.0	1.0	2.0
	Evaluation	2.6	2.9	5.0	5.0	2.0	2.5	3.0	3.0	2.0	3.0	2.0	2.0
	Learning and Teaching Strategies	2.6	2.5	4.0	4.0	1.5	2.0	2.0	2.0	2.0	3.0	1.0	2.0
	Problem Solving	2.5	2.8	5.0	5.0	2.0	3.0	3.0	2.0	1.0	3.0	2.0	2.0
Systems Analysis	2.6	3.0	5.0	5.0	2.0	2.0	3.0	3.0	2.0	3.0	1.0	2.0	
Resource Management Skills	Management of Financial Resources	1.6	1.7	4.0	4.0	0.0	0.0	2.0	0.0	0.0	3.0	0.0	0.0
	Management of Material Resources	2.4	2.7	4.0	5.0	1.0	2.0	2.0	2.0	2.0	4.0	2.0	2.0
	Management of Personnel Resources	2.2	2.5	4.0	4.0	2.0	2.0	2.0	2.0	1.0	4.0	1.0	2.0
Technical Skills	Digital Production	0.3	0.5	4.0	3.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
	Equipment and Tool Selection	1.2	2.1	4.0	4.0	3.0	3.0	4.0	5.0	3.0	4.0	3.0	2.0
	Operation and Control	1.5	2.6	4.0	4.0	3.0	3.0	3.0	4.0	4.0	3.0	4.0	5.0
	Operation Monitoring of Machinery and Equipment	1.5	2.5	5.0	4.0	2.5	4.0	3.0	4.0	3.0	3.0	3.0	5.0
	Preventative Maintenance	1.1	2.4	5.0	5.0	3.0	4.5	5.0	5.0	3.0	4.0	3.0	3.0
	Product Design	0.6	1.4	5.0	5.0	1.0	2.5	3.0	3.0	0.0	3.0	1.0	1.0
	Quality Control Testing	1.9	2.7	5.0	4.0	3.0	3.0	4.0	4.0	3.0	4.0	3.0	3.0
	Repairing	0.9	1.9	4.0	3.0	2.0	4.5	5.0	5.0	2.0	2.0	3.0	3.0
	Setting up	0.7	1.6	4.0	3.0	2.0	4.0	5.0	4.0	2.0	2.0	2.0	1.0
	Troubleshooting	1.5	2.4	5.0	4.0	2.0	4.0	4.0	5.0	3.0	3.0	3.0	3.0

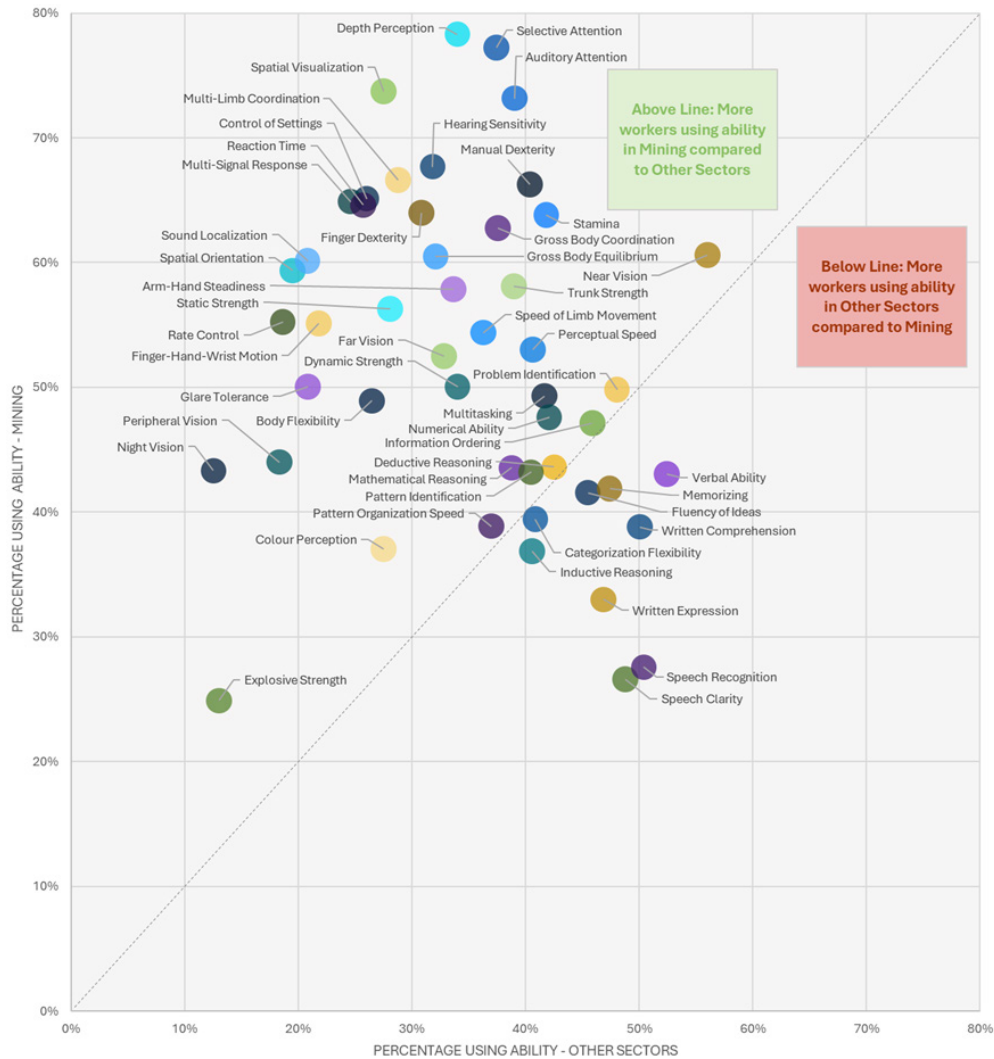
Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021), Employment and Social Development Canada, Occupational and Skills Information System (OaSIS) (2024).

