Raw materials for Europe

European Innovation Partnership

SUMMARY *The European Commission (EC) has highlighted Europe's dependence on imports of many raw materials, and that reliable supplies of these are critical to its competitiveness.*

Global trends show that competition for raw materials will increase in the future and that price levels are unpredictable.

The Commission has responded to these challenges with the Raw Materials Initiative (RMI) and the launch of the European Innovation Partnership on Raw Materials (EIPRM), which aims to accelerate innovation and research and development of breakthrough technologies by pulling together resources and using a multidisciplinary approach.

The EP has called for an integrated raw materials policy with more strategic coherence, as well as stronger recovery and recycling of electronic waste in the EU.

Industry welcomed the RMI but also signalled concerns about the coherence and contradictions of EU policy.

Member States and industry questioned the scope and objectives of the EIPRM proposal while agreeing that innovation is crucial in ensuring supplies of raw materials.

Antimony is used in production of batteries, plastics and computer screens. Current reserves could be exhausted by the early 2020s. Over the past decade, antimony's price has increased more than tenfold.

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Issue definition

Raw materials

In this briefing the term "raw materials" refers to non-agricultural raw materials that are primarily used for industrial and manufacturing purposes rather than for generating energy. These include:

- Ores and their metals and metallic by-products
- Industrial minerals
- Construction materials, such as aggregates, and
- Wood and natural rubber.

While Europe is self-sufficient in supplying construction materials and certain industrial minerals, it is highly dependent on imports of ores and metallic minerals.

Criticality

The competitiveness of a number of sophisticated industrial sectors such as electronics, cars, aeronautics or chemicals can be impaired by limited, volatile or more costly supply of certain raw materials. The EC has examined the supply of 41 materials and classified 14 of them as "critical" based on two types of risks:

- "Supply risk", taking into account political-economic instability of producer countries, heavy concentration of production, little potential for substitution and low recyclability rate
- The "environmental country risk" related to limitations in supply to the EU due to

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new environmental-protection measures introduced by producer countries.

The EU's import dependency for 12 of 14 critical raw materials (CRM) is more than 90%. The Commission considers CRM, rare earths and metallic ores essential for the functioning of European industry. Its report recommended updating the list of critical raw materials every five years, as the number and importance of key raw materials is a dynamic concept. The emergence of new shortages is illustrated by the fact that in 2011 the Commission concluded that the supply risks of five metals (four from the CRM list, as well as tellurium) may hamper the deployment of low carbon energy technologies in the EU.

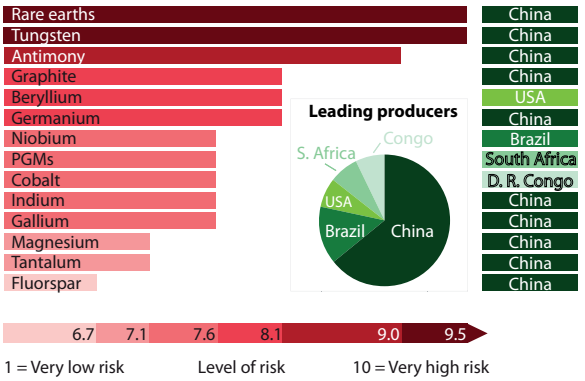
Global trends and supply disruption

According to projections, China and India will continue to grow economically and the Chinese economy will eventually outgrow both the USA and the EU. This trend means that global demand for raw materials is bound to increase and competition for resources will intensify. According to the EC, the criticality of raw materials is not primarily a consequence of their physical scarcity but rather a result of new geopolitical challenges, supply risks and rising demand from emerging economies.

In 2012, the British Geological Survey (BGS) also considered supply risks for 41 elements[1] (including all CRM) needed to maintain a modern economy and lifestyle. It concluded that factors such as geopolitics and resource nationalism are the most likely to disrupt supply.

It also noted the heavy concentration of the majority of them in China and suggested that supply problems are compounded by low rates of recycling and limited possibilities of substitution.

Figure 1 - Supply risk index and leading producers of CRM



Data source: BGS Risk list 2012

Markets and price volatility

The supply of raw materials is considered relatively inelastic because investment in extractive industries is capital intensive and has long payback times. Very often such investments involve substantial risks and are influenced by political decisions and environmental factors. In the European context, mining within or near Natura 2000 land, even if allowed, may be difficult.

