



MUNICIPAL  
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# **ANALYSIS OF ECONOMIC OBSOLESCENCE**

FOR THE  
BASE METALS ORE MINING & REFINING  
INDUSTRY IN ONTARIO  
AS AT JANUARY 1, 2016

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## Executive Summary

1. This report details the results of an analysis undertaken to determine the extent of economic obsolescence (EO) present in the Ontario base metals ore mining and refining industry (“the Industry”), or lack thereof, as at January 1, 2016 (the “effective date”).
2. This report should be read in conjunction with the attached schedules, which are integral to the analysis and report commentary.
3. It is important to note that this estimate of EO, as at the effective date, reflects analysis and assumptions as at the date of this report (the “report date”) based on publicly disclosed financial results of guideline public companies, economic data and expectations regarding future economic events and financial trends that are anticipated to impact the industry as at the effective date. Further, no guarantee is made or implied as to the accuracy of forecasts, projections or predictive statements referenced herein.

## Summary of Conclusion on Economic Obsolescence

4. Based on the scope of review, research and analysis carried out, and subject to the restrictions as set out herein, **the rate of EO present in the industry as at January 1, 2016, is estimated to be 36%. (See Schedule 1.)**

## Introduction and Purpose

5. It is understood that this report has been requested in order to confirm the existence of EO within the industry (or lack thereof), on a broad level, as at the effective date. It is further understood that this analysis will be incorporated into a mass appraisal of special purpose properties in Ontario using the cost approach method of valuation.

## Statement of Independence and Impartiality

6. The writer of this report has no stake, directly or indirectly, in the results of this analysis. The fee for this assignment is based solely on an hourly rate, and is in no way dependent upon the conclusion(s) expressed herein.

## Economic Obsolescence

7. EO can be described as a form of depreciation or an incurable loss in value that occurs when influences external to an asset itself reduce the value of the asset.
8. In industry terms, EO exists when external influences occurring in an industry have an adverse impact on profits, thereby preventing industry participants from earning an optimal return on their asset investment. Consequently, the current value of the industry's assets is less than what it would be if the profits derived from the operation of those assets were optimal.
9. EO is most often present when external influences prompt a change in the supply and/or demand of an industry's products and/or cause a change in competition, leading to a decline in operating profits. Some examples of external influences that adversely impact operating profits, giving rise to EO, include (but are not limited to):
  - changes in industry economics, such as reduced demand or excess supply, which can put downward pressure on prices, thereby negatively impacting sales revenue and weakening profitability;
  - an increase in direct costs, such as raw materials and labour, without a corresponding increase in sales price due to adverse market conditions, thereby weakening profitability. Such a scenario results from declining demand for an industry's products and/or increased competition leading to excess supply and price pressure;
  - increased domestic and/or foreign competition, which puts downward pressure on prices and negatively impacts sales revenue and profits;
  - government legislation and/or changes in regulations, which can negatively impact sales revenue and weaken profitability;
  - economic factors over which an industry has no control, including changes in inflation, interest rates, foreign currency rates, all of which can negatively impact sales revenue and profitability; and,
  - adverse global economic conditions.

## Scope of Review

10. In preparing these comments and calculations, the following has been reviewed, considered and relied upon, inter alia:
  - information contained in a report as published by IBISWorld entitled “Copper, Nickel, Lead & Zinc Mining in Canada – February 2016”;
  - information contained in a report as published by IBISWorld entitled “Copper, Nickel, Lead & Zinc Mining in Canada – March 2015”;
  - information contained in a report as published by IBISWorld entitled “Copper, Zinc & Lead Refining in Canada – December 2015”;
  - information contained in a report entitled “Commodity Markets Outlook – January 2016” as published by World Bank Group”;
  - [http://databank.worldbank.org/data/reports.aspx?source=global-economic-monitor-\(gem\)-commodities](http://databank.worldbank.org/data/reports.aspx?source=global-economic-monitor-(gem)-commodities);
  - excerpts from an economic report for Ontario as published by TD Economics entitled “Provincial Economic Forecast” and dated April 10, 2015;
  - excerpts from a report as published by the Bank of Canada entitled “Monetary Policy Report – October 2015”;
  - statistical data as published by Statistics Canada;
  - <http://www.bankofcanada.ca/rates/interest-rates/canadian-interest-rates/>;
  - <http://www.bankofcanada.ca/rates/interest-rates/lookup-bond-yields/>;
  - various financial and market data of publicly traded base metals mining companies as retrieved from the Thomson Reuters Eikon database; and,
  - a report entitled “Report, Commentary and Consultation Submission – Preliminary Economic Obsolescence Indicators for Base Metal Properties in Ontario,” prepared by Municipal Tax Equity Consultants Inc. and dated September 8, 2016.

