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Abdullah Hashim

abdullah.hashim@clsa.com
+62 21 2554 8827

Jonathan Mardjuki

+62 21 2554 8815

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Indonesia
Materials

Of EV policy and nickel

Policies are key, but recent rally is about China demand

The Indonesian government is developing a policy to encourage electric vehicle (EV) development in the country, according to local news reports. Even without this policy, the country already stands to benefit, as nickel is the key ingredient for batteries used in EVs. While the right policy is important, a stable one is equally crucial, as recent reversal of ore export ban gives pause to the nickel price rally. Nickel price has been strong thanks to strong China steel demand. While the nickel price rally is positive, INCO shares have rallied further.

Upside on nickel as EV trend would boost demand

Regardless of any possible policy, Indonesia stands to benefit from the global EV trend. Nickel is one of the key raw materials for two types batteries used by Tesla (NCA), and BMW, Nissan and GM (NCM). On the back of strong EV adoption worldwide, we forecast that global Li-ion delivery would grow 12x from 2016 to 2030. Currently, battery production only accounts for less than 6% of nickel used. This could increase to more than 30% by 25CL.

Expect more supply as govt gives more export permits

While policy details are unclear, the nickel sector is still operating in reaction to policy shifts. High export and stockpiling in 2009-13 was a reaction to the mineral ore ban. Investors built smelters post ban enforcement in 2014, only to find the govt conditionally loosen the ban in 2017. Expect more ore export in 2H17 as miners who received permits start to export.

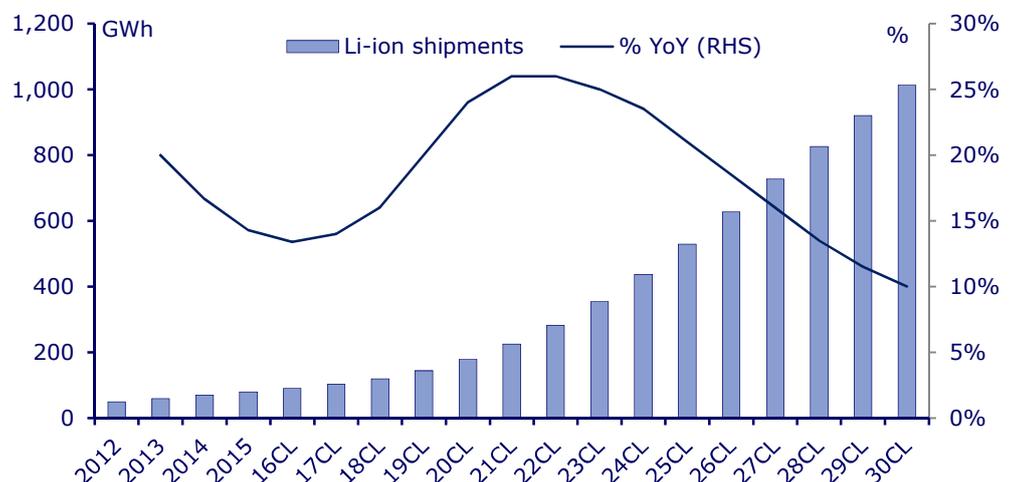
Recent rally is due to stronger steel demand in China

Despite the additional supply, strong demand for steel in China is driving the price of not only nickel, but also iron ore and coking coal. Even though we also expected nickel prices were going to improve, the reversal in nickel price trend happened much quicker.

INCO already rallied more than 30%

While nickel prices have rallied, INCO share prices have rallied further. INCO is the presumed market-favoured vehicle for nickel exposure given its transparent pricing and visible production. ANTM has a mix of different products which makes it more difficult to follow.

