

Ricardo Teles/Vale

# Vale's Production in 3Q17



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## Production highlights

Rio de Janeiro, October 19, 2017 – Vale S.A. (Vale) iron ore production<sup>1</sup> achieved a quarterly record of 95.1 Mt in 3Q17, 3.3 Mt higher than in 2Q17, mainly due to the better operational performance in the Northern System and the S11D ramp-up.

The Northern System, which comprises Carajás, Serra Leste and S11D, achieved a quarterly record of 45.0 Mt in 3Q17, 8.5% and 16.4% higher than in 2Q17 and 3Q16, respectively, mainly due to the ramp-up of S11D, which is advancing according to plan, plus better operational performance in the mine and plant at Carajás and the weather-related seasonality.

Sales volumes for 3Q17 were lower than the production volumes, implying a slight inventory build-up as a result of operational needs and market strategies. However, the sales/production volume ratio were higher than in 2Q17.

As announced in the 2Q17 Production Report, production of ore with high silica content from the Southern and Southeastern Systems was reduced by an annualized rate of 19 Mt. Production will therefore be within the lower end of the 360-380 Mt guidance range for 2017, in line with the ongoing strategy to maximize margins. Vale reaffirms its long-term base case target of 400 Mt of total production per year.

The average Fe content was 64.1% in 3Q17, slightly higher than the 63.8% in 2Q17. The increase results from the curtailment of high silica products and Vale's strategy to improve iron ore price realization.

Nickel production reached 72,700 t in 3Q17, 10.2% higher than in 2Q17, mainly due to Sudbury furnace #2 returning to production in July, strong production performance in Thompson and the steady performance at Onça Puma. In mid-September, Sudbury transitioned to the new single furnace flowsheet and commenced operating as a single furnace operation.

Production at the Long Harbour processing plant reached a record of 8,300 t in 3Q17, 118.4% higher than the 3,800 t recorded in 3Q16 due to the production ramp-up. In July, the refinery successfully reached 75% of monthly nameplate capacity.

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<sup>1</sup> Including iron ore acquired from third parties.



Production of finished products from VNC reached 10,100 t in 3Q17, 12.2% higher than in 2Q17 and 36.5% higher than in 3Q16.

Copper production<sup>2</sup> reached 116,900 t in 3Q17, 16.0% higher than in 2Q17 and 7.0% higher than in 3Q16, mainly due to the record quarterly production in Salobo and higher production in Sudbury, as it returned to regular operation after a scheduled maintenance shutdown in 2Q17.

Coal production in Mozambique reached a quarterly record of 3.2 Mt in 3Q17, 5.8% and 38.3% higher than in 2Q17 and 3Q16, respectively, as a result of the better performance of the two Coal Handling and Preparation Plants (CHPP1 and CHPP2). CHPP2 reached a new monthly production record of 566 kt in July, as a result of its continuing ramp-up. The share of metallurgical coal was 58% of overall production, due to a combination of the geological characteristics of the feed plus the continued optimization of the CHPPs. We expect the share of metallurgical coal to return to 60%-65% of overall production. Logistics operations in Mozambique reached all-time records, with railed volume<sup>3</sup> reaching 3.5 Mt in 3Q17, 15% higher than in 2Q17.

## Production summary

000' metric tons	3Q17	2Q17	3Q16	9M17	9M16	% change		
						3Q17/2Q17	3Q17/3Q16	9M17/9M16
Iron ore <sup>1</sup>	95,111	91,849	92,093	275,159	256,461	3.6%	3.3%	6.5%
Pellets	12,766	12,215	12,072	37,404	33,598	4.5%	5.8%	11.3%
Manganese Ore	568	507	642	1,620	1,791	12.1%	-11.5%	-9.6%
Coal (Mozambique)	3,213	3,037	1,756	8,684	3,907	5.8%	83.0%	122.3%
Nickel	72.7	66.0	76.0	210.1	228.0	10.2%	-4.3%	-7.9%
Copper <sup>2</sup>	118.8	102.7	111.4	330.4	330.6	15.7%	6.6%	-0.1%
Cobalt	1,489	1,412	1,488	4,160	4,199	5.4%	0.0%	-0.9%
Gold (000' oz troy)	131	110	118	346	345	19.1%	11.0%	0.3%

<sup>1</sup> Including third party purchases.

