



EUROPEAN TECHNOLOGY PLATFORM
ON SUSTAINABLE MINERAL RESOURCES

ETP SMR Policy Document for the EIP on Raw Materials

Securing a sustainable raw materials supply basis for Europe

*A mineral resources and metals industry view
on the future of innovation in Europe and the
role of the European Innovation Partnership
on Raw Materials for a Modern Society.*

Brussels, 22nd November 2011



1. Societal challenges – Mineral resources and metals are essential for the European future

The EU faces a number of major societal challenges including climate change, energy supply, availability of critical and essential raw materials from primary and secondary sources and availability of jobs, skills and technological competences. Addressing these challenges requires that the appropriate technologies, processes and products are in place, along with adequate policies to implement and stimulate the required changes. The Raw Materials Initiative and the Roadmap for a Resource-Efficient Europe outline measures and actions needed to ensure secured and sustainable access to raw materials in Europe.

All mineral resources and metals are essential to our developed high-tech economy as a whole and more specifically to the products and technologies that will allow a transition towards a competitive and sustainable European economy. Minerals and metals are vital to downstream sectors such as information technology, renewable and efficient energy production, investment, medical devices, construction, automotive, aerospace, chemicals, machinery and equipment (these sectors provide a total added value of €1,324 billion and employment for some 30 million people¹). In a more direct sense, the mineral resources sector contributes strongly to European jobs and added value, employing at least 1.2 million people and some €470 billion.²

The long-term sustainability of these sectors and in turn the achievement of the EU 2020 objectives of moving towards a competitive and sustainable economy requires that the EU downstream industry will have unrestricted access to raw materials in the required quantity and quality and at competitive cost.

The EU depends heavily on imports of metal concentrates (EU domestic production = 3%), while the increased use of recycled scrap (40-60% of input of EU base metal production) is not sufficient to meet growing demand. In addition, the EU faces major problems in accessing its scrap as exports of scrap and end-of-life products containing valuable raw materials has increased dramatically over the last decade (more than 125%) while imports have dropped significantly (-40%).

The EU also relies heavily on imports of metals. 14 critical raw materials for the EU have been identified in 2010, but the challenge of access to raw materials is a dynamic one that calls for an overall approach, not only limited to these critical materials.

Special attention should be given to **critical metals for strategic energy technologies**. A shortage of these metals could be a potential bottleneck to the deployment of low-carbon energy technologies (nuclear, solar, wind, bioenergy, tide energy) and new applications in XXI Century technologies (IT, embedded systems, sensors, robotics and automation in mining operations).

¹http://ec.europa.eu/enterprise/policies/raw-materials/critical/index_en.htm

²Data from websites of Eurometaux, Eurofer, IMA-Europe and UEPG

Increasing European mineral and metals production (exploration, extraction and processing of primary resources), increasing recycling and reuse of secondary resources and finding substitutes where necessary should also be key parts of the Roadmap of the EIP on raw materials.

2. The European Innovation Partnership on Raw Materials is a promoter for sustained and sustainable access to raw materials

The EU 2020 strategy aims at ambitious growth objectives to which innovation will be a major leverage. Innovation is rightly considered as one of the main avenues for achieving economic growth and competitiveness, while also addressing sustainability challenges. The greatest challenge is to anticipate future opportunities and to ensure an approach that identifies potential “step changes” and facilitates implementation.

Innovation has always been a major driver for the EU mineral resources and metals industry which holds a leading position at global level in terms of efficiency and environmental performance. Our leading position is currently under threat due to the degradation of the competitiveness of the EU industry versus its main competitors. This situation has resulted in a lower level of investment in R&D and innovation in Europe.

