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Countdown to a crisis?
How the global crunch on natural resources is threatening to derail Europe’s PV industry

There could be trouble brewing for Europe’s PV industry in the wake of a decision over mineral mining, taken in Beijing. The Chinese government wants to severely restrict the mining of rare metals in the country, and the problem for us in Europe revolves around rare earth minerals – a group of metals which are critical to the EU’s engineering industry as a whole – not just PV. China, which accounts for 97 per cent of global production, has imposed a steep decrease of export quotas on a number of rare metals since 2005 and is now considering a full export ban as of 2015.

In November 2009, the European Commission presented a new integrated strategy for raw materials, suggesting three pillars for the EU’s policy response to different challenges related to access to global resources:

• Better and undistorted access to raw materials on world markets
• Improved conditions for raw materials extraction within Europe
• Reducing the EU’s consumption of raw materials by increasing resource efficiency and recycling

Since then, an EU expert group has identified 17 raw materials seen as ‘critical’ for EU high-tech and eco-industries and suggested that the block global diplomacy should be geared up to ensure that companies gain easier access to them in future. For the experts, the criticality of these raw materials relates to their production, which is concentrated in a handful of countries – mainly China, Russia, the Congo and Brazil. It also relates to difficulties in substituting them with more commonly-available materials and to their low recycling rates.

Rare earths are seen as critical for European businesses, as these materials are widely used by high-tech and eco industries. The Chinese authorities initially announced plans to increase control of rare earth minerals mined in their territories after cracking down on illegal mineral exports last year.

However, the country now plans to tighten controls by only allowing state-owned companies to mine these minerals, putting
the Chinese government in complete ownership. The authorities have blamed ‘environmental degradations’ as the main reason for putting these controls in place, although many other countries are seeing the Chinese as trying to gain an advantage in the clean technology race.

These valuable minerals form an essential part of new green equipment used in wind energy, batteries, electric vehicles, LEDs and most significantly for us, in solar energy. Germany is close to being a world leader in its consumption of raw materials and while it has ample reserves of coal, potash, salt and sand, the nation has to import the resources needed to make high-tech goods. Without the likes of copper, cobalt, platinum and the group rare earths, the country’s technology industry could never have advanced to the heady heights from which it turns its tidy profit today. And although Germany is a major player in the fields of electronics and engineering, it is heavily dependent on imports for raw materials.

Without metal, for instance, there would be no wind turbines, without lithium and copper, no batteries for electric cars and without the 17 rare minerals with various electric and magnetic properties, no photovoltaic (PV) cells. There was a time when the Chinese were happy to export their valuable resources, but as Ulrich Grillo, Chairman of the Raw Materials Committee of the Federation of German Industry said recently, that situation has changed: "Back in July, China said it would reduce production for the second half of the year by 64 per cent," he said, adding that the China Daily newspaper had reported exports of rare earths would be cut by 30 per cent this year. "This report has not yet been denied," he said prophetically.

The German PV industry has already been affected by the scarcity of lanthanum, and consequently been forced to slow down its production of solar panels. It’s one of many examples that lead Ulrich Grillo to believe raw materials are being misused as geo-strategic tools. "More and more countries in Europe and in all other continents need resources for their own development," he said. "They want to be a part of industrial production, growth and affluence, and that is their legitimate right."

He said that imposing trade restrictions such as export quotas and tariffs meant important emerging markets were subsidising their own industries and warping international competition. Nevertheless, industrialised countries are not without blame for the current situation. As recently as 1990, for instance, more than 33 per cent of rare earths on the market came from the US. But their toxicity and dispersal always made mining them a costly affair. Consequently, US companies decided to close down their shafts and buy the minerals from China, which was selling rare earths cheaply at the time. Not any more however.

Recent developments have prompted a change in thinking and several mining companies have already announced plans to go back underground in search of rare earths. And when they do, German Economics Minister Rainer Bruederle would like to see German companies get involved. But the president of the Federation of German Industries (BDI), Hans-Peter Keitel, said it would take more than investments to secure $80bn ($112bn) worth of raw materials annually. "We could ask ourselves what political interests a region like central Asia has," he said. "Maybe there are political wishes we could help to fulfil in exchange for the procurement of raw materials.

say, "Without endorsing protectionism, we could consider whether China might not actually be within its rights to say it doesn’t want to sell its raw materials for money and yet more money," Mr Keitel said. "Isn’t this about partnership? Isn’t our technology really our currency?"

He said Germany should be looking at which of its technologies it was willing to export in exchange for raw materials. At the end of October last year, the German government signed off a raw materials strategy, for instance, which sets out plans for partnerships between the foreign, economics and development ministries with resource-rich developing and emerging
nations. Development Minister Dirk Niebel said he would like to see Germany help establish emerging nations in the international raw materials economy.

“I am interested in value-based and interest-based development co-operation,” the minister said, explaining that it was in Germany’s interests to help its partners develop and stand on their own feet. “On the other hand, it is also in Germany’s interest to ensure that what is organised here with taxpayers’ money flows back into German society with added value.”

The strategy makes sense because Germany is set to remain at least partially dependent upon Chinese raw materials in the future. Without them much of the nation’s industry would quite simply grind to a halt. The US has also become alarmed at these recent developments as the rare earths are also crucial for manufacturing high-tech military equipment like missiles and radars. Japanese companies are also under pressure, due to their dependence on illegal Chinese exports of the rare earth minerals.

So what exactly are the Chinese authorities proposing? In a nutshell, China is planning to tighten its control over its rare earth resources because of the American military’s dependence on China’s supply of rare earth minerals. But Chinese officials say they want to tighten control over the precious resource because the mining of rare earth minerals has led to environmental ruin and chaotic development. But is this the case, or are there more economically-based motives at work?

