



Update on world status and trends for critical raw materials

World Materials Forum 2017

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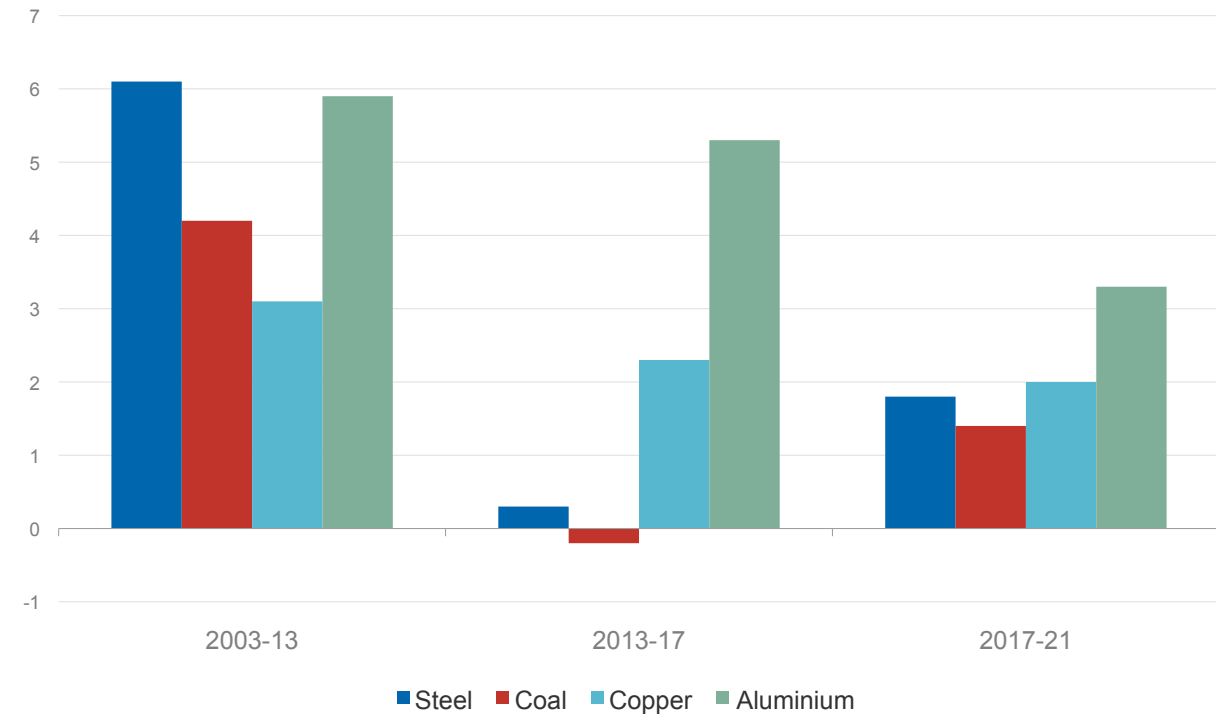
29 June 2017



Recap 2016: Prospective Study on some critical materials

- A super-cycle like the one seen in the 2003-2013 period is not expected to return in the foreseeable future,
- Physical availability of supply is not likely to be an issue, but practical availability may be impeded
- Price “fly-ups” are expected to occur, at least for select materials, due to temporary or perceived imbalances in supply and demand

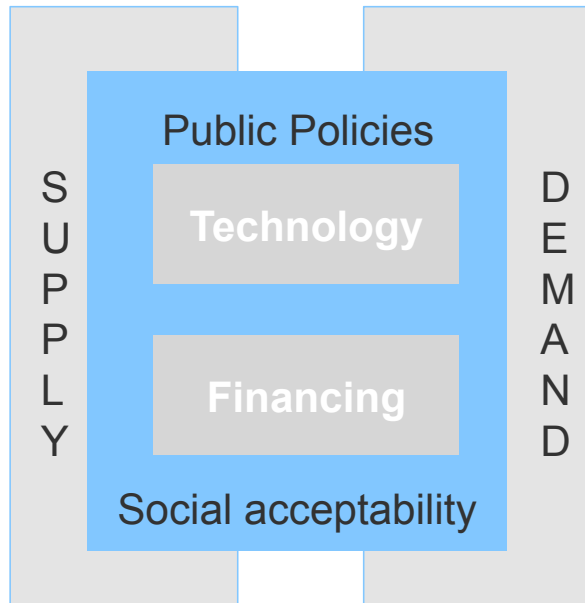
Average annual growth (%) in demand from China



Risk of mineral scarcity still low



Changing influences on demand and supply



- China's share of growth in metal demand is expected to decline from 79% in the 5 years to 2016 to 36% in the five years to 2021
- Regional instability could have a large impact on some commodities, for example, Katanga Province in the Democratic Republic of Congo supplies 5% of World copper and 59% of World cobalt
- Social pressures combined with changes in the end use demand of certain raw materials is leading to increased uncertainty around short term stability of supply