Global Li-ion shipment forecast – 12x from 2016 to 30CL



Source: CLSA

Developing policy to encourage EV adoption in Indonesia

Demand for Li-ion could boost nickel consumption

Nickel is a crucial to increase energy density

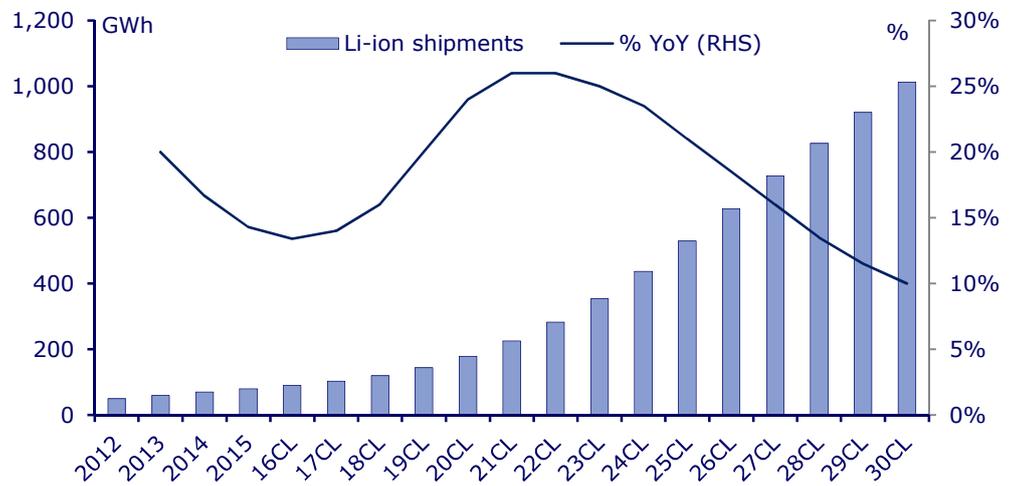
EV uplift goes beyond domestic policy

Local news reported that the President is asking for his Cabinet to develop industrial policies to encourage the development of electric vehicles (EV) in Indonesia. While Indonesia does have a population advantage that could help companies build scale, there is more to building a successful company than just having a market.

However, despite not having an EV industry yet, Indonesia is likely to benefit from the shift. Indonesia is one of the world’s biggest exporters of nickel. Nickel is a key ingredient for Li-ion batteries. From 2016 to 2030, we forecast that the global shipment for Li-ion batteries would grow 12x.

Figure 1

Global Li-ion shipment forecast – 12x from 2016 to 30CL



Source: CLSA

In recent years, CLSA have written a lot of research on Li-ion batteries. In the 132-page report **Battery Rush 2**, analyst Ken Shin highlighted that nickel is a crucial ingredient to Li-Ion batteries because it helps increase the energy density of the batteries. High energy density is the holy grail of battery as it allows EVs to go further.

Figure 2

Specific and Volumetric Energy Comparison amongst Li-ion batteries – Nickel-related batteries are superior

	Lithium Nickel-Cobalt-Aluminum (NCA)	Lithium Nickel Cobalt Manganese (NCM)	Lithium Iron Phosphate (LFP)	Lithium Cobaltite (LCO)
Specific Energy (Wh/kg)	685	629	544	570
Volumetric Energy (Wh/L)	3,322	2,988	1,958	2,907

Source: CLSA

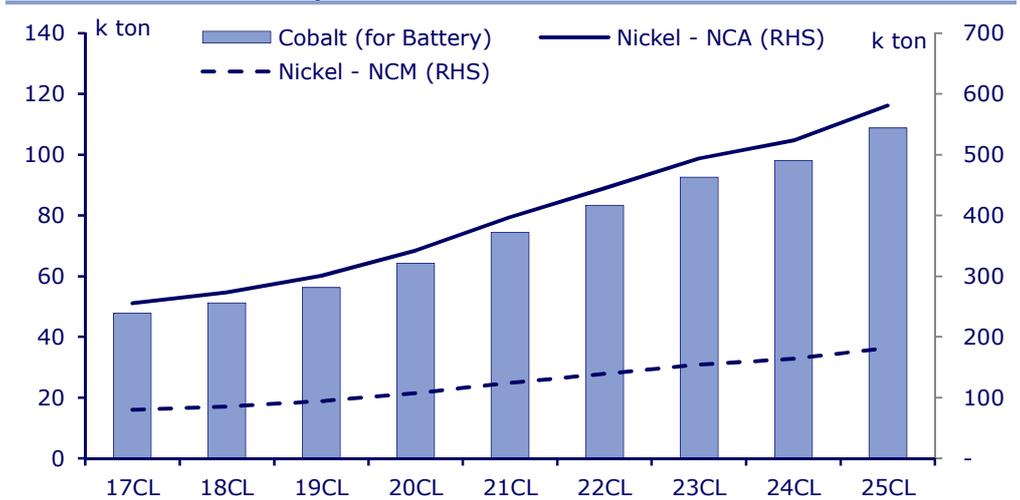
- **NCA:** Nickel accounts for 80% of metal layer, followed by cobalt at 15%, and aluminium at 5% by weight. Tesla used the NCA cathode materials. It offers 2x higher volumetric energy density than NCM. It also has 1.5x higher gravimetric energy density.
- **NCM:** The typical composition of NCM cathode is 50% nickel, 30% cobalt and 20% manganese. While it has lower energy density than NCA, it is safer. It is used by BMW, Nissan Leaf, and GM Bolt among others.

- **LFP:** Preferred by Chinese automakers. It is the cheapest and safest. But its energy density is inferior.
- **LCO:** Widely used in consumer electronics. But given that cobalt represents c.60% of cathode mass, and c.60% of cobalt is sourced from a single country, there is a risk to mass adoption. Not to mention the price of cobalt have rallied 163% from the lowest point in 2016 to c.US\$57,000/ton. More research on the dark side of cobalt in our 108 page **Heart of Darkness** by Charles Yonts, Head of Sustainable Research.

