Nickel Market Update

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JF BERTINCOURT

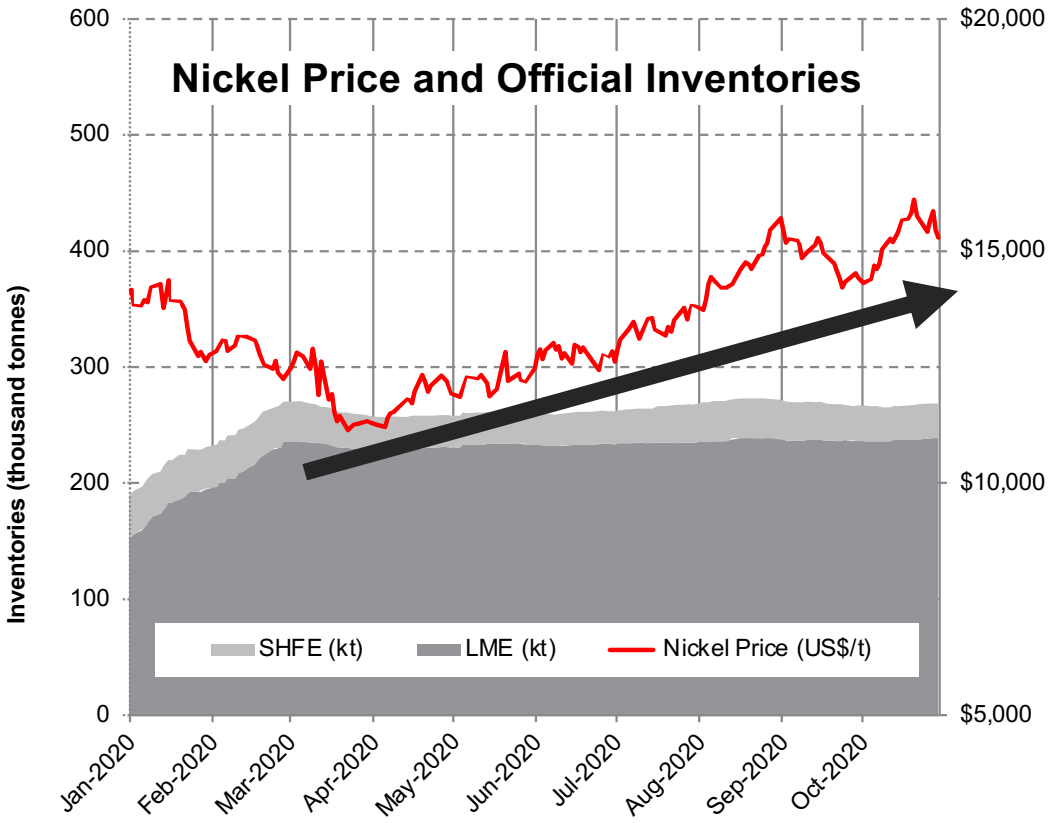
5TH NOVEMBER 2020

Nickel Market Size

Metal	Consumption	Price	Market
Nickel	2,400,000 t	$15,000/t	US$36 billion
Copper	24,000,000 t	$6,700/t	US$161 billion

