# State of the Ontario Mining Sector

Photo: Newmont, Porcupine Mine

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# State of the Ontario Mining Sector

## Foreword by Chris Hodgson, President of the Ontario Mining Association

In Ontario, the mining sector is a key engine of economic development. This report is the latest in a series of studies commissioned by the Ontario Mining Association, in partnership with Ontario's Ministry of Northern Development, Mines, Natural Resources and Forestry. The findings indicate that creating a favourable investment climate for mining exploration, production and processing contributes to significant GDP gains, employment opportunities, tax revenues, export earnings, infrastructure development (especially in remote areas), technological progress, and productive spillovers into other sectors of the economy.

Ontario has enviable geology, including the vast untapped critical mineral potential described in this report. However, good geology is not enough in today's fiercely competitive global economy. Success as a mining jurisdiction depends in large part on a stable and reliable legal system, and on continual efforts to refine the legislative and regulatory framework, making it ever more adaptive, nimble, risk-weighted and outcomes-based. Moreover, the future will be defined by our ability to inspire and invest in next generations of mining talent – a challenge that we will need to approach with creativity and collaborative gusto if we are to continue seeing sustainable, innovation-driven growth in the sector.

For more than a century, Ontario has created a strong mining culture, founded on the experience, expertise and passion of highly qualified people, who make us world leaders in responsible mining. The mining innovation ecosystem that has emerged in Ontario includes educators, public servants, miners, financiers, suppliers, service providers, scientists, and other professionals. This ecosystem creates valuable knowledge and promotes world-leading practices in areas such as worker health and safety, environmental protection, technological advancement, engagement with local communities and delivery of socio-economic benefits, good governance and transparency. As the collective voice of this future forward sector, our association believes in working collaboratively with governments and other partners to foster smart policies and trailblazing institutions that will enable us to build on our advantages and seize emerging opportunities.

Arguably, the opportunities for the Ontario mining industry have never been greater than they are now. As the world emerges from the COVID-19 pandemic and the race to halt climate change accelerates, Ontario is primed to contribute meaningful solutions, while capitalizing on rising global demand for green and critical minerals. Economic recovery and stimulus have caused a surge in demand in most commodity markets, while decarbonization commitments are gaining prominence in business strategies. Meanwhile, Environmental, Social and Governance (ESG) factors are increasingly linked to capital availability. This report presents data that not only demonstrate the current value of mining in Ontario, but also help identify risks and benchmark areas of opportunity to futureproof our sector – empowering it to better deal with growing stakeholder and market pressures. Having this baseline information will help us solidify our competitive advantages and enable us to deliver shared value by generating investment, creating jobs and opportunities, enhancing the security and resilience of local supply chains, taking climate action, and supporting the transition to a low-carbon economy both at home and abroad.

Executive Summary

Photo: Compass Minerals

# Executive Summary

## Ontario's Mining Industry

▶ The mining sector plays an important role in Ontario's economy and contributes to regional communities, including Sudbury, Northeastern, Northwestern and Southern Ontario.

▶ There are currently **41 active mining operations** in the province that cover a diverse set of metals and minerals, including precious and base metals, and non-metallic minerals.

▶ In 2019, major mining companies' direct full-time equivalent employment in Ontario totalled over 21,000, with more than $1.9 billion paid in total worker compensation.

## Current Economic Contribution

▶ The market value of the minerals produced by major mines in Ontario was **$10.4 billion** in 2019.

▶ Mining operations in Ontario contributed an estimated annual total of **$7.5 billion** to **Ontario's gross domestic product (GDP)**, **$3.3 billion** in **wages and salaries**, and sustained over **48,605 full-time equivalent (FTE) jobs** in the province via direct, indirect and induced channels.

▶ **Approximately 73%** of Ontario's mining company GDP contributions stay inside Ontario.

## Future Economic Contribution

▶ Future economic contributions are estimated based on the forecast of Ontario's mineral production values.

▶ Total market value of minerals produced in Ontario is projected based on production volume and commodity prices and is expected to reach **$13.7 billion** in 2025.

▶ In 2025, Ontario's mining industry is estimated to contribute **$9.3 billion** in GDP, **$3.4 billion** in **wages and salaries**, and sustain **51,872 FTE jobs** in the Ontario economy via direct, indirect and induced channels.
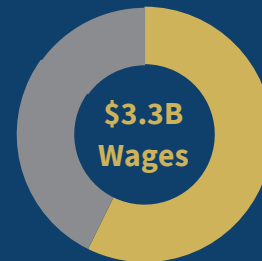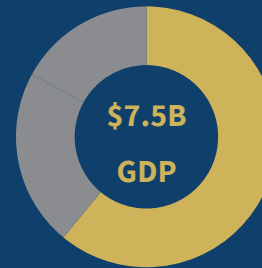
# Economic Contributions of Major Ontario Mining Operations

## 2019 Economic Contribution

**$10.3B** of minerals produced (market value)
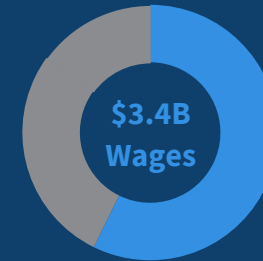
**48,605 jobs supported in Ontario**

| Direct | Indirect & induced |
|---|---|
| 21,281 (FTEs) | 27,324 (FTEs) |

**$7.5B GDP**

Direct
$4.6B

Indirect & induced
$2.9B

**$3.3B Wages**

Direct
$1.9B

Indirect & induced
$1.4B

## 2025 Economic Contribution Projection

**$13.7B** of minerals projected to be produced (market value)

**51,872 jobs are projected to be supported in Ontario**

| Direct | Indirect & induced |
|---|---|
| 22,711 (FTEs) | 29,161 (FTEs) |

**$9.3B GDP**

Direct
$5.7B

Indirect & induced
$3.6B

**$3.4B Wages**

Direct
$2B

Indirect & induced
$1.4B
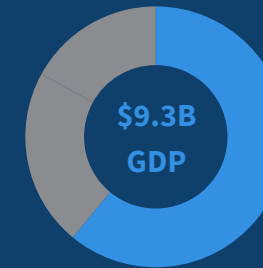
Note: Figures for market value, GDP, and wages are in 2019 CAD$
Sources: OMA Industry Survey, Statistics Canada, S&P Global Market Intelligence

# Executive Summary

- Mining companies are evaluated on the basis of their contributions to a sustainable economy, environment, and local communities.

- An environmentally conscious and socially responsible mining sector is key to Ontario's long-term economic growth and prosperity; companies demonstrate excellence in environmental, social, and governance (ESG) aspects.

- Across the province, mining companies are adhering to high standards of **sustainability** and **environmental protection** in areas including energy conservation, carbon emission reduction, and adoption of clean technologies.

- On the **social** aspect, Ontario's mining companies contribute to regional communities by prioritizing local hiring and suppliers, supporting health and education initiatives, and engaging with First Nations communities.

- On the **governance** aspect, mining companies have equity, diversity, and inclusion targets. OMA members voluntarily report on ESG compliance, and consider ESG factors in future investment decisions.

## Social

- In 2019, Ontario's mining companies sourced **44% of supplies, materials and services from local regions.**

- **~$60M** was paid to **Indigenous governments and community** partners in 2019.

- **Indigenous Peoples** represented an average of **~9% of employees** in Ontario's mining companies in 2019.

- During the **COVID-19 pandemic**, Ontario's mines participated in activities to provide supplies and support local communities, businesses, and hospitals.

## Environment

- Over **three-quarters of Ontario's mining companies participate in carbon pricing schemes** that aim to lower GHG emissions and spur innovation.

- **82%** of Ontario's senior mining companies have established **carbon emission reduction goals** and **64%** have **energy management targets**.

- Over **66% of water** used by major mining companies in 2019 was **recycled.**

## Governance

- Almost **70%** of OMA members reported that they have gender diversity and equity targets with respect to positions of authority.

- Over **75%** of OMA members indicated ESG aspects are part of considerations in their investment and operational decisions.

- Several mining companies voluntarily report on the ESG compliance as part of the reporting on exchanges where they are listed.

# 1. Current State of Ontario's Mining Industry

Photo: Glencore, Sudbury Operations

# Ontario Mining Operations, 2021

There are currently 41 active mining operations in Ontario that cover a diverse set of minerals. The province is home to 21 gold mines; 9 base metal mines (including nickel, copper, zinc, and iron); 1 iron mine; 1 platinum group metals (PGM) mine; and 9 other major industrial mineral operations.
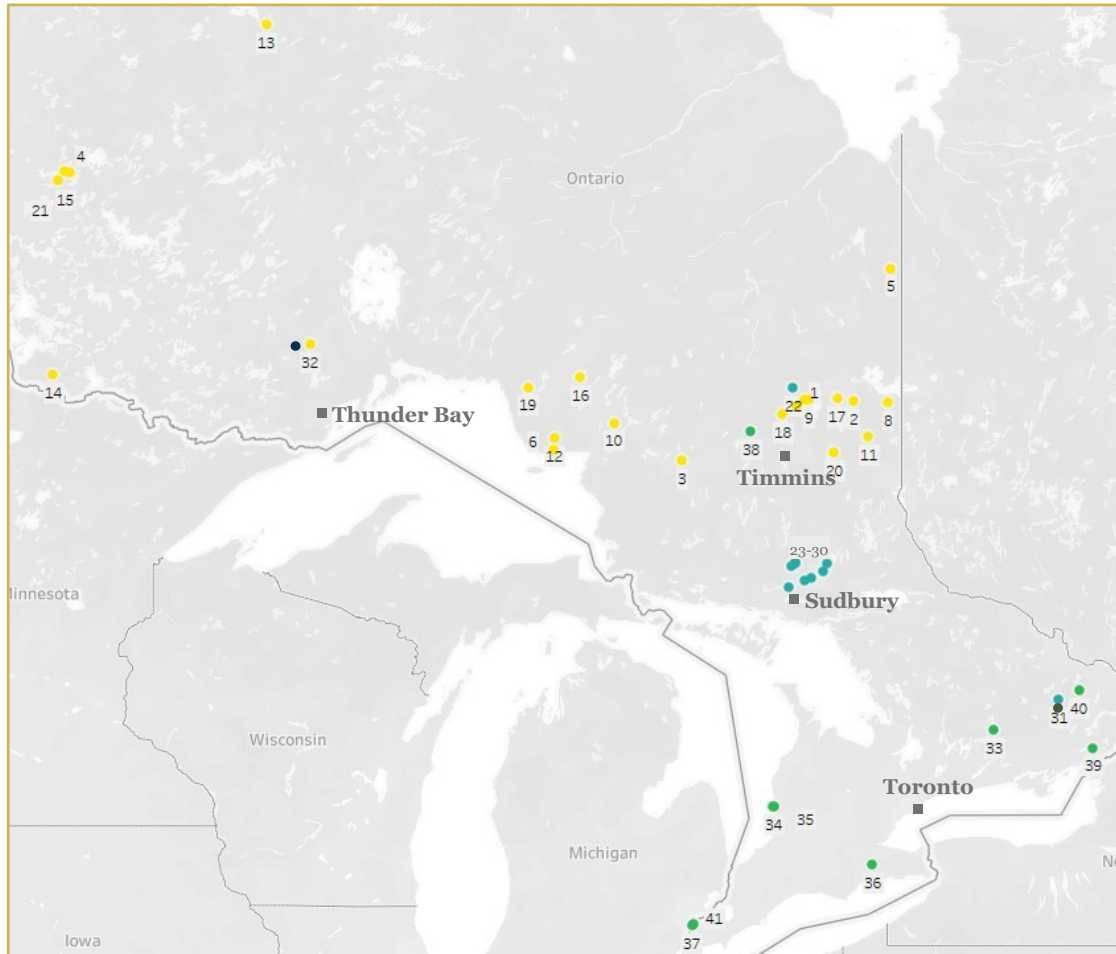


## Ontario Gold Mines

| | |
|---|---|
| 1. Bell Creek Mine, Lake Shore Gold Corp., a subsidiary of Pan American Silver | 2. Black Fox Mine, McEwen Mining Inc. |
| 3. Borden Mine, Newmont Corp. – Porcupine Gold Mines | 4. Cochenour Mine, Evolution Mining Ltd. – Red Lake Gold Mines |
| 5. Detour Lake Gold Mine, Agnico Eagle Mines Ltd. | 6. Eagle River Mine, Wesdome Gold Mines Ltd. |
| 7. Hollinger Mine, Newmont Corp. – Porcupine Gold Mines | 8. Holloway – Holt Mine, Agnico Eagle Mines Ltd. |
| 9. Hoyle Pond Mine, Newmont Corp. – Porcupine Gold Mines | 10. Island Gold Mine, Alamos Gold Inc. |
| 11. Macassa Mine, Agnico Eagle Mines Ltd. | 12. Mishi Gold Mine, Wesdome Gold Mines Ltd. |
| 13. Musselwhite Mine, Newmont Corp. | 14. Rainy River Mine, New Gold Inc. |
| 15. Red Lake Mine, Evolution Mining Ltd. | 16. Sugar Zone Mine, Harte Gold Corp. |
| 17. Taylor Mine, Holt Complex, Agnico Eagle Mines Ltd. | 18. Timmins West Mine, Lake Shore Gold Corp., a subsidiary of Pan American Silver |
| 19. Williams Mine, Barrick Gold Corp. | 20. Young Davidson Mine, Alamos Gold Inc. |
| 21. PureGold Mine, Pure Gold Mining Inc. | |

## Ontario Base Metal Mines

| | |
|---|---|
| 22. Kidd Creek Mine, Glencore PLC – Glencore Canada Corp. | 23. Sudbury Operations: McCreedy West Mine, KGHM International Ltd. |
| 24-28. Sudbury Operations: Coleman Mine/Copper Cliff North Mine/Creighton Mine/Garson Mine/Totten Mine, Vale S.A. – Vale Canada Ltd. | 29-30. Fraser Mine/Nickel Rim South Mine, Glencore PLC – Sudbury Integrated Nickel Operations |

## Ontario Iron Mine / Ontario Platinum Group Metal (PGM) Mine

| Ontario Iron Mine | Ontario Platinum Group Metal (PGM) Mine |
|---|---|
| 31. Tomclid Iron Mine, Ferromin Inc. | 32. Lac des Iles Mine, Impala Canada Ltd. |

## Ontario Major Industrial Mineral Operations

| | |
|---|---|
| 33. Blue Mountain Operations (nepheline syenite), Covia Holdings Corp. | 34. Goderich Brine Field (salt), Compass Minerals Canada Corp. |
| 35. Goderich Mine (salt), Compass Minerals Canada Corp. | 36. Hagersville Mine (gypsum), CGC Inc. |
| 37. Ojibway Mine (salt), Windsor Salt Ltd. | 38. Penhorwood Mine (talc), Imerys Talc |
| 39. St. Lawrence Mine (wollastonite), Canadian Wollastonite | 40. Tatlock Quarry (calcium carbonate), OMYA Canada Inc. |
| 41. Windsor Brine Field (salt), Windsor Salt Ltd. | |

Source: Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF)

# Ontario Mineral Production

## Key Observations

### Production Value

► Total provincial mineral production was valued at **over $10.7 billion** in 2020, which accounted for **24%** of Canada's total.

► Ontario's metallic minerals production was valued at **$8.6 billion** in 2020, representing **30.2%** of total Canadian metallic minerals production value.

► Ontario's non-metallic minerals production was valued at **$2.1 billion** in 2020, representing **13.8%** of total Canadian non-metallic minerals production value.

### Production Volume

► Ontario's mineral production volume totalled **over 119 million tonnes** in 2020.

► Ontario's metallic minerals production volume totalled nearly **190,000** tonnes in 2020, representing **29.3%** of total Canadian metallic minerals production volume.

► Ontario's non-metallic minerals production volume totalled approximately **119 million tonnes** in 2020, representing **35.6%** of total Canadian non-metallic minerals production volume.