Based on the Li-ion shipment forecast above plus cobalt consumption forecast, and the typical nickel content for both NCM and NCA Li-ion batteries, we estimated the nickel demand from these batteries could range from 80-250k tonne in 17CL and 180-580k tonne in 25CL. If more NCA is used, the tonnage would be on the higher end of the estimate. Vice versa, if more NCM is used, the tonnage would be on the lower end of the estimate.

Figure 3

Calculated nickel consumption based on cobalt forecast



Source: CLSA

While that amount may not seem very much when compared to Indonesia's other mining export, coal shipment, it is all relative. Global consumption of coal is approximately 3-4 billion tonnes per year. The global consumption of nickel is approximately only 1.8 million tonnes per year in 2016.

Currently, demand for Li-ion batteries is categorised under 'Other use' at 6%. This also includes other non-Li-ion of batteries such as nickel-cadmium and nickel-metal hydride. The addition tonnage is sizeable.

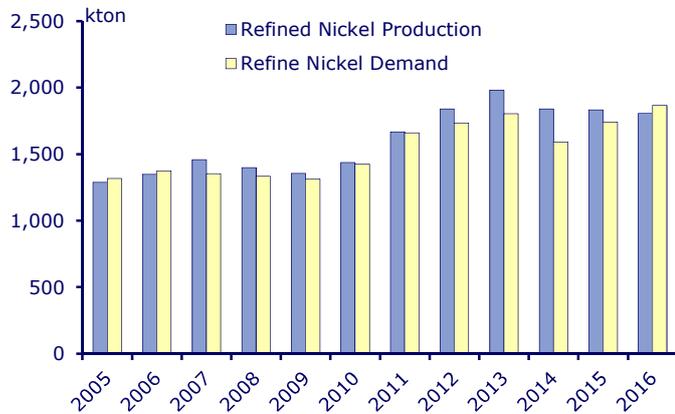
More NCA = upper end of range; More NCM = lower end of range

Relative to global nickel volume, the increase is sizeable

Upper-end range could increase battery to c.30% of nickel consumption

Figure 4

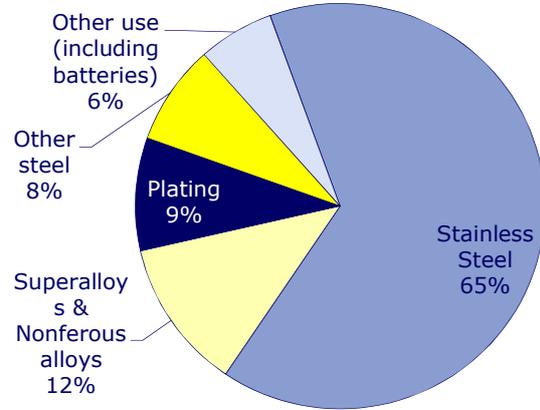
Global nickel production and demand



Source: Bloomberg, CLSA

Figure 5

Breakdown of nickel consumption

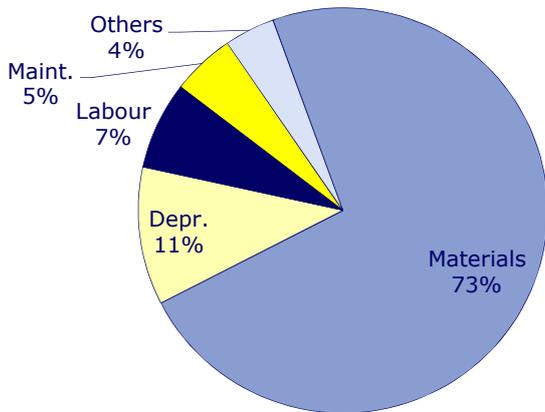


Source: USGS, CLSA

While Indonesia has a role to play in providing nickel supply to the world, we think building an industry around this advantage would be challenging. Indonesia's advantage is only from a nickel supply perspective. But the cost of cathode is only 33% of total cost.