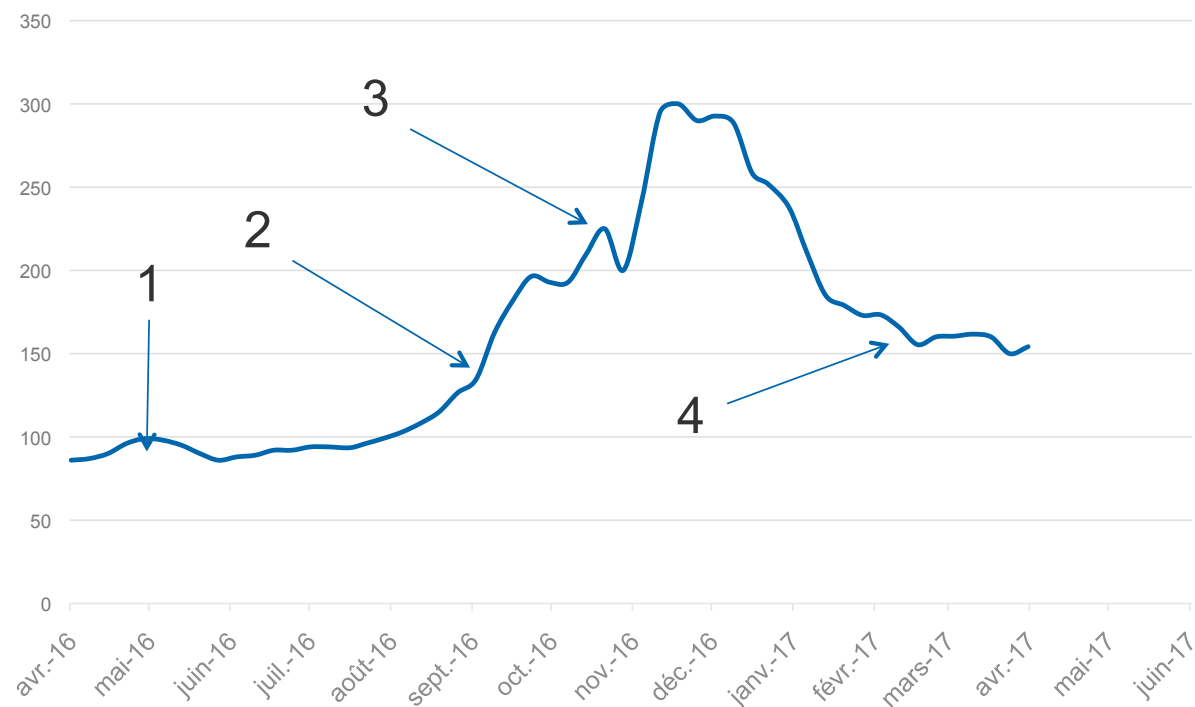
Increasing transparency, higher standards, more stakeholders



Impact of Legislation on price

1. Chinese coal mines were restricted from operating for more than 276 days/year
2. Rapid stock drawdown and physical squeeze created
3. Policy reversed
4. Delayed price reaction, then gently declining

Premium hard coking coal (US\$ / tonne) FOB Australia)



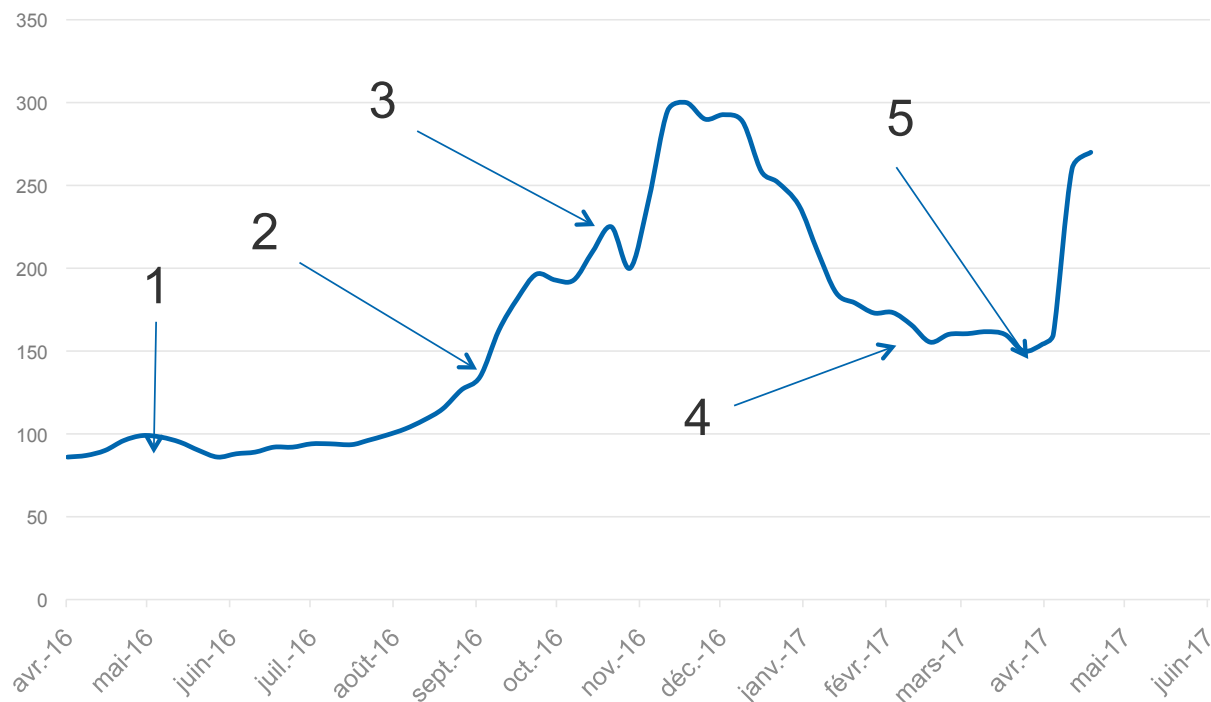
China and Australia dominate metallurgical coal supply



Impact of weather on an already constrained market

1. Policy
2. Structure
3. Policy reversed
4. Return to ordered market
5. Cyclone Debbie hits Australia with 260kmph gusts as insurers declare a force majeure

Premium hard coking coal (US\$ / tonne FOB Australia)



