



ΥΠΟΥΡΓΕΙΟ  
ΠΕΡΙΒΑΛΛΟΝΤΟΣ  
ΕΝΕΡΓΕΙΑΣ &  
ΚΛΙΜΑΤΙΚΗΣ  
ΑΛΛΑΓΗΣ



**GREEK MINISTRY OF ENVIRONMENT ENERGY AND CLIMATE CHANGE  
GENERAL SECRETARIAT OF ENERGY AND CLIMATE CHANGE  
GENERAL DIRECTORATE OF NATURAL WEALTH  
MINERAL RESOURCES POLICY DIRECTORATE**

**MESOGEION 119  
P.C. 101 92  
ATHENS  
GREECE**

**PUBLIC CONSULTATION ON RMI FOLLOW-UP**

**CONTRIBUTION**

**Responsible: D. Koleris  
Tel. 302106969829  
Fax: 302106969346  
e-mail: Kolerisd@eka.ypeka.gr**

## **POLICY AREA: DEFINING CRITICAL RAW MATERIALS**

### **Q. 1: Do you have any comments on the methodological approach, including the scope, to determine criticality at EU level? If so, please specify.**

The methodological approach of the report of the Ad-hoc Working Group on defining critical raw materials is based on a definition of "critical raw material" which is related to the "economic impact" "supply risk", "substitutability" and "environment country risk" of a raw material. However, the "economic impact" and other factors have a dynamic correlation with the "criticality", depending on a number of secondary factors not taken into account in the definition (e.g. technological developments).

Therefore, it is needed to "revise" the list of critical raw materials more frequently than every 10 years in order to anticipate for unpredictable economic, market, technological and environmental factors. Additionally, the definition of "critical raw material" should be re-examined in each list revision.

According to our opinion, the list of critical materials should not be exclusively based on the results of a quantitative approach. The above methodology should combine a quantitative and a qualitative approach.

The value of a specific raw material should not only be measured by considering the main factors mentioned above, but also considering the social impact of a mining project in the local, regional, national and EU level. Therefore, the economic importance of a raw material should be adjusted in order to consider the socio-economic importance of an extractive project, in accordance with the sustainable development principles.

The approach should make distinctions between different ore types and qualities of a single mineral, accommodating differentiations which are crucial for other industrial special uses (eg. the Greek monohydrate bauxite which is unique for usage in the Aluminate Cement Industry, refractories, proppants, abrasives etc).

Considering diagram (I), which is presented in the report of the Working Group, showing the methodology of defining the critical raw materials, we note the following.

A few materials are presented at their "raw" (natural mineral) form such as bauxite, gypsum, diatomite, perlite, clays, magnesite e.t.c. while the most are presented as end products (indium, iron, zinc, germanium) and not at their initial raw mineral form. Considering this inconsistency, it should be made clear that all raw materials should be compared in the same way either as their raw (natural-mineral) form or as their major final product. Nevertheless, under the scope of ensuring access to natural resources of critical raw materials, it is

understood that the whole strategic planning procedure is always based on exploiting certain geological deposits and not on end products. Therefore, it is advisable to replace each "critical material" by its major representing raw minerals.

There are raw minerals represented and compared with their own end products such as bauxite-aluminum or magnesite – magnesium. This value-chain breakdown adopted seems to be rather unorthodox and confusing, causing conflicts to the whole procedure as each of these "raw materials" is compared to its own mineral. Also, the "ability" for each of these raw materials to represent its economic importance becomes disputed as the main end product stands for itself independently.

The basic scope of the Group's report is to define critical raw materials also under the criterion of economic importance. For that, the study focuses on long term period predictions (~10 years), under the perspective of the technological change to take place. Therefore, the selected materials cope with innovations that are assumed to be exposed to noticeable impulses on their demand, such as the emerging technologies of high-tech products like hybrid vehicles, microelectronics, nanoparticles, renewable energy systems etc. However, European industry is for a long time based on its "classic" industrial sectors such as construction materials, metals, mechanical equipment, food etc, which are expected to maintain a significant importance in the future. Thus, it is necessary for these industrial sectors to be also taken into account for the determination of the raw materials quantities and qualities needed to operate smoothly.

