First Quantum Minerals Ltd

2017 Greenhouse Gas Report

Contents

Tables

Figures

1. Introduction

This document provides a summary of First Quantum Minerals "FQM" or "the Company" greenhouse gas (GHG) emissions from its operations in 2016. This document provides information on just one aspect of our environmental and corporate social responsibility (CSR) programs. For further information on FQM's sustainability programs, including our bi-annual Sustainability Report and an annual Environmental Information Sheet, review our website at www.first-quantum.com.

This report was prepared internally under the control of the Group Environmental Manager. Where previous data was found to be inaccurate, recent data was used to replace it. This report therefore represents the latest and most accurate data available.

FQM is still experiencing significant growth. Despite this growth, the company's overall GHG emissions decreased in 2016. This decrease was as a result of a number of factors across the Group. Factors include, but are not limited to increased production at new sites, revised mining plans as a result of lower metal prices, changes to CO_2 emissions factors at utilities providing us with electricity and the sale of some assets (in Finland). Scope 3 emissions increased as a result of more business related travel in 2016.

2. Greenhouse Gas Reduction Initiatives

FQM operates under a philosophy of continuous improvement and pushes operations to improve efficiency of energy and raw material use. As most of the Company's energy use is from Scope 1 activities and in particular operating mobile mining equipment, the Company has focused on these areas for opportunities.

Modifications that allow mining equipment to be operated by electricity and not fossil fuels have resulted in significant GHG emission reduction in Zambia. The initiatives which have been rolled out over the last few years include:

- A large percentage of haul trucks at Kansanshi mine use trolley assist to move waste rock and/or copper ore from the open pit under electrical power. As in 2015, the savings in CO_2 emissions during 2016 at Kansanshi are equivalent to approximately 1% of total CO_2 emissions.
- Sentinel copper mine in Zambia uses electrical mining equipment including three Caterpillar 7495 rope shovels, two Komatsu PC 5500 shovels, 15 Komastu 960E- and 15 Komatsu 860E trucks as well as Caterpillar MD6640 blast hole drill rigs. In-pit crushers are used to convey ore to the mill and concentrator further reducing diesel fuel usage and associated carbon emissions.

At our Ravensthorpe nickel operation in Western Australia, waste heat from the acid plant is used to generate electricity in three 18.5 MW stream turbines. At full

production, the steam turbines are capable of meeting 86% of the operation's power requirements. Diesel generators are available to supply electricity when one or more of the steam turbines are down.

Each operating site also has several smaller initiatives to reduce energy use and the associated emissions. Examples include improved water use and pumping efficiencies, the use of solar power, recycling process solution to capture heat energy, re-engineering grinding circuits, etc.

3. Greenhouse Gas Emissions

3.1 Scope and Approach

The identification of greenhouse gas sources, scope of reporting and calculation of the emissions is based on the *Greenhouse Gas Protocol*: *A Corporate Accounting and Reporting Standard Revised Edition* by World Resources Institute. Specifically, the scope of our reporting includes emissions from:

- Sites where we have operational control of the project and over 50% ownership. For the sites listed in Table 1, we have 100% ownership, except Kansanshi and Cobre Panama (each 80% equity).
- Exploration where we control the operations. We have not included exploration activities where we have minor equity involvement.
- Three airplanes owned and operated by FQM.
- Activities by our Roads Division.
- Corporate and administrative offices, which only generate Scope 2 emissions.
- Business travel, which is the only Scope 3 emission presented in this report.

Internationally recognized calculation tools were used to determine CO_2-equivelent emissions from various sources, as follows:

- Greenhouse Gas Protocol: The Corporate Accounting and Reporting Standard Revised Edition by World Resources Institute was used as a guide to calculate CO_2 emissions.
- The Australian Government National Pollution Inventory Emission estimation technique manual - Explosives Detonation was used to determine the nitrous oxide emissions from the use of explosives during mining.
- The International Energy Agency CO_2 Emissions from Combustion 2013, was used to determine the carbon dioxide emissions from fuels and purchased electricity from various countries.
- National Greenhouse and Energy Reporting System Measurement, Australian government, July 2013 was used to calculate GHG emissions from limestone use and carbonate leaching.

