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Ofi invest Conferences

METALS, A TRIPLE CHALLENGE:
climate, environmental
and european sovereignty

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"Investors today must take a greater interest in mining issues"

The energy transition is underway worldwide. We are now moving from words to deeds. China is a perfect illustration of this, having reduced its dependence on fossil fuels by investing massively in wind, solar and hydroelectric power. Last year, 50% of the wind turbines and 65% of the solar panels installed worldwide were installed in China, where a giant dam is also under construction, with a theoretical capacity equivalent to that of 70 nuclear reactors. Initial impacts of this new policy already include the first declines observed in CO_2 (carbon dioxide) emissions.

The energy transition has important consequences on the metals industry in both China and internationally and is spurring some thinking on European energy independence. Generating sustainable energy requires metals of various types. The energy transition has formed a new link with these rare metals and raised the issue of resource geography and resources. And it's no accident that, among the many executive orders signed by the new US president upon arriving at the White House, eight dealt with the issue of metals mining and production. This, in turn, has led France and the rest of Europe to reflect on this issue very seriously, while gauging their related strengths and weaknesses. We must calculate our energy mix while keeping in mind a reduction of that dependence. That's why we believe it is essential now for investors to look into mining, along with all the sustainability and sovereignty challenges that this entails.

METALS, A TRIPLE CHALLENGE: CLIMATE, ENVIRONMENTAL AND EUROPEAN SOVEREIGNTY

Benjamin LOUVET,
Head of Commodities
OFI INVEST ASSET MANAGEMENT

THE ENERGY TRANSITION IS TRANSFORMING FOSSIL FUEL DEPENDENCY INTO A METALS DEPENDENCY

Called "humanity's greatest challenge", the energy transition in is still in its infancy. In 2015, fossil fuels accounted for about 84% primary energy consumed worldwide. Despite efforts to lower that figure, it still accounts for 81%. Most of the political solution has focused on renewable energies, mainly wind and solar power, which require transformers fashioned from metals. The energy transition has thus transformed dependency on fossil fuels into dependency on metals, and to an unheard-of extent. According to Olivier Vidal, Head of Research at CNRS, "within the next 30 years, we will have to extract from the Earth's crust as much metal as we have in humanity's history up till now".

Hence, a basic question: can we meet this unprecedented deadline? And, if so, at what cost, given the opinion in some quarters that mining, which has always been controversial, is the remedy that's worse than the disease? Investors are also aware of this issue, and many of them have shunned the mining sector, deeming it insufficiently sustainable, thus exacerbating the flagrant lack of investments.

Benjamin Louvet (B.L.) : ***Can mining be made more sustainable in Europe?***

Victoire de Margerie (VdM) : One thing is certain: the concept of "sustainable mining" is beginning to draw interest from a growing number of players. We are moving ahead on both the political and regulatory terrain, as well as in technology, with significant progress made in recent years. Originally, an analysis of a mine's environmental impact focused solely on its CO_2 emissions. In conducting our research into more sustainable mining, we very quickly realised that water consumption, energy consumption and production of solid waste from mining also had to be taken into account. Accordingly, we track these four indicators on a regional basis, as not all of the world's regions have the same level of water stress, for example. We are also keeping an eye out for ways to innovate and optimise, in order to achieve a "Ultra Low Mining Footprint" certification[1]. Here are two examples of this trend in the United States, which, like France, largely halted mining exploration 40 years ago . One of the world's top mining specialists, Robert Friedland, has been tasked by the government with relaunching domestic production. He has identified a copper deposit in Arizona, for which he is using a revolutionary exploration technology called "Typhoon". This innovation detects anomalies more rapidly and, hence, helps locate deposits with limited drilling. When combined with other factors, such as solar power and "all-electric" transport, Typhoon gives this mine a Scope 1 and 2 of 0.5 tonnes of CO_2 equivalent per unit of output. In comparison, the average global emissions for similar mines is 3.9 tonnes of CO_2 equivalent per unit of output. Another interesting project is the century-old Boliden's* Garpenberg mine in Sweden. This mine is operated with massive use of hydropower and nuclear energy that massively electrifies transport. Mining waste has also been used to consolidate a nearby hydropower dam, which promotes sustainable recycling.

