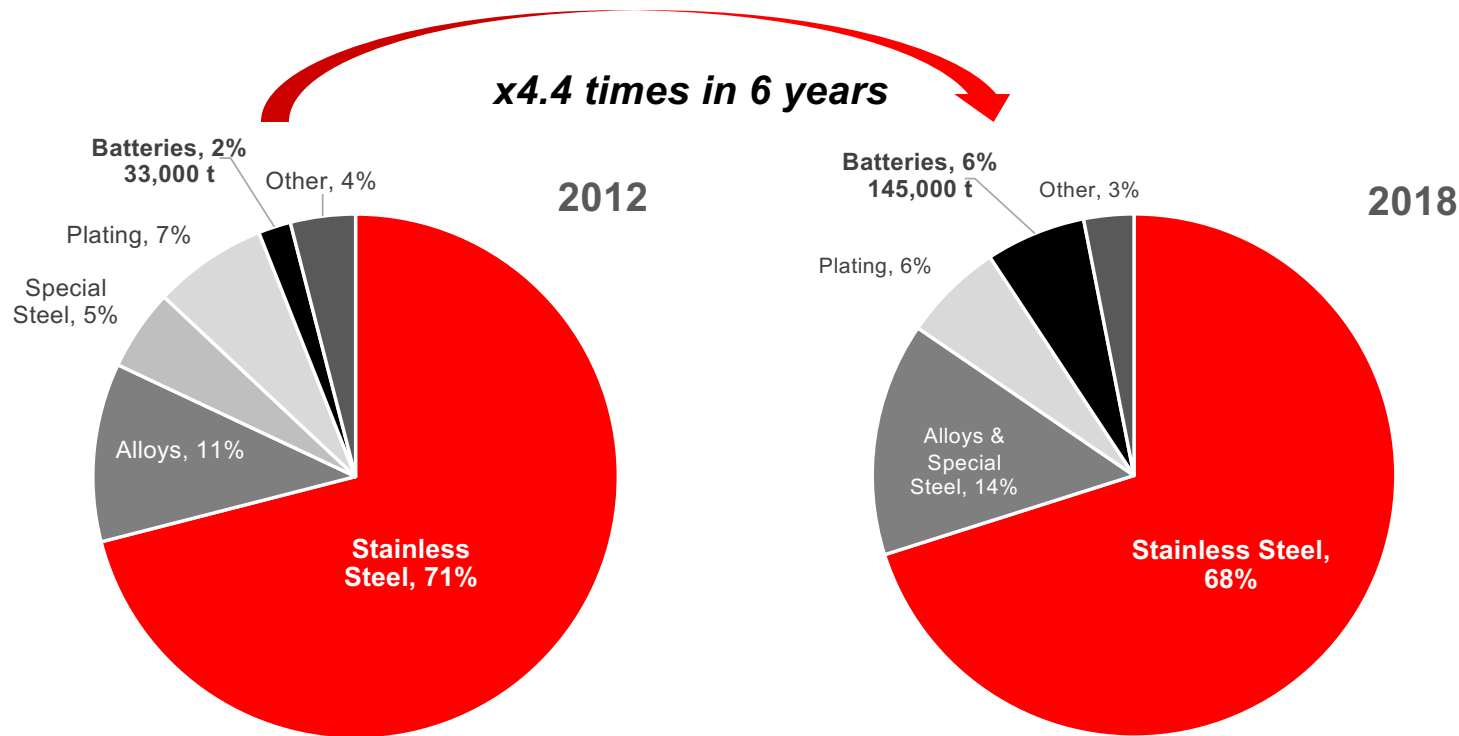


Mining for the Future: Nickel and Copper Outlook

TERRA
STUDIO

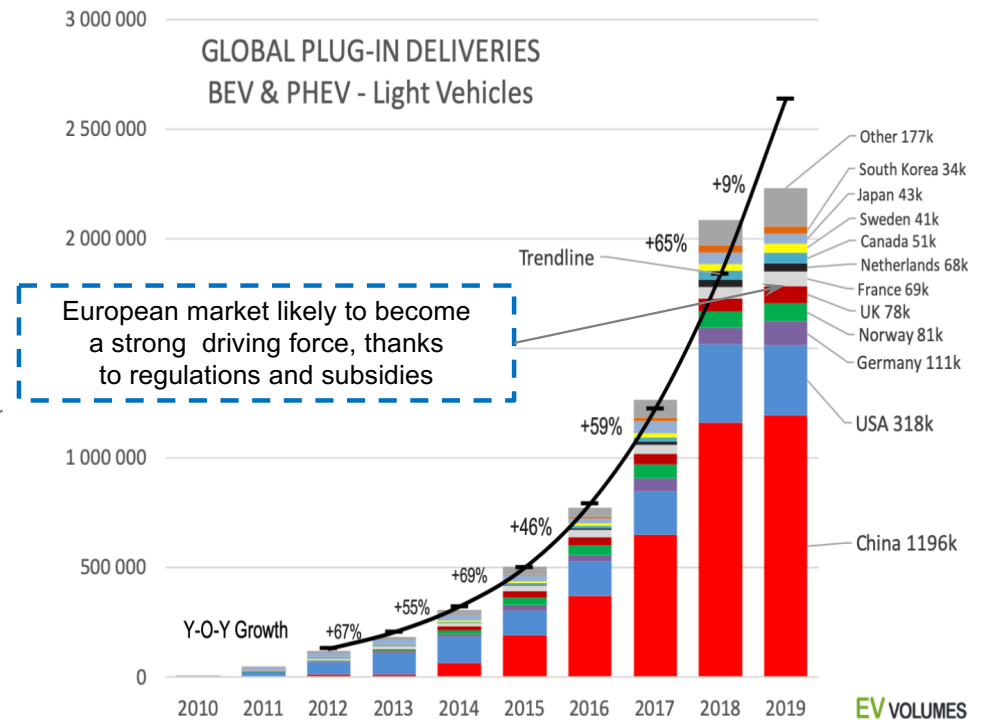
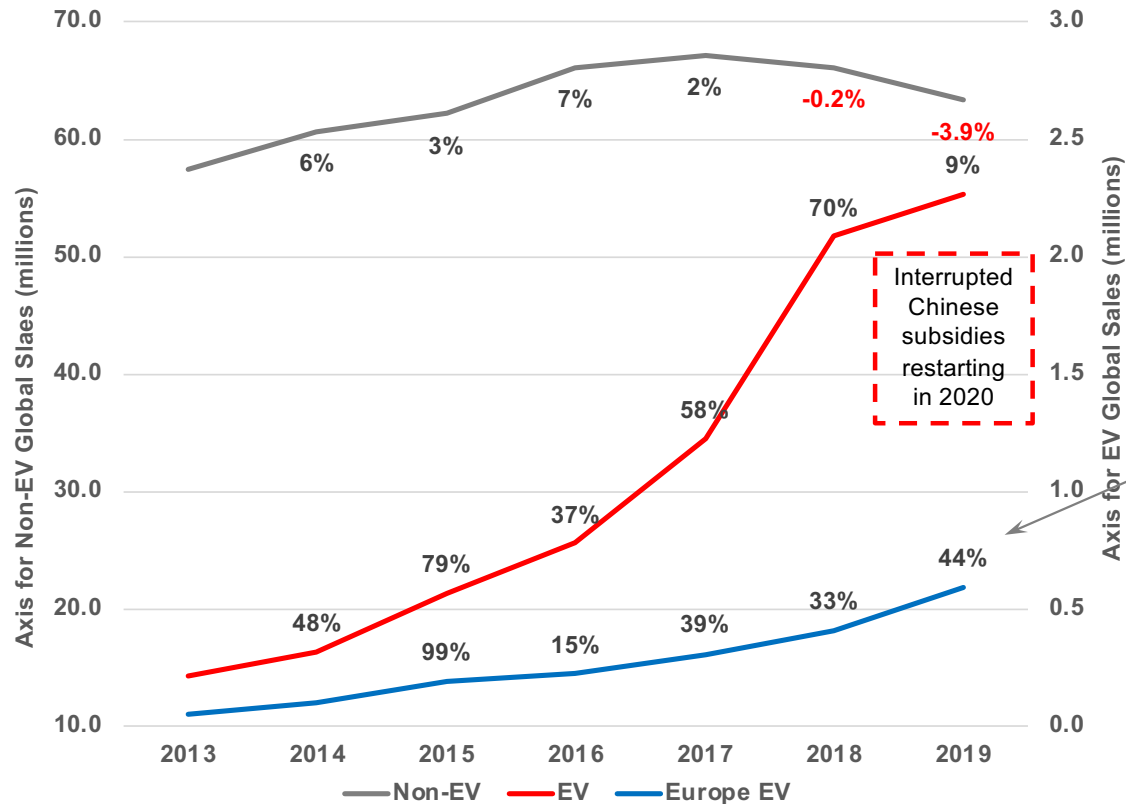
JF BERTINCOURT
7TH JULY 2020

