GREEK MINING ENTERPRISES ASSOCIATION

ASSOCIATION APPROVED BY THE JUSTICE COURT UNDER No . 3062/2002
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QUESTIONS

A) POLICY AREA: DEFINING CRITICAL RAW MATERIALS

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

a) The report of the Ad-hoc Working Group on defining critical raw materials is based mainly on key factors such as economic importance, supply risk, substitutability and environment country risk. Based on these factor a large number of raw materials was examined and compared, distinguishing the most critical ones.
According to our opinion the methodology mostly combines a quantitative and quantitative approach. However, the list of critical materials is exclusively based on the results of the quantitative approach.

b) The value of one material should not only be measured by considering the three factors mentioned aboved, but also considering the social impact of a mining project in the local, regional, national level and EU level. Therefore, the economic importance of a raw material should be adjusted as to consider the socio-economic importance of a mining exploitation, in accordance with the sustainable development principles.

c) It is wrong that the method used by the Ad-hoc-Working Group does not make distinctions between different ore types and qualities when those differentiations are crucial for other industrial special uses (ex. The Greek monohydrate bauxite with the unique use in Aluminate Cement Industry, refractories, proppants, abrasives etc).

d) Considering the 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.

i) A few materials are presented at their "raw" 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 at 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 strategical planning procedure is always based on exploiting certain geological deposits and not on end products. Therefore, it is advisable to replace each one of the "critical material" by its major representing raw mineral-s.

ii) There are raw materials represented and compared with their own end products such as bauxite-aluminum or magnesite – maganesium. 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 remains disputed as the main end product stands for itself independently.

e) 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 on 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, that are expected to keep their significant importance in the future. Thus, it is necessary for these industrial sectors to be taken into account for the determination of the raw materials quantities and qualities needed to operate smoothly.

f) According to the previous views, we think that every country must have the ability to set its own critical minerals. For example bauxite for Greece should be critical because the existing alumina plant is designed to consume Greek diasporic bauxite.

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

α) According to the previous view for Greece magnesite, bauxite, ferronickel ore should be characterized as critical minerals. Particularly:

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

iii) The Magnesite production in Greece and the magnesite products such as caustic magnesia, dead burned magnesia and refractory masses (annually are produced 400.000 ton magnesite, 80.000 ton of caustic magnesia, 65.000 ton dead barned magnesia and 30000 ton refractory musses) holds a leading position in exports to the EU, mainly to the construction market, steel industry and fertilizers.

b) The monohydrate bauxite ore met in the Greek diaspore should be included in the list of critical raw materials

As well known, bauxite is the major and most important aluminum ore which natural form, which consists mostly of the minerals of gibbsite $Al(OH)_3$, boehmite γ-AlO(OH) and diaspore α-AlO(OH), in a mixture with the two iron oxides goethite and hematite, clay, mineral kaolinite and small amounts of anatase 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 CO_2. Finally, that would introduce additional costs to the end-product (ex. building of agglomerating plant, fuel, 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 is 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 monohydrade 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.

c) <u>Cold should be included in the list of critical raw materials</u>

Gold is a rare metallic element with a melting point of 1064 degrees centigrade and a boiling point of 2808 degrees centigrade. 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 bettered only by copper and silver, but unlike these metals gold does not tarnish, making it indispensable in electronics.

The electrical resistivity of gold is 0.022 micro-ohm m at 20 °C. The thermal conductivity is 310 W m-1 K-1at the same temperature. The corrosion resistance of gold is perhaps one it's most useful properties. Electrode potentials are a useful method for representing the tendency of a metal to corrode. Electrode potentials are measured with reference to hydrogen and an electrochemical series can be prepared for metals as indicated below. Not surprisingly, gold is at the top of the series indicating its high corrosion resistance. In practice, it is corroded only by a mixture of nitric and hydrochloric acid (aqua regia). In everyday use gold does not tarnish.

Electrode potential (V)	Element
+1.5	Gold
+0.8	Silver
-0.4	Iron
-0.8	Zinc
-1.66	Aluminium

The metal gold is extremely malleable (the extent to which a material can undergo deformation in compression before failure). In the annealed state it can be hammered cold into a translucent wafer 0.000013 cm thick. One ounce of gold can be beaten into a sheet covering over 9 square meters and 0.000018 cm thick.

Gold is also ductile (degree of extension which takes place before failure of a material in tension) and one ounce can be drawn into 80 km (50 miles) of thin gold wire (5 microns diameter) to make electrical contacts and bonding wire.

The Young's modulus of elasticity of a material is related to rigidity or stiffness and is defined as the ratio between the stress applied and the elastic strain it produces. Gold has a Young's modulus of 79 GPa which is very similar to silver, but significantly lower than iron or steel.

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.

Property	
Atomic weight	196.97
Atomic number	79
Number of naturally occuring isotopes	1
Melting point °C	1064
Crystal structure	FCC
Density gcm^{-3}	19.3
Thermal conductivity W m^{-1} K^{-1}	310
Electrical resistivity micro-ohm m at 20°C	0.022
Youngs modulus E GPa	79
Hardness Hv	25
Tensile stress MPa	124
0.2% proof stress MPa	30
Poissons ratio	0.42

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 tones) 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.

d) For all those regions 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 non on the list.

