

## COBALT: MINING THE ENERGY FUTURE



**VARIOUS HISTORICAL** periods have been defined by the materials people used, such as the “Iron Age” and “Stone Age.” The present day “Digital Age” is going to see the primacy of new “energy metals,” which will become the building blocks of disruptive technologies that will change the way people

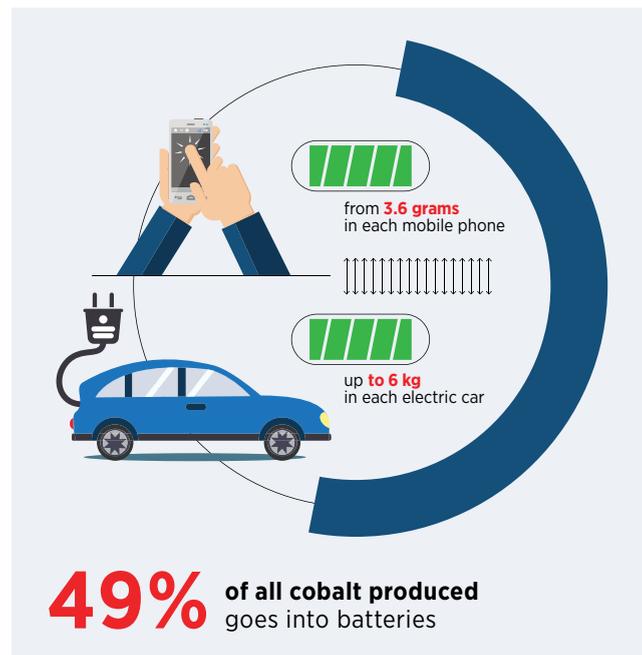
drive and power their buildings. This new age will result in higher dependence on renewables and breaking away from traditional infrastructure networks.

In the past decade, the progress of lithium-ion batteries has been essential to modern technology, powering smartphones, laptops, tablets, medical devices and power tools. Lithium-ion batteries are lighter and store more energy than conventional “dirtier” lead-acid batteries. Lithium-ion batteries are seen as “green.” The real growth story for these batteries is only getting started, with the emergence of electric vehicles (EV), and the energy storage market, expected to be the backbone of the new energy economy.

Current industry opinion anticipates that up to 40% of vehicles sold in 2040 will be electric, from a base of less than 1% of global sales today. A recent Deutsche Bank report states the global battery consumption has increased 80% in two years to 70 GWh in 2015, of which EV accounted for 35%. It is expected global battery demand will reach 210 GWh in 2018 across electric vehicles, energy storage and traditional markets. By 2025, global battery consumption should exceed 535 GWh.

While lithium grabs the headlines because of its use in batteries, it is just one of the minerals being used, and in fact, isn’t even the most common element in most lithium-ion batteries. Depending on the battery type, the strategic mined metals include cobalt, graphite, nickel, zinc, copper, manganese and aluminium, and these will likely become increasingly important raw materials in the new energy economy.

If you look at the constituents of the lithium-ion battery, Petra Commodities believes cobalt is the next stand-



out. There is no doubt that lithium has grabbed the media headlines lately, with the price having soared to multi-year highs (from about \$5,000 to \$20,000 per tonne). However, cobalt has been a much more modest performer, with the LME price actually dropping to a multi-year low of \$21,750 a tonne in February, before staging a rally to \$28,750. However, this price is still well below the \$33,100 cobalt fetched in August 2014.

Cobalt is an important part of the battery market and demand for the metal is expected to grow at an average annual rate of about 6% over the next five years. These remarkable demand figures haven’t flowed through to the price, because as of yet cobalt hasn’t managed to return to its peaks in 1977 and prior to the global financial crisis in 2008. The U.S. Geological Survey’s recommendation to the U.S. Defense and Logistics Agency (DLA) to add the cobalt compounds to the National Defense Stockpile for the first time in 20 years underlines how critical the metal is to the U.S. Essential to its economic health and national defence, the U.S. currently consumes approximately 13% of the world’s cobalt supply, with this projected to grow to 15% by 2020.

The Catch-22 is more than half of the world’s cobalt supply comes from one African country, the Democratic Republic of Congo (DRC). In 2015, an estimated 91,000 tonnes of refined cobalt was produced globally, with an

estimated 60% of the world's supply mined in the conflict-stricken DRC, which also possesses 60% of the world's cobalt reserves and resources. There is a clear supply uncertainty hanging over the global cobalt market given the treacherous environment of the DRC, while arresting media stories (including one from Amnesty International) expose the appalling conditions of miners and child laborers in parts of the DRC where the cobalt is mined.

Furthermore it is difficult to gain pure-play exposure to cobalt, as there are no listed companies that solely mine the metal—as approximately 96% comes as a by-product of copper or nickel mining. Given these genuine concerns over future supply, end users are looking at alternate supplies and pressure is mounting on companies such as Apple, Samsung and Tesla to find sustainable and ethical sources of cobalt for their products.

Petra Commodities sees an increasing focus in the mining of cobalt outside of the DRC, however there are no large-scale copper or nickel projects, with cobalt by-product credits, that are poised to break ground any time soon. Canada, Australia, New Caledonia, Indonesia and the Philippines are all producers nickel or copper where cobalt is a by-product. Most of Indonesia's cobalt is a

by-product of its nickel production and these individual nickel mines that are also cobalt rich will profit from the added cobalt credits.

Petra Commodities sees strong tailwinds for EV penetration, with Asia being at the heart of the EV charge with Japan speeding ahead of the rest of the world, now boasting more electric car charging stops than petrol stations, a result of the Japanese government subsidies for electric, hybrid and other low-emission cars, according to a review by automaker Nissan.

Another developer of this technology, Tesla, plans to produce 500,000 cars per year in 2018, with estimates output could be close to one million by 2018. Furthermore the Apple iCar, Google Car, and most of the world's most leading car manufacturers and electronics companies, including Apple, Dell, Sony, Lenovo, LG, Microsoft, Samsung, Nissan, Daimler AG, and Volkswagen will all be hooked on cobalt. The Italian luxury car manufacturer Maserati has also announced its plans to join the electric vehicle race by 2020. Right now, the attention has been on the potential shortage of lithium, but lithium is easy to find and mine, and supply can respond to the expected demand. But can the same be said of cobalt? 



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