Vale S.A.
Form 6-K
October 27, 2016
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United States

Securities and Exchange Commission

Washington, D.C. 20549

FORM 6-K

Report of Foreign Private Issuer

Pursuant to Rule 13a-16 or 15d-16

of the

Securities Exchange Act of 1934

For the month of

October 2016

Vale S.A.

Avenida das Américas, No. 700 Bloco 8, Sala 218
22640-100 Rio de Janeiro, RJ, Brazil

(Address of principal executive office)

(Indicate by check mark whether the registrant files or will file annual reports under cover of Form 20-F or Form 40-F.)

(Check One) Form 20-F x Form 40-F o

(Indicate by check mark if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)(1))

(Check One) Yes o No x

(Indicate by check mark if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)(7))

(Check One) Yes o No x

(Indicate by check mark whether the registrant by furnishing the information contained in this Form is also thereby furnishing information to the Commission pursuant to Rule 12g3-2(b) under the Securities Exchange Act of 1934.)

(Check One) Yes o No x

(If Yes is marked, indicate below the file number assigned to the registrant in connection with Rule 12g3-2(b). 82- .)

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Except where otherwise indicated the operational and financial information in this release is based on the consolidated figures in accordance with IFRS and, with the exception of information on investments and behavior of markets, quarterly financial statements are reviewed by the company s independent auditors. The main subsidiaries that are consolidated are the following: Compañia Minera Miski Mayo S.A.C., Mineração Corumbaense Reunida S.A., PT Vale Indonesia Tbk (formerly International Nickel Indonesia Tbk), Salobo Metais S.A, Vale Australia Pty Ltd., Vale International Holdings GMBH, Vale Canada Limited (formely Vale Inco Limited), Vale Fertilizantes S.A., Vale International S.A., Vale Manganês S.A., Vale Moçambique S.A., Vale Nouvelle-Calédonie SAS, Vale Oman Pelletizing Company LLC and Vale Shipping Holding PTE Ltd.

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Vale s performance in 3Q16

Rio de Janeiro, October 27th, 2016 Vale S.A. (Vale) posted another quarter of sound operational performance, with several production records in 3Q16, namely: (i) iron ore production(1) of 92.1 Mt; (ii) Carajás iron ore production of 38.7 Mt; (iii) Tubarão 3, Tubarão 8 and Vargem Grande pellet plants production of 1.2 Mt, 1.8 Mt and 1.8 Mt, respectively; (iv) contained gold as a by-product in the copper and nickel concentrates of 118,000 oz and (v) Moatize coal production of 1.8 Mt.

Net revenues totaled US$ 7.324 billion in 3Q16, increasing by US$ 698 million vs. 2Q16 as a result of higher sales prices for iron ore fines and pellets (US$ 275 million), nickel and copper (US$ 95 million), and coal (US$ 25 million), along with higher sales volumes of fertilizers (US$ 142 million) and for our ferrous business segment (US$ 127 million).

Costs and expenses decreased by US$ 2.180 billion in 9M16 vs. 9M15, mainly due to cost reduction initiatives (US$ 1.740 billion) and exchange rate variations (US$ 924 million), being partially offset by higher sales volumes (US$ 1.190 billion).

Adjusted EBITDA was US$ 3.023 billion(2) in 3Q16, 26.9% higher than in 2Q16, mainly driven by EBITDA improvements in Ferrous Minerals (US$ 357 million), Base Metals (US$ 224 million) and Coal (US$ 103 million). Adjusted EBITDA margin increased by 5 percentage points, reaching 41.3% in 3Q16.

Capital expenditures totaled US$ 1.257 billion in 3Q16, decreasing by US$ 111 million vs. 2Q16. Investments in project execution totaled US$ 741 million in 3Q16, with expenditures associated with the S11D project accounting for US$ 530 million. Sustaining capex totaled US$ 516 million in 3Q16, 11.4% higher than in 2Q16 as a result of the concentration of investment in the second half of the year.

There is now one main project under development, the S11D project, which reached an important milestone, successfully initiating its hot commissioning in 3Q16. S11D s start-up is expected for 4Q16 with the first commercial ore sale planned for 1Q17.

Net income totaled US$ 575 million in 3Q16 vs. US$ 1.106 billion in 2Q16, decreasing by US$ 531 million mostly as a result of foreign exchange rate variations (US$ 2.237 billion), which were partially offset by the Samarco provision recorded in 2Q16 (US$ 1.038 billion) and the higher EBITDA in 3Q16 (US$ 640 million). Underlying earnings (earnings after adjusting for one-off effects) were US$ 954 million in 3Q16, mainly after the adjustments for foreign exchange variation (US$ 330 million).

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(1) Including third party purchases.

(2) Including US$ 150 million from the goldstream transaction.

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Net debt decreased by US$ 1.543 billion to US$ 25.965 billion with a cash position of US$ 5.484 billion. Gross debt reduced by US$ 365 million to US$ 31.449 billion in 3Q16, with the leverage ratio(3) improving to 3.6x, the same level as in 3Q15.

The main highlights of Vale s performance by business segment were:

EBITDA from the Ferrous Minerals business segment increased 17% in 3Q16 vs. 2Q16, mainly driven by higher realized prices and by lower costs and expenses

- Adjusted EBITDA for Ferrous Minerals was US$ 2.493 billion in 3Q16, US$ 357 million higher than the US$ 2.136 billion achieved in 2Q16, mainly as a result of higher realized sales prices (US$ 291 million) and lower costs and expenses(4) (US$ 213 million), which were partially offset by exchange rate variations (US$ 117 million).

- Cash flow generation, simplified by measuring adjusted EBITDA less sustaining and growth capex, was US$ 1.698 billion in 3Q16, increasing US$ 331 million (24%) from the US$ 1.367 billion recorded in 2Q16.

- C1 cash cost FOB port per metric ton of iron ore fines in BRL reduced by 10% to R$ 42.2/t in 3Q16 vs. R$ 46.9/t in 3Q15, despite inflationary pressures of 8.5%(5), mainly due to improvements in operational performance and ongoing cost-cutting initiatives.

- Iron ore fines and pellets EBITDA break-even, measured by unit cash costs and expenses on a landed-in-China basis(6), decreased US$ 0.2/dmt(7) to US$ 28.3/dmt in 3Q16 when compared to 2Q16, despite the negative impacts of the exchange rate (US$ 1.0/wmt(8)) and bunker oil prices (US$ 0.7/wmt).

EBITDA from the Base Metals business segment increased 60%(9) in 3Q16 vs. 2Q16 as a result of the goldstream transaction and higher prices

- Adjusted EBITDA for Base Metals was US$ 600 million in 3Q16, US$ 224 million higher than in 2Q16, positively impacted by the goldstream transaction (US$ 150 million) and higher prices (US$ 114 million).

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(3) Leverage ratio measured by gross debt to LTM (Last Twelve Months) adjusted EBITDA.

(4) Cost and expenses after adjusting the effects of higher volumes, exchange rate variation and lower bunker oil prices.

(5) IPCA last twelve months until September 2016.

(6) Adjusted for quality, pellets margins differential and moisture, excluding ROM.

(7) Dry metric ton.

(8) Wet metric ton.

(9) Including US$ 150 million from the goldstream transaction.

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- Salobo s EBITDA totaled US$ 131 million in 3Q16, or US$ 281 million including the impact of the goldstream transaction, increasing US$ 9 million vs. 2Q16, despite the negative impact of an exchange rate variation of US$ 12 million.

- Salobo achieved a quarterly production record of 44,300 t in 3Q16 and a monthly production record of 17,000 t in September 2016, running at nominal capacity on a monthly basis.

- Adjusted EBITDA for VNC totaled negative US$ 39 million in 3Q16 improving by US$ 11 million when compared to 2Q16 despite a planned maintenance shutdown in 3Q16. VNC s unit cost net of by-product credits reached US$ 12,425/t in 3Q16, reflecting an US$ 11 million maintenance expenditures associated with the shutdown.

EBITDA from Coal almost reached break-even, being positively impacted by lower costs in Mozambique with the ramp-up of the Nacala Logistics Corridor and the start-up of the Moatize II beneficiation plant

- Adjusted EBITDA for Coal improved significantly from negative US$ 110 million in 2Q16 to negative US$ 7 million in 3Q16, despite not fully capturing the recent hike in index prices.

- Metallurgical coal realized price in 3Q16 did not yet reflect the recent sharp increase in coal index prices due to the impact of Vale s lagged pricing systems, with Vale s realized price (US$ 91.0/t) still significantly lower than the index price average(10) of US$ 135.6/t. Vale s realized price is expected to improve considerably in 4Q16 alongside the improvement in benchmark prices.

- Adjusted EBITDA at the Nacala port improved by 71% to negative US$ 7 million, while EBITDA at the Beira Port (-US$ 28 million) was offset by EBITDA from the Australian operations (US$ 28 million).

- Production cost per ton at the Nacala port continued to improve at US$ 87/t in 3Q16, 16% lower than 2Q16, with further improvement expected for the coming quarters.

EBITDA from the Fertilizers business segment increased 84% in 3Q16 vs. 2Q16, mainly driven by lower costs and higher volumes, despite lower prices and exchange rate variation

(10) Platts Premium Low Vol Hard Coking Coal FOB Australia Index used as reference.