## Current and Future Outlook of Canadian and Global Economy

11. The industry is highly globalized as a significant portion of its production is exported internationally. As the world economy grows, especially in emerging markets such as China and India, demand for the industry's products surge along with prices. The opposite is true when the world economy weakens.
12. As a result, the industry is significantly impacted by and exposed to global economic conditions. Accordingly, in order to validate and support a conclusion on EO, this review incorporates an assessment of both the domestic and global economic conditions existing around the report date.
13. The major economic indicators that are used to assess the overall state of the economy include changes in manufacturing activity, retail sales, gross domestic product, unemployment rates, the consumer price index and inflationary pressures, currency strength and interest rates, among others.
14. Below is commentary on the economic conditions and future outlook for the global economy, extracted from a report entitled "Monetary Policy Report – October 2015" as published by the Bank of Canada.

### Global Economy

Global economic growth remains modest as the world economy is undergoing significant shifts. The U.S. economy is in a solid expansion, and the recovery is gradually progressing in other advanced economies. At the same time, growth prospects have softened in a number of emerging-market economies (EMEs)—the main engine of global growth over the past several years.

After weak activity in 2015, global economic growth is expected to strengthen over 2016–17. Monetary policy easing by a number of central banks, together with the positive effects of low oil prices, is providing support for this pickup in growth. Nevertheless, persistent weakness in global business investment and slow progress in implementing structural reforms in a number of economies are dampening the growth of potential output. Against this backdrop, robust growth in private domestic demand in the United States—Canada's main trading partner—is driving stronger foreign demand for Canadian exports.

## US Economy

The U.S. economy is expected to grow at a solid pace, driven by strong growth in private domestic demand..... Housing market indicators have reached post-recession highs, and motor vehicle sales are near record levels.....

The Federal Reserve has indicated that it is likely to begin the gradual process of normalizing monetary policy, contingent on further improvement in the labour market and rising inflation. Against this background, weaker growth prospects in China and other EMEs have contributed to an appreciation of the U.S. dollar. Exchange rate adjustments, in turn, should facilitate some rebalancing of global growth, dampening net exports and growth in the United States and strengthening them in other economies.

## Canadian Economy

The implications of recent global economic developments for the Canadian economy are mixed. On the one hand, Canada's exports should benefit from the strength of the U.S. economy. Components of U.S. demand that are important for Canadian exports, such as business investment in equipment, housing and consumption, are expected to grow at a solid pace. On the other hand, commodity producers in Canada face lower prices for oil and non-energy commodities. In this context, the Canadian dollar has depreciated since the *July Report*. By convention, the Canadian dollar is assumed to be close to its recent average level of 76 cents over the projection horizon, lower than the 80 cents assumed in July.

### **GDP**

Economic momentum is rebuilding, and real GDP growth is estimated to have rebounded to about 2 per cent in the second half of 2015, following a modest contraction in the first half of the year. On an average annual basis, real GDP is expected to grow by just over 1 per cent this year, before firming to about 2 per cent in 2016 and about 2 1/2 per cent in 2017 (Table 2). Since July, the Bank has marked down modestly its projection for economic activity in 2016–17, in response to the further decline in the prices for oil and other commodities and the additional downgrade of investment intentions by energy firms.

## **Non-Energy Commodity Prices**

The Bank's non-energy commodity price index has fallen by about 10 per cent since the July Report and is now more than 25 per cent below its peak in 2011. While China is one of the world's largest consumers of several commodities and its demand remains high, expectations of a slower growth trajectory in the future have put downward pressure on prices, especially for base metals. The declines in prices of agricultural products and forestry products since July have been larger than for base metals because demand effects were compounded by stronger-than-expected supply growth.

Largely offsetting forces are expected to keep the Bank's non-energy commodity price index near its recent levels. The anticipated strengthening in the global economy should put upward pressure on non-energy commodity prices.

## **Inflation**

Core inflation is expected to remain near 2 per cent throughout the projection horizon as the upward pressure from exchange rate pass-through roughly offsets the downward pressure from excess supply, with both effects diminishing over time.

Total CPI inflation is expected to remain in the lower half of the inflation-control range until 2017, reflecting weak year-over-year gasoline price inflation. Once the economy reaches and stabilizes at full capacity, total CPI inflation and core inflation will remain at 2 per cent on a sustained basis.

## **Exports**

Commodity exports are expected to increase at a moderate pace over the projection horizon. Cuts to capital expenditures will temper future production and exports in the oil sector. Similarly, expectations of low prices and competitiveness issues will weigh on activity in the mining and related sectors (particularly for intermediate metal products). In contrast, lumber exports should benefit from an improving U.S. housing market, and agricultural exports are projected to pick up in response to increasing global demand for food and a bounce back in production after the 2015 drought.

Following a rebound in recent months, non-commodity exports are expected to grow at a solid pace, boosted by the strong growth in U.S. private domestic demand and the depreciation of the Canadian dollar. Export growth is being led by components sensitive to the exchange rate, roughly two-thirds of which are showing positive momentum and are significantly outperforming those that are less exchange rate sensitive.