## Ontario Metallic Minerals Production, 2020

| Commodity | Ontario Production Value (CAD$ millions) | Canada Production Value (CAD$ millions) | Ontario Share of Canada Production Value | Ontario Production Volume (tonnes) | Canada Production Volume (tonnes) | Ontario Share of Canada Production Volume |
|---|---|---|---|---|---|---|
| Cobalt | 24.2 | 156.4 | 15.5% | 1,028.0 | 4,279.0 | 24.0% |
| Copper | 888.1 | 3,860.0 | 23.0% | 123,630.0 | 475,898.0 | 26.0% |
| Gold | 5,070.8 | 12,320.8 | 41.2% | 72.6 | 179.5 | 40.5% |
| Indium | 2.3 | 2.3 | 100.0% | 6.2 | 6.2 | 100.0% |
| Nickel | 1,045.0 | 2,834.3 | 36.9% | 64,900.0 | 167,243.0 | 38.8% |
| Platinum group | 1,398.5 | 1,818.2 | 76.9% | 23.2 | 30.0 | 77.1% |
| Selenium | 2.6 | 4.9 | 52.7% | 52.7 | 100.0 | 52.7% |
| Silver | -- | 217.3 | -- | 70.7 | 290.4 | 24.3% |
| Tellurium | 0.8 | 1.3 | 59.1% | 7.5 | 22.5 | 33.5% |
| **Total** | **8,601.4** | **28,516.5** | **30.2%** | **189,790.9** | **648,048.6** | **29.3%** |

## Ontario Non-Metallic Minerals Production, 2020

| Commodity | Ontario Production Value (CAD$ millions) | Canada Production Value (CAD$ millions) | Ontario Share of Canada Production Value | Ontario Production Volume (tonnes) | Canada Production Volume (tonnes) | Ontario Share of Canada Production Volume |
|---|---|---|---|---|---|---|
| Lime | -- | 257.4 | -- | 1,077,942.0 | 2,062,542.0 | 52.3% |
| Nepheline syenite | 118.7 | 118.7 | 100.0% | 506,000.0 | 506,000.0 | 100.0% |
| Quartz (silica) | 20.1 | 122.9 | 16.4% | 1,511,482.0 | 3,720,938.0 | 40.6% |
| Sand and gravel | 589.4 | 1,729.3 | 34.1% | 63,402,919.0 | 181,471,031.0 | 34.9% |
| Stone | 526.3 | 1,632.6 | 32.2% | 51,845,481.0 | 141,200,924.0 | 36.7% |
| Sulphur (elemental) | <0.5 | 234.9 | <1.0% | 286.0 | 4,349,305.0 | <1.0% |
| Sulphur (smelter gas) | 65.5 | 95.7 | 68.4% | 379,550.0 | 554,746.0 | 68.4% |
| **Total** | **2,120.9** | **15,363.8** | **13.8%** | **118,913,450.9** | **333,865,486.0** | **35.6%** |

Sources: Natural Resources Canada, Annual Statistics of Mineral Production
Note: Natural Resources Canada's estimates for the 2020 reference year may be subject to revisions; production value estimates for silver and lime are under review

# Gold Mining in Ontario

## Key Observations

▶ Two-thirds of exploration investment in Ontario are related to precious metals. Moreover, 21 of the 41 active mines in the province are gold mines.

▶ Ontario is Canada's largest gold producer. Production in Ontario grew by nearly **50%** between 2010 and 2019. In 2020, production declined due to the COVID-19 pandemic.

▶ The world gold price has risen 45% since 2010 and was ~USD$1,800 per troy ounce as of 2020. The price is expected to continue to rise, surpassing ~USD$2,000 per troy ounce by 2030, indicating Ontario's gold production will further stimulate the provincial economy.

▶ Ontario generated a trade surplus from gold, with net exports reaching **$12.5** billion in 2019.

▶ In 2019 alone, nearly **75,000 kilograms** of gold was produced in the province, accounting for **42%** of the Canadian total.

▶ Ontario's gold mines are an important source of job creation and skill development opportunities, particularly for Indigenous communities in remote regions.
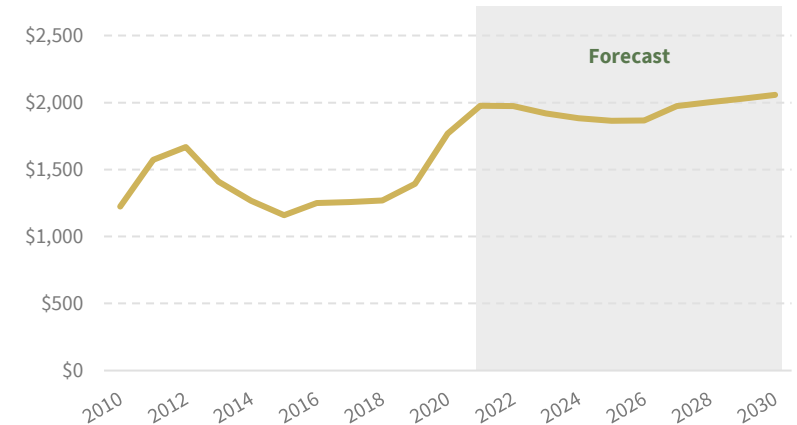
## Ontario Gold Production
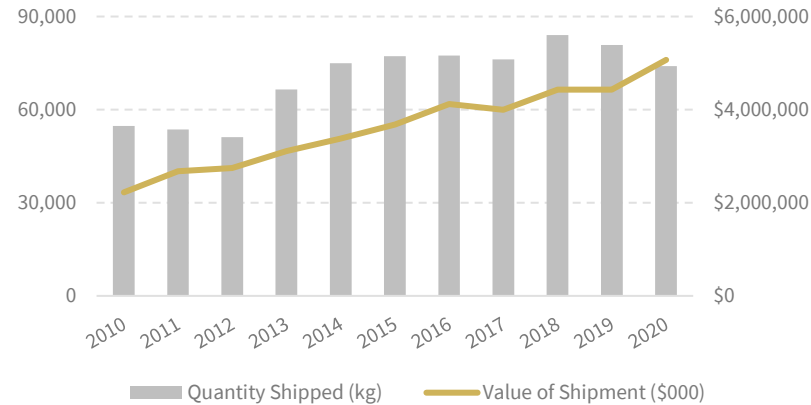


Source: Natural Resources Canada, Annual Statistics of Mineral Production
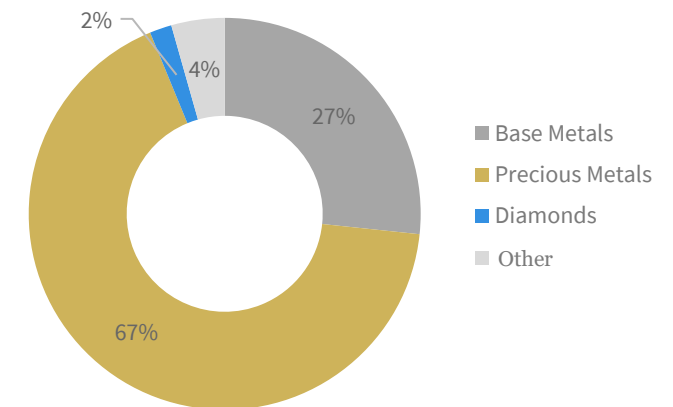
## Ontario Gold Net Exports (CAD$ millions)
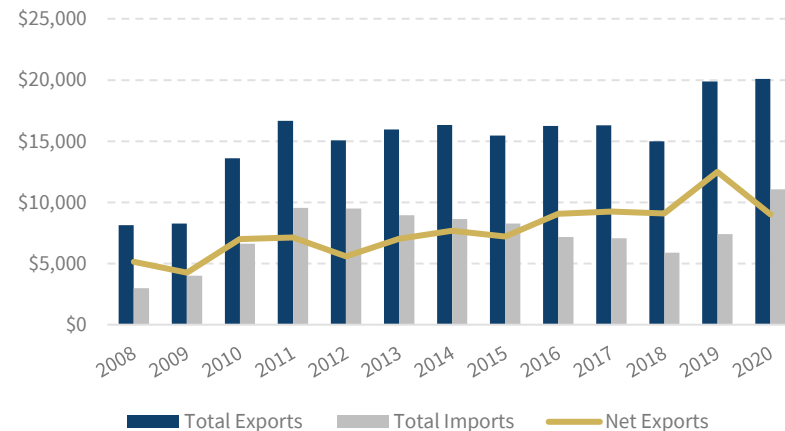


Source: Industry Canada, Trade Data Online

## World Gold Price Outlook (USD$/troy ounce)



Source: World Gold Council, S&P Global Market Intelligence

## Ontario Exploration Investment, 2019
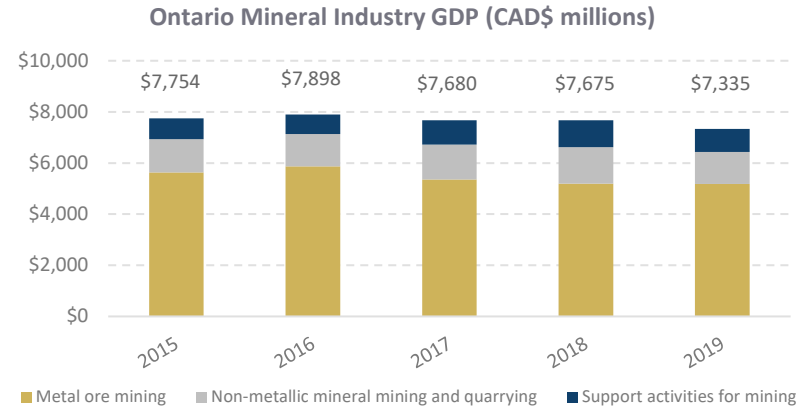


Source: Natural Resources Canada, Annual Statistics of Mineral Exploration

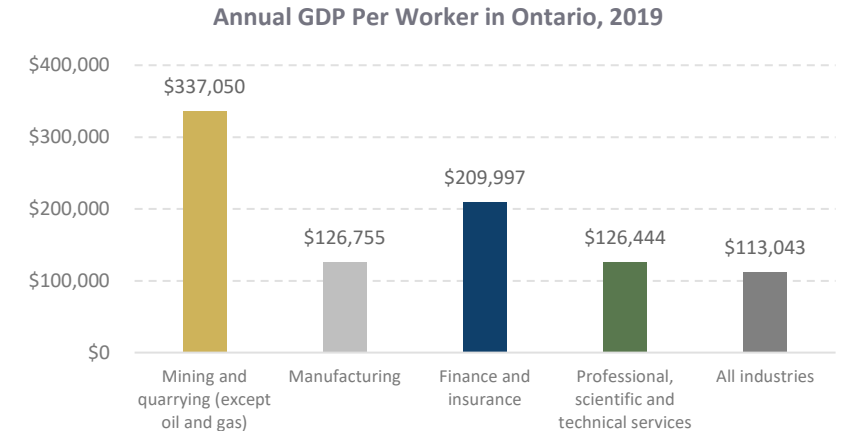# GDP & Production

## Key Observations

► Between 2015 and 2019, Ontario's mining industry on average contributed nearly **$7.7 billion** to the Ontario economy every year.

► Metal ore mining contributed **70%** of total mineral industry GDP during the period.

► On average, mining and quarrying GDP per worker was **$337,000** in 2019. This is roughly three times the average across all industries and significantly higher than the average for manufacturing, finance, and professional services.

► Production of key metal minerals (including gold, copper, platinum group elements, and nickel) and non-metal minerals in Ontario was valued at nearly $10.7 billion in 2016. Following a dip to $10.1 billion in 2017, production value rebounded to an average of $10.9 billion between 2018 and 2020.

► Ontario's natural resource reserves include millions of tonnes of copper, nickel, and zinc, and thousands of tonnes of gold and silver.

## Gross Domestic Product (GDP)

### Ontario Mineral Industry GDP (CAD$ millions)



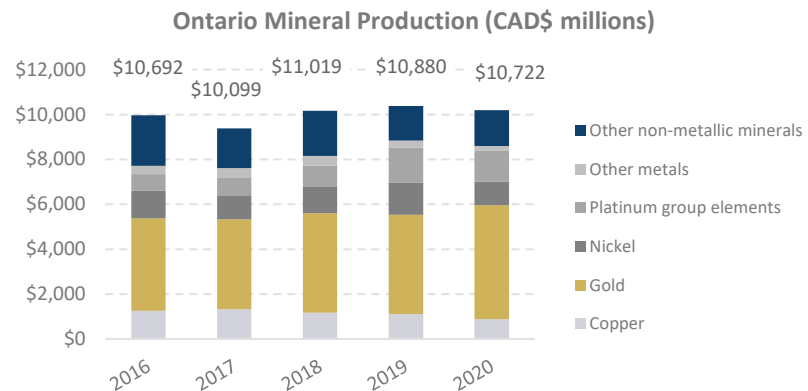Legend: ■ Metal ore mining ■ Non-metallic mineral mining and quarrying ■ Support activities for mining

Source: Statistics Canada, Gross Domestic Product by Industry

Note: In Section 2: Economic Contribution of Ontario's Mining Operations, GDP is estimated based on the OMA Industry Survey and is not comparable to the charts above

### Annual GDP Per Worker in Ontario, 2019



## Mineral Production & Reserves

### Ontario Mineral Production (CAD$ millions)



Legend: ■ Other non-metallic minerals ■ Other metals ■ Platinum group elements ■ Nickel ■ Gold ■ Copper

Source: Natural Resources Canada, Annual Statistics of Mineral Production

### Natural Resources Reserves (Tonnes)



Legend: ■ Copper (left) ■ Nickel (left) ■ Zinc (left) ━ Gold (right) ━ Silver (right)
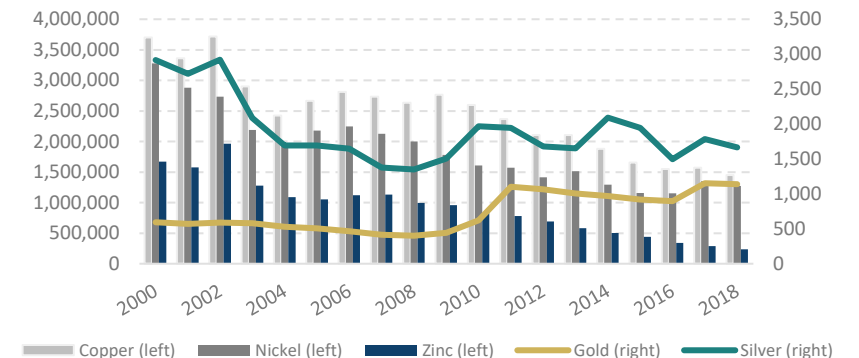
Source: Statistics Canada, Canadian System of Environmental and Resource Accounts
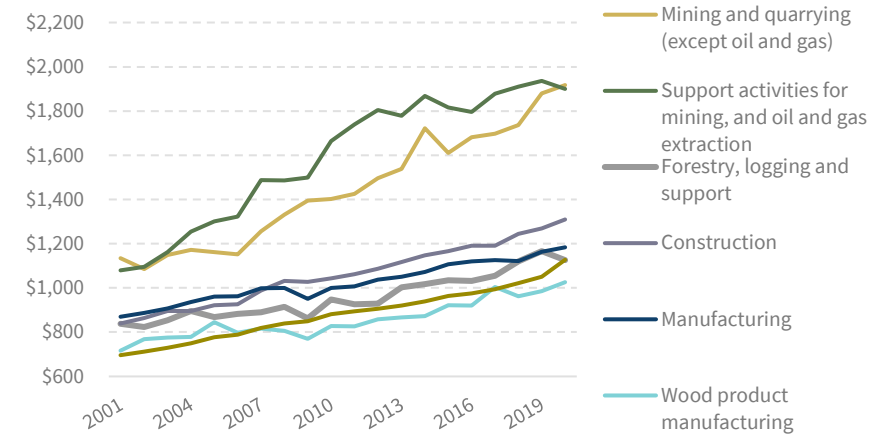
# Workforce Characteristics

## Key Observations

▶ In 2019, direct mining employment in Ontario totalled **more than 19,000 workers**.

▶ The average weekly wage in the Ontario mining sector is **70% higher** than the average industrial wage in the province, with mining workers earning **$1,917** weekly and mining support workers **$1,900** in 2019.

▶ Between 2001 and 2019, average earning for the mining and quarrying industry grew by **66%** while the average for the support activities for mining grew **80%**.

▶ Ontario's mining industry creates an equitable, diverse and inclusive environment for historically underrepresented groups. In 2016, **13%** of workforce were women, **9%** were of Indigenous Identities, and **6%** were visible minorities.

▶ Approximately three-fifths of the mining workforce has some post-secondary education, with college certificates or diplomas (**29%**) as the most common qualification.

