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# **Nickel:** **Nickel's Next Phase – An EV-driven Future**

December 2020

MRAG Annual Mining Analyst Forecast and Luncheon  
Mark Selby, CEO  
Canada Nickel

[www.canadanickel.com](http://www.canadanickel.com)





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The scientific and technical information contained in this Presentation has been reviewed by Steve Balch, P. Geo, (VP Exploration) and a Qualified Person within the meaning of National Instrument 43-101.

## **Foreign Exchange Assumptions**

All amounts discussed herein are denominated in CAD dollars unless otherwise specified.

# 2019 Forecast - How Accurate ?



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- Nickel will be a “tale of two halves”
  - “Sloppy” 1<sup>st</sup> half with prices in \$13,000-\$15,000 range (risk is to upside) with market in small surplus/balanced as scrap & NPI overhangs consumed
  - By 2<sup>nd</sup> half, primary demand will pick up, supply growth slows, pushing market into deficit. Prices will resume upward trend in 2<sup>nd</sup> half towards Q3 2019 levels (\$18,000)
- Nickel demand will grow in Indonesia (some growth in stainless despite market access issues), China (driven by growth in stainless and non-stainless), and ROW (non-stainless including (batteries))
- Nickel supply to continue to grow solely from NPI in Indonesia.
- NPI production in China will contract sharply by Q4 2020 as ore inventories drawn down and limited new supply
- Nickel prices during 2020 to trade in range of past 12 months with upside risk as continued stock drawdowns and EV demand begins to have an impact

## NICKEL

- ½ Nickel didn’t disappoint and definitely two halves – dropped to \$5/lb by May from \$8/lb in late 2019 and retraced back to \$7.25 now (overshoot on downside a result of COVID – which I didn’t predict )
- ½ Indonesia and China led demand growth; ROW continue to be impacted by COVID
- ✓ Indonesia NPI more than 100% of supply growth once again
- ✓ NPI production in China ended year <400ktpa rate down by 1/3 from peak
- ✓ Prices traded within range – Chinese stainless rebound helped offset COVID impact globally



## 2021 is the turning point into the nickel market's next phase

- Nickel's 1<sup>st</sup> phase was alloys/plating, 2<sup>nd</sup> phase was stainless steel, next phase is EV – “the new gasoline”
- After 2 years of disruption to demand from EV sector caused by sharp reduction in Chinese subsidies, nickel demand now on high growth track – EV demand set to increase more than 10X in 10 years
  - ***Tesla battery day - 3TW of annual production by 2030 will require more than 1 Mtpa of nickel !! Remember current nickel market is 2.5 Mtpa***
- EVs battery demand growth will underpin an already robust long-term demand growth story  
***Will require a nearly a million more tonnes by 2025 and a doubling of nickel supply by 2030 Remember EV batteries is not just cars, but trucks, buses, pickup trucks !***
- Every nickel supercycle (late 60s, late 80s, mid 00s) caused by underestimating new source of demand – coming supercycle to be caused by underestimate of new demand from EVs
  - ***Current views on EVs eerily similar to early 2000s when people very skeptical of China***
- Nickel industry structurally unprepared to deliver necessary supply
  - NPI and Indonesia once again >100% of supply growth. Unfortunately with 88 tonnes CO<sub>2</sub>/tonne Ni
  - Don't fear Indonesia – need everything it can produce. Need Indonesian HPAL projects !
  - Bigger issue is non-Indonesia supply ! Not sure where significant supply growth can come from ??
  - Large low grade sulphides are only source of large production increases for nickel outside Indonesia (plus come with much lower carbon footprints !)
- ***Nickel market largely balanced /small surpluses for next 2 years before demand growth starts to outpace supply growth and next supercycle accelerates***