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- Adjusted EBITDA for Fertilizers increased 84% to US$ 59 million in 3Q16, mainly driven by lower costs(11) (US$ 42 million) and higher sales volumes (US$ 13 million).

- Costs decreased by US$ 42 million(12) in 3Q16 vs. 2Q16, mainly as a result of lower raw material prices.

- Phosphate rock, SSP (single superphosphate) and MAP (monoammonium phosphate) production volumes increased by 14.5%, 9.0% and 3.9% in 3Q16, respectively, as a result of the stabilization of the plants operational performance after maintenance stoppages carried out in 2Q16.

Selected financial indicators

US$ million	3Q16 (A)	2Q16 (B)	3Q15 (C)	% (A/B)	% (A/C)
Net operating revenues	7,324	6,626	6,505	11	13
Adjusted EBIT	2,060	1,339	834	54	147
Adjusted EBIT margin (%)	28.1	20.2	12.8		
Adjusted EBITDA	3,023	2,383	1,875	27	61
Adjusted EBITDA margin (%)	41.3	36.0	28.8		
Net income (loss)	575	1,106	(2,117)	(48)	127
Underlying earnings	954	709	(961)	35	199
Underlying earnings per share on a fully diluted basis (US$ / share)	0.19	0.14	(0.19)		
Total gross debt	31,449	31,814	28,675	(1)	10
Cash and cash equivalent	5,484	4,306	4,462	27	23
Total Net Debt	25,965	27,508	24,213	(6)	7
Total gross debt/ adjusted EBITDA (x)	3.6	4.2	3.6		
Capital expenditures	1,257	1,368	1,879	(8)	(33)

US$ million	9M16 (A)	9M15 (B)	% (A/B)
Net operating revenues	19,669	19,710	(0)
Cost and expenses	15,116	17,296	(13)
Adjusted EBIT	4,553	2,414	89
Adjusted EBIT margin (%)	23.1	12.2	
Adjusted EBITDA	7,411	5,690	30
Adjusted EBITDA margin (%)	37.7	28.9	
Underlying earnings	2,177	(667)	426
Underlying earnings per share on a fully diluted basis (US$ / share)	0.42	(0.13)	
Capital expenditures	4,074	6,207	(34)

(11) Excluding volume and exchange rate variation.

(12) After adjusting for the effects of higher volumes (US$ 129 million) and exchange rate variation (US$ 18 million)

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Operating revenues

Net operating revenues in 3Q16 were US$ 7.324 billion, 10.5% higher than in 2Q16. The increase in sales revenues was mainly due to higher sales prices for iron ore fines and pellets (US$ 275 million), for nickel and copper (US$ 95 million) and coal (US$ 25 million), and higher sales volumes in fertilizers (US$ 142 million) and in ferrous minerals (US$ 127 million).

The following tables show net operating revenues by destination and by business areas, with the main highlights being:

- Net revenue by destination was marked by: (i) the increase in the share of sales to Brazil, from 13.6% in 2Q16 to 15.2% in 3Q16, reflecting higher revenues from Fertilizers (US$ 148 million) and (ii) the relative decrease in the share of sales to Europe, from 17.2% in 2Q16 to 15.7% in 3Q16.

- Contribution by business segments in 3Q16 was generally in line with 2Q16, with the Ferrous Minerals business segment representing 67.7% of Vale s total net revenues.

Net operating revenue by destination

US$ million	3Q16	%	2Q16	%	3Q15	%
North America	**551**	**7.5**	**511**	**7.7**	**394**	**6.1**
USA	239	3.3	230	3.5	188	2.9
Canada	303	4.1	281	4.2	206	3.2
Mexico	9	0.1				
South America	**1,194**	**16.3**	**994**	**15.0**	**1,199**	**18.4**
Brazil	1,111	15.2	903	13.6	1,086	16.7
Others	83	1.1	91	1.4	113	1.7
Asia	**4,081**	**55.7**	**3,668**	**55.4**	**3,547**	**54.5**
China	2,908	39.7	2,700	40.7	2,555	39.3
Japan	483	6.6	405	6.1	498	7.7
South Korea	270	3.7	188	2.8	171	2.6
Others	420	5.7	376	5.7	323	5.0
Europe	**1,147**	**15.7**	**1,137**	**17.2**	**1,109**	**17.1**
Germany	326	4.5	358	5.4	330	5.1
Italy	110	1.5	125	1.9	104	1.6
Others	711	9.7	654	9.9	675	10.4
Middle East	**236**	**3.2**	**240**	**3.6**	**227**	**3.5**
Rest of the World	**115**	**1.6**	**76**	**1.2**	**29**	**0.4**
Total	**7,324**	**100.0**	**6,626**	**100.0**	**6,505**	**100.0**

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Net operating revenues by destination

Net operating revenue by business area

US$ million	3Q16	%	2Q16	%	3Q15	%
Ferrous minerals	**4,959**	**67.7**	**4,541**	**68.5**	**4,312**	**66.3**
Iron ore fines	3,782	51.6	3,508	52.9	3,278	50.4
ROM	4	0.1	5	0.1	24	0.4
Pellets	991	13.5	868	13.1	883	13.6
Manganese ore	51	0.7	36	0.5	23	0.4
Ferroalloys	25	0.3	25	0.4	3	
Others	106	1.4	99	1.5	101	1.6
Coal	**163**	**2.2**	**145**	**2.2**	**127**	**2.0**
Metallurgical coal	105	1.4	77	1.2	115	1.8
Thermal coal	58	0.8	68	1.0	12	0.2
Base metals	**1,579**	**21.6**	**1,447**	**21.8**	**1,347**	**20.7**
Nickel	797	10.9	710	10.7	785	12.1
Copper	452	6.2	443	6.7	360	5.5
PGMs	104	1.4	99	1.5	58	0.9
Gold as by-product	179	2.4	154	2.3	115	1.8
Silver as by-product	9	0.1	10	0.2	7	0.1
Others	38	0.5	31	0.5	22	0.3
Fertilizer nutrients	**598**	**8.2**	**464**	**7.0**	**698**	**10.7**
Potash	34	0.5	22	0.3	41	0.6
Phosphates	470	6.4	363	5.5	560	8.6
Nitrogen	69	0.9	60	0.9	80	1.2
Others	25	0,3	19	0.3	17	0.3

Others	**25**	**0.3**	**29**	**0.4**	**21**	**0.3**
Total	**7,324**	**100.0**	**6,626**	**100.0**	**6,505**	**100.0**

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Costs and expenses

Costs and expenses were US$ 5.264 billion in 3Q16 in line with the US$ 5.287 billion recorded in 2Q16, impacted by cost reduction initiatives (US$ 244 million) and lower other operating expenses, including the positive impact from the goldstream transaction (US$ 150 million), which together more than offset the higher sales volumes (US$ 230 million) and exchange rate variations (US$ 196 million).

Costs and expenses

US$ million	3Q16	2Q16	3Q15
Costs	**4,955**	**4,795**	**5,040**
Expenses	**309**	**492**	**631**
Total costs and expenses	**5,264**	**5,287**	**5,671**
Depreciation	963	927	1,022
Costs and expenses ex-depreciation	**4,301**	**4,360**	**4,649**

COST OF GOODS SOLD (COGS)

COGS totaled US$ 4.955 billion in 3Q16, increasing US$ 160 million from the US$ 4.795 billion recorded in 2Q16, as a result of higher sales volumes (US$ 230 million) and exchange rate variations(13) (US$ 174 million), which were partially offset by cost reduction initiatives (US$ 244 million).

Further details regarding cost performance are provided in the Performance of the Business Segments section.

COGS by business segment

US$ million	3Q16	%	2Q16	%	3Q15	%
Ferrous minerals	2,663	53.7	2,579	53.8	2,813	55.8
Base metals	1,429	28.8	1,424	29.7	1,406	27.9
Coal	190	3.8	250	5.2	239	4.7
Fertilizers	610	12.3	482	10.1	536	10.6
Other products	63	1.3	60	1.2	46	0.9
Total COGS	**4,955**	**100.0**	**4,795**	**100.0**	**5,040**	**100.0**
Depreciation	899		866		861	
COGS, ex-depreciation	**4,056**		**3,929**		**4,179**	

EXPENSES

Total expenses decreased 37.2% to US$ 309 million in 3Q16 from the US$ 492 million recorded in 2Q16, mainly due to the positive one-off impact of the goldstream transaction (US$ 150 million) recorded in other operating expenses , which was partially offset by the increase in SG&A (US$ 13 million), R&D (US$ 7 million), and pre-operating and stoppage expenses (US$ 8 million).

(13) COGS currency exposure in 3Q16 was as follows: 60% BRL, 26% USD, 11% CAD, 2% EUR and 1% others.

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SG&A totaled US$ 153 million in 3Q16, representing a 9.3% increase from the US$ 140 million recorded in 2Q16, and a 16.8% increase from the US$ 131 million recorded in 3Q15. SG&A, net of depreciation, increased by US$ 9 million in 3Q16 vs. 2Q16, mainly as a result of the impact of exchange rate variations (US$ 7 million) and higher selling expenses (US$ 3 million).

