OUTLOOK FOR NICKEL TO 2017
MAY 2008

Mitsubishi Corporation
Contents

Report Summary  2

Fundamental Analysis  4
  Nickel Consumption  4
  Nickel Production  7

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Report Summary

Executive Summary

Background
The nickel market is emerging from a bull market where it can be argued that ‘perfect storm’ conditions prevailed. These were:

1) A lack of investment in nickel production capacity earlier this decade due to low prices.

2) The failure of the first generation of the Pressure Acid Leach Projects to fulfil potential and the delay of Voisey’s Bay contributed to the production shortfall.

3) There was a massive increase in production costs associated with labour, power and other raw material shortages.

4) There was a huge surge in capital costs associated with the next generation of nickel projects.

5) Nickel costs also rose with emergence of the Chinese nickel pig iron sector.

6) Demand growth accelerated, reflecting the beginning of a sustained period of metals-intensive growth in the emerging economies, particularly China.

7) After the dot.com collapse most of the OECD economies began to enjoy a sustained period of economic expansion.

8) Nickel prices were supported by a prolonged downturn in the value of the dollar.

9) Nickel prices were boosted by the increasing acceptance of commodities as an asset class and the massive expansion of hedge funds.

These factors combined to send nickel to new highs in excess of $50,000/tonne. As we discuss in this report, although many aspects of the nickel fundamentals remain positive, we doubt whether these perfect storm conditions will be duplicated over the forecast period to 2017.

There are a number of factors that will influence nickel long-term pricing over the course of the cycle. First, long-term prices need to be defined. From the mining industry’s perspective, the long-term price is often the price that is used for project evaluation. The mining industry is slow to adjust these rates (partly due to the experience of the prolonged period of low prices prior to the current bull market) and partly as they are based on production costs.

For the purposes of this report, we believe that the long-term price is a realistic average price over the course of the cycle taking into account both peaks and troughs. A ten-year price average can also be considered as a reasonable good proxy for long-term prices. However, it should be noted that the exceptionally high base skews the average price over the 2007-2017 period.

A number of different methods can be used to arrive at an estimate of the long-term average price. For this report, we have used a mixture of:

<table>
<thead>
<tr>
<th>Nickel supply-demand balance 2007-2017 (000 tonnes)</th>
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</thead>
<tbody>
<tr>
<td><strong>2007</strong></td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Global refined output</td>
</tr>
<tr>
<td>Output from new capacity (1)</td>
</tr>
<tr>
<td>Total production</td>
</tr>
<tr>
<td>% change</td>
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<tr>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Global consumption</td>
</tr>
<tr>
<td>% change</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
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<tr>
<td>Market balance</td>
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<tr>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Inventories</td>
</tr>
<tr>
<td>Total reported inventories</td>
</tr>
<tr>
<td>Total as No. of weeks’ consumption</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>LME 3mth price average ($/t)</td>
</tr>
<tr>
<td>LME 3mth forecast (upper range)</td>
</tr>
<tr>
<td>LME 3mth forecast (lower range)</td>
</tr>
</tbody>
</table>

Source: World Bureau of Metal Statistics and Triland Metals
Note (1) refers to capacity that is not already considered committed
1) Market balance derived price projections – this method takes into consideration likely demand conditions and importantly, known changes to supply. It also utilises the historical inverse relationship between stocks and prices to determine the price outlook. However beyond a certain period (five years) this approach becomes less relevant as more and more assumptions concerning both the supply and demand have to be made. Also, the relationship between inventories and prices can alter over the course of the cycle.

2) The incentive price is linked to the production cost of the industry. The nickel production cost curve has shifted considerably in recent years (see production section).

Market balance and price outlook

2008-2009 – reasonable balance
Triland Metals believes that the market will be in modest surplus in 2008, which is reflected in inventory movements so far this year. Another year of strong demand growth should return the market to deficit in 2009. This will not necessarily lead to higher average prices as the dollar strengthens and the general commodities bull market cools.