Figure 6

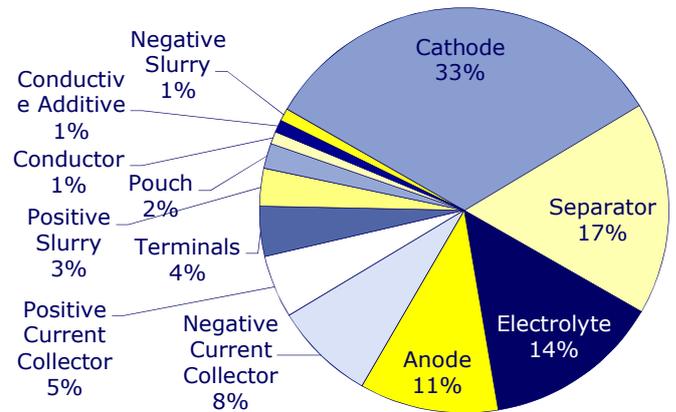
Average modelled cell-cost breakdown (NCM)



Source: CLSA

Figure 7

Average modelled material-cost breakdown (NCM)



Source: CLSA

In addition to the above reports, we have also written numerous notes on battery and cleantech. This includes notes on autonomous car clean technology, **Autocalypse**; battery for the grid, **Battery Ram**; Lithium Ion battery basic technical, **Top of its class**; and Lithium battery materials, **Battery Materials**

Partial reversal of ban still playing out

When the ban was first enforced in 2014, there were concerns that it may not bring the investment for downstream processing. Plus, the 5-year gap between introduction of the law in 2009 and enforcement led to massive stockpiling.

As a result, the impact from the ban was delayed. Even though Indonesia stopped exporting, the supply of nickel remained sufficient. Nickel price did not rally until much later. Stronger nickel price was necessary for the smelters

to be built in Indonesia to offset higher operation cost since the scale is smaller than China.

Once nickel price rallied, it was clear that the ban could work. Chinese companies came and built smelters. With the ban in place and separate unrelated mine closures in the Philippines, nickel prices were strong.

Figure 8

Smelter construction in Indonesia

Company	Operating Capacity	Additional Capacity	Time to commission	Total Production 2017
Tsingshan Holding Group	162.0	-	-	120.0
Xinxing Ductile Iron Pipes	18.0	6.0	4Q2017	13.2
Jiangsu DeLong Nickel Industry	14.0	28.8	3Q2017	12.0
Zhenshi Holding	8.6	-	-	5.8
Indoferro	5.8	1.0	-	8.2
Macrolink Group	4.3	4.3	4Q2017	0.6
Jiangsu Dafeng Harbor Holding	-	15.0	4Q2017	-
Ningbo Brili-Metal	-	2.2	Only when nickel < US\$10k/ton	Uncertain
Bintang Smelter Indonesia	-	4.3	Only when nickel < US\$10k/ton	Uncertain
Huadi Group	-	4.6	Pending nickel price	Uncertain
Evercontaining Electronics	2.2	-	-	Uncertain
Total	214.9	66.2		159.8

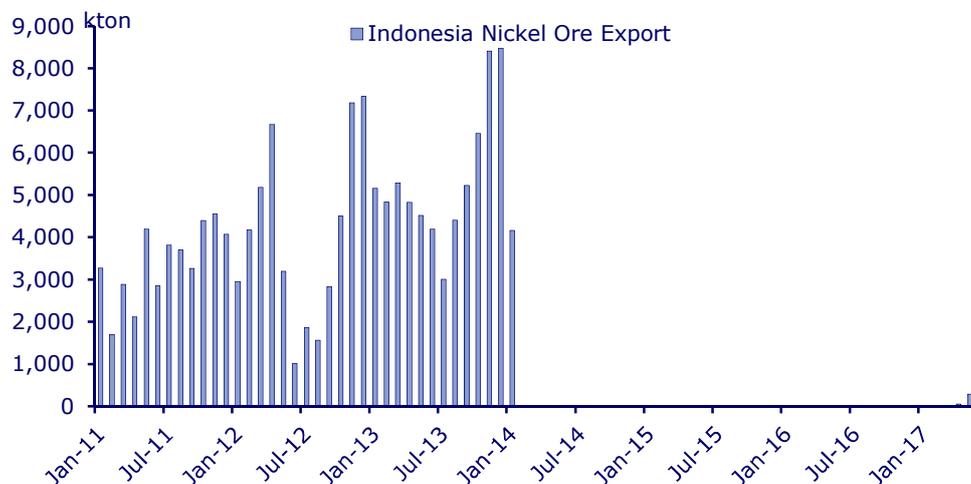
Source: CLSA, SMM

But earlier in 2017, a somewhat bizarre decision happened. The Indonesian government decided to conditionally reopen export. Even though the conditions were lengthy and temporary, plus export permits were limited to low rank nickel, the sense was more supply of ore will enter the market.

In April 2017, 55kt of nickel ore was exported. In May, another c.280kt was exported. So far, the scale of export has been small.

Figure 9

Indonesia Nickel ore export



Source: Government of Indonesia, CLSA

But this would likely grow in the coming months. In July 2017, the government issued two more export permits with a total quota of 4.4m

Ore export returned but the scale so far is very small

tonnes. In total 8.1m tonnes of quota was issued with 7.7mt more still pending.