## Exchange Rates

For many exporters, the lower exchange rate has boosted margins and cash flow expressed in Canadian dollars. In contrast, for domestic firms with relatively higher import content in their production processes, the higher Canadian-dollar cost of imports is potentially squeezing margins and cash flow.

## Labour Markets

Labour market data indicate continued slack, and there is little evidence of mounting wage pressures. The national unemployment rate has risen slightly in recent months, while the Bank's labour market indicator ticked up in September (Chart 22). Given the magnitude of the commodity price shock, the Canadian labour market is nonetheless showing some resilience. Over the past year, the Canadian economy has added about 160,000 net new jobs (with full-time employment increasing by about 200,000 and part-time employment decreasing by about 40,000); the total number of hours worked has grown by 1.3 per cent, about double the estimated trend pace of growth; and the prime-age participation rate has rebounded by 0.7 percentage points. As expected, national indicators mask diverging trends in developments among the energy-producing provinces and the rest of the country.

15. The key Canadian financial market indicators at the effective date per the Bank of Canada website are summarized below:

Government of Canada benchmark bond yields:	
3 years	0.49%
5 years	0.73%
7 years	1.03%
10 years	1.39%
Long-term	2.15%
Canadian chartered bank prime business rate	2.70%
Conventional mortgage lending rates:	
3 years	3.39%
5 years	4.64%
Chartered bank guaranteed investment certificate rates:	
3 years	1.03%
5 years	1.50%

16. Below is commentary on the economic conditions and outlook for the Ontario economy, extracted from a report entitled “Provincial Economic Forecast” as published by TD Economics and dated April 10, 2015.

### Ontario Economy

Ontario is projected to be the fastest growing economy over the 2015-16 period, with real GDP growth estimated at 2.7% on average.

U.S. real GDP growth is forecast to run at around 3% annually over the next two years which will translate into solid demand for Ontario’s manufacturing sector. A lower Canadian dollar will also benefit Ontario producers. Already there is evidence of rising momentum in factory production, with manufacturing real GDP in Ontario up almost 5% Y/Y in 2014Q3. Somewhat mitigating the positive outlook for manufacturing is an expected contraction in auto production on account of the planned 14-week shutdown for retooling at the Chrysler plant in Windsor and the gradual shutdown of GM’s Oshawa 2 plant.

A low interest rate environment has continued to fuel the housing market over the first few months of 2015 with both resales and average prices tracking higher. While our housing demand outlook has been nudged up since our January update, we still expect to see a gradual moderation in the resale market on account of an expected deterioration in affordability and elevated household debt. New construction activity is projected to decline over the next few years after a period of overbuilding.

The Ontario government’s fiscal outlook remains challenging, with a deficit elimination timetable still set for fiscal 2017-18. The upcoming spring budget should provide some additional details on how the government plans to keep program spending essentially flat through fiscal 2017-18.

Employment growth in Ontario has been slow out of the gate in 2015, up only 0.6% on a trend basis. Surprisingly, manufacturing employment is still tracking lower through February despite the uptick in activity. Our forecast pegs employment growth at 1% over the 2015-16 period. Steady gains in export-based manufacturing and tourism industries are expected to translate into increased hiring as 2015 progresses.

17. Economic conditions for the province of Ontario as at April 2015 are summarized in the chart below:

<b>SELECTED ECONOMIC STATISTICS - ONTARIO</b> (Annual average % change, unless otherwise noted)						
	Actual	Actual	Actual	Forecast (as at April 2015)		
	2012	2013	2014	2014E	2015F	2016F
Real GDP	1.7	1.3	-	2.4	2.8	2.5
Nominal GDP	3.2	2.4	-	4.0	3.8	4.7
Employment	0.7	1.8	0.8	-	1.0	1.0
Unemployment Rate (annual, %)	7.9	7.6	7.3	-	6.9	6.7
Retail Trade	1.6	2.3	4.8	-	3.6	4.0
Housing Starts (000's units)	77.4	60.9	58.4	-	57.4	57.3
Housing Starts	14.2	-21.4	-4.0	-	-1.8	-0.2
Existing Home Sales (000's units)	197.6	198.5	206.0	-	211.1	212.6
Existing Home Sales	-1.9	0.5	3.7	-	2.5	0.7
Average Home Price (000's C\$)	381.3	400.7	428.6	-	446.7	455.5
Average Home Price	5.0	5.1	7.0	-	4.2	2.0
Consumer Price Index	1.4	1.0	2.3	-	0.7	2.2

**SOURCE:** TD Economics – April 2015 ([www.td.com/economics](http://www.td.com/economics))

## Base Metals Ore Mining & Refining Industry in Canada and Ontario

### Background

18. Base metal ore mining and refining is one of Canada's primary industries and includes the extraction, refining and/or processing of rocks and minerals from the earth's crust.
19. Canada is the fifth largest producer of nickel and ninth largest producer of copper in the world.<sup>1</sup> A large portion of Canada's base metal production is located in Ontario, including nickel, copper and zinc mining operations as well as metal smelters and refineries.<sup>2</sup>
20. Exports accounted for approximately 50% of Canada's base metal mining industry revenues in 2015, with China and Japan receiving the majority of the exports.<sup>3</sup> Exports also accounted for approximately 70% of Canada's smelting and refining industry revenues in 2015, with the United States and United Kingdom receiving the bulk of the exports.<sup>4</sup>
21. The industry is highly capital intensive and must invest heavily in capital equipment and technology to increase production and improve efficiencies.