## OaSIS Abilities

Figure 36 compares how 49 OaSIS abilities differ between the Mining and Oil & Gas Sector and other sectors in Alberta. The percentages represent the share of workers that require a moderate or high proficiency in a given ability. Notable prevalent abilities in the sector (shown above the parity line) include Depth Perception, Spatial Visualization, Selective Attention and Auditory Attention.

The OaSIS database evaluates the different workforce abilities used across occupations, rating the required level of proficiency on a scale of 0 to 5. Figure 37 and Table 8 show the average level required of workers in the Mining and Oil & Gas Sector relative to the level required in other sectors.

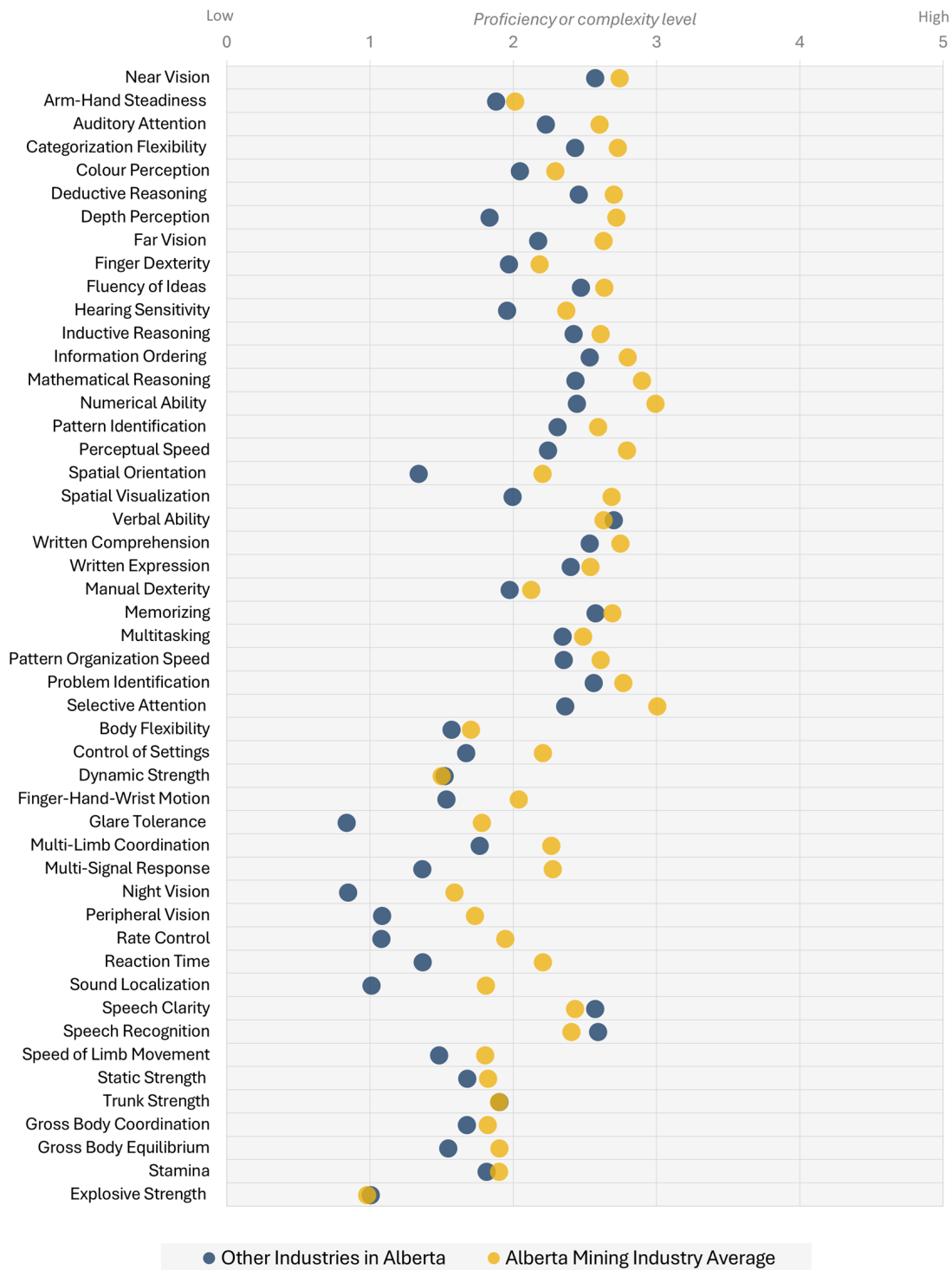
**Figure 36: Comparison of Abilities Prevalence in Alberta’s Mining and Oil & Gas Sector and Other Sectors (2021)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021), Employment and Social Development Canada, Occupational and Skills Information System (OaSIS) (2024).