At this level and using the maximum nickel content of 1.7%, the existing permits could lead to 136k tonnes of nickel content. Assuming all applicants receive permits, it could lead to export 268k tonnes of nickel content.

Figure 10

Smelters that applied and approved for export permit

Company	Smelter Company	Export Quota	State	Month of Issuance
Antam	Antam	2.7	Approved	Mar-17
Fajar Bhakti Lintas Nusantara	Eastern Special Steel	1.0	Approved	Apr-17
Ceria Nugraha Indotama	Hengshun Zhongshe	2.3	Approved	Jul-17
Harita via Trimegah Bangun Persada, Gane Permai	Xinxing Ductile Iron Pipes	2.1	Approved	Jul-17
Antam	Antam	3.7	Applied	
Ifishdeco	Bintang Smelter	1.0	Applied	
Central Omega	Central Omega	3.0	Applied	

Source: CLSA, SMM

That much export could negatively impact nickel prices. However, ramping up the nickel mine just for ore export takes time. Plus, these mines need to be inspected every six months. Not to mention the smelters need to meet certain operational requirements for that inspection.

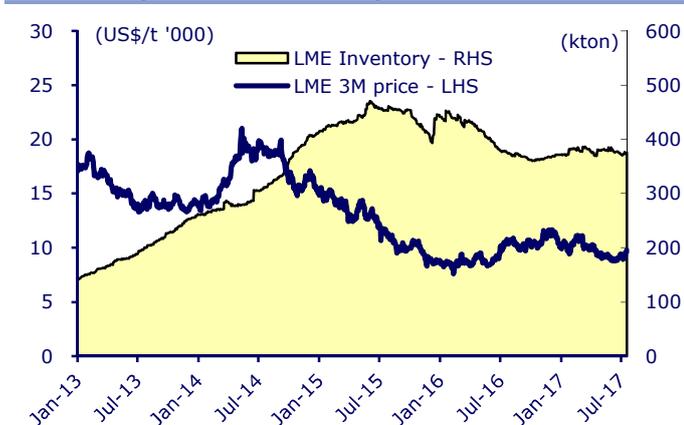
In short, even though there could be additional ore supply in the market, in reality, execution is not going to be easy. Difficulty in ramping up could lead to excess supply in the market.

Strong nickel prices is a function of stronger steel demand

Despite expectation that more nickel may enter the market later in the year, nickel prices rallied by more than 15% in the past month as LME inventory declined.

Figure 11

LME nickel prices and inventory



Source: CLSA, WIND, Bloomberg

Figure 12

China major port Nickel ore inventory

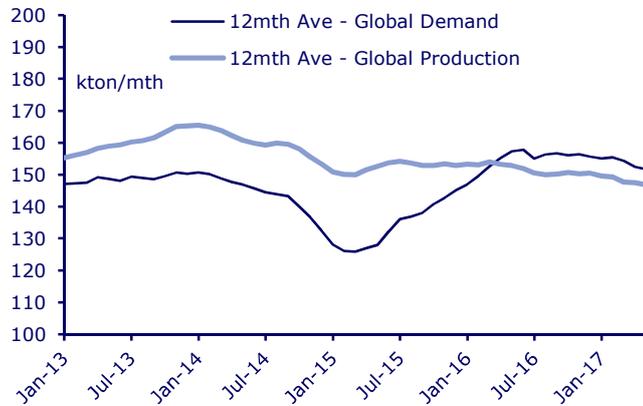


Source: CLSA, WIND, Bloomberg

In reality, nickel production has been fairly flat since 2015 even though nickel consumption grew fairly robust. Rallies in the past two years did not lead to significant production increase globally. Therefore, this led to widening deficit.

Figure 13

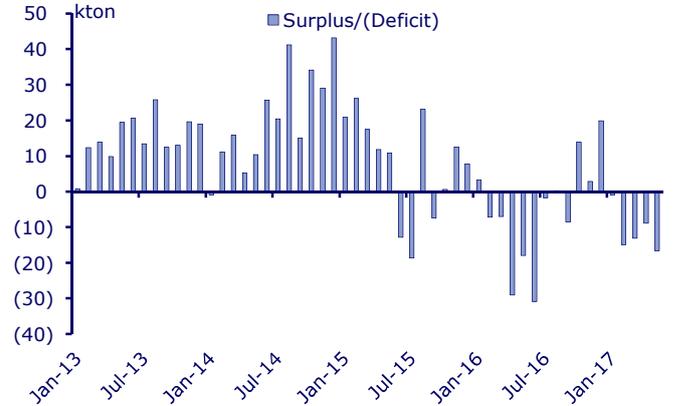
Rolling 12month average – Production and Demand



Source: CLSA, Bloomberg

Figure 14

Supply demand surplus/ (deficit)



