

One miner's trash is another's treasure: **The innovators generating revenue from waste materials**

Whilst traditional mining methods, namely open-pit and underground mining, will long be needed to meet the ever-growing demand for minerals, a few key innovators, across a range of commodities, are finding success with a more unconventional approach – extracting commodities and generating value from waste. This lower cost, more sustainable approach, perhaps deserves more recognition for its ingenuity and economic potential.



The Mooinooi processing plant, part of the Sylvania Dump Operations in South Africa.

Technological advancements and the implementation of innovative approaches to mineral extraction and processing have generated new opportunities for companies to take waste materials, by-products and tailings, and turn them into a consistent source of revenue.

Ferro-Alloy Resources, a London-listed vanadium producer, is – arguably – the paradigm for this. In November of last year, the market's attention was captured by its announcement that it had confirmed the commercial potential of producing a carbon black substitute (CBS) product from its vanadium process at the Balasausqandiq project in Kazakhstan.

Carbon black, a \$20 billion global commodity, is chiefly used in the production of car tyres. Ferro-Alloy's CEO, Nick Bridgen, notes carbon black as “an essential component of all rubber” – simply put, it's “what makes rubber black”.

Traditionally, manufacturing the commodity has required the incomplete combustion of oil or gas in an oxygen depleted atmosphere, making it both expensive and highly polluting.

An independent study has confirmed the viability of Ferro-Alloy's CBS product for use in the manufacture of vehicle tyre sidewalls and other rubber uses. The substitute can be recovered from the company's vanadium circuit through simple flotation methods, which is far more environmentally friendly than traditional methods, emitting just 0.36 to 0.6 tonnes of CO₂e per tonne of CBS. Standard carbon black production emits between two to five tonnes of CO₂e per tonne.

The CBS by-product is set to provide the company with a hugely significant secondary revenue stream, valued at a projected US\$110 million per year in revenue, which is comparable

to the company's main vanadium project.

Additionally, capital and operating costs for the CBS product are expected to be relatively low, with production involving only a simple flotation plant, milling, pelletising and drying equipment. Furthermore, the EU is reportedly considering forcing carbon black producers to purchase carbon credits in order to export their product to the trading bloc, costing producers an estimated \$144-360 per tonne. Ferro-Alloy, as a more carbon efficient producer, would attract far lower costs, helping maximise revenues.

Staying in Kazakhstan, London AIM-quoted Central Asia Metals, or CAML as its often known, extracts material from waste dumps at its Kounrad copper project. CAML's dump leach, solvent extraction and electrowinning operation, near the southeastern city of Balkhash, is a low cost, consistent copper producer.

CAML's innovative process, which reprocesses the waste dumps of the adjacent historical open-pit mine, begins with the distribution of a weak leaching agent over the top of the dumps via an extensive network of dripper pipes. Copper within the rock is leached out by the solution and slowly drains through the dump, down to the natural ground level where it flows out into collector trenches. From there, the solution is pumped into storage ponds, and then onto the processing plant where it undergoes solvent extraction. The final stage is known as electro-winning and involves plating by electrolysis, creating copper sheets with at least 99.99% purity.

CAML's method avoids the high costs of drilling or blasting and, as a result, Kounrad regularly finds itself in the lowest quartile of the global copper cost curve. On average, the process only costs \$0.78 per lb of copper.

These low costs are part of the reason that CAML is able to pursue such an attractive dividend policy, paying out nine pence per ordinary share in the first half of the 2024 financial year. It is testament to the company's management and strategy that they have turned Kounrad's waste dumps into a unique and highly valuable asset that utilises waste material to provide a significant revenue stream. CAML has extracted approximately 160,000 tonnes of copper cathode to date at Kounrad, generating a total revenue exceeding \$1 billion.

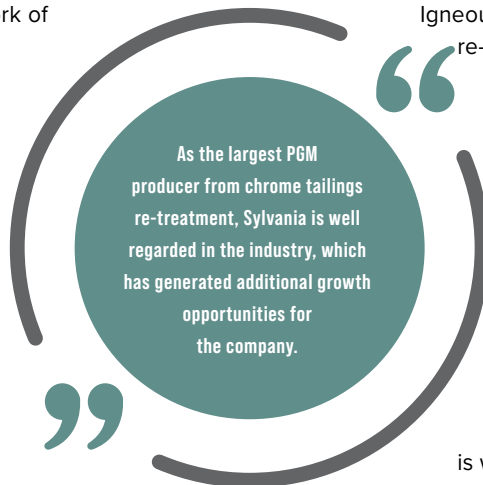
Sylvania Platinum is another London-listed miner which, like its Kazakh-operating peers, generates value primarily from discarded material, albeit in South Africa. The company is producing platinum group metals (PGMs) from its Sylvania Dump Operations (SDO), and is soon set to add chrome to its production profile from the Thaba Joint Venture (JV) with Limberg Mining Company.

The SDO is comprised of six chrome beneficiation and PGM processing plants focusing on the retreatment of PGM-rich chrome tailings from host mines in the Bushveld Igneous Complex. At these mine sites, Sylvania re-treats current and historic tailings, as well as run-of-mine material, leftover from the host mine's operations. In return for reprocessing this material, and giving any recovered chrome back to the host mine, Sylvania is able to retain the PGMs whilst constructing new, cleaner and safer tailings facilities at the host site. This approach is low-cost and cash generative, avoiding the high costs of underground mining. As the largest PGM producer from chrome tailings re-treatment, Sylvania is well regarded in the industry, which has generated additional growth opportunities for the company.

The Thaba JV is Sylvania's latest strategic partnership, through which the company has been granted access rights to extract chrome and PGMs from the primary ore and tailings at the Limberg Chrome Mine. Perhaps most notably, it marks the first occasion in which Sylvania will share in the revenue from both the chromite and PGM concentrates. The JV represents an opportunity for Sylvania to leverage its existing expertise, which has been proven and reinforced through the success of the SDO, to diversify away from a reliance on PGMs. This addition to Sylvania's production profile further derisks the company's portfolio as, historically, neither commodity has been in a down cycle at the same time.

Sylvania's shrewd approach is proof that non-traditional mining methods can not only work hand-in-hand with more common, traditional methods but can also generate significant profits; indeed, even in a weak PGM price environment, Sylvania remains profitable and continues to pay a dividend.

Even though extracting commodities from waste may not be possible at every mine, these three companies demonstrate that there are opportunities worth exploring. With the impact of mining on our planet under a microscope, perhaps more companies will re-examine existing processes and deposits and ask 'what is left?', or 'what is being left behind?' ■



The copper plating process in the electro-winning building at Kounrad.