How will electric vehicles transform the copper industry?

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A revolution in copper demand?

The automotive industry appears to be on the cusp of a paradigm shift from the internal combustion engine (ICE) to electric vehicles (EV). With capital costs plummeting, and governments around the world extending generous subsidies and other support to EVs ahead of outright bans planned in many countries in the medium and long term (see Figure 1 for details), EV sales are expected to boom in the coming years.

Figure 1 Planned government phase-outs of ICE sales

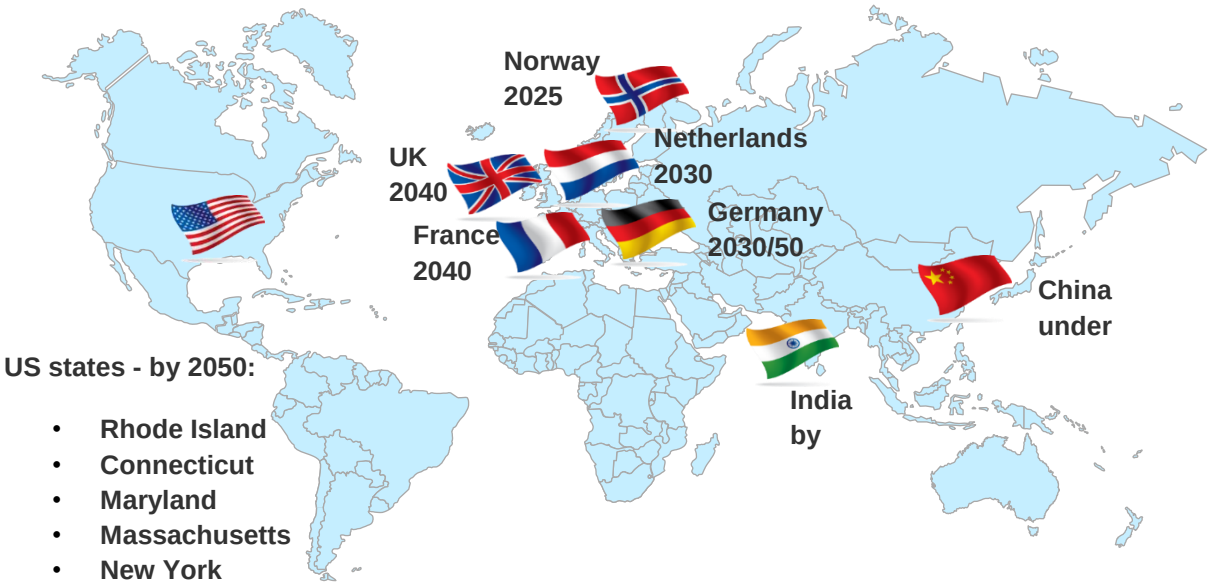
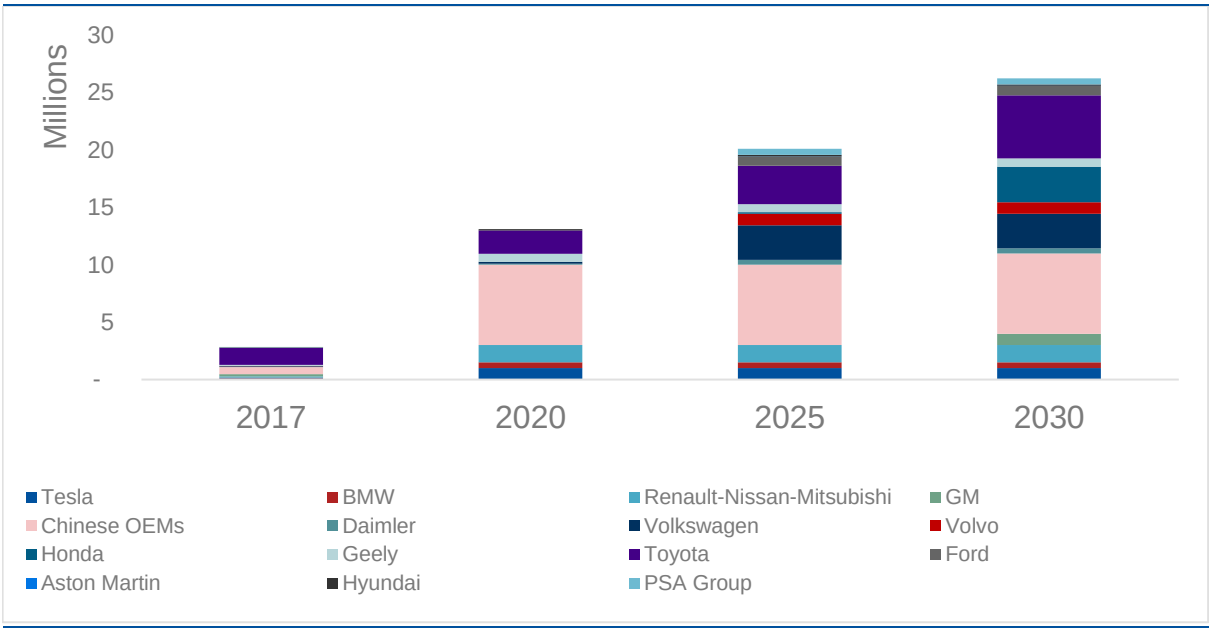


