

## NICKEL

*By the International Nickel Study Group*

**E**conomic growth worldwide accelerated from 3.0% in 2002 to 3.9% in 2003. However, growth was not evenly distributed over the different regions. Compared with 2002, economic growth increased in most of the Asian countries, in the US and in the countries of the Commonwealth of Independent States (CIS), and the Japanese economy started to grow again after a contraction in 2002. Economic performance in Europe, particularly in the Eurozone, was disappointing, as the growth rate fell below the already subdued level of 2002. Economic performance in South America was also restrained, and the Brazilian economy even contracted.

The importance of the emerging Asian countries (including China and India) for the recovery of the world economy is highlighted by the fact that, according to the IMF, these countries accounted for around 50% of the economic growth. The economies in these countries expanded by around 7% on average in 2003, mainly supported by China and India, which performed extremely well, with growth rates of respectively 9.1% (2002: 8.0%) and 7.4% (4.7%). At the end of 2003, Chinese authorities were considering measures to moderate investment spending in some sectors (including steel) to avoid overheating the economy and ease economic expansion in 2004.

Economic growth in the newly industrialised Asian countries (including South Korea and Taiwan) was subdued in 2003 (3%), as they were still recovering from the SARS epidemic. However, exports benefited from the strong growth within the region.

The economy of the US gained momentum in the course of 2003, resulting in an increase in GDP of around 3%. Domestic demand grew by 1%, fuelled by advances in capital investments of around 4%. The Japanese economy appeared to be finally on a recovery path, and grew by around 2.7%, compared with a contraction of 0.3% in 2002.

Economic growth in the Eurozone was disappointing. Although at the end of 2003 some signs of improvement were apparent in a few countries, the annual growth rate was only 0.4%, well below the already subdued increase of 0.9% in 2002. The German economy even contracted (-0.1%), and the economy of the other major countries grew marginally (France, 0.2% and Italy, 0.3%). Positive exceptions were Spain and the UK with an expansion of 2.4%.

The CIS showed a solid economic growth of 7.6% on average in 2003, compared with around 5% in 2002. For the past five years, the economies of

these countries expanded annually by 5% or more on average. The Russian economy grew by 7.3% in 2003 compared with 4.7% in 2002.

### **Mine production**

Nickel is mined from either sulphide or laterite ores, each providing almost equal shares for the current production of primary nickel. The main nickel sulphide deposits are located in Australia, Canada, Russia and South Africa, and are frequently associated with copper and platinum group metals (PGM) and often exploited as underground mines. By contrast, laterite deposits are operated as open-pit mines, located principally in Western Australia, New Caledonia, Indonesia, Colombia, Cuba, Venezuela, Brazil and the Dominican Republic, enabling cobalt recovery as a by-product if not further processed to ferronickel.

World nickel mine production was quite stable in 2003, with an increase of 0.4%. This global stability hides, however, very opposite trends on a regional basis. In North America for instance, the long strike at the leading producer in Canada resulted in a drop in mine production of 14%, and significant increases ranging from 10% to more than 20% took place in Venezuela, Dominican Republic and Colombia, although Cuba incurred a reduction of 5%. In Asia, the main developments occurred in Indonesia, with an increase of 18% in nickel output and, to a lesser extent, in China with 11% more than in 2002. On the other hand, a significant reduction of almost 14% in mine production was registered in Australia, which was less than compensated for by the 12% rise in New Caledonia. No noticeable changes occurred in 2003 in the Russian Federation (Table 1).

### **Refined nickel production**

The year once again encountered a small production increase of about 1.6%. The production is fairly well distributed around the world, using the geographical split below, and accounting the Russian Federation separately.

In Africa, production remained marginally above the 53,000 t level, with South Africa contributing about 75% and Zimbabwe, the remaining share.

The Americas experienced a decline of 3% in overall production and achieved over 280,000 t. In Brazil, we saw an improvement of around 4% to 25,000 t. In Canada, the long and drawn out Inco strike in the first half of the year resulted in a substantial production decline, from 145,000 t in 2002 to 124,000 t in 2003, a reduction of 14%. Colombia increased its production again, by 9% to 48,000 t, which was mainly the result of a ramp up of production from increased capacity in earlier years. Cuba is estimated to have increased production marginally to a level of over 40,000 t. The Dominican Republic continued to improve its output, to 27 000 t, or 15%. Venezuelan production also improved marginally, to 17,000 t.