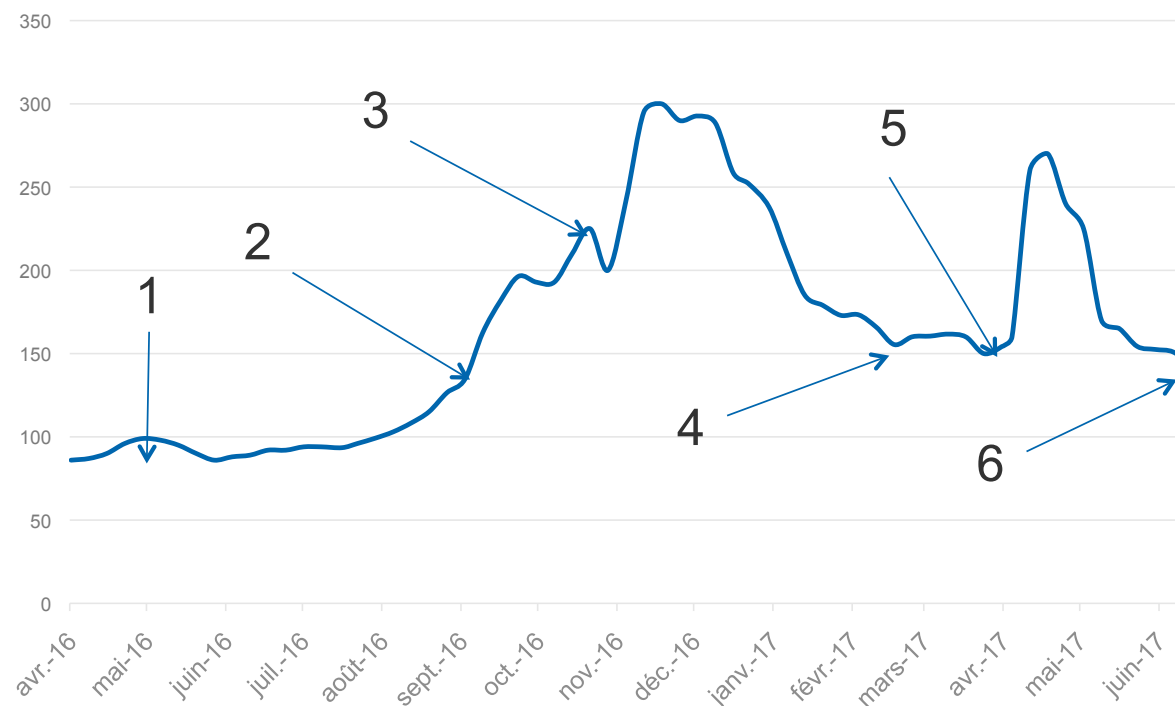
Two fly-ups: public policy and extreme weather



A true fly-up?

1. Policy
 2. Structure
 3. Policy reversed
 4. Return to ordered market
 5. Extreme weather
 6. Prices have settle back down as the supply constraints have eased, again
- Reaction: traders are making changes to contract pricing, away from the spot market

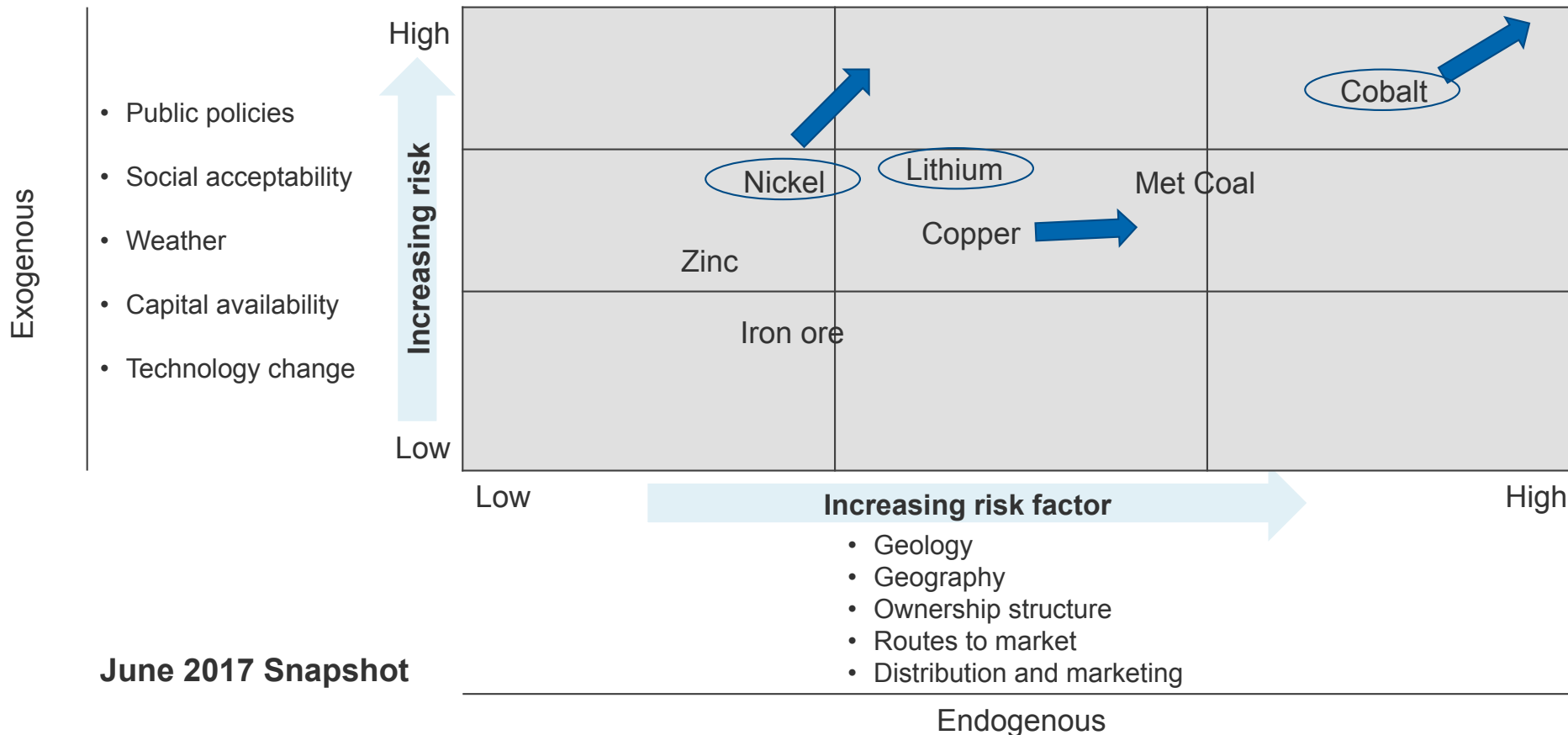
Premium hard coking coal (US\$ / tonne FOB Australia)