Periods of lower prices could lead to under-investment reaching years into the future.

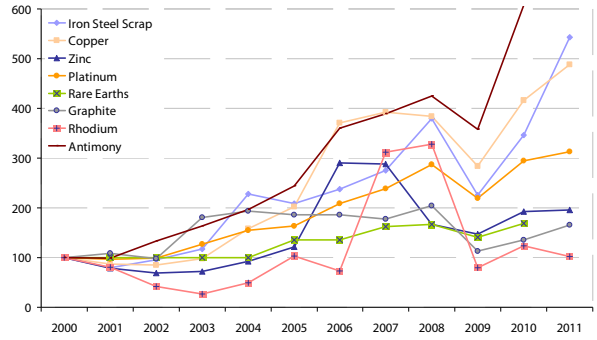
The prices of many raw materials have been relatively stable from 1990 to 2002. From 2002, prices generally started to rise either moderately (graphite, rare earths) or rapidly (copper, iron & steel, antimony). Much of the increase can be explained by strongly growing demand and the delayed response of the mining industry.

While prices of some materials (zinc, rhodium) collapsed due to the economic crisis, others (platinum, copper, iron & steel) returned to or even surpassed pre-crisis levels.

Raw materials disputes

Rare earths are used in a variety of high-tech products such as camera lenses and hard drives. Current global demand is already estimated to exceed production, which is concentrated almost exclusively in China (97% of global output). In June 2012, the EU together with USA and Japan requested a dispute settlement before the World Trade Organisation, arguing that China distorts global markets by restricting supply, holding down prices for domestic manufacturers and overcharging foreign importers. In January 2012 the EU, USA and Mexico won a similar case against China regarding other raw materials.

Figure 2 - Price indexes of selected raw materials (2000=100)



Source: United States Geological Survey, Minerals information

EU policy

The Commission recognised the strategic importance of sustainable raw materials supplies in its 2008 Raw Materials Initiative. It proposed an integrated strategy based on three pillars:

- Ensuring that European companies have the same access to global raw material markets as their competitors
- Improving conditions for domestic extraction of raw materials
- Reducing the EU's consumption of raw materials, by boosting resource efficiency and promoting recycling.

The RMI was endorsed by the European Council, which considered price volatility and the risks of interruption of supply to be the two main issues at stake. The Europe 2020 Strategy underlined the importance of raw materials supply both within the "Industrial policy" and "Resource efficiency" flagship initiatives. The associated Roadmap on Resource Efficiency outlined measures to encourage more efficient use of natural resources in the EU.

Urban mining

This is a process of extracting useful materials from urban waste. A mobile phone contains over 40 different raw materials, including four critical ones. A study in Japan has shown that while it takes a tonne of ore from a gold mine to produce 5 grams of gold, a tonne of mobile phones can deliver 150 grams or more in addition to 100 kg of copper and 3 kg of silver. A tonne of computer circuit boards yields 250 grams of gold. The UN estimates that the EU produces around 8.3 to 9.1 million tonnes of electrical and electronic waste per year. Only 30% is currently recycled, and as much as half may be dumped in landfills or shipped outside the EU.

In 2011 the Commission updated the RMI and reported on progress made, such as the development of a raw materials trade strategy and research and innovation projects in the extractive industry under the Seventh Framework Programme for research (FP7). The RMI update was focused mainly on trade policy as a tool to secure access to raw materials from third countries (raw materials diplomacy). It considered stockpiling at European level and more concrete measures to be taken to promote resource efficiency, in particular by urban mining, recycling and better implementation and enforcement of existing waste regulation.

European Innovation Partnership on Raw Materials

Framework

In 2010, the Commission provided a framework for creating European Innovation Partnerships as part of the "Innovation Union" flagship initiative. Such partnerships would be established to accelerate the achievement of societal targets by mobilising public and private efforts across the whole research and innovation chain at regional, national and EU level. Their aim is to strengthen research and development efforts, co-ordinate investment, speed up development of standards and stimulate demand. To date five partnerships[2] have been launched or are in the preparatory phase.