Source: CLSA, Bloomberg

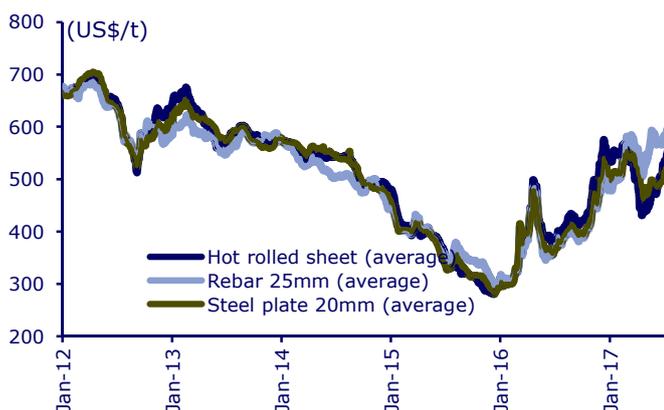
The big driver for the higher consumption is steel. Our Head of Materials, Andrew Driscoll wrote in his report, **Iron Ore’s Summer Strength** that highlight strong steel demand in China is pushing up iron ore’s prices.

China’s steel demand surprised positively in June, and indicators remain constructive. Steel spreads are extremely high, and while they are volatile, low stocks and high mill utilisation provide some comfort and visibility on spreads and steel production in the near term. The 1H17 run-rate on China’s imports implies 60mt YoY growth, which compares to our forecast of flat growth.

The strong steel prices allow steel mills to bid nickel price higher. Similarly, iron ore and coking coal prices have also rallied on the back of strong steel prices.

Figure 15

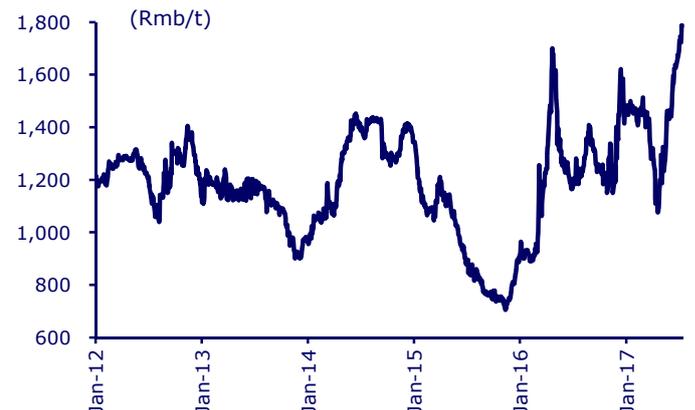
China steel prices by type



Source: CLSA, Bloomberg

Figure 16

HRC spread over raw material spot prices

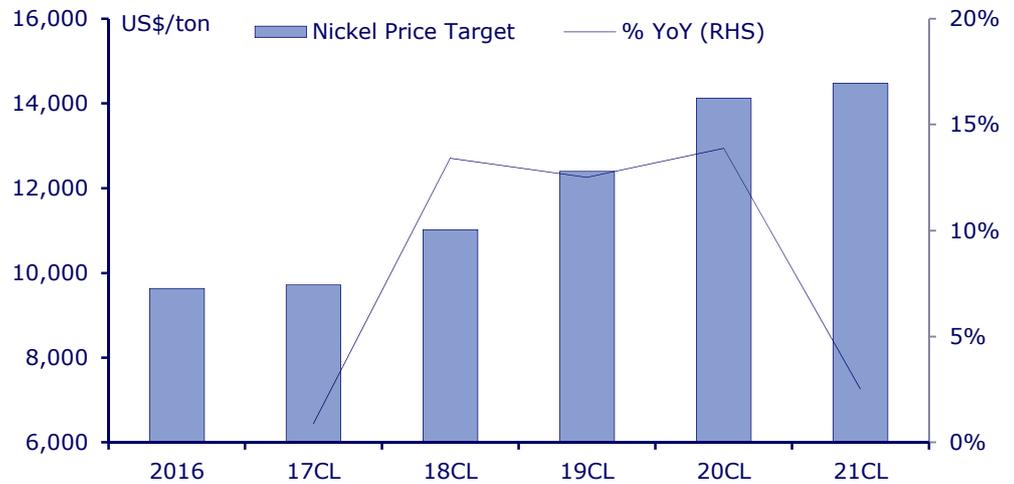


Source: CLSA, Bloomberg

While we also forecast that nickel prices are going to improve, the current rally is ahead of our forecast. Our target price for nickel in 17/18CL is US\$9,720/US\$11,023.

