Nickel

Nickel's origination is not known to the world but it is said that the metal is being used since around 3500 BC. At that time, the bronze medal in the region of Syria had small percentage of nickel content also but the people then did not know about its existence. The archeological findings regarding nickel metal include writings in the Chinese manuscripts that suggest that a kind of 'white copper' was used in the Orient in around 1500BC. It was also exported to some areas of Middle East and Europe.

The history of nickel is filled with various misconceptions in the earlier stages such as the miners at Saxony took the nickel ore as copper ore but later on they found out that it produces a slag like material. They considered it as bewitched and named it as 'Kupfernickel' meaning Old Nick's copper. Also the ores of nickel were mistakenly taken as the ores of silver due to its resemblance. That is why it was difficult to gain knowledge about nickel and bring the metal to its pure stage. For a long period of time, it was mixed with silver to make an alloy and was used in making coins, swords etc.

Nickel was recognized as a new metal in as late as 18th century when a Swedish chemist Axel Fredrik Cronstedt isolated this metal in nickel silver. Due to its anti-corrosive characteristic, it gained popularity and many other sources of nickel were found out within a short time. Pure nickel coins were first used in 1881 in Switzerland. Canada became the largest source of nickel in the world after a new source in New Caledonia was found out and developed but during 1970s, Soviet Union took over the Canadian lead.

Nickel, when added in small quantity to iron, increases its properties manifold and makes the product hard and stainless. The reason behind the demand of primary nickel all over the world is for the production of stainless steel. When it is used in plating, it makes the surface tarnish-resistant and provides polished appearance.

Nickel is not produced from primary sources in the country. The entire demand is met through imports. However, it is being recovered as nickel sulphate crystals, a by-product obtained during copper production.

Industry

Nickel sulphate is produced as a by-product at the Ghatsila Copper Smelter of HCL in Jharkhand. The sulphide copper ore from Ghatsila area contains nickel in small quantity along with other important metals like gold and cobalt. The installed annual capacity of the plant to produce nickel sulphate is 390 tonnes. However, the production of nickel sulphate has not been reported since 2004-05. Ronuk Industries, Mumbai is also reported to produce nickel sulphate. Sterlite (Thoothukudi) had developed innovative method to produce pure commercial grade nickel sulphate from electrolyte by solvent crystallisation. The pilot-scale trials are in progress.

Nickel sulphate is an important compound used commercially in the country in nickel plating, in dip baths for enamelling, in preparation of nickel compounds and as a catalytic nickel.

Products of Nickel

Mined Products- The bulk of the nickel mined comes from two types of ore deposits. The first are laterites where the principal ore minerals are nickeliferous limonite and garnierite. The second are magmatic sulfide deposits where the principal ore mineral is pentlandite.

Intermediate Products- Intermediate products of nickel are matte, mixed sulphide concentrates (containing more than 35 per cent combined nickel and cobalt), and other intermediate products of nickel metallurgy, including salts and oxides for further refining.

Primary Nickel Products- Primary nickel products are nickel contained in products of smelters and refineries in a form which is ready for use by consumers. This includes:

Refined nickel (class I) - products with a nickel content of 99% or more. This includes nickel in form of Electrolytic nickel, Pellets, Briquettes, Granules, Rondelles and Powder/Flakes.

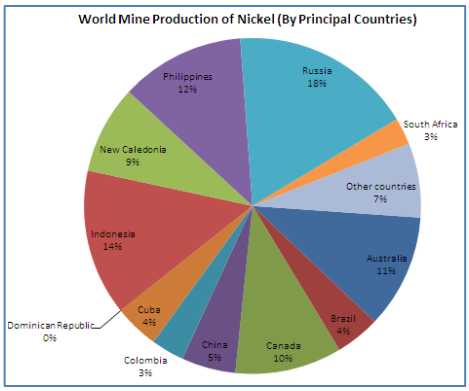
Charge nickel (class II) - products with a nickel content of less than 99%. This includes Ferro-nickel, Nickel oxide sinter, Utility and Nickel pig iron.