▶ The majority (**70%**) of the mining workforce is between 25 to 54 years old.
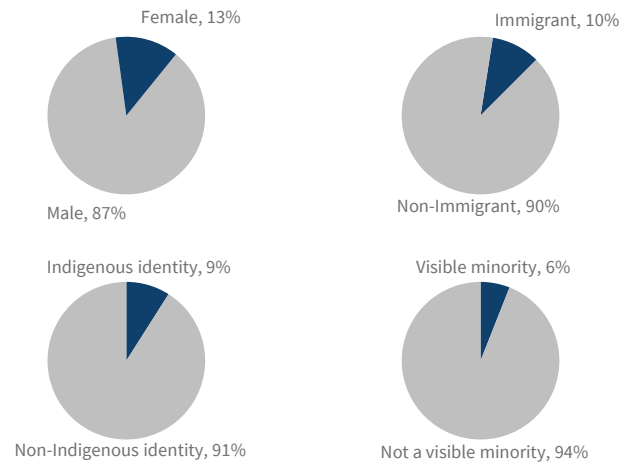
## Direct Mining Employment, Ontario
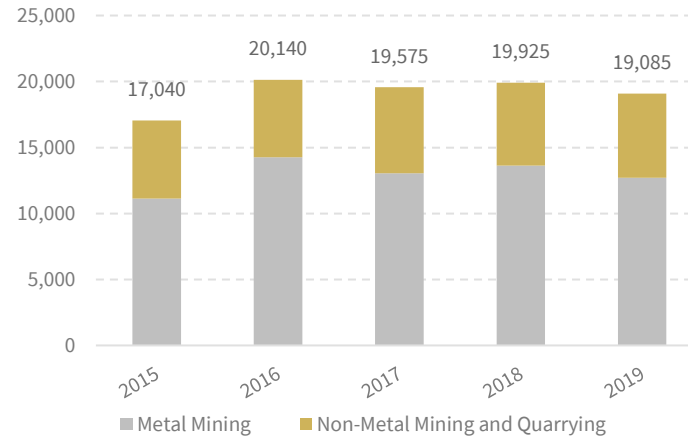


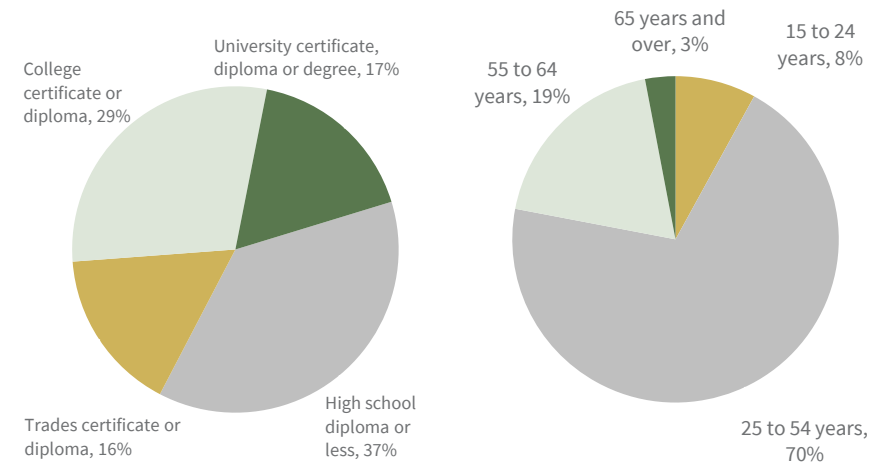Source: Statistics Canada, Labour Productivity Measures

## Ontario Mining Workforce Demographics



Source: Statistics Canada, Census 2016

## Average Weekly Earnings by Industry, Ontario



Source: Statistics Canada, Survey of Employment, Payrolls and Hours

# Workforce Characteristics (continued)

## Key Observations

▶ Approximately **44%** of mining companies' Ontario-based employees reside in **Northeastern Ontario**. This region includes the cities of Sault Ste. Marie and Timmins. The nearby **Sudbury Area** is home to nearly **27%** of the provincial mining workforce.

▶ The remaining **28%** of workers are located in **Northwestern or Southern Ontario**. The former includes Thunder Bay District, while the latter includes Toronto, Ottawa, and Hamilton.

▶ **Over two-thirds (67%)** of mining companies reported significant difficulty in hiring mechanics over the past three years, and an additional **27%** reported moderate hiring difficulty. This was followed by engineers, where **33%** of companies reported a significant hiring difficulty.

▶ The majority of mining companies have also experienced at least moderate difficulty in hiring millwrights (73%), engineers (60%), electricians (60%), workers in management occupations (60%), and maintenance planners (53%).

## Regional Employment Distribution, 2019

**Mining companies employees by place of residence**
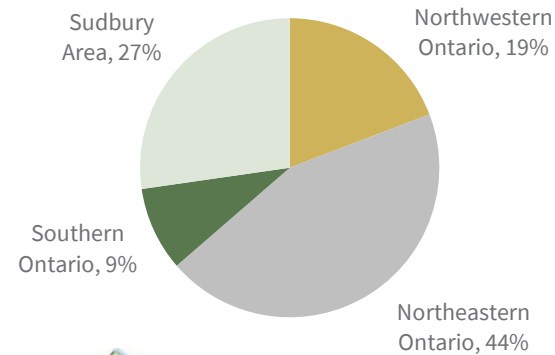


Sources: OMA Industry Survey

## Hiring Difficulties by Job Classification

**Percentage of mining companies reporting difficulty in hiring workers for each occupation over the past three years:**

| Job Classification | Moderate Difficulty | Significant Difficulty | Total |
|---|---|---|---|
| Mechanics | 27% | 67% | 93% |
| Millwrights | 53% | 20% | 73% |
| Management occupations | 40% | 20% | 60% |
| Engineers | 27% | 33% | 60% |
| Electricians | 33% | 27% | 60% |
| Maintenance planners | 40% | 13% | 53% |
| Geologists | 33% | 7% | 40% |
| Miners | 27% | 7% | 33% |
| Metallurgists | 20% | 7% | 27% |
| Health and safety workers | 27% | 0% | 27% |
| Other | 25% | 0% | 25% |
| **Average** | **27%** | **34%** | **61%** |

Note: Job classification descriptions are provided in Appendix B
Sources: OMA Industry Survey

# Investment

## Key Observations

▶ Ontario's mining sector supports a strong level of trade activity, and job and wealth creation for the province. Exports remained relatively steady at approximately $17 billion annually between 2015 and 2018 before rising to **over $21 billion** in 2019. Total imports rose to over $10 billion in 2019 after being relatively steady since 2016. Overall, the sector had **a positive trade balance of nearly $11 billion** in 2019.

▶ **43% of the world's public mining companies** globally are listed on either the TSX or TSXV. Throughout 2021, there were over **304.7 million trades** with a total **traded value of $2,546.2 billion**.

▶ Mining exploration and deposit appraisal expenditures grew by **42%** between 2016 and 2020.

▶ Capital and repair expenditures in Ontario's mining sector totalled approximately $3 billion in 2015 and 2016, before declining to $2.7 billion in 2017. However, expenditures rose to **$3.3 billion** in 2019.

## Ontario Mining Trade and Financing

### Mining and Quarrying Trade (CAD$ millions)
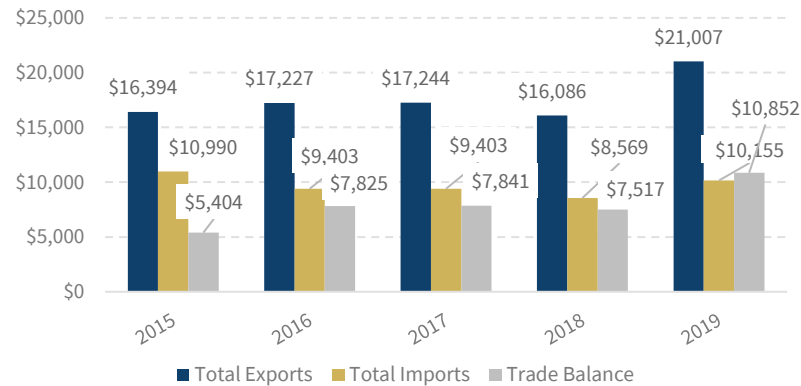


Source: Industry Canada, Trade Data Online

## Ontario Mining Expenditures

### Mining Exploration and Deposit Appraisal Expenditures

| CAD$ millions | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Senior Companies | 288.3 | 340.6 | 427.5 | 416.2 | 403.9 |
| Junior Companies | 105.9 | 199.1 | 163.9 | 107.1 | 157.8 |
| Total | 394.2 | 539.7 | 591.4 | 523.3 | 561.7 |

Source: Natural Resources Canada

### Mining Activity on the TSXV and TSX, 2021

| | TSXV | TSX | TSXV & TSX |
|---|---|---|---|
| Number of Issuers | 1,702 | 1,749 | 3,451 |
| Market Cap (CAD$) | 101.9B | 4,225.5B | 4,327.4B |
| Volume Traded (Shares) | 64.4B | 103.5B | 167.9B |
| Value Traded (CAD$) | 46.7B | 2,499.5B | 2,546.2B |
| Number of Trades | 26.5M | 278.2M | 304.7M |

Source: TMX Market Intelligence Report

### Mining and Quarrying Capital and Repair Expenditures (CAD$ millions)
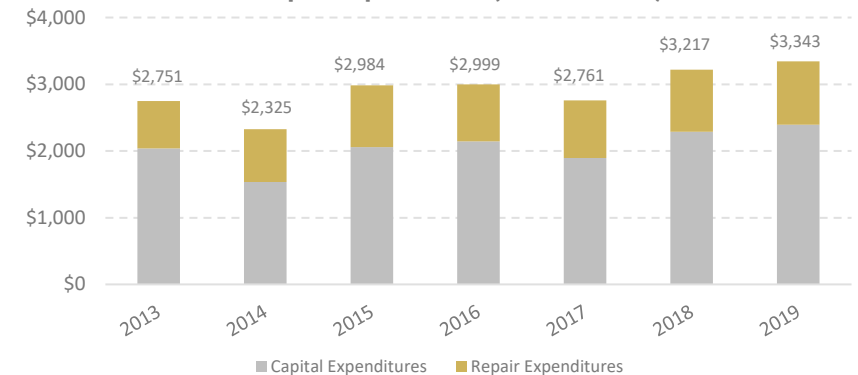


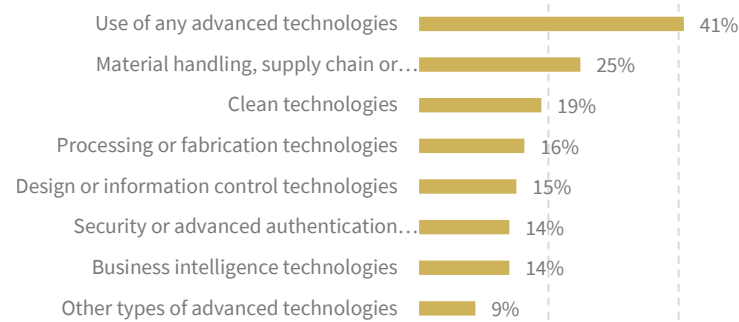Source: Statistics Canada, Annual Capital and Repair Expenditures Survey
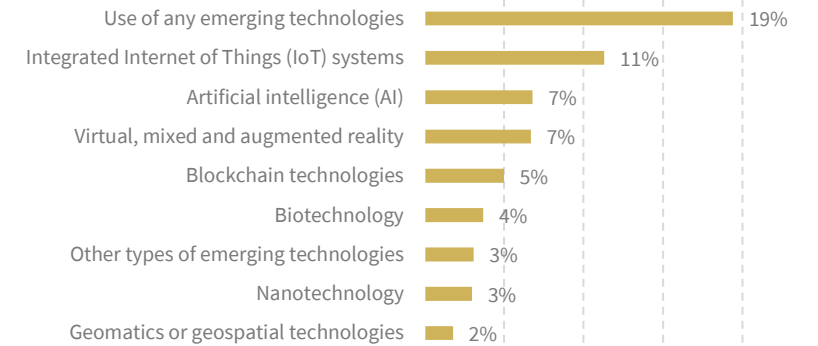
# Innovation

## Key Observations

▶ **Over 40%** of Ontario's mining businesses use some form of advanced technology, most commonly in the areas of material handling, supply chain or logistics (25%). Other common advanced technologies being used include clean technologies (19%) and processing or fabrication technologies (16%).

▶ The mining industry is beginning to invest in the technologies of tomorrow with **19%** of Ontario's mining companies using at least one emerging technology. The most frequently used emerging technology is Internet of Things[1] (IoT) (11%), followed by artificial intelligence (7%) and virtual/mixed/augmented reality (7%).

▶ The mining industry in Ontario has adopted advanced clean technologies at higher rates than industries such as utilities and manufacturing.

▶ As of 2019, mining companies has had **noticeably higher** rates of adoption for energy storage and energy-efficient transportation technologies than the provincial average and **surpassed** the provincial average for air, waste, and water treatment technologies.

## Adoption of Technologies among Ontario Mining Companies

**Mining Industry Adoption of Advanced Technologies, 2019**

| Technology | % |
|---|---|
| Use of any advanced technologies | 41% |
| Material handling, supply chain or… | 25% |
| Clean technologies | 19% |
| Processing or fabrication technologies | 16% |
| Design or information control technologies | 15% |
| Security or advanced authentication… | 14% |
| Business intelligence technologies | 14% |
| Other types of advanced technologies | 9% |

**Mining Industry Adoption of Emerging Technologies, 2019**

| Technology | % |
|---|---|
| Use of any emerging technologies | 19% |
| Integrated Internet of Things (IoT) systems | 11% |
| Artificial intelligence (AI) | 7% |
| Virtual, mixed and augmented reality | 7% |
| Blockchain technologies | 5% |
| Biotechnology | 4% |
| Other types of emerging technologies | 3% |
| Nanotechnology | 3% |
| Geomatics or geospatial technologies | 2% |

Source: Statistics Canada, Survey of Innovation and Business Strategy

## Ontario Mining Clean Technology Adoption, 2019
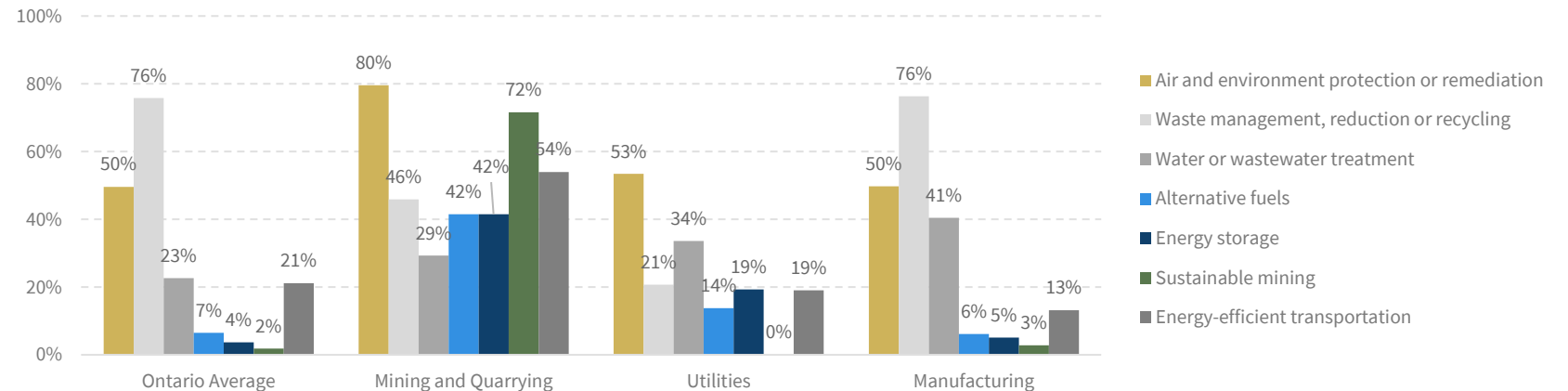


Source: Statistics Canada, Survey of Innovation and Business Strategy
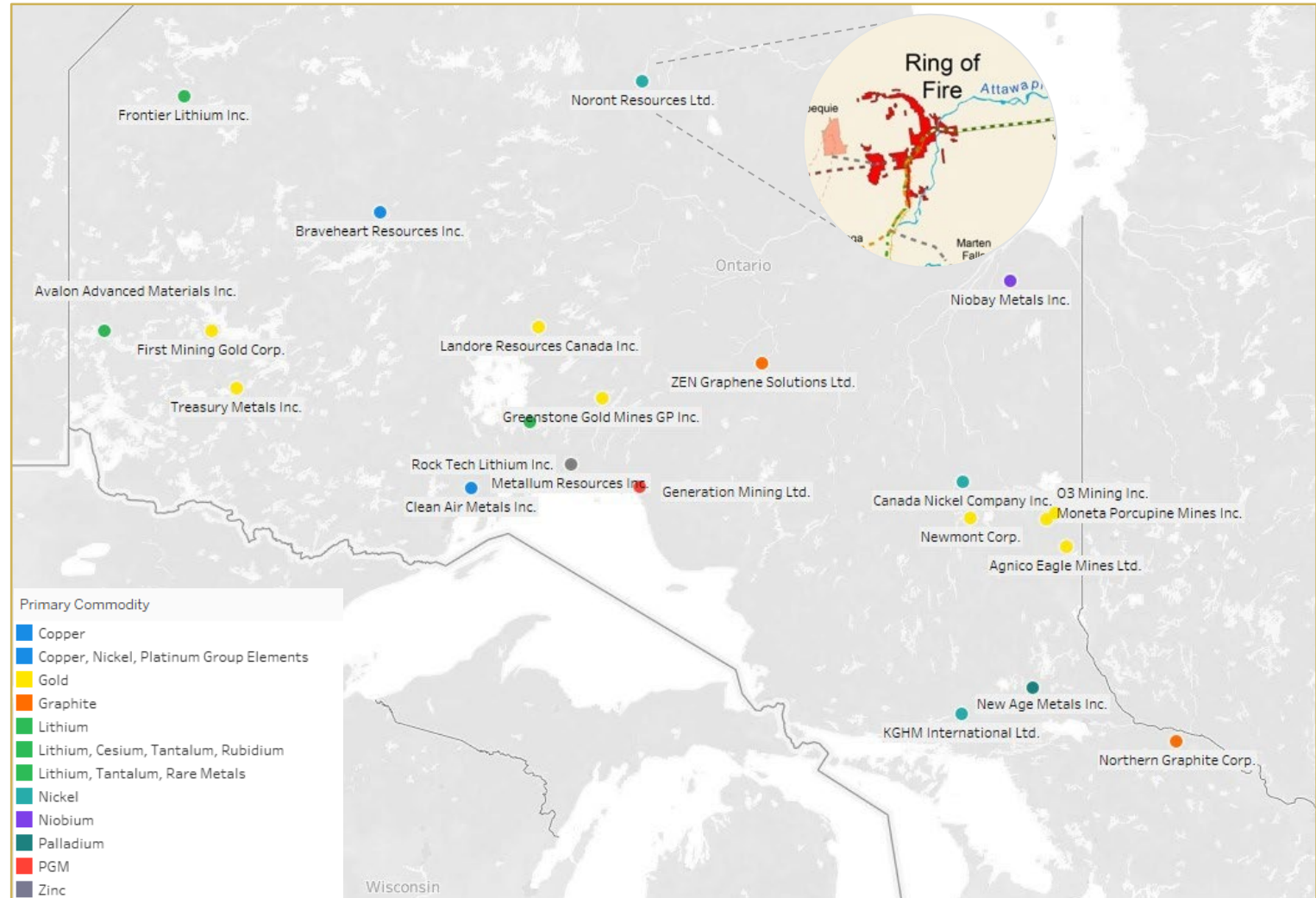
Note: [1] The "Internet of Things" refers to systems where physical objects are connected to and exchange data with other devices over the Internet through embedded sensors, software, and other technologies.