### Key External Market Influences Impacting the Industry

22. The key external influences impacting revenue growth and profitability within the industry are identified and discussed below.

### World Price of Copper

23. The industry's performance is strongly tied to the price of copper given that copper production accounts for a significant portion of the industry's total revenues. When the price of copper rises, the industry's profit margins increase. The opposite is true when the price of copper declines.
24. The price of copper has fallen significantly since 2011.<sup>5</sup> As at the effective date, the price of copper was forecast to decline further in 2016, then recover slightly in 2017 to 2019.<sup>6</sup>

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1 IBISWorld, "Copper, Nickel, Lead & Zinc Mining in Canada – February 2016."

2 *ibid.*

3 IBISWorld, "Copper, Nickel, Lead & Zinc Mining in Canada – March 2015."

4 IBISWorld, "Copper, Zinc & Lead Refining in Canada – December 2015."

5 [http://databank.worldbank.org/data/reports.aspx?source=global-economic-monitor-\(gem\)-commodities](http://databank.worldbank.org/data/reports.aspx?source=global-economic-monitor-(gem)-commodities)

6 World Bank Group, "Commodity Markets Outlook – January 2016."

## **World Price of Nickel**

25. The industry's performance is strongly tied to the price of nickel as well, given that nickel production also accounts for a significant portion of the industry's total revenues. When the price of nickel rises, the industry's profit margins increase. The opposite is true when the price of nickel falls.
26. The price of nickel has declined significantly since 2011.<sup>7</sup> As at the effective date, the price of nickel was forecast to decline further in 2016, then recover modestly in 2017 to 2019.<sup>8</sup>

## **World Price of Zinc**

27. The industry's performance is also tied to the price of zinc, although to a lesser extent than copper and nickel given it accounts for a much less significant portion of the industry's total revenues.
28. The price of zinc has been trending down, for the most part, since 2011.<sup>9</sup> As at the effective date, the price of zinc was forecast to decline further in 2016, then recover slightly in 2017 to 2019.<sup>10</sup>

## **Canadian-dollar effective exchange rate index**

29. The Canadian-dollar effective exchange rate index (CERI) compares the Canadian dollar against the currencies of Canada's major trading partners. The six foreign currencies in the CERI include the U.S. dollar, the European Union euro, the Japanese yen, the Chinese yuan and the Mexican peso.
30. When the CERI decreases, the Canadian dollar depreciates and domestic products become relatively less expensive for foreign buyers, typically increasing demand for exports of domestically produced goods. Alternatively, when the CERI rises this trend causes domestically manufactured goods to be relatively more expensive for global consumers, thereby cutting into global demand for Canadian exports.
31. Since the industry exports a significant portion of its production, the value of the Canadian dollar is a significant factor in the industry's ability to remain competitive. A stronger dollar makes exports relatively more expensive and imports relatively cheaper. As a result, the industry may become less competitive. However, if the Canadian dollar depreciates

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7 [http://databank.worldbank.org/data/reports.aspx?source=global-economic-monitor-\(gem\)-commodities](http://databank.worldbank.org/data/reports.aspx?source=global-economic-monitor-(gem)-commodities)

8 World Bank Group, "Commodity Markets Outlook – January 2016."

9 [http://databank.worldbank.org/data/reports.aspx?source=global-economic-monitor-\(gem\)-commodities](http://databank.worldbank.org/data/reports.aspx?source=global-economic-monitor-(gem)-commodities)."

10 World Bank Group, "Commodity Markets Outlook – January 2016."

against the currencies of its major trading partners, exports become cheaper and imports become more expensive, causing the industry's price competitiveness to improve.

### **Industrial Capacity Utilization**

32. Industrial capacity utilization reflects the rate of production capacity that is actually being utilized in comparison to the maximum production capacity available. The higher the industrial capacity utilization rate, the greater the demand for the industry's products given base metals and minerals are a major input in industrial manufacturing.
33. The industrial capacity utilization rate increased in 2015.