A return to the market fundamentals, but constraints remain



Susceptibility to a fly up in price

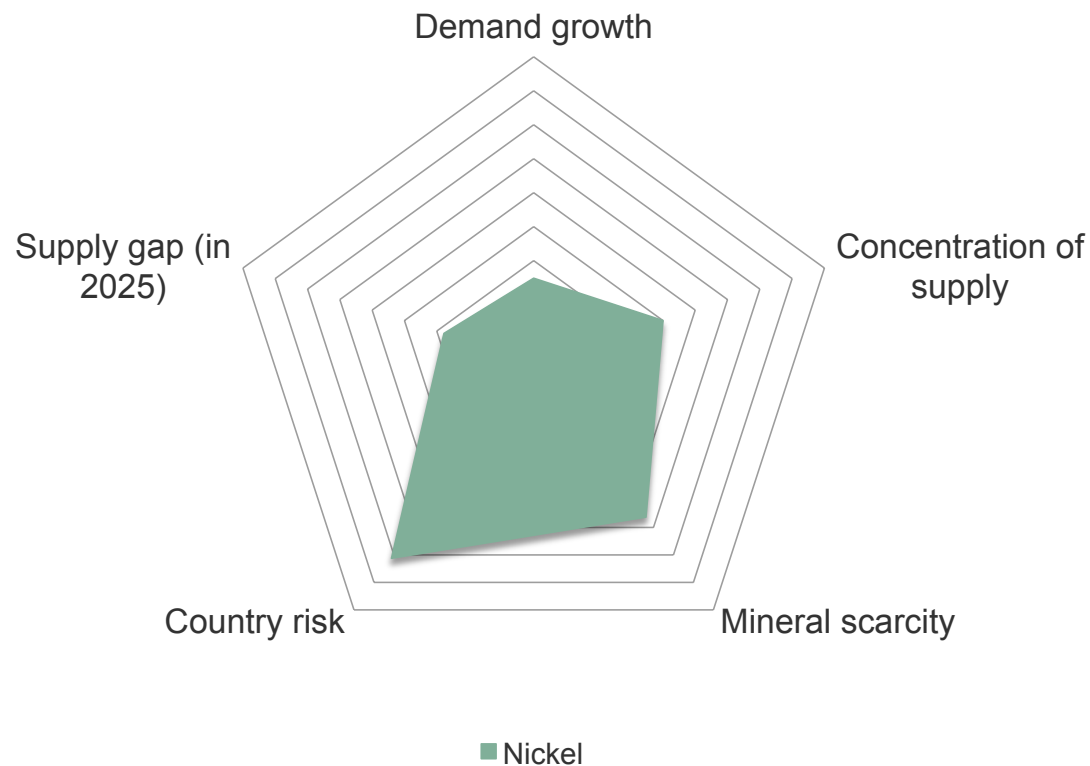


June 2017 Snapshot



Nickel overview

- Medium term outlook for demand is impacted by low growth in China
- Current supply story dominated by nickel in pig iron
- Lack of investment in low price environment leads to forecast of future deficits but
- High level of stock reduce nickel's vulnerability to political shocks



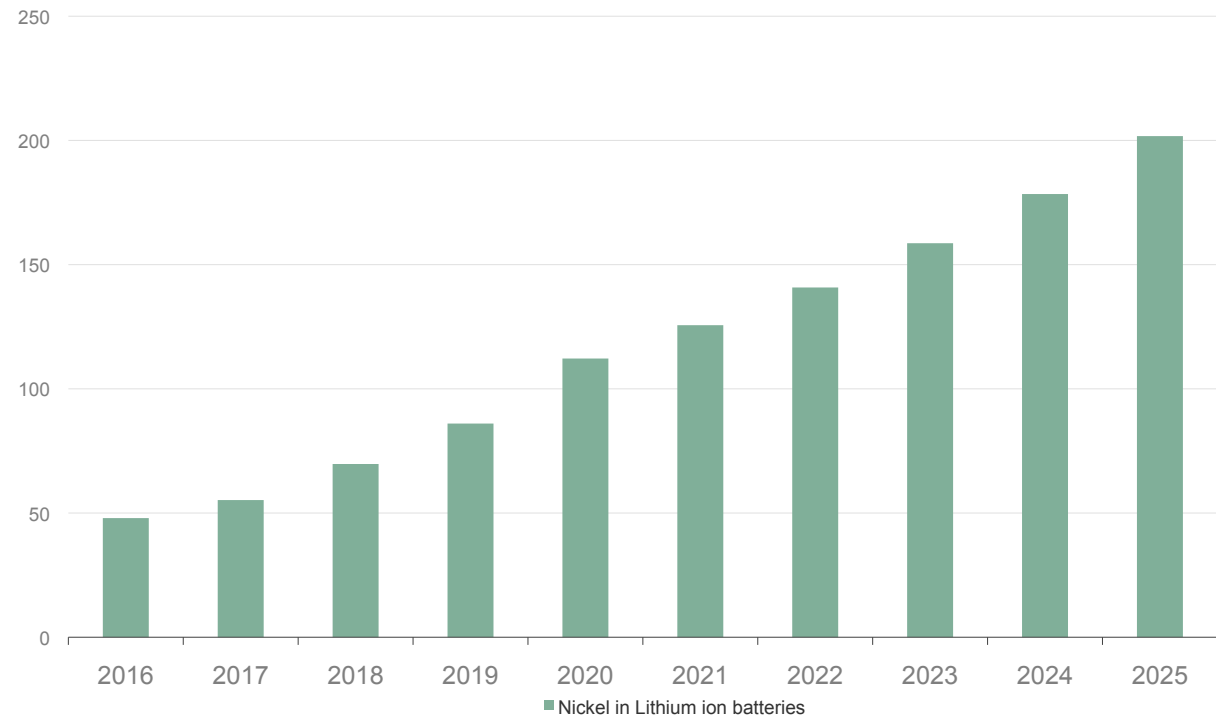
Geographic spread, low growth, low risk of fly-up



Application in electric vehicles

- Nickel sulphate, a cathodes used in batteries for electric vehicles, to show a dramatic rise
- Increase:
 - thermal stability
 - energy density
- Reduce
 - Weight
 - Cost (as substitute for cobalt)
- Nickel contained to increase from 50k tonnes to 200k tonnes by 2025

Nickel sulphate (thousands of tonnes of nickel metal contained)

