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**MAKING RAW MATERIALS AVAILABLE FOR EUROPE'S FUTURE WELL-
BEING
PROPOSAL FOR A EUROPEAN INNOVATION PARTNERSHIP ON RAW
MATERIALS**

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MAKING RAW MATERIALS AVAILABLE FOR EUROPE'S FUTURE WELL-BEING

PROPOSAL FOR A EUROPEAN INNOVATION PARTNERSHIP ON RAW MATERIALS

1. INTRODUCTION

The strategic importance of a sustainable supply of raw materials to the EU – for its industry and society as a whole – has been well recognised in different strategic policy documents such as the Raw Materials Initiative¹ proposed by the European Commission, related Council Conclusions² and Report from the EP³. The Europe 2020 Strategy highlighted the importance of this issue both within the "Industrial policy"⁴ and "Resource efficiency"⁵ Flagship initiatives. Moreover, the importance of an efficient use of resources has been highlighted in the associated Roadmap on Resource Efficiency⁶. These documents clearly outlined the new challenges and risks related to supply shortages and of an inefficient use of resources faced by the EU in view of the mounting global competition for raw materials. Paradoxically, for some decades, Europe has seen its role as a supplier of raw materials being progressively reduced. The complexity and urgency of the issues at stake have made it very clear that a continuation of "business as usual" is no longer an option for Europe.

This is where innovation comes into play. A new paradigm is emerging in the 21st century which points us to innovation as a driving force that has, so far, remained largely untapped in Europe in the area of raw materials. In 2010 the Commission has set out, as part of the Innovation Union flagship initiative⁷, the appropriate framework of European Innovation Partnerships (EIPs). Such Partnerships will be launched in cases where the combined strength of public and private efforts at regional, national and EU level in innovation and R&D and demand-side measures are needed to achieve societal targets quicker and more efficiently. This is the case for raw materials as presented in this Communication.

This Partnership will target non-energy, non-agricultural raw materials, including but not limited to the EU's list of critical raw materials⁸. Hence it also covers other metallic ones, industrial and construction minerals as well as other industrial raw materials such as natural rubber and wood. Many of these materials are vital inputs for innovative technologies that offer environmentally-friendly, clean-technology applications. They are also essential for the manufacture of crucial alloys, new and innovative products required by our modern society like, for instance, batteries for electric cars, photovoltaic systems and devices for wind turbines, which enable meeting the renewable energy objectives. The common objective of this Partnership will be that, by 2020, Europe will have made a great step in reducing its import dependency on raw materials. This will be achieved through accelerating innovations

¹ COM (2008)699 and COM (2011)25
² Council Conclusions 6909/11 of 10 March 2011
³ European Parliament resolution of 13 September 2011
⁴ COM(2010) 614
⁵ COM(2011)21
⁶ COM(2011) 571 final
⁷ COM (2010) 546
⁸ As defined in COM(2011)25

that ensure secure, sustainable supplies of both primary and secondary raw materials or prevent wastage of key raw materials during all their life cycle.

This proposal takes into account the lessons learnt in the context of the pilot EIP “Active and Healthy Aging”. It also builds on various inputs from Member States, research communities and other stakeholders gathered in the context of different meetings, workshops and events as well as a public consultation which were organised throughout 2010 and 2011.

2. OPPORTUNITIES FOR INNOVATION ALONG THE RAW MATERIALS VALUE CHAIN

For many years the basic geological **exploration** and mapping in the EU has been carried out by national geological surveys that have to operate within the constraints of national frameworks and regulations. Today, the full benefits of an appropriate coordination or even integration of some of the activities of the EU’s different 27 geological surveys has not been achieved. Yet, innovative thinking based on increased networking and cooperation offers a huge potential to move forward. Setting European standards will facilitate the creation of a uniform EU geological knowledge base, and can also lead to a more cost-effective development and use of required modern technologies, such as satellite-based resource information and advanced 4D computer modelling systems.

Over the last 50 years the EU’s share in global **mining** has decreased substantially. This has resulted in a loss of essential expertise and skills. However, such skills are required to ensure the safety of mining activities and to meet the potential growing need to extract more deeply, in remoter areas and under harsh conditions (e.g. seabed, Arctic region). While high standards for safer and more environmentally-friendly extraction techniques create new challenges, they also create new market opportunities. It would also help reduce the risk of major accidents in the mining sector. However, these expertise and skills are not only requested in extraction, but along the whole value chain (exploration, processing, recycling, substitution).