2010-12 – absorbing the next generation of nickel projects
We believe that eventually the market will be affected by the projects currently under development. This period may also be a period of slower, but not negative demand growth. The massive increase in production costs should however limit the downside.

2013-2017 – the need for new projects
In this period new projects, which are still on the drawing board, will need to be commissioned. The relatively high prices in the latter part of this decade should ensure that any supply bottlenecks are temporary. There are plenty of nickel projects under consideration. However high prices may be required to secure their development. Hence we believe that average annual prices will have to average between $17,200-20,000/tonne over the 2008-2017 period.
Fundamental Analysis

Nickel Consumption

End-use trends
The end-use data confirms the industry’s reliance on the stainless steel sector to underpin demand growth. Stainless steel has gained markets in many applications due to the greater implementation of life cycle costing. Its superior resistance to general corrosion, as well as its good pitting, crevice and stress corrosion has helped underpin growth in aggressive environments in certain marine applications and in the oil, gas power and chemical industries, although its largest market is now consumer durables. We estimate that stainless now accounts for just over two-thirds of nickel consumption.

Alloy steels find their way into a wide range of industrial applications - the largest market is the automotive industry where they are primarily used in engine components. Low levels of alloy steel output and developments in steel-making technology have reduced unit consumption of nickel. Recently its share of the market has stabilised at around 5%, having been 10% at the beginning of the last decade.

Non-ferrous alloys cover a wide variety of nickel alloys that contain little or no iron and display either excellent heat or corrosion resistance, or a mixture of both. Nevertheless miniaturisation and competition from other materials has seen its share of nickel consumption dip below 10% compared to just over 15% in 1990.

Nickel’s use in castings (usually stainless steel) has also come under pressure from better casting techniques and competition from lighter weight materials. Its share of the market is now around 3%.

Electroplating has been a major growth market, especially in Asia, which has been driven by new applications in the IT and electronics sectors. Its share of nickel consumption now stands at 7%.

Economic trends
We believe that there will be a cyclical recovery in economic growth in 2009 and that the construction sector will begin to rebound, albeit from a low base. However, growth rates in the mature economies will remain lower than in previous cycles. The erosion of the manufacturing base in these regions will continue to restrict nickel consumption growth going forward.

A number of factors suggest that economic growth in the BRICS and the ASEAN nations should continue to outpace that in the mature economies and we expect that developments within these countries will be the driver behind global nickel demand growth.

1) We expect faster rates of underlying economic expansion within these countries, particularly in China, Russia and Vietnam than in the mature economies. Growth in India will be held back slightly by poor infrastructure.

2) Although we have assumed that these countries will not be able to totally decouple from economic events in the US and other OECD economies, they have sufficient internal momentum to maintain relatively high growth rates over the forecast period.

3) Data relating to per capita consumption and GDP per capita points to the potential for metals intensive growth to continue in these countries over the forecast period i.e. nickel demand growth will exceed that of an economic aggregate such as GDP.

The prospects for stainless steel
Triland Metals believes that the stainless steel sector will continue to drive nickel demand and this is where we have concentrated our analysis. The tables below highlight regional trends in stainless steel consumption and production over the period 1996-2006. Official numbers on demand are only available for this period although production numbers are available for 2007, which are discussed below.

Predictably, total growth rates for stainless consumption and production are roughly in line. The regional demand and supply numbers show different trends, which essentially highlight investment in new capacity and, in particular, shifting trading patterns.
On a global level, two key features stand out. First, the average annual rate of consumption growth over the ten-year period of 6.6% was much higher than for most industrial commodities. Second, the rate of growth in 2001-2006 at 8.8% per annum was twice that in the period 1996-2001 of 4.4%.