<sup>2</sup> Including Lubambe's attributable production.

<sup>2</sup> Excluding Lubambe's attributable production.

<sup>3</sup> Includes Sena-Beira and Nacala logistics corridors.



## Iron Ore

000' metric tons	3Q17	2Q17	3Q16	9M17	9M16	% change		
						3Q17/2Q17	3Q17/3Q16	9M17/9M16
<b>Northern System</b>	<b>45,001</b>	<b>41,494</b>	<b>38,651</b>	<b>122,468</b>	<b>107,529</b>	<b>8.5%</b>	<b>16.4%</b>	<b>13.9%</b>
<b>Southeastern System</b>	<b>26,898</b>	<b>27,450</b>	<b>27,240</b>	<b>82,514</b>	<b>74,950</b>	<b>-2.0%</b>	<b>-1.3%</b>	<b>10.1%</b>
Itabira	9,607	9,076	8,781	27,505	24,784	5.9%	9.4%	11.0%
Minas Centrais	9,197	9,642	10,431	29,176	30,425	-4.6%	-11.8%	-4.1%
Mariana	8,094	8,733	8,028	25,834	19,741	-7.3%	0.8%	30.9%
<b>Southern System</b>	<b>22,580</b>	<b>22,318</b>	<b>25,648</b>	<b>66,402</b>	<b>72,255</b>	<b>1.2%</b>	<b>-12.0%</b>	<b>-8.1%</b>
Paraopeba	7,261	6,575	6,978	19,939	19,615	10.4%	4.0%	1.7%
Vargem Grande	5,448	6,325	7,750	18,238	22,435	-13.9%	-29.7%	-18.7%
Minas Itabirito	9,872	9,418	10,919	28,224	30,205	4.8%	-9.6%	-6.6%
<b>Midwestern System</b>	<b>632</b>	<b>587</b>	<b>554</b>	<b>1,774</b>	<b>1,726</b>	<b>7.6%</b>	<b>13.9%</b>	<b>2.8%</b>
<b>IRON ORE<sup>1</sup></b>	<b>95,111</b>	<b>91,849</b>	<b>92,093</b>	<b>275,159</b>	<b>256,461</b>	<b>3.6%</b>	<b>3.3%</b>	<b>6.5%</b>

<sup>1</sup> Including third party purchases.

### Production summary

Vale's iron ore production achieved a quarterly record of 95.1 Mt in 3Q17, 3.3 Mt higher than in 2Q17 mainly due to better operational performance in the Northern System and the S11D ramp-up. Production was 3.0 Mt higher than in 3Q16 due to the S11D start-up in 4Q16 in the Northern System.

As announced in the 2Q17 Production Report, production of ore with high silica content from the Southern and Southeastern Systems was reduced by an annualized rate of 19 Mt. Production will therefore be within the lower end of the 360-380 Mt guidance range for 2017, in line with the ongoing strategy to maximize margins.

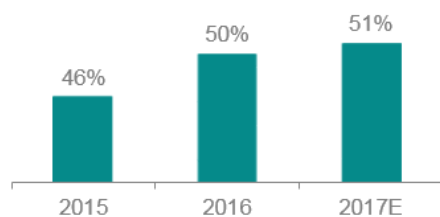
Vale reaffirms its long-term base case target of 400 Mt of total production per year.

Vale's Global Recovery rate (GR)<sup>4</sup> increased from 47% in 3Q15 to 49% in 3Q16 and to 50% in 3Q17, with an estimate of 51% for 2017.

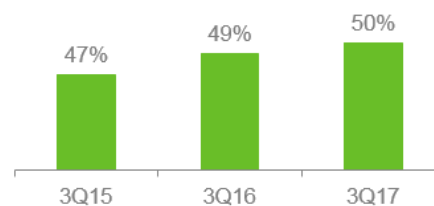
<sup>4</sup> Measured by output of final production divided by the total tonnages extracted (ROM and waste).