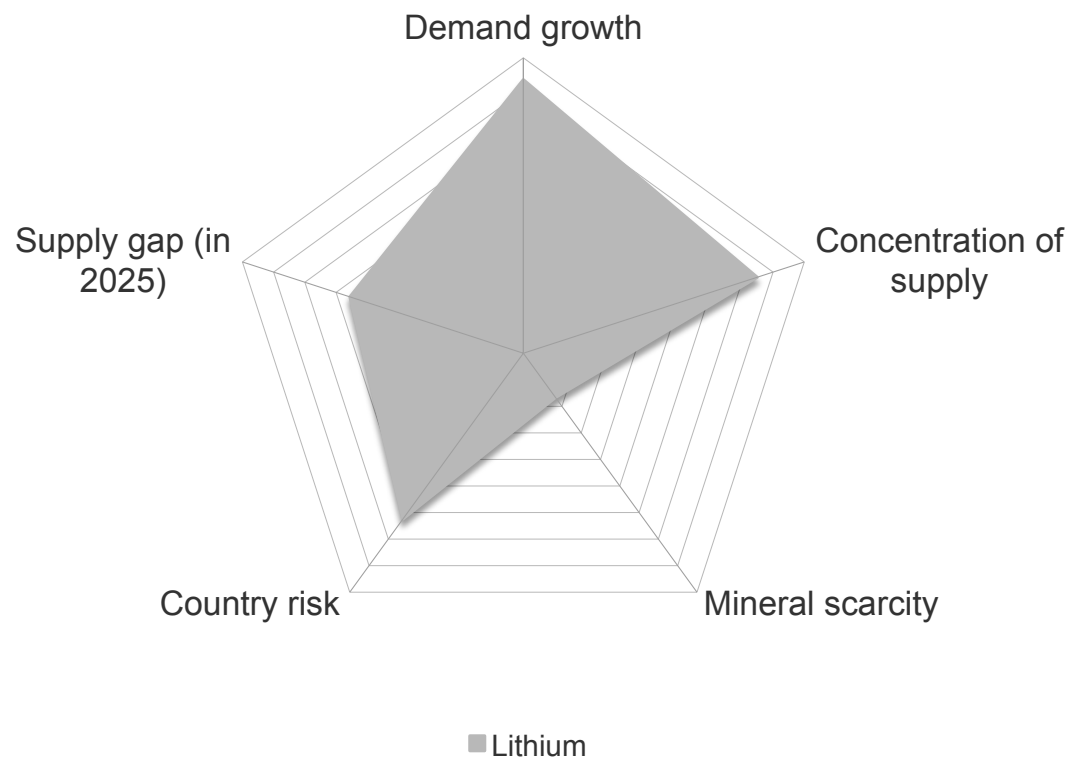


High purity nickel provides demand bright spot



Lithium overview

- Lithium ore deposits
 - hard rock “spodumene” or
 - salt “brine” deposits
- Abundance indicates low risk of supply gap in 2025
- Australia, Chile and Argentina dominate supply with a few large producers
- Geographic concentration but low level of country risk



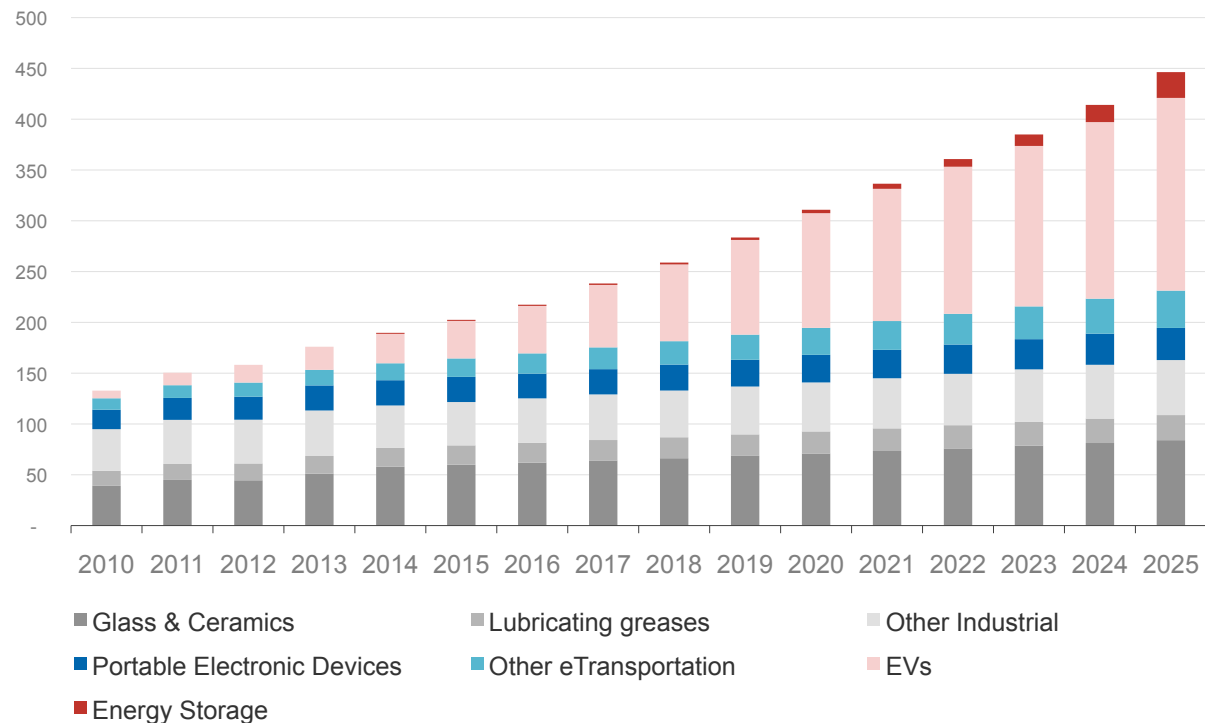
Cooperation needed to build strong supply industry



Lithium Demand

- Demand forecasts being revised upwards
- Strong demand growth forecast average CAGR 8.3% 2016 - 2025
 - 13.3% in batteries
 - 3% in industrial
- Batteries dominate
 - 63% of market in 2025
 - Electric vehicles (2/3rds)
- Industrial applications not impacted by higher prices

Lithium demand by end use sectors (thousands of tonnes of LCE*)