Nickel Demand by End-Use



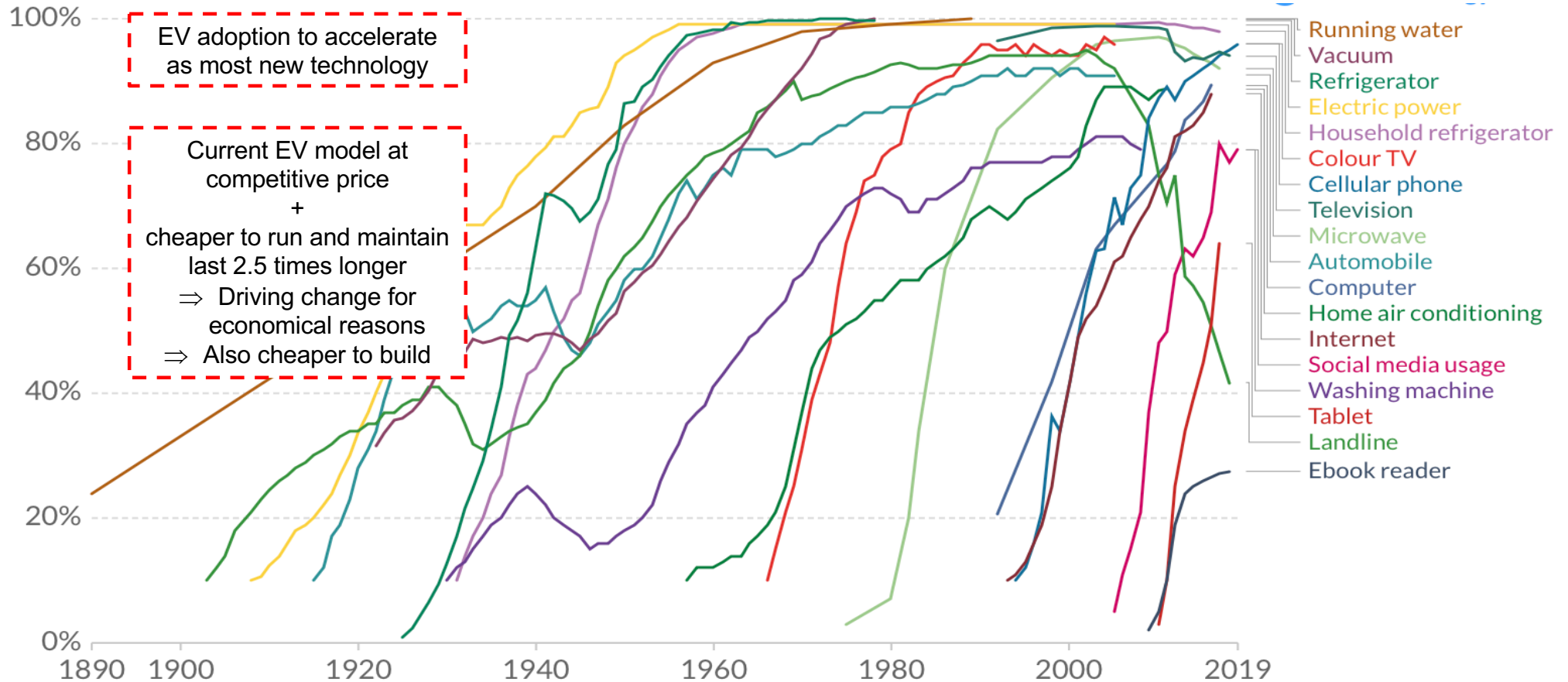
- ❑ Stainless steel still represents close to 70% of the nickel demand
- ❑ Nickel demand from batteries growing very strongly but from a low base