# Future Opportunities

## Key Observations

▶ Ontario currently has a total of **323 active exploration mineral projects**. Approximately 60% of these projects are for exploration of gold. There are also several active projects that primarily explore for critical minerals.

▶ Out of the province's current active projects, **23** are **advanced mineral projects**. These projects have the highest potential to drive regional development and generate economic value. For example, active advanced projects targeting nickel, copper, graphite, and lithium could potentially supply coveted raw materials used for battery production and other clean technology.

▶ Ontario's active exploration projects also include projects that are part of the 'Ring of Fire', a mining development area located in the James Bay Lowlands of Northern Ontario that holds potential for significant mineral reserves.

▶ Several mineral discoveries have been made in the Ring of Fire to date, including chromite, copper, zinc, gold and kimberlite.[1]

## Advanced Mineral Projects in Ontario, 2021[1, 2]



Primary Commodity
- Copper
- Copper, Nickel, Platinum Group Elements
- Gold
- Graphite
- Lithium
- Lithium, Cesium, Tantalum, Rubidium
- Lithium, Tantalum, Rare Metals
- Nickel
- Niobium
- Palladium
- PGM
- Zinc

# 2. Economic Contribution of Ontario's Mining Operations

Photo: Photo: Detour Lake Mine, Agnico Eagle
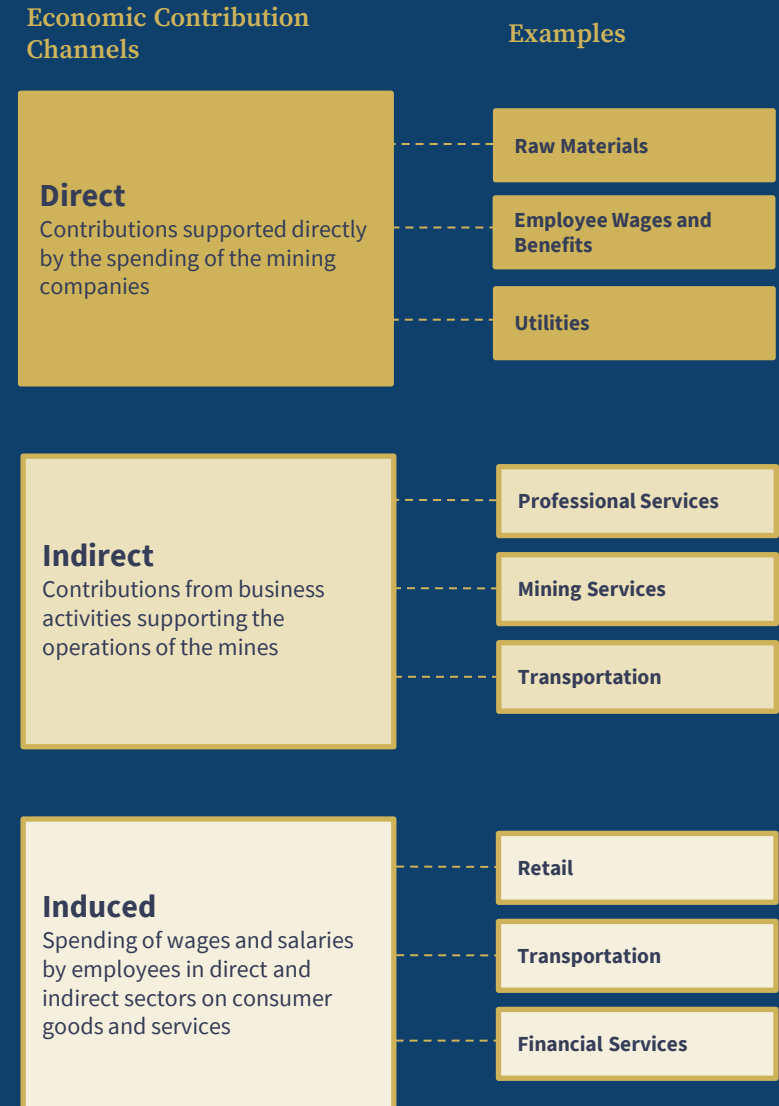
Ontario Mining
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# 2.1 Methodology and Approach Overview

▶ An economic contribution model was used to assess the current state and future economic contributions of OMA members' mining operations in Ontario. Additionally, the economic contribution of a representative hypothetical new gold mine was estimated.

▶ The model is constructed based on the principles of the input-output ("I-O") model. Total value of the minerals produced, spending patterns on suppliers and wages, and employment information provided by OMA members in the industry survey were used as inputs.

▶ Economic contributions associated with the mining operations are captured through three distinct channels: direct, indirect, and induced. These contributions individually, and collectively represent how Ontario mining activities ripple throughout the regional economies.

▶ The key economic indicators are Gross Output, Gross Domestic Product (GDP), Wages, and Jobs (FTEs).

▶ The economic impacts are estimated at the national, provincial, and regional levels.

▶ To develop regional economic multipliers for four Ontario regions (Northwest Ontario, Northeast Ontario, Sudbury, Southern Ontario), data and information on industry concentrations, employment levels, and other economic data from Statistics Canada were used to reflect the local economy.

## Economic Contribution Indicators

**Output**
Gross output contributions generated through revenue from mineral production

**GDP**
GDP contributions generated through stimulated economic activity from the OMA member mine operations

**Wage/Salary**
Contributions to wages and salaries sustained as a result of the economic activity and form a part of GDP

**Full-time equivalent jobs (FTEs)**
Jobs created and supported as a result of the operations of OMA member mines

Note: Detailed economic contribution methodology is provided in **Appendix A**

---

**Economic Contribution Channels**

**Examples**

**Direct**
Contributions supported directly by the spending of the mining companies

- Raw Materials
- Employee Wages and Benefits
- Utilities

**Indirect**
Contributions from business activities supporting the operations of the mines

- Professional Services
- Mining Services
- Transportation

**Induced**
Spending of wages and salaries by employees in direct and indirect sectors on consumer goods and services
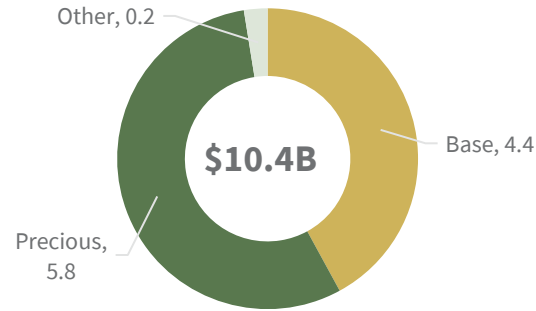
- Retail
- Transportation
- Financial Services

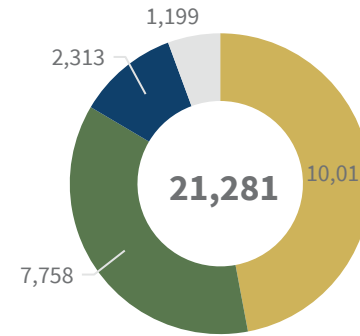# 2.2 Major Mines' Production, Spending, and Employment

## Key Observations

▶ The mining sector's direct contributions to Ontario's economy are derived from data provided by companies operating in the province.

▶ In 2019, Ontario's mining sector produced **$10.4 billion** worth of minerals, of which base metals accounted for 42%, and precious metals accounted for 56%.

▶ **21,281 full-time equivalent job**s were supported by Ontario's mining sector in 2019, with the majority located in the Sudbury region and Northeast Ontario.

▶ Major Ontario mining companies paid a total of over **$1.9 billion in wages** and salaries in 2019.

▶ Ontario's mining sector is a major contributor to government revenues. In 2019, mining companies paid a total of **$373 million in taxes**. Of those, ~55% was paid in federal taxes, provincial taxes made up 38%, and municipal taxes accounted for the remainder.

▶ Regionally, mining companies in Northeast Ontario and the Sudbury region accounted for **86% of the sector's government revenues**, reflecting the two regions' more active mining activities.

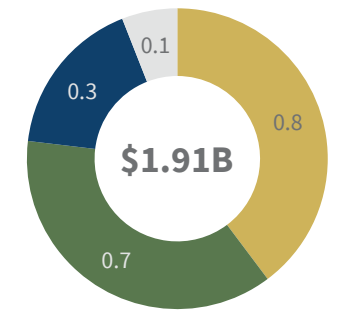## Major Mines' Direct Economic Contributions (2019)

### Mineral Production Value (2019 CAD$)



$10.4B

Other, 0.2
Base, 4.4
Precious, 5.8

Sources: OMA Industry Survey

### Employees (FTEs)



21,281

1,199
2,313
10,011
7,758

### Wages and Salaries (2019 CAD$)



$1.91B

0.1
0.3
0.7
0.8

■ **Sudbury**   ■ **Northwest**   ■ **Northeast**   ■ **South**

## Major Mines' Tax Contributions (2019)

### Tax Paid by Region (2019 CAD$)



$373M

42
11
147
174

■ Northwest
■ Northeast
■ Sudbury
■ South
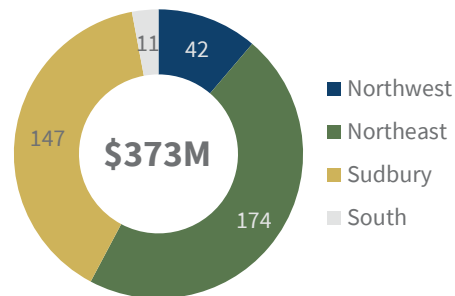
### Tax Paid by Levels of Government (2019 CAD$)



$373M

26
204
143

■ Federal taxes
■ Provincial taxes
■ Municipal taxes
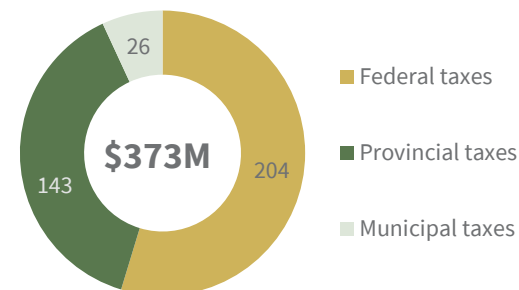
Sources: OMA Industry Survey

## Local Spending (2019)

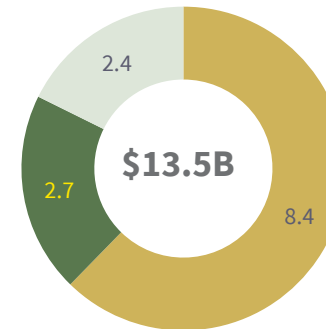| Share of spending on materials and services within 100 km of the mine | | |
|---|---|---|
| **Region** | **Materials** | **Services** |
| Sudbury | 70% | 71% |
| North East | 21% | 24% |
| North West | 36% | 46% |
| South Ontario | 60% | 80% |

Sources: OMA Industry Survey

# 2.3 Current Economic Contribution of Major Ontario Mines
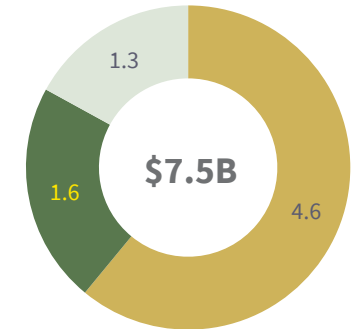
## Economic Contributions of Major Ontario Mines (2019)

- Market value of the minerals produced in Ontario was **$10.4 billion** in 2019. It represents the total gross output of the OMA members, which in turn stimulates the economic activity in the regional, provincial, and national economies.

- Based on the 2019 mineral production, major mining operations in Ontario are estimated to contribute **$13.5 billion in gross output**, **$7.5 billion in GDP**, **$3.3 billion in wages** to Ontario, and sustain over **48,605 FTE jobs** in the province annually.

- With 81% of direct and 72% of the total contributions to mining GDP staying within Ontario, mining operations also generate additional contributions throughout Canada. Annual total economic contributions of Ontario's major mines to the Canadian economy are estimated at **$18.9 billion in gross output**, **$10.3 billion in GDP**, **$3.8 billion in wages**, and **55,670 FTE jobs**.

## Estimated Annual Economic Contributions of Major Ontario Mines

| Indicator | Ontario | Canada |
|---|---|---|
| **Gross Output** (2019 CAD$) | **$13.5B** ($8.4B, $2.7B, $2.4B) | **$18.9B** ($10.3B, $5.1B, $3.4B) |
| **GDP** (2019 CAD$) | **$7.5B** ($4.6B, $1.6B, $1.3B) | **$10.3B** ($5.6B, $2.8B, $1.9B) |
| **Wages** (2019 CAD$) | **$3.3B** ($1.9B, $0.9B, $0.5B) | **$3.8B** ($1.9B, $1.1B, $0.7B) |
| **Employment** (FTEs) | **48,605** (21,281, 15,135, 12,189) | **55,670** (21,281, 18,280, 16,109) |

## Economic Contributions in Ontario (2019)

**Gross Output (2019 CAD$, billions)**

$13.5B — 8.4, 2.7, 2.4

**GDP (2019 CAD$, billions)**

$7.5B — 4.6, 1.6, 1.3

**Wages and Salaries (2019 CAD$, billions)**

$3.3B — 1.9, 0.9, 0.5

**Employment (FTE jobs)**

48,605 — 21,281, 15,135, 12,189

Legend: Direct, Indirect, Induced

Note: Total economic contributions are displayed in bold. Direct, indirect, and induced contributions are listed in order in parentheses. Figures represent annual contributions based on mineral production in 2019

Sources: OMA Industry Survey, Statistics Canada

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# 2.4 Regional Economic Contribution

## Regional Contributions of Major Ontario Mines (2019)

- Ontario mining operations generate benefits in each of Ontario's four regions.

- The majority of contributions at the regional level occur in the **Sudbury region** with total annual economic contributions of approximately **$7.5 billion in gross output**, **$3.3 billion in GDP**, **$1.2 billion in wages**, and over **20,517 FTE jobs**.

- In the **Northwest region**, mining operations contribute approximately **$2.4 billion in gross output**, **$1.5 billion in GDP**, **$600 million in wages**, and **6,000 FTE jobs** at direct, indirect, and induced levels annually.

- Additionally, on an annual basis, Ontario's mining companies contribute a total of **$1.9 billion to Northeast region's output**, **$1.7 billion to GDP**, **$1 billion in wages**, and sustain **16,278 FTE jobs**.

- In **South Ontario**, the mining sector's contributions are estimated at **$1.7 billion in gross output**, close to **$1 billion in GDP**, **$500 million in wages**, and over **5,810 FTE jobs**.