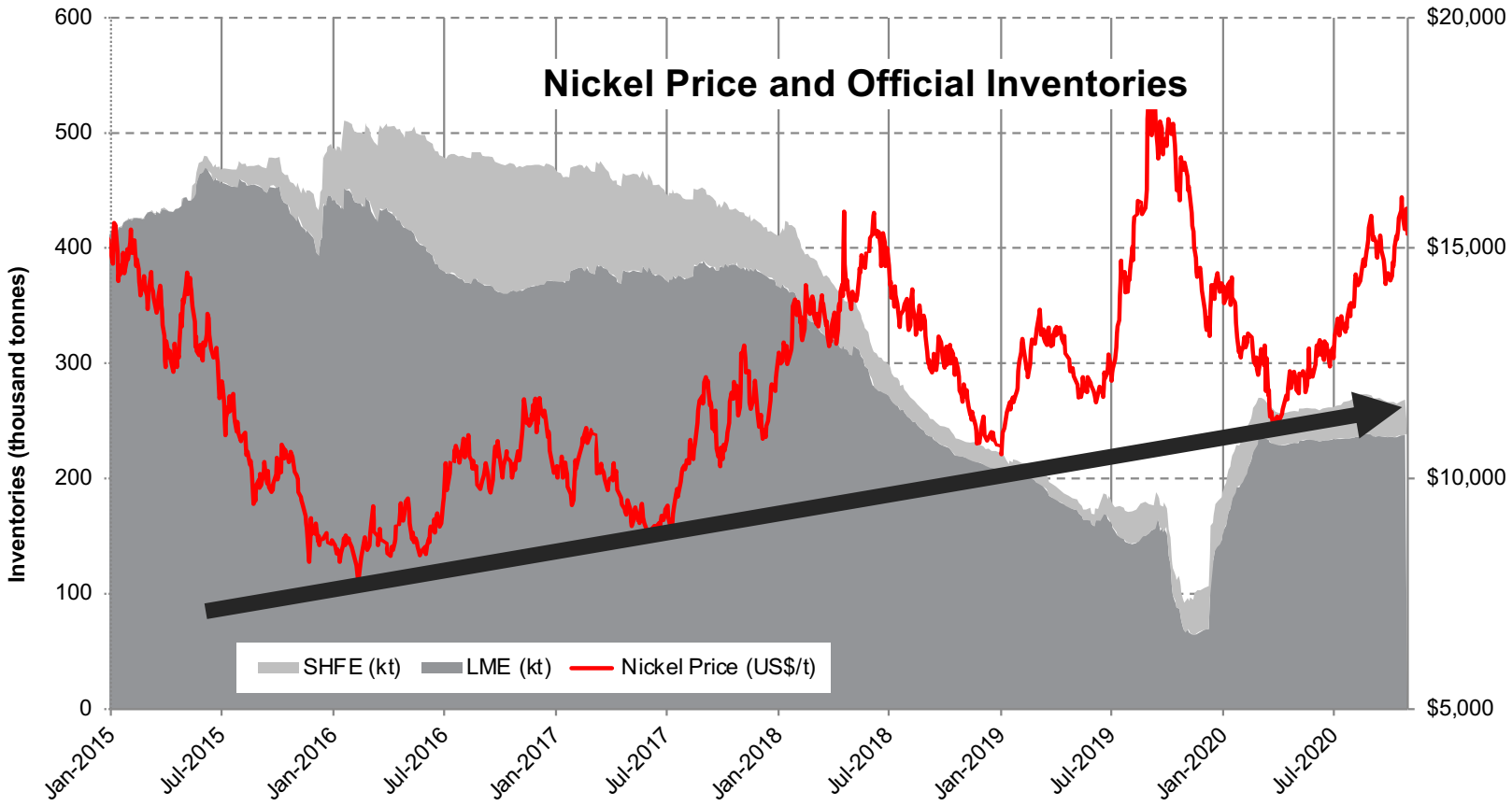
x 4+

This Year so Far



- ❑ Bounced back after COVID first wave
- ❑ Supported by US dollar weakness and recovering stock market
- ❑ Indonesian export ban: primary output growth offset by declining Chinese output
- ❑ Disruptions due to COVID (Philippines) + Goro shutdown
- ❑ Green metal + Elon Musk: "please mine more nickel" effects
- ❑ Inventories stable since COVID recovery
- ❑ More price volatility going forward:
  - Relatively high inventories
  - COVID second wave in Europe
  - China 5-year plan: green and low-carbon