Even if Europe, as a whole, has made significant progress, notably in terms of waste recycling, more can be done to avoid the wastage of valuable raw materials at all stages of their life cycle. A full application of the first steps of European "waste hierarchy" (prevention, followed by preparation for re-use and recycling) could avoid irremediable loss of valuable resources and create new business and job opportunities in the EU.

Innovation can be a powerful vehicle in meeting these challenges. Expertise in engineering and processing has developed in other emerging areas such as in robotics and in other key enabling technologies (KETs). The introduction of advanced remote-controlled operations and automation in underground mines and the innovative use of bioleaching to extract nickel and other metals in an eco-friendly and cost-effective way render mining in the EU more competitive and sustainable. New monitoring techniques including the use of satellite based technologies could allow preventing major accidents. Innovation is also very important for the **processing** stage where advanced technological solutions are needed for efficient water management, energy consumption and recycling (as for example in the case of critical raw materials like indium and gallium which are derived from base metals).

The more advanced the EU becomes in developing this innovative approach, the better equipped it will become in playing a leading role in introducing new environmentally-friendly and resource efficient technologies, in Europe and in third countries. This may have an additional positive side-effect through the dissemination of best practices, which will in turn contribute to a better preservation of the environment worldwide. Sustainable and resource

efficient management of raw materials, increasing preparation for re-use and recycling, harvesting and mobilisation of wood-based materials can contribute not only to halt biodiversity losses, to reduce worldwide Green House Gas emissions but also to secure supply of raw materials and address scarcity of, for example, wood-based fibre for recycling, in Europe.

The huge increase in sales of modern communication devices - such as mobile phones and laptops - that tend to have a high replacement rate, has created a huge potential of valuable waste (“our Urban mines”). A mobile phone contains today more than 40 different raw materials, such as cobalt, gallium, platinum and rare earths elements. Nowadays, each citizen in the EU generates around 17 kg of electrical and electronic equipment waste (WEEE) annually, a figure which is predicted to rise to 24 kg by 2020⁹. However, the **recycling** of rare earths elements from electronic devices, for example, is currently challenging from a technological but also an economic point of view. Separate collection of waste has to be further encouraged and markets need to be supported to move ahead. Moreover, preventing illegal exports and inappropriate treatment of waste can lead to considerable environmental benefits and recuperation of valuable materials (e.g. metal scrap, recovered paper for recycling).

New cost-effective and environmentally-sound recycling techniques and best practices regarding the collection and treatment of waste offer the possibility to improve the recycling of key raw materials. As an illustration, the recent development of special adhesives that contain encoded information on the basis of unique chemical identifiers may contribute to the fight against illegal trafficking and theft of metal products and scrap. In addition, some Member States have substantially increased their collection and recycling rates by putting in place appropriate economic instruments including performing producer responsibility schemes to support separate collection, re-use and recycling.

Moreover, many applications rely on key raw materials that are currently very difficult, or even virtually impossible, to substitute due to their specific physical and chemical properties. **Substitution** can be used to either develop alternative materials in certain applications, or to replace those applications by an equivalent technology that does not rely on the key raw materials. For example, the development of ceramic high-temperature superconductors could become a substitute for permanent magnets in wind turbines which currently use rare earth elements such as neodymium and dysprosium.

In a nutshell, the above examples show that:

- innovation is a necessary condition for Europe to regain a role and a presence in the resource efficient use and sustainable supply of raw materials, without which the sustainability of its entire economy will be undermined
- innovation is needed to maintain and improve the competitiveness of the EU industry and to ensure an efficient use of resources in the European Union
- innovation is needed along the entire raw materials value chain, thus requiring a comprehensive approach to tackle the different challenges the EU will face in the coming years.

⁹ Source IPA (International Platinum Group Metals Association): www.ipa-news.com

This situation calls for targeted innovation and research efforts, breakthrough technologies and multidisciplinary approaches to bridge the gaps in our knowledge.

