MINING & MINERALS FACTSHEET

MINING AND OUR GREEN FUTURE

MINERALS & MINING TERMS

Raw Materials **-** Materials in their natural state, before being processed into a product.

Climate change requires an immense response across all of society and the economy. Mineral exploration and mining are essential for ensuring a stable and sustainable supply of metals to support this.

The European Commission's Green Deal and the United Nation's Sustainable Development Goals aim to transform economies for a sustainable future. In a green economy, employment and economic activities reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and natural capital. This means dramatic changes for the energy, mobility and digital sectors, and how they are resourced. The Green Deal recognises the importance of ensuring supply of both primary (mined) and secondary (recycled) materials necessary for the move away from fossil fuel-based energy technologies.

Energy Transition

Brown Economy

Fossil Fuels for combustion engines, generator and power station: oil, gas, coal

Green Economy

Mined & Recycled Materials in e-motors, energy storage, energy conversion containing, for example, Co, Li, Pt, REE, Ge, Ga, Si, V

Fundamental shift in the resource basis of a society

Decarbonisation, the process of removing or reducing carbon dioxide production from a country's economy, is at the core of the green economy and climate action. Switching from fossil fuels means using renewable options such as wind energy, solar energy, geothermal energy (energy sourced from the Earth's natural heat) and battery storage. All of these are reliant on utilising a wide variety of metals and minerals, which are naturally occurring inorganic substances that make up rocks. The mining industry will continue to have a vital part to play as the demand for different metals increases significantly to meet changing trends in consumption.

Analysis by the World Bank of the demand for metals to support the clean energy transition estimates increases in demand for metals used across a variety of energy technologies, including aluminium, cobalt, copper, iron, lead, lithium, nickel, manganese, platinum group elements, rare earth elements, silver, titanium and zinc.

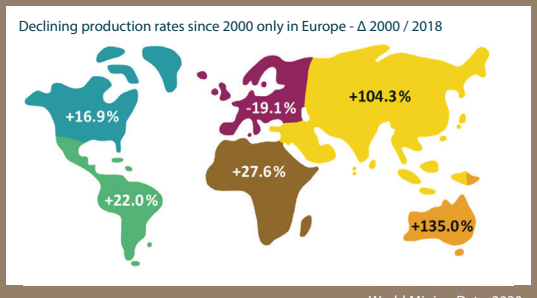
Where are the raw materials to make this future going to be sourced?

Despite a long mining history in much of Europe, awareness remains low of the critical importance of raw materials to society, the need to develop domestic European production and resources, and the socio-economic benefits of sustainable and ethical mining.

Mineral production in Europe is lagging behind elsewhere in the world (down 19% between 2000 and 2018). Currently, Europe has to import more than 75% of almost all metals, and up to 100% of some critical minerals. With that comes certain supply risks, such as higher prices that could have an adverse impact on the economy in the event of a serious trade dispute or disruption.

Long import distances also mean carbon-heavy shipping at a time when the move to a low carbon economy is a priority for governments across Europe. Also, some countries where we currently source our minerals are heavily dependent on coal-powered electricity. EU policy supports the secure and sustainable supply of minerals sourced in Europe.

Europe is home to raw materials which can be used to reduce our dependency on imports from the rest of the world and the geological community has the ability to meet this challenge. While not all metal requirements can be met within Europe and Ireland, more can be done. More mining in Europe would ensure it takes place under environmentally and socially sound conditions while making the economy more resilient.



World Mining Data, 2020

Ireland's Contribution

Ireland has much to contribute. The country is a major international source of zinc, producing 122,000 tonnes in 2019, the 4th largest producer in Europe and the 17th in the world. Zinc is used in galvanising processes to prevent corrosion, protecting metals from rust and extending the lifetime of products, particularly vital energy transition technologies such as wind turbines, solar panels and electric cars – keeping them in use as part of the circular economy for longer.

Zinc has an increasing role to play in large-scale battery infrastructure that will facilitate the storage of energy from renewable energy sources, which can be intermittent. It is also a major component of brass and is a raw material for goods such as medicines, cosmetics and human health supplements.

Our mines also produce lead (16,000 tonnes in 2019, 8th in Europe) and silver which, amongst other uses, are vital components of batteries and electronics used in everyday items such as vehicles and smart phones.

Amongst other metals that are important to the green economy that can be found in Ireland are copper, gold, lithium, barytes, antimony, tin, tungsten and Rare Earth Elements.

Battery Technology

The success of green technology is dependent on the efficiency of battery storage, both in terms of size and capacity. They need to be small enough for electric vehicles or have sufficient capacity for large-scale utility use. Zinc-air and solid-state lithium-ion batteries are currently in development but are not expected to be widely in use until 2030. Their development would see an increase in demand for zinc, lithium, nickel, cobalt and manganese.