**Figure 37: Average Ability Level Required, Alberta Mining and Oil & Gas Sector and Other Sectors (2021)**



Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021), Employment and Social Development Canada, Occupational and Skills Information System (OaSIS) (2024).

**Table 8: Ability Level Requirements for 10 Critical Occupations**

	Alberta Average	Alberta Mining and Oil & Gas	Mechanical engineers	Mining engineers	Welders and related machine operators	Construction millwrights and industrial mechanics	Industrial electricians	Heavy-duty equipment mechanics	Heavy equipment operators	Supervisors, mining and quarrying	Underground mine service and support workers	Central control and process operators, mineral and metal processing	
Cognitive	Categorization Flexibility	2.4	2.7	5.0	5.0	2.0	2.0	3.0	2.0	1.0	3.0	1.0	2.0
	Deductive Reasoning	2.5	2.7	5.0	5.0	2.0	2.5	3.0	2.0	1.0	3.0	1.0	2.0
	Fluency of Ideas	2.5	2.6	5.0	5.0	2.0	2.0	3.0	2.0	1.0	3.0	1.0	1.0
	Inductive Reasoning	2.4	2.6	4.0	5.0	2.0	2.5	3.0	2.0	1.0	2.0	2.0	2.0
	Information Ordering	2.5	2.8	5.0	5.0	2.0	3.0	4.0	3.0	1.0	2.0	2.0	2.0
	Mathematical Reasoning	2.5	2.9	5.0	5.0	2.0	2.0	3.0	2.0	2.0	3.0	1.0	2.0
	Memorizing	2.6	2.7	4.0	4.0	2.0	2.0	3.0	3.0	1.0	3.0	1.0	2.0
	Multitasking	2.4	2.5	3.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0	2.0	3.0
	Numerical Ability	2.5	3.0	5.0	5.0	2.0	2.0	3.0	3.0	2.0	3.0	1.0	2.0
	Pattern Identification	2.3	2.6	4.0	5.0	2.0	3.0	3.0	3.0	2.0	2.0	1.0	2.0
	Pattern Organization Speed	2.4	2.6	4.0	4.0	2.0	2.5	3.0	3.0	2.0	3.0	2.0	2.0
	Perceptual Speed	2.3	2.8	3.0	3.0	2.0	2.5	4.0	3.0	3.0	3.0	2.0	3.0
	Problem Identification	2.6	2.8	4.0	5.0	2.0	3.0	3.0	2.0	2.0	4.0	2.0	2.0
	Selective Attention	2.4	3.0	5.0	4.0	2.0	3.0	3.0	4.0	3.0	3.0	2.0	3.0
	Spatial Orientation	1.4	2.2	3.0	4.0	2.0	2.0	3.0	3.0	4.0	4.0	4.0	3.0
	Spatial Visualization	2.0	2.7	4.0	5.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0
	Verbal Ability	2.7	2.6	5.0	4.0	2.0	2.0	3.0	2.0	1.0	3.0	1.0	2.0
	Written Comprehension	2.5	2.7	5.0	5.0	2.0	2.0	2.0	2.0	1.0	3.0	1.0	2.0
	Written Expression	2.4	2.5	4.0	5.0	1.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0
Physical	Body Flexibility	1.6	1.7	1.0	1.0	3.0	4.0	4.0	4.0	2.0	1.0	4.0	1.0