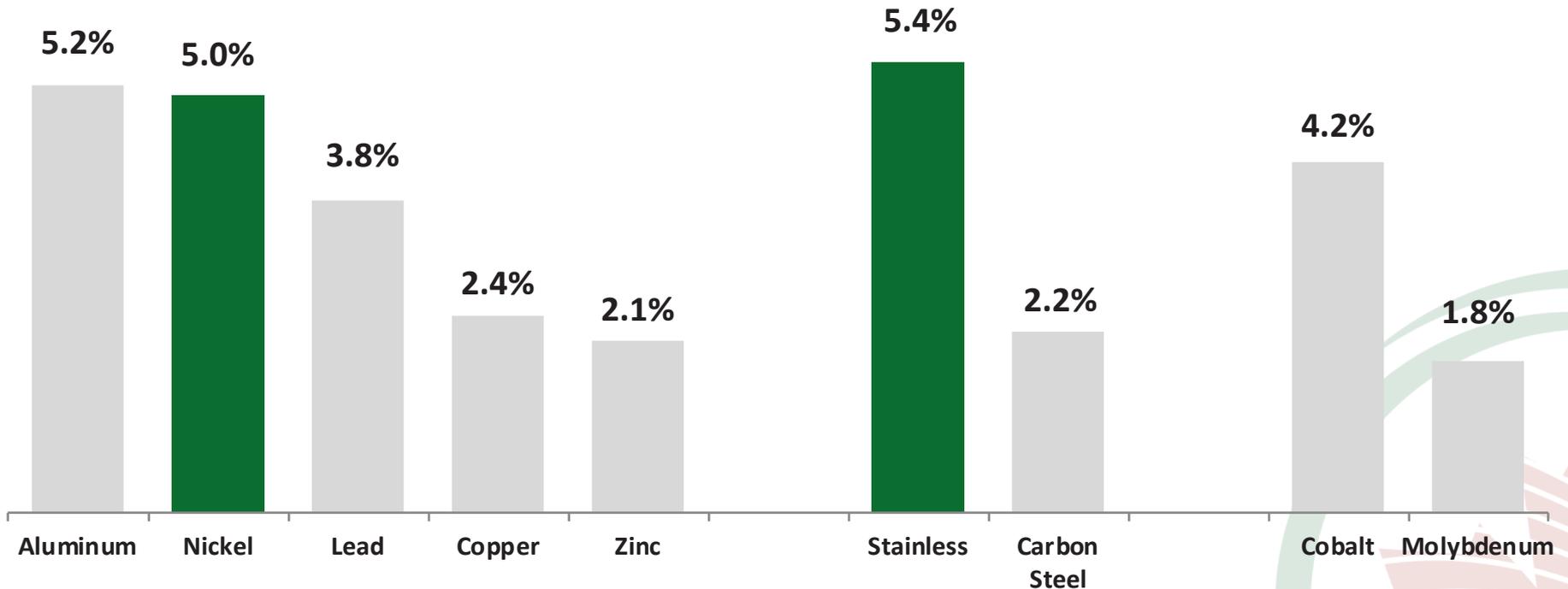
# Nickel Demand A Leader Among Metals



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Nickel demand a leader among metals over the last decade (5%) driven by continued strong growth in stainless steel (5.4%). Both figures consistent/better than long-term trends

Base Metals & Other Metals  
Demand CAGR% (2007 - 2017)