### **Current Industry Performance and Market Trends**

34. The industry's performance is primarily driven by copper and nickel prices and production levels as they account for the largest portion of the industry's revenues. The prices of copper, nickel and zinc made a strong recovery after the economic crisis in 2008. During 2010 and 2011, prices surged in response to strong demand from emerging economies such as China.
35. However, since 2011, declining demand from China and weak global growth overall in combination with oversupply had pushed copper and nickel prices down significantly by the end of 2015.
36. Large swings in the prices of metal commodities can have a major impact on the industry's revenues and profits, as the cost of a mining operation will take into account the expected selling price. When prices fluctuate from the expected level, a mining operation will alter production levels in order to attempt to sustain profit margins. Revenues related to the base metal mining and refining sectors declined at an average annual rate of 1.0% and 1.8%, respectively, for the five years up to and including 2015.<sup>11, 12</sup>

### **Future Outlook for the Industry**

37. The current oversupply of copper and nickel on global markets is expected to decrease going forward as downstream manufacturers use up existing stockpiles and global manufacturing activity strengthens over the next five years. However, demand is expected to remain modest in comparison to earlier years, as China's rapid pace of growth slows.

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11 IBISWorld, "Copper, Nickel, Lead & Zinc Mining in Canada – February 2016."

12 IBISWorld, "Copper, Zinc & Lead Refining in Canada – December 2015."

38. Revenues for the sector will continue to be depressed by weak copper and nickel prices. Consequently, the aggregate revenues of the base metal mining and refining industry in Canada are forecast to grow modestly at annualized rates of 0.2% and 0.8%, respectively, over the five years up to and including 2020.<sup>13, 14</sup>

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13 IBISWorld, "Copper, Nickel, Lead & Zinc Mining in Canada – March 2015."

14 IBISWorld, "Copper, Zinc & Lead Refining in Canada – December 2015."

## Analysis of Existence of Economic Obsolescence

39. As discussed previously, EO exists when external influences adversely impact the economic returns an industry earns from the operation of its assets, thereby diminishing the value of those assets. The first step in determining if EO exists in an industry is to perform a qualitative analysis assessing the current economic conditions of the industry and the impact of external influences on that industry.
40. As prices and production levels are the dominant drivers of the industry's profitability, the drastic declines in the prices of copper and nickel have had a severe negative impact on the industry. The prevailing conditions of weak global demand and depressed prices combined with modest growth projections for the five years up to and including 2020 provide evidence of the existence of EO within the Industry as at the effective date.

## Approach to Quantifying Economic Obsolescence

41. In addition to a review of the qualitative factors associated with EO as discussed above, a quantitative analysis of key profitability ratios of guideline public companies operating in the industry, as well as certain market and industry data key to the industry, was completed as a method of quantifying the level of EO present in the Industry, or lack thereof, on a broad level.
42. The guideline public companies considered most appropriate for this analysis are as follows: Glencore PLC; Vale SA; Teck Resources Ltd.; Southern Copper Corp.; Freeport-McMoRan Inc.; First Quantum Minerals Ltd.; KGHM Polska Miedz SA; Lundin Mining Corp.; HudBay Minerals Inc.; and, Thompson Creek Metals Company Inc. The selected guideline public companies are collectively referred to hereafter as the “Guideline Companies.”
43. Of the ten Guideline Companies selected, six have mining operations in Canada to ensure that the conditions facing the subject properties under assessment are incorporated into the analysis. It is important to note that the financial information of the Guideline Companies analyzed will reflect the circumstances of the companies’ global operations. However, absent site-specific financial and operating results of the subject properties under assessment, the global operating results of the Guideline Companies selected is the best information available.
44. For purposes of the quantitative analysis portion of this report, the Guideline Companies were divided into subgroups based on the size of their market capitalization (market cap). Market cap is a measure of the aggregate value of a company’s outstanding shares as determined by the market and is calculated by multiplying a company’s current share price by its total number of outstanding shares. Companies are generally classified based on the size of their market cap (i.e., “Large-Cap” is greater than \$10 billion, “Mid-Cap” is \$2 to \$10 billion and “Small-Cap” is less than \$2 billion.)
45. Generally, companies with a large market cap are considered less risky given they are well established, operate in mature industries, realize greater diversification benefits and have greater access to capital resources. Financial and operating performance results are also relatively more stable in comparison to companies with a smaller market cap.
46. The specific information analyzed (and explained in greater detail further below) is as follows:
  - base metal prices;
  - normalized return on invested capital;

- gross profit margin percentage;
  - EV/EBITDA multiples;
  - S&P TSX Global Base Metals Index;
  - capital expenditures data for base metals ore mining; and,
  - industrial capacity utilization rates.
47. The historical key profitability ratios of the Guideline Companies as well as the market and industry data were analyzed in order to derive historical performance benchmarks. The most current data based on 2015 was then compared against the historical benchmarks.
  48. If the current performance data is trending below historical benchmarks by a material amount, on a collective basis, this can signal that EO is present in the industry.
  49. The percentage decline in the current data as measured against the historical benchmarks, on a collective basis, serves as the basis for an overall benchmark of the rate of EO present in the industry, on a broad level.
  50. A discussion of the analysis undertaken to quantify EO follows below.

## Quantifying Economic Obsolescence

51. A description of the key profitability ratios and the market and industry data reviewed as well as a discussion of the analysis undertaken to quantify EO follows below.