	Dynamic Strength	1.5	1.5	0.0	0.0	4.0	4.0	3.0	4.0	2.0	0.0	4.0	1.0
	Explosive Strength	1.0	1.0	0.0	0.0	2.5	2.0	2.0	4.0	1.0	0.0	3.0	1.0
	Gross Body Coordination	1.7	1.8	0.0	0.0	3.0	3.5	3.0	4.0	3.0	4.0	3.0	3.0
	Gross Body Equilibrium	1.6	1.9	0.0	0.0	3.0	3.0	5.0	4.0	3.0	4.0	3.0	3.0
	Multi-Limb Coordination	1.8	2.3	1.0	1.0	3.0	4.0	3.0	5.0	5.0	3.0	4.0	4.0
	Stamina	1.8	1.9	0.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	4.0
	Static Strength	1.7	1.8	0.0	1.0	3.5	4.0	4.0	5.0	3.0	1.0	4.0	2.0
	Trunk Strength	1.9	1.9	0.0	1.0	3.5	3.0	4.0	5.0	3.0	1.0	4.0	2.0
Psychomotor	Arm-Hand Steadiness	1.9	2.0	2.0	1.0	4.0	3.0	3.0	4.0	3.0	2.0	2.0	3.0
	Control of Settings	1.7	2.2	2.0	1.0	4.0	4.0	3.0	5.0	4.0	3.0	4.0	4.0
	Finger Dexterity	2.0	2.2	2.0	1.0	3.0	4.0	3.0	5.0	3.0	2.0	3.0	3.0
	Finger-Hand-Wrist Motion	1.6	2.0	0.0	1.0	2.0	2.5	4.0	5.0	3.0	4.0	3.0	3.0
	Manual Dexterity	2.0	2.1	1.0	1.0	3.0	4.0	3.0	5.0	3.0	3.0	3.0	3.0
	Multi-Signal Response	1.4	2.3	1.0	1.0	3.0	3.5	4.0	4.0	5.0	4.0	5.0	4.0
	Rate Control	1.1	1.9	0.0	1.0	2.0	3.5	2.0	3.0	4.0	3.0	4.0	4.0
	Reaction Time	1.4	2.2	1.0	2.0	3.0	3.0	3.0	4.0	4.0	4.0	5.0	4.0
	Speed of Limb Movement	1.5	1.8	0.0	0.0	2.0	2.5	4.0	3.0	3.0	3.0	3.0	3.0
Sensory	Auditory Attention	2.2	2.6	3.0	2.0	2.0	4.0	3.0	4.0	4.0	4.0	4.0	3.0
	Colour Perception	2.1	2.3	2.0	2.0	2.0	2.5	3.0	3.0	2.0	3.0	2.0	3.0
	Depth Perception	1.9	2.7	3.0	3.0	3.0	3.0	3.0	4.0	5.0	4.0	5.0	4.0
	Far Vision	2.2	2.6	3.0	4.0	3.0	2.5	4.0	3.0	3.0	3.0	3.0	2.0
	Glare Tolerance	0.9	1.8	0.0	0.0	3.5	1.5	3.0	3.0	4.0	4.0	4.0	1.0
	Hearing Sensitivity	2.0	2.4	2.0	3.0	3.0	4.0	3.0	5.0	3.0	3.0	3.0	3.0
	Near Vision	2.6	2.7	4.0	4.0	3.0	3.0	4.0	3.0	1.0	3.0	2.0	2.0
	Night Vision	0.9	1.6	0.0	1.0	2.0	1.5	3.0	2.0	3.0	3.0	4.0	3.0
	Peripheral Vision	1.1	1.7	0.0	1.0	2.0	2.0	3.0	3.0	4.0	3.0	2.0	1.0
	Sound Localization	1.1	1.8	1.0	1.0	1.0	4.5	3.0	5.0	3.0	4.0	4.0	3.0
	Speech Clarity	2.6	2.4	3.0	4.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Speech Recognition	2.6	2.4	3.0	4.0	1.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0	

Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021), Employment and Social Development Canada, Occupational and Skills Information System (OaSIS) (2024).