Global Non-EV and EV Sales



Source: EV-Volumes.com, Terra Studio

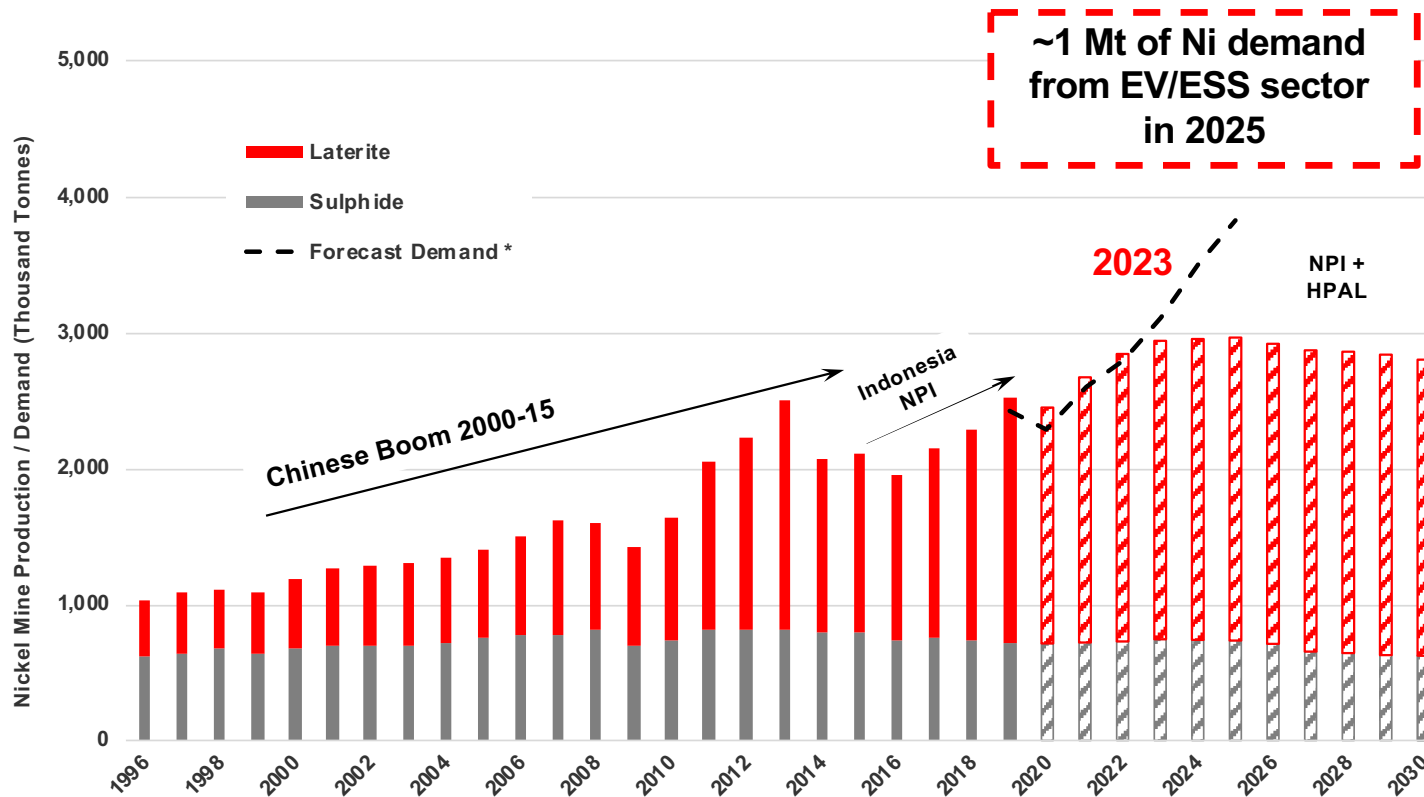
EV Adoption to Accelerate



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

Potential Nickel Scenario

Nickel Mine Production by Mine Type and Forecast Demand



**~1 Mt of Ni demand
from EV/ESS sector
in 2025**

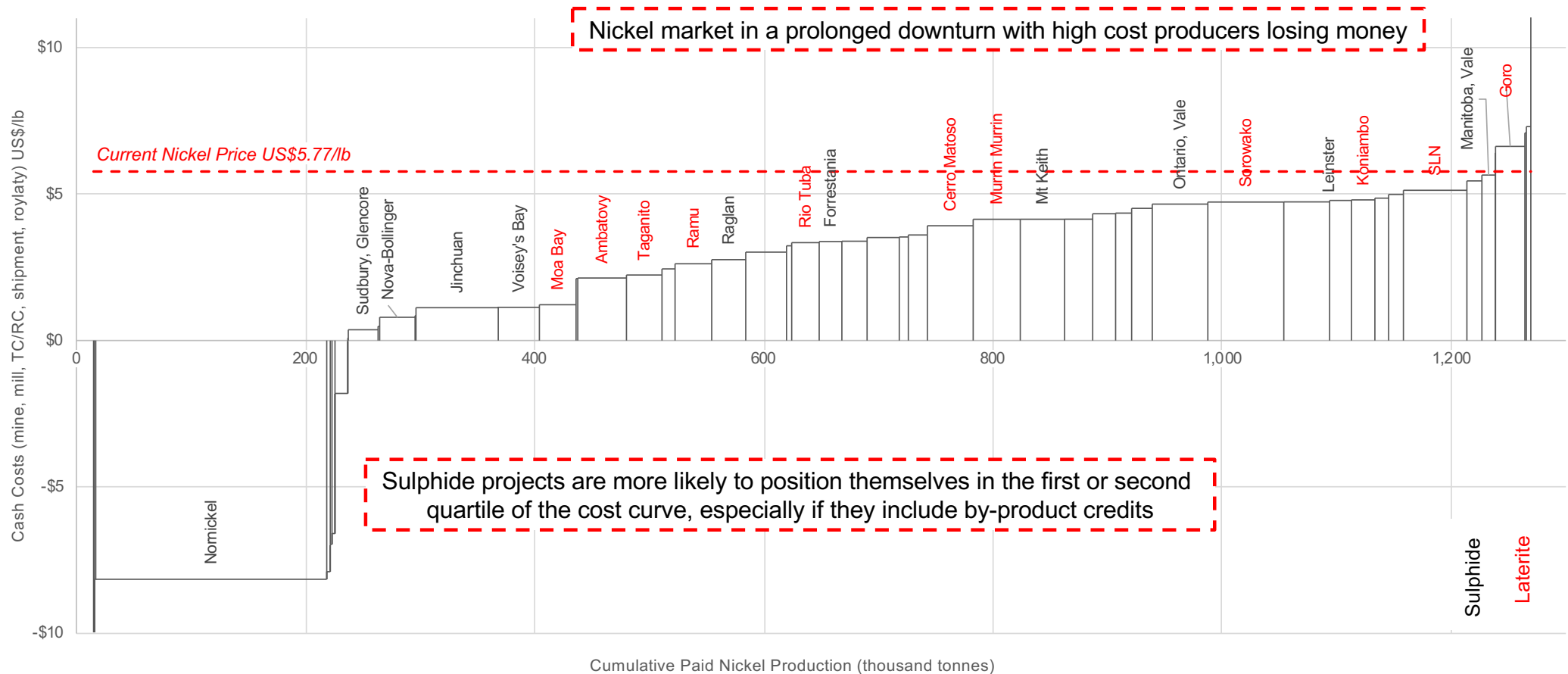
2023

**NPI +
HPAL**