Source: Macquarie

# Electric Vehicles to Drive Significant Additional Demand

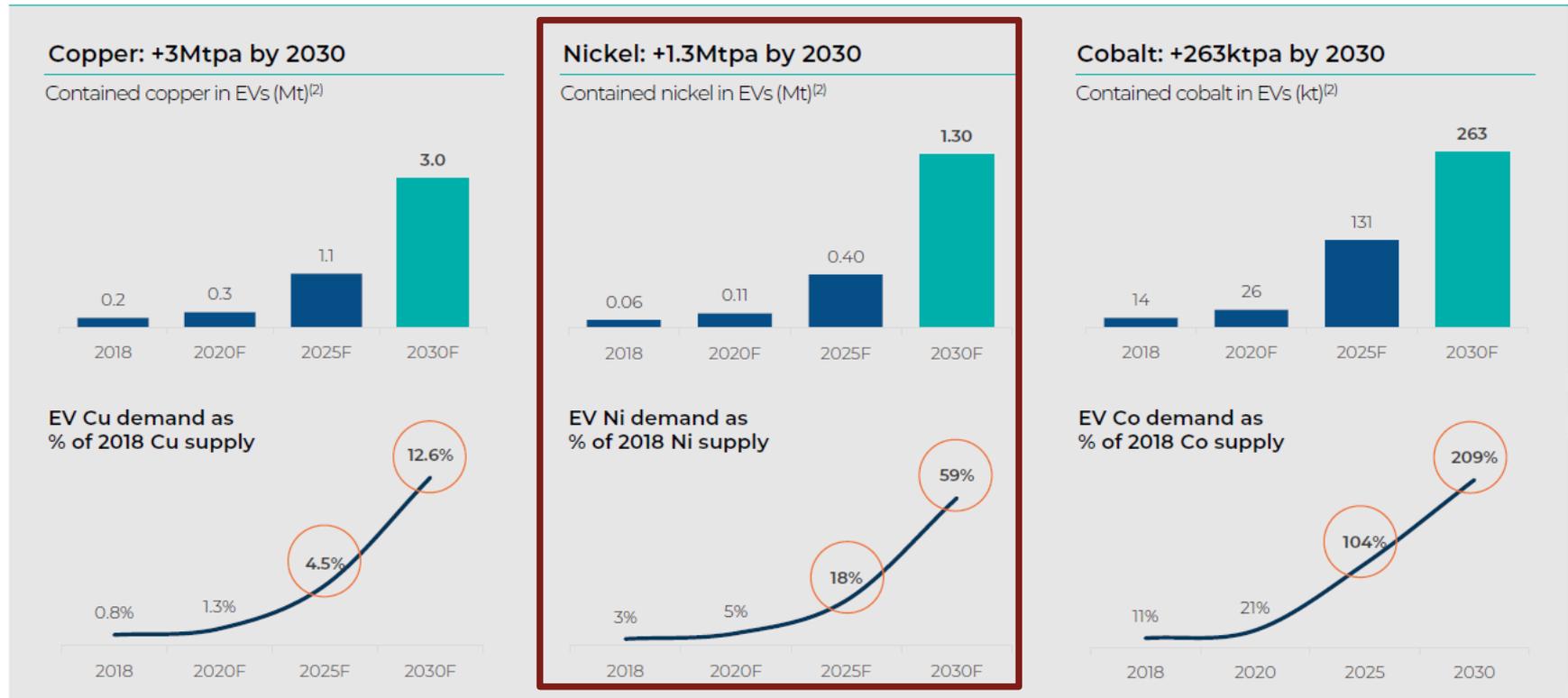


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**2018 Glencore presentation highlights massive growth expected in nickel demand. *Please note that Tesla 3TW of annual batteries needs 1+ Mtpa alone***

Electrification of transport relies on the large scale replacement of ICE with EVs

The mobility transition is a major new source of material demand: >140M EVs forecast on the road by 2030<sup>(1)</sup>



Bank of America Merrill Lynch  
2019 Global Metals, Mining & Steel Conference

Source: (1) BNEF Long-Term Electric Vehicle Outlook 2018. (2) Glencore estimates, Wood Mackenzie, CRU, BNEF. Does not include the copper, nickel or cobalt required for other parts of the EV supply chain including charging infrastructure, energy storage systems, grid

GLENCORE

# Nickel demand from EVs Now Rapidly Accelerating ....



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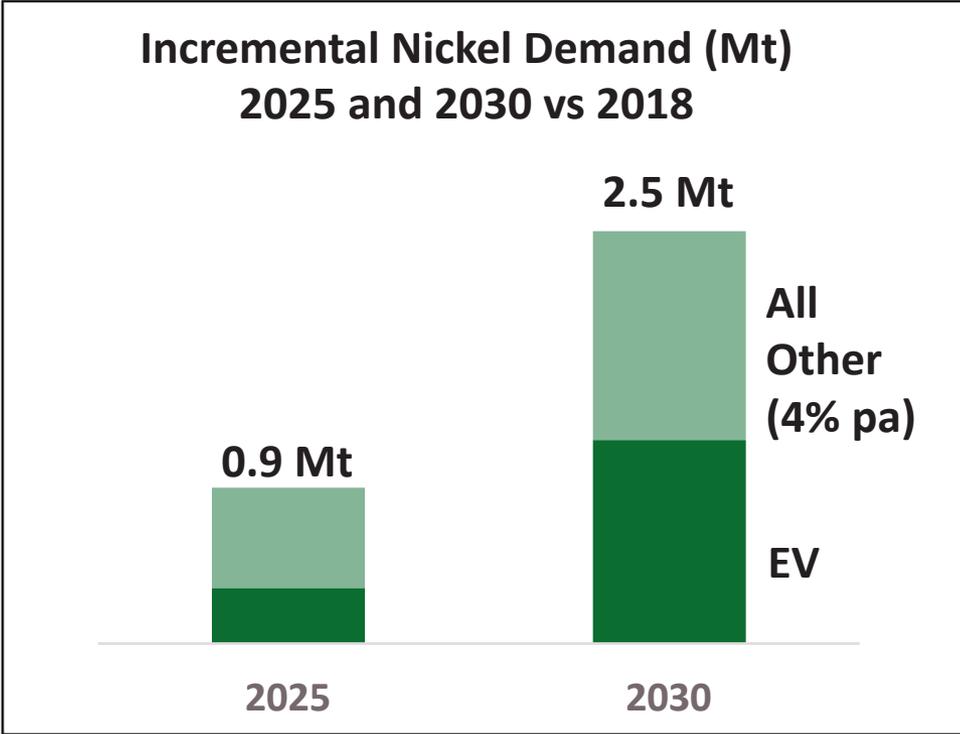
**NCM battery production in China in October up 77% year-over-year. 98% of batteries already 50+% nickel.**

- Last 18 months has obscured underlying trend in China
  - Chinese announcement of reduction in EV subsidies in June 2019, led to 1<sup>st</sup> half 2019 surge in sales/production
  - Chinese EV sales then plummeted in 2<sup>nd</sup> half 2019 – producers hoped would rebound, but were then forced to slash production in 1<sup>st</sup> half 2020
- These one-time impacts are now largely gone and solidly trending upward at very high growth rates



By 2025, EV + trend demand 4% growth (slower than 5% trend) requires nearly 1 Mtpa of new supply. By 2030, 2.5 million tonnes (or double today) is required.