Chemicals- Nickel is also available in form of chemicals. This includes Chemical nickel oxide, Nickel sulphate, Nickel chloride, Nickel carbonate, Nickel acetate and Nickel hydroxide.

Secondary Nickel Products- Secondary nickel is basically the nickel bearing scrap which is the obsolete austenitic stainless steel scrap evolved from the demolition of obsolete factories, machinery, equipment and consumer goods. This is the largest source of scrap. Another source of nickel is the Internal Scrap which is generated during melting and rolling processes. Generally, the nickel content in the scrap is about 8%.

World Review

The world reserves of nickel are estimated at 74 million tonnes of metal content. Australia (24%), New Caledonia (16%), Brazil (11%), Russia (8%), Cuba (7%), Indonesia & South Africa (5% each) and Canada & China (4% each) together accounted for around 84% nickel reserves. The identified land-based reserves analyzing on an average of 1% nickel or more contain at least 130 million tonnes nickel. About 60% of nickel reserves are in laterites and 40% in sulphide deposits. In addition, extensive deep-sea resources of nickel are in manganese crusts and nodules, covering large areas of the ocean floor, particularly in the Pacific Ocean.



In 2012, world mine production of nickel increased marginally to 1.89 million tonnes as compared to 1.82 million tonnes in the previous year. Philippines, Russia, Indonesia, Australia & Canada, New Caledonia, China and Brazil & Cuba were the principal producers. Almost all nickel producing countries showed increase in production; significant among them are Philippines, Canada and Australia.

World Mine Production of Nickel (By Principal Countries)
(In '000 tonnes of metal content)

Country	2010	2011	2012
Australia	169	215	244
Brazil	66	74	87
Canada	158	220	204
China	80	90	93
Colombia	49	38	52
Cuba	66	66	68
Dominican Republic	–	13	15
Indonesia	217	226	253
New Caledonia	131	129	132
Philippines	184	319	318
Russia	270	270	269
South Africa	40	43	46
Other countries	110	120	114
World: Total	1540	1823	1895

Source: World Mineral Production, 2008-2012

Nickel production

Strong world economic growth until 2007 supported rising production of primary nickel metal. In 2007 world primary production stood at 1.416 million tonnes. However, the economic crisis led to lower worldwide nickel production in the period 2008 to 2009 and production of primary metal declined to 1.32 million tonnes in the latter year. Production rapidly recovered in 2010 to 1.446 million tonnes and increased further to 1.589 million tonnes in 2011. On an annual average the growth in production between 2001 and 2011 was 3.7%. A new product started to be produced in China in 2005 and that

was Nickel Pig Iron (NPI) in different forms and grades. Production increased slowly in the first few years but in 2010 production was estimated at over 160,000 tonnes and in 2011 production could be has high as around 250,000 tonnes. Basically all of this product is used domestically in China in the production of stainless steel and has replaced traditional products like nickel metal and stainless steel scrap. In addition to new NPI production in China, several other nickel projects around the world started during this 10 year period. Examples are Barro Alto and Onça Puma in Brazil with a combined capacity of over 100,000 tonnes per annum when in full production. In Madagascar the Ambatovy project is still under construction with a capacity of 60,000 tonnes, Myanmar will have its first nickel project in Tagaung Taung, which should start production in 2012. In New Caledonia, Vale's Goro project has been commissioned, but is still in slow ramp up mode.

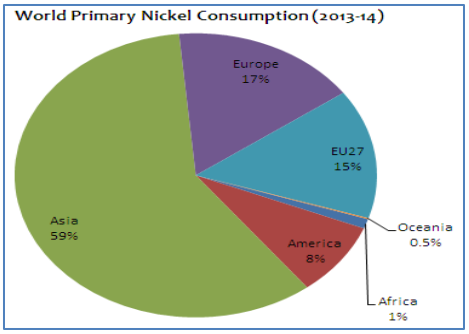
Consumption

World over stainless steel is the major end-use sector of nickel having over 66% consumption share. Other uses include, electroplating (8%), other steel alloys, including casting (24%) and other chemical applications, like nickel-cadmium battery (3%). Domestic consumption of ferro-nickel during 2010-11, 2011-12 and 2012-13 was 2,000 tonnes, 2,235 tonnes and 2,235 tonnes, respectively, all in alloy-steel industry.