Last Five Years



Last Twenty Years

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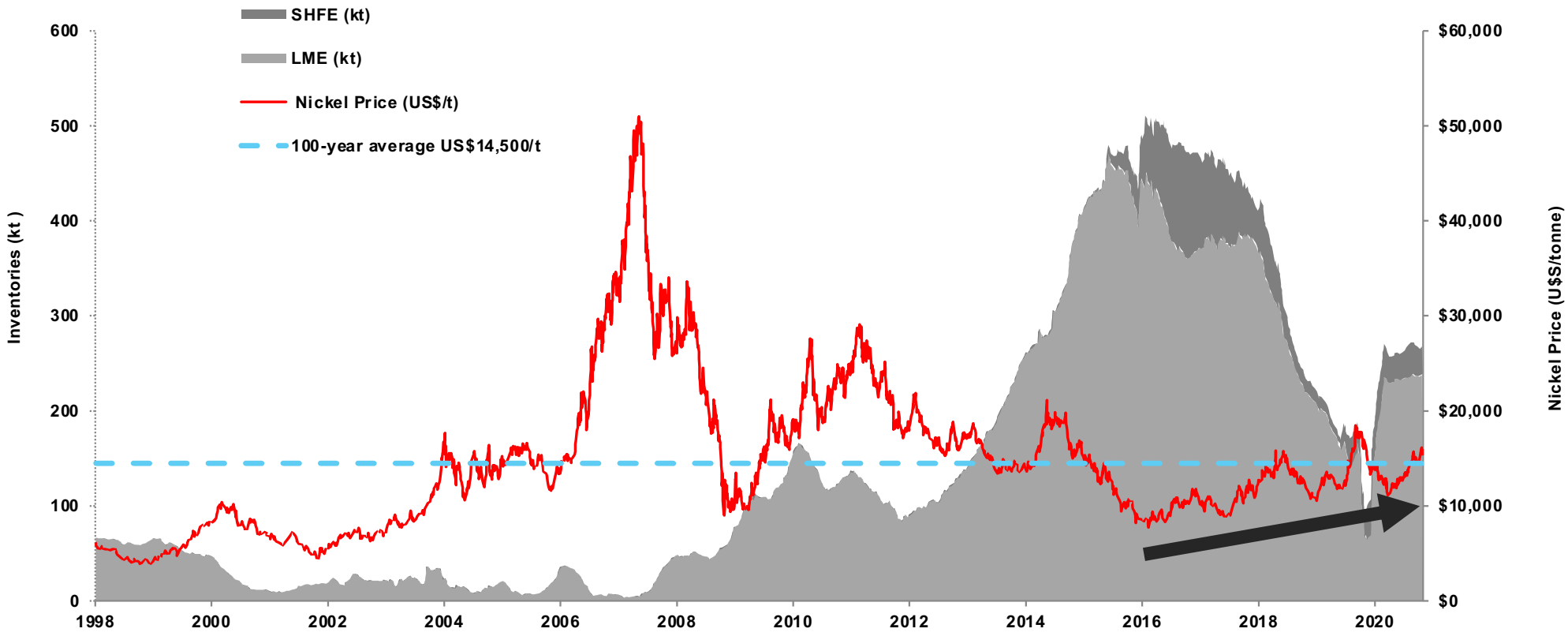
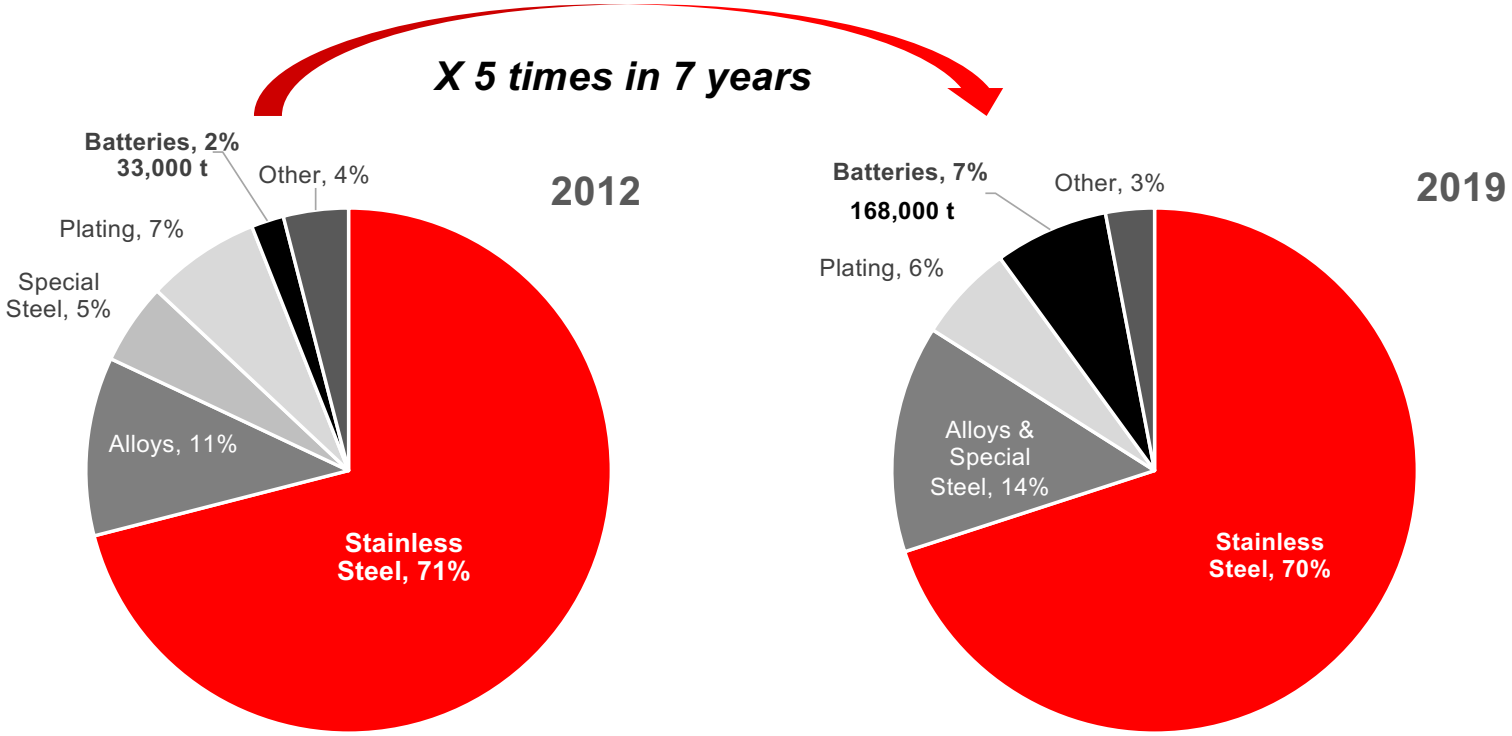
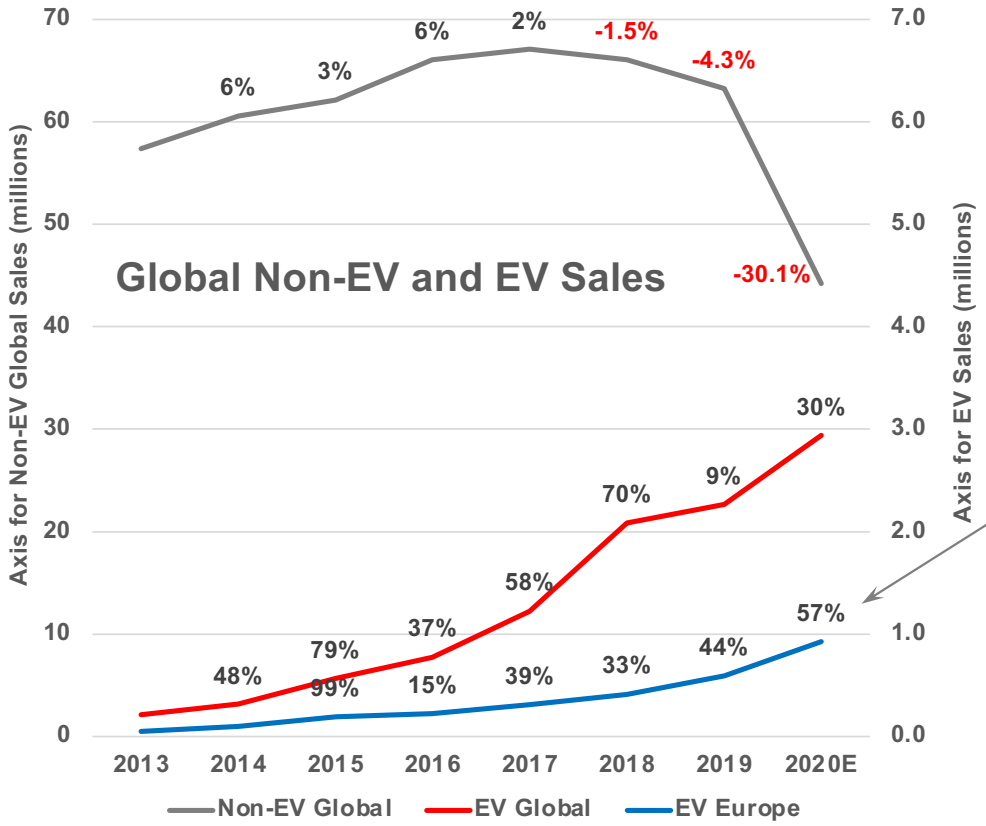