*Outside of Indonesia, very little visibility on new supply*



**Where is new project supply going to come from?**

- Laterites – HPAL?
- Laterites – FeNi?
- NPI?
- Sulphides?

*Using copper as comparison,  
adding 100% of current nickel supply is equivalent to adding 20 Escondidas*

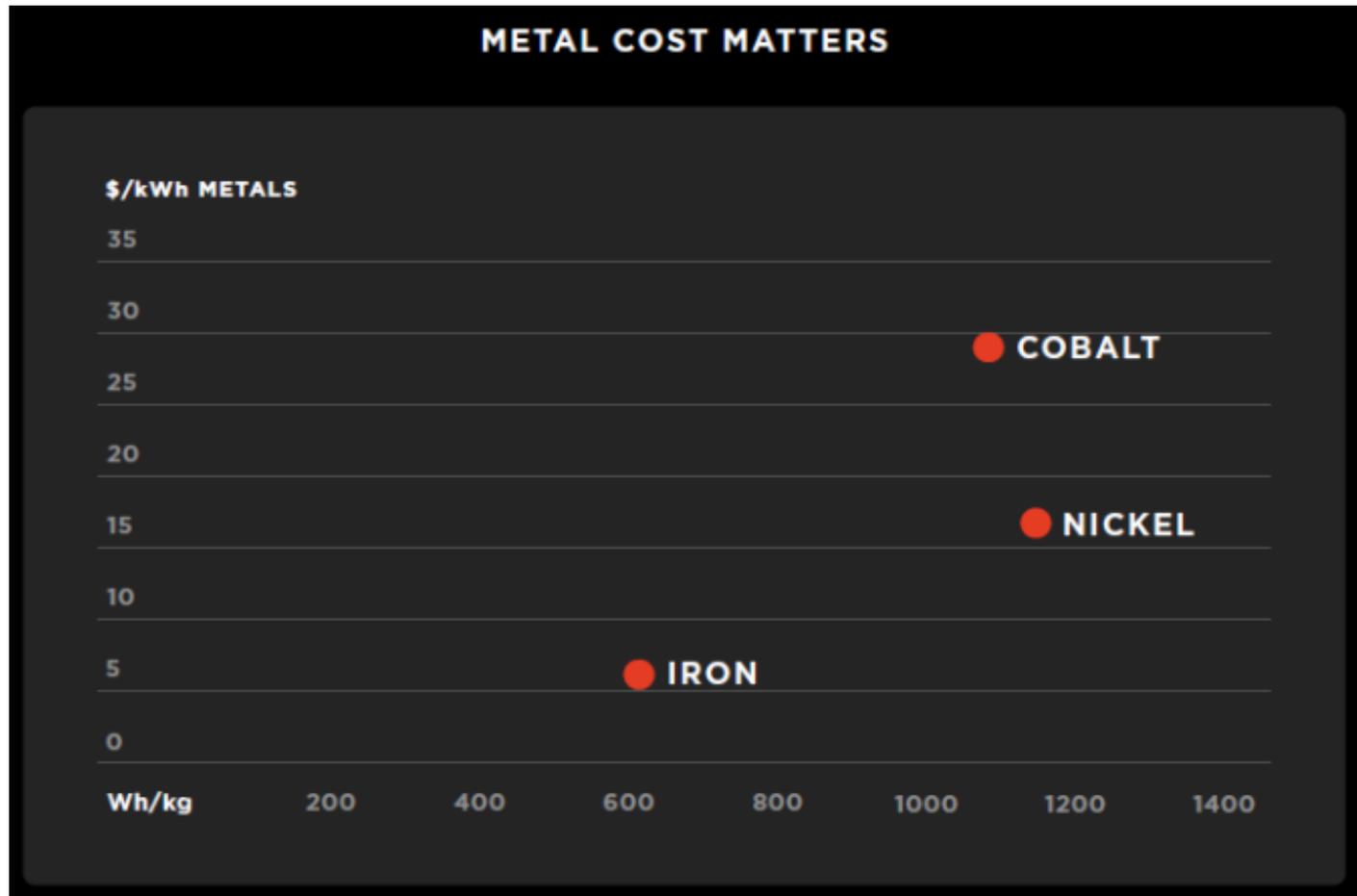
Source: CRU, CNC Analysis

# Tesla's Battery Day Presentation Highlighted Nickel's Key Role



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Tesla highlighted nickel's high energy density and lower cost than cobalt.



# Tesla's Battery Day Presentation Highlighted Nickel's Key Role



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Tesla plans 3TW of batteries annually by 2030 (30x increase)  
Highlighted nickel's role in its mid-range and high end applications and LFP for everything else. EVs not just cars – lots of trucks too !