3. ADDED VALUE OF THE EUROPEAN INNOVATION PARTNERSHIP IN RAW MATERIALS

The support already provided by the Council and the European Parliament to the EU raw materials and resource efficiency strategies put forward by the Commission demonstrates that there is a growing awareness of the need to tackle the above-mentioned challenges at both European and national levels. Closer cooperation in the EU between public bodies, but also between public and private players, will provide the impetus needed to overcome the major obstacles.

These obstacles include (see also section 1.3 in annex):

- Insufficient critical mass towards a single objective;
- insufficient co-operation between Member States in different domains related to raw materials;
- Lack of integrated approach to 'value chains' from extraction and process of raw material, product design and use to end of life;
- Very limited co-operation between national research organisations and high fragmentation of the European Research Area in the field;
- Under-developed EU geopolitical role in ensuring access for European companies to raw materials in the world while respecting as far as possible European environmental standards.

The EIP's real added value will therefore be to provide a platform that aims to put together the relevant policies and actors at Community level, but without replacing the existing legal decision-making process at EU level.

3.1. Scope and objectives

This EIP will contribute to the mid- and long-term security of sustainable supply of raw materials (including critical raw materials, industrial minerals and wood-based materials) that are required to meet the fundamental needs of a modern resource efficient society. It is an essential contribution to the competitiveness of European industries, to increased resource efficiency in the EU, and to the development of new European-based recycling activities.

The EIP has an overall target of reducing Europe's import dependency on the raw materials that are critical to Europe's industries. This will be achieved by providing Europe with enough flexibility and alternatives in the supply of important raw materials, whilst taking into account the importance of mitigating the negative environmental impacts of some materials during their life cycle, thus making Europe the world leader in the capabilities related to exploration, extraction, processing, recycling and substitution by 2020. As part of its Strategic Implementation Plan (SIP), the EIP will be expected to set out impact targets to measure its success, for example in terms of major reductions in the import dependency of some of the most critical raw materials.

In addition, the Commission proposes some specific, concrete targets to be achieved by 2020 at the latest, such as:

- European standardised statistical instruments for the survey of resources and reserves (land and marine) and a 3-D geological map;
- a dynamic modelling system linking trends in supply and demand with economical exploitable reserves and a full lifecycle analysis including an assessment of the environmental, economic and social impacts of various scenarios;
- up to ten innovative pilot actions (e.g. demonstration plants) for exploration, extraction and processing, collection and recycling;
- substitutes for at least three key applications of critical and scarce raw materials;
- a Network of Research, Education and Training Centres on Sustainable Mining and Materials Management (M³), whilst ensuring appropriate coordination with the possible European Institute of Innovation and Technology (EIT) - Knowledge and Innovation Community (KIC) on sustainable exploration, extraction, processing and recycling;
- enhanced efficiency in material use and in prevention, re-use and recycling of valuable raw materials from waste streams, with a specific focus on materials having a potentially negative impact on the environment;
- identified opportunities and develop new ideas for innovative raw materials and products with market potential;
- a pro-active strategy of the EU in multi-lateral organisations and in bilateral relations, such as the US, Japan, Australia in the different areas covered by the EIP.

These targets will also allow for adequate follow-up and monitoring of the functioning of the EIP, including the work to be carried out and the results achieved.

3.2. Mechanisms

The added value of the EIP is that it will apply major innovation mechanisms¹⁰ including the following broad categories, to deliver common objectives (as stated above in section 3.1):

- Support to the development of innovations; both technology-based and non-technology-based, such as new combinations of products-services, new services, better design of products in order to ensure their recyclability at the end of their life, user-driven design, new policy tools for research and innovation;
- Stimulating excellence in the science base and investing in people (skills);
- Support to targeted innovative regulatory action and/or cooperation with Member States to improve innovation-friendly regulatory framework conditions;
- Promotion of targeted standardisation and public procurement instruments;

¹⁰ As defined in COM(2010)546

- Bringing policy-tools and organisations (policy makers, agencies, industry, researchers) working on supply and on demand-sides together to speed up time-to-market and dissemination of innovations.

The above instruments may act either in the supply or in the demand side of the market. However, on both sides, an adequate monitoring of results must be assured.