**Annual global recovery rate**

%

**Quarterly global recovery rate**

%



Iron ore and pellets shipments from Brazil and Argentina totaled 86.0 Mt in 3Q17, 9.0 Mt and 1.7 Mt higher than in 3Q15 and 3Q16, respectively, mainly due to higher production in the Northern System.

Blended volumes in Asia totaled 19.3 Mt in 3Q17, 14.3 Mt and 10.2 Mt higher than in 3Q15 and 3Q16, respectively, as a result of the ongoing strategy to bring more flexibility to the integrated supply chain, consequently increasing Vale's offshore blending capacity, to respond to market conditions.

The share of offshore inventories over total inventories increased from 15% in 2015 and 2016 to 30% in 3Q17, reflecting the ongoing strategy to shift inventories downstream along the supply chain and closer to the final customer. The expectation is to maintain 30% of total inventories offshore by the end of 2017.

Sales volumes for 3Q17 were lower than production volumes, implying a slight inventory build-up as a result of operational needs and market strategies. However, the sales/production volume ratio were higher than in 2Q17.

The average Fe content was 64.1% in 3Q17, slightly higher than the 63.8% in 2Q17. The increase results from the curtailment of high silica products and Vale's strategy to improve iron ore price realization.

## Northern System

The Northern System, which comprises Carajás, Serra Leste and S11D, achieved a quarterly record of 45.0 Mt in 3Q17, 8.5% and 16.4% higher than in 2Q17 and 3Q16, respectively, mainly due to the ramp-up of S11D, which is advancing according to plan, with better operational performance in the mine and plant at Carajás and the positive weather-related seasonality.

## **Southeastern System**

The Southeastern System, which encompasses the Itabira, Minas Centrais and Mariana mining hubs, produced 26.9 Mt in 3Q17, 0.6 Mt and 0.3 Mt lower than in 2Q17 and 3Q16, respectively, mainly due to the curtailment of production in some mines prioritizing higher margins.

## **Southern System**

The Southern System, which encompasses the Paraopeba, Vargem Grande and Minas Itabirito mining hubs, produced 22.6 Mt in 3Q17, in line with 2Q17 but 12.0% lower than in 3Q16, mainly due to the curtailment of production in some mines prioritizing higher margins.

## **Midwestern System**

The Midwestern System, which encompasses the Urucum and the Corumbá mines, produced 0.6 Mt in 3Q17, in line with 2Q17 and 3Q16, as a result of Vale's continuing strategy to optimize margins.



## Pellets

000' metric tons	3Q17	2Q17	3Q16	9M17	9M16	% change		
						3Q17/2Q17	3Q17/3Q16	9M17/9M16
<b>Southeastern System</b>	<b>7,678</b>	<b>7,748</b>	<b>7,000</b>	<b>22,940</b>	<b>20,878</b>	<b>-0.9%</b>	<b>9.7%</b>	<b>9.9%</b>
Itabasco (Tubarão 3)	1,095	1,169	1,150	3,395	3,369	-6.4%	-4.8%	0.8%
Hispanobras (Tubarão 4)	1,192	1,126	1,084	3,446	3,299	5.9%	10.0%	4.5%
Nibrasco (Tubarão 5 and 6)	2,464	2,378	2,283	7,244	6,156	3.6%	7.9%	17.7%
Kobrasco (Tubarão 7)	1,134	1,201	694	3,506	2,752	-5.6%	63.4%	27.4%
Tubarão 8	1,793	1,873	1,789	5,349	5,302	-4.2%	0.3%	0.9%
<b>Southern System</b>	<b>2,600</b>	<b>2,518</b>	<b>2,749</b>	<b>7,664</b>	<b>6,622</b>	<b>3.3%</b>	<b>-5.4%</b>	<b>15.7%</b>
Fábrica	998	919	956	2,837	1,817	8.6%	4.4%	56.1%
Vargem Grande	1,602	1,599	1,792	4,827	4,804	0.2%	-10.6%	0.5%
<b>Oman</b>	<b>2,488</b>	<b>1,948</b>	<b>2,323</b>	<b>6,800</b>	<b>6,099</b>	<b>27.7%</b>	<b>7.1%</b>	<b>11.5%</b>
<b>PELLETS</b>	<b>12,766</b>	<b>12,215</b>	<b>12,072</b>	<b>37,404</b>	<b>33,598</b>	<b>4.5%</b>	<b>5.8%</b>	<b>11.3%</b>

### Production overview

Vale's pellet production achieved a quarterly record of 12.8 Mt in 3Q17, 4.5% and 5.8% higher than in 2Q17 and 3Q16, respectively, mainly due to higher productivity and a reduction in the number of scheduled maintenance stoppages.

