

PHILIPPE CHALMIN

Founder of Cercle CyclOpe, Professor at Paris-Dauphine University, Consultant for various International Organisations (OECD, EEC, UNCTAD)

Friedbert Pflüger, Director of the European Cluster for Climate, Energy and Resource Security (EUCERS) at the University of Bonn, Founding Partner of Strategic Minds Company GmbH

The first I would like to introduce to you is a scholar who has worked on these subjects for 40 years, long before they became popular. That is Philippe Chalmin, who is with us, who is a Professor at Paris-Dauphine University, author of 40 books on economic issues and the Founder and Head of CyclOpe. Every year for 36 years, CyclOpe has produced a handbook that documents the latest development in the field of commodities and raw materials. There could be hardly a better expert on this issue in Europe. Philippe Chalmin, the floor is yours.

Philippe Chalmin

Thank you very much, I will try to be as short as possible. By the way, do you know which commodity has had the steepest price rises in 2022? It is not natural gas, it is lithium. A ton of lithium carbonate today costs around USD 80,000, compared to between USD 5,000 and USD 10,000 two years ago, so it has multiplied by between seven and eight times. You mentioned nickel and in the early days of March this year it jumped for a few hours to USD 100,000 per ton. Another mineral that is important in the same field of electric batteries of course, graphite, which is not mentioned much, its price has risen by 33% in 2022 alone. Of course, this is all linked to the needs of energy transition and that is why we now talk about a new category that we call CRM, critical raw materials. In CyclOpe, we have devoted a chapter to what we call electric materials, where we put lithium, cobalt, graphite and some others.

What is a critical raw material? It is definitely a material that is strategic for economic development and, of course, it depends on technologies. If we had had that classification some years or centuries ago, it would have been very different. For example, the critical raw material in antiquity was tin because with tin and copper you made bronze and with that you could make arms. However, at the end of the 19th century, tin was still a critical raw material because you made tin plate from it, which was very useful for manufacturing boxes in which to keep food. By the way, the first contract on the London Metal Exchange at the end of the 19th century was not copper, it was tin. But nowadays we use less and less tinfoil and tin at the end of 20th century had lost most of its demand. Tin is back right now because it is used for electronic soldering in the chip industry. Today, when we look at critical raw materials you have everything that is needed for batteries, that is lithium, cobalt, graphite and nickel. I would probably add rare earths that are used in wind technologies, platinum in hydrogen and some others. By the way, the extraordinary thing with energy transition is that everything was decided without a thought about

what might be purchase planning. We all love solar energy for example but, so far, 80% of solar panels come from China with silicon being the big problem. It was more or less the same thing for electric batteries, and I remember about 10 years ago when a French company was developing a fleet of electric hire vehicles in Paris, they later contacted me to ask where they could find some lithium. Today, if you just look at batteries – which are probably the hottest product at the moment – for cathodes, if I take the demand in 2022, and the demand forecast for 2030, the need for lithium should be multiplied by 490%, for graphite it should be 554%. On the other side for the anodes, the need for cobalt will be 172% more and nickel, “only” 96%. However, when you think about electricity, of course, you need copper to carry it and you can see that even old metals are now very hot commodities. In fact, we are facing two problems. Reserves are not really a problem: when we talk about lithium, the production of equivalent lithium metal is 100,000 tons today and there are 22 million tons of reserves. It is the same for cobalt and rare earths. The production of rare earths today is a bit less than 300,000 tons, and the reserves are 120 million tons. That is not the problem, the problem is mining and mining with a dependency on some areas. 50% of the reserves of lithium are in the triangle of lithium: Argentina, Bolivia and Chile. 60% of cobalt is in the “Democratic” Republic of Congo. While when you look for platinum, palladium and vanadium, you are looking at Russia and South Africa. It is clear that we have a problem on the mining side, which today is not enough investment. We should have investments of around USD 160 billion in mining each year; in 2020 world investment in mining was only USD 80 billion, half what is needed. It is also very difficult in many countries to open a mine, it is a problem to open a mine in Europe. The biggest reserves and potential producer of lithium in Europe should be Serbia and, for the moment, everything is closed. We just discovered some lithium in France but before exploiting it we will have to get over all the green hurdles you can imagine. In many countries, it is really difficult to open a mine. By the way, the greens love to put us in electric vehicles, but they do not want us to produce lithium; try and see if that is a problem in their minds.

However, mining is one thing, metallurgy is another. You have the mineral, and you have to transform it into a usable product. For a long time, rare earths were not rare, and the center of rare earth metallurgy was in France. Today, we have all exported, delocalized our environmental problems and, of course, you know now about 80% of rare earths are produced in China. When you look at China’s position as far as metallurgy is concerned, today China produces 60% of lithium carbonate and hydroxide, 65% of cobalt metal, 70% of graphite and only 30% of nickel. What kind of solutions can we have? It is clear that today all car manufacturers are trying to build joint ventures; General Motors has one for nickel with Vale and with Livent for lithium; Tesla has just taken a participation in New Caledonia, and it was even said that Tesla could buy a minority stake in Glencore, the world’s biggest miner and trader in minerals. Of course, we have the possibility of developing recycling which will be important. Remember that for normal cars with lead batteries, more than 60% of world lead is secondary lead that is recycled. However, in fact it is clear that we are facing potential deficits in the horizon of 2030-2040, and that could be for lithium and cobalt, but certainly for more basic products like copper or tin. In fact, we are back to antiquity, to the time when copper plus tin made bronze. Both of you are German [Friedbert Pflüger and Jonathan Cordero], remember that the copper trade made the fortune of Austria, of the Hapsburg monarchy and the Fugger trade company.

I will conclude by saying that what I think is important and strategic is to anticipate and plan. I will give you an example of a perfectly irrational decision, which was taken by the European



parliament to ban all gasoline and diesel cars by 2035. It is stupid and counterproductive, both because we do not have enough lithium as it takes 10 to 15 years to mine, so we will lack the necessary lithium production and we will probably have problems with cobalt and others. By the way, all those electric cars will be run by power that may be derived from coal.

Just to finish, remember the quotation from the French poet Éluard, who said you should never look at the past with today's eyes, so you must not imagine the future with today's technologies.

Friedbert Pflüger

Thank you very much, Philippe. I wish my kids could study at Dauphine-Paris and hear you speaking with so much power and clarity, it was a great introduction.