- ❑ 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\$16,000/t
- ❑ Potential new nickel price boom from 2023

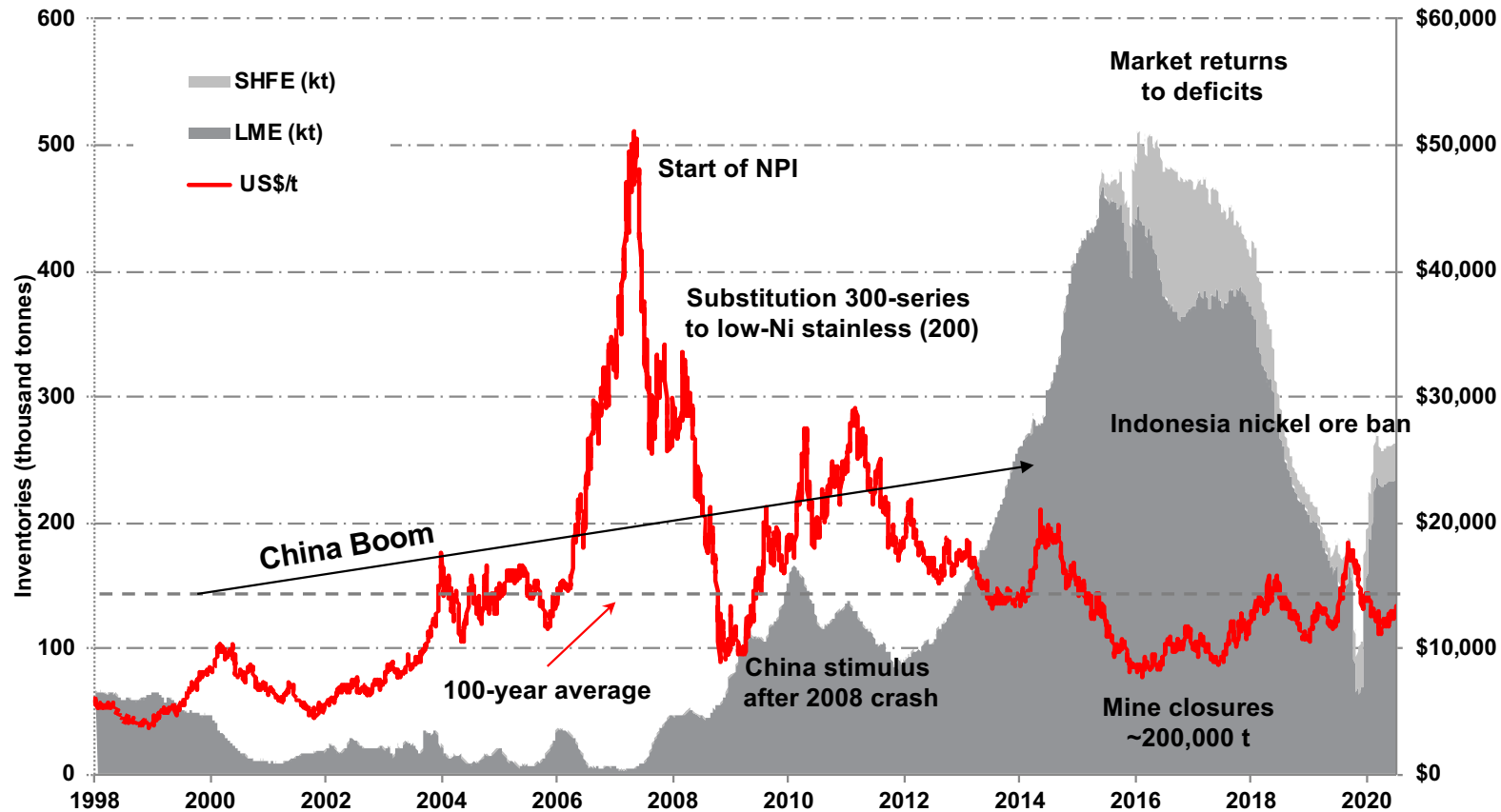
Source: INSG, Terra Studio. * based on the assumption that all new car sold are electric by 2025, in a reduced size market: 55 million vehicles x 14kg Ni per vehicle = 770,000 t; +25% for Energy Storage Systems and other batteries = ~ 1 Mt