## Diversified Cathode Approach

<b>IRON BASED</b> LONG CYCLE LIFE	<b>NICKEL + MANGANESE</b> LONG RANGE		<b>HIGH NICKEL</b> MASS SENSITIVE	

# EV Skepticism Eerily Similar to Early 00's China views



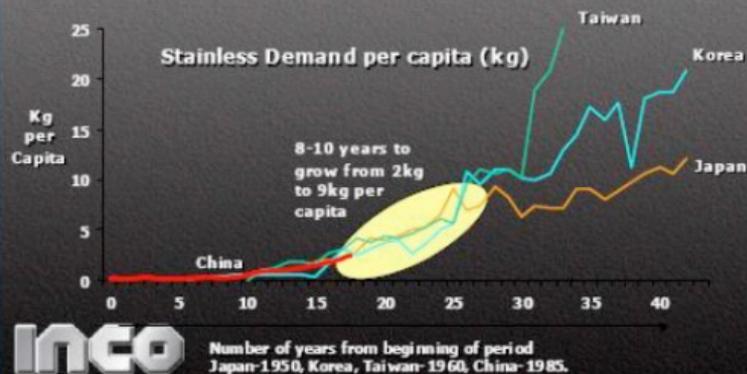
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China's growth in metal demand continued for 15+ years. Some of us got it right... Many others were very skeptical until it was too late and missed it ...

## NICKEL MARKETS PAST... MRAG 2003 – LME CASH: \$12,770

In December 2003, Inco put forward the case that Chinese stainless demand would grow strongly simply following a path that Japan, Korea, and Taiwan had already followed.

*China is following the same stainless demand timeline as Japan, Korea, and Taiwan implying that annual stainless demand could reach nine kg per capita or 13 million tonnes - by 2012 at the latest*



*Please remember that in 2003, China produced less than 1 million tonnes of stainless steel and consumed just over 4 million tonnes of stainless steel.*

### If history repeats itself....

- China will be...

...consuming 13Mtpa of stainless steel annually by 2012 *at the latest*

...producing well over 10Mtpa of stainless steel by the end of the decade

*This prediction was a 10X increase in production and a 4X increase in consumption in just 7 years*

**INCO**

# Nickel Supply - Don't Fear Indonesia !

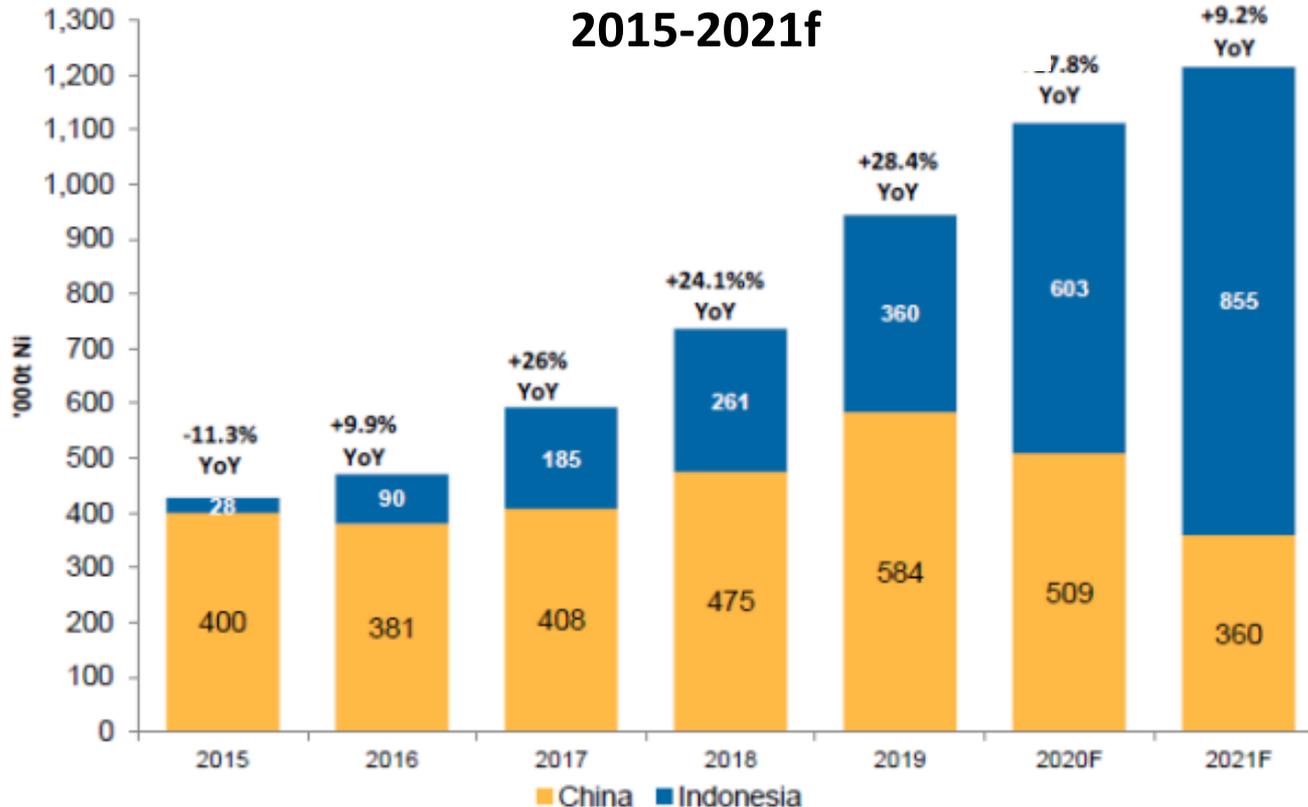
## Indonesian NPI Net 500ktpa since 2018