Nickel Demand by End-Use

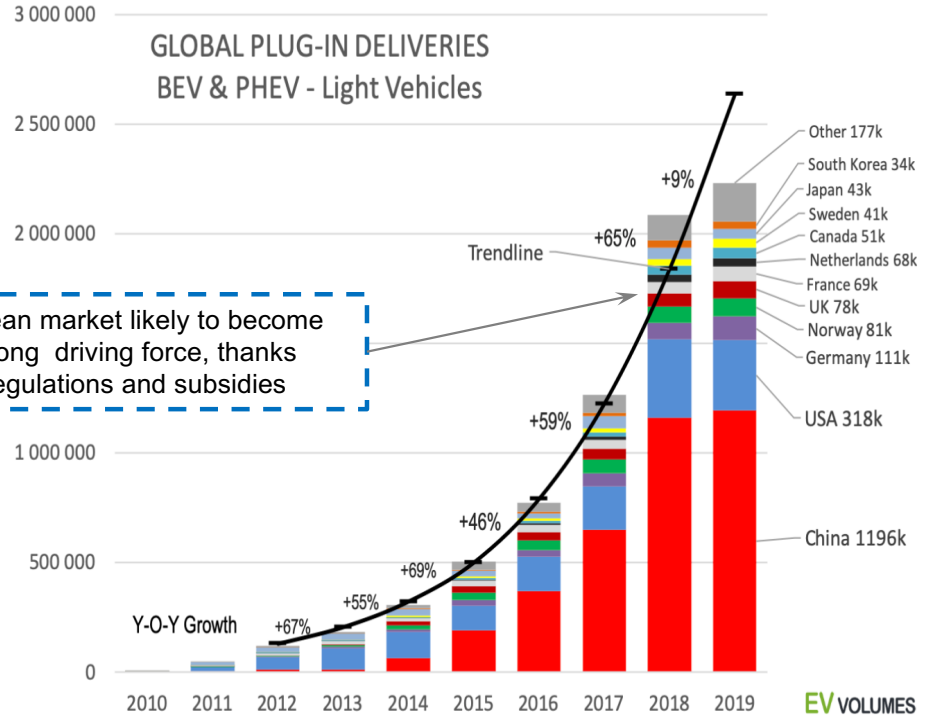


- Stainless steel still represents 70% of the nickel demand
- Nickel demand from batteries growing very strongly (CAGR 26%) but from a low base

Technology/Market Disruption



European market likely to become a strong driving force, thanks to regulations and subsidies