In accordance to the previous views, we think that each country should have determine its own critical minerals. For example, bauxite for Greece should be critical because the existing alumina plant is specifically designed to consume only Greek diasporic bauxite.

**Q. 2: Do you see any additional raw material that should be considered as critical? If so, please explain.**

In accordance to the previous view, besides Greek magnesite and bauxite, ferronickel laterite ore should also be characterized as a critical raw material. Particularly:

The exploitation of Fe-Ni Laterite Ore and Ferronickel production in Greece is critical not only for our country but also for EU. The annual extractive production is above 2.700.000 tons of laterite ore which is used as raw material for the local metallurgy that produces, approximately, 18.000 tons Ferronickel which in turn is exported to the European stainless steel industry and in this area, it is the sole producer.

The Magnesite production in Greece and the magnesite products such as caustic magnesia, dead burned magnesia and refractory masses (annual production: 400.000 tons magnesite, 80.000 tons

caustic magnesia, 65.000 tons dead burned magnesia and 30000 tons refractory masses) hold a leading position in EU industry raw materials, mainly in the construction market, steel industry and fertilizers.

The monohydrate bauxite ore met in the Greek diaspore should be included in the list of critical raw materials. Bauxite is well known as the major and most important aluminum ore, the natural form of which consists mostly of the minerals gibbsite  $\text{Al}(\text{OH})_3$ , boehmite  $\gamma\text{-AlO}(\text{OH})$  and diaspore  $\alpha\text{-AlO}(\text{OH})$ , in a mixture with the two iron oxides goethite and hematite, clay, kaolinite and small amounts of anatase ( $\text{TiO}_2$ ).

Main usage of bauxite is the extraction of aluminum (>90%), one of the most important non ferrous metals that is 100% recyclable and used in a very wide variety of applications such as a aerospace engineering, automotives, packaging, paints, construction (windows, doors, etc), electronics etc. However, bauxite is also used for non-metallurgical applications like refractories, abrasives (including proppants), high aluminum cements, aluminum chemicals, activated bauxite and alumina, which are major materials that many industrial sectors rely on (ex. steel and mechanical equipment, cement, mortars, food, glass, construction, road-transport, etc). European companies that operate and compete successfully on the production of that kind of industrial end products, represent one of the major european economic pillars and therefore their future holds a significant importance. Thus, it is essential for the European industry to keep up on a reliable and undistorted access to these materials, which may be secured effectively by relying on its local area natural resources and not on imports that may be become under various supply restrictions.

The European Calcined Aluminate Cement (CAC) industry is based on acquiring hard and agglomerated (large blocks) bauxite rocks, necessary for further processing at revebratory furnaces. Only monohydrate bauxite ore can meet CAC industry's need for large blocks as the tri-hydrate (gibbsite) is too soft and brittle to allow its direct use in revebratory furnaces. Nevertheless, it could be possible to use gibbsite only after burning and agglomeration which, on the other hand, would leverage raw materials cost, energy consumption and production of  $\text{CO}_2$ . Finally, that would introduce additional costs to the end-product (ex. building of agglomerating plant, fuel,  $\text{CO}_2$  emission rights), making it less competitive considering that European industry has already one of the highest production costs worldwide.

Diachronically, Greece is between the world's top 10 producers of bauxite and the largest in the EU, providing the necessary monohydrate bauxite to the European industry while Greek reserves are believed to be the biggest in the EU and capable for fulfilling future demands for a large time span. Thus, the European monohydrate bauxite production holds directly a significant role for the local end markets while indirectly is backing up a very large part of the European industry (high-tech or not) that relies on the usage of products such as refractories, proppants, abrasives etc.

According to the above, the role of bauxite as a fundamental raw material for the European industry and economy, is identified as rather critical regarding its importance, but in the view of reassuring

the necessary access to the sufficient local reserves and not under the lack of local mineable resources.

Bauxite is distinguished already for its high economic importance but not under the possible supply risk that may suffer in the future. That categorizes it inside the lower right sub-cluster of raw materials, where a small shift on the variables of supply risk may result to a sudden change of each member's position upwards placing it inside the Critical Group.