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Indonesia to deliver 1-1.5 Mtpa by 2030. Will add net 500ktpa of NPI supply (vs 2018) by 2021, another *net* 200-350ktpa of net new NPI post 2021, and 250-300 ktpa of HPAL (depending on how quickly it ramps up)

**NPI Production (kt)**  
**2015-2021f**



- Another 400-500ktpa of supply post 2021 would be offset by further 150-200 ktpa drop in China
- HPAL to add another 250-300 ktpa and (if it works) another 250-500 ktpa by 2030

Source: Macquarie, SMM

# Nickel Supply – Don't Fear Indonesia !

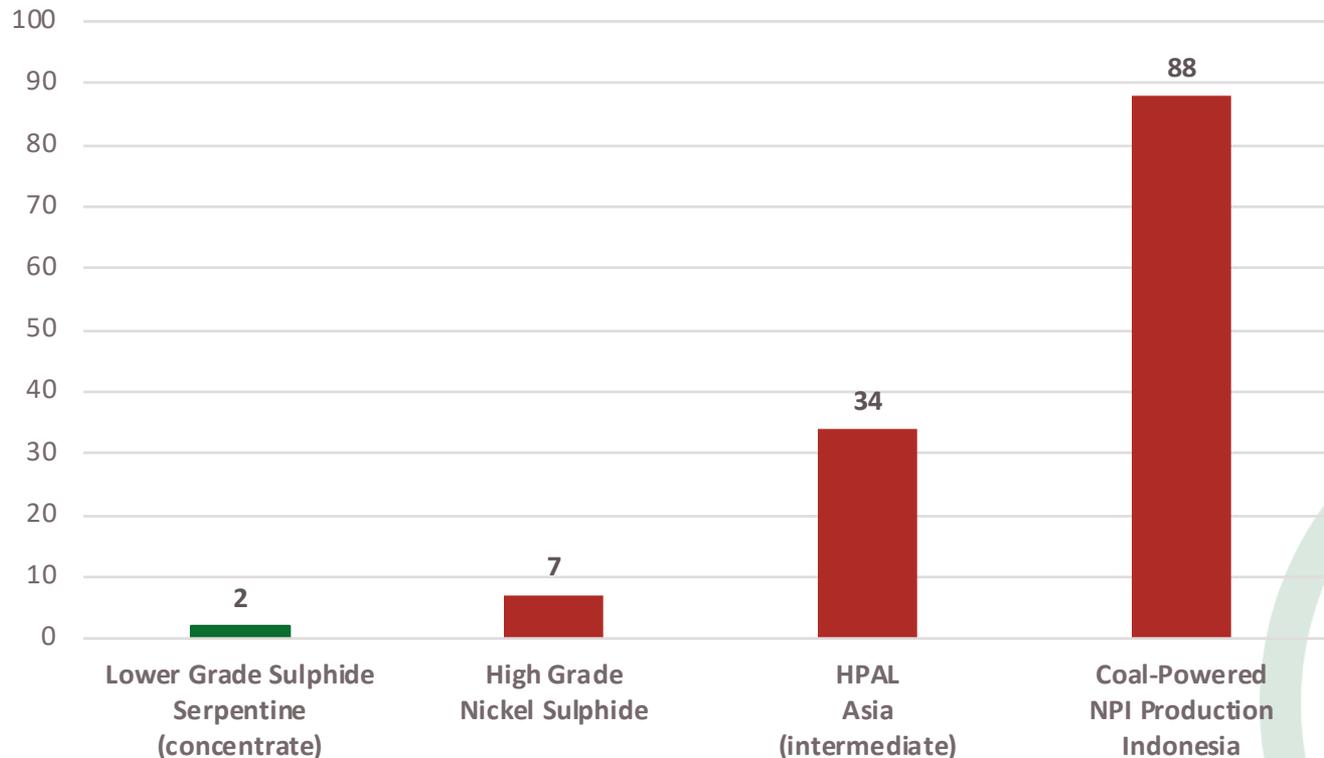
## Carbon Footprint & Chinese Control Concerns



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Future supply has a “dirty nickel” issue - Indonesian supply will NOT be a solution for a number of consumers due to its massive carbon footprint. Other consumers will be deterred by integrated Chinese supply chains.