## Chapter 4: Conclusion

This report establishes the importance of mining in Alberta and reviews the minerals produced within the province. MiHR's analysis finds that mining is an inseparable component of Alberta's natural resources economy, providing one of every five jobs in the Mining and Oil & Gas Sector.

A labour market forecast is also presented in this report. MiHR's analysis projects the size of labour market gaps in critical mining occupations. Notably, Heavy Equipment Operators, Heavy-duty Equipment Mechanics, and Construction Millwrights are found to have the most sizable gaps, corresponding to their prevalence in the industry.

Additionally, MiHR conducted interviews with various key informants from the sector, to learn about their unique perspectives regarding the primary labour market challenges they face. Common themes from these discussions include remoteness and relocation issues, lack of investment in infrastructure and housing, and poor industry reputation, among others.

Lastly, this report explores characteristics and trends of critical mining occupations. Specifically, the analysis brings data forward and confirms many of the themes discussed in the key informant interviews.

Overall, this report provides a resource to mining stakeholders (e.g., employers, governments, educators and career-seekers) that aims to support informed decisions regarding recruitment strategies, training initiatives and career choices.

# Appendices

## Appendix A: Forecasting Methodology

### Labour Supply Methodology

MiHR’s Labour Market Analysis (LMA) framework is an analytical model to understand whether Alberta’s future labour supply can sufficiently sustain future labour demand in the mining sector. The LMA framework considers the entire population of Alberta as a base, progressively narrowing down individuals based on their “degree of attachment” to the mining sector’s relevant labour pool.

Figure A1 deconstructs the complexity of Alberta’s labour supply into successive layers of inquiry. As the analysis drills down layer by layer, a more detailed picture of the labour supply emerges.

Additionally, Table A1 provides descriptions of the six layers and the forecasting methodology of the key assumptions underpinning each layer.

**Figure A1: MiHR’s Labour Market Analysis Framework**

Total Population					
Working Age Population					Not Eligible to Work
Labour Force				Non Participants	Not Eligible to Work
Labour Force in Relevant Occupation			Other Occupations	Non Participants	Not Eligible to Work
Employed in Relevant Occupation		Unemployed	Other Occupations	Non Participants	Not Eligible to Work
Employed in Mining Sector	Employed in Other Sectors	Unemployed	Other Occupations	Non Participants	Not Eligible to Work

Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024).

**Table A1: MiHR’s Labour Market Analysis Methodology and Key Assumptions**

LMA Levels and Descriptions	Key Variable and Methodology	Assumptions Projected Year (2024 – 2033)
<b>Total Population</b> Overall population of Alberta	<b>Total population annual growth rate</b> Based on Statistics Canada’s population forecast, adjusted to Census.	<b>1.8%</b> average annual growth rate
<b>Working Age Population</b> Population of Alberta aged 15 and over	<b>Total working age population annual growth rate</b> Based on Statistics Canada’s population forecast, adjusted to Census.	<b>2.2%</b> average annual growth rate
<b>Labour Force</b> Working population of Alberta potentially available for employment (including employed and unemployed job seekers).	<b>Labour force participation rate</b> Based on last historic observation (2023) from Statistics Canada’s Labour Force Survey and Census of Population.	<b>67.9%</b> of working age population each year
<b>Labour Force in Relevant Occupations</b> Working population of Alberta employed or looking for employment in relevant occupations.	<b>Share of labour force for relevant occupations</b> Based on historic trend from Statistics Canada’s Census of Population 2016 and 2021.	<b>3.2%</b> of labour force each year
<b>Employed and Unemployed in Relevant Occupations</b> Labour force divided into those who are employed and unemployed (i.e., actively looking for work) in relevant occupations.	<b>Average unemployment rate for relevant occupations</b> Based on historic trend from Statistics Canada’s Census of Population 2016 and 2021.	<b>12.7%</b> of labour force each year
<b>Employed in Mining and Other Sectors</b> Employed workers divided into those who are employed by the mining sector in Alberta and all other sectors.	<b>Mining’s share of overall labour supply</b> Based on historic trend from Statistics Canada’s Census of Population 2016 and 2021.	<b>5%</b> of labour force each year

Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Projected population, by projection scenario, age and sex (Table: 17-10-0057-01) (2024); Statistics Canada, Census of Population (2006 – 2021); Statistics Canada, Statistics Canada, Labour Force Survey (2024).