Additionally, bauxite is by at least 90% used for aluminum production purposes, which is already examined as a separate raw material by the Working Group. However, while bauxite is also used as a key ingredient by non-metallurgical industries, it is suggested that this raw material should stand for them while aluminum is represented independently.

Given the fact that:

1. China, the world's major monohydrate bauxite producer, introduced lately stronger export quotas.
2. under the current economic recession bauxite mining companies tend to consolidate, building an over-regulated market
3. there is a general setback on licensing mining works in Europe,

serious bauxite supply shortage may be induced in the future getting bauxite inside the group of Critical Raw Materials.

However, due to the existence of enough identified bauxite reserves in the EU, European non-metallic bauxite industry is capable of successfully facing worldwide raw materials market distortions, certifying its sustainability and the long presence of the European Community inside the group of the world's most industrialized economies.

Therefore:

- as non-metallic bauxite industry allows the production of a wide range of products that may indirectly designate the production of other industrial products under the current or future European technology development,
- as there are enough identified mineable bauxite reserves in the EU
- as the developing European non-metallic bauxite industry already relies on local producers

there is a direct need for bauxite, and especially in the terms of its monohydrate minerals found in Europe, to be characterized by the Commission as Essential or Potentially Critical Raw Materials that are encouraged for further exploration and exploitation, by providing the required administrative provision under suitable legislations to take place in the future.

Gold should be included in the list of critical raw materials. Gold is a rare metallic element. It has several properties that have made it very useful to mankind over the years, notably its excellent conductive properties and its inability to react with water or oxygen.

The ability of gold to efficiently transfer heat and electricity is surpassed only by copper and silver, but unlike these metals gold does not tarnish, making it indispensable in electronics.

The corrosion resistance of gold is perhaps one of its most useful properties. The metal gold is extremely malleable. Gold is also ductile.

Gold demonstrates excellent biocompatibility within the human body (the main reason for its use as a dental alloy), and as a result there are a number of direct applications of gold as a medical material. Gold also possesses a high degree of resistance to bacterial colonization and because of this it is the material of choice for implants that are at risk of infection.

Its reflectivity, ductility, conductivity and corrosion resistance have long made it a vital material in medicine, chemistry, science, space technology and investments.

Also recent research has uncovered a number of new practical uses for gold, including its use as a catalyst in fuel cells, chemical processing and controlling pollution. The potential of use nanoparticles of gold in advanced electronics, glazing coatings and cancer treatments.

Industrial, medical and dental uses account for around 11% of gold demand (an annual average of over 440 ton).

The overall level of global mine production is averaging approximately 2,485 tons per year over the last five years. New mines that are being developed are serving to replace current production, rather than to cause any significant expansion in the global total.

The comparatively long lead times in gold production, with new mines often taking up to 10 years to come on stream, mean mining output is relatively inelastic and unable to react quickly to a change in price outlook. The incentives promised by a sustained price rally, as experienced by gold over the last seven years, are not therefore easily or rapidly translated into increased production.

According to the experts, the peak on the gold productions was the year 2001 (2600 tonnes) since then the level of global production decreased with 20%, due to the exhaustion of the biggest gold deposits. Since 70% of the gold deposits around the world were already exploited, the prediction is that in the next 20 years, there will be only a small number of countries that will benefit of gold reserves.

As a final comment on gold, we note that, in contrast with many other materials qualified as critical by the Report (which are geological available in deposits outside EU), there are significant reserves of gold across Europe.

Still, given the complex legal and administrative hurdles mainly imposed by national legislations, gold often remains a simple theoretical resource, very difficult (if not, in some cases, impossible) to be commercially and legally exploited. Hence, the second pillar of the RMI, that of "setting the right framework conditions within the EU in order to foster sustainable supply" is of particular importance for ensuring sustainable access to gold.

Such feature significantly reduces the effort in terms of time and resources required for EU bodies to design and implement a coherent support strategy with respect to gold. That is because the strategy would simply consist in streamlining the legal procedures (or determining the Member States in such direction) for allowing private investors to develop a gold mining project whose beneficial returns are certain and substantial.

