VERAM

Vision and roadmap for European raw materials

Project Final Conference

EU Raw Materials 2050: Roadmap to Success

II. Creating a Vision 2030 and 2050 for Raw Materials

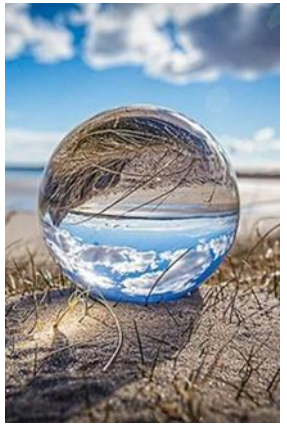
This project has received funding from the European Union's Horizon 2020 Framework Programme for Research & Innovation under Grant Agreement No. 690388

VERAM

Vision and roadmap for European raw materials

The VISION

EU Raw Materials 2050: Roadmap to Success



Dr. Corina Hebestreit
Veram Consortium

Brussels, 17th April 2018

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The EU economic outlook as available/predictable today…

forecasts an increase in raw material needs for whichever scenario of a future society we choose!

Despite higher resource efficiency in production and use and higher circularity of value chains efforts in the predictable future will be offset by

- **growth and partially aging of world population,**
- **aspired improved standard of living,**
- **higher environmental and climate protection requirements.**

Vision: Raw materials in the 2050 society

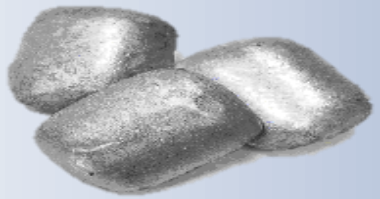
- **The acceleration in digitalisation, evolution of consumer behaviour, such as increased connectivity, the sharing economy, mass-customisation and sustainability, are reshaping the future of both products and processes.**

- **To achieve a global leadership in technological innovation, the industry in Europe is developing and improving smart technologies and applications that respond to consumer demands and global challenges that include the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement on climate change.**

- **Innovation in raw material value chains help the EU achieve the targets outlined by its roadmaps for a resource-efficient Europe and a competitive low-carbon economy by 2050 .**

- **In response to these future drivers, the EU raw materials sectors need to foster a sustainable supply and use of raw materials to feed existing and new value chains through research and innovation. At the same time, it needs to ensure base loads from EU resources, decreasing import dependencies and resilience of the EU industrial base through resource diversification.**

Mining productivity will be particularly important in satisfying the rapidly growing EV demand for cobalt, nickel and lithium – estimated to be 25 to 35 million vehicles per year

For producing each electric vehicle, we need:	Today[1]	Tomorrow[2]
	7.4 kilograms of lithium	8.4 kilograms of lithium
	36 kilograms of nickel	52 kilograms of nickel
	12 kilograms of cobalt	6.6 kilograms of cobalt

1 Considering an NMC622 cathode, 55 kWh battery pack
2 Considering an NMC811 cathode, 77 kWh battery pack

SOURCE: McKinsey 2017 Battery raw materials demand model 2018Q1

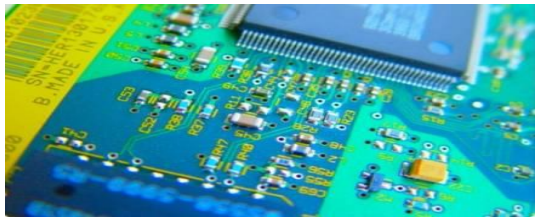
The metals and minerals value chain

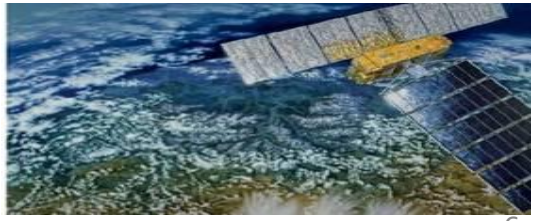
- The European mineral raw material sector is facing critical challenges in terms of supporting the transition to a low-carbon, fossil-free sustainable Europe and the green economy.

- The metals mined are critical to build electric infrastructure as well as energy storage systems, renewable energy power plants and vehicles for both personal and commercial use.

- The sustainable supply of metals and minerals will also be critical to build a future sustainable society that will rely heavily on new transport infrastructure as well as new green buildings.

- The mining sector and the mineral processing sector are vital to securing the supply of metals extracted in a sustainable manner. The value chain spans from geological exploration, mining and processing to the recycling of metals. The aggregate sector is spread throughout Europe providing aggregates for the building and infrastructure industries. Embedded in the value chain is a strong environmental commitment both during operation, as well as for the reclamation of land used for mining.