The BRICs have provided much of the growth with the average annual growth rate increasing by 17% per annum between 1996 and 2006. Consumption in Europe was relatively healthy, reflecting the region’s large export-oriented capital goods sector and a significant white goods industry. When the full year stainless data becomes available it will show the emerging economies further increasing their share as off-take slipped in Europe, Japan and the US, due to a combination of de-stocking and economic weakness.

What ultimately sets the background for nickel demand is the level of stainless steel production and here the trends essentially follow investment in new melting capacity. Here the dominance of the BRICs, and in particular China, is even greater. Stainless production in the BRICs has risen at an average annual rate of 20.3% over the last ten years (and 31% per annum over the last five years). This has come about despite flat or declining production in Russia. The country used to be a large producer of stainless prior to the collapse of communism, to supply the military industrial complex. Russian steel mills are now starting to invest in stainless facilities that should filter through to quite sharp output (and hence nickel consumption) growth towards the end of the forecast period. The vast majority of the new melting capacity in the pipeline will come on-stream in China in the next few years. In the next decade we expect a surge in capacity in Russia.

Substitution effects (the austenitic ratio)
The other major determinant of nickel demand is the austenitic ratio i.e. the split between nickel and non-nickel (ferritic grades). The austenitic ratio has been falling in recent years, which means that the average annual growth of nickel consumption tends to be below the average rate for stainless steel production. Up until about 2003, the austenitic ratio had been reasonably stable at around 75%.

However, this ratio came under attack from a number of sources. There was a high profile shift in China towards the 200 series which have a 1-5% nickel content while many producers, particularly in Japan and Western Europe, have raised their production of ferritic grades that contain no nickel. The bottom line is that the austenitic ratio has fallen by over 10 points and is now around 62-64%. The recent surge in ferro-chrome has stabilised or slightly reversed this decline. However it is difficult to imagine circumstances where the austenitic ratio returns to its earlier levels.

Substitution limits nickel demand growth
Reflecting the trends highlighted above, nickel has a relatively high consumption growth rate compared to most of the other base metals, yet it lags well behind the rate of stainless production growth. As can be seen from the table, average nickel demand and stainless growth were roughly similar between 1996 and 2001 at around 4%, a time when the austenitic ratio was stable, while in the next five-year period, the rate of nickel demand was half that of stainless as the austenitic ratio collapsed. Data for 2007 shows more extreme changes as high prices early in the year accelerated the decline in the production of nickel-containing grades.

The nickel industry has been even more reliant on China to drive consumption growth in recent years than the other base metals. Firstly, the country has seen a massive surge in stainless production, and secondly, consumption in the other BRICs has been limited, or in some cases negative. This reflects that stainless steel production in Brazil has flattened out after strong growth up to around 2003 and that Russian stainless output
Fundamental Analysis

Nickel

Average annual consumption growth

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>6.2%</td>
<td>-0.2%</td>
<td>2.9%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Japan</td>
<td>-2.9%</td>
<td>2.3%</td>
<td>-0.3%</td>
<td>-0.6%</td>
</tr>
<tr>
<td>USA</td>
<td>1.6%</td>
<td>2.3%</td>
<td>1.9%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Brazil</td>
<td>6.5%</td>
<td>3.3%</td>
<td>4.9%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Russia</td>
<td>-2.7%</td>
<td>-1.2%</td>
<td>-1.9%</td>
<td>2.0%</td>
</tr>
<tr>
<td>India</td>
<td>6.1%</td>
<td>-6.3%</td>
<td>-0.3%</td>
<td>2.8%</td>
</tr>
<tr>
<td>China</td>
<td>12.4%</td>
<td>23.7%</td>
<td>17.9%</td>
<td>19.5%</td>
</tr>
<tr>
<td>Total BRICs</td>
<td>6.9%</td>
<td>14.5%</td>
<td>10.7%</td>
<td>12.8%</td>
</tr>
<tr>
<td>Total World</td>
<td>4.4%</td>
<td>4.2%</td>
<td>4.3%</td>
<td>4.1%</td>
</tr>
</tbody>
</table>

Source: World Bureau of Metal Statistics and Triland Metals

has been declining. Although Indian stainless output has been rising it is primarily focused on low nickel containing grades.