For all the reasons mentioned above and because actual development of emerging technologies, industrial development in emerging economies and operating conditions of the raw materials global markets are all having a direct impact on future demand of raw materials as well as on the terms and conditions under which this demand can be satisfied. It is therefore essential neither to freeze the list of critical materials nor to consider this list as the exclusive target for policy initiatives. Problems may arise that should require special attention in order to ensure a level playing field in access to certain raw materials that are currently not on the list.

Zeolite, due to its widespread uses that are only recently being discovered (e.g. environmental protection) and aluminum and nickel due to sensitivity of their "behaviour" even in slight changes of the parameters of the market.

**Q. 3: Do you have any comments regarding the recommendations of the report? If so, please specify.**

The following should be included in the recommendations:

- Updating of the definition of "critical raw material"
- Policy action on the development of technologies and systemic approaches that would ensure minimization of superfluous raw material use at the processing/manufacturing stage (outdated processing/manufacturing technologies).
- Substitution is not the solution to criticality in access to raw materials, because for most of the materials identified as "critical", substitution possibilities have already been identified as very limited or non-existent.

**Q. 4: Are you aware of any initiatives in your country that aim to assess the criticality of raw materials? If so, please describe briefly.**

No, we are not aware of such initiatives in Greece.

**Q. 5: The functioning of raw materials markets has not been dealt with. Do you think that further analysis of their functioning should be carried out? What actions should be proposed to increase their transparency?**

The functioning of raw materials should be examined in the frame of an extended definition of "critical raw material". The Commission can play a very useful role, however, to increase and improve the level of information on market distortions by mobilizing the Delegations and the national embassies on any regulatory developments that affect trade on raw materials in particular. The Commission and the Member States can play a very useful role also by creating awareness of the problems and calling for transparency on their systemic causes at international level (e.g. the project

of an inventory of trade restrictions on raw materials at OECD level). All this is already done in DG Trade-market Access and should be encouraged.

**Q. 6: Do you think that the EU should propose a system of stockpiling for the critical raw materials? If so, please indicate whether you consider it more appropriate to do this at Community or alternatively at Member States level.**

Stockpiling of certain "critical raw materials" occurs in countries outside the EU. The availability of stockpiles or not could affect the entire EU economy. Stockpiling, if this approach is followed, should be controlled at EU level under agreement with Member States.

In our opinion, stockpiling in general is not an effective option, particularly in today's context of global economy. Resulting market disruptions, notably price impacts, and loss of market transparency are likely to give rise to additional distortions in the free play of market forces as well as biased business decisions and policy initiatives. In addition, stockpiling would require Member States to mobilize considerable financial resources and demand delicate arbitrages with high costs.

Eventual stockpiling in our opinion should be limited to those rare critical minerals with low volumes of consumption by EU industry (eg. Rare Earths).

**POLICY AREA: TRADE**

**Q. 7: Do you think that the importance of trade is adequately reflected in the work carried out so far in the Raw Materials Initiative?**

Indeed, the importance of trade is adequately reflected in the work carried so far in the RMI .We strongly believe in the importance of trade but it is not possible to resolve all questions with general rules. It is needed to discuss on eventual restrictions which took place during the negotiation.

Only a minimal amount of the EU non-ferrous metals industry's total feed supplies is secured through upstream integration (i.e. captive supply of raw materials). The market, and therefore the trade, plays a key role in securing raw materials for the sector. It is consequently of vital importance to:

- o ensure undistorted operation of the EU and international markets for raw materials,
- o promptly challenge the causes of trade distortions,
- o prevent the arising of such causes as much as possible and
- o promptly remedy their injurious impact.

These objectives are properly taken up by DG Trade strategy with respect to access to raw materials. This strategy must be further pursued and, in view of the extent, importance and increasing complexity of the challenges, more resources should be dedicated to it.

**Q. 8: Do you have any comment regarding the main findings of DG Trade activity report? What activities should be prioritised? Are there, in your opinion, additional activities not mentioned in the report which should be pursued in this strategy?**

The question of sustainable raw materials supply is strongly dependable on specific needs of every country.

According to our opinion the activities that should be prioritised are:

- effective rule enforcement
- effective coherence of policies (e.g. in the GSP, in the implementation of trade defence at EU and WTO level, in external relations, etc)

Additionally, we propose:

- review of the Trade Barrier Regulation in order to make it more operational
- modification of the Regulation on Common Rules for Exports as an effective temporary safeguard instrument against massive export flows of raw materials.