Demand driven by policy. Substitution risk low

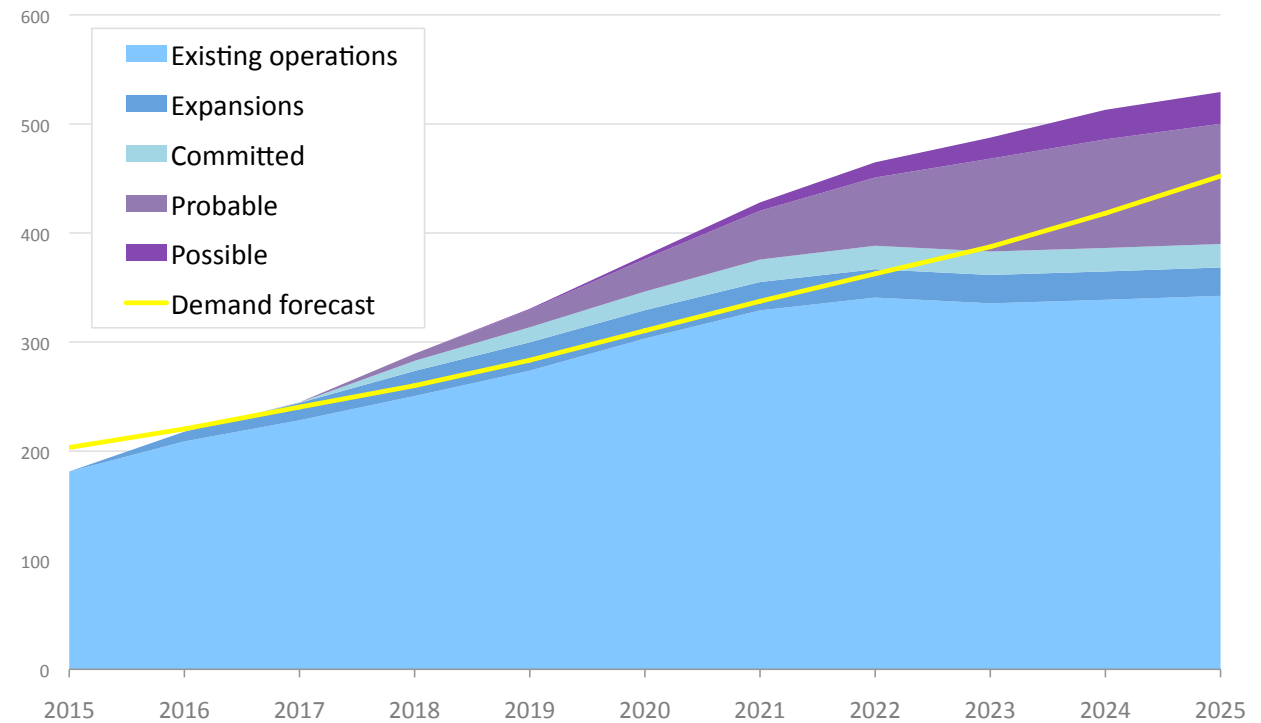
* Lithium carbonate equivalent



Lithium supply and demand balance

- Hard rock vs brine
- Speed to market
- Scalability
- Marketing / off-take arrangements
- Note existing operations which are in ramp up phase

Lithium supply and demand forecast (thousands of tonnes of LCE*)



Existing producers to dominate. Limited room for new entrants.

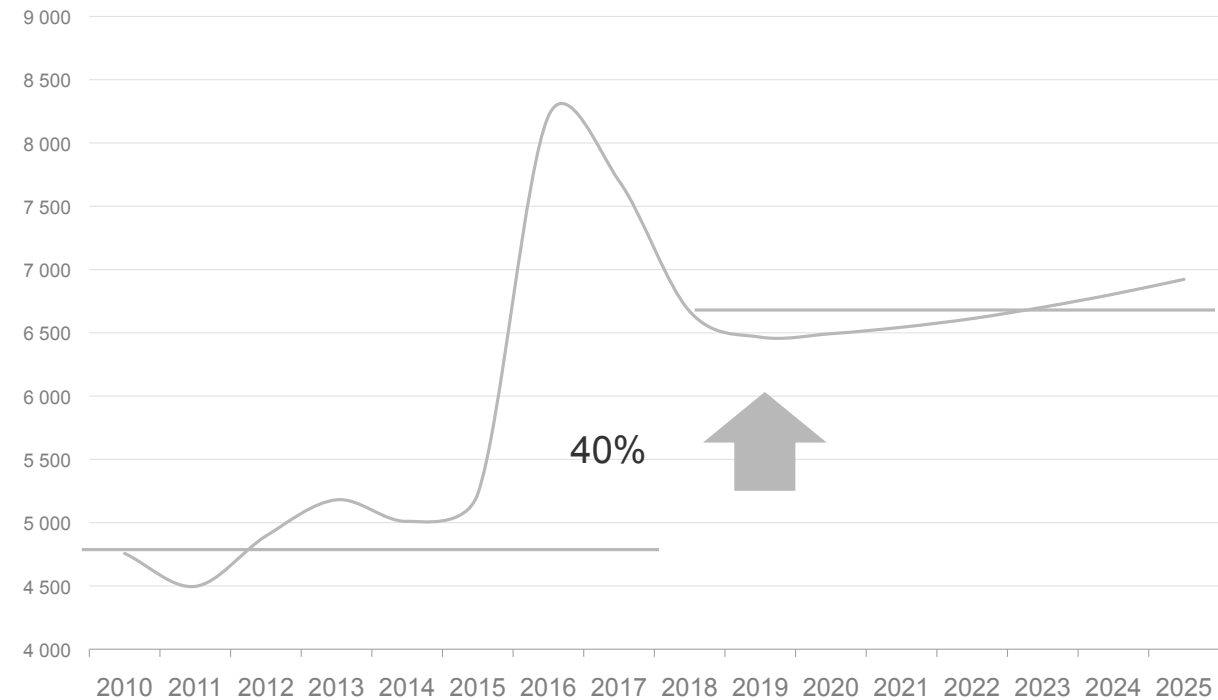
* Lithium carbonate equivalent



Positive outlook for lithium prices

- Strong demand growth will support prices and encourage capital investment
- Rising share of production from hard rock mines will increase long run marginal costs
- Balance will be volatile as delays drag on supply and lumpy new production comes on stream
- Research and development likely to increase economically available deposits

Lithium carbonate equivalent (US\$/tonne, nominal)