Consumption outlook 2008-2017

In deriving our consumption projections we take into consideration the following factors.

1) Historical regional consumption patterns
2) Historical end use patterns
3) Long-term growth potential indicators such as per capita consumption.
4) Substitution pressures
5) Miniaturisation i.e. where less metal is used in an exiting operation
6) Economic environment

We have touched upon most of these issues above. Triland Metals forecasts that global nickel consumption will increase over the 2007-2017 period at an average annual rate of 5.3% per annum. This is slightly faster than over the previous ten-year period as strong growth is expected to continue from the emerging economies (particularly the BRICs), and inevitably the base for this growth gets larger every year. Rapid expansion will also begin to “kick in” from Russia and India which, as noted above, have made little contribution in recent years.

The rate of demand growth in the first five years of the forecast period at 5.6% per annum will be faster than the next five years (2012-17) on the assumption that the metals-intensive period of growth will begin to ease slightly. Generally the decline in the mature economies should continue. However, given the highly developed market for stainless in Western Europe and the potential for growth in Eastern Europe, we have mildly positive growth over the forecast period. By 2017, global nickel consumption should be 2.475m tonnes compared to around 1.5m tonnes in 2007.

It should be remembered that nickel is inherently one of the most volatile base metals in terms of demand. Our projections about global demand for individual years are given in our supply-demand balance analysis.

<table>
<thead>
<tr>
<th></th>
<th>2007-2012 ('000 tonnes)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2007</td>
<td>2012</td>
<td>2017</td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>447</td>
<td>470</td>
<td>500</td>
<td>1.0%</td>
</tr>
<tr>
<td>Japan</td>
<td>175</td>
<td>170</td>
<td>165</td>
<td>-0.6%</td>
</tr>
<tr>
<td>USA</td>
<td>130</td>
<td>125</td>
<td>120</td>
<td>-0.8%</td>
</tr>
<tr>
<td>Brazil</td>
<td>27</td>
<td>45</td>
<td>65</td>
<td>10.8%</td>
</tr>
<tr>
<td>Russia</td>
<td>40</td>
<td>55</td>
<td>100</td>
<td>6.6%</td>
</tr>
<tr>
<td>India</td>
<td>25</td>
<td>40</td>
<td>100</td>
<td>9.9%</td>
</tr>
<tr>
<td>China</td>
<td>330</td>
<td>550</td>
<td>750</td>
<td>10.8%</td>
</tr>
<tr>
<td>Total BRICs</td>
<td>422</td>
<td>680</td>
<td>1015</td>
<td>10.0%</td>
</tr>
<tr>
<td>Total World</td>
<td>1481</td>
<td>1945</td>
<td>2475</td>
<td>5.6%</td>
</tr>
</tbody>
</table>

Source: World Bureau of Metal Statistics and Triland Metals
Fundamental Analysis

Nickel Production

Background
There have been three main features on the nickel supply side in recent years. First was the delay with the next generation of Mega-projects, which was a massive contributory factor to the bull market. Second was the emergence of small-scale non-integrated nickel mining projects, many of which were based in Australia. Most recently, there was the surge in nickel pig iron production in China based on large-scale mining operations of low-grade nickel in South East Asia. Initially this extra production merely filled the gap between nickel consumption and output from ‘conventional’ nickel producers. More recently it has contributed to the oversupply in the nickel market.

An analysis of the supply side of the market shows that it is a ‘moving feast’ in terms of the timing and size of projects. The classic example of this is the 10-year plus development period of Voisey’s Bay, although the progress of some of the laterite projects is proving to be equally tortuous. For the purposes of this report, we will provide capacity projections by region with reference to some projects, but we will also assess some of the wider trends that will affect production. Obviously the further into a ten-year forecast, the greater the uncertainty becomes in relation to the next generation projects that are required to meet realistic demand projections.