World Primary Nickel Consumption ('000 tonnes)

Country	2008	2009	2010	2011	2012	2013
Africa	27	31.7	24	23.9	24.6	22.9
America	160.5	121.8	153.2	165	166.4	174.8
Asia	688.3	760.4	929.4	1050.6	1102	1233.6
Europe	407.5	317.7	355.9	364.5	359.9	347
EU27	365.1	279.9	317.4	325.5	322	307.7
Oceania	2.9	2.7	2.7	2.7	2.7	2.7
World Total	1286.1	1234.3	1465.2	1606.7	1655.6	1781

Source: International Nickel Study Group



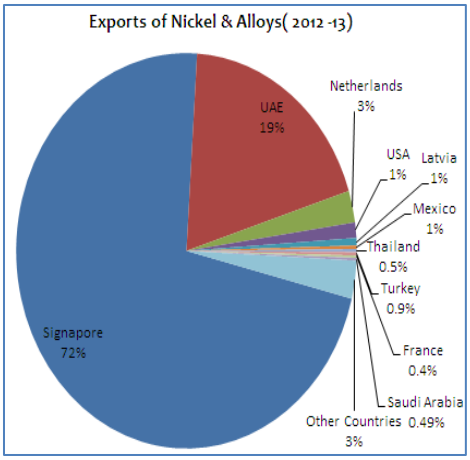
Foreign Trade

Exports

Exports of Nickel & Alloys('000 tonnes)

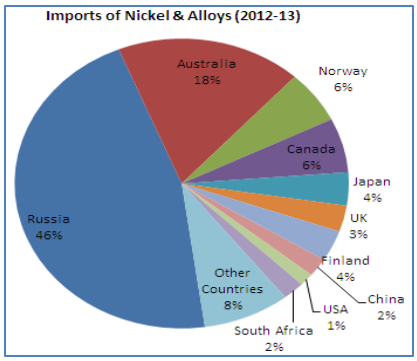
Country	2011-12	2012-13
Signapore	43	15386
UAE	3640	4077
Netherlands	62	553
USA	254	270
Latvia	147	129
Mexico	45	61
Thailand	71	53
Turkey	64	60
France	25	40
Saudi Arabia	34	49
Other Countries	833	660
All Countries	5218	21338

Exports of nickel and alloys including waste & scrap increased substantially to 21,615 tonnes in 2012-13 from 5,340 tonnes in the previous year. Out of the total alloys and scrap exported in 2012-13, nickel alloys were 21,338 tonnes, while nickel waste & scrap were 277 tonnes. Exports were mainly to Singapore, UAE, Netherlands, USA, Latvia & Japan.



Imports

Imports of Nickel & Alloys ('000 tonnes)		
Country	2011-12	2012-13
Russia	11292	24768
Australia	3901	9659
Norway	3603	3155
Canada	1716	3259
Japan	1539	1987
UK	1907	1569
Finland	1281	1847
China	1538	1105
USA	840	750
South Africa	1186	1130
Other Countries	4855	4526
All Countries	33658	53755