Source: EV-Volumes.com, Terra Studio

Technology Adoption S-Curve

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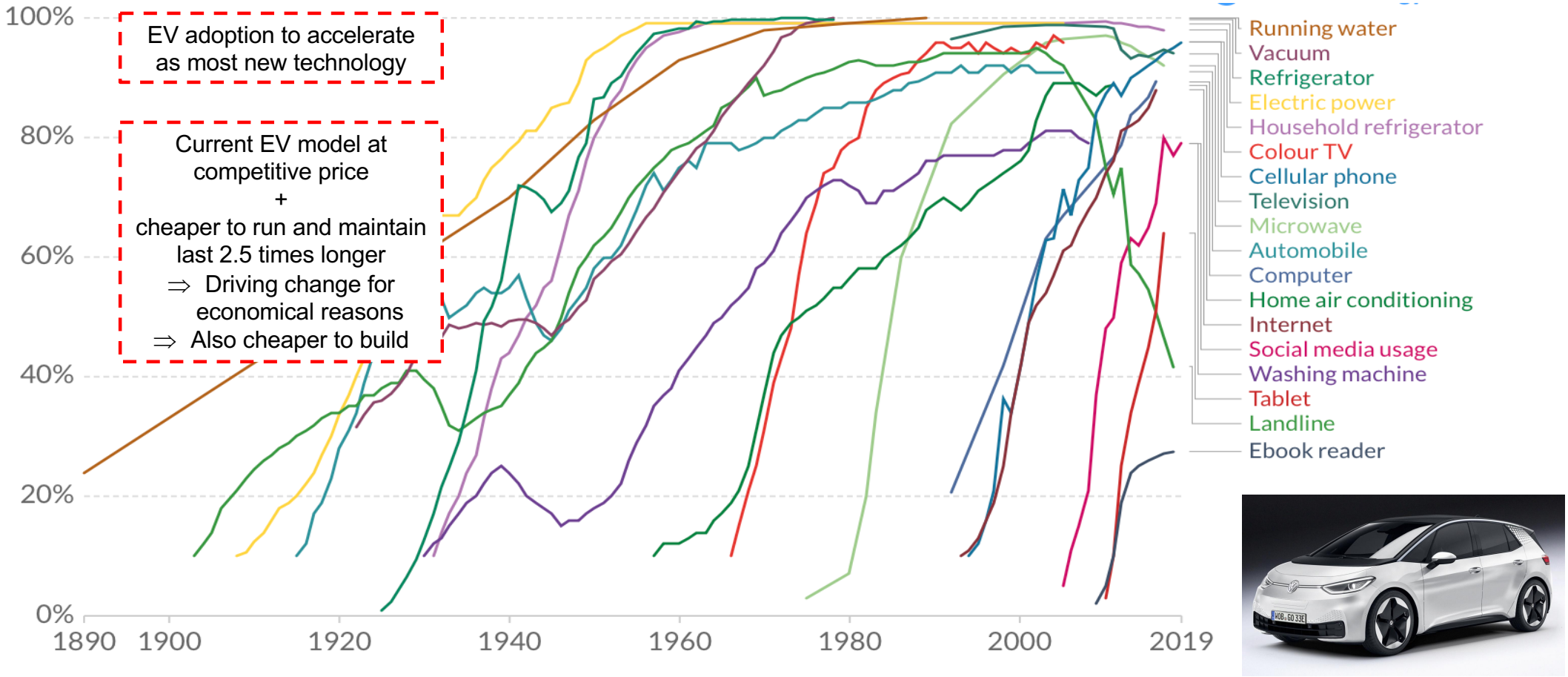

Source: Comin and Hobjin (2004) and others via ourworldindata.org

Horse to Car vs ICE to EV

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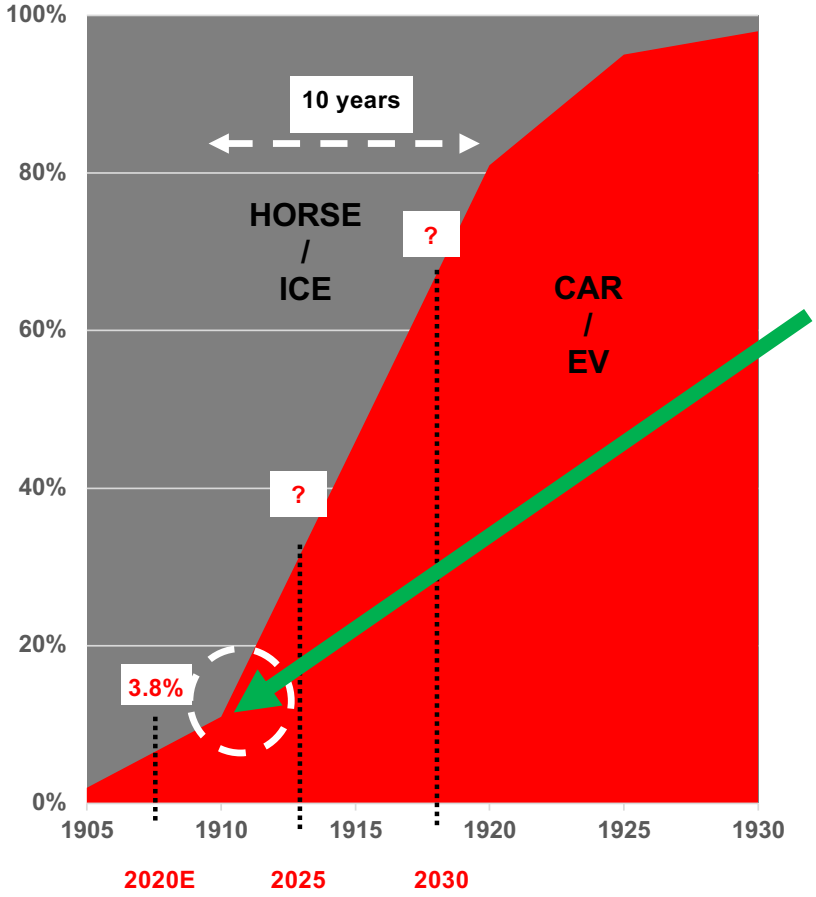
- Car market share (vs horse) from 11% to 81% in 10 years

While:

- Building two new industries (auto and oil) from nothing
- Building new road infrastructure
- Fighting World War I
- Influenza Pandemic (1918-19)



- As at Q1 2020, market share 2.8% according to McKinsey
- For 2020, market share estimated at 3.8% according to EV Volumes
- **Acceleration point within the next five years**

Need:

- New Gigafactories
- More **nickel**, cobalt & lithium
- More charging stations

While:

- No World War
- COVID Pandemic (2020-?)