R&D expenses totaled US$ 85 million in 3Q16, representing an 8.9% increase from the US$ 78 million recorded in 2Q16, following the usual seasonality, and a 29.7% decrease from the US$ 121 million recorded in 3Q15. R&D expenses relate mostly to iron ore and pellets (US$ 29 million) and nickel (US$ 21 million).

Pre-operating and stoppage expenses totaled US$ 122 million in 3Q16, representing a 7.0% increase from the US$ 114 million recorded in 2Q16, mainly driven by higher S11D project expenses (US$ 9 million).

Other operating expenses recorded a positive amount of US$ 51 million in 3Q16, improving by US$ 211 million when compared to the US$ 160 million expenses in 2Q16, mainly due to: (i) the positive one-off impact of the goldstream transaction (US$ 150 million); (ii) lower contingencies (US$ 28 million); and (iii) lower disposals and write-off of assets (US$ 21 million).

Expenses

US$ million	**3Q16**	**%**	**2Q16**	**%**	**3Q15**	**%**
SG&A ex-depreciation	**116**		**107**		**100**	
SG&A	**153**	**50**	**140**	**28**	**131**	**21**
Administrative	**136**	**44**	**126**	**26**	**132**	**21**
Personnel	61	20	58	12	56	9
Services	19	6	18	4	26	4
Depreciation	37	12	33	7	31	5
Others	19	6	17	3	19	3
Selling	**17**	**6**	**14**	**3**	**(1)**	**(0)**
R&D	**85**	**28**	**78**	**16**	**121**	**19**
Pre-operating and stoppage expenses(1)	**122**	**39**	**114**	**23**	**266**	**42**
VNC					97	15
Long Harbour	39	13	45	9	65	10
S11D	28	9	19	4	11	2
Moatize	1		9	2	25	4
Others	54	18	41	8	68	11
Other operating expenses	**(51)**	**(17)**	**160**	**33**	**113**	**18**
Total Expenses	**309**	**100**	**492**	**100**	**631**	**100**
Depreciation	64		61		161	
Expenses ex-depreciation	**245**		**431**		**470**	

(1) Includes US$ 27 million of depreciation charges in 3Q16, US$ 29 million in 2Q16 and US$ 83 million in 3Q15

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Adjusted earnings before interest, taxes, depreciation and amortization(14)

Adjusted EBITDA was US$ 3.023 billion(15) in 3Q16, 26.8% higher than in 2Q16 mainly as a result of improvements in the Ferrous Minerals EBITDA (US$ 357 million), Coal EBITDA (US$ 103 million) and Base Metals EBITDA (US$ 224 million). Adjusted EBITDA margin was 41.3% in 3Q16, improving from the 36.0% recorded in 2Q16.

Adjusted EBIT was US$ 2.060 billion in 3Q16, 53.8% higher than in 2Q16.

Adjusted EBITDA

US$ million	3Q16	2Q16	3Q15
Net operating revenues	7,324	6,626	6,505
COGS	(4,955)	(4,795)	(5,040)
SG&A	(153)	(140)	(131)
Research and development	(85)	(78)	(121)
Pre-operating and stoppage expenses	(122)	(114)	(266)
Other operational expenses	51	(160)	(113)
Adjusted EBIT	**2,060**	**1,339**	**834**
Depreciation, amortization & depletion	963	927	1,022
Dividends received		117	19
Adjusted EBITDA	**3,023**	**2,383**	**1,875**

Adjusted EBITDA by business area

US$ million	3Q16	2Q16	3Q15
Ferrous minerals	2,493	2,136	1,652
Coal	(7)	(110)	(129)
Base metals	600	376	193
Fertilizer nutrients	59	32	197
Others	(122)	(51)	(38)
Total	**3,023**	**2,383**	**1,875**

(14) Net revenues less costs and expenses net of depreciation plus dividends received.

(15) Including US$ 150 million from the goldstream transaction.

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Net income

Net income totaled US$ 575 million in 3Q16 vs. US$ 1.106 billion in 2Q16, decreasing by US$ 531 million, mainly as a result of the negative impact of the foreign exchange rate variation in 3Q16 vs. 2Q16 (US$ 2.237 billion), which was partially offset by the Samarco provision recorded in 2Q16 (US$ 1.038 billion) and the higher EBITDA in 3Q16 (US$ 640 million).

Underlying earnings (earnings after adjusting for one-off effects) were US$ 954 million in 3Q16, after the adjustments for foreign exchange variation (US$ 330 million).

Underlying earnings

US$ million	3Q16	2Q16	3Q15
Underlying earnings	**954**	**709**	**(961)**
Items excluded from basic earnings			
Result on measurement or sale of non-current assets	(29)	(66)	(48)
Deferred Income tax - foreign subsidiaries			2,990
Shareholders Debentures	(48)	(86)	75
Foreign Exchange	(330)	1,960	(5,025)
Monetary variation	2	(51)	(92)
Currency and interest rate swaps	(49)	483	(1,196)
Other financial results	(55)	(31)	29
Other results in investments from joint controlled and associates	(33)	(1,038)	
Income tax over excluded items	163	(774)	2,111
Net Income (loss)	**575**	**1,106**	**(2,117)**

Net financial results showed a loss of US$ 1.047 billion vs. a gain of US$ 2.091 billion in 2Q16. The main components of the 3Q16 net financial results are: (i) financial expenses (US$ 715 million); (ii) financial revenues (US$ 35 million); (iii) foreign exchange and monetary losses (US$ 328 million); (iv) currency and interest rate swap losses (US$ 49 million); and (v) gains on other derivatives (US$ 10 million), which were partially offset by losses on bunker oil derivatives of US$ 7 million.

Financial results

US$ million	3Q16	2Q16	3Q15
Financial expenses	**(715)**	**(611)**	**(277)**
Gross interest	(466)	(452)	(239)
Capitalization of interest	172	213	
Tax and labour contingencies	(4)		10
Shareholder debentures	(48)	(86)	75
Others	(225)	(157)	15
Financial expenses (REFIS)	(144)	(129)	(138)
Financial income	**35**	**34**	**92**

Derivatives(1)	**(39)**	**759**	**(1,799)**
Currency and interest rate swaps	(49)	483	(1,196)
Others(2) (bunker oil, commodities, etc)	10	276	(603)
Foreign Exchange	**(330)**	**1,960**	**(5,025)**
Monetary variation	**2**	**(51)**	**(92)**
Financial result, net	**(1,047)**	**2,091**	**(7,101)**

(1) The net derivatives losses of US$ 39 million in 3Q16 are comprised of settlement losses of US$ 191 million and marked-to-market gains of US$ 152 million.

(2) Other derivatives include mainly bunker oil derivatives losses of US$ 7 million

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Equity income from affiliated companies

Equity income from affiliated companies was US$ 46 million in 3Q16 vs. US$ 190 million in 2Q16. The main contributors to equity income were MRS (US$ 17 million), CSI (US$ 17 million) and VLI (US$ 16 million).

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The impact of bunker oil hedging on Vale s financial performance

Vale s financial performance has been impacted by the bunker oil hedge previously contracted. The outstanding bunker oil hedge position is marked-to-market and recorded as financial results, as a proxy for future cash flow. The outstanding hedge position as of September 30th, 2016 will be completely settled by the end of 2016(16).

The impact on the financial statements can be summarized as follows:

(i) In 3Q16: a negative impact of US$ 7 million recognized in 3Q16 as financial results due to the net position of: (i) the positive impact of the mark-to-market of the open positions on September 30th, 2016; and (ii) the negative impact of the realized loss on the settlements which occurred in the quarter.

(ii) In 4Q16: financial results will only be impacted by the gains or losses related to the settlements recorded in the quarter, as all current open positions will be settled until December 31st, 2016.

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(16) Costs are no longer impacted in 2016, since all outstanding bunker oil hedge positions recorded under the hedge accounting program were settled up to 4Q15.

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Impact of bunker oil hedging on Vale s financial performance

Freight contract type	Hedge accounting	Concept Impact of derivative position in P/L statement	Current impact Impact incurred in 3Q16 P/L statement	Type of Instrument	Drivers of future impact Bunker oil derivative outstanding position (,000 tons)	Average strike price (US$/t)
FOB	No	Impact on financial results	US$7 million decrease in financial results	Forward	352	511
				Zero Cost Collar	540	300 - 380

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Effects of currency price volatility on Vale s financial performance

In 3Q16, from end to end, the Brazilian Real (BRL) depreciated 1.1% against the US Dollar (USD) from BRL 3.21/ USD as of June 30th, 2016 to BRL 3.25/ USD as of September 30th, 2016. On a quarterly average, the BRL appreciated 7.5%, from an average BRL 3.51/ USD in 2Q16 to an average BRL 3.25/ USD in 3Q16.

The end-to-end depreciation of the BRL against the USD and other currencies caused mainly non-cash losses of US$ 379 million on our earnings before taxes in 3Q16, driven by its impact on:

(i) The net position of the USD and other currency denominated liabilities and the USD and other currency denominated assets (accounts receivable and others) which amounted to a loss of US$ 330 million in 3Q16, recorded in the financial statements as Foreign exchange .