Projects for restarting the São Luis and the Tubarão II pellet plants are on schedule, with their start-up envisioned for the first half of 2018.

### Southeastern system

Production at the Tubarão pellet plants – Tubarão 3, 4, 5, 6, 7 and 8 – reached 7.7 Mt in 3Q17, remaining in line with 2Q17 and 9.7% higher than in 3Q16, mainly due to the scheduled maintenance stoppage of Tubarão 7 in July and August of 2016.

### Southern system

The Fábrica pellet plant achieved a production level of 1.0 Mt in 3Q17, 8.6% higher than in 2Q17 due to higher availability of feed, and 4.4% higher than in 3Q16 due to higher productivity in the plant.



The Vargem Grande pellet plant reached 1.6 Mt of production in 3Q17, in line with 2Q17, but 10.6% lower than in 3Q16, as a result of lower availability of feed due to a maintenance stoppage in the iron ore concentration plant.

### **Oman operations**

The Oman pellet plant achieved a quarterly record of 2.5 Mt in 3Q17, 27.7% higher than in 2Q17 due to a 37-day scheduled maintenance stoppage in one of the plant's lines in April and May 2017, and 7.1% higher than in 3Q16 due to higher productivity in the plants.



## Manganese ore and ferroalloys

000' metric tons	3Q17	2Q17	3Q16	9M17	9M16	% change		
						3Q17/2Q17	3Q17/3Q16	9M17/9M16
<b>MANGANESE ORE</b>	<b>568</b>	<b>507</b>	<b>642</b>	<b>1,620</b>	<b>1,791</b>	<b>12.1%</b>	<b>-11.5%</b>	<b>-9.6%</b>
Azul	382	318	475	1,067	1,306	19.8%	-19.7%	-18.3%
Urucum	160	172	167	495	485	-6.8%	-4.2%	2.0%
Morro da Mina	27	17	-	58	-	57.9%	n.m.	n.m.
<b>FERROALLOYS (Brazil)</b>	<b>35</b>	<b>40</b>	<b>36</b>	<b>111</b>	<b>89</b>	<b>-11.6%</b>	<b>-0.9%</b>	<b>24.9%</b>

### Production overview

Manganese ore production totaled 568,000 t in 3Q17, 12.1% higher than in 2Q17 and 11.5% lower than in 3Q16.

Ferroalloy production reached 35,000 t in 3Q17, in line with 3Q16 and 11.6% lower than in 2Q17.

### Manganese ore production

Production at the Azul manganese mine totaled 382,000 t in 3Q17, 19.8% higher than in 2Q17 due to a scheduled maintenance stoppage in the plant in June, and 19.7% lower than in 3Q16 mainly due to lower availability of high grade run of mine.

Production at the Urucum mine totaled 160,000 t in 3Q17, 6.8% and 4.2% lower than in 2Q17 and 3Q16, respectively, mainly due to a 10 day scheduled maintenance stoppage at the beneficiation plant.

Production at the Morro da Mina mine totaled 27,000 t in 3Q17, 57.9% higher than in 2Q17 mainly due to an increase in production at the Barbacena ferroalloys plant, in response to higher demand from customers. There was no production in 3Q16.

### Ferroalloy production

Ferroalloy production in 3Q17 totaled 35,000 t, in line with 3Q16 but 11.6% lower than in 2Q17 due to stoppage in Furnace 8 in Simões Filho plant. Production was made up of 17,000 t of ferrosilicon manganese (FeSiMn), 12,000 t of high-carbon manganese (FeMnHC) and 6,000 t of medium-carbon manganese (FeMnMC).