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

The recommendations presented in the report generally concur with the EU non-ferrous metals industry expectations about EU policy lines and objectives that could Help to secure access to raw materials on a level playing – field.
However, as regards recommendations for substitution, it should be stressed that substitution is not the solution to criticality in access to raw materials, for most of the materials identified as "critical", substitution possibilities have been identified already as very limited or non-existent.

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 in Greece we don't have such initiatives.

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 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.

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 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 mobilize considerable financial resources and would require delicate arbitrages whose costs will ultimately fall on the industrial community at large.

B. POLICY AREA: TRADE

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

Only a marginal 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 trade, plays a key role in securing raw materials for the sector. It is consequently of vital importance to ensure undistorted operation of the EU and international markets for raw materials, to promptly challenge the causes of trade distortions, to prevent the arising of such causes as much as possible and to promptly remedy their injurious impact.
These objectives are properly taken up DG Trade strategy in respect of access to raw materials. This strategy must be pursued and, in view of the extent, importance and increasing complexity of the challenges, more resources should be dedicated to it.

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?

According to our opinion the activity that should be prioritised are:
- effective enforcement of rules
- effective coherence of policies (e.g. in the GSP, in the implementation of trade defence at EU and WTO level, in external relations, etc)

As additional activities we proposed
- the review of the Trade Barrier Regulation in order to make it more operational

- the rehabilitation of the Regulation on Common Rules for Exports as un effective temporary safeguard instrument against massive export flows of raw materials

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

EU enterprises are confronted on the international and EU markets for raw materials with competitors which derive a significant purchasing edge on raw materials which they need to import from the fact that their domestic market is closed and protected by various trade and industrial policy measures that provide them with an actual subsidy on imported raw material or enable them to secure domestically a higher revenue from their production.

EU enterprises are also confronted with the predatory policies of certain countries rich in natural resources which have imposed themselves as major or eventually dominant world supplier of certain raw materials and are now restricting these supplies in order to gradually more up their market dominance to the next products in the value chain, imposing on their competitors not only dual prices and scarcity of inputs but also dumping prices of outputs.

Above mentioned situations are arising form the operation of a variety of policy measures, eventually combined in a sophisticated manner. This includes export restrictions (taxes, quotas, bans, licensing systems, limited number of clearance points, etc), differentiated import and export incentives, domestic preferential tax treatments, State interference in local commodity exchanges etc.

Over the years, the mechanisms which are distorting competition in access to raw materials have become not only increasingly complex but also increasingly pervasive in terms of materials concerned and countries taking advantage of them. In the meantime however, international trade rules, designed to address unfair selling practices, are remaining totally helpless to address unfair purchasing practices and the World Trade Organization has not acknowledged yet the fact that disciplines are urgently needed to ensure free and fair trade in raw materials.

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.

No in Greece we don't have such kind of initiatives.

C. POLICY AREA: DEVELOPMENT

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

D. POLICY AREA – IMPROVEMENT OF THE REGULATORY FRAME WORK CONDITIONS INSIDE THE EU

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

Yes we agree. Especially we want to note:
- All M.S. must adopt a national minerals policy or strategy. The same must be 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 by 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 in the authorization of minerals exploration and extraction, without the bureaucratic procedure of today and the involvement of different government institutions. The "one-stop-shop" approach which industry demands 5 years ago is still today an unsatisfied issue and an open subject.
- Geological Knowledge

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

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

- There is a need to adopt best practices in Permitting Procedures following good examples from other Members States, to ensure, permits are granted in a timely and efficient manner and for durations that justify the significant capital investment involved.
- National government to be encouraged to improve data collection in order to establish short – medium and long – term minerals demanding and supply scenarios for the different development regions, taking into account future development plans, These plans should not a priori exclude area with Natura 2000 or similar conservation designations.
- Each M.S. must encouraged to give rise to awareness of society's dependence on minerals and of the real need for access to local resources. Also to point out the importance of the secure supply of minerals for society and promote a balanced approach in the assessment of conflicting interests between minerals, development and other land use issues

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 once to be added. Please explain.

Yes we agree

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

Yes it is not only useful but crucial for the future of Raw Material Initiative.

E. POLICY AREA: PROMOTING SKILLS AND RESEARCH , DEVELOPMENT AND INNOVATION

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.

The commission must 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.
Also European Technology Platform on Sustainable Mineral Resources must be reinforced in order to contribute this effort, to utilize the operational experience from all over the world and transfer the knowledge to companies, universities and public authorities,

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

No we are not

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 for the utilization of by-products.

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 of a better and efficient use of the existing raw materials (to find out new uses for the same material).
Also research will play a major role in developing the recycling of secondary raw materials and in developing the waste deposits that cannot be recycled economically today but might become interesting in the future.