### Base Metals Price Analysis

52. Copper, nickel and zinc are the primary metals and minerals extracted and refined in Ontario. Their prices are mainly influenced by the cost of extraction and transport as well as the magnitude of demand by manufacturers utilizing such commodities in their production process.
53. The annual prices in real U.S. dollars per metric ton were analyzed from 2009 to 2014 to derive historical benchmarks based on the median price levels over this time period assuming this represents an economic price level for the industry.
54. The historical benchmarks were then compared against the estimated stabilized prices going forward as at the effective date based on a weighted average incorporating both actual 2015 and forecasted price levels to reflect future expectations of value. In calculating the estimated stabilized price levels, a greater weight was applied to the actual 2015 prices and decreasing weight was applied to the forecasted prices for 2016 to 2019 given the uncertainty and unpredictability of forecasted prices the farther out the projection period.
55. The current price levels of each of the base metal classes analyzed based on 2015 annual prices have declined when compared to their historical benchmarks. Consequently, there is evidence that the industry has experienced a loss of economic value resulting from the decline in price levels. The calculation of the rate of indicated EO based on the base metals price analysis is presented on **Schedule 2**.

### Normalized Return on Invested Capital Analysis

56. Return on invested capital (ROIC) is a profitability ratio that measures how efficiently a company generates income from capital invested by comparing net operating profit to capital invested. The ROIC is a better measurement than return on equity as it measures how well a company is using both its equity and debt to generate profits. A low ROIC indicates that a company is making poor use of its capital resources.
57. The return on invested capital is calculated as follows:

$$\frac{\text{Return (i.e., Net Operating Profit after Taxes)}}{\text{Invested Capital (i.e., Interest-bearing Debt + Equity)}}$$

58. The ROIC is informative when tracked on a trend line annually, as it will indicate long-term changes in the operating performance of a company. A decline in operating profits while invested capital remains constant or increases will cause the ROIC to decline.
59. A decline in the ROIC can signal that external influences occurring in the marketplace are negatively impacting profitability, giving rise to EO.
60. Any or all of the following external influences can negatively impact operating profits and the ROIC, giving rise to EO, and can impede the ability of an industry to earn an economic rate of return on its assets:
  - a declining demand for an industry's products;
  - increased competition creating excess supply and price pressure; and,
  - government regulations requiring increased investment and/or price caps.
61. The historical rates of ROIC of the Guideline Companies from 2005 to 2014 were analyzed to derive historical benchmarks. The rates of ROIC were normalized by adjusting the earnings results in each of the fiscal years to exclude any unusual/nonrecurring amounts, such as impairment losses and/or gains (losses) on sale of assets. The historical benchmarks were based on the median ROIC realized over this period under the assumption that this benchmark is the best measure of an economic rate of return for the industry.
62. The historical benchmarks were then compared against the current rates of ROIC in fiscal 2015 to gauge if the most current rates of ROIC are consistent with historical benchmarks.
63. The majority of the Guideline Companies realized significant declines in their rates of ROIC in 2015 when compared to their historical benchmarks. Consequently, there is a strong indication that the industry has realized a material decline in value based on the ROIC analysis of the Guideline Companies.
64. The overall rate of EO was calculated by weighting the median rate of EO indicated by each subgroup based on the size of its market cap. Increased weighting was applied to the median rate of EO indicated by the Large-Cap subgroup and decreasing weight was applied to the median EO rates of the Mid-Cap and Small-Cap subgroups. (The larger the market cap, the more reliable the historical benchmarks are considered given they are generally more established companies with relatively stable earnings performance results. In contrast, smaller companies are generally more prone to greater earnings volatility, which may distort historical benchmarks.) The calculation of the rate of indicated EO based on the ROIC analysis is presented on **Schedule 3**.

## Gross Profit Margin (%) Analysis

65. Gross profit margin percentage is a profitability ratio that measures the percentage by which sales revenue exceeds the expenses required to manufacture a product, known as the cost of goods sold (COGS).
66. The COGS includes the cost of the raw materials, direct labour and production overheads that go into producing the goods sold and is included on a company's income statement where it is deducted from revenue in order to calculate the company's gross margin dollars. The gross margin dollars reflect the amount of dollars earned from the sale of products and services before consideration of non-production costs, such as selling and administrative costs.
67. Gross profit margin percentage is calculated as follows:

$$\text{Gross Profit Margin (\%)} = (\text{Sales Revenue} - \text{COGS} / \text{Sales Revenue}) \times 100$$

68. The gross profit margin percentage when tracked on a trend line indicates if any significant changes in sales and/or the COGS have occurred over a period of time. The gross profit margin percentage declines when sales revenue decreases and the COGS remains constant or increases, as less gross margin dollars are being generated per unit sold.
69. A decline in the gross profit margin percentage can be an indication that external influences occurring in the marketplace are negatively impacting sales and/or the COGS, thereby giving rise to EO.
70. Similar to the ROIC, external influences that cause declining demand for an industry's products and/or increased competition leading to excess supply put downward pressure on prices and can negatively impact an industry's gross profit, thereby impeding an industry's ability to earn an economic return on its assets.
71. In addition, when the COGS increases and the increase cannot be passed on to the consumer through a price increase due to adverse market conditions, such as government price caps and/or price pressure due to increased competition, the additional costs must be absorbed by the manufacturer and gross profits therefore decline, negatively impacting industry returns.
72. The historical gross profit margin percentages of the Guideline Companies from 2005 to 2014 were analyzed to derive historical benchmarks. The historical benchmarks were based on the

median gross profit margin percentage realized over this period under the assumption that this benchmark is the best measurement of an economic rate for the industry.