**Q. 9: Please identify trade distortive measures (i.e. export restrictions) concerning raw materials that in your view should be tackled.**

We are not aware of specific trade distortive measures concerning raw materials. However, as a resource rich country we are in favour of resolving distortions in global trade of mineral raw materials with respect to promoting fair trade.

**Q. 10 : Are you aware of any initiatives in your country that have one of the above goals in mind such as, for example, developing a raw materials diplomacy, or supporting companies to invest in third countries in the raw materials sector? If so, please describe briefly.**

We are not aware of any initiatives in Greece.

**POLICY AREA: DEVELOPMENT**

**Q. 11: What specific actions would you consider most relevant needed in the following areas:**

- **Good governance;**
- **Infrastructure/investments;**
- **Geological knowledge/skills.**

- **Good governance:**

- transparency
- efficient legislative framework
- clear objectives and targets

- **Infrastructure/investments:**

In this field the targets-actions needed are:

- Clear identification of related topics in the Framework Programmes FP7 and FP8. Especially, for the FP8, the necessary actions relating to the Raw Minerals Initiative should be clearly identified in the program. The structure of the program should be suitable for the process industry where geology, intelligence technology, energy, environment and materials issues are strongly linked. We support increased transparency and simplifications on how the framework programs are planned and implemented.
- R&D projects to improve methods for exploration, extraction and recycling in close collaboration between academia and industry.
- Creation of European added value through RTD-based technology leadership, education and training.
- Better education and training. Due to strong links between high quality research & development and high quality education, we endorse a clear definition of European minerals programs, a framework for funding Pan-European education, funding of mobility of students and teachers, international networking and integration of European education with other leading schools internationally.
- Mobilization of existing research and development capabilities to enable a more efficient approach to innovation.
- Maintenance of research base, education and training for the next generations.
- Development of innovative and sustainable production technologies.
- Implementation of best practices - new and improved high quality products and services – responding to societal needs in the 21<sup>st</sup> century.
- Reuse, recovery and recycling as well as new product applications.
- Reduced material and energy consumption per functional unit.

- **Geological knowledge/skills**

- Cooperation between extractive industry, governmental institutions, geological surveys and academia across Europe and future common agenda concerning research and higher education related to a sustainable supply of metallic and non-metallic raw materials.

- Support of the revival of exploration of Europe's mineral potential.
- Development of a pan-European "Europe beneath our feet" knowledge base on the geology and mineral resources, as written in the Lulea Declaration (October 2009).

**Q. 12: Regarding transparency, what measures do you believe the EU should take to foster revenue transparency in the mining industry in raw material resource rich countries? What are your views regarding existing initiatives currently being taken in this area, namely by the Extractive Industries Transparency Initiative (E.I.T.I.)?**

We believe that the E.I.T.I. Principles would be properly served by incorporating to "transparency target" the notion of "coupling" appropriate technologies applied to developing countries and best available technologies – best practices already applied to developed countries to Extractive Industry Investments in countries rich in natural resources.

**Q. 13: Concerning the recent agreement between the European Commission and the African Union Commission, in your view, what concrete objectives, targets and deliverables should be included in such a partnership?**

In such a partnership, the following should be included:

- Mineral resources issues to allow development of common strategies
- Transfer of expertise and technological support from Europe to the sustainable development of the mining sector in African countries
- good governance,
- more focus on resource efficiency in the mining and processing sector and
- European investment incentives in Africa's raw material sector

**Q. 14: Do you consider that wood should be addressed in the framework of development policy? If yes, please specify what the main issues to be analysed are.**

This is not relevant.

**Q. 15: Are you aware of any initiatives in your country that contribute to promoting exploration and exploitation of mines in developing countries? Should such initiatives be better coordinated or promoted at the EU level?**

We are not aware of any such initiative in Greece.

We believe that such initiatives would be better coordinated or/and promoted at the European Union level taking into account the special problems and needs of every State-Member.

