# Why metals should be recycled, not mined

## *By Wayne Visser*

*Extractive companies need to recast themselves as resource stewards and embrace the circular economy by investing in recycling, not mining.*

There is no denying that the sustainability impacts of the extractive sector are serious – sometimes even tragic and catastrophic. But they are not without solutions. Technology, which is the source of so much destruction in the mining and metals industry, can also be its saviour.

The most obvious opportunity for the sector is to embrace the circular economy. Many metals can be recycled – and in some cases, actual recycling rates are already high. For example, 67% of scrap steel, more than 60% of aluminium and 35% of copper (45-50% in the EU) is already recycled. Apart from resource savings, there is often also a net energy benefit. Energy accounts for 30% of primary aluminium production costs, but recycling of aluminium scrap uses only 5% of the energy of primary production.

Recyclability of metals is as important as recycling rates. We need more companies that grow the markets for recycled materials, like Novelis, which announced the commercial availability of the industry's first independently certified, high-recycled content aluminium (90% minimum) designed specifically for the beverage can market.

The opportunity to increase recycling rates is significant. Today, less than one third of 60 metals analysed have an end-of-life recycling rate above 50% and 34 elements are below 1%. The irony is that recycling is often far more efficient than mining. For example, a post-consumer automotive catalyst has a concentration of platinum group metals (like platinum, palladium and rhodium) more than 100 times higher than in natural ores. Already, special refining plants are achieving recovery rates of more than 90% from this 'waste'.

This sustainability business case logic has not gone unnoticed. Given the importance of rare earth metals in electronics and renewable technologies, Japan has set aside ¥42bn (£231m) for the development of rare earth recycling, while Veolia Environmental Services says it plans to extract precious metals such as palladium from road dust in London.

Some recycling technologies are hi-tech. For example, the Saturn project in Germany uses sensor-based technologies for sorting and recovery of nonferrous metals. Similarly, Twincletoes is a technology collaboration between the UK, Italy and France that recovers steel fibres from end-of-life tyres and uses them as a reinforcing agent in concrete.

By contrast, E-Parisaraa, which is India's first government authorised electronic waste recycler, is much more low-tech, using manual dismantling and segregation by hand before shredding and density separation occur. This is a good reminder that the best available sustainable technology is not always the most applicable, especially in developing countries.

Recycling is not the only way for technology to reduce the impact of metals. If we look at energy consumption, each phase of the steel-making process presents opportunities. For example, direct energy use can be reduced by 50% in the manufacture of coke and sinter through plant heat recovery, and the use of waste fuel and coal moisture control. In the rolling process, hot charging, recuperative burners and controlled oxygen levels can reduce the energy by 88% and electricity consumption by 5%.

Other technologies, like using pulverised coal injection, top pressure recovery turbines and blast furnace control systems, can reduce direct energy use by 10% and electricity by 35%. In Electric Arc Furnace steelmaking, improved process control, oxy fuel burners and scrap preheating can cut electricity consumption by 76%. In fact, applying these kinds of energy saving technologies could

result in energy efficiency improvements in the steel sector of between 0.7% and 1.4% every year from 2010 to 2030.

Water is another critical issue, but with significant opportunities. For example, BHP-Billiton's Olympic Dam in South Australia achieved industrial water efficiency improvements of 15%, from 1.27 kilolitres to 1.07 kilolitres per tonne of material milled. That may not sound like a lot, but when scaled across the operations of the world's fourth largest copper and gold source and the largest uranium source, it makes a huge difference.

Sometimes the technologies are fairly simple. In the metal finishing sector, improving rinsing efficiency represents the greatest water reduction option. For example, C & R Hard Chrome & Electrolysis Nickel Service switched its single-rinse tanks to a system of multiple counter-flow rinse tanks, and installed restrictive flow nozzles on water inlets. As a result, the process line has reduced water consumption by 87%.

We can see, therefore, that technology can help to rescue the high-impact extractives sector from its siege by the forces of sustainability. However, it requires some critical shifts. Extractives companies need to recast themselves as resource stewardship companies – experts at circular production and post-consumer 'mining'. And customers and governments need to give up their compulsive throw-away habits and embrace the take-back economy.

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