Nickel By-Product Cost Curve



Source: S&P Global covers 53% of global recovered nickel production, Terra Studio

Nickel Boom and Bust Metal



- Considering past history, nickel prices are more likely to come out of a downturn with a spike than to follow a gentle uptrend
- Recent build-up of inventories have pushed the potential price boom further by a couple of years to our 2023 estimate

Source: LME, SHFE, Terra Studio

Australian Nickel Sector (ASX-Listed)

AUSTRALIAN NICKEL SECTOR (ASX-listed or asset in Australia)

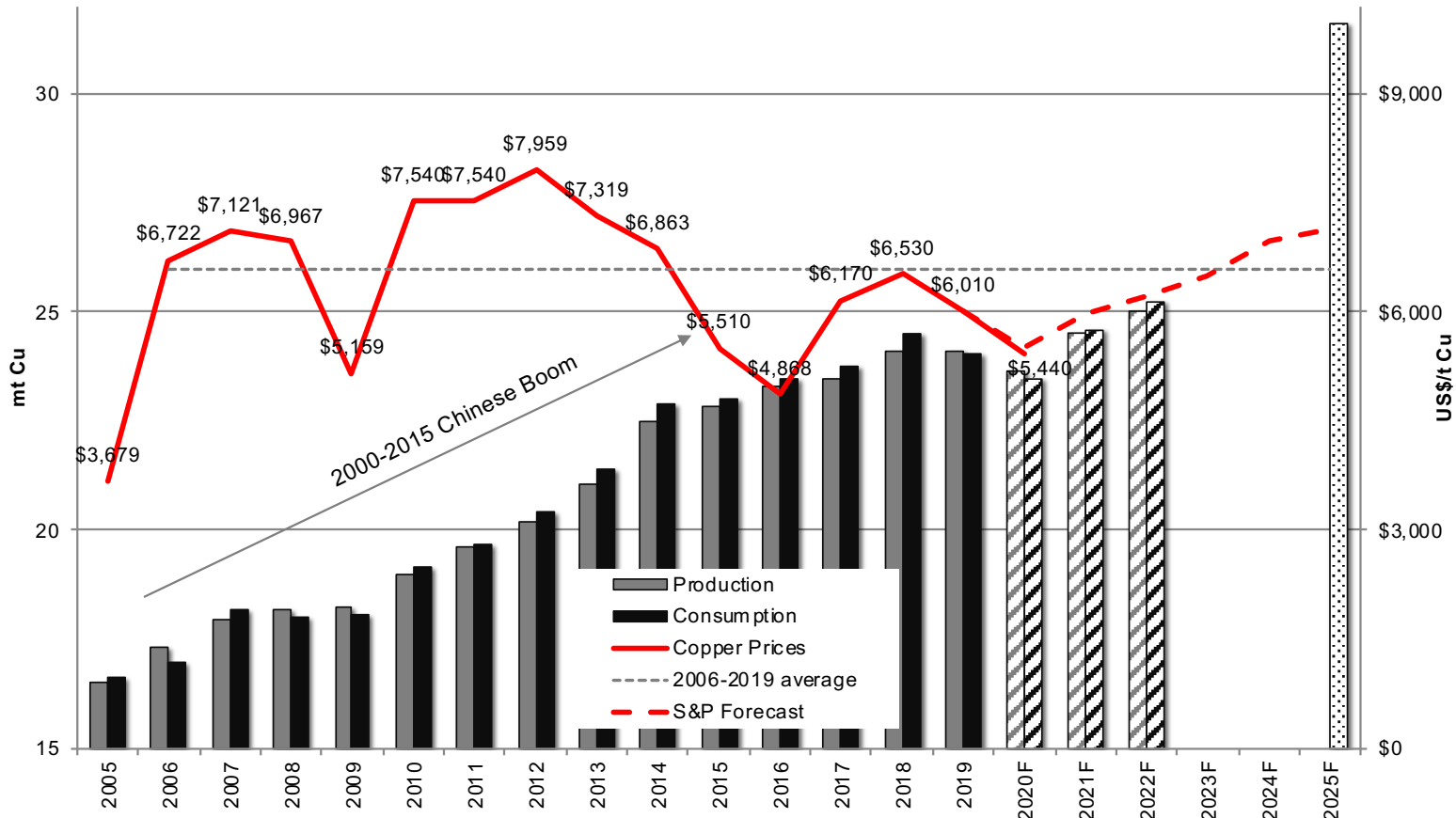
As at 6-Jul-2020

| Code | Company | Share Price | Week | YTD | 52 Week Range | Market Cap (A\$m) | Type | Project |
|--------------------------------------|-----------------------|-------------|-------|-------|---------------|-------------------|----------|--|
| PRODUCERS | | | | | | | | |
| BHP | BHP Group | 35.650 | ▲ | 1% | (8%) | 167,969 | Sulphide | Nickel West division, WA |
| IGO | Independence Group | 5.010 | ▲ | 6% | (20%) | 2,960 | Sulphide | Nova mine, WA |
| WSA | Western Areas | 2.700 | ▲ | 4% | (11%) | 740 | Sulphide | Forrestania mine, WA |
| NIC | Nickel Mines | 0.595 | ▲ | 7% | (7%) | 416 | Laterite | Hengjaya mine + NPI, Indonesia |
| PAN | Panoramic Resources | 0.074 | ▼ | (10%) | (70%) | 152 | Sulphide | Savannah mine, WA |
| AVQ | Axiom Mining | 0.025 | Susp. | 0% | 0% | 13 | Laterite | Isabel mine, Solomon Islands |
| HOLDING COMPANY | | | | | | | | |
| ZER | Zeta Resources | 0.180 | ▲ | 20% | (42%) | 52 | Sulp+Lat | Holding Co PAN+GME |
| EXPLORATION & DEVELOPMENT | | | | | | | | |
| LEG | Legend Mining | 0.135 | — | 0% | 50% | 341 | Sulphide | Mawson project, Fraser Range, WA |
| MCR | Mincor Resources | 0.760 | ▼ | (2%) | 17% | 281 | Sulphide | Kambalda+Long mines, WA |
| CHN | Chalice Gold Mines | 0.920 | ▲ | 5% | 309% | 279 | Sulphide | Julimar project, WA |
| RXL | Rox Resources | 0.085 | ▲ | 2% | 227% | 169 | Sulphide | Leinster area, WA |
| CTM | Centaurus Metals | 0.500 | ▲ | 11% | 156% | 131 | Sulphide | Jaguar project, Brazil |