73. The historical benchmarks were then compared against gross profit margin percentages based on fiscal 2015 to gauge if the most current gross margin percentages are consistent with historical benchmarks.
74. All of the Guideline Companies realized significant declines in their gross profit margin percentages in 2015 when compared to their historical benchmarks. Consequently, there is a strong indication that the industry has realized a material decline in value based on the gross profit margin percentage analysis of the Guideline Companies. The gross profit margin percentage is a direct reflection of the impact of demand conditions and price volatility on the financial performance of the Guideline Companies.
75. The overall rate of EO was calculated by weighting the median rate of EO indicated by each subgroup based on the size of its market cap. Increased weighting was applied to the median rate of EO indicated by the Large-Cap subgroup and decreasing weight was applied to the median EO rates of the Mid-Cap and Small-Cap subgroups. (The larger the market cap, the more reliable the historical benchmarks are considered given they are generally more established companies with relatively stable earnings performance results. In contrast, smaller companies are generally more prone to greater earnings volatility, which may distort historical benchmarks.) The calculation of the rate of indicated EO based on the gross profit margin percentage analysis is presented on **Schedule 4**.

#### **EV/EBITDA Multiples Analysis**

76. The EV/EBITDA ratio, also referred to as the EBITDA multiple, compares the enterprise value of a company to its earnings before interest, taxes, depreciation and amortization (EBITDA).
77. The enterprise value (EV) of a company is determined by the sum of its market value (i.e., current share price multiplied by total number of outstanding shares, also known as market capitalization) and the net value of its interest-bearing debt (i.e., debt less non-operational cash/cash equivalents). This measurement is used to estimate what it would cost for an investor to buy a company outright given it incorporates both the market value of the shares and the debt that the investor assumes on takeover.
78. As a company's shares are bought and sold in the public market, the EV reflects investor perception of a company's value. More specifically, the EBITDA multiple is an indicator of how many times of EBITDA an investor is willing to pay for a company's assets.

79. The historical EBITDA multiples of the Guideline Companies were analyzed from 2005 to 2014 to derive historical benchmarks. The historical benchmarks were based on the median EBITDA multiple over this period under the assumption that this represents a period of optimal price levels for the industry.
80. The historical benchmarks were then compared against the EBITDA multiples in 2015 to gauge if the most current EBITDA multiples are above or below their historical benchmarks.
81. Approximately half of the Guideline Companies realized a moderate to significant decline in their EBITDA multiples in 2015 when compared to their historical benchmarks. The remaining half of the Guideline Companies realized an increase in their EBITDA multiples in 2015 when compared to their historical benchmarks. Consequently, there is a wide divergence in the rates of indicated EO based on the analysis of the EBITDA multiples of the Guideline Companies.
82. The overall rate of indicated EO chosen was based on the median of the range of indicated EO values of the Guideline Companies. The calculation of the rate of indicated EO based on the EBITDA multiples analysis is presented on **Schedule 5**.

#### **S&P TSX Global Base Metals Index**

83. The S&P TSX Global Base Metals Index (“the Index”) can be used as an indicator of changes in the aggregate market value of the global base metals mining industry. Canadian base metals mining companies represent approximately 15% of the Index’s weight.
84. The Index is calculated based on a modified market-value weighting, which is a type of market index where the individual components are weighted according to their market capitalization and where no one constituent can have a weight in the Index greater than or equal to 10%.
85. The historical end-of-year prices and average monthly prices of the Index were analyzed from 2005 to 2014 to derive historical benchmarks. The historical benchmarks were based on the median price over this period under the assumption that this represents a favourable value for the industry.
86. The historical benchmarks were then compared against the Index’s prices in 2015 to gauge if the most current price levels are above or below the historical benchmarks.
87. The end-of-year price levels and monthly average price levels declined significantly over the past five years. The overall rate of indicated EO chosen was based on the average of

the range of indicated EO values based on the two pricing measures reviewed. The calculation of the rate of indicated EO based on the analysis of the S&P TSX Global Base Metals Index is presented on **Schedule 6**.