Figure 2 Global EV sales based on companies' announcements

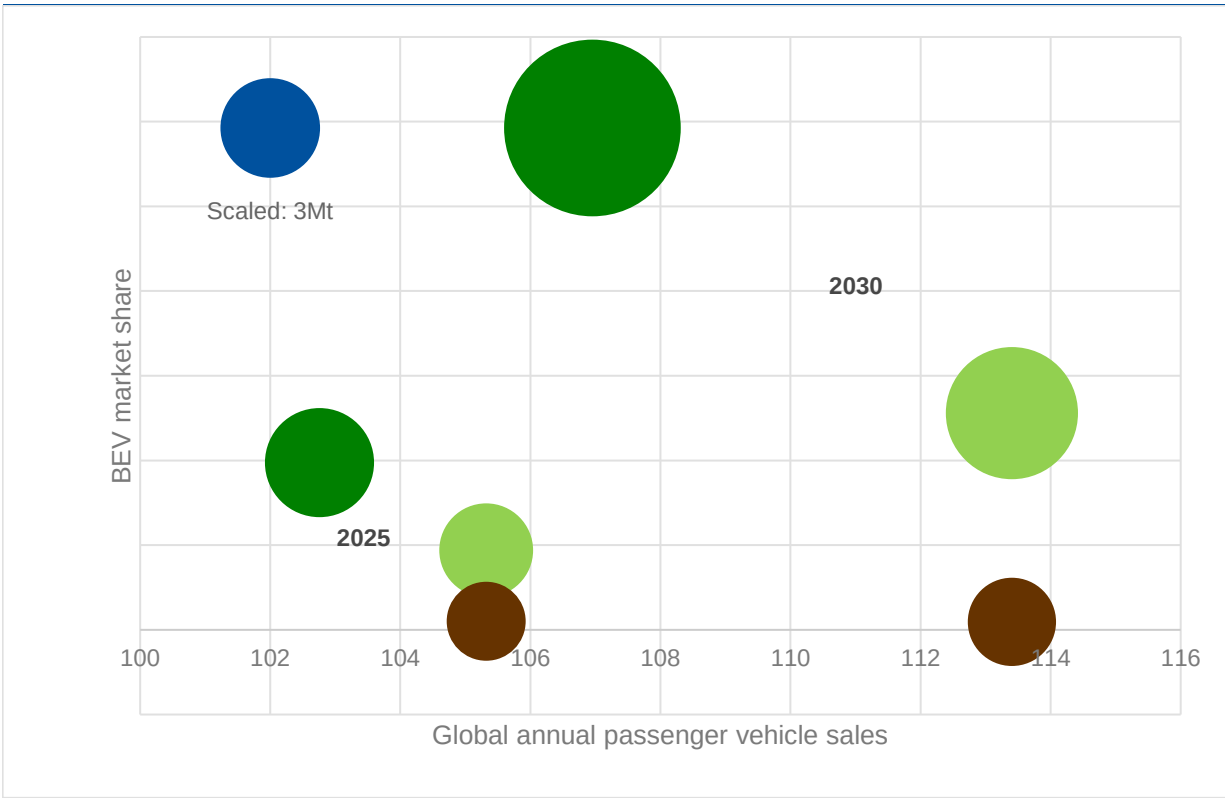


Auto manufacturers – and the battery related supply chain – are preparing strategic plans and investment programmes to transform EV production capacity and EV product offerings, further confirming the likelihood of an impending structural shift. Figure 2 summarises the EV sales being targeted by the major vehicle manufacturers, demonstrating a potential 4-fold increase in the size of the EV market by 2020 relative to 2017.

