



Analysis III: Quantification of Copper Mine Impacts for Bingham Canyon, Prominent Hill, Intag, and Solwara 1

◀ Keratoisis, a deep sea coral that
lives at inactive (non-venting) sites
Image credit: Nautilus

The impacts of producing copper can be considered by examining both the natural capital inputs needed for production and the waste by-products associated with each metric ton of copper produced.

Analysis III provides a quantitative assessment of the impact of the proposed Solwara 1 copper mine on natural capital assets and compares Solwara 1 with each of the other three terrestrial mines.

The impacts of producing copper can be considered by examining both the natural capital inputs needed for production and the waste by-products associated with each metric ton of copper produced. This type of analysis should not be based upon per metric ton of copper ore as it reflects dramatically different concentrations of copper. Copper production is the goal, thus refined copper by the metric ton should be the common natural capital efficiency measure. Table 6 provides a full analysis of Solwara 1 and the two active copper mines (Prominent Hill, Australia and Bingham Canyon, USA), and a limited analysis for the proposed Intag mine.

▼ **Table 6.**
Mine Comparisons for Inputs Required for 1 Metric Ton of Copper Output

	Measure	Annual Cu Production	Total Cu Production	Freshwater Use	Energy Use	CO ₂ Emissions	Mineral Waste	Area of Disturbance
	Unit	Metric tons	Metric tons	Liters per metric ton of Cu produced	MWh per metric ton of Cu produced	Metric tons of CO ₂ per metric ton of Cu produced	Metric tons of tailings & waste rock per metric ton of Cu produced	Square meters per metric ton of Cu produced
COMPARISON MINES	IMPACT TYPE							
Solwara 1 (proposed) Total ^{46,48}	Mine + Refinery	77,760 ⁸⁶	127,186 ⁸⁷	0	4.0	3.6	1.9	5.4
<i>Solwara 1 Mine</i>	<i>Mine</i>			<i>0</i>	<i>4.0</i>	<i>3.6</i>	<i>1.9</i>	<i>1.1</i>
<i>Tongling Refinery</i>	<i>Refinery</i>			<i>Data not available</i>	<i>Data not available</i>	<i>Data not available</i>	<i>0</i>	<i>4.3</i>
Prominent Hill Total	Mine + Refinery	73,362 ⁸⁹	2,046,000 ⁸⁹	83,831 ⁹⁰	15.3 ⁹¹	5.4 ⁹²	36.3 ⁹³	7.2 ⁹⁴
Bingham Canyon Total	Mine + Refinery + Smelter	194,000 ⁹⁵	19,000,000 ⁹⁶	21,041 ⁹⁷	24.8 ⁹⁸	7.7 ⁹⁹	11.5 ¹⁰⁰	5.4 ¹⁰¹
Intag (proposed) Total	Mine	484,437 ¹⁰²	9,906,472 ¹⁰³	<i>Data not available</i>	<i>Data not available</i>	<i>Data not available</i>	11.5 ¹⁰⁴	5.4 ¹⁰⁵

This analysis involves two key components: inputs and waste by-products. First, calculations of the freshwater (liters), energy (MWh), and area of disturbance (square meters) as inputs per metric ton of copper produced are estimated. Second, a calculation of two by-products, metric tons of CO₂ emissions and metric tons of waste rock per metric ton of copper produced, are also provided. Because this study is a preliminary analysis, only these five areas of impact were considered. In future studies, additional analyses that would be informative could include examinations of the arsenic and other hazardous materials produced per metric ton of copper, the biodiversity impacted, the level of gold production, worker safety and other measures. However, these figures are not reported in GRI or contained in other reporting requirements. The table is based upon information derived from GRI databases and company sustainability reports. References are provided for each value.

The impacts of copper mining operations should be measured in terms of impacts per ton of refined copper produced, not impact per ton of ore.