(ii) The changes in fair value and the settlements of the currency swaps from the BRL and other currencies to the USD, which caused one-off losses of US$ 49 million.

The BRL appreciation on a quarterly average brought negative impacts to Vale s cash flows. In 3Q16 most of our revenues were denominated in USD, while our COGS were 60% denominated in BRL, 26% in USD and 11% in Canadian dollars (CAD) and about 70% of our capital expenditures were denominated in BRL. The appreciation of the BRL and of other currencies in 3Q16 increased our costs and expenses by US$ 196 million.

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Investments

Capital expenditures totaled US$ 1.257 billion in 3Q16 with US$ 741 million in project execution and US$ 516 million in sustaining capital. Capital expenditures decreased US$ 111 million vs. the US$ 1.368 billion spent in 2Q16.

Project Execution and Sustaining by business area

US$ million	3Q16	%	2Q16	%	3Q15	%
Ferrous minerals	795	63.3	767	56.1	1,099	58.5
Coal	149	11.9	159	11.6	333	17.7
Base metals	189	15.0	232	17.0	370	19.7
Fertilizer nutrients	100	7.9	68	4.9	55	2.9
Power generation	15	1.2	16	1.2	16	0.9
Steel	9	0.7	126	9.2	6	0.3
Total	**1,257**	**100.0**	**1,368**	**100.0**	**1,879**	**100.0**

Evolution of capital expenditures

Project execution

The Ferrous Minerals and the Coal business segments accounted for about 78% and 14%, respectively, of the total investment in project execution in 3Q16.

The Moatize II project was delivered in 3Q16 with total investments of US$ 2.034 billion.

There is now one main project under development, the S11D project with a nominal capacity of 90 Mtpy of iron ore which will help reduce Vale s C1 cash costs and improve Vale s

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operational flexibility with the CLN S11D logistics expansion which will increase the capacity in the Northern System to 230 Mtpy by 2020.

Project execution by business area

US$ million	3Q16	%	2Q16	%	3Q15	%
Ferrous minerals	579	78.2	608	67.1	878	71.3
Coal	106	14.3	140	15.5	311	25.2
Base metals	2	0.3	1	0.1	10	0.8
Fertilizer nutrients	30	4.1	14	1.6	11	0.9
Power generation	14	1.9	16	1.7	16	1.3
Steel	9	1.2	126	13.9	6	0.5
Total	**741**	**100.0**	**905**	**100.0**	**1,232**	**100.0**

FERROUS MINERALS

About 92% of the US$ 579 million invested in Ferrous Minerals in 3Q16 relates to the S11D project and the expansion of its associated infrastructure (US$ 530 million).

S11D Mine and Plant   Plant and stockyards

S11D (including mine, plant and associated logistics CLN S11D) achieved combined physical progress of 83% in 3Q16 with 95% progress at the mine site and 74% at the logistic infrastructure sites. The duplication of the railway reached 58% physical progress with 281 Km delivered up to the quarter. The railway spur started up in early October with the circulation of the first train with 330 wagons through the entire route of the spur, including the railway loop. The offshore port initiated its hot commissioning having loaded a Capesize vessel with 160,000t of ore in October, and is expected to start up in November.

The S11D mine and plant successfully initiated its hot commissioning with approximately 196,000 t of accumulated iron ore production in 3Q16, with start-up expected for 4Q16 and the first commercial ore sales planned for 1Q17. S11D will have a 4-year phased ramp-up

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instead of the 2-year ramp-up originally planned in order to maximize margins. The S11D (Southern range) full production of 90 Mtpy will be reached by 2020, adding a net output of 75 Mtpy from the entire Northern System (Northern and Southern ranges), which is expected to supply around 155 Mt from the Northern range only in 2016 and 230 Mtpy from both ranges by 2020.

S11D Logistics Railway loop

COAL

The Moatize II coal handling and processing plant (CHPP) with net additional capacity of 11 Mtpy started up in 3Q16. Ramp-up is progressing well, having reached production of 129,000 t in August and 169,000 t in September. The project was delivered with total investments of US$ 2.034 billion.

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Moatize Expansion Stockyard

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Description and status of main projects

Project	Description	Capacity (Mtpy)	Status
Ferrous Minerals projects			
Carajás Serra Sul S11D	• Development of a mine and processing plant, located in the Southern range of Carajás, Pará, Brazil.	90	• Hot commissioning in the mine and mill initiated • Ore stocking in the yards initiated • Earthworks of all four systems concluded • Delivery of the electrocenters for the mine 98% completed
CLN S11D	• Duplication of 570 km railway, with construction of rail spur of 101 km. Acquisition of wagons, locomotives, and onshore and offshore expansions at PDM maritime terminal.	(80)(a)	• Duplication of the railway reached 58% physical progress, totaling 281 Km delivered • Railway spur start-up occurred • Offshore expansion achieved 95% physical progress with hot commissioning initiated • Onshore expansion reached 88% physical progress

(a) Net additional capacity

Progress indicators(17)

Project	Capacity (Mtpy)	Estimated start-up	Executed capex (US$ million) 2016	Executed capex (US$ million) Total	Estimated capex (US$ million) 2016	Estimated capex (US$ million) Total	Physical progress
Ferrous minerals projects							
Carajás Serra Sul S11D	90	2H16	755	5,411	890	6,405(b)	95%
CLN S11D	230 (80)(a)	1H14 to 1H20	951	5,418	1,154	7,850(c)	74%

(a) Net additional capacity.

(b) Original capex budget of US$ 8.089 billion.

(c) Original capex budget of US$ 11.582 billion.

Sustaining capex

Sustaining capital increased from US$ 463 million in 2Q16 to US$ 516 million in 3Q16. The Ferrous Minerals and Base Metals business segments accounted for 42% and 36% of the total sustaining capex in 3Q16, respectively.

Sustaining capital for the Ferrous Minerals business segment included, among others: (i) enhancement and replacement in operations (US$ 132 million), (ii) improvement in the current standards of health and safety, social and environmental protection (US$ 39 million), (iii) maintenance, improvement and expansion of tailing dams (US$ 30 million). Maintenance of railways and ports in Brazil and Malaysia accounted for US$ 66 million.

(17) Pre-operating expenses were not included in the estimated capex for the year, although included in the total estimated capex column, in line with Vale s Board of Directors approvals. Estimated capex for the year is only reviewed once a year.

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Sustaining investments in iron ore fines (excluding sustaining investments in pellets plants) amounted to US$ 171 million, equivalent to US$ 2.5/dmt of iron ore fines in 3Q16, representing a 39% increase vs. the US$ 1.8/dmt in 2Q16, mainly due to the concentration of sustaining investments in the second half of the year. The last twelve months average of sustaining for iron ore fines amounts to US$ 2.3/dmt. Sustaining investments for Pellets totaled US$ 37 million, equivalent to US$ 3.2/dmt, 10.3% higher than in 2Q16.

Sustaining capex in the Base Metals business segment was mainly dedicated to: (i) enhancement and replacement in operations (US$ 117 million), (ii) improvement in the current standards of health and safety and environmental protection (US$ 60 million); (iii) maintenance improvements and expansion of tailing dams (US$ 8 million).

Sustaining capex by type - 3Q16

US$ million	**Ferrous Minerals**	**Coal**	**Base Metals**	**Fertilizer**	**TOTAL**
Operations	132	39	117	50	**338**
Waste dumps and tailing dams	30		8	3	**41**
Health and Safety	31	3	13	2	**49**
CSR - Corporate Social Responsibility	8		47	13	**69**
Administrative & Others	16	1	1	2	**19**
Total	**217**	**43**	**186**	**70**	**516**

Sustaining capex by business area

US$ million	**3Q16**	**%**	**2Q16**	**%**	**3Q15**	**%**
Ferrous minerals	217	42.0	159	34.4	221	34.2
Coal	43	8.3	19	4.1	22	3.4
Base metals	186	36.1	231	49.9	360	55.6
Fertilizer nutrients	70	13.6	54	11.6	44	6.8
Total	**516**	**100.0**	**463**	**100.0**	**647**	**100.0**

Corporate social responsibility

Investments in corporate social responsibility totaled US$ 114 million in 3Q16, of which US$ 76 million dedicated to environmental protection and conservation and US$ 38 million dedicated to social projects.

Portfolio Management

On August 2nd, 2016, Vale sold an additional 25% premium of the goldstream payable in copper concentrate from Salobo for the life of the mine to Silver Wheaton (Caymans) Ltd. (Silver Wheaton) Vale received an initial cash payment of US$ 800 million and will receive: (i) approximately US$ 23 million in option value of the 10 million Silver Wheaton warrants held by Vale and (ii) future cash payments for each ounce of gold delivered to Silver Wheaton under the agreement, equal to the lesser of US$ 400 per oz (plus a 1% annual adjustment from 2019 onwards) and the prevailing market price.