## Estimated Annual Total Economic Contributions in Ontario's Regions

| Indicator | Sudbury | Northwest | Northeast | South | Ontario |
|---|---|---|---|---|---|
| **Gross Output** (2019 CAD$) | $7.5B | $2.4B | $1.9B | $1.7B | **$13.5B** |
| **GDP** (2019 CAD$) | $3.3B | $1.5B | $1.7B | $1B | **$7.5B** |
| **Wages** (2019 CAD$) | $1.2B | $0.6B | $1B | $0.5B | **$3.3B** |
| **Employment** (FTEs) | 20,517 | 6,000 | 16,278 | 5,810 | **48,605** |

## Total Regional Employment Contributions (2019)



**Northwest 6,000 FTE**

**Northeast 16,278 FTE**

**Sudbury 20,517 FTE**

**South 5,810 FTE**

Note: Figures display total of direct, indirect, and induced economic contributions to Ontario's regional economies. Figures represent annual contributions based on mineral production in 2019
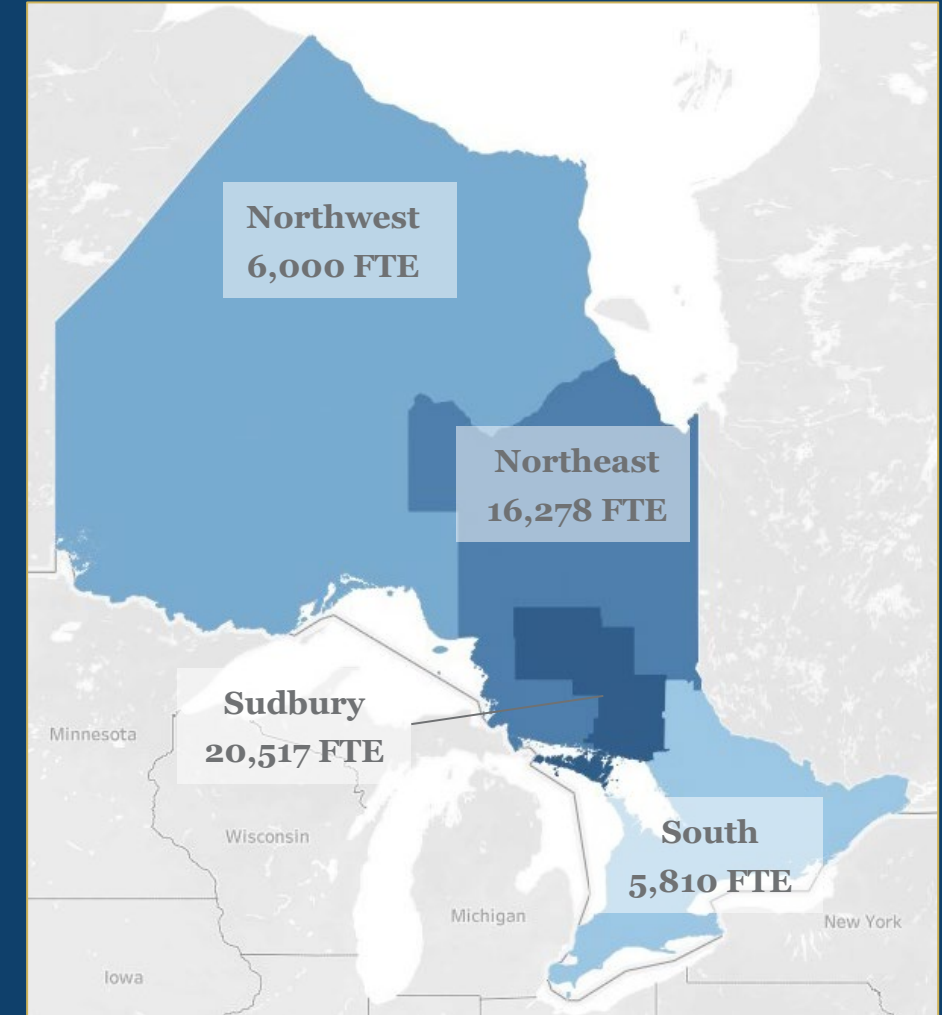
# 2.5 Projected Economic Contribution

## Projected Economic Contributions of Major Ontario Mines

▶ Future economic contributions are projected and based on the forecast of Ontario mineral production value. Production value is determined based on production volume and commodity prices.

- S&P Market Intelligence database and company announcements are used to project mine start-ups and closures over the forecast period and understand their corresponding impacts on Ontario's mineral production volume.

- Futures prices and consensus of analyst forecasts form the basis of the commodity price forecasts.

▶ The total value of the minerals produced in Ontario is expected to reach **$13.7 billion** in 2025 and generate a total contribution of **$16.8 billion**, an increase from **$13.5 billion** in total gross output contribution in 2019**.**

▶ **GDP** contribution is expected to rise **from $7.5 billion** in 2019 **to $9.3 billion** in 2025, and **wages and salaries** contribution is expected to grow from **$3.3 billion to $3.4 billion** over the same period of time**.**

▶ In 2025, mining is expected to sustain close to **51,900 FTE jobs** in Ontario up from **48,605** in 2019.

## Economic Contributions in Ontario (2020-2025)
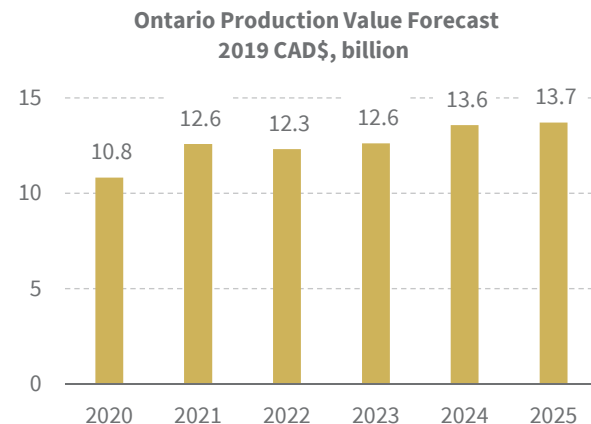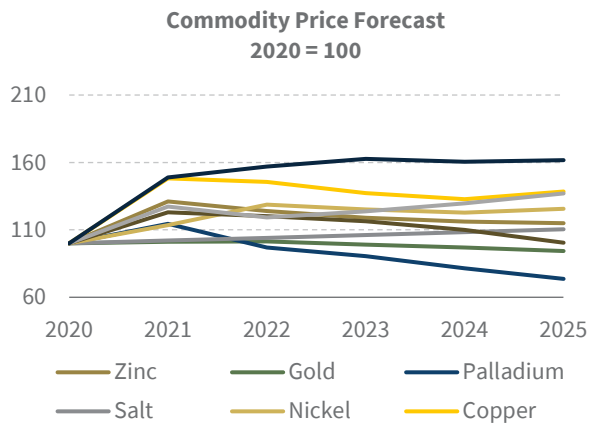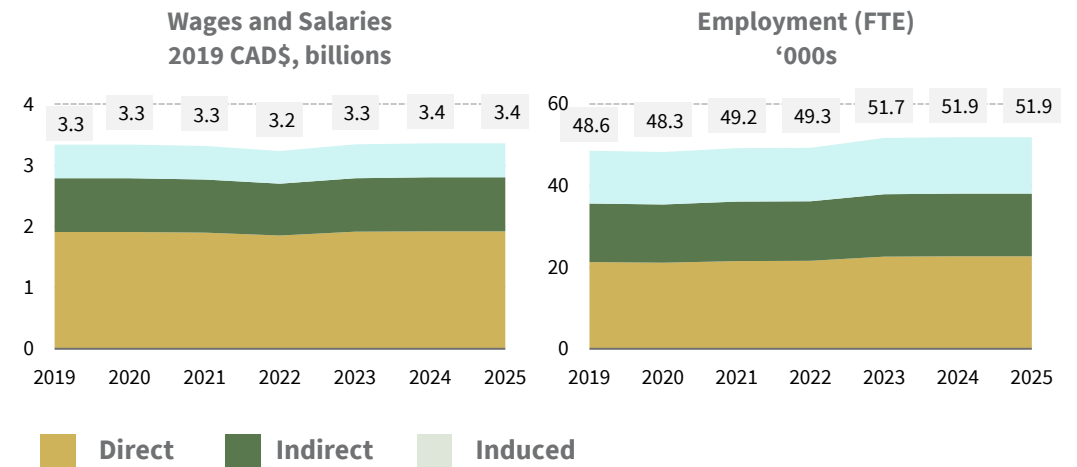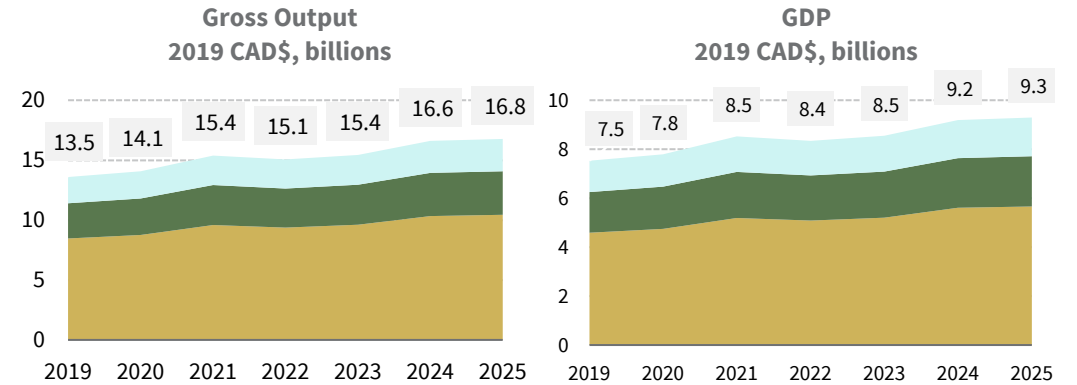


Sources: OMA Industry Survey, S&P Capital IQ



Sources: OMA Industry Survey, S&P Capital IQ

# 2.6 Economic Contribution of a New Gold Mine: Construction Phase

## Key Observations

### Underground Mine

► Based on historical data, construction of a new underground gold mine is estimated to cost **$989 million** over three years in Ontario.

► Throughout the construction phase, annual total economic contributions in Ontario from mine construction activities are estimated at:
  - **$357 million in GDP**
  - **$132 million in wages and salaries**
  - **1,850 FTE jobs**
  - **$58 million in taxes**

### Open Pit Mine

► Based on historical data, construction of a new open pit mine is estimated to cost **$1.24 billion** over three years in Ontario.

► Throughout the construction phase, annual total economic contributions in Ontario from mine construction activities are estimated at:
  - **$447 million** in **GDP**
  - **$165 million** in **wages and salaries**
  - **2,312 FTE jobs**
  - **$60 million** in **taxes**

Sources: OMA Industry Survey, S&P Global Market Intelligence

## Construction Phase

### Underground Mine
- 755 Direct Jobs
- $989M Construction Costs (3 years)
- $87,000 Average Compensation

### Open Pit Mine
- 943 Direct Jobs
- $1.24B Construction Costs (3 years)
- $87,000 Average Compensation

| Indicator | Annual Economic Contributions in Ontario (2021 CAD$) | |
|---|---|---|
| | Underground Mine | Open Pit Mine |
| GDP | **$357M** ($156M, $122M, $79M) | **$447M** ($195M, $152M, $99M) |
| Wages | **$132M** ($66M, $45M, $21M) | **$165M** ($82M, $57M, $27M) |
| Employment (FTEs) | **1,850** (755, 664, 431) | **2,312** (943, 830, 539) |
| Taxes | Municipal: **$8.2M** Provincial: **$20M** Federal: **$30M** | Municipal: **$10.2M** Provincial: **$22M** Federal: **$28M** |

Note: Total economic contributions are displayed in bold. Direct, indirect, and induced contributions are listed in order in parentheses

# 2.6 Economic Contribution of a New Gold Mine: Production Phase

## Key Observations

### Underground Mine

► Based on historical data, an operation of a new underground mine costs an estimated **$282 million during each production year**.

► Annual total economic contributions in Ontario from mine production activities are estimated at:

- **$321 million** in **GDP**
- **$181 million** in **wages and salaries**
- **1,932 FTE jobs**
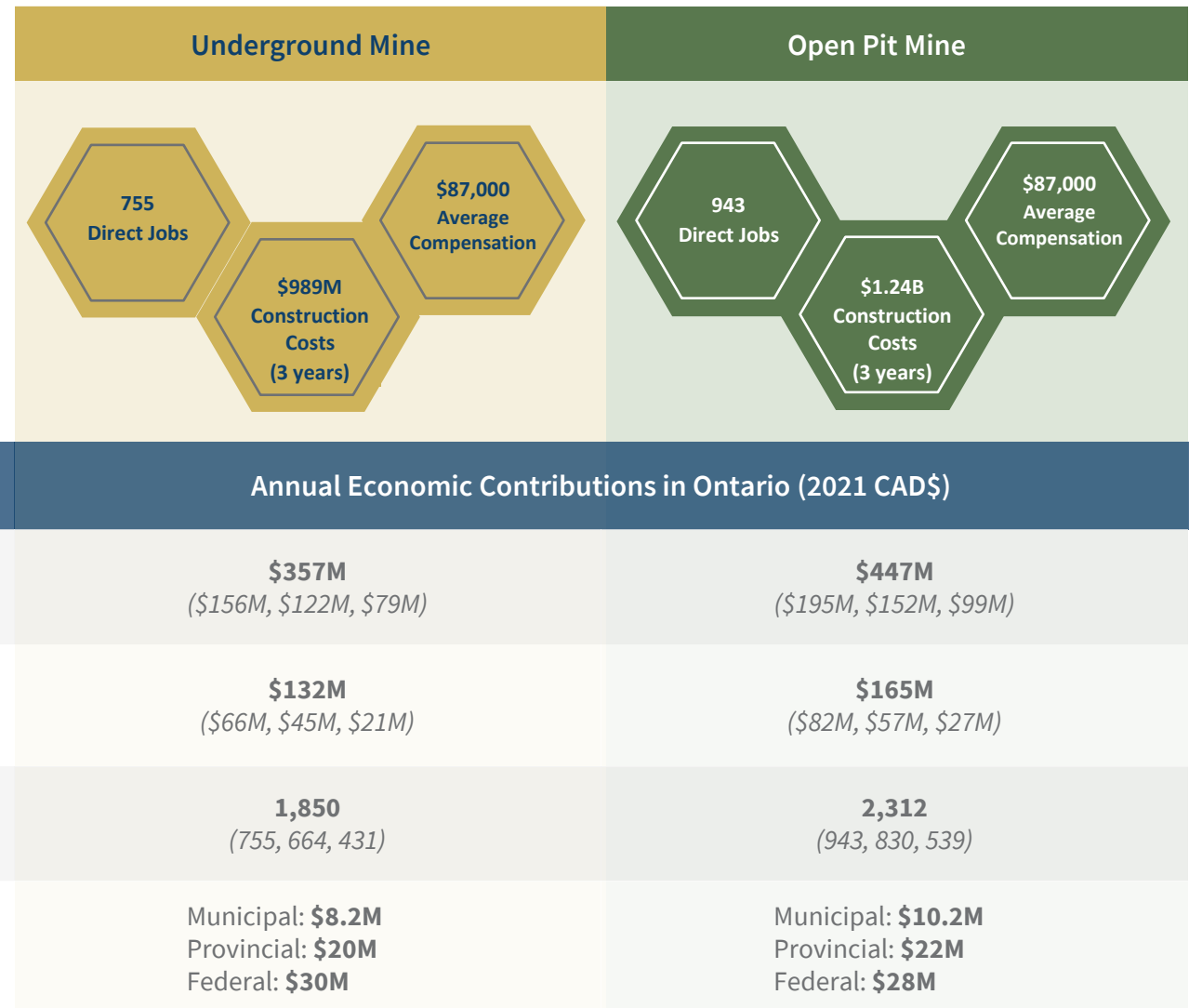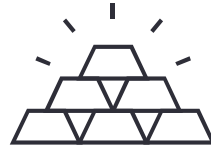- **$93 million** in **taxes**

### Open Pit Mine

► Based on historical data, an operation of a new open pit mine costs an estimated **$346 million** during each production year.

► Annual total economic contributions in Ontario from mine production activities are estimated at:

- **$303 million** in **GDP**
- **$126 million** in **wages and salaries**
- **1,368 FTE jobs**
- **$83 million** in **taxes**

Sources: OMA Industry Survey, S&P Global Market Intelligence

## Production Phase

### Underground Mine

- 846 Direct Jobs
- $282M Annual Production Costs
- $129,000 Average Compensation

### Open Pit Mine

- 599 Direct Jobs
- $346M Annual Production Costs
- $126,000 Average Compensation

| Indicator | Annual Economic Contributions in Ontario (2021 CAD$) | |
|---|---|---|
| | **Underground Mine** | **Open Pit Mine** |
| GDP | **$321M** ($189M, $73M, $59M) | **$303M** ($177M, $70M, $57M) |
| Wages | **$181M** ($104M, $47M, $30M) | **$126M** ($72M, $33M, $21M) |
| Employment (FTEs) | **1,932** (846, 572, 514) | **1,368** (599, 405, 364) |
| Taxes | Municipal: **$7.8M** Provincial: **$29M** Federal: **$56M** | Municipal: **$9.6M** Provincial: **$27M** Federal: **$46M** |

Note: Total economic contributions are displayed in bold. Direct, indirect, and induced contributions are listed in order in parentheses

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# 3. Environmental, Social, and Corporate Governance

Photo: Glencore Sudbury Operations

Ontario Mining Association

# Environmental, Social, and Corporate Governance

An environmentally conscious and socially responsible mining sector is key to Ontario's long-term economic growth and prosperity. Analysis in this stage is focused on the most common ESG criteria used to evaluate mining companies' performance and highlight social benefits from mining activities in Ontario.