## Labour Demand Methodology

MiHR uses a dynamic time-series econometric model (regression with ARIMA errors) to forecast the mining sector's employment over a 10-year time horizon (2024 – 2033). MiHR developed the following three economic scenarios for employment projections to capture the sector's underlying volatility relative to changes in economic conditions:

- 1) Baseline Scenario:** The mean forecasted values serve as the baseline benchmark for MiHR's labour demand forecast. The forecast considers Alberta's historic employment trend in the Mining and Oil & Gas (NAICS 21) from 2000 to 2023<sup>11</sup> and the impact on employment of key predictive variables, such as crude oil prices<sup>12</sup>, exports of metal ores and non-metallic minerals<sup>13</sup>, and 10-year treasury yields interest rates<sup>14</sup> forecasts.
- 2) Expansionary Scenario:** MiHR's expansionary scenario is estimated from the *upper bound 80% prediction interval*, relative to the baseline benchmark forecasted values. A prediction interval is the estimated interval within which the forecasted value is expected to fall, given a margin of error. This scenario captures the possibility of an alternative environment where future employment levels trend upward (relative to the baseline benchmark) due to, for instance, oil prices being lower than Alberta Energy Regulator's projected estimates.
- 3) Contractionary Scenario:** MiHR's contractionary scenario is estimated from the *lower bound 80% prediction interval*, relative to the baseline benchmark forecasted values. This scenario poses a contrarian scenario whereby future employment levels trend downwards (relative to the baseline benchmark) due to, for example, oil prices following an even higher price regime.

MiHR's forecast implicitly assumes that the future will somewhat resemble the past. While the different scenarios capture some inherent uncertainties, there are still limitations to projections. The model does not account for unexpected or unpredictable events (i.e., exogenous shocks) that may occur during the time horizon analyzed.

11 Statistics Canada, Labour statistics consistent with the System of National Accounts (SNA) (Table: 36-10-0489-01) (2024).

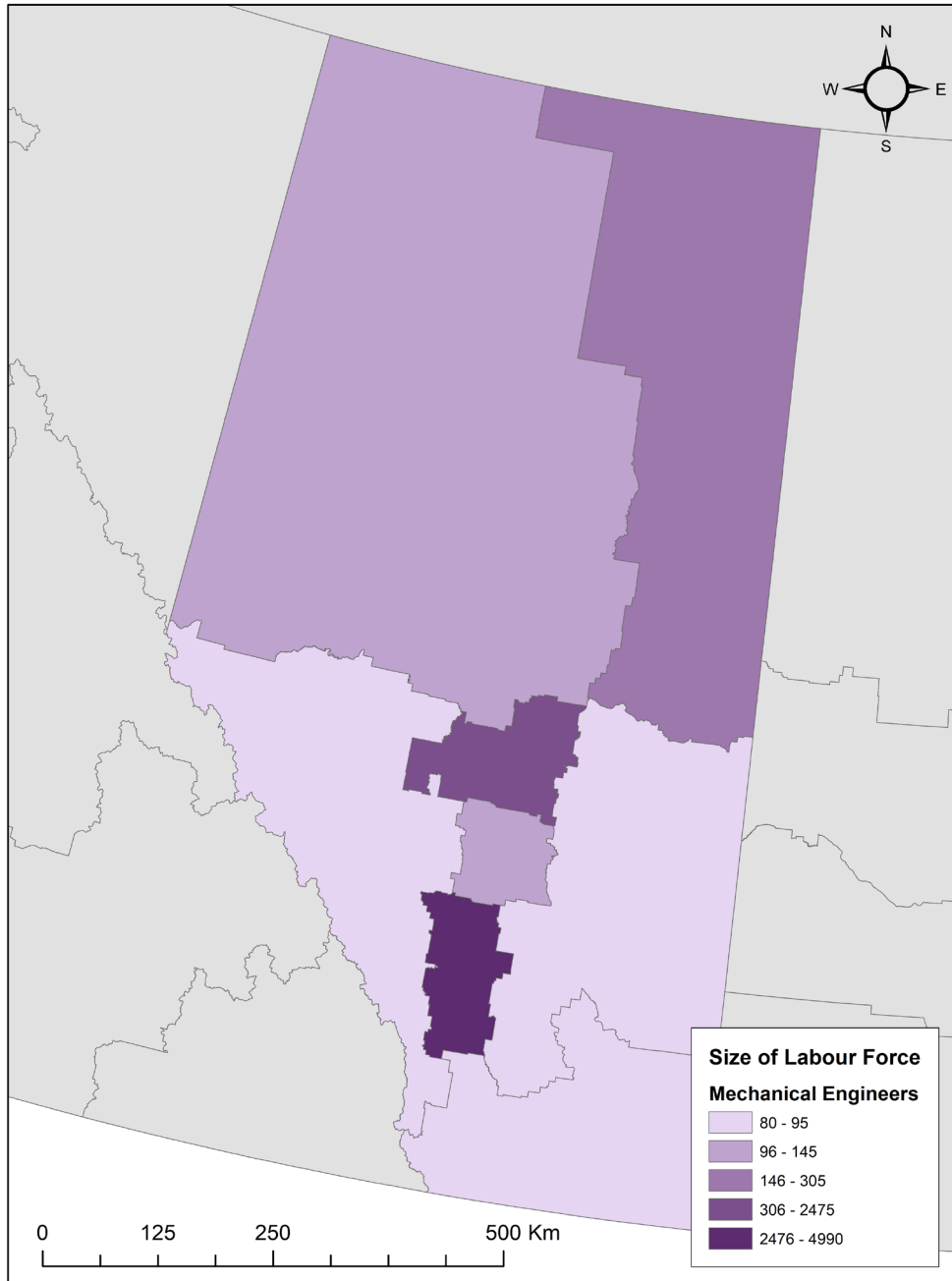
12 Alberta Energy Regulator, Alberta Energy Outlook (ST98) (2024).