The EU mineral resources and metals industry, as assembled in the European Technology Platform on Sustainable Mineral Resources (ETP SMR), therefore greatly welcomes the focus on innovation expressed through the Innovation Union Flagship Initiative, and particularly **the European Innovation Partnership on Raw Materials** (EIP on RM) which is under preparation. This EIP on RM rightly addresses all aspects of access to essential and critical mineral raw materials (exploration, mining, smelting, recycling and metallurgical recovery and refining, including the highly innovative enabling technologies and equipment industry). The EIP should also address the technological and non-technological challenges and innovations to access materials from an integrated value chain perspective. Part of that integral approach is the attention paid to innovative substitution routes, ensuring lowering the vulnerability of the supply chain. The **ETP SMR** therefore acknowledges the role of the other **ETPs** (for example Sustainable Chemistry, European Steel Technology Platform, ETP ManuFuture, European Construction-ECTP, ETP EuMaT) in supporting the EIP on RM with emphasis on the role of many metals and minerals in electronic, advanced materials, construction and the chemistry sector (substitution).

3. The European Innovation Partnership on Raw Materials supports European policies

In 2008 the EU launched the first Raw Materials Initiative (RMI) – Meeting our critical needs for growth and jobs in Europe (SEC(2008)2741). Both the first report in



the framework of the RMI (June 2010) and the second Communication on Raw Materials (February 2011), adopted by the EU, set out measures to secure and improve access to raw materials for the EU. The strategy reinforces the 3 pillar-based approach to improve access to Raw Materials for Europe through fair and sustainable supply from international sources; fostering sustainable supply within the EU and boosting resource efficiency and recycling. In parallel, the Commission has developed and implemented a number of more specific measures/policy initiatives which in some way contribute to or support access to raw materials. Just to name a few:

- Various reports on the Competitiveness of related EU industries
- The Sustainable Consumption and Production Action Plan (2008)
- The EU Report on Critical Raw Materials which identified 14 critical mineral resources based on the supply shortage risk and their impacts on the economy
- The Thematic Strategy on Sustainable Use of Natural Resources
- The Thematic Strategy on the Prevention and Recycling of waste (2005) and the 2011 Commission report on the Thematic Strategy
- The European Parliament Report on Raw Materials Strategy for Europe (issued on 12.9.2011)
- The Resource Efficiency Roadmap issued on 20 September 2011
- The EU report on Minerals Policy, Land-planning and Permitting (June 2010)
- Ongoing preparatory work to support the EIP on RM (under the leadership of DG ENTR several workshops have been organised)

The link with access to raw materials is clear and calls for consistent policies.

4. Overall Vision and Strategic Ambitions

Vision: by 2020, the EU will have secured a sustainable minerals and metals supply base to ensure competitiveness and growth of the EU industry as a whole. Scientific breakthroughs and sustained innovation efforts will have significantly improved access to, production, use and recycling of resources. By 2050, the EU will have achieved a sustainable basis for the entire life-cycle of minerals and metals in the EU.

On the way to make this vision a reality, the following strategic ambitions can be formulated:

Strategic Ambition 1 (exploration and inventory of resources)

By 2020, Europe has a comprehensive overview about available intra-EU geological mineral resource and metal potential (primary resources) and of the mineral resource and metal potential in the “urban mine” (secondary sources). Secondly, we will have



developed new, advanced exploration technologies for land and sea-based exploration as well as tools to assess the resource potential in technical infrastructure and products put on the market.

Strategic Ambition 2 (mineral extraction from land and sea bed deposits)

Already today some of the world's smartest, and most energy and resource efficient mines and quarries are operating in Europe. By 2020, Europe will maintain and develop further technological leadership aiming at economically viable and environmentally sound mineral extraction operations, including from greater depth of land and sea deposits.

Strategic Ambition 3 (mineral processing)

By 2020 Europe has identified new ore and concentrates processing technologies that will allow step changes in energy, water and emissions intensity and will allow treating more complex (primary and secondary) mineral resources. These technologies will pave the way for expanding European business and future advanced jobs.

Strategic Ambition 4 (metallurgy/metals recovery)

Europe should maintain its advanced technology in metals production and should develop further its know-how in order to be able to process even lower grade and/or complex (primary and secondary) materials in the most sustainable way.