### Estimated Carbon Footprint (tonnes CO<sub>2</sub>/tonne of Nickel produced) Selected Types of Nickel Production – Existing Projects/Producers



Source:  
WoodMac Nickel Industry Costs, Canada Nickel analysis

[www.canadanickel.com](http://www.canadanickel.com)

# Nickel Supply – Significant Political Risk

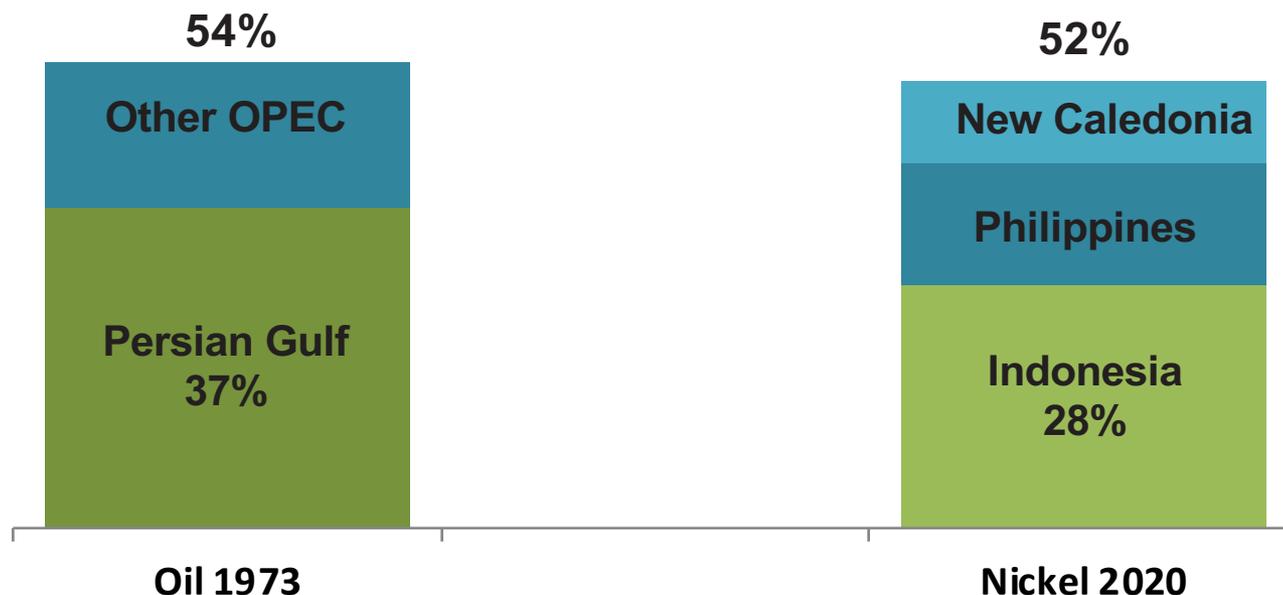
## Is there an OPEC in our future ??



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Nickel supply facing increasing political risk as Indonesia now dominates nickel supply growth. Just 3 countries are expected to control as much of the nickel supply as OPEC did of global oil supply at its peak in 1973

### Nickel Supply Concentration (2020) vs Oil Supply Concentration at OPEC peak (1973)



These 3 countries:

- Face revenue shortfalls
- Have intervened directly into mining sector

Source: U.S. EIA, Canada Nickel analysis

# Nickel Supply

## Outside Indonesia – Little Visibility



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Indonesia will supply 40-60% of the 2.5 Mtpa of nickel needed by 2030  
Very little visibility on new supply outside Indonesia

**Where  
Does the  
Other  
1 - 1.5 Mtpa  
Of  
Nickel Supply  
Come From ?**

### Possible Sources

Laterites – HPAL?

Laterites – FeNi?

Sulphides?