A shift to electric vehicles could have major implications for the copper market. Battery electric vehicles (BEVs) contain as much as 80kg – more than double the amount of some hybrids and 3 -4 times that of a typical ICE. In addition, substantial – highly copper intensive – investment in power distribution and charging infrastructure would be required to support the build out of the EV fleet (and wider renewable policy objectives).

To explore these impacts, CRU have developed scenarios representing impacts differing degrees of low carbon transition (outlined further in Box 1). In terms of market impacts, we find that incremental copper demand rises by more than several million tonnes by 2030 in the green compared to the brown scenario. The auto market and copper demand impacts of these scenarios are shown in Figure 3.

Figure 3 Copper demand by global LDV sales and BEV market share (Mt)

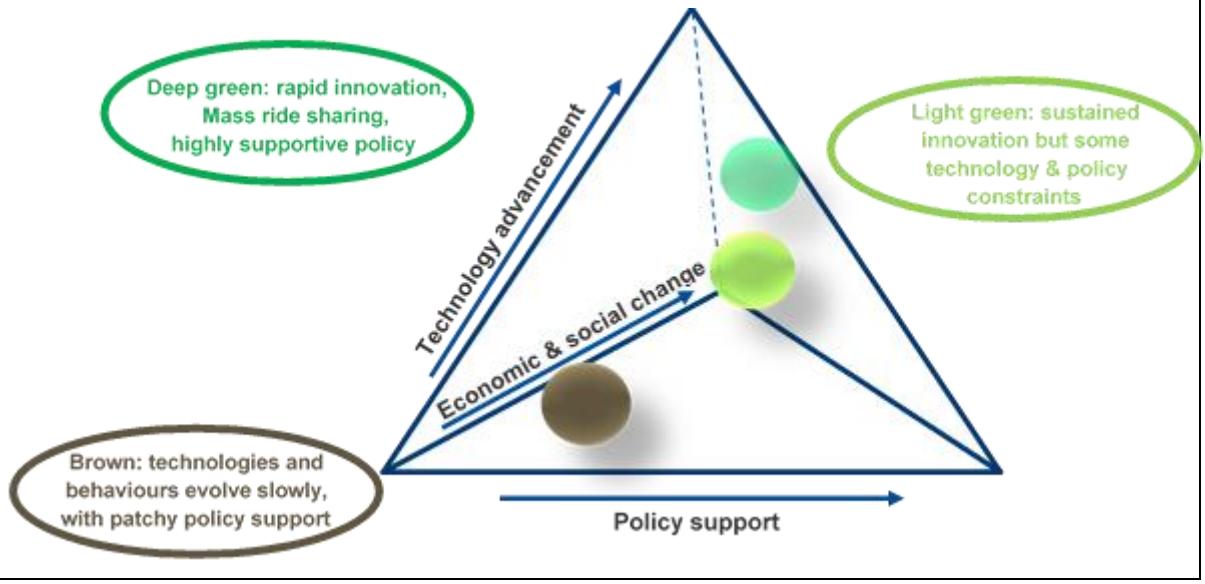


Size of bubble illustrates annual copper demand

Box 1: Low carbon transition scenarios:

As part of CRU's cutting-edge demand analysis, we have developed and robustly evaluated two internally consistent scenarios – termed "light green" (our base case view) and "deep green" – relating to potential future economic, technological and policy drivers bearing on low carbon transition (depicted graphically below).

Both green scenarios assume substantial transformation of transport and power markets, with widespread uptake of EVs and renewable generation technologies, supported by policies and – particularly in the deep green world – adaptive consumer behaviours, such as a greater incidence of ride sharing. We have also developed a "brown" scenario, in which public support for EVs wavers, policy is reversed, and EVs fail to gain market share beyond current levels.



