



# Transportation electrification’s dependency on the materials ecosystem

## MY REMARKS TO COP26 SESSION “SCALING EVS: AN HONEST CONVERSATION ABOUT THE KEY CHALLENGES”

Hosted by National Grid and Octopus Energy



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Amazon-backed Rivian became the 6th most valuable car company as it hit a valuation of more than \$120 billion on its U.S. debut. While this feat is noteworthy, it also poses a looming question: what strain will the increased pace of transportation electrification place on the minerals ecosystem?

There is a growing awareness, albeit still nascent, of an inadequate supply of key minerals to satisfy the demand for transport electrification and the growth of renewable energy. EVs are essentially materials-based, as opposed to fuel-based, and the chip shortage situation places a spotlight on the criticality of the supply chain of materials.

The supply of minerals, which is vital and, in some cases, irreplaceable, must be secure and affordable. It must also be responsibly sourced, with significantly lower environmental impact of extraction and

processing, and a focus on furthering the social and economic prosperity of Indigenous communities in and around projects.

Demand for Minerals among EVs and Traditional Vehicles		
Electric vehicle contain:	Mineral:	Traditional vehicles contain:
70 kg	Copper	20 kg
46 kg	Nickel	4 kg
17 kg	Zinc	10 kg
14 kg	Cobalt	0 kg
12 kg	Lead	10 kg

◀ This table indicates the enormous scale of this increased demand posed by an EVs alone.

## A SET OF COMPLEX AND INTERCONNECTED CHALLENGES, BOTH INTERNAL AND EXTERNAL, IMPACT THE SUPPLY OF THESE MINERALS:

- **The innovation challenge:** presented by the high energy and water intensity of mining and ever lower grades and deeper mines.
- **The 20-year time horizon:** permitting can take 7 to 10 years, while development can take up to 10 years or more.
- **Capital efficiency:** the tension between value destruction (via over-supply) and shareholder returns.
- **Geopolitical risks:** many jurisdictions are challenging politically.
- **The prosperity of Indigenous Peoples:** to ensure benefits flow through to improve social and economic prosperity for these communities.
- **Miners:** different players for different commodities; the majors face different challenges than the juniors.

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There is no one single ubiquitous mining challenge. A one-size-fits-all approach will inevitably fail, as each commodity critical to electrification has different dynamics and players. Given the scale and complexity of this supply chain, I would encourage organizations to think how “whole of ecosystem approaches” are key to accelerating the changes needed.

A powerful example of this is copper. To achieve transport electrification and renewable energy goals, copper annual production must increase from the current 21 million tonnes to 29 million tonnes by 2030, and 42 million tonnes by 2050. Assuming the grade remains at the current 0.5%, that means **two billion plus** additional **tonnes** of rock must be extracted, crushed, and processed annually. The energy and water intensity of current processes, coupled with the capital discipline of current miners and the challenges presented by the permitting and development cycles (~15-20 years), makes that 42 million tonnes number by 2050 highly unlikely. Furthermore, the upstream impact is likely to wipe out any downstream gains if current mining methods are applied.

This example showcases how the entire ecosystem must act together and simultaneously, irrespective of the specific commodity in question, to:

- transform how mining is done, both in extraction and processing;
- increase the percentage of supply provided via recycling;
- innovate to lower the amount of minerals needed in each case, and to substitute where possible;
- innovative approaches to flow the benefits of projects to indigenous people in a way that grows their social and economic prosperity; and
- lower overall demand, via approaches like incentivizing more shared rides or providing consumers a selection of battery ranges for EVs.

These are all important levers that need transformative innovation and whole of value chain collaboration to both accelerate the change and increase the chance of success. Business as usual with incremental change will not get the job done.

The Development Partner Institute ([www.dpimining.org](http://www.dpimining.org)), that I co-founded with Anglo American CEO Mark Cutifani, is a good example of a transformative, whole-of-ecosystem approach with Indigenous Peoples at the center. It addresses the key challenges I’ve laid out above, and many organizations that attended the COP26 session are part of that effort. If you’re interested in joining or learning more, please visit [www.responsible sourcingcoalition.com](http://www.responsible sourcingcoalition.com)