The growth of the ‘independent’ mining sector
The nickel industry has always been characterised by a high level of vertical integration. In this decade, we have seen the emergence of the small-scale mining sector. However, it should be noted that the ‘major’ nickel producers have been quick to take equity stakes in these companies, fully take them over, or at least have long-term off-take agreements with them. There is still sufficient spare smelting capacity in place, particularly in China, but also in Europe and, to a lesser extent, in other regions to continue to encourage this trend.

The laterites should fill the next gap
Clearly the history of the laterite projects in Western Australia raises questions about the next generation of projects that will operate at much higher volumes. However, it should be noted that most of the large projects due on-stream have been developed by the ‘major’ mining companies and the commissioning process has been comprehensive. The first contributor will be BHP Billiton’s Ravensthorpe project.

There is greater potential for delay at the Vale Inco Goro project as there have been more disputes recently which could put back the currently planned end 2008 start-up. However, a more likely factor to restrict the flow of additional nickel to the market is a slower than expected ramp-up to full capacity. Even assuming there are some delays, there is a large amount of new capacity due on-stream in the 2009 to 2011 period that is likely to push the market into over-supply.

In addition to the large (typically 50,000+ tpy) laterite projects, there are also a myriad of small to medium-sized projects due on-stream in the next few years. These include Rio Tinto’s Eagle mine (16,000 tpy), Nunavik (12,000 tpy) a joint venture between Norilsk and Canadian Royalties. In the chart below, we provide an estimate of likely additions to capacity. The principle operation due on-stream over the forecast period in Europe is the 34,000 tpy Sotkamo project in Finland.

Will Chinese nickel pig iron continue to grow?
The emergence of nickel pig iron production in China has been dramatic and it is now a major source of supply within China with output likely to be around 100,000 tonnes in 2008. Some questions have been raised about the sustainability of high levels of production from this source due to high production costs. However, for the purposes of this report, we have factored in the potential for higher production, particularly as some producers begin to treat higher grade ores.

It has been suggested that production costs at some producers utilising this route are in the region of $25,000/tonne and therefore the Chinese nickel pig iron producers represent the swing capacity. If true, this means that the cost curve for the nickel industry has steepened massively. We believe that in practice, production from this sector may not be quite as ‘price-elastic’ as has been suggested. As noted above, producers are beginning to treat high grade ores. Also importantly, the cost of importing ore is usually linked to the LME price. Therefore, as prices fall, costs also fall.

Mine capacity additions (2007 - 2011)
Fundamental Analysis

In addition to the development of the high-cost nickel pig iron output, production costs have been rising at other operations. For nickel, apart from the general escalation in production costs associated with rising labour, power and other raw material costs etc, there has been the massive increase to capital costs associated with the development of the pressure acid leach projects. Higher production costs are a key factor supporting our average price over the next ten years of $18,600/tonne (this represents the mid point of our price range for the three month price for the period 2008-2017).

Higher production costs for nickel should provide much higher floor prices than in previous cycles. However, higher production costs will not necessarily guarantee higher peak prices than the extraordinary levels seen in recent years.

In terms of our production forecasts used in the supply-demand balance analysis, we have taken into account:

1) The likely timing of committed projects
2) The development of highly probable projects
3) The need for a contribution from other projects to meet our demand projections
4) A general uptrend in Chinese nickel pig iron output

In our supply-demand balance analysis, we have also highlighted when new capacity is required from possible projects. This begins to be required from 2012. For the purposes of the supply-demand balance, we have tried to build in some realistic cyclical into both the supply and demand projections. Therefore, we have assumed that at times in the cycle, ‘new projects’ will contribute to over supply in the nickel market.
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