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On September 29th, 2016, Vale reached an important milestone in the Mozambique coal transaction by approving new terms with Mitsui. Mitsui agreed to contribute up to US$ 450 million, being: (i) an aggregate of US$ 255 million for a 15% of Vale s stake in the Moatize coal mine; and (ii) an additional contribution of up to US$ 195 million based on meeting certain conditions, including mine performance. Mitsui will also contribute US$ 348 million for a 50% stake in the equity and quasi-equity instruments of the Nacala Logistics Corridor (NCL) and extend a long-term facility of US$ 165 million to the NCL. Vale expects to receive US$ 768 million after the completion of the equity transaction with Mitsui and up to US$ 2.7 billion upon closing the Project Financing.

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Free cash flow

Free cash flow was US$ 1.622 billion in 3Q16.

Cash generated from operations was US$ 3.227 billion in 3Q16, with non-operational uses of cash stemming mainly from: (i) interest on loans (US$ 423 million); (ii) income taxes and REFIS installments (US$ 204 million); (iii) settlement of derivatives (US$ 191 million), of which US$ 166 million related to bunker oil; and (iv) investments (US$ 1.249 billion)(18).

The goldstream transaction generated a cash inflow of US$ 800 million in 3Q16. For accounting purposes, the cash inflow was classified into two components. The first component was recorded as sale of mining rights for US$ 276 million (included in the net disposal/acquisition of assets and investments), of which US$ 126 million was deducted from the book value of the mining rights and US$ 150 million reduced other operational expenses representing the gain on the sale of mining rights. The other component was recorded as deferred revenue of US$ 524 million (improving Vale s working capital), which will be recognized in our income statement as the actual gold is delivered.

Net additions and repayments of loans were negative US$ 414 million, with debt repayments exceeding debt additions in 3Q16.

Free Cash Flow

(18) The investments figure reported in the cash flow statement may differ from the ones reported in the Investments section of this report due to the fact that some actual figures are converted into U.S. dollars at the exchange rate on the date of each cash disbursement, while figures reported in our cash flow statements are converted into U.S. dollars based on average exchange rates.

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Debt indicators

Gross debt totaled US$ 31.449 billion as of September 30th, 2016, decreasing from the US$ 31.814 billion as of June 30th, 2016, as a result of net debt repayments(19) and the impact of the depreciation of the BRL(20) on the translation of BRL denominated debt into USD.

On August 3rd, 2016, Vale issued, through its wholly-owned subsidiary Vale Overseas Limited, US$ 1.0 billion of Guaranteed Notes due in August 2026 bearing a coupon of 6.25% per annum. The net proceeds from the offering were used to pay part of the redemption price of the 6.250% notes due January 2017, issued by Vale Overseas Limited. The redemption of the notes due in 2017 was concluded on September 23rd, 2016.

Net debt decreased by US$ 1.543 billion compared to the end of the previous quarter, totaling US$ 25.965 billion based on a cash position of US$ 5.484 billion as of September 30th, 2016. The decrease in net debt was mainly driven by the positive free cash flow of US$ 1.622 billion in 3Q16.

Debt position

Gross debt after currency and interest rate swaps was 92% denominated in USD, with 34% based on floating and 66% based on fixed interest rates as of September 30th, 2016.

Average debt maturity increased slightly to 7.7 years on September 30th, 2016, against 7.6 years on June 30th, 2016. Average cost of debt, after the above-mentioned currency and

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(19) Debt repayments less debt additions.

(20) In 3Q16, from end to end, the BRL depreciated 1.1% against the USD.

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interest rate swaps, increased slightly, to 4.34% per annum on September 30th, 2016, against 4.23% per annum on June 30th, 2016.

Interest coverage, measured by the ratio of the LTM(21) adjusted EBITDA to LTM gross interest, improved to 5.0x in 3Q16 vs. 4.5x in 2Q16.

Gross debt to LTM adjusted EBITDA decreased to 3.6x as of September 30th, 2016 from 4.2x as of June 30th, 2016.

Debt indicators

US$ million	3Q16	2Q16	3Q15
Total debt	31,449	31,814	28,675
Net debt	25,965	27,508	24,213
Total debt / adjusted LTM EBITDA (x)	3.6	4.2	3.6
Adjusted LTM EBITDA / LTM gross interest (x)	5.0	4.5	4.8

(21) Last twelve months.

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Performance of the business segments

The Ferrous Minerals business segment accounted for 82.5% of Vale s adjusted EBITDA in 3Q16, followed by 19.8% from the Base Metals business segment, 2.0% from the Fertilizers business segment, -0.2% from the Coal business segment and -4.0% from Others.

Segment information 3Q16, as per footnote of financial statements

			Expenses				
US$ million	**Net Revenues**	**Cost(1)**	**SG&A and others(1)**	**R&D(1)**	**Pre operating & stoppage(1)**	**Dividends**	**Adjusted EBITDA(2)**
Ferrous minerals	4,959	(2,293)	(95)	(29)	(49)		2,493
Iron ore fines	3,782	(1,648)	(80)	(25)	(40)		1,989
ROM	4						4
Pellets	991	(512)	(8)	(4)	(5)		462
Others ferrous	106	(70)	(1)		(1)		34
Mn & Alloys	76	(63)	(6)		(3)		4
Coal	163	(157)	3	(3)	(13)		(7)
Base metals	1,579	(1,046)	116	(23)	(26)		600
Nickel(3)	1,159	(792)	(31)	(21)	(26)		289
Copper(4), (5)	420	(254)	147	(2)			311
Fertilizer nutrients	598	(501)	(29)	(5)	(4)		59
Others	25	(59)	(63)	(25)			(122)
Total	**7,324**	**(4,056)**	**(68)**	**(85)**	**(92)**		**3,023**

(1) Excluding depreciation and amortization

(2) Excluding non-recurring effects

(3) Including copper and by-products from our nickel operations

(4) Including by-products from our copper operations

(5) Including US$ 150 million from the goldstream transaction

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Ferrous minerals

Adjusted EBITDA of the Ferrous Minerals business segment was US$ 2.493 billion in 3Q16, US$ 841 million higher than in 3Q15, despite the negative impact of exchange rates (US$ 121 million), which were offset by higher sales prices (US$ 392 million), lower bunker oil prices (US$ 63 million) and real gains in competitiveness (US$ 508 million).

Gains in competitiveness were based mainly on: (i) marketing and commercial initiatives (US$ 77 million); (ii) higher sales volumes (US$ 56 million); and (iii) ongoing cost reduction initiatives(22) (US$ 201 million).

Year-on-year EBITDA variation 3Q16 vs. 3Q15 Ferrous Minerals business segment

Iron ore

EBITDA

Adjusted EBITDA of iron ore fines was US$ 1.989 billion in 3Q16, 20.1% higher than in 2Q16, as a result of higher realized sales prices (US$ 199 million), lower costs(23) and expenses(24) (US$ 180 million) and higher sales volumes (US$ 38 million), which were partially offset by the negative impacts of the appreciation of the BRL against the USD on a quarterly average (US$ 84 million).

(22) Including the positive impact of renegotiations of chartering freight contracts.

(23) After adjusting for the effects of higher volumes and exchange rate variation.

(24) After adjusting for the effect of exchange rate variation.

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SALES REVENUES AND VOLUME

Net sales revenues of iron ore fines, excluding pellets and Run of Mine (ROM), amounted to US$ 3.782 billion in 3Q16 vs. US$ 3.508 billion in 2Q16, as a result of higher iron ore fines sales prices (US$ 199 million) and higher sales volumes (US$ 75 million) in 3Q16 vs. 2Q16.

Production, including third party purchases, was 92.1 Mt in 3Q16, 5.3 Mt higher than in 2Q16 and 1.4 Mt higher than in 3Q15, mainly due to: (i) better operational performance at the mines and plants of the Northern System; (ii) the start-up of a new crushing facility at the Fazendão mine; and (iii) greater productivity in the Southern and Southeastern systems.

Sales volumes of iron ore fines reached 74.2 Mt in 3Q16 vs. 72.7 Mt in 2Q16, 2.1% higher than in 2Q16, respectively, with iron ore inventory increasing by 3.0 Mt as a result of: (i) production and acquisition of ore from third parties of 92.1 Mt; (ii) deduction of 13.2 Mt of iron ore fines used for the production of pellets; (iii) adjustment of iron ore inventories(25) of 1.4 Mt; (iv) sales of iron ore fines of 74.2 Mt; and (v) deduction of 0.4 Mt of ROM sales.

CFR sales of iron ore fines totaled 47.8 Mt in 3Q16, practically in line with the 48.2 Mt in 2Q16. CFR sales represented 64% of all iron ore fines sales volumes in 3Q16, slightly below the share of CFR sales in 2Q16 (66%).

ROM sales totaled 0.4 Mt in 3Q16, remaining in line with the 0.4 Mt recorded in 2Q16.

Net operating revenue by product

US$ million	**3Q16**	**2Q16**	**3Q15**
Iron ore fines	3,782	3,508	3,278
ROM	4	5	24
Pellets	991	868	883
Manganese & Ferroalloys	76	61	26
Others	106	99	101
Total	**4,959**	**4,541**	**4,312**

Volume sold

000 metric tons	**3Q16**	**2Q16**	**3Q15**
Iron ore fines	74,231	72,678	70,530
ROM	351	405	3,546
Pellets	12,001	11,388	11,961
Manganese ore	448	354	448

Ferroalloys	31	36	3

REALIZED PRICES

Iron ore sales in 3Q16 were distributed across three pricing systems: (i) 61% based on the current quarter, month and daily spot prices, including provisional price sales that were settled

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(25) Iron ore inventories are periodically adjusted downwards due to moisture and handling during its processing phases.