Objective and work packages

The EIPRM aims at a significant reduction of the EU's dependence on raw materials by 2020, by accelerating innovation along the raw materials value chain. In the background document the Commission

underlined the need for a new integrated approach to the management of materials: from identification, extraction, processing, use for production, to end-of-life including recycling, reuse and disposal.

Work packages of EIPRM:

WP1: Developing technologies and solutions for raw materials supply; extraction, processing and recycling.

WP2: Developing solutions for substitution of critical and scarce raw materials.

WP3: Improving raw materials regulation, knowledge and infrastructure bases by building and standardising geological datasets, and exchanging best practices in policies for minerals and land planning.

WP4: Improving legislation to promote re-use and recycling and increase efficiency in the collection, sorting and recovery of raw materials from waste streams.

WP5: Improving the knowledge base, research and innovation, trade policy and policy dialogue with international organisations.

Some concrete targets include developing a 3-D geological map of Europe, finding substitutes for at least three key CRM applications, and establishing up to ten pilot demonstration plants for exploration, extraction, processing, collection and recycling.

EIPRM instruments

The EIPRM will use the following tools:

- On the supply side: it will pull together regional, national and European investment in research and innovation, and skills and training. The involvement of existing networks and instruments[3] will be combined with the promotion of new networks of researchers and funding organisations. EIPRM does not have a dedicated budget but relies on funding from other budgets: EU-level financing will be provided by FP7 (and, in the future, Horizon 2020), the structural funds and the European Investment Bank.
- On the demand side: incentives will be used to bring new products and services to market through targeted legislation, innovation-friendly public procurement, intellectual property and knowledge transfers, market and life-cycle analysis and EU-level standards and labelling.

State of play

On 11 October 2012, the European Council endorsed the EIPRM proposal and called on the EC to launch the partnership and develop its strategic implementation plan by the end of 2013. It also invited the Commission, in appointing representatives to the high-level steering group, to ensure good balance between industry, environment and research, including all fields of expertise in the value chain.

The EC commissioned a first study to identify and assess possible pilot plants and innovative technologies along the entire raw materials value chain. The Commission has also appointed the members of the steering group, which will hold its first meeting in January 2013. The first report on progress in setting up the EIPRM is due by the end of July 2013.

Role of European Parliament

In a resolution of 13 September 2011, the EP called for an integrated and coherent EU resource policy and diplomacy. MEPs also called for regular updating of the CRM list and for the establishment of an early warning system – a "risk radar" – for CRM supply. The EP asked the Commission to set up a long term "European Raw Materials Roadmap 2050". MEPs also recommended establishment of a high-level raw materials task force to ensure strategic coherence. The EC has established an internal task force to guide implementation of the RMI. Its first meeting took place on 26 April 2012.

Directive 2012/19/EU of the EP and Council obliges EU countries to collect 65-85% of electrical and electronic equipment waste

by 2019. The legislation requires larger retailers to set up collection points and seeks to prevent illegal waste dumping in third countries.

Member States and stakeholder views

Early reactions

The first RMI was welcomed by the mining industry which pointed out that the EU was finally addressing the issue coherently and at the highest level, which would help to tackle two obstacles to accessing raw materials: industry being regulated by a whole array of legislative measures and the lack of public awareness.

Environmentalists criticised the document for its contradictory tone, claiming that it promotes resource efficiency and recycling while focusing on exploiting third-country resources with trade instruments. Development NGOs claimed that the EU's raw materials strategy is driven by competition with the USA and China rather than the EU's development goals[4]: Pursuit of raw materials does not necessarily bring about development of resource-rich countries, so the RMI fails to reconcile EU values and economic interest.

Substituting for CRM

According to a 2012 EP study, the majority of substitutes for CRM are currently in the research and development phase, with 5-15 years being the likely timeframe for market-ready solutions. A faster way may be to develop products with the same functionalities but not dependant on CRM: groups of researchers around the world are working on reluctance motors for cars which, unlike conventional ones, do not use rare earths.

EC consultation and the 2011 RMI update

The 2011 RMI update has been viewed as diluted and inconsistent[5] as it contained a section on agricultural and energy commodities added at the last moment due to pressure from France, which was at odds with Germany over this addition.