3.2 Scope 1 (Direct) GHG Emissions

The main sources of First Quantum's Scope 1 GHG emissions are the combustion of fuels by mobile mining equipment, electric generators, the processing of limestone in metallurgical processes, and the reaction of carbonates in ore from acid leaching. The Scope 1 GHG emissions over the past six years are presented in **Table 1**. In 2016, the Company's Scope 1 GHG emissions decreased by 2.6%. The decrease is primarily related to changes in mining activity at a number of sites and the sale of Kevitsa. The percentage of Group GHG emissions produced per operation is provided in **Figure 1**.

Table 1: Scope 1 GHG Emissions (tonnes of CO_2 equivalents)

Location	2011	2012	2013	2014	2015	2016
Bwana Mkubwa, Zambia	50,200	2,000	200	131	108	733
Çayeli, Turkey	4,700	4,826	5,490	6,061	6,114	6,250
Closed Properties, Canada & US	500	500	895	664	549	411
Cobre Las Cruces, Spain	40,700+	72,500	72,973	76,436	69,408	65,241
Cobre Panama, Panama	5,900	14,200	13,069	81,302	110,831	139,998
Exploration Global	6,000	4,100	6,237	3,026	1,025	352
Guelb Moghrein, Mauritania	126,700	136,000	146,249	140,687	146,768	158,169
Haquira, Peru	-	500	121	513	492	454
Taca Taca, Argentina	-	-	-	-	-	62
Kansanshi, Zambia*	199,900	293,921	489,068	457,903	551,965	605,147
Roads Division	1,000	1,100	2,130	35,497	-	1,315
Kevitsa, Finland#	16,600	21,000	26,710	35,314	82,323	13,528
Pyhäsalmi, Finland	1,800	1,900	1,811	1,763	2,509	2,521
Ravensthorpe, Australia	125,400	294,418	247,635	254,176	158,734	116,876
Sentinel, Zambia	2,100	10,100	42,995	103,645	165,503	151,579
Total	**581,500**	**857,065**	**1,055,583**	**1,197,118**	**1,296,329**	**1,262,636**

* Roads Division (excluding their planes) has been included in Kansanshi figures in 2015 and 2016

Kevitsa was sold on June 1, 2016

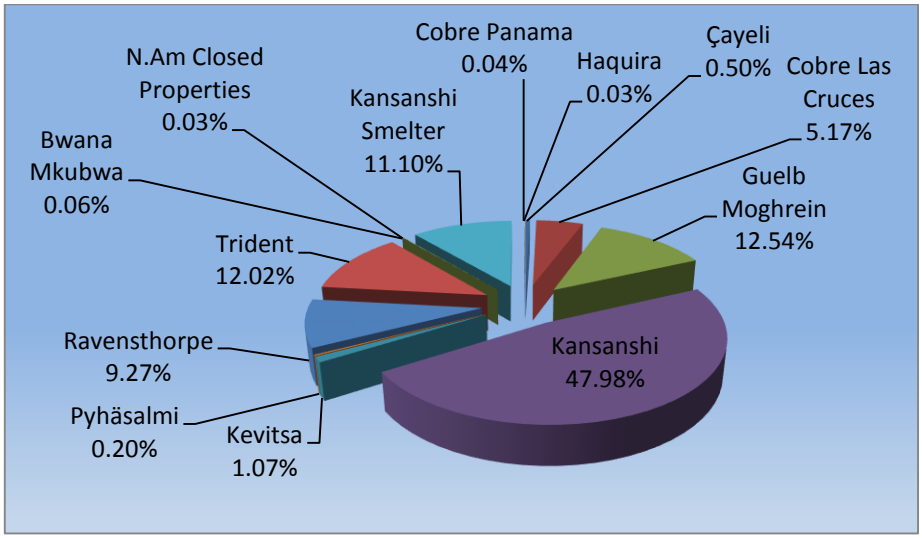

Figure 1: Scope 1 GHG Emissions in 2016

3.3 Scope 2 (Indirect) GHG Emissions

The electricity consumption at our major sites over the last four years is provided in **Table 2**. All sites listed purchase electricity from local power generation companies. Guelb Moghrein and Ravensthorpe generate their own power. In 2016, the Company's purchased electricity consumption decreased by approximately 2%. The increase in consumption in Zambia was offset by the sale of Kevitsa.