The biotic value chain

- **provides means to tackle global challenges by replacing fossil-based raw materials with sustainable, renewable raw materials sourced in Europe.**
  - Forests cover 42% of the EU's land area. The forest-based sector is a key enabler for a low-carbon, bio-based society.
  - The value chains produce a wide range of products ranging from wood construction products, packaging, furniture, paper and pulp products, and hygiene articles to bio-plastics, bio-composites, carbon fibres, textile fibres and bio-chemicals.
  - Furthermore, forests provide biodiversity and many ecosystem services that are of importance for human well-being and health, including clean air and water and recreational activities. In addition, forest and forest products are a renewable resource, and therefore there is a need to include long-term sustainable measures in forest management.
  - Forests are also fundamental to the mitigation of the effects of climate change.

- **Natural rubber is a strategic raw material, on which European industry has a complete import dependency.**
  - Natural rubber is mainly produced in Asia (93%). Hevea, however, a native tree from South America, is currently the only commercial source of natural rubber. Guayule (Parthenium argentatum) is one of the alternative sources, growing on marginal lands in semi-arid regions of European Mediterranean countries.

The EU Raw Materials sectors will achieve and underpin greater…

Sustainability

- by providing and improving the sustainable supply and use of primary, secondary and renewable RMs throughout the values chains.
- by developing and implementing improved and better adapted measurable scientifically based values/indicators/standards associated with sustainability through the whole value chain where needs have been identified using newly developed data management systems.

Economic resilience

- by increasinge the resilience of the EU economy by decreasing import dependencies and ensuring base load supply through diversification of primary, secondary and renewable raw materials.
- by developing new business models.

Technological leadership

- through the development of and adaptation of new technologies such as digitisation, automation, robotics and AI.
- by establishing new value chains. Current processes will change radically through big data management.
- by improving scientific and technical dialogue along and across business lines, exchange experiences, advance and leverage good practices.
- Through cross-disciplinary integration between academia and business for identification and development of new, cross-sectorial value chain opportunities.

Vision 2030 -2050
for the forestry and the metals and minerals sector

- **Increasing EU production to ensure base load supply for the EU economy and reduce import dependencies**
  - The European forest-based sector can sustainably increase its primary wood production by 30%.
  - For the metals and minerals sector this will mean a considerable increase in the production in a number of materials as well as the considerable increase in recovery and recycling of materials.
- **Improving access to resources in every possible way to attract more investments;**
- **Developing further the technical leadership worldwide and maintain global competitiveness in sustainable technologies.**
- **Exploring investment possibilities outside of Europe to facilitate future access to resources and increase sustainability globally;**
- **Creating new jobs in the raw materials and its service sectors to generate economic growth and contribute to the industrial policy goals of the EU;**
- **Contributing to EU cohesion by facilitating replacement of jobs being lost in other parts of the economy and through automation.**

Priorities identified

4 Priorities

Priority I:
Fostering a sustainable supply of raw materials to feed new and existing value chains

Priority II:
Resource-efficient processing for raw materials

Priority III:
Raw materials in new products and applications

Priority IV:
Closing material loops by maximising the recycling of products, buildings and infrastructure

Innovation and capacity building needs across the EU economy till 2050- Leveraging the European dimension

a. Increasing the engagement of all EU Member States through ERA-Nets;

b. Creating incentives through economic instruments (e.g. national legislation and tax frameworks).

c. Leveraging the innovative capacity – “picking the brains”

d. Expanding the cross-sector collaborative approach and knowledge transfer: bringing together various industrial and scientific sectors: Raw materials provide the basis for most societal development and “Megatrends” and therefore cannot conduct research in isolation. Continued joint trans-sectoral research will be required.

e. In particular, the European Commission should acknowledge the considerable societal challenge which will lie in the closure and rehabilitation of its coal and lignite mining areas. Support for a focussed RTD area for closure and rehabilitation of extractive industry sites would help to address old and newly arising legacy issues and thus anticipate a future foreseeable issue of the licence to operate for raw material extraction.

Leveraging EU's innovation leadership – "hitting the ground running"

d. "Innovation" Fitness-check of (European and national) patent and standardisation procedures;
Patent procedures: Assessment of the true relevant statistics for the raw materials sector is needed and bureaucratic hindrances need to be removed.

- Trademark registrations: The raw materials industry will be touched by two categories of trademarks: the one for machinery and the one for mineral products. Both should be considered when assessing the innovation rate in the sector.

- Standardisation: The choice of convenors and technical working group members of the CEN and CENELEC TCs needs to be submitted to tighter scrutiny and the assessment of the innovation potential or hindrances should be assessed when issuing the mandate for a working group.

Leveraging EU's innovation leadership – "hitting the ground running" - 2

e. Supporting the "genius" through special awards for innovations in the raw materials sector and for the raw material related courses should be created.

f. Extending awareness raising, education, skills and capacity building: the EIT Raw Materials
Further education and life-long-learning, in particular with regard to health and safety, automation and robotics, as well as digitisation, should be fostered through a European-wide multi-lingual training programme. Such training material and courses can also be exported as a service.