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within the quarter; (ii) 28% based on provisional prices with settlement price based on the market price defined on the delivery date, in which case prices had not yet been settled at the end of the quarter; and (iii) 11% linked to past prices (quarter-lagged).

Vale s CFR dmt reference price for iron ore fines (ex-ROM) increased by US$ 3.0/t from US$ 56.3/t in 2Q16 to US$ 59.3/t in 3Q16, equivalent to a price realization of 101% of the average Platts IODEX 62% of US$ 58.6/t in 3Q16.

Vale s CFR/FOB wmt price for iron ore fines (ex-ROM) increased 5.4% (US$ 2.6/t) from US$ 48.3/t in 2Q16 to US$ 50.9/t in 3Q16, after adjusting for moisture and the effect of FOB sales, which accounted for 36% of the total sales volumes in 3Q16, while average Platts IODEX 62% increased 5.2% in 3Q16 vs. 2Q16.

Price realization in 3Q16 was impacted by:

- Provisional prices set at the end of 2Q16 at US$ 52.7/t, which were later adjusted based on the price of delivery in 3Q16, which positively impacted prices in 3Q16 by US$ 1.6/t compared to US$ 2.0/t in 2Q16, as a result of the higher realized prices in 3Q16.

- Provisional prices set at the end of 3Q16 at US$ 54.4/t vs. the IODEX average of US$ 58.6/t in 3Q16 which negatively impacted prices in 3Q16 by US$ 1.2/t compared to a negative impact of US$ 1.0/t in 2Q16.

- Quarter-lagged contracts, priced at US$ 56.9/t based on the average prices for Mar-Apr-May which negatively impacted prices in 3Q16 by US$ 0.4/t compared to a negative impact of US$ 1.2/t in 2Q16.

Iron ore sales of 21.0 Mt, or 28% of Vale s sales mix, were recorded under the provisional pricing system, which was set at the end of 3Q16 at US$ 54.4/t. The final prices of these sales and the required adjustment to sales revenues will be determined and recorded in 4Q16.

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Price realization iron ore fines

Average prices

US$/ metric ton	**3Q16**	**2Q16**	**3Q15**
Iron ore - Metal Bulletin 65% index	65.60	59.99	62.11
Iron ore - Platts 62% IODEX	58.60	55.70	54.90
Iron ore fines CFR reference price (dmt)	59.30	56.30	56.00
Iron ore fines CFR/FOB realized price	50.95	48.30	46.48
ROM	11.40	12.35	6.77
Pellets CFR/FOB (wmt)	82.58	76.20	73.82
Manganese ore	113.84	103.13	51.34
Ferroalloys	806.45	690.36	1,000.00

COSTS

Costs for iron ore fines amounted to US$ 1.648 billion (or US$ 1.899 billion with depreciation charges) in 3Q16. Costs decreased by US$ 110 million vs. 2Q16, after adjustments for the effects of exchange rate variations (US$ 69 million) and higher sales volumes (US$ 37 million). The decrease was mainly driven by savings in C1 cash costs and freight renegotiations, which more than offset the negative impact of higher bunker oil prices (US$ 32 million).

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IRON ORE COGS - 2Q16 x 3Q16

US$ million	2Q16	Variance drivers Volume	Exchange Rate	Others	Total Variation 2Q16 x 3Q16	3Q16
Total costs before depreciation and amortization	**1,652**	**37**	**69**	**(110)**	**(4)**	**1,648**
Depreciation	250	6	18	(23)	1	251
Total	**1,902**	**43**	**87**	**(133)**	**(3)**	**1,899**

Maritime freight costs, which are fully accrued as cost of goods sold, totaled US$ 575 million in 3Q16, having increased US$ 9 million vs. 2Q16 after adjustments for lower CFR volumes (US$ 5 million).

Unit maritime freight cost per iron ore metric ton was US$ 12.0/t in 3Q16, remaining practically in line with the average spot freight index of US$ 11.7/t recorded in September 2016 and Vale s freight cost of US$ 11.8/t recorded in 2Q16, mainly as a result of short term freight contracts fixed at lower rates than current spot freight levels, which partially offset the negative impact of higher bunker oil prices (US$ 0.7/t). Vale s average bunker oil price increased from US$ 197.0/t in 2Q16 to US$ 232.2/t in 3Q16.

Additional negative impact on Vale s unit maritime freight cost is expected in 4Q16 given the recent increase in bunker oil prices and in the spot freight market, however, such impact will be partially offset by the abovementioned chartering contracts.

C1 CASH COST

Total iron ore fines C1 cash cost at the port (mine, plant, railroad and port, ex-royalties) was US$ 965 million after deducting depreciation of US$ 251 million, iron ore maritime freight costs of US$ 575 million and distribution costs of US$ 18 million.

C1 cash cost FOB port per metric ton for iron ore fines ex-royalties decreased US$0.2/t, from the US$ 13.2/t recorded in 2Q16 to US$ 13.0/t in 3Q16, as a result of the strong cost savings in BRL, which more than offset the negative impact of the BRL appreciation against the USD on a quarterly average (US$ 1.0/t).

C1 cash cost FOB port per metric ton of iron ore fines in BRL was R$ 42.2/t in 3Q16, R$ 3.9/t lower than the R$ 46.1/t recorded in 2Q16, despite the inflationary pressures in Brazil. The reduction in costs was mainly due to improvements in operational productivity, cost-cutting initiatives and the increased fixed-costs dilution on seasonally higher production volumes.

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C1 Cash Cost Breakdown

Iron Ore Fines Costs and Expenses in BRL

R$/t	3Q16	2Q16	3Q15
Costs(1)	42.2	46.1	46.9
Expenses(1)	7.4	9.7	8.5
Total	**49.5**	**55.8**	**55.4**

(1) Net of depreciation

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Evolution of C1 Cash Cost[1] per ton in BRL

EXPENSES

Iron ore expenses, net of depreciation, amounted to US$ 145 million in 3Q16, 27.5% lower than the US$ 200 million recorded in 2Q16. SG&A and other expenses totaled US$ 80 million in 3Q16, 47% lower than the US$ 150 million recorded in 2Q16, mainly as a result of the adoption of new managerial criteria for allocating, in Other Business Segment , the Simandou and Samarco legal, remediation and other expenses incurred by Vale in 2016, amounting to US$ 19 million and US$ 41 million, respectively. R&D amounted to US$ 25 million, increasing US$ 9 million vs. 2Q16, following the regular seasonality of expenditures. Pre-operating and stoppage expenses, net of depreciation, amounted to US$ 40 million, 18% higher than the US$ 34 million recorded in 2Q16, mainly as a result of the increase in S11D pre-operating expenses (US$ 9 million).

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Iron ore fines cash cost and freight

	3Q16	2Q16	3Q15
Costs (US$ million)			
COGS, less depreciation and amortization	1,648	1,652	1,838
Distribution costs	18	30	14
Maritime freight costs	575	571	736
Bunker oil hedge			109
FOB at port costs (ex-ROM)	**1,055**	**1,051**	**979**
FOB at port costs (ex-ROM and ex-royalties)	**965**	**958**	**894**
Sales volumes (Mt)			
Total iron ore volume sold	74.6	73.1	74.1
Total ROM volume sold	0.4	0.4	3.5
Volume sold (ex-ROM)	74.2	72.7	70.5
% of CFR sales	64.0%	66.0%	64.0%
% of FOB sales	36.0%	34.0%	36.0%
Vale s iron ore cash cost (ex-ROM, ex-royalties), FOB (US$ /t)(1)	**13.0**	**13.2**	**13.2**
Freight			
Volume CFR (Mt)	47.8	48.2	44.9
Vale s iron ore unit freight cost (US$/t)	12.0	11.8	18.8
Vale s iron ore unit freight cost (ex- bunker oil hedge) (US$/t)	12.0	11.8	16.4

(1) US$ 13.2/t is equivalent to the US$12.7/t reported in 3Q15 after adjusting for the new allocation criteria for ICMS (US$ 0.5/t) and Distribution Costs (-US$ 0.2/t) as described in the box Managerial Allocation Changes in pages 45-46 of the 4Q15 Earnings Release. Additional adjustment was made to include the cost of Third Party Ore Purchases (US$ 0.2/t) to our C1 costs.

Evolution of iron ore fines cash cost, freight and expenses

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Evolution of iron ore fines sustaining per ton

Iron ore pellets

Adjusted EBITDA for pellets in 3Q16 was US$ 462 million, US$ 25 million higher than in 2Q16, mainly as a result of the positive impacts of higher sales prices (US$ 76 million) and higher sales volumes (US$ 21 million), which were partially offset by the lack of dividends received from the leased pelletizing plants (US$ 60 million), which are usually paid every 6 months, and the negative impact of exchange rate variations (US$ 25 million).