> *"The concept of "sustainable mining" is beginning to draw interest from a growing number of players."*
> Victoire de MARGERIE

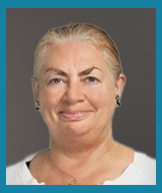
B.L. : Boliden* is indeed an example of good practices, and hopefully, such practices will inspire other mining groups to develop more sustainable mines. They aren't perfect, but we now know that they make it possible to do better. In addition, a more sustainable mine is also a mine that meets social criteria. This includes better working conditions, greater gender equality, and massive efforts to be made in automating transport and maintenance, to reduce the number of accidents. Nowadays, at some mines, jackhammers are operated from screens in a control room with joysticks; trucks are driven, loaded and unloaded remotely. So, mining groups possess all the technologies needed to become more sustainable. More and more of them will be heading down this road, despite the additional costs this entails.

What is your viewpoint, Laurent, as co-founder, alongside Robert Friedland, of the I-Pulse* company?

Laurent Frescaline (L.F.) : Over the past 15 years or so, I-Pulse has developed a pulsed power technology to accelerate exploration and discovery of new deposits. This is a military technology based on compressing electrical energy. You take a low source of energy and concentrate it into a very brief time to enhance its power and effects. Pulsed power generates electrical fields used for geophysical exploration at 1.5 km underground. It is also used to create shockwaves to revive oilwells. We are also reducing energy consumed in crushing, which is the reduction of rock extracted from the mine into powder, from which the metals are extracted. The stakes are huge. For example, 14% of electricity consumed in Australia is used to crush rocks. Mining accounts for 4% to 7% of global carbon emissions. By continuing our optimisation efforts, we could reduce our energy consumption by almost another 50%.

> *"Mining accounts for 4% to 7% of global carbon emissions."*
> Laurent FRESCALINE

SPEAKERS



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[1] *Very small mining footprint.*
** Companies are mentioned only for informational reasons and not as an offer to sell or buy securities.*

B.L. : ***On top of its attractiveness in terms of sustainability, this technology if French, which is quite relevant, given the challenges we are facing. This leads us to the other topic of our discussion: can Europe regain mining sovereignty? Reminder: the US is more than 50% dependent on 16 metals from China and 100% dependent on 12 metals. The same issue exists in Europe. That's why the example of Imerys* is worth studying.***

> *"The US is more than 50% dependent on 16 metals from China and 100% dependent on 12 metals. The same issue exists in Europe."*
>
> *Benjamin LOUVET*

Alessandro Dazza (A.D.) : Imerys* is very prominent in France, with 30 production sites and almost 2000 employees. Our flagship project for addressing the challenge of sovereignty is EMILI, a lithium mine in Allier, France. We operate a kaolin quarry under which a very promising deposit of lithium is located, potentially one of the world's five largest, with a concentration greater than 1.1%/1.2%. That doesn't sound like much, but keep in mind that the world's top concentrations, in Australia, are around 1.8%. We currently see an operating life of more than 30 years for this mine, which will supply electric vehicle manufacturers directly. We should be able to equip 700,000 cars each year with this lithium, out of French output of 1.2 million vehicles, which shows how important this deposit is. And, switching back to our previous topic, we are developing methods for reusing water and the extracted rock and for promoting underground production that is as automated as possible. We will perhaps be a little less competitive than some Chinese mines, but that is the price to pay for the project's acceptability and the development of more responsible mining that contributes to our sovereignty.

B.L. : ***What is the timetable for operations?***

A.D. : Opening a mine used to take, on average, 15 years in France. We launched this project three years ago and have already invested €100 million in it. We are building a pilot plant to test and certify the technology within the next two years, at a cost of €150 million. Thereafter, building the commercial plant will take two to three years. The total investment will exceed €1 billion by the end of the decade.

> *"Opening a mine used to take, on average, 15 years in France."*
>
> *Alessandro DAZZA*

B.L. : ***So, we do have lithium in France, but we need other minerals, as well. What do we know about what's under our feet in France? And why are we remapping it?***

Christophe Poinssot (C.P.) : There two misconceptions in France regarding our mining potential. The first of these is that we have perfect knowledge of our country's mineral resources. The second is that we stopped mining 40 years ago because we had exhausted those resources. In fact, the subsoil remains a terra incognita, and we truly need to look into it again, given the global metal supply issues involved. The last subsoil map was done in the 1970s and 1980s, with technologies that are far less efficient than those employed today. Back then, there were far fewer metals of interest than now. We focused our mapping on about 20 metals, vs. the about 60 that we need today. Lithium, for example, was found by accident at Échassières. We are very likely to find other worthwhile sites in France. And this is just one example among many. This is what is at stake in the environmental plan that will unfold over the next five years. This preliminary work is meant to lead to private industrial projects. The road will be long, and there will be some speed-bumps, both financial or cultural in nature, as we will have to convince our fellow countrymen that we cannot live in our world today without mining. Political speed-bumps, as well, as it is not always easy for an elected official to take on a mining project that will not pay off until many terms of office later. And regulatory speed-bumps in striking the right balance between the need for public debate and the need for action and progress. Our national sovereignty is at stake, along with our ability to freely choose our collective future.