Table 2: Electricity Consumption (MWh)

Location	2012	2013	2014	2015	2016
Bwana Mkubwa, Zambia	72,540	2,730	2,250	1,950	1,586
Closed Properties, Canada & US	4,880	4,940	4,570	4,732	4,315
Çayeli, Turkey	76,770	77,587	77,587	75,926	71,423
Cobre Las Cruces, Spain	249,820	249,750	272,130	276,055	291,784
Guelb Moghrein, Mauritania#	-	-	-	869	2,410
Kansanshi, Zambia	836,610	896,030	1,015,450	1,191,865	1,269,323
Kevitsa, Finland+	164,270	289,300	301,600	329,559	110,649
Pyhäsalmi, Finland	76,150	76,490	78,790	77,754	73,601
Ravensthorpe, Australia*	-	-	-	39	-
Sentinel, Zambia	-	-	13,380	339,020	424,947
Offices - Johannesburg, Lima, London, Ndola, Nouakchott, Panama City, Perth, Toronto, Vancouver	10,750	10,110	10,000	1,490	1,029
Total	**1,491,790**	**1,606,937**	**1,775,757**	**2,299,259**	**2,251,067**

Guelb Moghrein generates their own electricity at the mine. Values for 2016 represent facilities in Nouakchott

+ Kevitsa was sold on June 1, 2016

* Ravensthorpe generates its own electricity at site

The Scope 2 GHG emissions from the purchase of electricity from external electricity generating companies over the past five years are provided in **Table 3** and **Figure 2**. As with electrical consumption, the Company's Scope 2 GHG emissions decreased in 2016. The decrease in Scope 2 emissions was primarily as a result of the sale of Kevitsa. Our biggest two electricity users rely on electricity provided by the Zambian state utility, ZESCO. Most of the power generated by ZESCO is generated from hydro-electric sources.

Table 3: Scope 2 GHG Emissions (tonnes of CO_2 equivalents)

Location	2011	2012	2013	2014	2015	2016
Bwana Mkubwa, Zambia	20	200	10	10	12	10
Çayeli, Turkey	36,000	36,200	36,600	36,600	35,837	32,793
Closed Properties, Canada & U.S	80	20	50	180	173	11
Cobre Las Cruces, Spain	78,000	72,696	72,678	79,183	80,332	90,453
Guelb Moghrein, Mauritania	-	-	-	-	426	245
Kansanshi, Zambia	2,400	2,500	5,380	6,100	7,151	7,616
Kevitsa, Finland+	20	34,000	60,000	67,250	62,946	21,134

Location	2011	2012	2013	2014	2015	2016
Pyhäsalmi, Finland	19,100	24,000	23,490	23,680	15,512	14,058
Ravensthorpe, Australia	-	-	-	-	32	-
Trident, Zambia	-	-	-	80	2,034	2,550
Administrative - Johannesburg, Lima, London, Ndola, Nouakchott, Panama City, Perth, Toronto, Vancouver	700	1,100	700	860	541	388
Total	**136,320**	**170,749**	**198,929**	**213,964**	**204,995**	**169,256**

[+] Kevitsa was sold on June 1, 2016

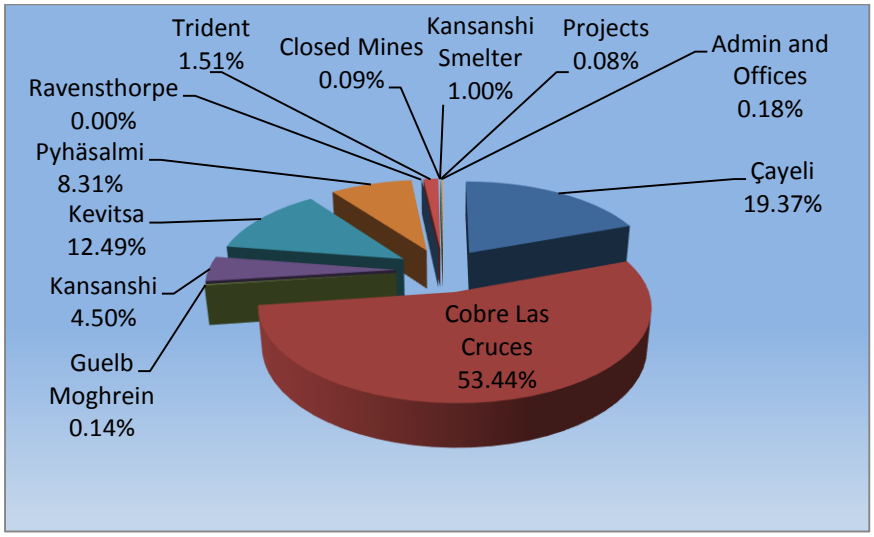

Figure 2: Scope 2 GHG Emissions in 2016

3.4 Scope 3 (Other Indirect) GHG Emissions

The only Scope 3 GHG emission information provided in this report is for employee business air travel. Data on business air travel for all FQM sites for the last four years is provided in **Table 4**. Scope 3 GHG emissions increased in 2016 as a result of more employee business air travel.