**POLICY AREA: IMPROVEMENT OF THE REGULATORY FRAMEWORK CONDITIONS  
INSIDE THE EU**

**Q. 16: Do you agree that these topics correspond to the major challenges in this policy area? If not, please specify.**

Yes we agree. Specifically, we would like to note:

- All M.S. must adopt a national minerals policy or strategy. The same applies at European level. Minerals policy at EU level will safeguard security of supply for the EU market and support employment and industry competitiveness, promoting development according to sustainable development principles. Besides, setting European goals to be implemented by the countries secures the harmonization of policies between the M.S.
- All M.S. must have clear and applicable land use planning policies concerning minerals
- All M.S. must have a clear, effective, stable and simple licensing system for the authorization of minerals exploration and extraction.
- Distribution of Geological Knowledge

At EU or MS level it is essential to have a good knowledge base with accurate data of EU ore deposits. It is an important target of the Raw Material Initiative to improve the EU's geological Knowledge base and to support a better networking between the national Geological Surveys.

**Q. 17: Do you think of any other avenues which should be followed by the Commission? If yes, please specify.**

No, we don't think of any other avenue.

- There is a need to adopt best practices in Permitting Procedures
- National governments should be encouraged to improve data collection in order to establish short – medium and long – term minerals supply and demand scenarios taking into account future development plans.
- Each M.S. should promote awareness of society's dependence on minerals and of the real need for access to local resources. Also the importance of the secure supply of minerals for society should be stressed.

**Q. 18: Do you agree with the recommendations made in the report on "Exchanging Best Practice on Land Use Planning, Permitting and Geological Knowledge Sharing" or do you have any specific ones to be added. Please explain.**

Yes we agree

**Q. 19: Do you consider it useful to establish an EU geological service based on a network of Member State geological services?**

Yes, we strongly believe in such an establishment based on a network of Member State geological services.

**Q. 20: Do you consider that EU regulatory framework conditions for wood and/or recovered paper need to be further analysed? If yes, please specify.**

This is not relevant.

**POLICY AREA: PROMOTING SKILLS AND RESEARCH, DEVELOPMENT AND INNOVATION**

**Q.21: What type of actions would you propose to provide better cooperation between companies, universities and public authorities in order to promote skills and in the extractive or other raw materials sectors? Please specify.**

We believe that the best way to promote better cooperation amongst companies, universities and local authorities is open public consultation.

The commission should also create a platform in which these three parts should brief each other for the real needs of the industry and the society at the same time.

The European Technology Platform on Sustainable Mineral Resources must be further reinforced.

**Q. 22: Are you aware of any research, development and innovation programme(s) at national, regional or local level? Please specify.**

There is not a specific framework for R&D programmes in Greece. Nevertheless in the current National Strategic Reference Framework, the following Programmes include R&D actions:

- o Sectoral Operational Programmes:
  - Environment – Sustainable Development

**Q. 23: Where do you see the major gap / the urgent need for the raw materials sector related research, development and innovation at EU level? Please provide details.**

Related research should be carried out on the valorisation of extractive industry by-products and waste.

**Q. 24: What is your idea of a major research and innovation action that would have the highest positive impact on the security of raw materials supply for the EU industries? Please specify.**

A major research and innovation action that would have the highest positive impact on the security of raw materials supply for EU industries is the research for the discovery of new uses for them.

**Q. 25: Are you aware of innovative exploration and extraction technologies, where project partners on a European level are needed to develop and implement the new technologies and which are the innovative technologies which need to be developed further? Please provide details.**

**Q. 26: Are there any other aspects related to skills, R&D and innovation for other raw materials, such as wood, that need to be further promoted? Please, specify.**

This is not relevant.

**POLICY AREA: RESOURCE EFFICIENCY & RECYCLING**

**Q. 27: In your view, and beyond measures already being taken (e.g. the recast of the WEEE Directive), what practical measures can be taken by the EU and by Member States to prevent the illegal shipment of obsolete end-of-life vehicles and electronic equipment?**

In depth evaluation of operating collection, turn-back systems and upgrade of them.  
Use of recognition signs (codes) accompanying new vehicles and electronic equipment (like Hg-free batteries) traceable through the life cycle of the goods.

**Q. 28: In what ways should statistics on trade in and recycling of, products containing secondary raw materials be improved?**

**Q. 29: Have you identified major problems with recovered paper? What are the main issues that need to be further analysed?**

This is not relevant.