Strategic Ambition 5 (recycling)

Europe has already become the leading continent with regard to recycling of base metals and a number of other raw materials. The same needs to be achieved for the recycling of critical and essential raw materials, where currently still significant deficits exist. In particular, the ambition is therefore to become the leading continent with regard to recycling of both base and critical/technology metals:

- By 2020, the recycling rates of critical and technology metals are at least above 10% in the EU;
- By 2050, the recycling rates of critical and technology metals are at least above 25% and an overall 10% increase in recycling rate is reached for all other metals.

That gives the opportunity to improve the extraction from secondary sources increasing the overall availability of resources for the EU economy.

Collaborative efforts by the various institutions and governments in the EU Member States are required to achieve these goals since the interdependencies of industries and raw material supply in the Internal Market are such that only a joint EU effort will have the critical mass to produce the technological leadership and know-how. The ERA-Min will provide a starting point. Such innovation will have to foster



technology, but also adjust the legal and social framework for innovation and the uptake of the innovative technologies.

5. Main Innovation Needs

Innovation is the key to fulfil the strategic ambitions described above. The main innovation needs as seen by the ETP SMR are:

- To enlarge our knowledge base on the availability of primary and secondary raw materials. Primary raw materials comprise both land and seabed deposits, while secondary address the material composition of relevant (consumer) products, their stocks and flows through manufacturing, use and end-of-life. This will lead to a more comprehensive and updated information on the available EU mineral resources and would for the first time also systematically show the potential we have from secondary sources.
- To develop new, deep penetrating geophysical technologies and sustainable technologies aimed at exploration, deep land and seabed extraction.
- To increase our understanding of the functionality of metals and minerals in downstream industrial processes and products, thereby facilitating design-for-recycling and a stepwise improvement of recycling (and substitution) potential.
- To enhance significantly the production efficiency and metal recovery when processing metal ores (Metal Factory of the Future).
- To optimally exploit the EU secondary resources as a step towards a circular economy. For this purpose innovation along the entire reuse and recycling chain (logistics, pre-processing, material recovery) is required over all possible sources (production waste streams, end-of-life products, industrial side streams (slags, dusts, effluents, etc.), historic tailings and landfills).
- To develop innovative awareness campaigns, business models (e.g. leasing or deposit systems) and infrastructures to boost the collection of consumer products.
- To enhance the monitoring and transparency in flows of end-of-life materials by development of smart tracking and tracing technology, right from the moment of collection throughout the entire EoL chain (e.g. tagging with RFIDs).
- To develop innovative pilot plants which enhance the introduction of the innovation pathways addressed above along the whole value chain from exploration, extraction, mineral processing, metallurgy and refinement to recycling.

The **Strategic Technology Roadmap** (a further development of the SRA) is under development by the ETP SMR.



6. Training and Education

Training and education is an essential part to foster innovations in the raw materials sector. The value chain of exploration-mining-processing-refining–recycling offers ample opportunities for jobs, many of them advanced and highly sophisticated. Besides innovations in technology, we also need social innovations to develop skills and transfer knowledge and understanding within and beyond current practice.

It is essential that training and education includes a strong interdisciplinary approach to address the complex interdependencies in the mineral resources field and to facilitate a true value chain approach. It further requires collaborative work between research institutions in the EU 27 Member States.

Stronger ties between industry and universities should be developed as well as increased mobility in between sectors to nurture innovations.

Well-funded academic institutions that foster research and education of future researchers will be required to further develop and maintain technological leadership.

A secure access to raw materials also requires capable human resources. The EIP on RM hence has to play an important role to raise awareness among young people for the significance of the sector as a corner stone in the sustainable development of Europe and to attract more students to engage in related fields.