Now the European Union has entered the fray with a report warning of a shortage of 17 materials with 11 of them being rare materials found mostly in China. A group of experts has warned about the shortage of antimony, beryllium, cobalt, fluor spar, gallium, germanium, graphite, indium, magnesium, niobium, platinum group metals (PGM), rare earths, tantalum and tungsten. The report also notes that most of the world’s production of these minerals is in China with other minerals being found in Russia, the Congo and Brazil. The report has no solution for this scarcity problem except recommending more recycling.

But the EU should not restrict itself to China-bashing over rare earth supplies and instead focus on access to all raw materials and emphasise recycling and substitution, experts have said. A long-awaited European Commission paper on raw materials failed to raise enthusiasm among EU businesses and other stakeholders. Many described the paper as a mere repetition of a previous 2008 initiative and called for better prioritisation of its work.

The majority of stakeholders also seem to have rejected the inclusion of a whole new chapter on financial and commodity markets, saying these should be dealt with separately. The European Parliament’s raw materials group, set up to work on an EU strategy, is not even going to address these markets. The new chapter was added to the commission paper at the last minute at the request of France, which has vowed to take China-bashing over rare earth supplies and other plus measurements as part of its G20 presidency.

Concerns over scarcity and supplies of raw materials have emerged as the global population continues to grow and the world’s poor continue to lift themselves out of poverty. The rapid industrialisation of emerging economies, such as Brazil, China and India, has intensified competition for raw materials, pushing up prices on world commodity markets.

However, some scientists are now challenging this widely-accepted view. “We are not running out of minerals, at least not any time soon,” Professor Roderick Eggert of the Colorado School of Mines told a European Parliament hearing last January. Speaking in Brussels, Eggert, a geochemistry graduate who holds a PhD in mineral economics, challenged such perceptions and said businesses and policymakers should focus instead on “costs, geography and timeframes”.

By cost, Eggert referred to both the economic cost of extraction and recycling,
“which varies significantly from one location to another”. He also drew attention to a broader, ‘less quantifiable’ environmental and social costs associated with those two methods of production. For the European Commission, the ‘criticality’ of a raw material primarily relates to the concentration of production in a handful of countries. But Eggert disputed this claim and argued that “geographically-concentrated production cannot be a risk factor in terms of access to raw materials”.

In his view, geographic concentration and dependency on imports were simply not the same thing and in many cases import dependency can even be good if foreign sources are better and available at lower cost than domestic ones, he said. Eggert also stressed the difference between short and long-term supply issues. In the short term, the real issue is “the reliability of producers and the risks associated with availability”, which depend on existing production capacities and are strongly influenced by investment decisions and past government policies.

“Long-term issues are very different and are linked to geological availability, the evolution of production techniques and the role that public policy plays in facilitating them,” he went on. The commission’s new strategy also calls on Member States to draw up ‘national minerals policies’, draft land-use planning policies for minerals, and ease the authorisation process for mineral exploration and extraction. Regarding rare earths, Eggert believes that non-Chinese sources of supply will ultimately come on to the market, as a result of ‘miner mania’ – the expected boom in exploration for deposits that contain rare earth elements. Despite their name, rare earths are actually not that rare, with a third of the world’s known reserves located in Greenland and deposits existing in the US, Canada, Australia, South Africa and even Sweden, according to Reinhard Bütkofer, a Green MEP. Had it not been all too easy in the past to rely on China to supply Europe’s high-tech industries with rare earths, policymakers would not have fallen asleep at the wheel, he wrote in a recent op-ed piece.

Within the next couple of years, production is already expected to come online in the United States and particularly Canada. As such, others argue that their supply risk is more of a medium to long-term issue,” Bütkofer said.

If, like Eggert and Bütkofer suggest, raw materials are not really scarce, the EU could decide to boil down its strategy to ensuring that industry access is maintained at a competitive price.

The European Commission said the 2002-2008 price boom was marked by surging demand from emerging countries and that the trend will continue with further industrialisation of China, India and Brazil. As European demand for materials remains relatively stable compared to the surge in China, the old continent is losing buying power on world markets to emerging economies, and is forced to gear up its raw materials diplomacy via trade agreements or attacks against China at the World Trade Organisation.

Vanishing resources

The relevant minerals, affected by the Chinese decision, are:

- Germanium
- Graphite
- Indium
- Magnesium
- Niobium
- Tantalum
- Tungsten

America also hit by shortages

The US can’t dig its way out of its rare earth minerals shortage. Instead, increased government investments are necessary to foster the development of alternatives, experts groups concluded in a joint study.

The American Physical Society (APS) and Materials Research Society were unanimous in calling for broader research into new materials and increased electronics recycling. The study was released to lawmakers in March this year.

Ask as they may, the US House of Representatives seems unlikely to oblige. The House majority’s FY 2011 discretionary budget proposal dramatically reduces government spending for the sciences by 33 per cent, the APS reports.

House Republicans have committed to cut US$100 billion in government spending, with the possibility of further cuts to come.

Washington’s nascent austerity politics puts the experts at loggerheads with policy makers: the study saw no away around greater government involvement.

The Associated Press quoted Robert Jaffe, co-chair of the joint study group and professor at Massachusetts Institute of Technology, as saying, “We do not recommend economic stockpiling, which we believe is a disincentive to innovation and has backfired in the past.”

Jaffe continued: “After all, many of these elements are not even found in significant deposits in the United States so mining independence doesn’t even make sense.”

The Obama administration called on Congress to take action to diversify sources of supply for the US and its allies. There has been a slight uptick in domestic supply in response. In December 2010, a rare earth mine reopened in California.