Lucas Pupo / Agência Vale

## Nickel

### Finished production by source

000' metric tons	3Q17	2Q17	3Q16	9M17	9M16	% change		
						3Q17/2Q17	3Q17/3Q16	9M17/9M16
Canada	35.6	27.3	37.6	98.8	112.5	30.4%	-5.3%	-12.2%
Sudbury	18.5	7.9	22.1	44.2	60.5	134.2%	-16.3%	-26.9%
Thompson	6.7	4.6	4.9	16.0	19.3	45.7%	36.7%	-17.1%
Voisey's Bay	10.4	14.8	10.6	38.6	32.7	-29.7%	-1.9%	18.0%
Indonesia	18.2	19.7	20.8	54.1	59.3	-7.6%	-12.5%	-8.8%
New Caledonia <sup>1</sup>	10.1	9.0	7.4	29.3	25.4	12.2%	36.5%	15.4%
Brazil	7.1	5.5	6.6	18.7	18.5	29.1%	7.6%	1.1%
Feed from third parties <sup>2</sup>	1.7	4.5	3.6	8.9	12.3	-62.2%	-52.8%	-27.6%
<b>TOTAL NICKEL</b>	<b>72.7</b>	<b>66.0</b>	<b>76.0</b>	<b>210.1</b>	<b>228.0</b>	<b>10.2%</b>	<b>-4.3%</b>	<b>-7.9%</b>

<sup>1</sup> Production at VNC reached 9,400 t in 3Q17, while production of finished nickel from VNC totaled 10,100 t in 3Q17; the differences stemming from the required time for processing into finished nickel.

<sup>2</sup> External feed purchased from third parties and processed into finished nickel in our Canadian operations.

### Production overview

Production of nickel reached 72,700 t in 3Q17, 10.2% higher than in 2Q17, mainly due to Sudbury furnace #2 returning to production in July, strong production performance in Thompson, and the steady performance at Onça Puma.

### Canadian operations

Production from the Sudbury mines reached 18,500 t in 3Q17, 134.2% higher than in 2Q17 and 16.3% lower than in 3Q16. The increase compared to 2Q17 was due to the return of furnace #2 to production in 3Q17 while the three-week scheduled maintenance in June for all surface operations adversely impacted production in 2Q17. Furnace #2 was rebuilt with expanded capacity. In mid-September, Sudbury transitioned to the new single furnace flowsheet and commenced operating as a single furnace operation. Production decreased in relation to 3Q16 mainly due to the full operation of two furnaces in 3Q16 while in 3Q17 Sudbury transitioned to a single furnace operation. Sudbury's transition to a single furnace has gone very well with the newly designed furnace already exceeding its nameplate capacity.

Production from the Thompson mines reached 6,700 t in 3Q17, 45.7% higher than in 2Q17 and 36.7% higher than in 3Q16. The increase when compared to 2Q17 was due to operational issues at the Thompson refinery in 2Q17. Production increased in relation to 3Q16 due to a shortened scheduled maintenance period at its surface plants in 3Q17. As previously announced, Birchtree mine in Thompson was placed under care and maintenance at the end of September.

Production from Voisey's Bay source ore reached 10,400 t in 3Q17, 29.7% lower than in 2Q17 and 1.9% lower than in 3Q16, mainly due to lower shipment of Voisey's Bay concentrate to Sudbury for further processing, which was partially offset by higher volumes delivered to the Long Harbour processing plant in preparation for its continued ramp-up, coincident with this the volume of Voisey's Bay concentrate sent to Ontario and Manitoba for further processing is declining. .

Production at the Long Harbour processing plant reached a record of 8,300 t in 3Q17, 15.3% higher than in 2Q17 and 118.4% higher than the 3,800 t recorded in 3Q16 due to the production ramp-up. In July, the refinery successfully reached 75% of monthly nameplate capacity.

### **Indonesian operation (PTVI)**

Production of finished nickel from PTVI reached 18,200 t in 3Q17, 7.6% lower than in 2Q17 and 12.5% lower than in 3Q16, mainly due to timing issues as PTVI source nickel was shipped to Clydach, with a longer transit period, in order to optimize production from our carbonyl refineries. It is anticipated that Indonesian source nickel will continue to be shipped to Clydach in response to the single furnace operation in Sudbury.