<u>Supply-side:</u>		<u>Demand-side:</u>	
<u>National</u> R&I funding by MS and regions Skills and training in MS	Science, RTDI	<u>National</u> Regulation (incl. regulatory implementation) Procurement in MS and regions	Market, consumers
<u>International (EU level)</u> Eureka, Eurostars, ERANet Framework programmes by EU <i>FP7 (Cooperation, PPPs, Cost, JTIs, ERANet, ESFRI...)</i> <i>EIT KICs</i> <i>CIP</i>		<u>International (EU level)</u> Standards/ Labelling Regulation (incl. regulatory implementation) Public procurement IP and knowledge transfer Market monitoring	
EIB tools Structural Funds		<u>International (worldwide)</u> Trade policy Policy dialogue	

On the 'supply side', investments in research on mining, substitution, resource efficiency and recycling need to be better aligned with the common objectives of the Innovation Partnership in order to create the necessary critical mass, because no national or European research programme can cover all aspects and the research investments and risks are too large for many private companies. This calls for a strong involvement of existing networks (e.g. ERANET in materials, European Technology Platform on Sustainable Mineral Resources, Forest-based Sector Technology Platform and other ETPs) and the promotion of new networks of researchers and funding organisations, both public and private, in Europe. For the future EU research and innovation programme, Horizon 2020, the Commission has proposed a specific objective to address the societal challenge of "climate action, resource efficiency and raw materials".

While Europe has had some tradition in funding research and innovation in this area, there is further significant potential¹¹ on the demand-side for bringing new products and services to the market. Accelerating the 'time-to-market' of innovations is particularly important for SMEs. Therefore, this EIP should incentivise innovation through both supply and demand-sides, when possible and appropriate via tools such as legislation, public procurement, life cycle analysis, IPR, and standards. Innovation related to Sustainable Consumption and Production policies should be particularly relevant. Incentives for sustainable and innovation-friendly public procurement already exist in Europe, and Lead Market Initiative's type networks of public procurers¹² could be established and the wider use of EU Green Public

¹¹ See 2006 Aho Report "Creating an Innovative Europe, the 2007 Lead Market Initiative and the 2010 OECD Innovation Strategy

¹² http://ec.europa.eu/enterprise/policies/innovation/policy/public-procurement/pp-networks_en.htm

Procurement criteria¹³ applied in this EIP to promote the uptake and dissemination of (eco-) innovations.

3.3. Work packages

Based on inputs from stakeholders and from policymakers, the possible actions to be taken have been grouped under five headings or 'work packages' (WPs). These WPs, which will include actions both on the supply and on the demand-side, will not work on a stand-alone mutually-exclusive basis. Rather, the individual WPs will interact with one another and there is even some intentional overlap between them. Moreover, they can be adapted to address changing needs and to capture new opportunities.

The governance structure will encourage cooperation, thereby breaking-down walls between policies, sectors, geographical distance or organisational cultures. For example, some mining technologies could also be applied in recycling, or vice-versa. It will also be a way to introduce better cooperation between large companies and SMEs, as well as among SMEs themselves, for example through regional clusters.

The following work packages for the EIP are proposed (a detailed description of each WP is outlined in section 2 of annex):

Technology-focussed policy areas

WP 1 - Developing innovative technologies and solutions for sustainable and safe raw materials supply; extraction, processing and recycling. Complementing technology development, this WP aims to produce standardisation roadmaps for these areas, while having in mind costs for business.

WP 2 - Developing innovative and sustainable solutions for the appropriate substitution of critical and scarce materials. The first set of priority actions may be derived from the list of critical raw materials and from the most economically-important and ecologically-sensitive applications.

Non Technology-focussed policy areas

WP 3 - Improving Europe's raw materials regulatory framework, knowledge and infrastructure bases. This WP aims to build and standardise geological data, and to identify and exchange best practices in defining policies for minerals, land planning and regulation thereof in the Member States. It will also support actions to promote technical excellence and skills needed in Europe.

WP 4 - Improving the regulatory framework conditions, notably by promoting excellence and prevention, preparation for re-use and recycling through public (e.g. procurement) and private initiatives. This WP aims at optimising the raw materials added value, improving the profitability and reducing the cost of recycling by enhancing efficiency in the collection, sorting and recycling of valuable raw materials from waste streams. It will also apply product, standardisation and certification policies as well as economic instruments for this aim.