Source: CRU, RNC Analysis

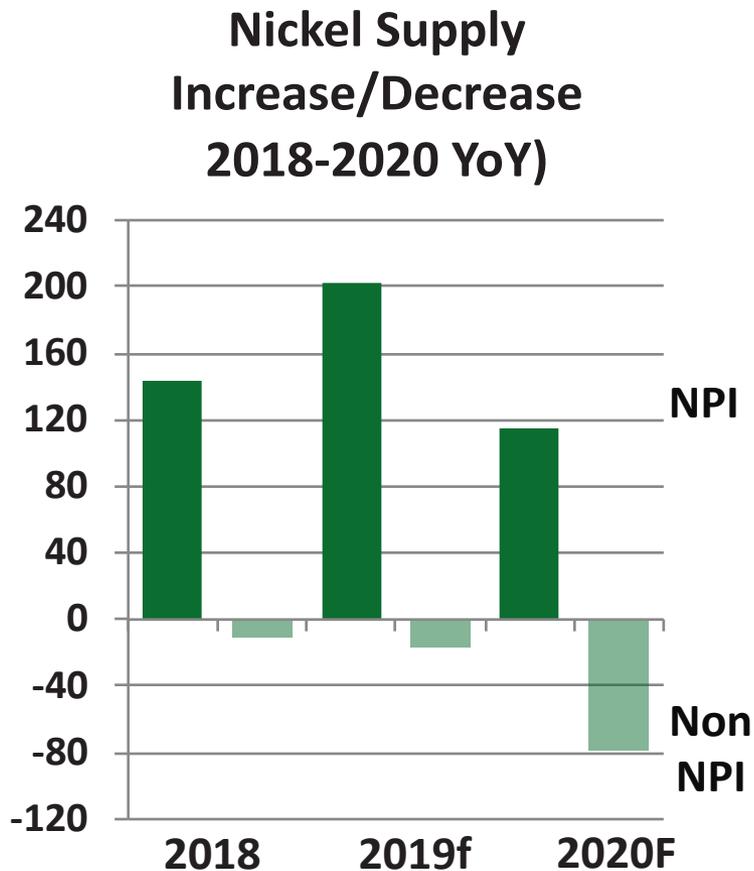
# Nickel Supply – Outside Indonesia

## First ... Needs to Reverse Direction



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Non-NPI production has been *shrinking* since 2015 ...  
First, need to turn the trend in the opposite direction



### Nickel Supply:

- NPI now 1.1 Mtpa (~45% of total supply)
- Non-NPI supply peaked in 2015
- Few growth projects ready to go outside Indonesia
  - Vale Voisey's Bay Underground and Glencore Onaping Deep only replacing production

Source: Canada Nickel analysis, Macquarie

# “Tidal Wave” of Development in 2000s Cleaned out the Cupboard



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**Most of the prior development wave sat “in the cupboard” for many decades (even back to the beginning of the last century !)**

<b>Project</b>	<b>Discovery</b>
Koniambo	Early 1900s
Goro	Early 1900s
Ramu	Early 1960s
Ambatovy	Early 1960s
Barro Alto	Early 1960s
Onca Puma	Mid 1970s
Talvivaara	Early 1980s

## New Nickel Supply: Laterites- FeNi & HPAL ?



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FeNi also not expected to play a major role in nickel supply going forward as the highest grade resources are already developed and no new high grade discoveries have been made. HPAL's track record deters development

- The current set of projects has now developed ALL known saprolite deposits with large resource of 2%+ average grade or higher (Koniambo, Onca Puma, Barro Alto, Tagaung Taung)
- NO NEW HIGH GRADE SAPROLITE DISCOVERIES HAVE BEEN MADE ***IN MORE THAN 30 YEARS*** TO REPLACE THESE PROJECTS IN THE PROJECT PIPELINE
  - Tagaung Taung was discovered in early 1980s, Onca Puma in the 1970s, Barro Alto in the 1960s and Koniambo in the 1900s
- HPAL (outside Indonesia) – struggling to find buyers for existing operations (Goro) Only SMM has made work successfully in last 15 years and the second owners of Ravensthorpe and Murrin Murrin



### Nickel sulphides an attractive source of nickel production

- Sulphides have a number of inherent advantages over laterites
  - Typically standard mine/mill facilities utilizing commonly used technology.
  - Inherently less energy intensive
  - Less capital intensive as smelting/refining facilities don't always need to be constructed – can ship a concentrate
  - Lower carbon footprint
- ***However, last 1+ Mtpa high grade sulphide discovery was Voisey's Bay in the early 1990s***
- Best discoveries in last decade (Nova Bollinger, Sakatti) are too small to move the needle
  - ***Each of their ENTIRE resource only 1-2 quarters of Tesla nickel consumption by 2030***



# New Nickel Supply

## Low Grade Sulphides An Attractive New Source



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**Large scale, low grade nickel sulphides are an attractive potential source of large volumes of nickel outside Indonesia**

**Obviously would be better if grades were higher ...**

**However, they have a number of significant advantages:**

- **Large Scale – several deposits with 2+ million tonnes of contained nickel**
- **Scaleable production – typically open pit mine/mill operation readily expanded**
- **Potential for zero/low carbon footprint particularly where zero carbon hydroelectricity available**
- **Many located in low political risk jurisdictions**
- **Some deposits (like Crawford) proximate to significant infrastructure**



## Nickel

- Nickel demand to rebound much more strongly than many expecting with significant growth in China and Indonesia and positive ROW growth
- Indonesia once again will be >100% of nickel supply growth
- Chinese NPI production to shrink to < 300ktpa
- Market in surplus but much smaller than many analysts forecast
- Nickel prices to go through similar pattern to 2020 – 1<sup>st</sup> half fall to absorb new NPI production in Indonesia, followed by demand led rebound in 2<sup>nd</sup> half of year.