The Circular Economy

Recent economic models have been "take – make – dispose". Instead, the circular economy aims to keep materials in use as long as possible then either re-using them as another product or recycling them to make new products, where feasible. With efficient recycling, metals can be used over and over again, minimising the need to mine and process raw materials while decreasing energy and water requirements. However, there are challenges to achieving a truly circular economy, which mean that raw materials are lost in part or in full at various stages in the circular economy cycle.

Mining and the Circular Economy

Source: EIT Raw Materials

Challenges

- As people live longer, global population is increasing. Plus, consumption rates are increasing, driven by developed countries.
- Many metals in renewables had limited uses until recently. As such, there is very little stock that can be recycled until enough reach the end of their lifespans.
- All the metal available for recycling now is representative of historical production and even if all of that metal was recycled today, would be unable to meet current demand.
- Recycling rates are currently low for many elements, meaning they unfortunately end up as waste. Secondary raw materials, sourced from recycling, also currently have disadvantages compared with primary raw materials in relation to performance, availability and cost. Recycling rates and technologies need to be improved. Better product design with end-of-life recycling in mind is essential if society is to make the most efficient and environmentally conscious use of valuable resources for the long term.
- Metals may be lost during the consumption of products (e.g. cosmetics, medicines) or bound in long-term usage (e.g. energy infrastructure). This loss/binding of raw materials means that there is still a significant need to produce metals in order to 'feed' the circular economy.

Circular Economy in Mining

- Improving extraction efficiencies and maximising re-use of tailings (the leftover material from the mining process) for backfilling and stabilising underground mines, can have cost savings and environmental and safety benefits.
- Smelters, facilities that apply heat to ore in order to extract metals, can be used for recycling metals.
- Historic mine waste is being investigated for sources of metals that were not considered economic at the time to recover during mining but may be economic now.

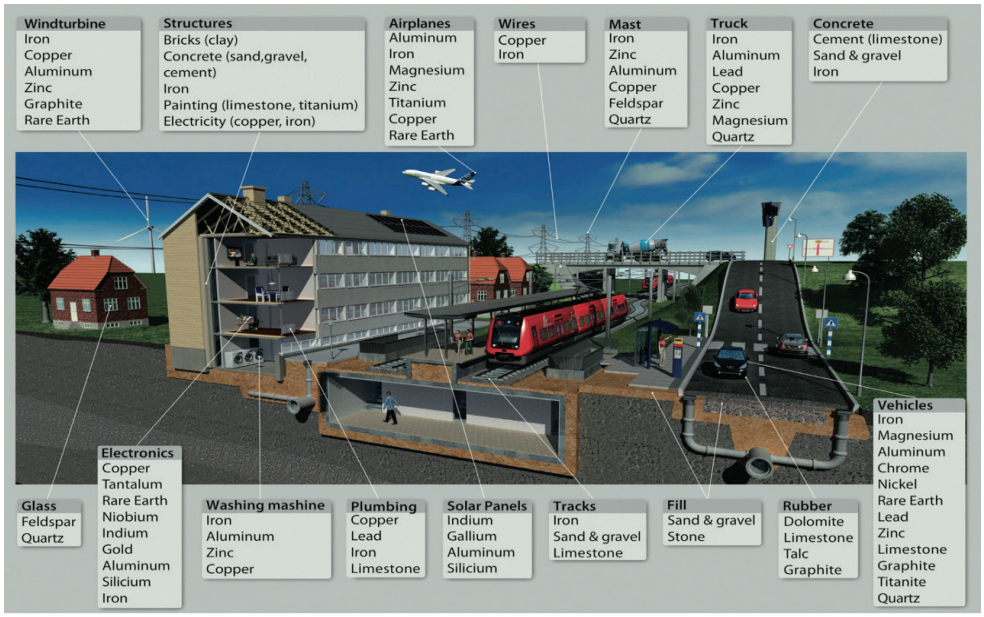
Decarbonisation in the Mining Sector

Mining and climate change are inextricably linked; mining uses a lot of energy but the technologies the world needs for decarbonisation will require more mined materials. It is crucial that the mining industry decarbonises, so the greenhouse gas emissions do not simply move from power stations to mine sites.

Fortunately, renewable energy sources for powering mines and electrification of vehicles are rapidly becoming more affordable and uptake has increased significantly. Re-purposing disused mine sites also has a role to play - the wind farm built on the Lisheen mine site in Co. Tipperary midway through the life of mine had the capacity to provide all of the mines power requirements, while also supplying the nearby villages and the whole town of Thurles. The mine is now closed but the wind farm remains operational. The electrical infrastructure installed for the mine has been further leveraged by other wind farm companies, who developed additional turbines in the area, with further turbines planned. The substation at Lisheen now has over 100MW of wind energy connected, which is capable of powering the entire city of Galway or saving 100,000 tonnes of CO2 every year.

Wind farm established at the site of the Lisheen zinc-lead mine, Co. Tipperary.

Minerals in Our Everyday Lives



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