Table 4: Scope 3 GHG Emissions (tonnes of CO_2 equivalents)

Site	2012	2013	2014	2015	2016
Bwana Mkubwa	4	80	2	-	-
Çayeli	205	255	141	99.8	57.0
Cobre Las Cruces	74	74	102	69.3	54.8
Cobre Panama	1,205	47	402	962.2	2,981.3
Exploration	69	NR	93	303.8	231.3
Guelb Moghrein	2,142	888	940	1,470.2	1,114.8
Haquira	241	38	340	128.9	122.9
Johannesburg Office	437	274	1,138	432	732.7
Kansanshi	593	813	1,827	247.8	352.8
Kevitsa [+]	145	201	252	246.9	92.9

Site	2012	2013	2014	2015	2016
London Office	334	430	575	476	255.2
Closed Properties, Canada & US	5	3	12	5.7	0.4
Ndola Office	979	990	990	25	-
Perth Office	970	1,261	1,249	1,070	942.8
Pyhäsalmi	70	28	46	21.2	11.0
Ravensthorpe	889	159	349	593.6	1,168.9
Sentinel	-	-	1,545	125.9	224.3
Toronto Office	668	274	114	59.6	55.0
Vancouver Office	-	6	3	-	-
Total	**9,031**	**5,819**	**10,119**	**7,351**	**9,802**

[+] Kevitsa was sold on June 1, 2016

3.5 Emission Intensity

Emission intensity (normalizing emission loading based on key operational parameters) is an important tool to better understand performance. FQM is in a significant growth phase due to acquisitions and development projects. As a result, our absolute emissions are increasing as noted in the discussions above. Furthermore, during 2016, FQM sold the Kevitsa operation in Finland. These absolute changes mask operational improvements that are being implemented at each site. This sections looks at the emission data by normalizing it for three operating parameters, namely:

- Milled Ore
- Metal Production
- Copper Equivalents

Milled Ore – normalizes the emission data (Scope 1 + Scope 2) based on the amount of ore processed. In this analysis, changes in emissions due solely to changes in throughput are discounted. The resulting comparisons often reflect improvements in operating efficiency. CO_2-eq intensity values for each operation from 2012 to 2016 are presented in **Figure 3**.

The data shows improvements in milled ore intensity at all the sites except Guelb Moghrein in 2016. Overall CO_2-eq intensity for milled ore improved in 2016.