Source: RethinkX.

“All New Car Sold Electric by 2025” *

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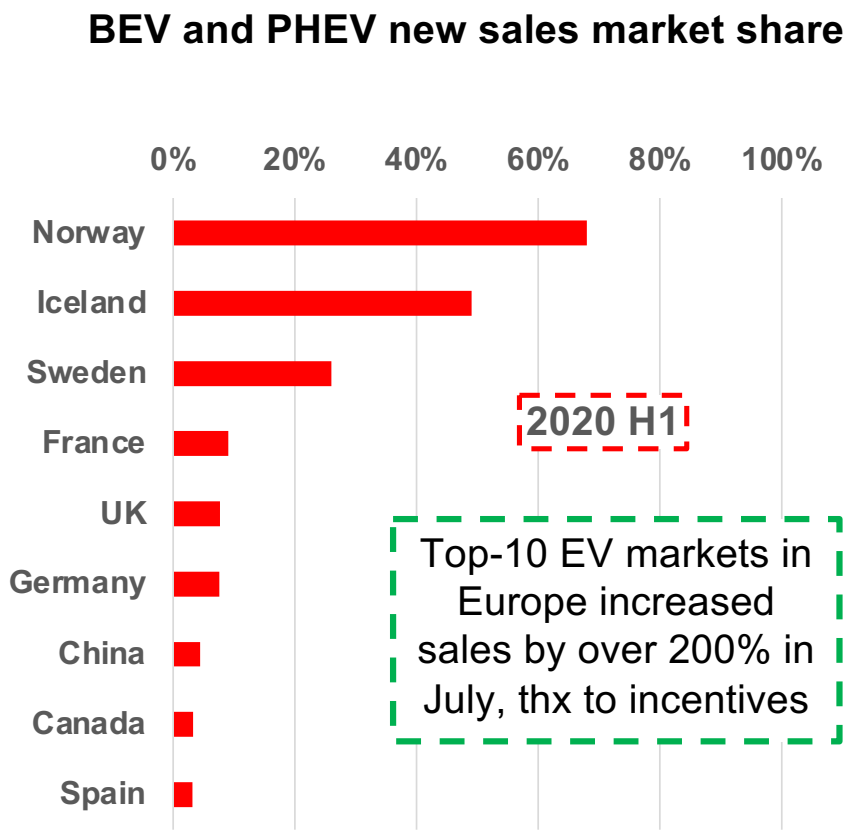
- Sounds impossible, but is it really?
- Non-EV market is falling
- EV is the only market offering growth to car manufacturers
- EVs are cheaper to build
- For consumers, EVs will soon make sense from a purely economic perspective:
  - Similar purchase price
  - Cheaper to run and maintain
  - Able to drive in cities
  - More than 2x life