A.D. : These political and cultural obstacles can be overcome. We've seen that with Emili. We are supported by public authorities, but also by neighbouring communities who have understood how much this matters to them economically. We are obviously dealing with protests, but they are normal for a project of this size. We have taken time out for a long public debate of more than five months, which gave us time to win over the biggest sceptics. It was a gratifying exercise in democracy.

C.P. : In doing so, it is worth mentioning a few figures. For example, mining the 50 or so metals considered strategic amounts to just 2% of what we take out of the Earth's crust today. More than 90% of extraction is of coal, oil and natural gas. This is an argument in support of mining.

B.L. : ***If we do compare mining's environmental footprint with that of fossil fuels, mining's is far better in***

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terms of CO2 emissions and water consumption. Could we take this reasoning so far as to focus on agro-mining or phytoremediation, i.e., the capacity of certain plants and mushrooms to extract metals?

C.P. : This is indeed an efficient method for some metals, but only for the top few meters of a mine, near the surface soil. Hence, a negligible and extremely low quantity compared to the volumes and stakes that we have mentioned.

B.L. : ***Could certain mines be reopened in France?***

C.P. : In France, there are a number of European- or even global-scale mines that are just waiting to be reopened. They were closed in the 1980s and 1990s as they were not cost-effective. Things may have changed. I'm thinking, for example of the tungsten mine in the Ariège. Tungsten is essential in microelectronics and special steels, and in particular for various applications in defence, shielding and aircraft turbines. Technically, these sites could be reopened very easily. And with Airbus* just 100 km away, this would be a very attractive prospect.

> *"In France, there are a number of European- or even global-scale mines that are just waiting to be reopened."*
>
> *Christophe POINSSOT*

Guillaume POLI,
Deputy CEO
for Business
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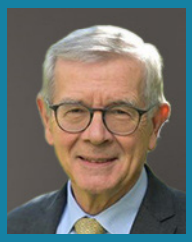
OFI INVEST AM

DIVERSIFYING PORTFOLIOS TOWARDS METALS

2000 years ago, the Greeks wondered how to square a circle. 2000 years later, this problem remains unsolved, to the point that some mathematicians suggest tweaking the problem's rules and parameters, so that it can at last be solved. Following this Ofi Invest Asset Management metals conferences, we find ourselves in somewhat the same configuration. We all came here wondering about "more responsible mining", one that would have a very small impact on environmental social and sustainability issues. At first, this looked like squaring a circle. And yet, it now seems to be possible. Could we one day reopen mines in France and elsewhere in Europe and assume the consequences of doing so, with the support of local communities? Could Europe retake control of its metals destiny and sovereignty? The various experts who spoke on this rostrum seem quite optimistic and have provided some tools doing so. From the investors' viewpoint, we can see that metals, a true cornerstone of the energy transition, could be an opportunity for diversifying their portfolios.

TESTIMONIAL



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Author of a report to the French President on critical metals in 2022

Mining could once again interest investors, given the numerous opportunities out there.

First of all, because the concept of "responsible mining" will take old, thus reducing de facto the risk inherent to these projects for investors, who often hesitate to take the plunge, lest the project be rejected by local communities and fail to pan out. Second, growth in this market is relatively predictable. We may be experiencing a temporary dip in electric vehicle sales in Europe, but there is no such dip in China, where demand is very high for electrical battery components. In Europe as well, EVs are likely to become the norm for the auto market. Financing should be facilitated by the option that automakers have of entering into offtake arrangements with mining companies. Through such agreements, a mining group is able to raise bank financing using a multi-year mineral purchasing contract with automakers as security. This set-up is expected to expand considerably. And, lastly, COP30 in Belém, Brazil late this year is expected to highlight that we are not on the right climate trajectory and, that, most of all, that we will have to update countries' commitments. There are no precise figures, but current projects are estimated to achieve only 10% to 20% of what is needed to align with the future trajectory. The issue of project financing will then arise with even greater urgency. This will boost sustainable energy more than ever, which will require heavy mining production.

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[1] Source: Ofi Invest at 31/12/2024 - Employees under temporary and permanent contracts only.
[2] Source: Financial statements of the entities concerned, as of 31 December 2023.
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