Net sales revenues for pellets amounted to US$ 991 million in 3Q16, increasing US$ 123 million from the US$ 868 million recorded in 2Q16 as a result of higher realized sales prices (US$ 76 million), which increased from an average of US$ 76.2 per ton in 2Q16 to US$ 82.6 per ton in 3Q16, and higher sales volumes (US$ 47 million), which increased from the 11.4 Mt recorded in 2Q16 to 12.0 Mt in 3Q16.

Production reached 12.1 Mt in 3Q16, 2.0 Mt higher than in 2Q16 mainly as a result of: (i) the resumption of the Fábrica pelletizing plant; and (ii) the higher feed availability for the Vargem Grande and Tubarão plants.

CFR pellet sales of 2.2 Mt in 3Q16 represented 18% of total pellets sales and were 0.3 Mt higher than in 2Q16. FOB pellet sales increased from 9.5 Mt in 2Q16 to 9.8 Mt in 3Q16.

Pellet CFR/FOB prices increased by US$ 6.4/t to US$ 82.6/t in 3Q16, whereas the Platt s IODEX iron ore reference price (CFR China) increased by only US$ 2.9/t in the quarter, as a result of higher pellet premiums in the quarter and the positive impact from Vale s pricing systems.

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Pellet costs totaled US$ 512 million (or US$ 599 million with depreciation charges) in 3Q16. Costs decreased by US$ 4 million vs. 2Q16 after adjusting for the effects of higher volumes (US$ 26 million) and exchange rate variations (US$ 23 million).

Pre-operating and stoppage expenses for pellets were US$ 4 million in 3Q16, US$ 5 million lower than in 2Q16 mainly due to the resumption of the Fábrica pellet plant. SG&A and others expenses decreased US$ 11 million in 3Q16 vs 2Q16.

EBITDA unit margin for pellets was US$ 38.5/t in 3Q16, in line with 2Q16.

Pellets - EBITDA ex-Samarco

	3Q16		2Q16	
	US$ million	**US$/wmt**	**US$ million**	**US$/wmt**
Net Revenues / Realized Price	991	82.6	868	76.2
Dividends Received (Leased pelletizing plants) ex-Samarco			60	5.3
Cash Costs (Iron ore, leasing, freight, overhead, energy and other)	(512)	-42.7	(459)	-40.3
Expenses (SG&A, R&D and other)	(17)	-1.4	(32)	-2.8
EBITDA ex-Samarco	462	38.5	437	38.4

Iron ore fines and pellets cash break-even

Iron ore fines and pellets EBITDA break-even, measured by unit cash costs and expenses on a landed-in-China basis (and adjusted for quality, pellets margins differential and moisture, excluding ROM), decreased slightly from US$ 28.5/dmt in 2Q16 to US$ 28.3/dmt in 3Q16, despite the negative impact of the exchange rate and bunker oil prices.

Iron ore and pellets cash break-even on a landed-in-China basis, including sustaining capex per ton of US$ 2.5/dmt, increased from US$ 30.3/dmt in 2Q16 to US$ 30.8/dmt in 3Q16.

Iron ore and pellets cash break-even landed in China(1)

US$/t	**3Q16**	**2Q16**	**3Q15**
Vale s iron ore cash cost (ex-ROM, ex-royalties), FOB (US$ /t)	**13.0(2)**	**13.2**	**13.2**
Iron ore fines freight cost (ex-bunker oil hedge)	12.0	11.8	16.4
Iron ore fines distribution cost	0.4	0.6	0.3
Iron ore fines expenses(3) & royalties	3.2	4.0	3.5
Iron ore fines moisture adjustment	2.5	2.6	2.8
Iron ore fines quality adjustment	-1.5	-1.6	-2.1

Iron ore fines EBITDA break-even (US$/dmt)	**29.6**	**30.7**	**34.1**
Iron ore fines pellet adjustment(4)	-1.3	-2.2	-1.5
Iron ore fines and pellets EBITDA break-even (US$/dmt)	**28.3**	**28.5**	**32.6**
Iron ore fines sustaining investments	2.5	1.8	2.7
Iron ore fines and pellets cash break-even landed in China(3) (US$/dmt)	**30.8**	**30.3**	**35.3**

(1) Measured by unit cost + expenses + sustaining investment adjusted for quality

(2) Including negative exchange rate impact of US$ 1.0/t and real cost reduction of US$1.2/t

(3) Net of depreciation

(4) US$ 0.7/t in 2Q16 relates to the dividends received from the pelletizing plants, which are usually paid every six months.

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Iron ore and pellets cash break-even on a landed-in-China basis

Manganese and ferroalloys

Adjusted EBITDA of manganese ore and ferroalloys was US$ 4 million in 3Q16, US$ 2 million lower than the US$ 6 million in 2Q16, mainly due to the negative impact of higher costs and expenses (US$ 17 million), which were partially offset by the positive impact of higher prices (US$ 9 million) and higher sales volumes (US$ 6 million).

Net sales revenues for manganese increased to US$ 51 million in 3Q16 from US$ 36 million in 2Q16 mainly due to higher sales prices (US$ 5 million) and sales volumes (US$ 10 million) in 3Q16. Production of manganese ore reached 642,000 t in 3Q16 vs. 553,000 t in 2Q16 and 644,000 t in 3Q15.

Net sales revenues for ferroalloys amounted to US$ 25 million in 3Q16 in line with 2Q16 with lower sales volumes (US$ 3 million) offsetting higher sales prices (US$ 3 million). Ferroalloys production increased to 36,000 t in 3Q16 from the 29,000 t recorded in 2Q16.

Manganese ore and ferroalloys costs totaled US$ 63 million (or US$ 71 million with depreciation charges) in 3Q16. Costs increased by US$ 4 million vs. 2Q16 after adjusting for the effects of lower volumes (US$ 3 million) and exchange rate variations (US$ 3 million), due to higher costs in services and materials for the manganese operations.

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Market outlook iron ore

Iron ore Platts IODEX 62% averaged US$ 58.60/dmt in 3Q16, increasing 6.7% year-on-year and 5.4% quarter-on-quarter. Prices improved on the back of a continuous growth in fixed asset investments in China and a more positive sentiment towards the Chinese real estate market.

The loosening of the monetary policy in China since the second half of 2015 together with fiscal and credit support in 3Q16 kept the economy growing at healthier levels. Property sales grew 25% year-on-year in 3Q16, supporting investments in new and ongoing constructions and keeping steel demand steady.

Production of steel in China continued strong reaching 603.8 Mt in 9M16, reversing the yearly drop and increasing 0.4% in the period, despite production cuts during events such as the G20 meeting in Hangzhou and the Horticultural Exposition in Tangshan. Demand for imported iron ore surged to 92.9 Mt in September, the highest reading this year, taking the 9M16 iron ore imports to 763 Mt, a 9.1% year-on-year increase compared to 9M15. Also, demand for high grade iron ore was encouraged after the spike in coking coal prices in 3Q16, as the higher the Fe grade the lower the need for coking coal in the steelmaking process. Throughout the quarter, most of the Chinese steel mills continued profitable as steel prices remained at the high levels reached in 2Q16.

Going forward, we expect the market for iron ore to remain stable, as the current credit availability in China should provide support for the economy. However, steel demand and production are expected to ease towards the end of the year due to seasonality.

Volume sold by destination Iron ore and pellets

000 metric tons	3Q16	%	2Q16	%	3Q15	%
Americas	**9,275**	**10.7**	**8,054**	**9.5**	**10,760**	**12.5**
Brazil	7,384	8.5	6,291	7.4	9,363	10.9
Others	1,891	2.2	1,763	2.1	1,397	1.6
Asia	**61,353**	**70.9**	**60,568**	**71.7**	**59,597**	**69.3**
China	49,061	56.7	48,176	57.0	46,512	54.1
Japan	7,512	8.7	7,778	9.2	8,548	9.9
Others	4,780	5.5	4,614	5.5	4,537	5.3
Europe	**12,421**	**14.3**	**12,893**	**15.3**	**13,014**	**15.1**
Germany	4,753	5.5	5,160	6.1	5,219	6.1
France	1,549	1.8	1,799	2.1	1,497	1.7
Others	6,119	7.1	5,934	7.0	6,298	7.3
Middle East	**2,274**	**2.6**	**2,231**	**2.6**	**2,401**	**2.8**
Rest of the World	**1,260**	**1.5**	**725**	**0.9**	**265**	**0.3**
Total	**86,583**	**100.0**	**84,471**	**100.0**	**86,037**	**100.0**

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Selected financial indicators Ferrous Minerals

US$ million	3Q16	2Q16	3Q15
Net Revenues	4,959	4.541	4.312
Costs(1)	(2,293)	(2.228)	(2.447)
Expenses(1)	(95)	(171)	(153)
Pre-operating and stoppage expenses(1)	(49)	(46)	(32)
R&D expenses	(29)	(20)	(28)
Dividends received		60	
Adjusted EBITDA	2,493	2.136	1.652
Depreciation and amortization	(399)	(381)	(402)
Adjusted EBIT	2,094	1.695	1.250
Adjusted EBIT margin (%)	42.2	37.3	29.0

(1) Net of depreciation and amortization

Selected financial indicators Iron ore fines

	3Q16	2Q16	3Q15
Adjusted EBITDA (US$ million)	1,989	1,656	1,236
Volume Sold (Mt)	74.231	72.678	70.530
Adjusted EBITDA (US$/t)	26.79	22.79	17.52

Selected financial indicators Pellets (excluding Samarco)

	3Q16	2Q16	3Q15
Adjusted EBITDA (US$ million)	462	437	382
Volume Sold (Mt)	12.001	11.388	11.961
Adjusted EBITDA (US$/t)	38.50	38.37	31.94

Selected financial indicators Iron ore fines and Pellets

	3Q16	2Q16	3Q15
Adjusted EBITDA (US$ million)	2.451	2.093	1.618
Volume Sold (Mt)	86.232	84.066	82.491
Adjusted EBITDA (US$/t)	28.42	24.90	19.61

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Base Metals

Adjusted EBITDA was US$ 600 million in 3Q16, increasing US$ 224 million vs. 2Q16 mainly as a result of the one-off positive effect of the goldstream transaction (US$ 150 million) and higher prices (US$ 114 million), which more than offset the negative impact of higher costs(26) (US$ 19 million) and exchange rate variation (US$ 16 million).