| JRV | Jervois Mining | 0.175 | ▲ | 17% | (15%) | 112 | Laterite | Nico Young project, NSW |
| CLQ | Clean Teq | 0.135 | ▼ | (4%) | (34%) | 101 | Laterite | Sunrise project, NSW - DFS Jun 2018 |
| POS | Poseidon Nickel | 0.029 | ▲ | 7% | (37%) | 77 | Sulphide | Black Swan + others, WA |
| CZI | Cassini Resources | 0.175 | ▲ | 6% | 92% | 75 | Sulphide | West Musgrave JV with OZL, WA - PFS Feb 2020 |
| SGQ | St George Mining | 0.120 | — | 0% | (11%) | 60 | Sulphide | Mt Alexander project, WA |
| BSX | Blackstone Minerals | 0.225 | ▲ | 29% | 50% | 57 | Sulphide | Ban Phoc mine, Vietnam |
| GAL | Galileo Mining | 0.245 | ▲ | 20% | 81% | 35 | Sulphide | Fraser Range, WA |
| ARL | Ardea Resources | 0.285 | ▲ | 4% | (44%) | 33 | Laterite | Goongarrie project, WA - PFS Jul 2018 |
| AUZ | Australian Mines | 0.009 | ▲ | 6% | (40%) | 33 | Laterite | Sconi project, QLD - DFS Nov 2018 |
| DKM | Duketon Mining | 0.195 | ▲ | 18% | 26% | 23 | Sulphide | Duketon Belt, WA |
| GME | GME Resources | 0.037 | ▼ | (3%) | (38%) | 19 | Laterite | NiWest project, WA - PFS Aug 2018 |
| PIO | Pioneer Resources | 0.012 | ▲ | 9% | 0% | 18 | Sulphide | Kalgoorlie area, WA |
| DRE | Dreadnought Resources | 0.007 | ▲ | 8% | 0% | 14 | Sulphide | Taraji-Yambi project, WA |
| BAR | Barra Resources | 0.018 | ▲ | 6% | (18%) | 11 | Laterite | Mt Thirsty Co-Ni project, WA - PFS Feb 2020 |
| AOU | Auroch Resources | 0.054 | ▲ | 8% | (11%) | 10 | Sulphide | Saints and Leinster projects, WA |
| MAN | Mandrake Resources | 0.028 | ▲ | 12% | 100% | 7 | Sulphide | Jimperding project, WA |
| PM1 | Pure Minerals | 0.014 | — | 0% | (13%) | 6 | Laterite | DNI process implementation, QLD |
| CZN | Corazon Mining | 0.002 | — | 0% | (20%) | 5 | Sulphide | Lynn Lake project, MT |

Source: Terra Studio

- ❑ Sulphide projects attract much higher market valuation even at an earlier stage of development
- ❑ Companies with sulphide projects typically have performed better so far this year