What does this mean for supply and industry investment?

The global copper industry experienced 5 consecutive years of declining or flat capital investment prior to a modest uptick last year. Coupled with robust demand, this is fuelling anticipated market tightness in the medium term. Under our light green case, for example, CRU forecast an emerging market imbalance – reversing the current supply surplus – of around 400 thousand tonnes by 2022 (see, for example, Figure 4).

Figure 4 World refined copper supply/demand balance, light green scenario

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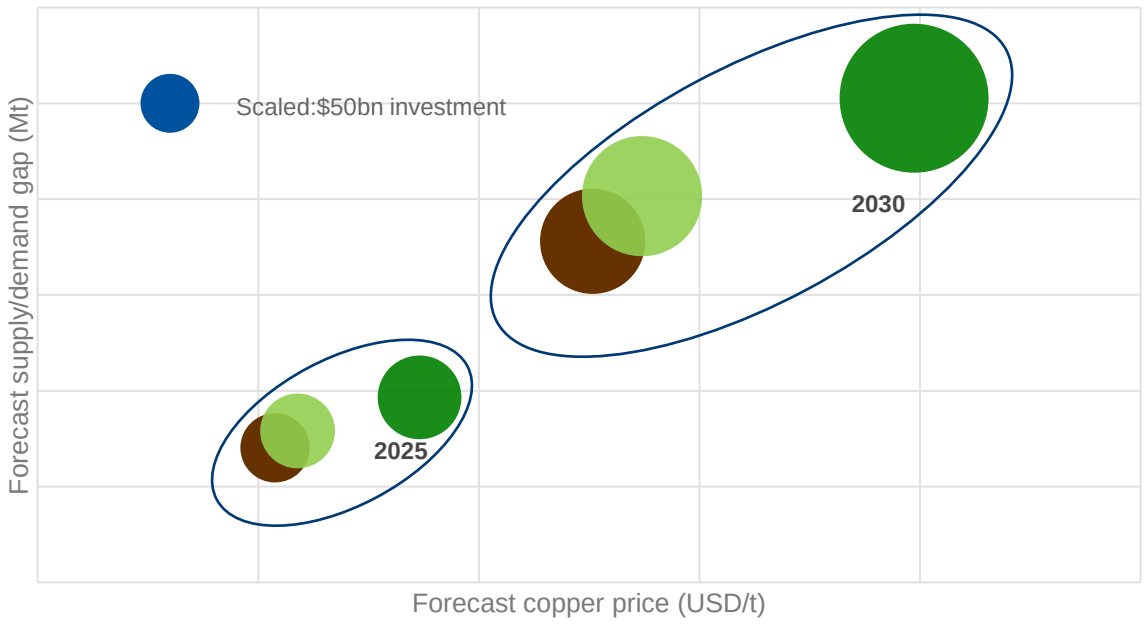
The new influx of demand associated with low carbon transition will exacerbate these issues, particularly in the longer term, resulting in additional price support to incentivise the necessary project investment. Figure 5, for example, illustrates the potential future market shortfalls under different green futures, and our expectations of the extent of future prices increases required to close these gaps (the size of the bubbles is indicative of the growing investment requirements).

Figure 5 Total capital expenditure by supply/demand gap and incentive price (billion USD)



Size of bubble illustrates annual copper related upstream investment

A complex picture

The copper industry is at another inflexion point following a China-led boom in the early 2000s and a subsequent correction in industry investment following the 2011 price peak. With the long run copper intensity of economic growth set to be stimulated by EVs and a greening of global power sectors – potentially markedly under some future scenarios – the need for, and possible returns to new investment in the industry is becoming clearer. However, despite some positive long run signs on the demand side, the picture remains subject to considerable uncertainty.

A number of key questions which warrant potentially close consideration in the context of appraising future market conditions bearing on investment or contracting terms include:

- How quickly will EVs transition into a mass market?
- What policy, technological, economic and infrastructural conditions will need to be met to support this transition?
- How does rising demand for battery metals such as cobalt impact copper supply from DRC and elsewhere (and prices)?
- How would upward pressure on the cost of capital impact both project returns and market prices?
- Should downstream customers seek new long term contracting terms or more aggressive hedging in expectation of tighter market conditions ahead?