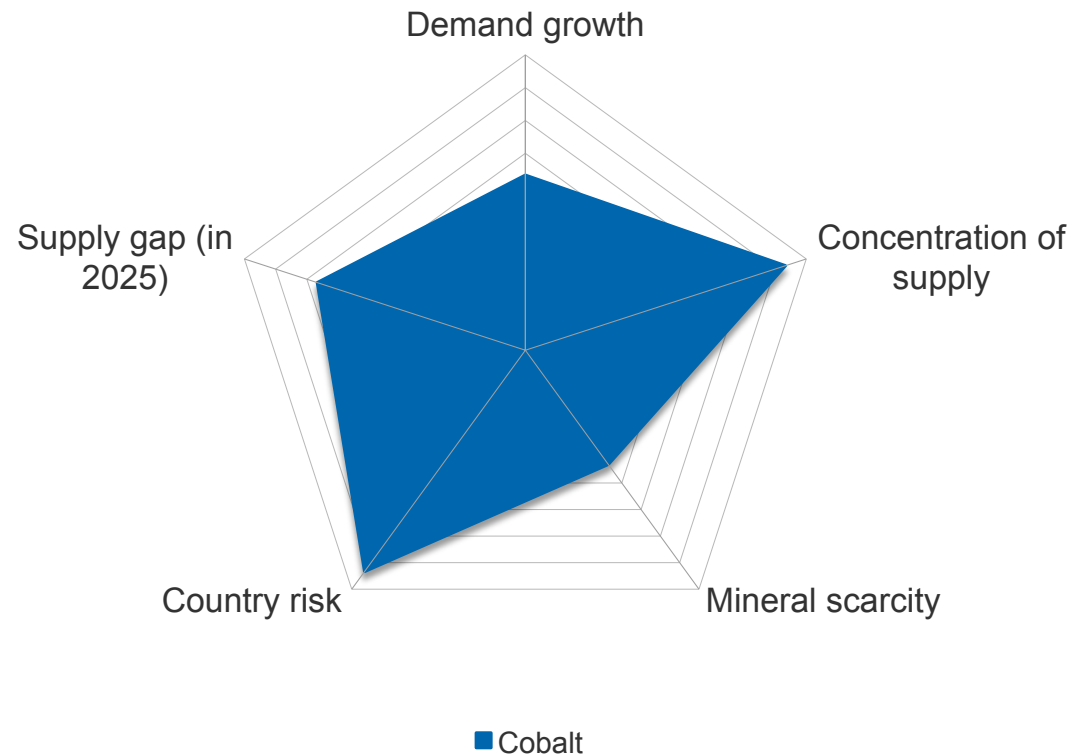


Volatile outlook as industry learns to live with high growth rates



Cobalt - the metal we can't live without

- Strong demand growth forecast average CAGR 5.3% 2016 - 2025
 - 6.2% in chemicals (batteries)
 - 3.8% in industrial
- Cobalt story not all about demand
- Supply has interesting features with markedly different geological and political background
- Source – no primary Cobalt also major factor

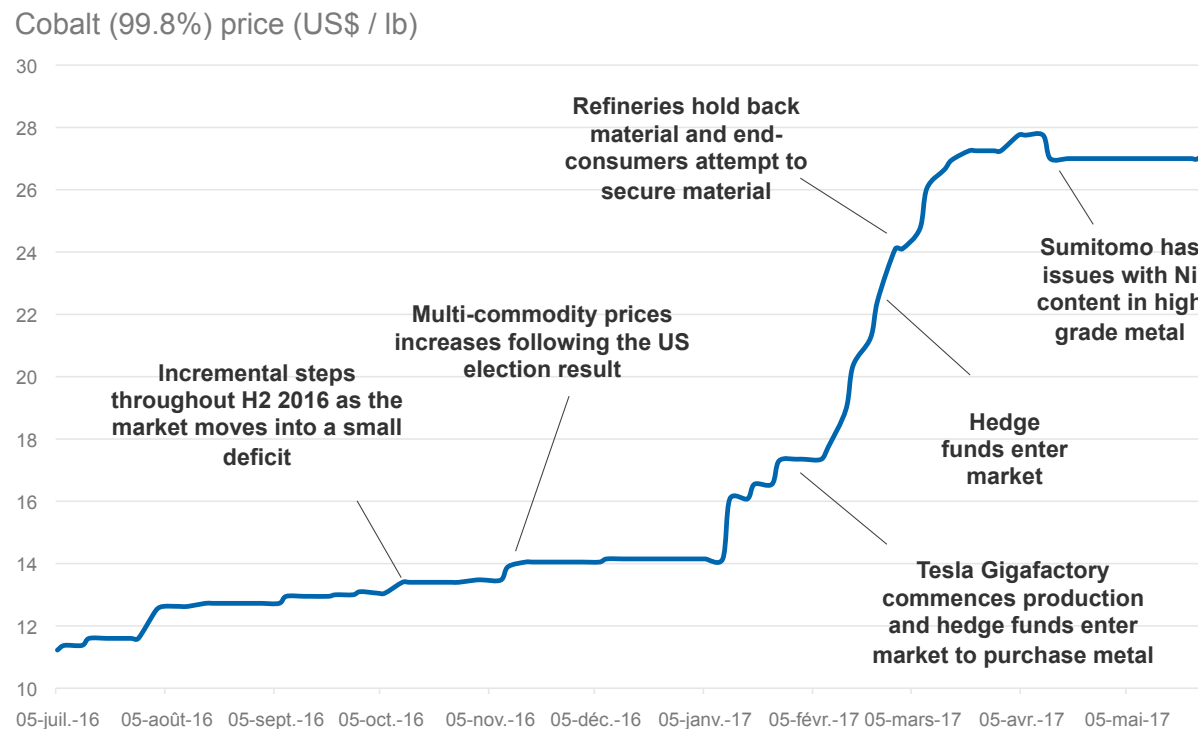


Sustained volatility, continued higher prices, political concerns



A fly up in the cobalt price was predictable

- Cobalt has performed strongly in 2017
- A number of factors lead to the fly up in price
 - Publicity
 - Technical squeeze
 - Interest of speculators