SALES REVENUES AND VOLUMES

Nickel sales revenues were US$ 797 million in 3Q16, increasing US$ 87 million vs. 2Q16 as a result of the positive impact of higher realized nickel prices in 3Q16 (US$ 87 million). Sales volumes were 77 kt in 3Q16, in line with 2Q16.

Copper sales revenues were US$ 452 million in 3Q16, increasing US$ 9 million vs. 2Q16 as a result of higher realized copper prices in 3Q16 (US$ 8 million). Sales volumes were 107 kt in 3Q16, in line with 2Q16.

PGMs (platinum group metals) sales revenues totaled US$ 104 million in 3Q16, increasing by US$ 5 million vs. 2Q16. Sales volumes were 130,000 oz in 3Q16 vs. 151,000 oz in 2Q16. PGMs sales volumes decreased, mainly due to lower production of palladium.

Gold contained as a by-product in our nickel and copper concentrates sales revenues was US$ 179 million in 3Q16, increasing by US$ 25 million vs. 2Q16 as a result of higher realized prices (US$ 15 million) and higher sales volumes (US$ 10 million). Sales volumes of gold as a by-product amounted to 129,000 oz in 3Q16, 7,000 oz higher than in 2Q16.

Net operating revenue by product

US$ million	**3Q16**	**2Q16**	**3Q15**
Nickel	797	710	785
Copper	452	443	360
PGMs	104	99	58
Gold as by-product	179	154	115
Silver as by-product	9	10	7
Others	38	31	22
Total	**1,579**	**1,447**	**1,347**

REALIZED NICKEL PRICES

Nickel realized price was US$ 10,317/t, US$ 52/t higher than the average nickel LME price of US$ 10,265/t in 3Q16.

(26) After adjusting for impacts of volumes.

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Vale s nickel products are divided into two categories, refined nickel (pellets, powder, cathode, FeNi, Utility Nickel and Tonimet) and intermediates (concentrates, matte, NiO and NHC).

Refined nickel products have higher nickel content, typically commanding a premium over the average LME nickel price, whereas nickel intermediates are less pure as they are only partially processed. Due to this difference, intermediate products are sold at a discount. The amount of the discount will vary depending on the amount of processing still required, product forms and level of impurities. The sales product mix is an important driver of nickel price realization.

Refined nickel sales accounted for 88% of total nickel sales in 3Q16, in line with 2Q16. Sales of intermediate products accounted for the balance.

The realized nickel price differed from the average LME price in 3Q16 due to the following impacts:

(i) Premium for refined finished nickel products averaged US$ 319/t, with an impact on the aggregate realized nickel price of US$ 281/t;

(ii) Discount for intermediate nickel products averaged US$ 1,944/t, with an impact on the aggregate realized nickel price of -US$ 229/t.

Price realization nickel

REALIZED COPPER PRICES

Realized copper price was US$ 4,218/t, US$ 554/t lower than the average copper LME price of US$ 4,772/t in 3Q16. Vale s copper products are mostly intermediate forms of copper,

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predominately in the form of concentrate, which is sold at a discount to the LME. These products are sold on a provisional pricing basis during the quarter with final prices determined at a future period, generally one to four months forward(27).

The realized copper price differed from the average LME price in 3Q16 due to the following impacts:

- Current period price adjustments: mark-to-market of invoices still open in the quarter based on the copper price forward curve(28) at the end of the quarter (-US$ 105/t).
- Prior period price adjustment: variance between the price used in final invoices (and in the mark-to-market of invoices from previous quarters still open at the end of the quarter) and the provisional prices used for sales in previous quarters (-US$ 101/t).
- TC/RCs, penalties, premiums and discounts for intermediate products (-US$ 348/t).

Excluding the effects of prior period price adjustments and the discounts for copper intermediate products, including TC/RCs, the gross realized copper price(29) was US$ 4,667/t in 3Q16.

Price realization copper

Realized copper prices increased 1.8% in 3Q16 vs. 2Q16, while LME copper prices increased 1% in the same period, mainly due to lower discounts associated with copper intermediate products that decreased the TC/RCs, penalties, premiums and discounts in 3Q16 (US$ 16

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(27) On September 30th, 2016, Vale had provisionally priced copper sales totaling 106,496 tons valued at a LME forward price of US$ 4,859/t, subject to final pricing over the next several months.

(28) Includes a small amount of final invoices that were provisionally priced and settled within the quarter.

(29) Price to be used when comparing with other copper producers realized price.

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million), which more than offset the higher impact of the provisional pricing system on sales revenues that was a negative US$ 22 million in 3Q16 vs. a negative US$ 9 million in 2Q16.

Average prices

US$/ metric ton	3Q16	2Q16	3Q15
Nickel - LME	10,265	8,823	10,561
Copper - LME	4,772	4,729	5,259
Nickel	10,317	9,180	10,865
Copper	4,218	4,144	3,892
Platinum (US$/oz)	1,060	909	1,005
Gold (US$/oz)	1,383	1,266	1,095
Silver (US$/oz)	15.15	16.66	13.49
Cobalt (US$/lb)	11.83	10.41	14.54

SALES VOLUME PERFORMANCE

Sales volumes of nickel achieved a record for a third quarter of 77 kt in 3Q16, in line with the previous quarter and 5 kt higher than in 3Q15.

Sales volumes of copper achieved a record for a third quarter of 107 kt in 3Q16, in line with 2Q16, and 13 kt higher than in 3Q15, due to higher sales of copper from our North Atlantic nickel operations and Salobo as it continues its ramp-up.

Sales volumes of gold as a by-product achieved a record 129,000 oz in 3Q16, 7,000 oz higher than in 2Q16 and 24,000 oz higher than in 3Q15, as a result of the ongoing ramp-up of Salobo.

Volume sold

000 metric tons	3Q16	2Q16	3Q15
Nickel operations & by-products			
Nickel	77	77	72
Copper	42	41	32
Gold as by-product (000 oz)	24	23	15
Silver as by-product (000 oz)	388	480	374
PGMs (000 oz)	130	151	83
Cobalt (metric ton)	1,069	1,000	468
Copper operations & by-products			
Copper	65	66	62
Gold as by-product (000 oz)	105	99	90

Silver as by-product (000 oz)	221	139	154

Costs and expenses

Costs and expenses, net of the one-off effect of the goldstream transaction (US$ 150 million) in 3Q16 and the US$ 30 million insurance payment in 2Q16, increased US$ 28 million in 3Q16, mainly due to higher costs (US$ 19 million) and the negative impact of the exchange rate variation (US$ 16 million), partially offset by lower expenses (US$ 6 million).

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COSTS OF GOODS SOLD (COGS)

Costs totaled US$ 1.047 billion in 3Q16 (or US$ 1.429 billion including depreciation). After adjusting for the effects of exchange rate variations (US$ 19 million) and lower sales volumes (-US$ 4 million), costs increased by US$ 19 million vs. 2Q16, mainly due to scheduled maintenance costs (US$ 35 million) at our Canadian operations and VNC.

BASE METALS COGS - 2Q16 x 3Q16

		Variance drivers				
US$ million	2Q16	Volume	Exchange Rate	Others	Total Variation 2Q16 x 3Q16	3Q16
Total costs before depreciation and amortization	**1,013**	**(4)**	**19**	**19**	**34**	**1,047**
Depreciation	411		3	(32)	(29)	382
Total	**1,424**	**(4)**	**22**	**(13)**	**5**	**1,429**

UNIT CASH COST

Unit cash cost in the North Atlantic Operations decreased in 3Q16 due to an increase in by-product credit prices and volumes. The Onça Puma unit cost increased mainly due to the negative impact of exchange rate variations (US$ 4 million). VNC unit costs net of by-product credits increased from the US$ 12,208/t recorded in 2Q16 to US$ 12,425/t in 3Q16 mainly due to costs associated with the three-week scheduled maintenance shutdown carried-out in 3Q16.

Sossego and Salobo unit costs decreased mainly due to increased revenues from by-products which more than offset the negative impact of the exchange rate.

Base Metals unit cash cost of sales, net of by-product credits

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Base Metals unit cash cost of sales per operation, net of by-product credits(1)

US$ / t	3Q16