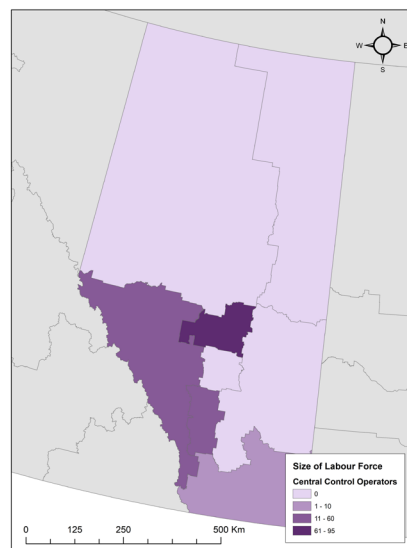
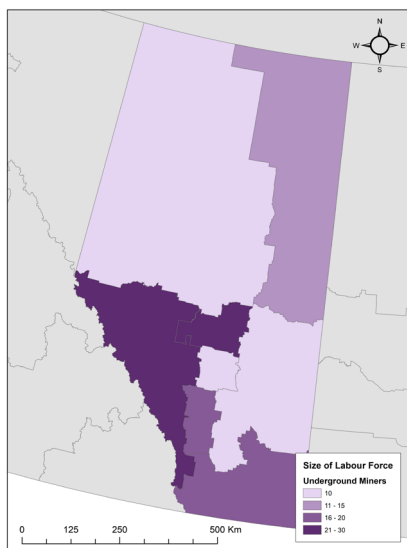
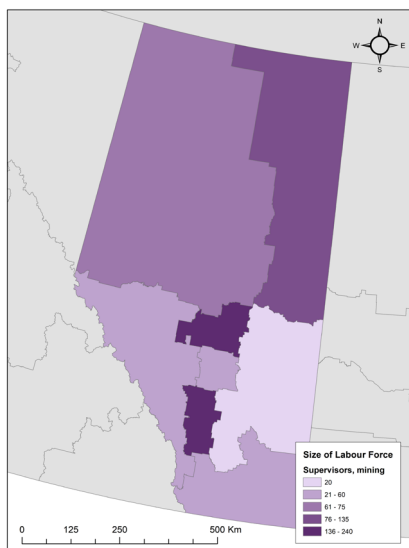
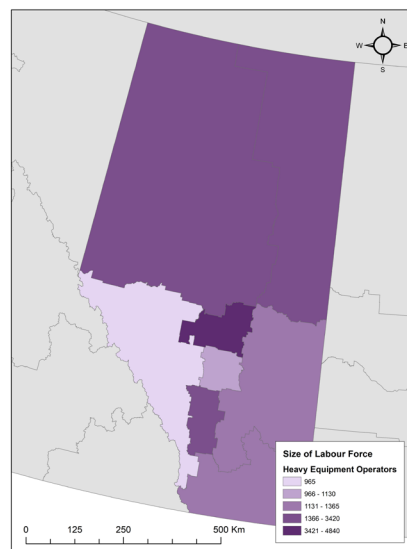
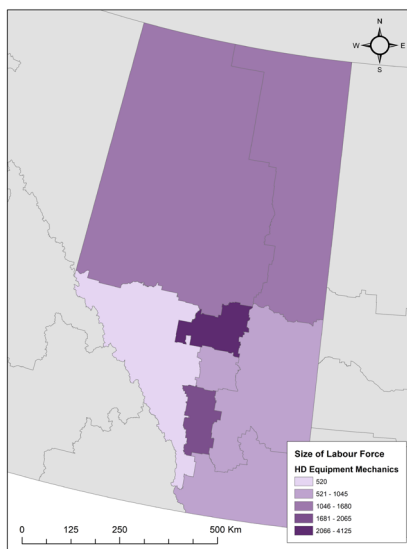
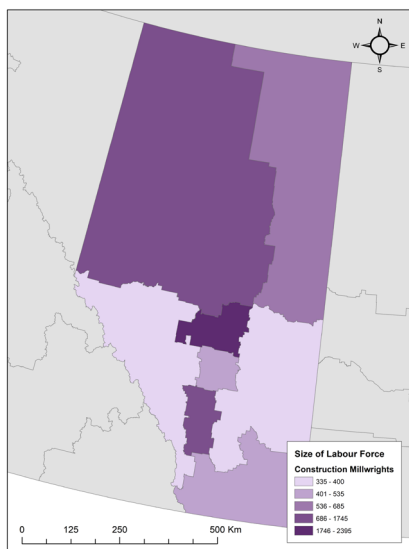
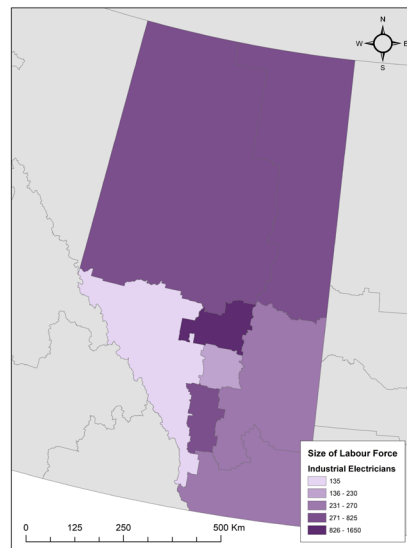
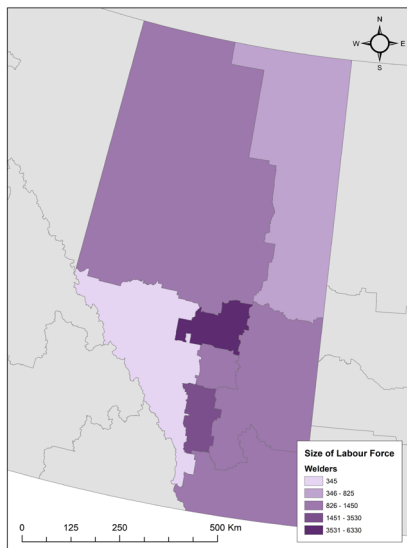
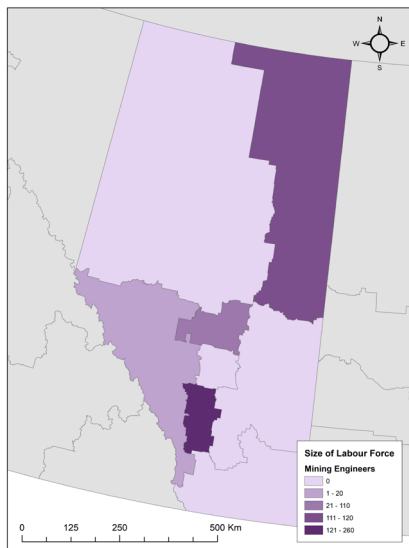
13 Statistics Canada, International merchandise trade by province, commodity, and principal trading partners (Table: 12-10-0175-01) (2024).

14 Congressional Budget Office, The Long-Term Budget Outlook: 2024 to 2054 (2024).

## Appendix B: Geography Distribution of Labour Force by Occupation

Figure B1: Geographic Distribution of Labour Force by Occupation





Source: Mining Industry Human Resources Council, Alberta Mining Labour Market Analysis (2024); Statistics Canada, Census of Population (2021).





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