PTVI nickel in matte production reached 20,200 t in 3Q17, in line with 2Q17 and 6.9% lower than in 3Q16.

### **New Caledonia operation (VNC)**

Production of finished products from VNC reached 10,100 t in 3Q17, 12.2% higher than in 2Q17 and 36.5% higher than in 3Q16.

Production of NiO and NHC at VNC amounted to 9,400 t in 3Q17. Site production was 8.0% higher than 2Q17 and 4.4% higher than in 3Q16. The increase when compared to 2Q17 was also due to the impact of unscheduled maintenance and two tropical cyclones during that quarter.

### **Brazilian operation (Onça Puma)**

Production at Onça Puma operation reached a record 7,100 t in 3Q17, 29.1% higher than in 2Q17 and 7.6% higher than in 3Q16, mainly due to strong plant performance with high productivity. Additionally, Onça Puma production in 2Q17 was impacted by a scheduled maintenance shutdown.





## Copper

### Finished production by source

000' metric tons	3Q17	2Q17	3Q16	9M17	9M16	% change		
						3Q17/2Q17	3Q17/3Q16	9M17/9M16
<b>BRAZIL</b>	<b>77.4</b>	<b>72.2</b>	<b>68.4</b>	<b>217.7</b>	<b>196.2</b>	<b>7.2%</b>	<b>13.2%</b>	<b>11.0%</b>
Sossego	25.6	26.2	24.1	76.7	70.1	-2.3%	6.2%	9.4%
Salobo	51.8	46.0	44.3	140.4	126.1	12.6%	16.9%	11.3%
<b>CANADA</b>	<b>39.5</b>	<b>28.6</b>	<b>40.9</b>	<b>107.8</b>	<b>128.7</b>	<b>38.1%</b>	<b>-3.7%</b>	<b>-16.2%</b>
Sudbury	30.1	17.0	29.7	73.5	89.4	77.1%	1.3%	-17.8%
Thompson	0.3	0.4	0.8	1.0	2.2	-25.0%	-62.5%	-54.5%
Voisey's Bay	6.6	8.7	5.6	24.3	20.7	-24.1%	17.9%	17.4%
Feed from third parties	2.5	2.5	4.9	9.0	16.3	0.0%	-49.0%	-44.8%
<b>TOTAL EX-LUBAMBE</b>	<b>116.9</b>	<b>100.8</b>	<b>109.3</b>	<b>325.1</b>	<b>324.8</b>	<b>16.0%</b>	<b>7.0%</b>	<b>0.1%</b>
Lubambe <sup>1</sup>	1.9	1.9	2.1	5.3	5.9	0.0%	-9.5%	-10.2%
<b>TOTAL COPPER</b>	<b>118.8</b>	<b>102.7</b>	<b>111.4</b>	<b>330.4</b>	<b>330.6</b>	<b>15.7%</b>	<b>6.6%</b>	<b>-0.1%</b>

<sup>1</sup> Attributable production

### Production overview

Copper production<sup>5</sup> reached 116,900 t in 3Q17, 16.0% higher than in 2Q17 and 7.0% higher than in 3Q16, mainly due to the record quarterly production in Salobo and higher production in Sudbury, as it returned to regular operation after a scheduled maintenance shutdown in 2Q17.

### Brazilian operations

Production of copper in concentrate at Sossego totaled 25,600 t in 3Q17, in line with 2Q17 and 6.2% higher than 3Q16. The increase when compared to 3Q16 was due to higher feed grades and higher mill productivity.

Production of copper in concentrate at Salobo reached a quarterly record at 51,800 t in 3Q17, 12.6% higher than in 2Q17 and 16.9% higher than in 3Q16. Production was positively impacted by higher feed grades and stronger plant performance in 3Q17.

<sup>5</sup> Excluding Lubambe's attributable production.