Figure 17

CLSA nickel price forecast



Source: CLSA

INCO trades along with nickel prices

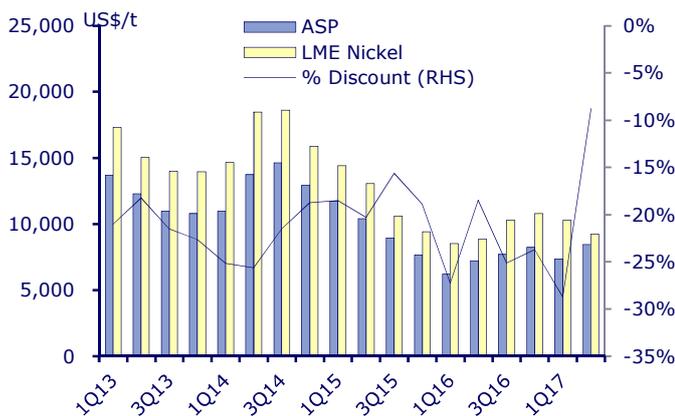
There are three nickel miners that should benefit directly from strong nickel prices: INCO (Vale Indonesia), ANTM (Aneka Tambang) and DKFT (Central Omega).

Out of the three, impact to INCO would be the clearest since it only sells a single product, with price linked to a LME Nickel prices. It does not need additional export permits or licences to export.

Similarly, INCO shares have rallied on the back of stronger nickel prices. As a matter of fact, INCO shares already rallied 32% since early July. The question is what is implied in the prices.

Figure 18

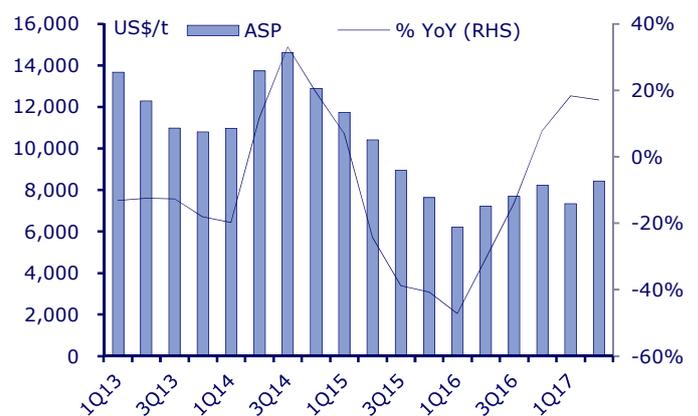
INCO's ASP and quarterly average price for nickel



Source: CLSA, INCO, Bloomberg

Figure 19

INCO's strong ASP growth due to trough in 2016



Source: CLSA, INCO

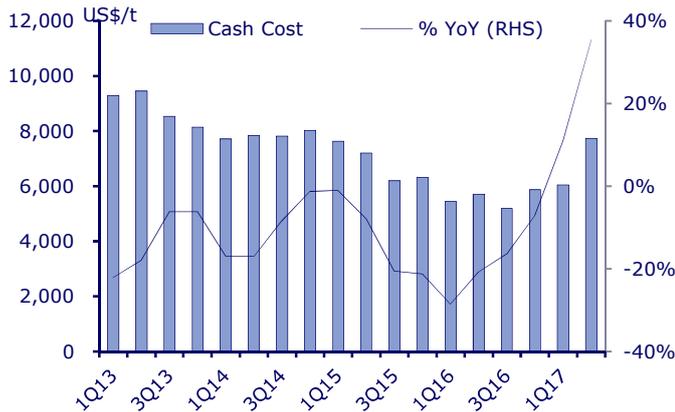
For miners like INCO, operating leverage is typically high. Cash cost are typically independent of revenue. Changes in revenue typically do not lead to change in cost, except for taxes.

Because of this operating leverage, INCO's Ebitda margin in 2Q17 became razor thin at 8% when nickel prices were weak. This is the lowest Ebitda margin for the company in the past five years.

On the flipside, stronger ASP should increase Ebitda margin fairly quickly, as long as cost remains constant.

Figure 20

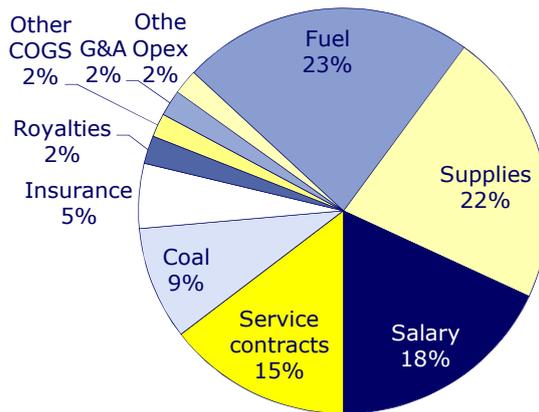
INCO's Cash Cost



Source: CLSA, INCO

Figure 21

INCO's cost breakdown



Source: CLSA, INCO

We calculated the implied nickel price expectation based on share prices. To calculate, we used INCO's historical Enterprise Value.