## Environment

On the environmental aspect of the ESG criteria, mining companies are typically evaluated on the basis of:

- ▶ Energy intensity and associated carbon footprint, e.g., share of energy from low-carbon and renewable sources, and connection to power grid

- ▶ Water usage, recycling and pollution mitigation strategies

- ▶ Investment in clean technologies and innovation, e.g., electric vehicles and mobile equipment

- ▶ Greenhouse gas (GHG) emission reduction targets and energy management targets

## Social

On the social aspect of the ESG criteria, mining companies are typically evaluated on the basis of their:

- ▶ Contributions to local communities: hiring local and providing training opportunities, procurement from local businesses, and charitable donations

- ▶ Ongoing engagement and meaningful relationships with First Nations communities

- ▶ Health and safety performance at mine sites (e.g., number of incidents and injuries) and measures introduced to protect workers

## Governance

On the governance aspect of the ESG criteria, mining companies are typically evaluated on the basis of:

- ▶ Equity, diversity and inclusion efforts, including improving representation of women, Indigenous Peoples, and People of Colour

- ▶ ESG factors taken into account by mining companies in their investment decisions

- ▶ Company-wide executive pay, audits, internal controls, and shareholder rights policies

- ▶ ESG reporting at the stock exchanges where companies are listed

# Environment & Sustainability

Ontario's mining industry continues to operate in an environmentally responsible way. Across the province, mining companies adhere to high standards in sustainability and environmental protection in areas of renewable energy sources, energy conservation, carbon emission reduction, and clean technologies adoption.

▶ Ontario's mining industry **adopts advanced clean technologies at a rate of 13.8% above the Ontario industry average**.[1]

▶ The majority of operating mines have connected to Ontario's power grid, of which nearly 95% of electricity is produced from zero-carbon sources.[2]

▶ Ontario's mining companies are industry leaders in the use of battery electric mobile equipment, which contributes to minimizing GHG emissions.

**82% of senior mining companies have established carbon emission reduction goals; 64% have energy management targets.**

82%
Have carbon emission reduction goals

64%
Have energy management targets
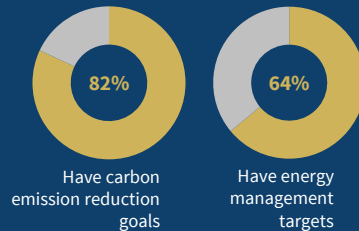
**Over 66% of water used by major Ontario mines in 2019 was recycled.**

66%

■ Recycled water
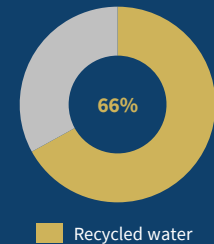
**$123.5M was spent on adoption of clean technologies, environmental protection, energy efficiency, and reclamation & decommissioning in 2019.**

12M
4M
18M
$123.5M
89M
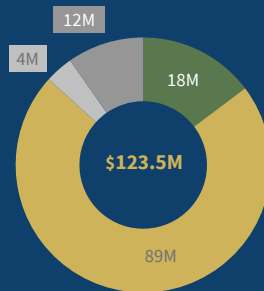
**57% of Ontario mining companies have indicated plans to use more low-carbon energy;* 46% indicated plans to use more renewable energy**.**

| | Low carbon energy | Renewable energy |
|---|---|---|
| | 43% | 54% |
| Yes | 57% | 46% |
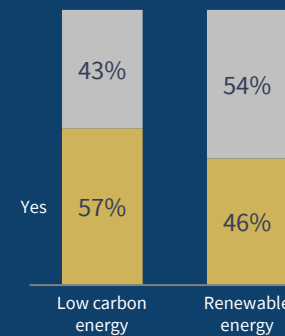
## Ontario's mining companies lead the industry in adopting battery electric vehicles in underground mines

■ Former Kirkland Lake Gold (KLG), now merged with Agnico Eagle Mines Ltd., a senior Canadian gold mining company, was an early adopter of the battery electric movement with electric scoops being deployed underground at the Macassa mine.[3]

■ The Newmont Borden mine near Chapleau has installed 38 pieces of electric equipment leading to a significant reduction in GHG output. Switching diesel in favour of electric is truly transformational for the mining industry globally and has contributed to the goal to position the Ontario mining sector as a leader in the transition to a low carbon economy, enhanced employee safety with the reduction of diesel particulate emissions and advanced commercialization within Ontario's supply and service sector.[4]

## Ontario's mining companies participate in regreening efforts

■ Vale and Glencore worked with the government, and the public on the Sudbury's regreening program. As of 2020, nearly 10 million trees were planted, nearly 3,500 hectares were limed and fertilized, and about 2.12 hectares of forest floor plots were transplanted.[5]

## Water management is an important focus of environmental initiatives led by mining companies

■ Ontario's mining companies are committed to water conservation, including using recycled water.

■ For example, Wesdome Gold improved its water recycling programs to reduce freshwater consumption. Approximately 90% of the water discharged from the site's tailings management area (TMA) is from precipitation because the Eagle River Mill is able to recycle the majority of that water used to process ore.[6]

Sources: [3] KLG 2021 Sustainability report [4] Newmont [5] Glencore PLC [6] Wesdome 2020 Sustainability report

Sources: [1] Statistics Canada, Survey of Innovation and Business Strategy; OMA Industry Survey . [2] OMA Industry Survey and Canada Energy Regulator
Notes: * Low-carbon energy includes liquefied natural gas (LNG) and biofuel; ** Renewable energy includes solar and electric power

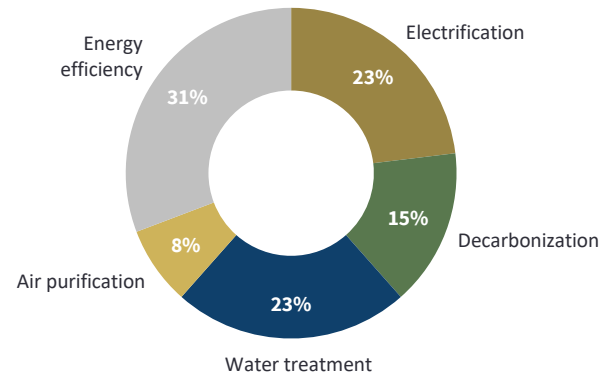# Environment & Sustainability (continued)

## Key Observations

► The majority of Ontario mining companies have adopted environmental technologies in their operations, including:

- Electrification of mining fleets and mobile equipment;
- Low carbon technologies;
- Conversion to natural gas;
- Water treatment technology to mitigate pollution and recycle water;
- Air purification technology to maintain air quality underground; and,
- Energy efficiency technology, such as ventilation on demand to reduce power consumption.

Altogether, these technologies help Ontario's mining companies to meet stringent environmental targets.

► **Three-quarters** of Ontario's mining companies participate in carbon pricing schemes that aim to lower GHG emissions and spur innovation.

► **More than half** of Ontario mines have set carbon reduction targets, and almost **40%** have established long-term net zero targets. Of those that have not yet established targets, several indicated they are currently developing such targets.

Sources: OMA Industry Survey

**Use of environmental technologies, 2021**

Energy efficiency 31%
Electrification 23%
Decarbonization 15%
Water treatment 23%
Air purification 8%

**Carbon-pricing scheme participation, 2021**
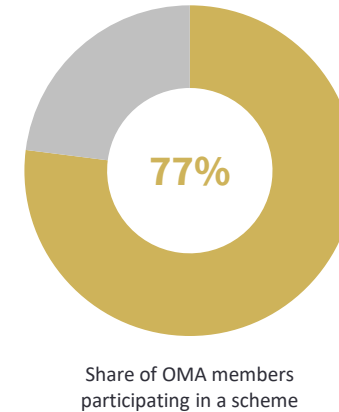
77%

Share of OMA members participating in a scheme

**Carbon emission reduction goals, 2021**

Long-term net zero targets 39%
Carbon reduction target 62%
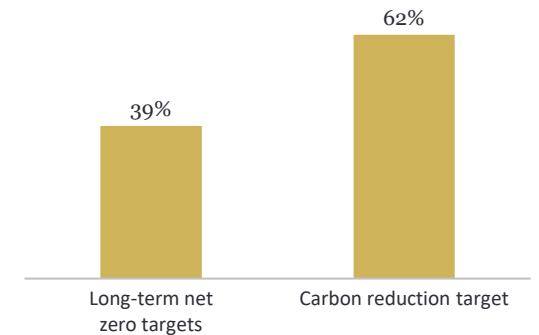
# Environment & Sustainability (continued)

## Key Observations

▶ Ontario's mining industry has consistently used less energy in its operations compared with similar industries in the province. Between 2000 and 2018, energy use by the mining industry was well below that of iron and steel, pulp and paper, petroleum refining, chemicals, and other manufacturing industries.

▶ The mining industry also converts its energy use into economic value more efficiently than the aforementioned industries. Except for construction, mining contributes more to Ontario's GDP per unit of energy used than all of its comparable industries in the province.

▶ Ontario's mining industry accounted for 4% of total GHG emissions as of 2018. This share is significantly lower than that of some comparable indust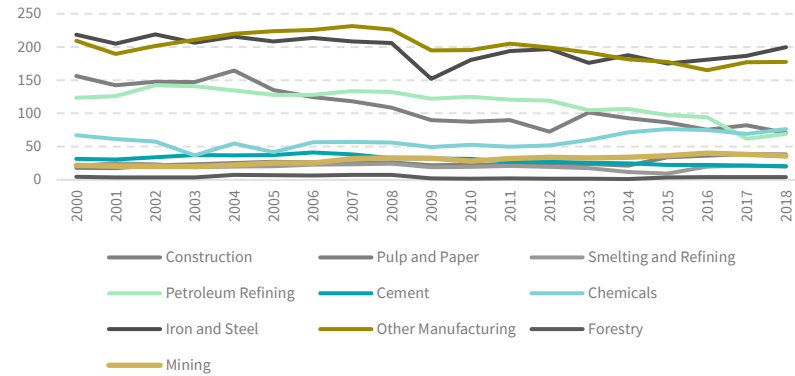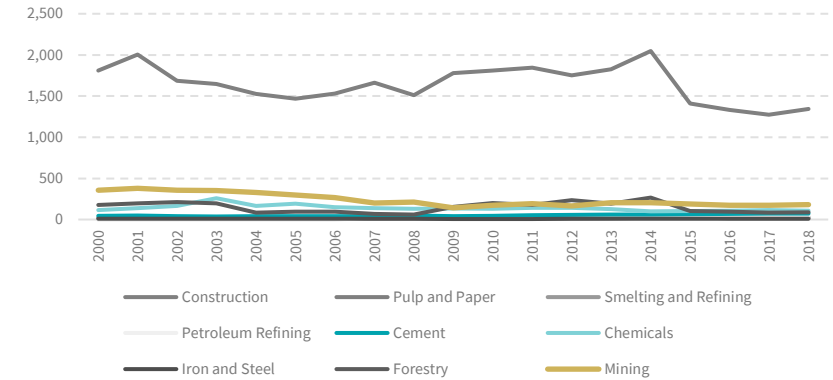ries, for example iron and steel production (43%), petroleum refining (11%), and other manufacturing industries (16%). Mining's GHG emissions share is also lower than that for cement production (5%), chemicals production (8%), and construction (8%).

## Energy Use by Industry

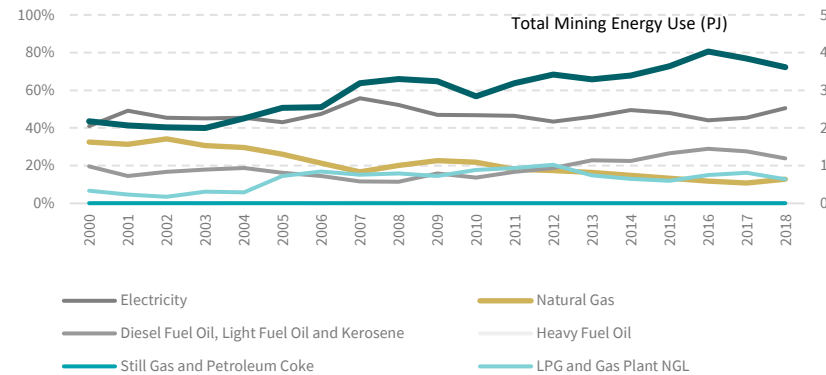**Ontario Energy Use by Industry (PJ)**



**Ontario GDP Per Energy Used (PJ) by Industry**



Sources: Natural Resources Canada, Comprehensive Energy Use Database; Statistics Canada, Gross Domestic Product by Industry
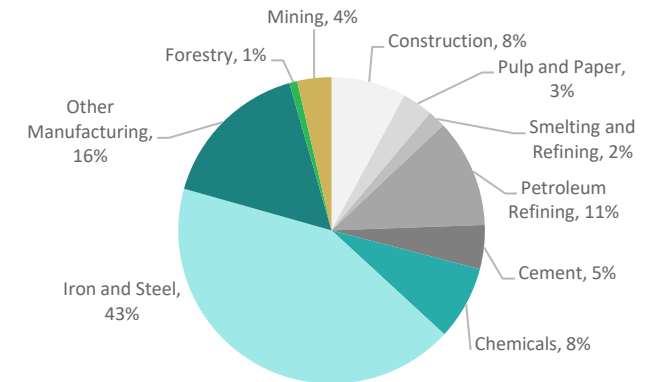
## Energy Sources and Emissions

**Ontario Mining Energy Use by Source**



**Share of Total GHG Emissions by industry, 2018**



Source: Natural Resources Canada

# Contributions to Local Communities

Ontario's mining companies play an important role in local communities that they operate in and contribute to social well-being by prioritizing local hiring and procurement, supporting health and education initiatives, and engaging with First Nations communities.

**On average, 44% of supplies, materials and services were locally sourced in 2019**

**~9% average share of Indigenous employees at OMA member mines in 2019**

**~$60M paid to Indigenous governments and communities in 2019**

**~$36M spent on health and safety measures by mining companies in 2019**

**~$7.3M spent by mining companies on employee training in 2019**

**~$6M in charitable donations to communities in 2019**

Sources: OMA Industry Survey





Sources: [1] North Bay Nugget, 2021, "Vale's beehives in Sudbury overflowing" [2] Impala Canada [3] CTV News, 2021, "Operating room at Timmins hospital receives $250K boost from Lake Shore Gold" [4] Glencore Kidd Operations [5] Newmont 2020 Sustainability report [6] New Gold Sustainability report 2021

## Mining operations in Ontario are committed to improving their local communities by reinvesting in important social programs

- On World Bee Day in 2021, Vale donated 650 jars of honey to the Sudbury Food Bank.[1]
- Impala Canada invested $375,000 to Thunder Bay's Root to Harvest – a Community Food Centre that aims to address root causes of food insecurity.[2]
- In 2021, Lake Shore Gold, a subsidiary of Pan American Silver, donated $250,000 for operating room upgrades at the Timmins and District Hospital.[3]
- Glencore Kidd Operations donated over $175,000 to support COVID efforts throughout the education and health sectors.[4]

## Ontario's mining companies actively engage with local First Nations communities

- Newmont's Musselwhite team led a trapping course in the community of Mishkeegogamang First Nation. The course taught fur trapping, wildlife biology, pelt preparation skills and fur harvesting ethics. This course was done in support of the community's Choose Life program, which helps promote positive life habits and reconnects participants with the land.[5]

## Mining companies invest in infrastructure improvements in Ontario's regions

- New Gold Inc. operations continually seek opportunities to invest in infrastructure improvements that increase the quality of life in its host communities. In 2020, construction at the Ceremonial Roundhouse (the Roundhouse) at New Gold's Rainy River site was completed. The Roundhouse – a heated, wheelchair accessible building – is used as a gathering place to conduct traditional ceremonies and celebrations, and share traditional knowledge. When New Gold mining operations cease, the Roundhouse will be donated to the community.[6]

# Community Partnerships

## Key Observations

► As of 2020, there are **142 active agreements** in place between Indigenous communities and mining companies across Ontario.[1] These agreements formalize mutually beneficial relationships between Indigenous communities and the province's mining industry.

► Over **40 exploration agreements** are currently active. These agreements allow for mining activities like collection of core samples.

► The mining industry is the **largest** heavy industry employer of Indigenous Peoples in Canada.

► In 2019, Ontario's mining industry employs nearly **3,000** Indigenous community members.