Asian production increased by 4% to over 238,000 t. China reached a new high of close to 65,000 t, up by over 20%. Again, production problems in Indonesia reduced output of primary nickel marginally to 8,000 t. Japan

continued to be the second-largest producing country by increasing nickel output by close to 5%, to over 165,000 t.

European production was 183,000 t, a decline of 4%, with many of the individual countries experiencing a drop. Austria continued to produce about 1,500 t. Finland's production was reduced to 51,000 t, an 8% decline. France reduced production marginally to about 11,000 t. The Former Yugoslav Republic of Macedonia (FYROM) continued to improve slightly, to over 5,000 t. Greek production decreased marginally from 19,000 t to 18,000 t. In Norway, production increased substantially to 77,000 t, up over 12%. The UK was affected by the Inco strike and production was reduced by 28%, to 24,000 t.

Oceania's production declined marginally to 179,000 t. Australian production was 128,000 t, a drop of 3%. New Caledonia again managed to improve output, this time by 4% to 51,000 t.

CIS countries reversed the previous year's negative trend and increased production by 9% to 260,000 t, with Ukraine believed not to have produced at all (Table 2).

### **Primary nickel usage**

Production of stainless steel is the main driver of nickel demand, with about 67% of the annual volume of primary nickel usage. The momentum of world stainless-steel consumption is heavily dependent on the global economic situation. However, it has shown on average a long-term annual growth rate of almost 6% since the 1950s, to reach over 20 Mt in 2002. This positive trend has been further enhanced in 2003 with an increase of more than 11% year-on-year of the global stainless steel production, confirming that the current global market level is now above 22 Mt, driven to a large extent by Asian producing countries (Table 3).

After the general recovery in stainless-steel production recorded in 2002, a strong expansion has taken place in Asia, and particularly in China which had a spectacular increase of almost 90% year-on-year. South Korea and India posted increases of about 27% and 14%, respectively. With an increase of 7% in 2003, Japan has been consolidating its recovery and remains by far the largest stainless-steel producer in the world, with more than 4 Mt. Belgium and Finland completed the expansion programmes of their respective stainless-steel production facilities, and increased substantially their level of stainless-steel output. Otherwise, Europe and North America showed a stable profile over the year. By contrast, Brazil and South Africa managed to exceed a 13% growth in their stainless steel production in 2003.

The regional trends in world stainless-steel production are reflected in the primary nickel consumption patterns during the same period, as outlined in Table 4.

Primary nickel usage increased by 5% worldwide in 2003 and this trend was sustained particularly by Asian stainless-steel producing countries such as China (33.5%), South Korea (14.2%) and Taiwan (6.6%). The latter two countries reached the threshold of 100,000 t/y of primary nickel usage. Japan also consolidated the recovery on the usage side, remaining by far the largest nickel-using country in the world, with a slight increase of 2% over 2003. South Africa and Brazil are becoming significant nickel users, with 44,000 t and 25,000 t consumed respectively in 2003. Momentum is strong, particularly in South Africa (rising by over 27% in 2003). Also, it is interesting to note the continuing development of nickel consumption in Mexico (25%) and Turkey (11%) in 2003, although still modest in volume.

By contrast, North American consumption was quite stable and Europe even displayed a downturn (-0.9%). However, European countries exhibited very diverging trends with the UK and Germany having reduced their nickel consumption by 17% and 6.5%, respectively, and Finland's consumption expanding by 35%. Diverging trends in nickel use in France (-21%) and Belgium (+17%) in 2003 reflect the relocation process of the stainless-steel production facilities, as explained above. As usual, most of the regional gaps in nickel supply and demand were covered by nickel-bearing scrap, particularly in Europe and during the second half of 2003, when the market price started to climb (Table 3).

### **Projects and expansions**

The year started with continued problems in obtaining financing for new projects and little progress was made in new project announcements in the first half. The nickel price increased rapidly, particularly in the second half of the year to well over US\$10,000/t and made nickel a very attractive metal to be involved with. A host of junior mining and exploration companies started to announce new and pending projects at a faster and faster rate.

Owing to the change in the economics of nickel, companies were once again able to raise sufficient capital in different forms to carry out further development work. For a change there were countries other than Australia and Canada, where the projects were situated. Countries such as Guatemala, Kazakhstan, Madagascar, Papua New Guinea, Rwanda and Vietnam were again in the picture. A new country on the nickel map was Spain with a promising project, which should be up and running this year. Developments took also place in Turkey and to a far smaller extent in Albania.