*Source: EV Volumes. * One of the predictions of Tony Seba*

Impact on Nickel Demand

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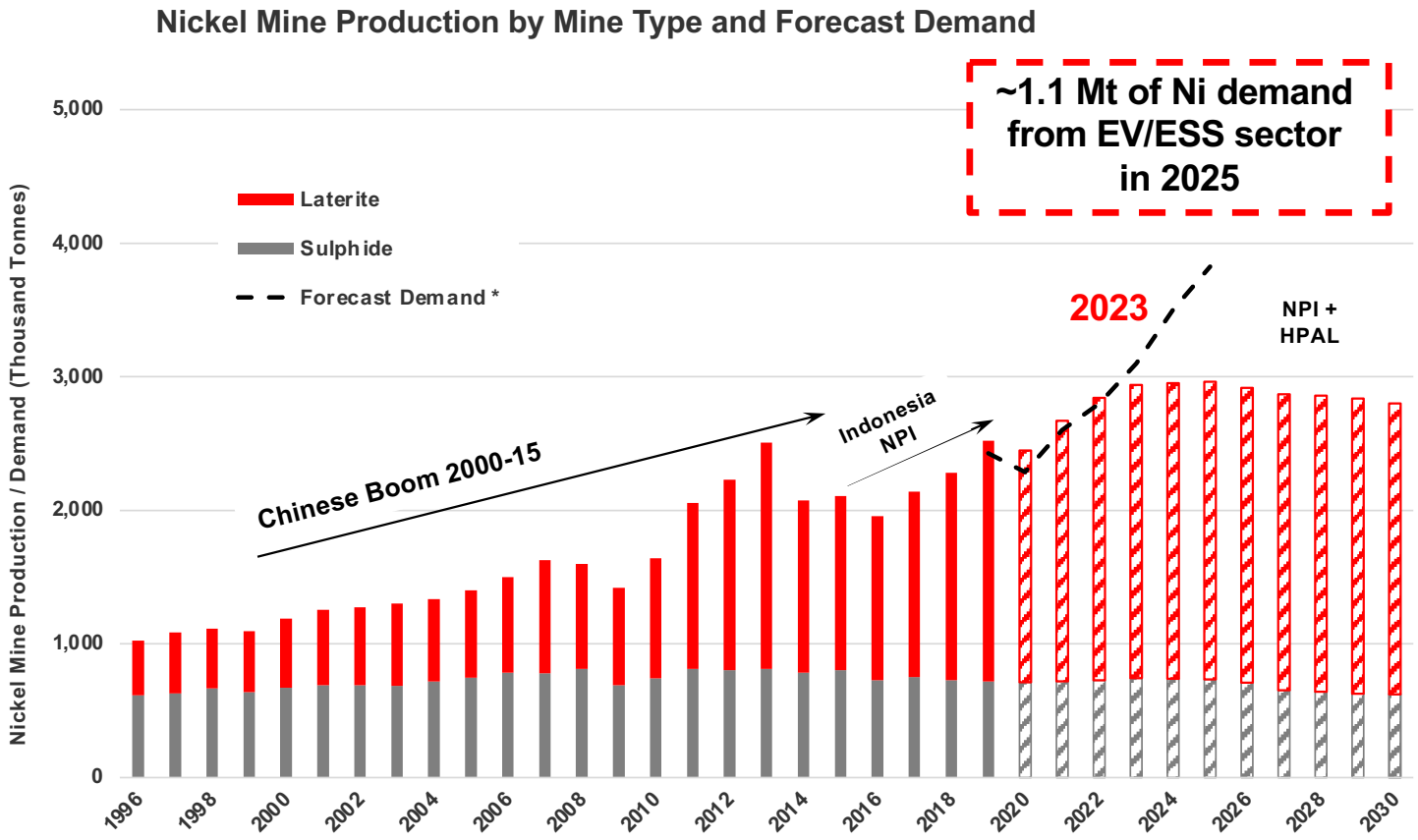
- Current nickel market size ~2.4 million tonnes
- Li-ion batteries demand potentially reaching an additional 1.1 million tonnes by 2025
- Where is it going to come from?

Item	Value
2019 Market Size	65.5 million cars
2025 Market Size Assumption	50.0 million cars
Nickel per Car	20 kg *
Additional Nickel Demand	1.0 million tonnes
Other Batteries ** (+10%)	1.1 million tonnes

*Source: Terra Studio. * Tesla Model 3 required 50 kg of nickel. ** includes Energy Storage Systems*