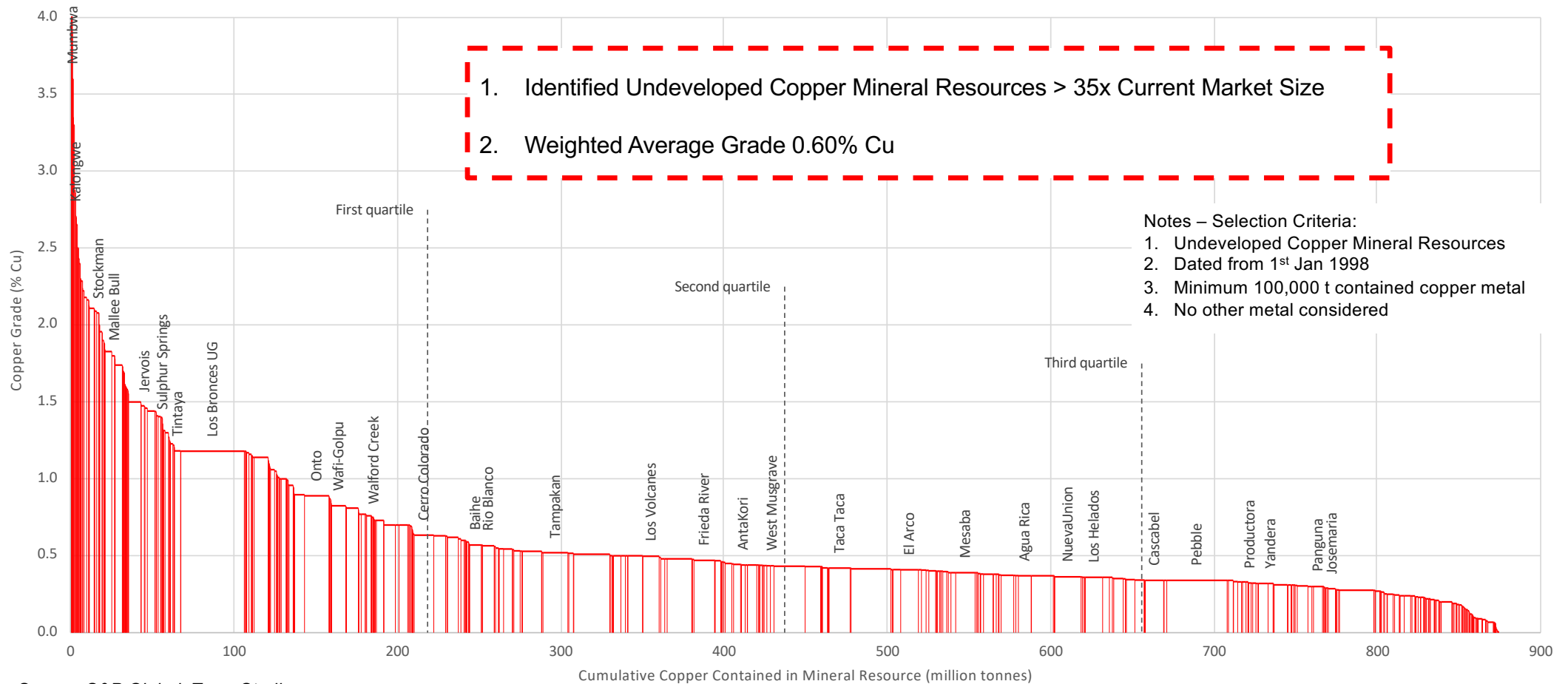
Copper Market Characteristics



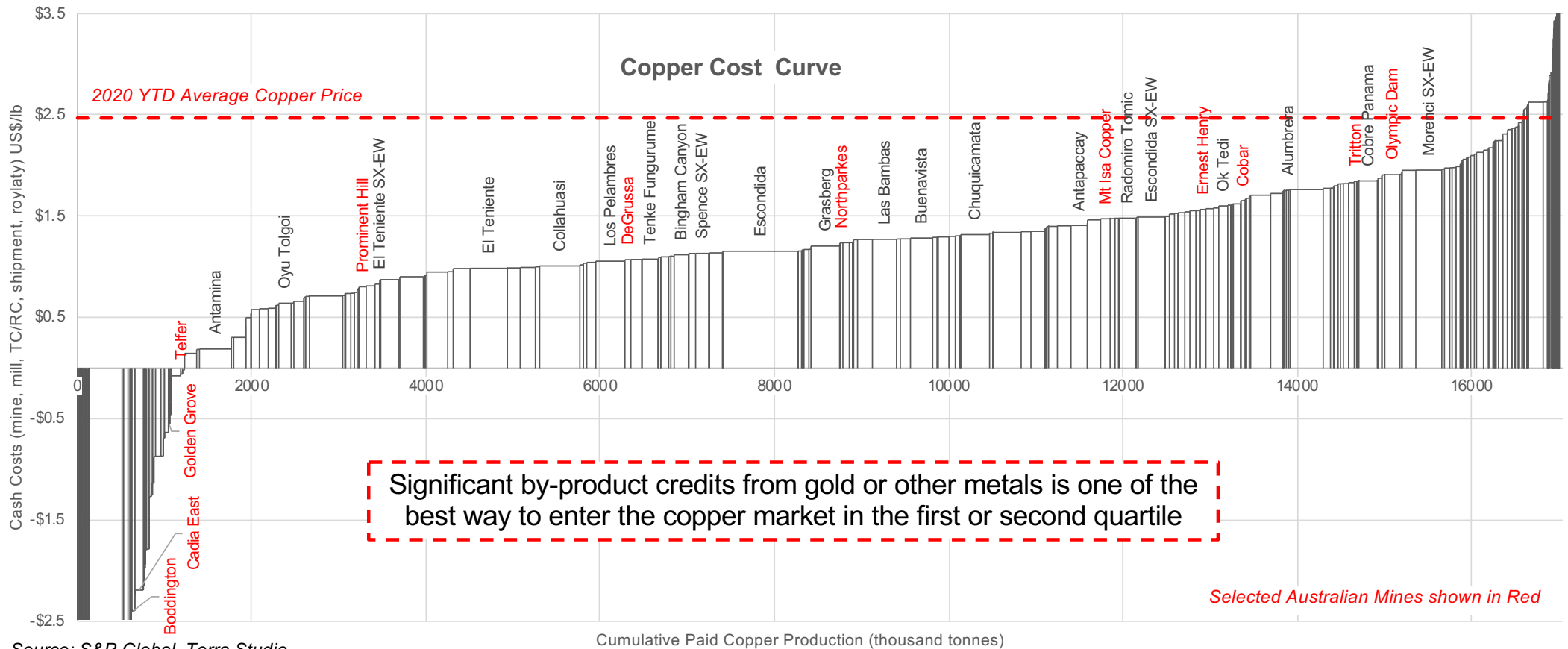
- 25 million tonnes of copper metal consumed per year (~10x the size of the nickel market)
- Step change in copper prices in 2005-2006
- New long-term average: ~\$6,600/t or \$3.00/lb
- Market deficit/surplus < 1% of market size
- 50 large mines (out of 400, or 12.5%) produce more than 50% of the copper mine production