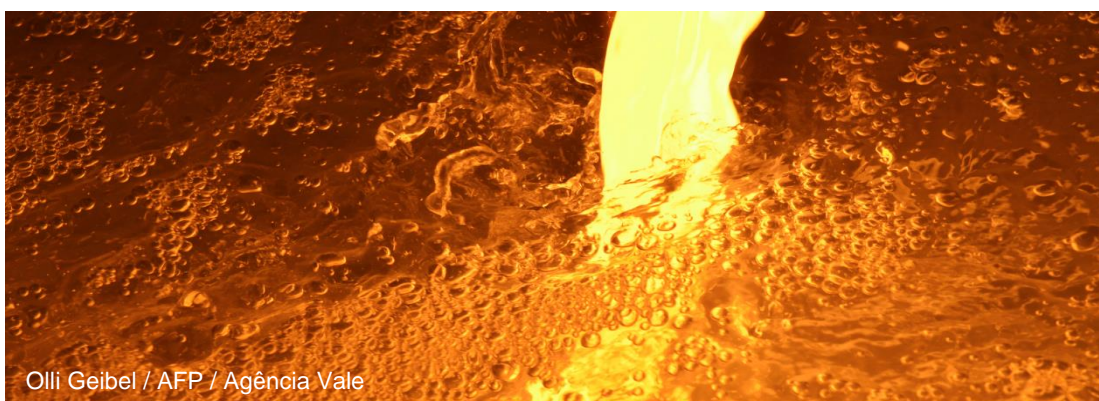
## **Canadian operations**

Production of copper from the Sudbury mines reached 30,100 t in 3Q17, 77.1% higher than in 2Q17 and in line with 3Q16. The increase when compared to 2Q17 was due to lower copper production at Sudbury in 2Q17 as a result of the scheduled three-week maintenance period at the surface plants and both planned and unplanned maintenance in the mines. With the transition to the new single furnace flowsheet in 3Q17, Sudbury achieved a record quarterly copper concentrate production of 22,400 t.

Production of copper from Voisey's Bay reached 6,600 t in 3Q17, 24.1% lower than in 2Q17 and 17.9% higher than in 3Q16. The decrease when compared to 2Q17 was due to a scheduled maintenance shutdown conducted at the Voisey's Bay minesite and additional Voisey's Bay concentrate being moved to Long Harbour to support Long Harbour's continued ramp-up. The increase in relation to 3Q16 was due to the ramp-up of copper production at the Long Harbour processing plant and the strong operational performance at the Voisey's Bay mine and mill.

## **African operation (Lubambe)**

Lubambe delivered 4,800 t of copper in concentrate on a 100% basis (attributable production of 1,900 t).



Olli Geibel / AFP / Agência Vale

## Nickel and copper by-products

### Finished production by source

	3Q17	2Q17	3Q16	9M17	9M16	% change		
						3Q17/2Q17	3Q17/3Q16	9M17/9M16
<b>COBALT (metric tons)</b>	<b>1,489</b>	<b>1,412</b>	<b>1,488</b>	<b>4,160</b>	<b>4,199</b>	<b>5.4%</b>	<b>0.0%</b>	<b>-0.9%</b>
Sudbury	279	124	198	618	596	124.0%	41.0%	3.7%
Thompson	106	111	191	355	544	-3.8%	-44.3%	-34.7%
Voisey's Bay	382	436	227	1,030	566	-12.4%	68.0%	82.0%
VNC	710	675	843	2,063	2,374	5.1%	-15.7%	-13.1%
Others	12	66	30	95	119	-82.0%	-59.9%	-20.2%
<b>PLATINUM (000' oz troy)</b>	<b>36</b>	<b>36</b>	<b>44</b>	<b>107</b>	<b>140</b>	<b>-0.8%</b>	<b>-18.7%</b>	<b>-23.6%</b>
Sudbury	36	36	44	107	140	-0.8%	-18.7%	-23.6%
<b>PALLADIUM (000' oz troy)</b>	<b>57</b>	<b>64</b>	<b>79</b>	<b>182</b>	<b>274</b>	<b>-11.1%</b>	<b>-28.2%</b>	<b>-33.6%</b>
Sudbury	57	64	79	182	274	-11.1%	-28.2%	-33.6%
<b>GOLD (000' oz troy)</b>	<b>131</b>	<b>110</b>	<b>118</b>	<b>346</b>	<b>345</b>	<b>19.1%</b>	<b>11.0%</b>	<b>0.3%</b>

### Cobalt

Cobalt production totaled 1,489 t in 3Q17, 5.4% higher than in 2Q17 and in line with 3Q16. Production increased mainly due to Sudbury, which registered record cobalt production in the months of August and September.