The metals industry argued that stockpiling and substituting CRM is very difficult, if not impossible, and very costly, and that the EC should focus on trade policy as a supply tool. Industrial and employers' federations welcomed the policy recommendations as aligned to industry expectations but said more could be done to remove obstacles to domestic extraction. The paper industry noted that wood and recovered paper were not included in the CRM assessment although their prices are constantly being driven up by renewable energy subsidies.

EIPRM

The German Mineral Resources Agency claimed that the interests of small and medium-sized enterprises were not represented sufficiently in the EIPRM. French authorities supported mobilising all European innovation instruments, especially to keep the whole industrial value chain on the EU territory. The UK government did not want to express approval until it is assured that funding will come from a smaller, reprioritised EU budget. It suggested examining whether EIPRM duplicates other ongoing efforts. Sweden, while recognising the potential of recycling, regretted that the excellent extraction potential of raw materials was neglected in the EIPRM proposal. The Spanish administration pointed out that the CRM list should not be the main focus of the EIPRM as other important raw materials also have a significant impact on Europe's industry.

The mining industry has a similar view stressing that all minerals should be explicitly considered in EIPRM, adding that old mine waste also has significant economic potential. The business association Eurochambres warned that planned standardisation and certification may create new administrative burdens for businesses.

The Industrial Minerals Association considered that, in the EIPRM, resource efficiency is understood mainly as recycling whereas it should also be supported in the earlier stages (extraction, processing and usage phase, e.g. minerals in paper reduce cellulose consumption which improves

paper's environmental footprint). The metals industry, European Aluminium Association and recycling firm Umicore agreed that the EIPRM could have clearer objectives ("efficient recycling" instead of just "recycling" to keep quality and composition of material for future recycling cycles) and that a comprehensive examination of the value chain should replace the current fragmented approach. The chemicals industry stressed the need to incentivise innovation across the whole value chain as this will push more industrial sectors to consider potential contributions and investment.

Recycling

The European Environmental Bureau (EEB), an NGO, claims that the recycling industry will not be significantly boosted unless concrete long-term targets are set. Without them current techniques will not develop into more profitable ones as investment will go to the extractive industries on which the RMI focuses.

Too much legislation?

Industry complains that the EU's raw materials market is overregulated: subsequent reviews and additional legislation may discourage investment in the EU. Industry argues that EU legislation is sometimes conflicting, which creates wrong incentives (e.g. strict environmental regulations instead of promoting recycling encourages illegal waste dumping in third countries) and hampers competitiveness (e.g. cobalt is on the list of CRM, but at the same time obtaining authorisation for the use of cobalt salts under the REACH Regulation is a heavy process).

Further reading

European Competitiveness Report 2011, Chapter 4: Access to non-energy raw materials and competitiveness of EU industry, European Commission, 2011, p. 109-148.

Raw Materials: EU policy to secure access and improve use-efficiency, EP Library Briefing, 2011.

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Endnotes

[1] The 41 materials selected by the British Geological Survey include 27 materials considered in the Commission's criticality assessment and cover all the critical raw materials. They also include precious or semi-precious stones like diamonds, and metals like gold, lead, tin, uranium and zirconium,

[2] They include EIPs on: Active and Healthy Ageing, Agricultural Sustainability and Productivity, Smart Cities and Communities, Water, as well as Raw Materials.

[3] The EC Communication on EIPRM mentions mobilising networks such as ERANET in materials, European Technology Platforms on Sustainable Mineral Resources and Forest-based Sector, EUREKA, Eurostars, as well as frameworks and funding programmes such as Cooperation, Public Private Partnerships in Research, Competitiveness and Innovation Programme, European Cooperation in Science and Technology, long-term public-private partnerships under Joint Technology Initiatives, as well as the scientific integration bodies such as the European Strategy Forum on Research Infrastructures and the European Institute of Innovation and Technology.

[4] Article 3(5) TEU states: "In its relations with the wider world, the Union shall uphold and promote its values and (...) It shall contribute to peace, security, the sustainable development of the Earth, solidarity and mutual respect among peoples, free and fair trade, eradication of poverty and the protection of human rights".

[5] A similar view was given in the EP policy department study on RMI which reads: "The communication is overloaded with discussions on energy, agriculture and financial markets, which do not bear a solution for resource supply problems of the manufacturing sector."

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