Source: ICSG, S&P Global, Terra Studio. 2025 demand forecast based on the assumption that all new car sold are electric by 2025, in a reduced size market: 55 million vehicles x 67kg additional Cu per vehicle = 3.7 Mt; +25% for Energy Storage Systems and other batteries = ~ 4.6 Mt

Undeveloped Copper Resources

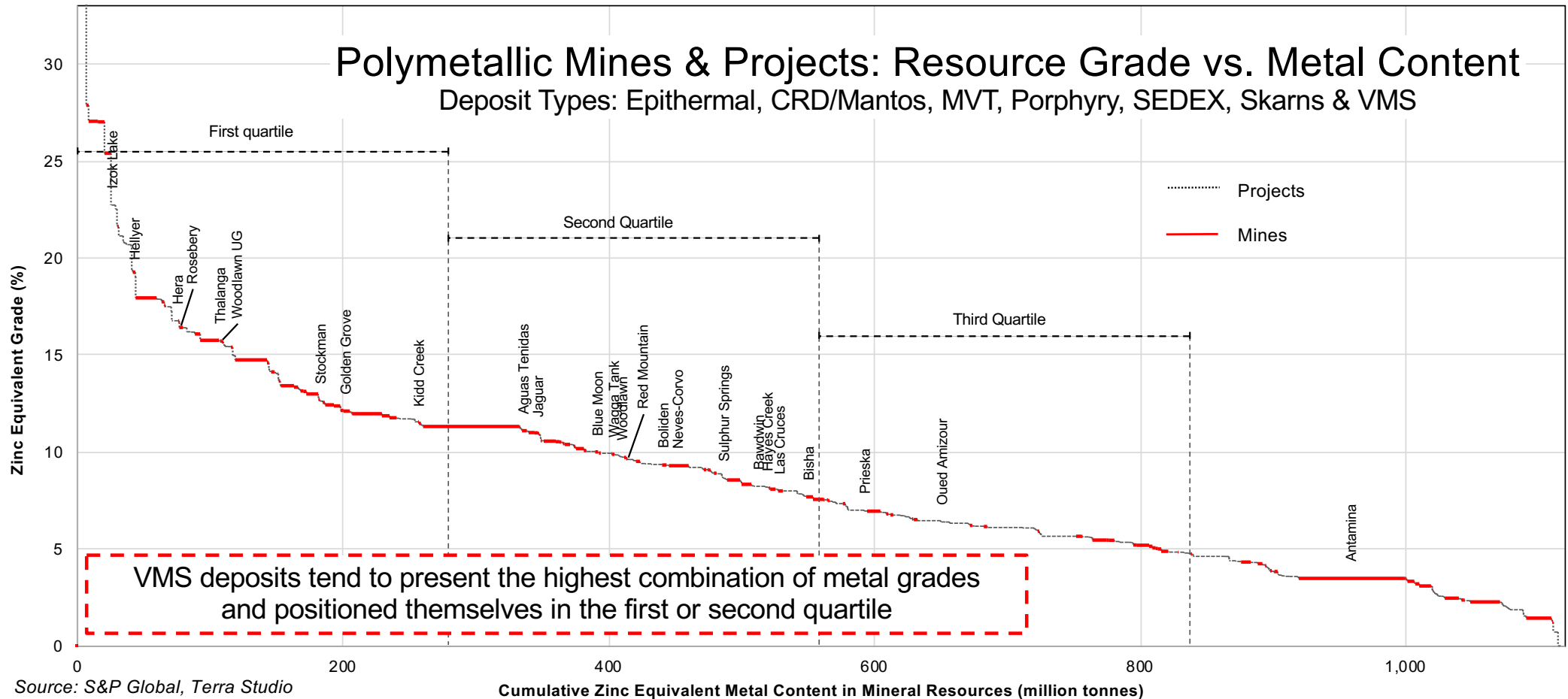


Copper By-Product Cost Curve



Source: S&P Global, Terra Studio

Polymetallic Projects





Contact Details

J-François Bertincourt

Geological Engineer, MAusIMM, GAICD

📞 +61 406 998 779

✉ jf@terrastudio.biz

💻 www.terrastudio.biz

TERRA
STUDIO