Cobalt production from Sudbury was 279 t in 3Q17, 155 t higher than the 124 t in 2Q17 and 81 t higher than the 198 t in 3Q16. Production from Voisey's Bay was 382 t in 3Q17, 54 t lower than the 436 t in 2Q17 and 155 t higher than the 227 t in 3Q16.

### Platinum and palladium

Platinum production was 36,000 oz, in line with 2Q17, and palladium production was 57,000 oz, 11.1% lower than in 2Q17.

### Gold as a by-product of nickel and copper concentrates

The contained volume of gold as a by-product in the nickel and copper concentrates reached 131,000 oz in 3Q17, 19.1% higher than in 2Q17 and 11.0% higher than in 3Q16.



## Coal

000' metric tons	3Q17	2Q17	3Q16	9M17	9M16	% change		
						3Q17/2Q17	3Q17/3Q16	9M17/9M16
<b>MOZAMBIQUE</b>	<b>3,213</b>	<b>3,037</b>	<b>1,756</b>	<b>8,684</b>	<b>3,907</b>	<b>5.8%</b>	<b>83.0%</b>	<b>122.3%</b>
Metallurgical coal	1,853	2,049	1,063	5,534	2,474	-9.6%	74.4%	123.7%
Thermal coal	1,360	988	693	3,150	1,433	37.7%	96.2%	119.8%
<b>AUSTRALIA</b>	-	-	<b>568</b>	-	<b>1,585</b>	-	-	-
Metallurgical coal	-	-	568	-	1,585	-	-	-
<b>TOTAL COAL</b>	<b>3,213</b>	<b>3,037</b>	<b>2,324</b>	<b>8,684</b>	<b>5,492</b>	<b>5.8%</b>	<b>38.3%</b>	<b>58.1%</b>
Metallurgical coal	1,853	2,049	1,631	5,534	4,059	-9.6%	13.6%	36.4%
Thermal coal	1,360	988	693	3,150	1,433	37.7%	96.2%	119.8%

### Production overview

Coal production reached 3.2 Mt in 3Q17, a record for a quarter, with production coming exclusively from the Moatize mine in Mozambique. Total coal production was 5.8% and 38.3% higher than in 2Q17 and 3Q16, respectively. The production record resulted from the better performance of the two Coal Handling and Preparation Plants (CHPP1 and CHPP2), which increased production by 5% and 6%, respectively, compared to 2Q17. More specifically, CHPP2 reached a new monthly production record of 566 kt in July, as a result of its continuing ramp-up.

Production of metallurgical coal from Mozambique was 1.9 Mt in 3Q17, 9.6% lower than 2Q17 and 74.4% higher than in 3Q16. Production of thermal coal was 1.4 Mt in 3Q17, 37.7% and 96.2% higher than in 2Q17 and 3Q16, respectively.

The decrease in metallurgical coal production in 3Q17 compared to 2Q17, was more than offset by the increase in thermal coal production, which contributed to lower the share of metallurgical coal to 58% of overall production. The determinant of this lower share was a combination of the geological characteristics of the feed plus the continued optimization of the CHPPs. We expect the share of metallurgical coal to return to between 60%-65% of overall production.

We are revising our coal production guidance to around 12 Mt in 2017, as a result of reduced stripping capacity and lower achieved equipment productivity.

In 3Q17, our logistics operations in Mozambique reached all-time records, with the continuous ramp-up of Nacala Corridor. Total railed volume<sup>6</sup> was 3.5 Mt in 3Q17, 15% higher than the 3.1 Mt railed in 2Q17 and total shipped volume<sup>6</sup> was 3.4 Mt in 3Q17, 9% higher than the 3.1 Mt shipped in 2Q17.

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<sup>6</sup> Includes Sena-Beira and Nacala logistics corridors.