



# NEWS ARTICLE

## FINDING A PATH FORWARD

Julian Aldridge MIMMM, Principal Geologist at Snowden Optiro, provides insights into the route a project takes from the initial identification of a target to opening and operating a mine.

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It's around 4.30 pm in early autumn on the side of a mountain near to the town of Artvin in Eastern Turkey, and the sun is beginning to set. In the low light of dusk, a geologist spots a reddish rock poking out of a path, and quickly hammers pieces off it until he has enough material to fill a sample bag. It's extremely remote out here and the geologist doesn't want to be working in the dark. Just yesterday he found fresh pawprints of a bear in the area he was mapping, each big enough to fill a dinner plate.

The geologist has been mapping and sampling out here for the previous six months, on an exploration licence owned by his company - a UK-based mineral exploration and development company with shares traded on AIM in London and the ASX in Australia.

In 2008, this is a pretty normal occurrence - the company owns multiple projects in several countries in Southeast Europe, and has had no issues in working on its licences and developing its potential deposits along the track to becoming a mine.

When the results from this rock sample come back from the laboratory, the geological team working on this licence are extremely pleased to find that the sample has a gold concentration of over 18g/c. In an industry where a concentration of 1g/t of gold in large enough quantities can be mined profitably, the team's mood is buoyed by this news. Attention turns to focus on this particular area of the licence with more detailed mapping and chemical sampling.



Move forward six months, and a mineralised structure - a shallow-dipping plane of weakness in the Earth's crust - has been outlined under the gold-rich outcropping rock. Drilling commences to try to prove the continuation of gold below the surface. This discovery is only the beginning of a phenomenally complex sequence of events that will end, if the company is both lucky and skilled, in the opening of a producing mine. The deposit will need to follow a meandering pathway of project development that can take over 20 years and will have to defy odds of over 100/1.



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## Same but different

So, how does one go about developing a project from a sniff of gold in an outcrop into a mine employing upwards of 300 people, producing half a million ounces of gold a year, and shifting and processing millions and millions of tonnes of rock every year!

Every mineral deposit is unique. Each one has its own economic commodities - these can range from precious metals (gold, silver, platinum), base metals (copper, lead, zinc), industrial commodities (iron, coal, sand), to materials that support 21st Century life (rare-earth elements, lithium).

Each one has its own shape - cylindrical (copper-porphyry), flat and strata-bound (coal), blanket-like (nickel/aluminium laterite), thin and sheet-like (gold-vein deposits), or irregular (lead/zinc sulphides).

The grades can also range from high percentages (iron/coal) to a few parts per million (gold/platinum), and the deposit can be at any depth inside the Earth's crust, within reason.

However, mineral deposits also share common characteristics that allow them to be developed in a similar way.

Mineral projects are developed in a step-by-step manner, and acting to provide information on size and grade, mining method, revenue, profit, and costs associated with developing the project. This allows the team to de-risk the project technically and financially.

Once an area of potentially economic mineralisation has been located, the grade and 3D extent are tested. This usually involves surface mapping, drilling holes into the deposit, geochemical and geophysical surveys, and extensive sampling.

## Devil in the detail

After sufficient information has been collated, a resource estimation can be performed. This involves calculating the grade and tonnage of a mineral deposit to within certain confidence limits. The confidence in your estimation accounts for the type of drilling, quality of sampling and logging, the process or set of processes used to measure and assure the quality of a product and quality control, understanding of the geological model, and overall abundance or paucity of data.

The purpose of the resource estimate is two-fold - to aid decision-making to plan the mining of the deposit, and to report the size and grade of the deposit to the market to stimulate investment for further development.

Once the initial resource has been estimated, the normal route is to perform technical studies on the deposit. These are usually termed 'scoping study', 'pre-feasibility study' and finally a 'feasibility study'. Each requires an order-of-magnitude increase in detail, and each has a concomitant order-of-magnitude increase in cost.

The purpose of these studies is to answer fundamental questions such as:

Can we mine from the surface or do we need to go underground?

How do we process the ore to get the commodity out?

Where do we store the waste?

Where can we put the infrastructure'?

How can we minimise environmental impact and ensure rehabilitation?

What permits and planning approvals do we need?

How many staff do we need, and what training will they require?

How much will it cost to extract the ore, and how much revenue will it make?