### Industry Capital Expenditures Analysis – Base Metals Mining

88. Capital expenditures (Capex) are costs related to acquiring or upgrading operating assets, such as land, buildings and/or equipment. The magnitude of an industry's Capex can be used as an indicator of an industry's expectations with regard to future profitability and growth opportunities over the long term from new investment projects.
89. Statistics Canada data was available on the Capex levels of the copper-zinc and nickel-copper ore mining industries in Canada. These base metal classes account for the majority of the mining production in Ontario. The annual Capex levels of these two sectors, related to new construction, machinery and equipment investment, were analyzed from 2006 to 2014 to derive historical benchmark levels of capital investment based on the median Capex levels over this time period assuming this represents a favourable level of investment for the industries.
90. The historical benchmarks were then compared against the Capex levels in 2015 to gauge if the most current expenditure levels are above or below the historical benchmarks.
91. The current levels of Capex based on 2015 are significantly below their historical benchmarks. Accordingly, it appears that the current Capex levels of the copper-nickel and nickel-copper ore mining sectors are well below their historical levels. The overall rate of indicated EO chosen was based on the average of the range of indicated EO values based on the base metal classes reviewed. Details of the analysis are presented on **Schedule 7**.

### Industrial Capacity Utilization Rate Analysis

92. The capacity utilization rate indicates the rate of production capacity that is actually being utilized in comparison to the maximum production capacity available.
93. A decline in the utilization rate when compared to historical industry norms indicates that current production is below the supply capacity available and may be a signal that external factors occurring in the marketplace are causing a decline in demand for an industry's products, which can negatively impact an industry's economic return, giving rise to EO.
94. The capacity utilization rate can be calculated as follows:

$$\text{Capacity Utilization Rate} = \frac{[(\text{Actual Output} - \text{Potential Output}) / \text{Potential Output}]^{\text{scale factor}}}{1}$$

95. Data on the industrial capacity utilization rates specific to the industry was not available. As a substitute, the industrial capacity utilization rates of the Canadian mining sector, as a whole, were analyzed from 2005 to 2015 to gauge whether the industry's current production levels are consistent with historical levels.
96. The current capacity utilization rate for the Canadian mining sector based on the average capacity utilization rate for 2015 falls above the median rate for the past ten years. Accordingly, it appears that the current productivity rate of the industry is well above its historical benchmark.
97. It is important to note that EO can exist even when an asset's capacity utilization rate is at maximum and/or at the industry norm because, although the asset may be operating at its normal/maximum capacity utilization rate, the return being generated by the asset(s) may still be below an economic level.
98. The results of the analysis of industrial capacity utilization rates for the Canadian mining sector are presented on **Schedule 8**.

## Conclusion

99. Based on the scope of review, research, and analysis carried out, and subject to the restrictions as set out herein, the rate of EO present in the industry as at January 1, 2016, is estimated to be as follows (see also Schedule 1):

<b>Ontario Base Metals Mining Industry</b>			
Summary of EO Indicators by Index	Indicated EO	Assigned Weight	Weighted Average
Base Metal Prices	31.5%	2	63.0%
Normalized Return on Invested Capital (%)	62.3%	2	124.6%
Gross Profit Margin (%)	65.1%	2	130.2%
EV/EBITDA Multiples	3.8%	2	7.5%
S&P TSX Global Base Metals Index	34.8%	2	69.6%
Industry Capital Expenditures	35.9%	1	35.9%
Industrial Capacity Utilization rates	0.0%	1	0.0%
		12	430.8%
	divide by total assigned weight		12
<b>Estimated Rate of EO as at January 1, 2016</b>			<b>36.0%</b>

100. In concluding on the overall rate of EO, a weighted average of the rates of EO indicated by each of the indices analyzed was calculated based on their degree of significance in relation to the EO analysis.
101. Increased weight was given to the rates of EO indicated by the pricing and profitability analyses given that this data provides a direct measure of actual loss in value resulting from a decline in prices and profitability. Accordingly, they are direct indicators of changes in economic value.
102. Increased weight was also given to the rate of EO determined based on the market multiples analysis given that this is a direct measure of changes in the magnitude of prices paid by investors for base metals mining stocks. Accordingly, it is a direct indicator of changes in economic value. Increased weight was also given to the equity market data as this data directly measures changes in investor perception of the value of the global base metals mining industry.
103. Lesser weights were assigned to the rates of EO indicated by the industry's production capacity data and capital expenditures data. Although these analyses are meaningful indicators of the industry's expectations with regard to future demand and potential growth opportunities (i.e., through additional investment), they do not directly measure changes in economic value. Accordingly, they have been assigned reduced weights.

## Assumptions and Restrictions

104. The financial and operating results of the Guideline Companies, as sourced from the Thompson Reuters Eikon database (Reuters), are fairly stated and free of material errors. If the financial and operating results of the Guideline Companies, as sourced from Reuters, are not free of material errors, such errors could have a material impact on the conclusion(s) stated herein.
105. The information contained in the IBISWorld reports, including aggregate financial results, statistics and prospects for the base metals mining and refining industry in Canada, is accurate, reasonable and reflects best estimates based on the information available at the report date.
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