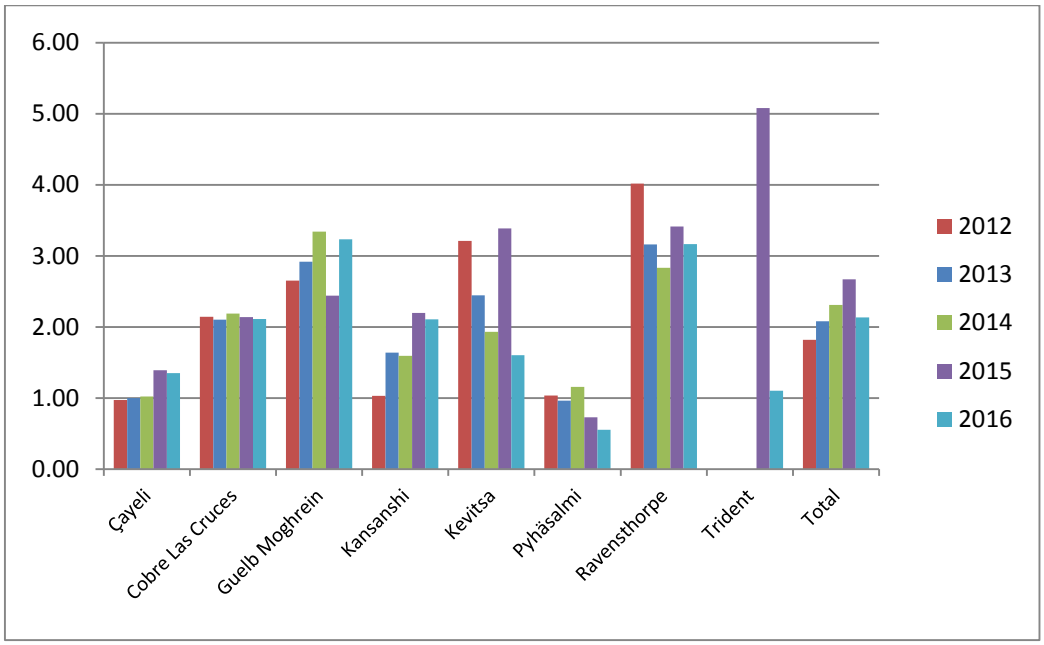

Figure 3: CO_2-eq Intensity – Milled Ore (ton CO_2/ton milled ore)

Metal Production – normalizes the emission data (Scope 1 + Scope 2) based on the amount of metal produced. This intensity parameter is similar to the previous intensity rate, but includes a number of factors such as ore grade, process recovery rate and multiple metals recovered. CO_2-eq intensity values for each operation from 2012 to 2016 are presented in **Figure 4**.

The data shows improvements in metal production intensity at Cobre Las Cruces, Kansanshi, Pyhäsalmi and Trident in 2016. Overall CO_2-eq intensity for metal production improved in 2016.

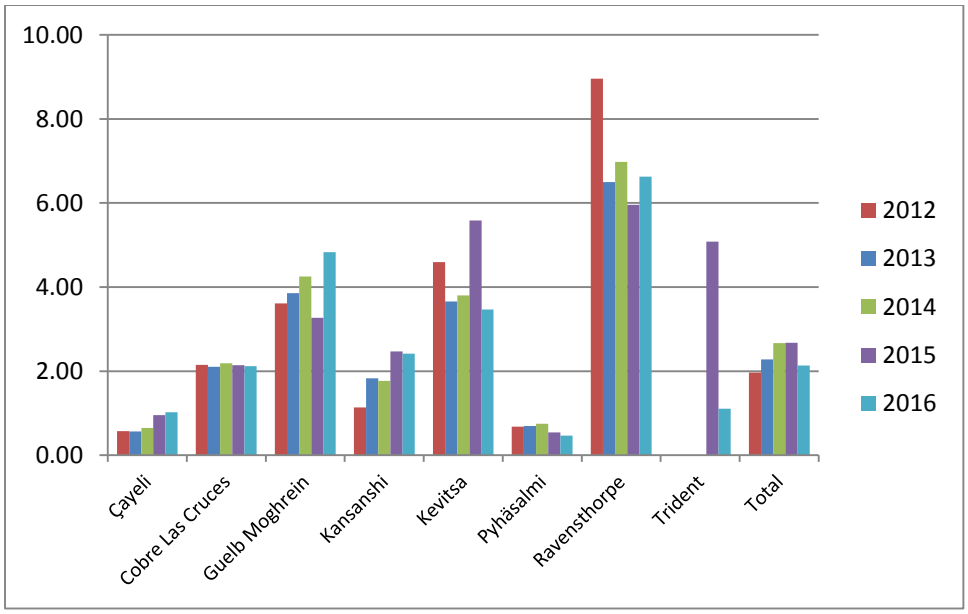

Figure 4: CO_2-eq Intensity – Metal Production (ton CO_2/ton metal produced)

Copper Equivalents – normalizes the emission data (Scope 1 + Scope 2) and combines metals sold and presents it as if all of the revenue were in copper. This intensity reflects the CO_2 produced as a function of the revenue created from the mine. Other factors to consider include the change in commodity pricing of metals relative to the price change in copper. CO_2-eq intensity values for each operation from 2012 to 2016 are presented in **Figure 5**.

The data shows improvements in copper equivalents intensity at all sites except Guelb Moghrein in 2016. Overall CO_2-eq intensity for copper equivalents improved in 2016.