Because of the long time period it takes to get a nickel mine into production, even the smaller re-opened mines could not make their marks in 2003 production figures. We can look forward to a host of projects starting to produce in 2004 and 2005, with the middle- and larger-sized projects even later. Of the main known projects around the world, Canada's Voisey's Bay made progress, but still requires substantial investments before being able to start production. Again, there were a lot of activities in Cuba, both in regard to mining as well as refining, but no material changes in actual capacity took place.

In Australia, the Ravensthorpe project was worked on, but no major decisions have been taken to go ahead during the year. Brazil has potential to become a medium to large producer in the future, with a few projects in the pipeline. In South Africa, and to a lesser extent in Zimbabwe, PGM mining expansions continued, but at a reduced rate compared with the previous year, which should have resulted in increasing nickel production. In Botswana, mining capacity and production was increased from existing mines and an exciting project using the Activox process could be in operation by the end of this year.

In New Caledonia, there are currently large expansions taking place in both mining and refining. The Doniambo smelter project progressed during the year. The Goro project has been under cost scrutiny for some time and will therefore be delayed. The Koniambo project started to take shape. Further, in Indonesia a decision to more than double FeNi production was finally taken. The Japanese have also stated plans to increase refined production, which will be supported by a new production facility in the Philippines, which should be ready to ship an intermediate mixed nickel cobalt sulphide to Japan later on this year.

Although there were no major greenfield refined nickel projects coming on stream during the year there were capacity expansions in China, including new and expanded mines. In Russia, the main producer is in the process of refurbishing its mines, smelters and refineries, which has already resulted in higher output compared with the previous year's production, although nameplate capacity might not have been increased.

### **Nickel stocks and prices**

The nickel price increased substantially during 2003. In the first half of 2003, the LME nickel price fluctuated around US\$8,500/t, and started to increase gradually in the second half to around US\$14,000/t on average in December, an increase of around 75% compared to the average price in January (Table 5).

As the value of the US dollar was falling (compared for instance, with the Japanese yen and the Euro), the increase in metal prices in general terms was mitigated somewhat in some areas. LME nickel stocks were very volatile during 2003. In February, they reached their lowest average monthly level of around 13,500 t, only to rebound to 26,500 t in May. During the summer, stocks fell slightly to 18,900 t in August, followed by an increase of 15,500 t to reach 34,200 t in September. In December, stocks fell to 24,100 t. Increases in the LME stocks coincided with the release of nickel to the market that was previously used as a collateral for a loan to a major Russian nickel producer.

**Table 1: Nickel mine production ('000 t)**

	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2003/ 2002 (%)</b>
<b>Africa</b>	<b>69.3</b>	<b>67.7</b>	<b>73.3</b>	<b>80.9</b>	<b>+ 10.4</b>
Botswana	24.4	23.9	26.7	31.0	+16.1
South Africa	36.6	36.4	38.8	42.1	+8.5
Zimbabwe	8.3	7.4	7.8	7.8	+ 0.0
<b>America</b>	<b>386.9</b>	<b>391.3</b>	<b>398.8</b>	<b>386.5</b>	<b>- 3.0</b>
Brazil	35.6	34.2	36.8	37.8	+ 2.7
Canada	190.7	194.1	189.3	162.8	- 14.0
Cuba	71.4	76.5	75.2	70.9	- 5.7
Colombia	58.9	53.0	58.5	70.8	+ 21.0
Dom. Rep.	27.8	22.3	23.5	27.2	+ 15.7
Venezuela	2.5	11.4	15.5	17.0	+ 9.7
<b>Asia</b>	<b>169.4</b>	<b>176.7</b>	<b>200.3</b>	<b>226.5</b>	<b>+ 13.0</b>
China	51.0	51.5	54.6	60.6	+11.0
Indonesia	98.2	102.1	121.6	143.9	+18.3
Philippines	20.2	23.1	24.1	22.0	- 8.7
<b>Europe</b>	<b>25.2</b>	<b>26.3</b>	<b>27.3</b>	<b>25.6</b>	<b>- 7.0</b>
Greece	19.5	20.8	22.7	21.4	- 5.7
<b>Oceania</b>	<b>284.0</b>	<b>322.7</b>	<b>307.9</b>	<b>291.3</b>	<b>- 5.4</b>
Australia	166.4	205.1	208.0	179.4	-13.8
New Caledonia	117.6	117.6	99.9	111.9	+ 12.0
<b>Russia</b>	<b>235.0</b>	<b>235.0</b>	<b>235.0</b>	<b>237.0</b>	<b>+ 0.9</b>
<b>Others</b>	<b>3.6</b>	<b>4.5</b>	<b>5.2</b>	<b>5.6</b>	<b>+ 7.7</b>
<b>Total</b>	<b>1,173.5</b>	<b>1,224.3</b>	<b>1,247.8</b>	<b>1,253.4</b>	<b>+ 0.4</b>