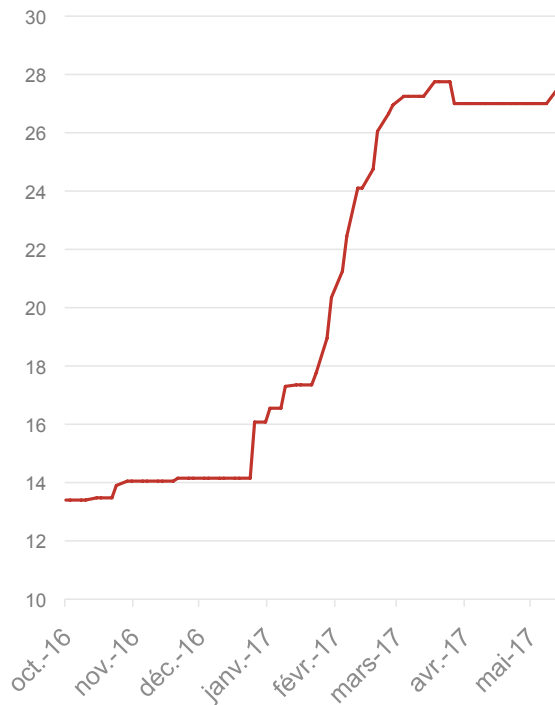
Data: CRU

When is a fly up the start of a trend?

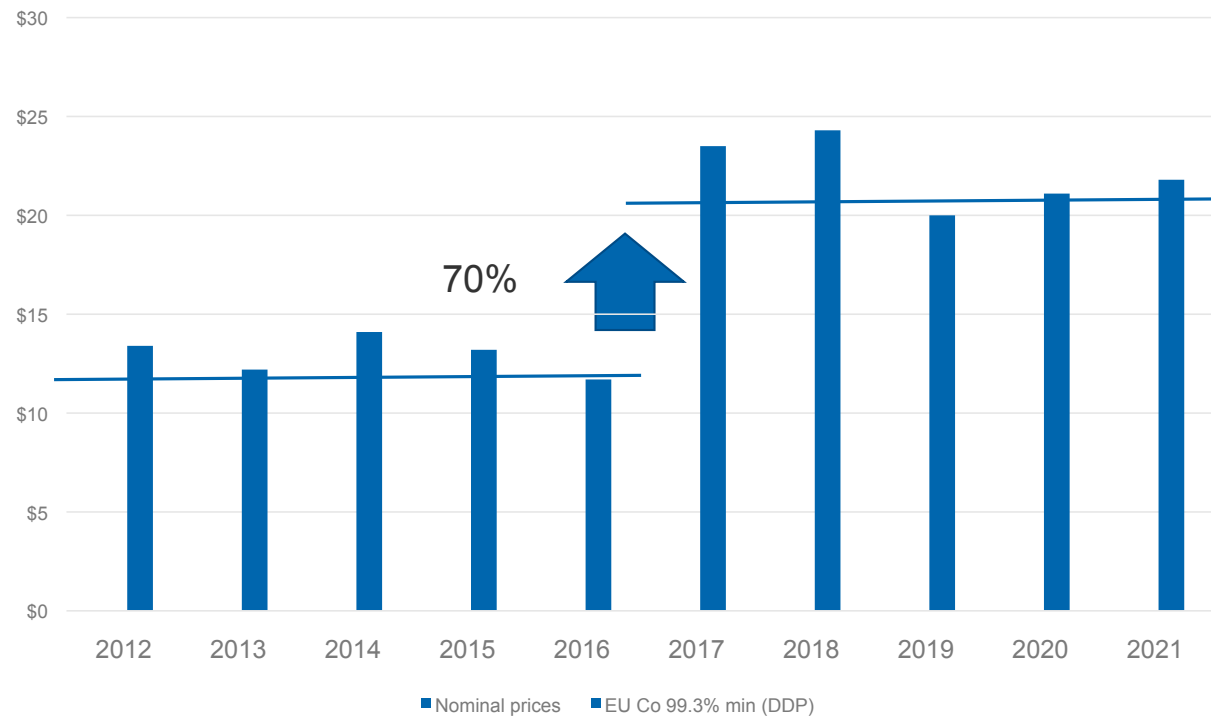


Market fundamentals have changed

Cobalt (99.8%) Price US\$ / lb



Average Annual Price of Cobalt (US\$/lb)



Higher prices are here to stay



Summary on Nickel, Lithium and Cobalt

Exogenous

Endogenous

Policy / Politics

Geology

Technology

Industry
structure

Finance

Supply Chain
Linkages

Weather

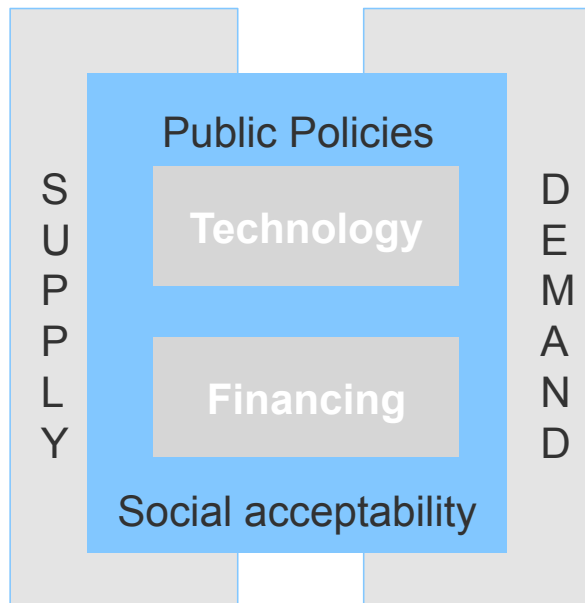
Supply
response

- Nickel's hangover continues
 - Battery demand a bright spot
 - Politics will become increasingly important
- A demand led boom in cobalt and lithium
- Lithium can react
 - Speed of deployment of capital a concern
- Cobalt can't react
 - demand likely to be tempered by substitution
 - risk of fly-ups remains high
- Individual political decisions can still have a huge impact on the existence and duration of temporary fly ups
- Long term political trends will have a much bigger impact on demand

High growth end market; very different fundamentals



Conclusion on Political and Social Responsibility



- Increasing impact of policy on demand
- Citizens health will be a significant driver
- Tools to be used by governments come in various categories
 - Encourage vs deter
- Industry will need to determine the solution
- Supply side needs to work with industry to ensure no shortages and that long term sustainable supply is developed

Policy will be the greatest driver of demand changes



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