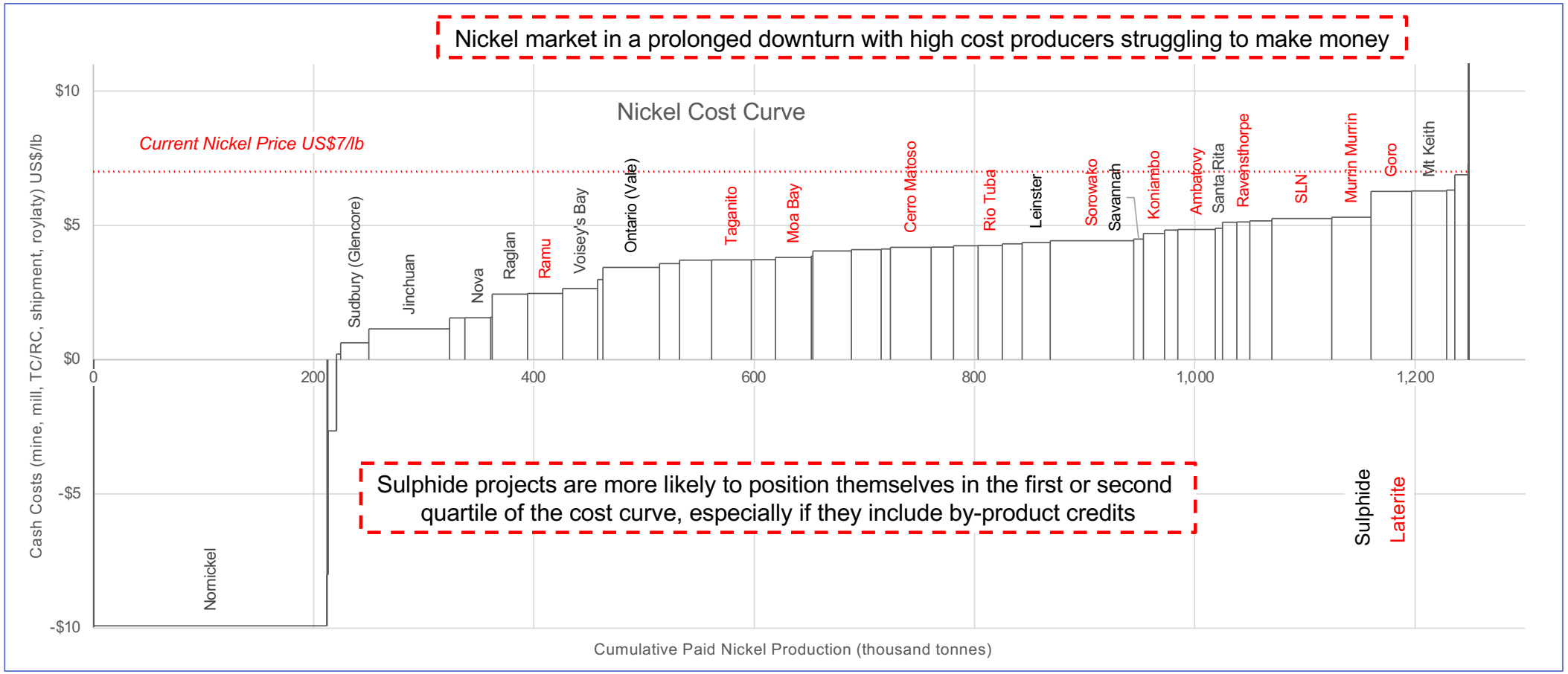
Potential Nickel Scenario



*Source: INSG, Terra Studio. * based on the assumption that all new car sold are electric by 2025, in a reduced size market: 50 million vehicles x 14kg Ni per vehicle = 770,000 t; +25% for Energy Storage Systems and other batteries = ~ 1 Mt*

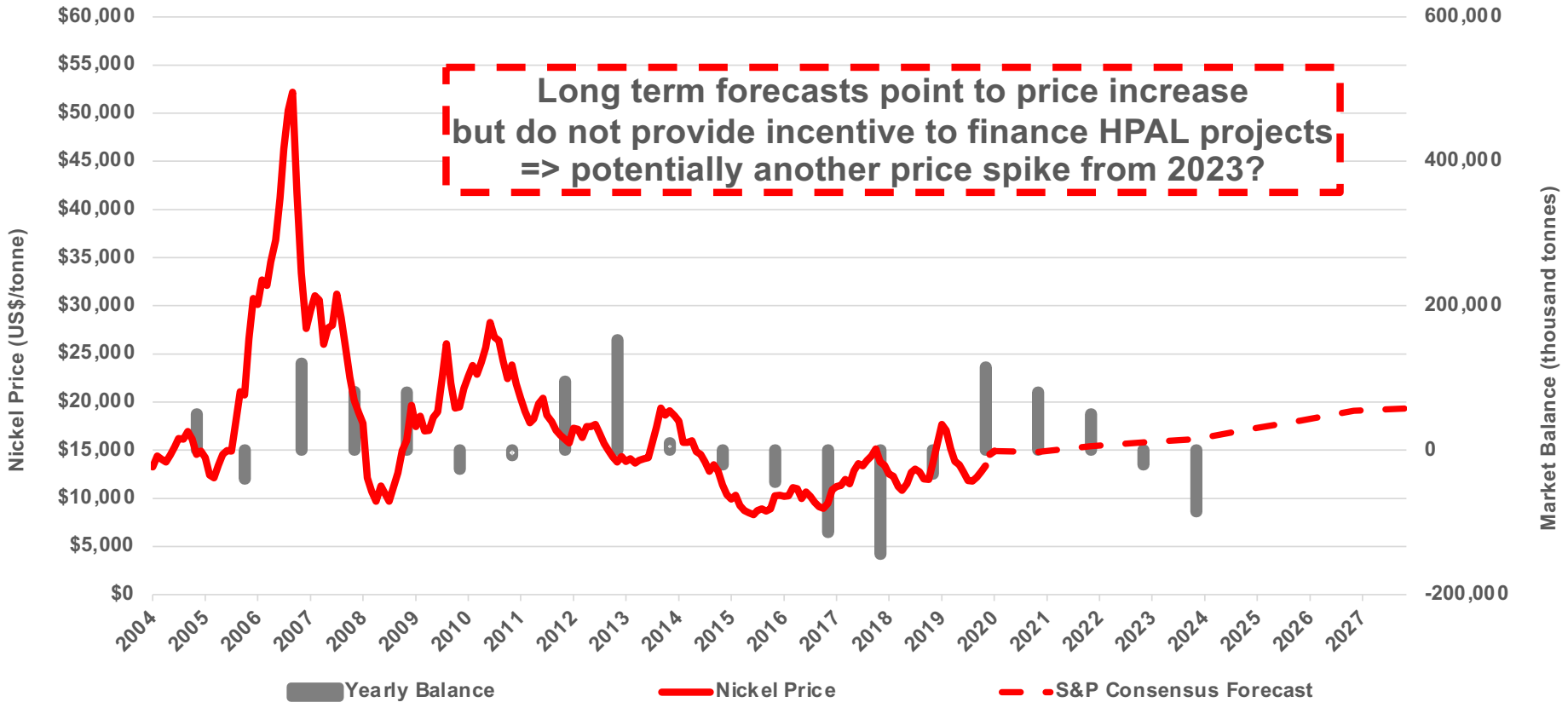
- Limited supply response from sulphide deposits during Chinese boom
- Most Indonesian laterite deposits are targeting NPI production, i.e. not Class 1 nickel required for batteries
- More NPI and HPAL needed
- Most Australian HPAL projects have high capex ➔ incentive price >US$20,000/t
- Potential new nickel price boom from 2023

Nickel By-Product Cost Curve



Source: S&P Global covers 62% of global recovered nickel production, Terra Studio

Nickel Boom and Bust Metal



Source: INSG, S&P Global, Terra Studio

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