**Table 2: Refined nickel production ('000 t)**

	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2003/ 2002 (%)</b>
<b>AFRICA</b>	<b>52.9</b>	<b>56.1</b>	<b>53.5</b>	<b>-4.6</b>
South Africa	33.4	38.5	40.8	6.0
Zimbabwe	19.5	17.6	12.7	-27.8
<b>AMERICA</b>	<b>232.9</b>	<b>251.3</b>	<b>241.3</b>	<b>-4.0</b>
Brazil	22.5	23.7	24.6	3.8
Canada	140.6	144.5	124.4	-13.9
Colombia	38.4	44.0	47.9	8.9
Dom Rep	21.7	23.6	27.2	15.3
US	0.0	0.0	0.0	n.a.
Venezuela	9.7	15.5	17.2	11.0
<b>ASIA</b>	<b>164.0</b>	<b>166.8</b>	<b>173.6</b>	<b>4.1</b>
Indonesia	10.3	8.9	8.3	-6.7
Japan	153.7	157.9	165.3	4.7
<b>EUROPE</b>	<b>188.8</b>	<b>189.7</b>	<b>183.0</b>	<b>-3.5</b>
European Union	120.6	121.2	105.8	-12.7
Austria	1.5	1.5	1.5	0.0
Finland	54.6	55.3	51.0	-7.8
France	13.0	11.4	11.1	-2.6
Greece	17.7	19.2	18.0	-6.3
UK	33.8	33.8	24.2	-28.4
Norway	68.2	68.5	77.2	12.7
<b>OCEANIA</b>	<b>174.0</b>	<b>180.7</b>	<b>178.6</b>	<b>-1.2</b>
Australia	128.1	132.0	127.9	-3.1
New Caledonia	45.9	48.7	50.7	4.1
<b>EAST</b>	<b>347.4</b>	<b>337.2</b>	<b>370.4</b>	<b>9.8</b>
China, PR	49.5	53.5	64.7	20.9
Cuba	41.2	39.2	40.1	2.3
The Former Yugoslav Republic of Macedonia	3.0	5.2	5.6	7.7
Russian Federation	252.2	239.3	260.0	8.7
Serbia	0.0	0.0	0.0	0.0
Ukraine	1.5	0.0	0.0	0.0
<b>WORLD TOTAL</b>	<b>1,160.0</b>	<b>1,181.8</b>	<b>1,200.4</b>	<b>1.6</b>



**Table 3: Stainless-steel production ('000 t)**

	2000	2001	2002	2003 (e)	2003/2002 (%)
Europe	7,960	7,690	8,110	8,460	+ 4.3
Japan	3,840	3,850	3,830	4,110	+ 7.3
Asia others <sup>(1)</sup>	4,220	4,260	5,000	6,520	+ 30.6
US	2,180	1,820	2,180	2,210	+ 1.3
Others	1,230	1,050	1,190	1,280	+ 7.5
<b>Total</b>	<b>19,430</b>	<b>18,670</b>	<b>20,310</b>	<b>22,580</b>	<b>+ 11.2</b>

<sup>(1)</sup> China, South Korea, India, Taiwan. e - estimate

**Table 4****Primary nickel use ('000 t)**

	2000	2001	2002	2003 (e)	2003/2002 (%)
Europe	400	420	435	430	- 1.0
Japan	200	160	190	195	+ 2.0
Asia others <sup>(1)</sup>	250	265	295	350	+ 18.5
US	150	130	120	120	0.0
Others	120	125	140	145	+ 3.5
<b>Total</b>	<b>1,120</b>	<b>1,100</b>	<b>1,180</b>	<b>1,240</b>	<b>+ 5.0</b>

<sup>(1)</sup> China, India, South Korea, Taiwan. e - estimate

**Table 5: LME nickel cash price and stocks**