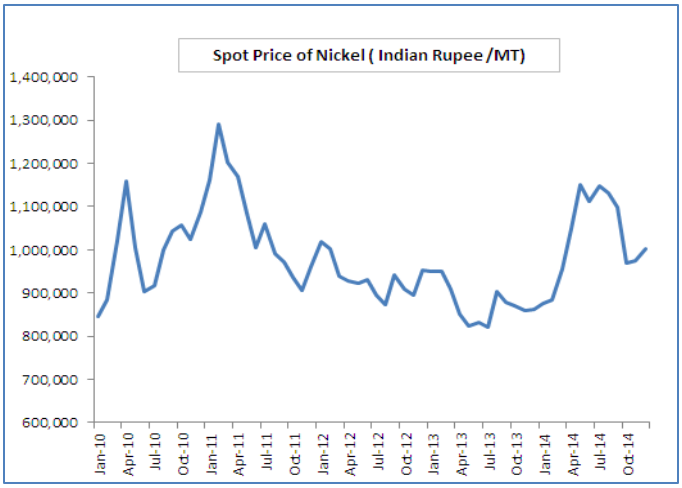


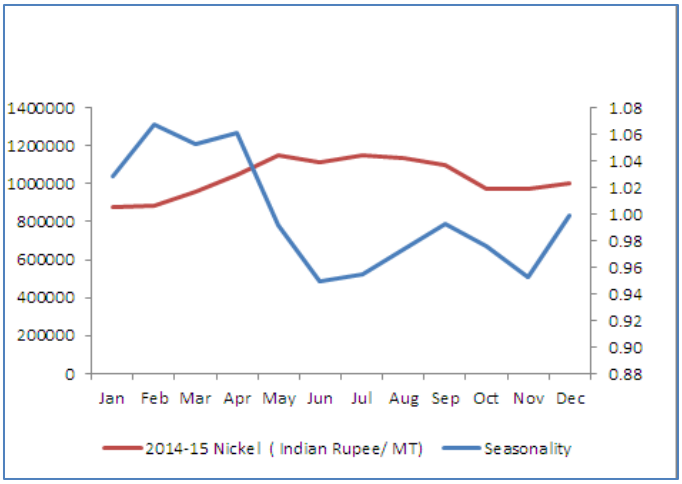
During 2012-13, imports of nickel ores & concentrates decreased manifold to only 865 tonnes in comparison to 41,729 tonnes in the previous year. Imports were mainly from Australia & China. Imports of nickel & alloys including scrap were 54,424 tonnes in 2012-13 compared to 34,787 tonnes in the previous year. Out of total alloys and scrap imported in 2012-13, nickel alloys were 53,755 tonnes, while nickel waste & scrap was 669 tonnes as compared to 1,129 tonnes in the previous year. Imports in 2012-13 were mainly from Russia, Australia, Canada and Norway.

The main factor influence Nickel prices rise run as upward trend continues

- Nickel containing materials play a major role in our everyday lives like food preparation equipment, mobile phones, medical equipment, transport, buildings, power generation etc. Most nickel-containing products have long useful lives. Average life is probably 25-35 years, with many applications lasting much longer Nickel use is growing at about 4% each year while use of nickel-containing stainless steel is growing at about 6%.
- India does not have any history related to the metal nickel. It does not have any resources nor does it indulges in the mine as well as plant production of the metal. But as one of the fastest developing nations of the world, Indian demand for stainless steel and consequently nickel has been rising at a high rate. A rising demand and no production makes the country a total importer of nickel. The country imports around 45 to 50000 tons of nickel annually. This demand is expected to rise in future with the increase in the demand of stainless steel.
- India's nickel consumption is constantly on the rise. According to the data from the World Bureau of Metal Statistics, nickel consumption in India rose 12.2 per cent in 2013 to 37,000 tonnes.
- India depends entirely on imports, any fluctuations in the rupee-dollar rate and global nickel prices could impact the domestic prices.
- Nickel is poised to rally a further 20 percent last year (2014) as Indonesia's ban on exports of ore push the market toward a global shortage and unrest increases in Ukraine.
- Increasing fears of fresh sanctions on Russia that could disrupt supply, has stoked prices.
- Indonesia, the largest exporter of nickel ore, imposed an export ban in January to promote domestic processing.
- The International Nickel Study Group expects global supply of primary nickel to remain unchanged at 1.94 million tonnes in 2014 and the Consumption, however, is projected to increase by 6.7 per cent to 1.89 million tonnes.

Price Trend Analysis





Over 60% of world nickel demand is for the production of stainless steel. Nickel accounts for 10 to 20% input cost in stainless steel production depending on the nickel content. The future outlook for nickel depends mainly on the production of stainless steel which is one of the main drivers for nickel produced. The production of stainless steel is estimated to be 5 million tonnes by 2016-17 as per the 12th Five Year Plan Report. India will have no option but to depend on imports for this metal till a technology to recover nickel from the overburden of chromite ore in Odisha is established on a commercial scale. Overall, the market outlook for nickel is quite bullish in the years to come.