7. Growth of the Regions

The importance of foreseen activities within the EIP on raw materials for regional growth and development should be acknowledged. The mineral resources industry is an important player to develop jobs, often also in remote regions. In the EU regional and cohesion development policy, the importance of the mineral industry therefore should clearly also be included in the funding programmes, i.e. the structural funds.

8. Conclusions and Way Forward

The EIP on RM is of strategic relevance for the Agenda 2020, the EU's Industrial Policy and other Flagship policies. It has the potential to create the needed leverage for the whole European industry value chain. Secured and sustainable access to raw materials from primary and secondary resources is imperative as a basis for a competitive and sustainable economy in the EU. The ETP SMR and its members (industrial partners ranging from exploration, extraction, smelting, recycling, alongside geological surveys and academia) are in full support of the future development of the EIP and its implementation.

ANNEX 1: Raw Materials value chain and the interlinks

The raw materials value chain is illustrated in the Figure below. It is generally valid for a broad range of raw materials, including industrial minerals, ferrous and non-ferrous metals.

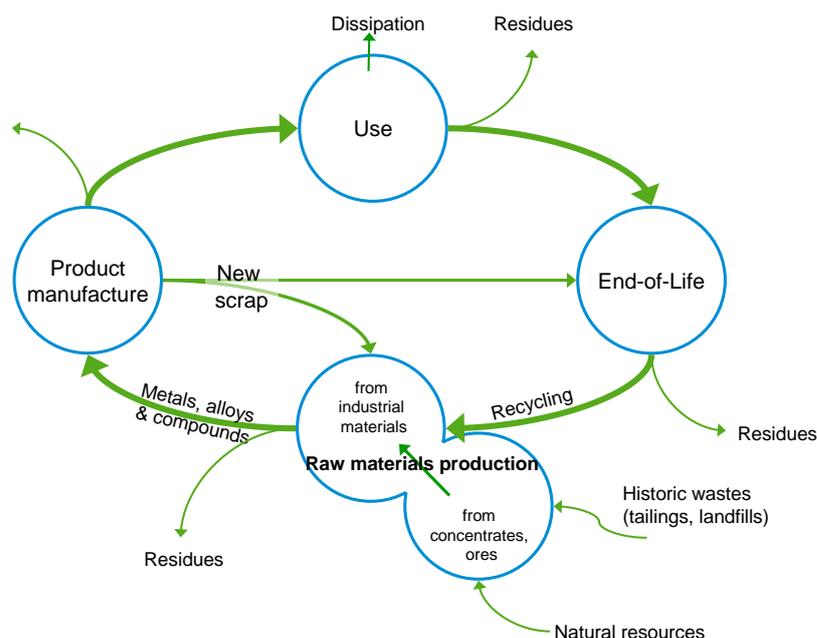


Figure: Life cycle of raw materials with main steps in the value chain³

As the figure shows, the metals life cycle starts with exploration and mining to provide first hand access and bring materials from the geosphere into the technosphere. From then on the basic concept is simple: extract metals at high rates from the ores, use them as efficiently as possible in the manufacturing process of products, avoid dissipation during the use and EoL phase and minimise losses of metals into residues during all phases of the life cycle. By doing so metals can be reused to a high percentage for a second, third etc. life cycle. This implicitly means that both scrap occurring during production and end-of-life products are new sources of raw materials that need to be recycled with high efficiencies. It is desirable to reduce unrecycled residues that derive from all stages of the lifecycle. This demands intelligent product design as well as smart processes over the value chain. Historic wastes create additional future resources beyond natural (geological) resources. Moreover, substitution efforts in product manufacturing may help mitigate raw materials access constraints, but it could lead to new challenges for recyclability or for sourcing the substitutes. Promoting more reuse of products and materials is also important, providing it leads into final recycling at the end of the extended lifetime.

³ Slightly modified after Meskers 2008. Basic figure is also used in the Report of the Ad-hoc Working Group on defining critical raw materials, EU Commission – DG Enterprise and Industry, July 2010, page 53