**VERAM Research & Innovation ROADMAP 2050**

*Draft 3.6*

**Version for Public Consultation**

*A Sustainable and Competitive Future for EU Raw Materials*

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# Why a Raw Materials Research Roadmap?

**Demographic changes**, such as population growth in developing countries and ageing population in developed countries, coupled with increasing standards of living and urbanisation trends will foster a greater demand for products and applications linked to human wellbeing, health, hygiene and sustainability. As a consequence, a worldwide demand for raw materials is expected to increase while global resources and land become scarce.

To meet the challenges caused by the **global warming** and waning natural resources, a shift towards a more resource efficient economy and sustainable development is becoming more crucial than ever. Meanwhile, trends such as the emerging ”sharing economy” and changing raw material demands as new technologies develop, will reshape the world we live in and influence our need for raw materials. The opportunities enabled by emerging technologies, digitalisation, artificial intelligence (AI) and additive manufacturing applications will bring about unforeseeable breakthroughs in technologies and organisation of human work.

Securing reliable and undistorted access to raw materials is crucial to boosting growth, jobs and competitiveness in Europe. Currently, the EU is dependent on imports of many raw materials that are crucial for a strong European industrial base.

Europe is confronted with several challenges along the entire raw materials value chain composed of exploration, extraction, processing and refining, manufacturing, use and recycling as well as substitution. Yet, innovation in raw materials value chains remains untapped despite the sector’s great potential. A more coordinated approach towards raw materials management will help reduce external supply dependency and lead to an efficient use of resources.

To achieve these goals, a long-term vision and roadmap to 2050 aims to tap the full potential of raw materials supply and use in Europe and to boost the innovation capacity of the sector, turning it into a strong sustainable pillar of the EU economy and an attractive industry, whilst addressing societal challenges and increasing benefits for society.

# Abiotic and Biotic Raw Materials

The Roadmap 2050 for European raw materials envelopes relevant research and innovation activities of non-energy, non-agricultural raw materials used in industry, including metallic minerals, industrial minerals, construction materials, aggregates as well as wood and natural rubber. In addition, as part of the circular economy concept, secondary raw materials[[1]](#footnote-1) will become more and more integral part of the materials consumption, requiring targeted research and innovation efforts.

The Roadmap distinguishes two raw material categories: the abiotic and biotic sectors encompassing the entire value chain from primary raw material extraction and harvesting and their transformation through processing or refining and the valorisation of waste into secondary raw materials to closed loops materials flows and the development of new products and applications to substitute fossil-based and/or critical raw materials.[[2]](#footnote-2)

#### The abiotic value chain

*To be developed*

#### The biotic value chain

The **European biotic raw material sector** is in the heart of the bioeconomy providing means to tackle global challenges by replacing fossil-based raw materials with sustainable, renewable raw materials sourced in Europe. Forests cover 42% of EU’s land area. **The forest-based sector** is a key enabler for a low-carbon, biobased society. The sector consists of four major sectors: woodworking, furniture, pulp and paper manufacturing and converting and printing, as well as forest owners. However, the value-chain is producing a wide range of products ranging from packaging, textiles, hygiene articles and furniture to bioplastics, bio-composites, carbon fibres, textile fibres and biochemicals. **Natural rubber** is a strategic raw material, on which the European industry has a complete import dependency. Natural rubber is mainly produced in Asia (93 %). Hevea, 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 structure of the Research Roadmap

To secure the competitiveness and sustainability of the European raw material sector will require significant investment in research and innovation and fostering synergies between and across different value chains. The biotic and abiotic raw material sectors have therefore identified four key priorities and ten research and innovation areas, including a number of activities with a view to addressing the key concerns of raw materials community as well as societies and citizens at large, as identified by the Vision 2050. The concrete research and innovation activities cover specific needs within supply and production of raw materials, creating closed loops, and developing new products and applications.

**THE STRUCTURE OF THE VERAM RESEARCH AND INNOVATION ROADMAP**

1. Polymers, glass, composites, ceramics, metal scraps, (non-energy, non-agricultural raw materials processing residues and side-streams e.g. tailings, sludges, slags, dusts, scales…) [↑](#footnote-ref-1)
2. <http://ec.europa.eu/eurostat/web/environmental-data-centre-on-natural-resources/natural-resources/raw-materials> [↑](#footnote-ref-2)