How long will it take for investors to see a return on their investments?

## High risk

The construction period is the part of the venture that carries the highest financial risk. There are significant capital costs associated with building the mine infrastructure, stripping the overburden, and providing roads and access to the deposit, while at the same time, there is no revenue stream coming from production.

Overhanging the construction phase like storm clouds are the potential decisions of a capricious government to rescind permits or prevent work on a whim. This has recently been the case for the Eldorado Gold site in Greece, and the Barrick-Antofagasta joint venture in Reko Diq, Pakistan, where permits were suddenly withdrawn, coinciding with changes in the ruling party in both countries.

Both cases led to claims of government corruption and incompetence, and resulted in these companies losing control of their assets at the key construction stage.

Assuming successful construction of the mine, this is the point at which payback can commence. The mine starts to produce a commodity and receives revenue through the sale to off-takers. This is usually associated with a big jump in the share price and may also mark the start of dividends for shareholders.

A successful modern mine should also train and employ hundreds of local people, and have minimal environmental impact other than the significant energy required for mining and processing.

## Slow start

Fast-forward to 2022 and the situation for the aforementioned deposit in Eastern Turkey is totally different and illustrates the complex route exploration and mining companies have to navigate. Development of the mine will still follow the same technical blueprint, but the political climate has changed beyond recognition. Back in the early 2000s, large numbers of Western companies were working in Turkey and investing millions of dollars in exploration and development.

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## Finding a path forward

The licence auction system and work, and environmental permitting processes were transparent and easy to use.

At the present time, pretty much all Western companies have made an exodus -those who remain have had to take on a majority Turkish partner, or simply take a royalty or financial position in a Turkish miner.

Anecdotally, those companies who previously were able to apply and receive environmental/ forestry permits in a matter of weeks, now have to wait several years for them to be granted, if at all. The government has not openly thrown out foreign investment, but they have made it difficult for non-Turkish companies to work in Turkey.

Well, so what? Shouldn't Turkish companies be able to take advantage of their country's mineral wealth? In my opinion that should definitely be the case. As much value from mining as possible should stay in the country, and in the region around the mine where possible. The real value that mining brings to a region is in things like provision of jobs, development of roads, power, infrastructure, provision of education, and the economic uplift that a valuable industry always brings.

Unfortunately, it isn't that simple. Mining is a capital-hungry, high-risk venture, and almost always requires external investment to develop a project.

Even the largest mining companies do not have the capital at hand to develop a mine. So, in a country like Turkey, where foreign investment in mineral exploration is depleting, this directly affects the country's economy, and reduces the development capability of the Turkish-controlled mining industry. No money coming in for investment, no development of mines.



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So, for now the project in Turkey remains at pre-feasibility study stage, some 14 years after the first discovery. The licence it sits within was owned by three different companies before the discovery and has since been owned by two other companies. It is in no danger of being developed into an operating mine anytime soon, despite positive project economics and technical study results.

## Changing the narrative

This is just an example of one of the many challenges faced by extractive industries all over the world. It is a phenomenon that is sometimes termed 'resource nationalism', and is happening in many different countries.

Resource nationalism has a large number of unique and individual causes, but pushback against East India Company-type exploitation and 21st Century political isolationism are two main drivers.

Going back to the post-colonial, mid-20th Century, rich and powerful Western countries would have just used their influence to access the resource wealth of poorer countries.

But Western companies and governments no longer have the power or political mandate for open exploitation - what would have been considered fine examples of empire-building now leave an unpleasant taste in the mouth of most voters.

This kind of financial stranglehold of weaker countries by more powerful ones is starting to be addressed, at least via the money flowing into the global mining industry from Western investors. Companies and politicians want to separate themselves from past behaviors and be part of the solution. Enter environmental, social and governance (ESG) policies stage left.

ESG has gained tremendous traction in the industry. The likelihood is that over time mining can become a positive global influence, and perhaps lose the destructive, resource-scavenging image it currently has.

How we turn mining from being seen as an exploitative profit-driven industry to one that is seen as a welcome development opportunity, is without a doubt the biggest challenge facing the industry at the present time, and the solution may need to be as drastic and as multi-faceted as the problem. ESG is not a universal panacea - the keystone of the arch through which we walk to success - but is perhaps the first building block in a paradigm shift for the industry.