Figure 22

Enterprise Value as of 1H17

Variables	Units	Value
Share Prices	(Rp/Sh)	2450
Market Cap	(Rpt)	24,344
Market Cap @ Rp 13,300/USD	(US\$m)	1,830
Net debt/ (cash) @ End of 1H17	(US\$m)	(203)
Enterprise Value	(US\$m)	1,627

Source: CLSA

Using the enterprise value calculated, we assumed a range of EV/Ebitda multiples, and used 2Q17 data to calculate the implied nickel prices.

Figure 23

Calculation of implied Nickel Prices at different EV/Ebitda

EV/Ebitda	Multiple	Scenarios											
		3	4	5	6	7	8	9	10	11	12	13	14
Implied Ebitda	(US\$m)	542	407	325	271	232	203	181	163	148	136	125	116
Total Cash Cost @ 80kton production	(US\$m)	618	618	618	618	618	618	618	618	618	618	618	618
Implied Revenue	(US\$m)	1,161	1,025	944	889	851	822	799	781	766	754	743	734
Implied ASP	(US\$/t)	14,508	12,813	11,796	11,118	10,634	10,271	9,988	9,762	9,577	9,423	9,293	9,181
Implied Nickel Prices	(US\$/t)	18,600	16,427	15,123	14,254	13,633	13,167	12,805	12,516	12,278	12,081	11,914	11,770

Source: CLSA

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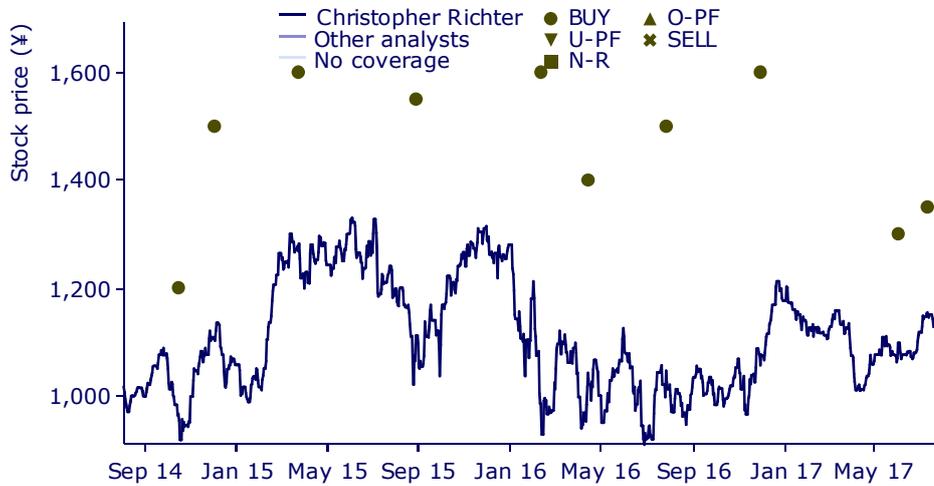
Antam (N-R)
Bintang Smelter (N-R)
Bintang Smelter Indonesia (N-R)
BMW (N-R)
Delong (N-R)
Eastern Special Steel (N-R)
Evercontaining Electronics (N-R)
Fajar Bhakti Lintas Nusantara (N-R)
Gane Permai (N-R)
General Motors (N-R)
Harita (N-R)
Hengshun Zhongshe (N-R)
Huadi Group (N-R)
Ifishdeco (N-R)
Indoferro (N-R)
Jiangsu Dafeng Harbor Holding (N-R)
Jiangsu DeLong Nickel Industry (N-R)
Jiangsu Expway (N-R)
Macrolink (N-R)
Macrolink Group (N-R)
Ningbo Brili-Metal (N-R)
Ningbo Port (N-R)
Nissan Motor (7201 JP - ¥1,098 - BUY)
Omega Resources Tbk (N-R)
Tesla (N-R)
Trimegah Bangun Persada (N-R)
Tsingshan Holding Group (N-R)
Vale Indonesia (N-R)
Xinxing Ductile Iron Pipes (N-R)
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Date	Rec	Target	Date	Rec	Target
11 Jul 2017	BUY	1,350.00	11 Feb 2016	BUY	1,600.00
02 Jun 2017	BUY	1,300.00	28 Aug 2015	BUY	1,550.00
30 Nov 2016	BUY	1,600.00	24 Mar 2015	BUY	1,600.00
27 Jul 2016	BUY	1,500.00	02 Dec 2014	BUY	1,500.00
14 Apr 2016	BUY	1,400.00	15 Oct 2014	BUY	1,200.00

Source: CLSA

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