► On average, Indigenous mining workers earned over **$87,000** that year, significantly higher than the all-industry average.[2]

► Indigenous Peoples made up for **8.9%** of employees at OMA member mines in 2019.[3]

► Ontario's mining companies contributed **nearly $60 million** to Indigenous governments and communities in 2019.[3]

Sources: [1] Natural Resources Canada [2] Statistics Canada [3] OMA Industry Survey

## Active Indigenous Mining Agreements, 2020[1]



Agreement type
- Memorandum, of Understanding
- Exploration Agreement
- Impact and Benefits Agreement
- Cooperation Agreement
- Engagement Agreement
- Letter of Intent
- Negotiation Protocol
- Participation Agreement
- Socio-Economic Agreement
- Other
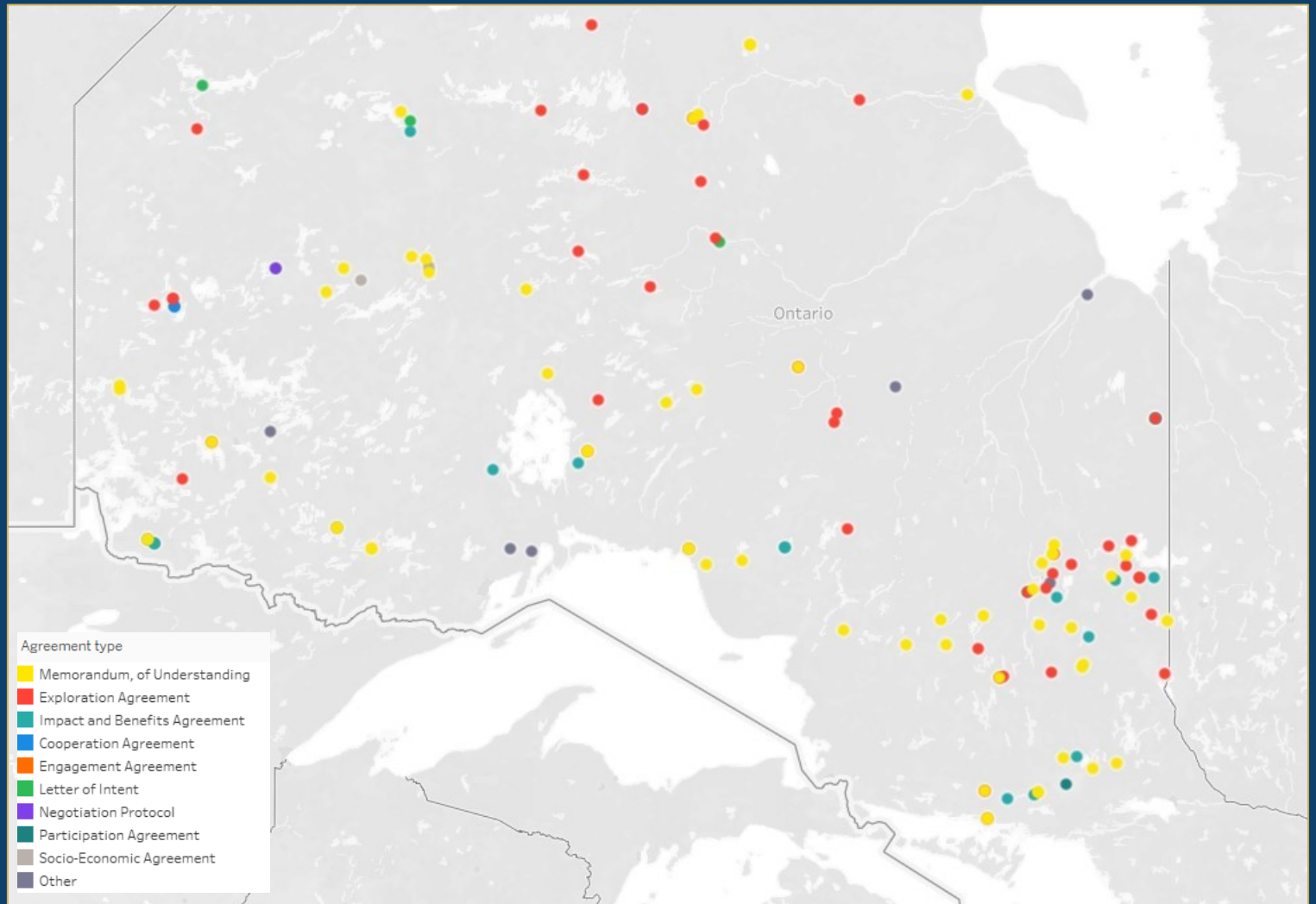
# Worker Health & Safety

## Key Observations

▶ Lost-time injury (LTI) rates are based on WSIB claims created when a worker suffers a work-related injury or disease. LTI rates for mining are among the lowest of any Schedule 1* Ontario industry. The LTI rate for mining was 0.71 in 2019, which was below the provincial average (0.98) and lower than comparable industries, such as construction (1.12), forestry (1.49), and automotive (0.96).

▶ Ontario's mining industry reduced its LTI rate by nearly 30% since 2010, continuing its trend as one of the safest industries in the province. In comparison, the provincial average fell by just 15% over the same period.

▶ Mining fatalities have also seen a significant decline in Ontario over the past two decades, falling from 40 in 2002 to fewer than 10 in 2019. There were zero traumatic fatalities (i.e., deaths caused by work-related incidents) and 8 occupational disease fatalities (i.e., deaths due to a work-related disease or condition) in 2019.

Note: *Schedule 1 industries include (but are not limited to): mining and related industries, manufacturing, transportation and storage, retail and wholesale trades, and construction

## Lost-Time Injury Rates by Industry, Ontario
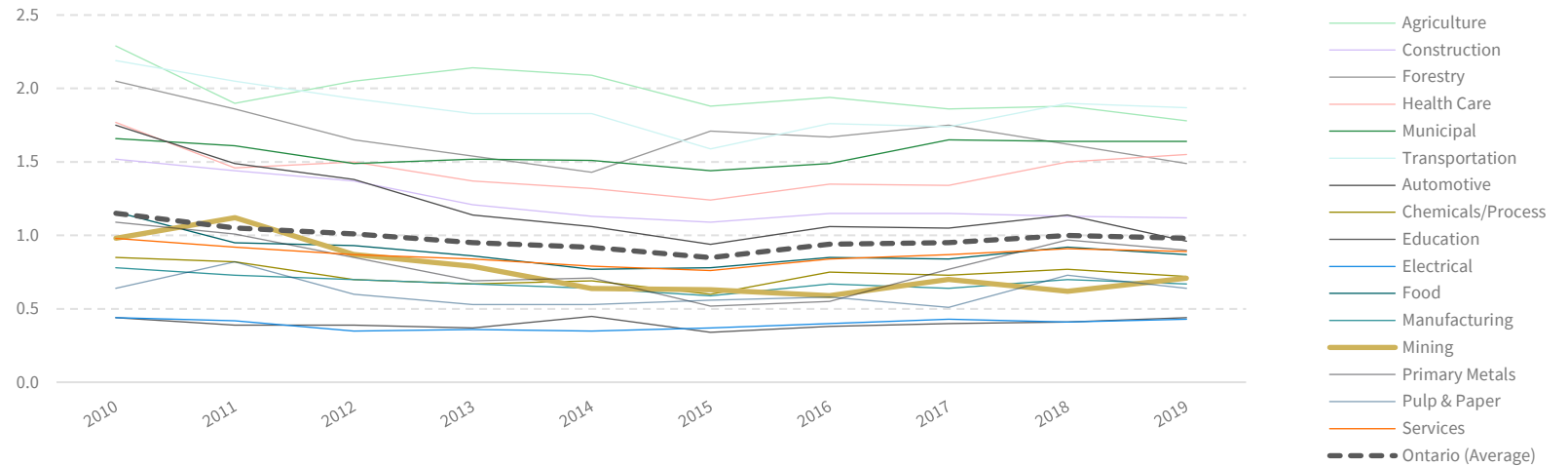


Source: Workplace Safety and Insurance Board (WSIB) Enterprise Information Warehouse

## Lost-Time Injury Rates by Industry, 2010 vs. 2019



2010 / 2019     Source: WSIB Enterprise Information Warehouse

## Mining Fatalities by Type, Ontario



■ Traumatic   ■ Occupational Disease
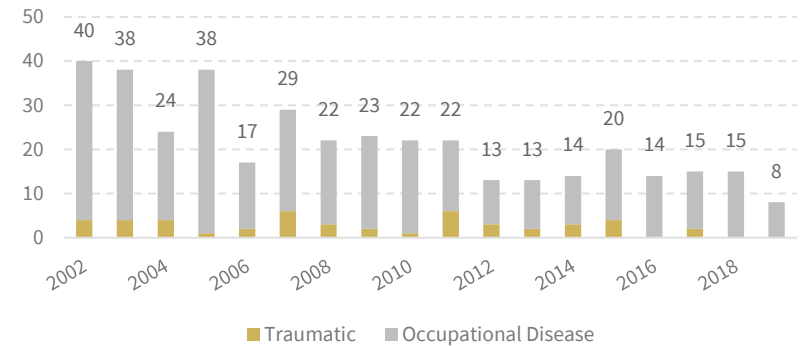
Note: Traumatic fatalities include deaths caused by work-related incidents. Occupational Disease fatalities include deaths due to a work-related disease or condition
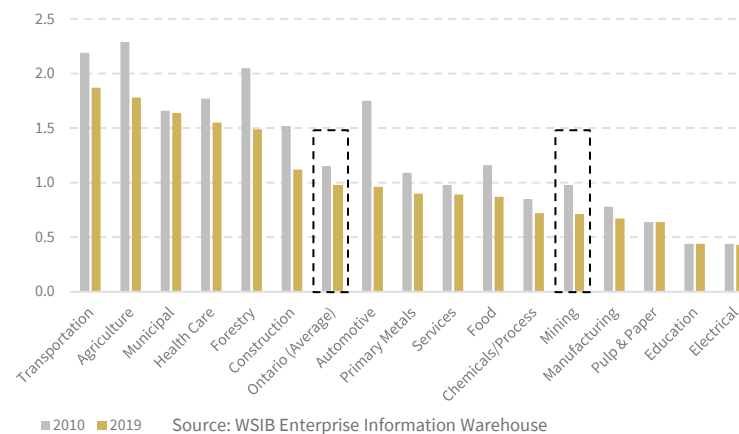
Source: WSIB Enterprise Information Warehouse

# Worker Health & Safety (continued)

## Key Observations

▶ Ontario's mining companies implement comprehensive health and safety measures to ensure the safety of their employees, with **$36 million spent on health and safety** in 2019.

▶ All of the OMA industry survey respondents indicated that they actively seek to improve lines of communication with regards to health and safety training , streamlining communication between leadership and their direct reports.

▶ To avoid collisions, Ontario's mining companies utilize traffic control systems, radio communication and proximity detection systems.

▶ Some safety tools used at Ontario mines include synthetic ropes, laser equipment, and protective gloves.

▶ The majority of companies also use automation in high-risk environments and all companies use data to improve mine safety. For instance, companies collect data from the mines to identify safety trends and use the information collected to implement initiatives.

## Health and Safety Measures Used by Ontario's Mining Companies, 2021
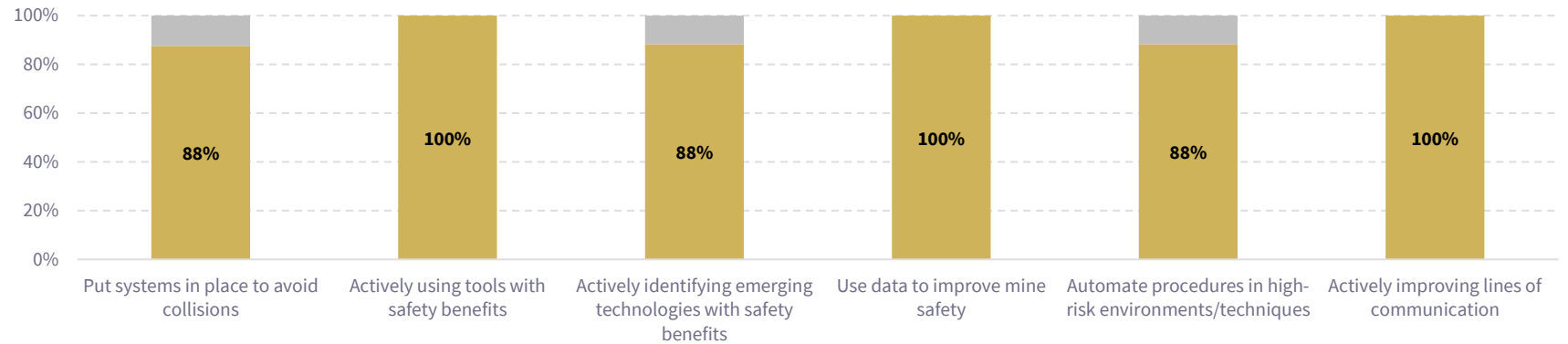


| | 88% | 100% | 88% | 100% | 88% | 100% |

Put systems in place to avoid collisions | Actively using tools with safety benefits | Actively identifying emerging technologies with safety benefits | Use data to improve mine safety | Automate procedures in high-risk environments/techniques | Actively improving lines of communication

Sources: OMA Industry Survey

## Ontario mine implements additional safety measures

Compass Minerals Goderich mine team introduced micro-mist sprays, a high-pressure, low-flow spray system used for dust-suppression, that is mounted on continuous miners. It is superior to the previously installed scrubber system by providing safety-related benefits, including improved operator visibility, reduced dust and noise exposure, and reduced hydraulic temperatures, water usage and maintenance time.

Source: Compass Minerals ESG report 2020

## Ontario mine offers mental health support programs

New Gold has numerous programs in place company-wide to support and educate employees on mental health issues. For the *Not Myself Today* initiative at Rainy River, a group of ambassadors meets monthly to develop mental health packages; the packages include tips, activities and video clips on a range of mental health topics.

Source: New Gold Sustainability report 2021

## Ontario's mining companies introduce health and safety training and leadership programs

Prioritizing health, safety and employee well-being is at the core of Ontario miner, former KLG, now merged with Agnico Eagle Mines Ltd. companies' corporate culture.

▪ In 2020, introduced *Managing Vital Performance*, a in-house behavioural safety program at Detour Lake Mine for employees and business partners. The program monitors the Mine's behavioural expectation for general and high-risk activities, and allows the workers and their supervisors to take ownership of the workplace.[1]

▪ Alamos Gold rolled out the *Home Safe Every Day* safety leadership program across the entire organization. The *Home Safe Every Day* program reinforces awareness of safety tools and attitudes, risk detection and safety analysis in routine and non-routine tasks.[2]

Sources: [1] KLG 2021 Sustainability report [2] Alamos Gold 2020 ESG report
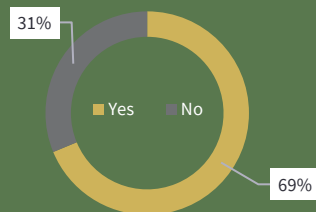
# Corporate Governance

## Equity, diversity, and inclusion

In 2019, the share of women directors and executive officers in public mining companies in Canada was 13% and 14%, respectively.

Ontario's mining companies implement diversity and inclusion policies to increase the share of women, Indigenous Peoples, and People of Colour and other underrepresented groups in the workforce.

► The inclusion programs introduced at mining companies include PPE for women, training on diversity and inclusion, and career development programs.

► Some companies have developed comprehensive diversity and inclusion strategies and action plans.

► Almost 70% of the OMA members reported that they have gender diversity and equity targets with respect to positions of authority.

Does your company have gender diversity and equity targets with respect to positions of authority (e.g., corporate boards, executives ranks)? (16 respondents)

31%
Yes  No
69%

Sources: Osler, 2020, "Diversity and leadership at Canadian public companies"; OMA Industry Survey

## Leadership, executive pay, audits, internal controls, and shareholder rights

OMA members follow the best practices in corporate governance, including guidelines on governance, audits, internal controls, and shareholder rights.

Ontario's mining companies also voluntarily report on ESG compliance as part of their reporting for exchanges where they are listed. Of the OMA members that participated in the industry survey:

► 9 companies are listed on TSX;

► 7 companies are listed on NYSE;

► 1company is listed on TSX – Venture;

► 1 company is listed on NASDAQ; and,

► 2 companies are listed on other exchanges.

6 companies report on ESG compliance for the exchange they are listed on.

Do you report on ESG as part of compliance for the exchange you are listed? (14 respondents)

21%
43%
Yes
No
36%
N/A - Not publicly listed
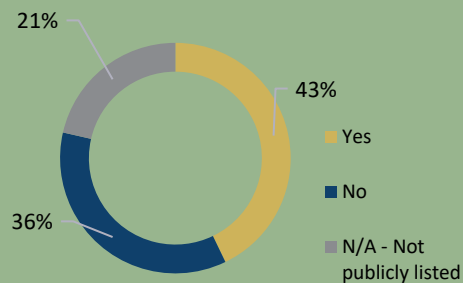
Sources: OMA Industry Survey

## ESG considerations in investment decisions and supply chain

ESG considerations are changing the way in which mining companies are evaluating investment and operational decisions.

In addition to conventional investment metrics, such as rate of return, the impact on the environment and society has become an important investment factor considered by the mining sector.

More than 75% of the survey participants indicated that they seek to assess their supply chain to make sure it is compatible with their corporate responsibilities and environmental targets.

Some companies are still facing challenges in evaluating ESG factors and are developing more consistent and comprehensive corporate frameworks to be able to balance key financial and ESG metrics.

Do you actively seek to assess if your supply chain (either downstream or upstream) is compatible with your corporate responsibilities and reputation? (17 respondents)

24%
Yes  No
76%
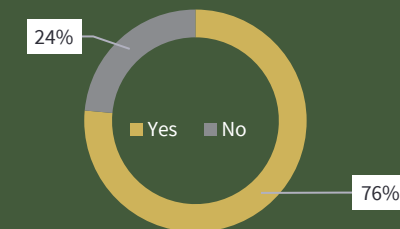
Sources: OMA Industry Survey

# Key Risks in Mining & Metals

## Key Observations

While opportunities in the mining sector continue to outweigh the risks both on a global scale and in Ontario, understanding the key issues faced by the mining and metals companies can help stakeholders to adapt.