International cooperation – horizontal approach

¹³ http://ec.europa.eu/environment/gpp/gpp_criteria_en.htm

WP 5 - recognises the global market place of securing access to raw materials and promoting the use of environmentally friendly extraction and processing technologies, and may deal with research and innovation, improving the knowledge base, trade policy and policy dialogue with international organisations, such as the African Union, OECD, World Bank, G20, and in bilateral relations. A particular attention will be paid to the possibility of better synergies between this initiative and the different policies related to Overseas Countries and Territories (OCTs).

3.4. Governance structure

The EIP's governance structure will follow the principles set-out in the Innovation Union; it aims to balance the need for high-level commitment and functional coordination on the one hand, with strong decentralised operational responsibilities to ensure effective ownership by practitioners and other key stakeholders on the other. Lessons learnt in the pilot EIP "Active and Healthy Aging"¹⁴ on defining governance, scope, planning and stakeholder involvement have been applied to meet the needs of this EIP.

This EIP will bring together representatives of the public sector (from EU to national, regional and local levels), industry (including SMEs), civil society and other stakeholders, to support both the development of innovation and its take-up and dissemination in the market. However, the underlying principle is that the EIP will provide a pragmatic, flexible, non-bureaucratic setting that will allow for different interests to be represented.

This approach is reflected in the following working methods at operational level (more details in section 3 in annex):

The **High Level Steering Group** (HLSG) will provide strategic advice and guidance for this EIP on the basis of a well defined mandate. The HLSG will, however, not impinge on the formal decision-making process outlined under Community law. Its composition will reflect the key constituencies in this Partnership, including representatives, appointed in their personal capacity, of Member States, the EP, companies, academics, research centres, NGOs and other institutions. At the same time, the group will be limited in number in order to ensure effectiveness. The HLSG will be entrusted to develop a SIP, recommending priority lines of action. Following the response to this plan, the HLSG will help ensure progress during the start-up phase of the implementation, will steer and report on progress, and will update the SIP. In order to monitor progress, the work of the HLSG will also involve developing impact targets to be achieved by the EIP.

The linkage between the strategic level and the operational level will be provided by the **Sherpa Group** made up by personal representatives of the HLSG. Its main task will be to ensure a smooth running of the partnership including planning of major actions, overall coordination of work packages and preparation of the meetings and follow-up of the High Level Steering Group.

Operational groups will be set up according to specific topics in order to provide advice to the HLSG and to convert the strategic implementation plan into tasks and actions. They will operate on the basis of flexible structures, a temporary time horizon and in close interaction with each other, where needed. In order to ensure that the EIP can benefit fully from existing excellence within the EU, operational groups should aim to have the widest possible coverage

¹⁴ SEC(2011) 1028 final

(geographical coverage of 27 Member States and from different areas of required expertise), following a transparent nomination procedure. Meetings will be organised in such a way as to maximise the contributions provided by experts.

3.5. Outreach

To maximise a transparent, circular flow of information and accountability throughout the lifetime of the EIP, it will be essential to interact with both the political level as well as with society at large (see also annexes 4 and 5). This will be achieved in two ways. At the political level, the Commission intends to report on an annual basis to the Council and EP. At societal level, the EIP will seek the participation of a wide audience through the organisation of a yearly public event. Thus it will meet a major objective of the Innovation Partnerships, which is to ensure the broadest level of societal engagement.

3.6. Timeline

The Commission welcomes the further views of the European Parliament and Council, as well as wider stakeholders, on this European Innovation Partnership. Subject to the views received, the following milestones are envisaged (details in section 6 in annex):

- From mid-2012: Nomination of HLSG, Sherpa group and operational groups by EC;
- Early 2013: Strategic Implementation Plan finalised by HLSG, and which will be presented by the Commission to the EP and Council (first semester of 2013);
- From mid-2013: implementation started and first annual conference held;
- State of progress assessment (including the governance structure): late 2014 (to take into account the new 2014-2020 Multiannual Financial Framework and the new Commission that will be in place).

To underpin the work of this EIP, a number of preparatory actions and studies have already been initiated in 2011. The first deliverables will be completed during 2012 and 2013, so that the EIP can show concrete progress at an early stage. The Commission will organise a review of EIPs during 2013 to take stock of progress.