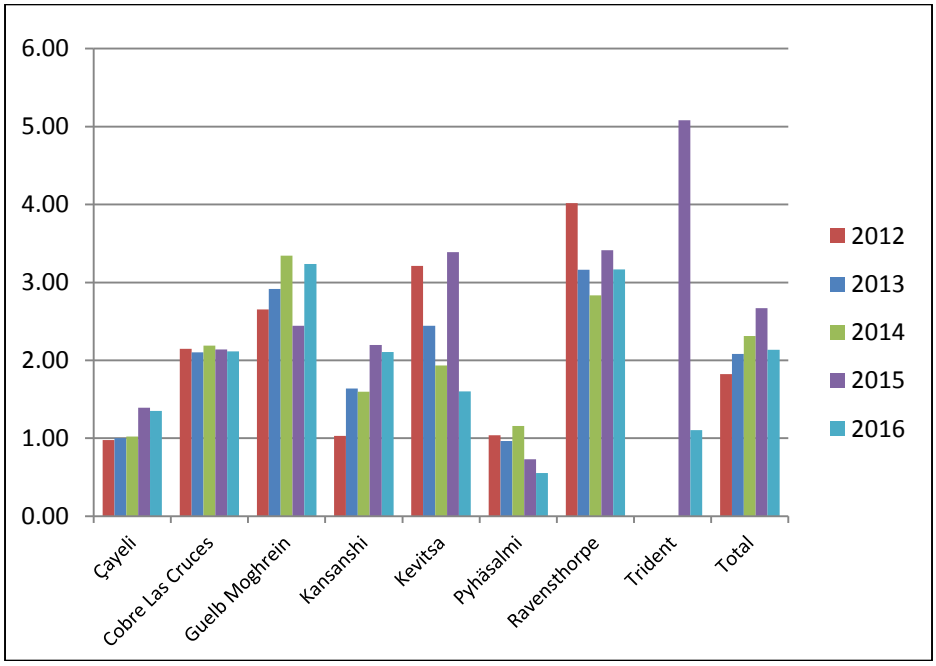

Figure 5: CO_2-eq Intensity – Copper Equivalents (ton CO_2/ton copper equivalent produced)

3.6 Emissions by Country

The direct and indirect emission data by country are provided in **Table 5**.

Table 5: GHG Emissions Reported by Country

Country	Scope 1 (Direct)			Scope 2 (Indirect)		
	2014	2015	2016	2014	2015	2016
Zambia	597,177	717,575	758,774	6,190	9,197	10,175
Turkey	6,061	6,113	6,250	36,621	35,837	32,793
Spain	76,436	69,408	65,241	79,183	80,332	90,453
Panama	81,300	110, 831	139,998	100	144	139
Mauritania	140,687	146,767	158,169	300	425	245
Peru	513	492	454	30	26	17
South Africa	-	-	-	100	87	60
Finland	37,077	84,832	16,049	90,800	78,457	35,192

Country	Scope 1 (Direct)			Scope 2 (Indirect)		
	2014	2015	2016	2014	2015	2016
United Kingdom	-	-	-	50	41	63
Canada	664	549	411	180	260	55
Australia	254,200	158,733	116,876	200	173	64
Argentina	-	-	62	-	-	-
Exploration (global)	3,026	1,025	352	-	-	-
Total	**1,197,118**	**1,296,329**	**1,262,636**	**213,964**	**204,995**	**134,064**

3.7 Supporting Information

Data Accuracy

Data in this report on fuel, electricity and material consumption is gathered mainly from the Company wide financial accounting systems and therefore a high level of confidence is placed in the accuracy of the information used. The calculation methodologies are based on the Greenhouse Gas Protocol and other references which have been verified and internationally accepted for use in calculating carbon emissions. Emission factors are based on the best available information provided by utilities at the time. The level of accuracy of the emission factors varies from region to region.

Data gathered for the calculation of nitrous oxide emissions from the use of explosives originate from the compulsory records kept of the quantity of explosives used. Again the financial and regulatory requirements assure a high level of confidence in the data.

Air travel data has a reasonably high level of confidence as the flight information is downloaded from financial databases and the emission factors are based on internationally accepted standards.

External Verification

The 2016 GHG inventory was prepared in-house. No external audit or verification was performed.

Emission Trading

No emission trading is being conducted by the Company.

4. References

1. The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard - revised edition, World Resources Institute.
2. Worksheet for estimation of mobile CO_2 emissions, World Resources Institute, 2006.

3. Optional Emissions from Commuting, Business Travel and Product Transport; May 2008, US Environmental Protection Agency; EPA430-R-08-006.
4. National Greenhouse Accounts (NGA) Factors Australian Government Department of Climate Change, 2008 - Table 4
5. National Greenhouse and Energy Reporting System Measurement, Australian government, July 2013
6. The International Energy Agency CO_2 Emissions from Fuel Combustion Highlights, 2013
7. Annual Reports, First Quantum Minerals Ltd.