► **Environmental and Social**

For mining and metals companies, navigating ESG is a growing challenge. Mining companies in Ontario indicate that developing a comprehensive framework to consider all ESG factors in operations and investment decisions is a complex and uncertain process, particularly related to regulations.

The top environmental issues that are expected to face the most scrutiny from investors are local community impact, water management, and green production.

► **Decarbonization**

Both Ontario's and global mining companies face challenges in setting decarbonization goals that they can achieve. On the other hand, technology adoption, including shift to renewable energy, fleet electrification, and more efficient equipment can help companies to navigate the green business environment.

► **License to operate**

According to EY's Global Mining and Metals survey, miners that can demonstrate their societal value will strengthen relationships with stakeholders and be rewarded in the marketplace with lower costs of capital, improved human capital engagement and, in the long run, improved market value.

Contributions to communities, economies, protection of heritage sites and engagement with First Nations people, and the industry's role in ethical supply chains are the key themes assessed by shareholders.

Sources: OMA Stakeholder Engagement; EY Global Survey, Top 10 business risks and opportunities for mining and metals in 2022

## EY's Survey of Global Mining and Metals Executives

EY's annual global survey of mining executives asked survey respondents to identify the top business risks and opportunities in 2022:

► 25% of our survey respondents saw environmental and social issues as the number one risk

► Mining and metals companies also have highlighted challenges related to following the path towards decarbonization targets

► Additionally, social license to operate remains one of the top three risks, but has dropped from the top spot held for the past three years.

Source: EY Global Survey, Top 10 business risks and opportunities for mining and metals in 2022

| Top 10 Business Risks in 2022 | |
| --- | --- |
| **Risk** | **Rank in 2021** |
| 1. Environment and social | 4 |
| 2. Decarbonization | 4 |
| 3. License to operate | 1 |
| 4. Geopolitics | 5 |
| 5. Capital | 6 |
| 6. Uncertain demand | 6 |
| 7. Digital and innovation | 9 |
| 8. Workforce | 7 |
| 9. New business models | - |
| 10. Productivity and costs | 3 |

## Key Risks faced by Mining Companies in Ontario

► Uncertainty in permitting, policy and regulatory environment.

► Access to labour force in Northern communities, and limited labour pool in specialized mining occupations.

► GHG emission targets are difficult to achieve.

► Social license to operate: difficulties working with local communities and First Nations.

► High energy costs depreciate Ontario's competitive edge.

Source: OMA Stakeholder Engagement

4. Ontario's Mining Industry's Response to the COVID-19 Pandemic

Photo: Newmont, Porcupine Mine

# Ontario's Mining Industry's Response to COVID-19 Pandemic

The COVID-19 pandemic posed unprecedented challenges to Ontario's mining sector. Mining companies have experienced short-term disruptions, and are developing long-term strategies to respond to the changing economic conditions brought on by the pandemic.

## Short-term (1-2 years) COVID-19 Response

▶ In 2020, Ontario's mining companies spent approximately **$35 million on enhanced health and safety measures** to respond to the COVID-19 pandemic.

▶ During the pandemic, a total of **approximately $30 million** was received by mining companies through the Canada Emergency Wage Subsidy program.

▶ Some of the common short-term challenges that companies have faced included:

▪ **Labour force disruptions**

Companies experienced absenteeism and an increased number of resignations due to the nature of the work (e.g., travel and quarantine requirements). The majority of mining companies did not lay off employees.

▪ **Supply chain disruptions**

Ontario's mining sector stakeholders indicated that supply chains of some major production inputs, which were sourced from the U.S. and other parts of the world, have been disrupted, resulting in a backlog. In addition, the prices of some materials, such as steel, have risen.

▪ **Shutdowns, slower permitting and exploration**

Mining operations were deemed essential by the provincial government and continued without disruption for the majority of Ontario mines. However, the exploration activities, including permitting and consultations were impacted by the public health measures, adding significant uncertainty and increasing timelines. For the mines whose operations were shut down in 2020, closures lasted between 2 to 12 weeks.

Sources: OMA Industry Survey, stakeholder consultations

## Long-term (3-5 years) COVID-19 Response

▶ Overall, Ontario's mining sector stakeholders believe that the impacts of the pandemic will be temporary and that the sector has become more resilient. Some long-term effects of the pandemic indicated by the mining industry stakeholders includes:

▪ **Risk management**

Ontario's mining companies plan to introduce more comprehensive and robust risk management strategies. For example, many companies are set to implement supply chain management system to monitor operational disruptions and mitigate shipping delays and cut costs.

▪ **Technology adoption**

Some mining companies have adopted new technologies to enable remote and physically distanced work. These include digital and communication technologies, as well as virtual reality technologies.

▪ **Remote and on-site work arrangements**

While a significant proportion of the mining sector employees need to be physically present at the mining sites, Ontario's mining companies have reduced corporate travel and introduced hybrid work arrangements for corporate employees.

For workers who need to be present on-site, health and safety measures to limit the spread of the COVID-19 are expected to remain long-term.

Some additional labour force challenges may persist as workers may have a preference for remote working arrangements; thus, companies expect to see an increase in contract work and labour costs.

# Ontario's Mining Industry's Response to COVID-19 Pandemic (continued)

In response to the challenges posed by the pandemic, Ontario's mining companies introduced additional health and safety measures to ensure the safety of their employees, and support local communities, businesses and hospitals.

## COVID-19 safety measures at mining sites

Mining was deemed as an essential service in Ontario, and was allowed to operate during the onset of the pandemic. Significant efforts and resources were allocated to protect the workforce. In 2020, Ontario's mining companies spent more that **$35 million** on enhancing pandemic-related health and safety measures. Some common measures introduced at mining sites included:

► Health screening and testing protocols

► Physical distancing, including construction of barriers

► Increased ventilation and cleaning

► Additional PPE requirements (e.g., masks, eyewear)

► Contact tracing procedures

► Remote work for eligible employees

To share the best-practice strategies to slow down or prevent the spread of the virus, *Response to COVID-19 Controls*, a collaborative document summarizing submissions from OMA members was developed. This document provides a reference for mining companies to implement health measures, and includes a summary of lessons learned.

Sources: "Response to COVID-19 Controls" A Collaborative Document Summarizing Submissions from Ontario Mining Association Members, OMA Industry Survey and stakeholder consultations

## Mining companies supported local communities throughout the COVID-19 pandemic

Ontario's mining companies supported local communities, businesses, and hospitals throughout the pandemic, including donating supplies such as personal protective equipment (PPE), hand sanitizer, and providing support to communities in need. For example:

► The team at Alamos Gold Island Gold mine funded a meal service program for persons in need, at-risk and facing economic challenges in the local town of Dubreuilville.[1]

► Former Kirkland Lake Gold, now merged with Agnico Eagle Mines Ltd., supported a local microbrewery, Underground Brewing in Kirkland Lake, to help transform their business to manufacture hand sanitizer.[2]

► Newmont Porcupine donated to Timmins and District Hospital, the Timmins PPE Drive, Chapleau Health Services, Cochrane District Social Services Administration Board (DSSAB) food security programs, and Chapleau food banks. The company also invested $250,000 in the local business community by partnering with the Timmins Chamber of Commerce.[3]

► Glencore Kidd Operations collaborated with Compass Brewing to make locally produced hand sanitizer. Over 5,000 bottles were donated to frontline health care workers, emergency response teams, long-term care facilities, and non-profit organizations, as well as to the Timmins Chamber of Commerce PPE support grant program.[4]

► In 2020, Lake Shore Gold, a subsidiary of Pan American Silver supported local food banks, shelters, Cochrane District Social Services Administration Board (DSSAB), Timmins and District Hospital Foundation, and Spruce Hill Lodge in Timmins. Lake Shore Gold employees also donated to the Timmins and South Porcupine food banks through payroll deductions, which were matched by the company.[5]

► Several mines hosted on-site vaccination clinics for their employees and local community members.[6]

Sources: [1] Alamos Gold News Release 2020 [2] KLG 2021 Sustainability report [3,4,5] Timmins Today [6] OMA Industry Survey and stakeholder consultations

Appendix A:
Detailed Methodology

Photo: Noront Resources

# A. Economic Contribution Assessment Methodology

To assess the economic contributions generated by OMA member mines, an economic contribution assessment ("ECA") was performed using inputs from Statistics Canada, revenue, spending and employment data from OMA industry survey and economic modeling tools founded on the principles of Input-Output ("I-O") model.

**Direct, Indirect, and Induced Contributions**

Economic contributions associated with the mining operations are captured through three distinct channels: direct, indirect, and induced contributions. These contributions individually, and collectively represent how OMA member mines' activities ripple throughout the regional economies. More specifically, we define each of these contributions as follows:

- **Direct contributions** include the economic contributions supported directly by the revenues of the mining companies;

- **Indirect contributions** include the economic contributions from supporting industries supplying goods and services to mining companies; and

- **Induced contributions** include the economic contributions that occur when benefited employees from the stimulated direct and indirect economic effects spend their additional wages and salaries on consumer goods and services. The induced activities are assumed to be primarily in service or consumer-related industries, such as retail, transportation, accommodation, food and beverage services and banking and finance.
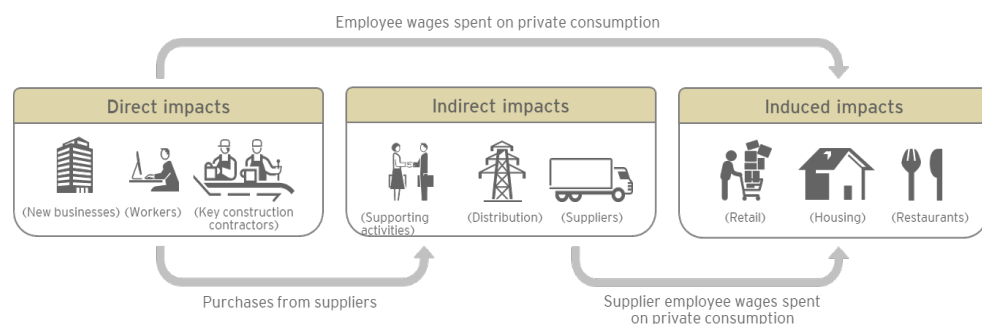


This consumer spending circulates in the economy and, in turn, results in additional jobs and salaries that are also considered part of the induced contributions. Induced contributions can be estimated based on any number of rounds or iterations of additional income resulting in increased spending, economic activity, and further additional income.

## Economic Contribution Indicators

| Impact | Description | Indicator | Inputs Used |
|---|---|---|---|
| **Gross Output** | Gross output contributions generated through revenues from mineral production | Output/Gross sales | Market value of minerals produced |
| **GDP** | GDP contributions generated through stimulated economic activity from the revenues of OMA member mines | GDP | Estimated through the I-O model, based on the structure of the four economic regions |
| **Labour Income** | Includes contributions to wages and salaries sustained as a result of the economic activity and forms part of GDP | Wages and salaries | Total worker compensation reported by mining companies in OMA industry survey |
| **Employment** | Includes jobs created and supported as a result of OMA member mines' operations | Full-time equivalent (FTE) jobs | Total number of FTE jobs reported by mining companies in OMA industry survey |

**Estimation of Regional Economic Contributions**

To develop regional economic multipliers for the four economic regions where the mines are located, the report uses data and information on industry concentrations, employment levels, and other microeconomic data from Statistics Canada that reflect the local economies. More specifically, the regional data and information serve as an input to the provincial input-output table to simulate the regional economy. The economic multipliers developed using this methodology provide a more granular representation of how activities associated with the mine contribute both regionally and provincially.

# A. Economic Contribution Assessment Methodology (continued)

## The Input-Output Model: Assumptions and Restrictions

The following section outlines the assumptions and restrictions associated with the I-O model used to perform the economic contribution analysis in this Report. The I-O model is subject to limitations both in concept and implementation. Like any economic model, the I-O model is conceptually an abstraction that attempts to be complex enough to accurately capture and estimate the most significant impacts to the real-life economy caused by economic activities, yet simple enough to be analytically and intuitively meaningful.

An I-O model reflects the observed interdependency between all sectors of the economy. For Canada, Statistics Canada reports on the 236 industrial sectors in the economy: (1) how each sector relies on the other 235 sectors for inputs to their production; and (2) how each sector supplies its products and services to each of the remaining 235 sectors. While an I-O model provides a consistent and innovative way of measuring the economic effects of an economic activity, one should be aware of the assumptions and limitations of the model's underlying approach. Some of these assumptions include:

- The relationship between industry inputs and outputs is linear and fixed, meaning that a change in demand for the outputs of any industry will result in a proportional change in production;

- The model assumed constant returns to scale, and cannot account for economies/diseconomies of scale or structural changes in production technologies, an assumption that does not necessarily hold in the actual economy;

- Prices are fixed in the model; thus, the model is unable to account for elasticities, or more formally, how one economic variable changes in response to another;

- I-O models are static, and therefore, do not consider the amount of time required for changes to happen. Changing the timeframe would not affect the magnitude of the estimates;

- There are no capacity constraints, and all industries are operating at full capacity. This implies that an increase in output results in an increase in demand for labour (rather than simply re deploying existing labour). It also implies that there is no displacement that may occur in existing industries as new projects complete;

- I-O models assume that the technology and resource mix (ratios for inputs and production) is the same for all firms within each industry, i.e., the 236 industry categories reported in Statistics Canada's input-output table. As such, our analysis describes industry average effects;

- The model assumes that the structure of the economy remains unchanged, and any structural changes in the economy since 2017 will, therefore, lead to changes to the multipliers, which could be implemented once Statistics Canada release updated input-output tables. As such, the further the year of analysis is away from the year of the input-output tables used, the greater the uncertainties;

- The model does not consider the economic impacts or opportunity costs associated with using resources elsewhere. In the case of this analysis for example, funds used to purchase lab equipment may be allocated to other areas. Using these funds for alternative uses would generate their own economic impacts, which could potentially be larger or smaller. However, the model will not be able to capture this difference;

- Results from the I-O model should not be interpreted as causal impacts, that is, one should not take the economic impacts presented in this report at verbatim. We cannot say with certainty that X dollars of capital or operational spending will produce X number of FTE jobs or have an X amount of impact on GDP.

## Survey Data Limitations

In conducting economic contribution assessment, we relied on unaudited data from the OMA Economic survey, in which mineral production, spending on production inputs and wages and salaries, employment, and other indicators were reported by OMA members. The assumption made is that the survey data and information is accurate, complete and appropriate for the purposes of the economic contribution assessment. There was no audit conducted to independently verify the accuracy or completeness of the survey information provided by OMA members.

Appendix B:
Job Classification
Descriptions

Photo: Newmont, Musselwhite Mine

# B. Job Classification Descriptions

The table below provides descriptions of the job classifications included as part of the OMA Industry Survey. Survey respondents were asked to select the level of difficulty that best matches the experiences of their organization with hiring skilled workers for each job classification over the past three years. Survey respondents selected from a list of options to assess the level of hiring difficulty, ranging from no difficulty to significant difficulty.

| Job Classification | Description |
|---|---|
| Mechanics | Mechanics repair, troubleshoot, adjust, overhaul, and maintain light vehicles, trucks and mine support equipment. |
| Millwrights | Millwrights install, maintain, troubleshoot, overhaul, and repair machinery and stationary equipment (e.g. conveyors, hydraulic systems, pneumatic devices, pumps, engines, motors, production machines, etc.). |
| Management occupations | Management occupations include positions that are responsible for planning, organizing, directing, controlling and evaluating mining operations. Common job titles include project manager, process supervisor, mine manger and mine operations superintendent. |
| Engineers | Engineers apply the principles of science and mathematics to design and develop solutions to technical problems, typically in a specialized field. In the mining industry this can include mining engineers, mineral process engineers, mechanical engineers, geological engineers, electrical engineers, and civil engineers. |
| Electricians | Electricians install, test, repair and maintain electrical systems and equipment that are integral to the mine's operation. |
| Maintenance planners | Mine maintenance planners develop, implement, and monitor maintenance plans. |
| Geologists | Geologists conduct programs of exploration and research to extend knowledge of the structure, composition, and processes of the earth, to locate, identify, and extract hydrocarbon, mineral, and groundwater resources and to assess and mitigate the effects of development and waste disposal projects on the environment. |
| Miners | Miners extract rocks, ore and minerals from the ground and use heavy equipment and machinery to blast and move rock containing minerals and metals. |
| Metallurgists | Metallurgists conduct studies of the properties and characteristics of metals and other non-metallic materials and plan, design, and develop machinery and processes to concentrate, extract, refine, and process metals and other non-metallic materials. |
| Health and safety workers | Health and safety professionals inspect, investigate, and ensure compliance with regulatory requirements. Health and safety coordinators build, implement, and oversee health and safety programs. |

Sources: Statistics Canada, National Occupational Classification; Ontario Mining Association