SOCIO ECONOMIC ANALYSIS

CHANGES IN CLASSIFICATION CUT-OFF VALUES OF LEAD – IMPACT ON THE COPPER INDUSTRY

The European Copper Institute

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CONTENTS

1) INTRODUCTION

The aim of this Socio Economic Analysis (SEA) is to evaluate the effect of a possible classification cut-off value of lead and lead compounds, of 0.03%, due to their potential characterisation as a "high potency substance for reproductive effects". This would impact the classification of Pb containing copper alloys, and indirectly also of copper slags and copper concentrates.

The goal will be to assess whether the proposal is appropriate from a community-wide point of view. This SEA follows the structured advice by ECHA in its Guidance for Socio-Economic Analyses-Restrictions. It will start by defining the scope of the SEA, follow with analyses of the impacts, a comparison of the scenarios and finally the conclusions.

The assessment is based on the information currently available and includes expert judgement. Some of the data used for this analysis has been provided by ECI's members and remains confidential.

2) SCOPE OF THE SEA

The Swedish Chemicals Agency, KEMI, assessed the health effects from lead exposure and proposed to classify lead-metal as reproductive toxicant with a classification cut-off value of 0.03 % Pb for mixtures and lead-containing materials (e.g. alloys).

Detailed commenting on the effects from lead exposures is however outside the scope of the ECI mandate.

It is nevertheless expected that the proposal will impact significantly the broader non-ferrous metals industry. Several aspects shall be considered: a) up to now, Pb-metal was not classified, so there is a change from no classification to classification; b) the SCL of 0.03% impacts a number of important end-use markets for alloys, included recycling; c) the SCL of 0.03% will, by extrapolation to complex materials containing Pb and Pb compounds, also impact the transport and use of various materials, such as metal concentrates, metal intermediates and metal slags.

In this SEA the baseline scenario is to define the current legislative situation. The proposed restriction scenario will be considered as a hypothetical case. The socio-economic consequence of being classified as reproductive toxicant at cut-off values of respectively 0.3% (baseline cut-off value) and 0.03% (proposed specific concentration limit) was retained for this assessment.

Baseline Scenario

Copper Alloys

Lead, in its metal form, is currently not classified, while lead compounds are classified for reproductive toxicity at levels > 0.3%.

There is a wide range of copper-lead alloys currently manufactured in Europe. These are already well regulated in EU through several directives and voluntary initiatives:

- ⇒ Drinking water: 98/83/EC
- ⇒ Toy Safety : 2009/48/EC
- ⇒ Lead in jewellery and watches: EU/836/2012
- ⇒ Lead in end of life vehicles: 2000/53/EC

⇒ Lead in electronic devices: 2002/95/C

⇒ Voluntary industry initiative: Oeko-Tex© 100 standard for textiles

An example of a regulation that is highly relevant for the protection of humans, from lead-related health effects, is the drinking water directive. Lead-containing copper alloys are used extensively in drinking water installations. They are subject to compliance with the EU drinking water directive 98/83/EC (DWD). This harmonised the quality of drinking water across the European Union, with a transition period of 15 years (i.e. ending in 2013) during which time the limit values (e.g. < 10 µg Pb/L drinking water) are to be implemented. The European copper industry has, over the past 15 years, been intensively involved in EU activities on drinking water quality as well as in providing relevant life-cycle and emissions information to regulators and interested stakeholders. In a joint effort between EU Member States and the metal alloys industry, the metal releases from various metallic materials have been assessed in order to secure high quality drinking water. The initiative has resulted in a 4 Member State common composition list of metallic materials accepted for contact with drinking water (See also annex 1 and annex 2 and http://www.umweltbundesamt.de/ wasser/themen/trinkwasser/4ms-initiative.htm). A more detailed summary, covering 15 years of industry efforts, is provided as annex 3. The 4 MS list, now agreed by several other MS, represents the most thoroughly investigated instrument, fully accounting for potential human health hazards of the metallic materials used for products in contact with drinking water. This includes alloys, with lead levels up to 3.5%, which have been shown, in accordance to an agreed testing protocol, to release lead below 5 µg/L in drinking water.

The total amount of copper-alloys used in the EU is estimated at 1,426,000 tonnes in 2011. The copper alloys accounts for 32% of the production of copper trade in the EU. A decreased demand of copper alloy products is not expected. The main market for copper alloys is the EU27 internal market.

The direct copper industry turnover is estimated at 45 billion €/yr, with more than 30% coming from copper-alloys (13.5 billion €/yr). The producers of copper, along with their first customers (semi-fabricators and wire-rod manufacturers), employ around 45,000 people.

Furthermore, the EU copper smelting and refining industry (which produces copper metal) has been able to grow, primarily by securing raw materials on the international market and by making use of "urban mining". The latter consists of copper scrap and residues, generated by consumers and processors, as well as by building demolition and end of life of articles, such as vehicles and electric and electronic waste. The small number of European companies smelting imported concentrates into metal has been able to remain globally competitive primarily because of their ability to include secure supplies of scrap in their raw material mix.

There is a very wide range of copper-lead alloys manufactured in Europe. Details on lead content in the various CEN standardized copper alloys are specified in table 1. In "lead-free copper alloys", lead is present as an impurity at concentrations between 0.02 and 1%. The impurity % is, for each alloy family, the result of years of industry investigation and development to reuse and recycle valuable raw materials. For several applications, lead is added up to 3.5 % for functional reasons.

Table 1: *CEN standardized lead containing material groups, material numbers and lead content of the materials delivered to the consumer market[1].*

Material group	Why Pb?	Material number according to CEN standards	Pb content according to CEN standards	Pb content, grouped
copper nickel zinc alloys (nickel silver)	impurity	CuNi12Zn24	0,03	< 0,1 %
		CuNi18Zn20	0,03	< 0,1 %
		CuNi18Zn27	0,03	< 0,1 %
	functional	CuNi12Zn25Pb1	0,5 - 1,5	up to 1,5 %
		CuNi12Zn30Pb1	0,5 - 1,5	up to 1,5 %
		CuNi12Zn38Mn5Pb2	1,0 - 2,5	up to 2,5 %
		CuNi18Zn19Pb1	0,5 - 1,5	up to 1,5 %
		CuNi7Zn39Pb3Mn2	2,3 - 3,3	up to 3,5 %
		CuNi8Zn26Pb1	0,5 - 1,5	up to 1,5 %
copper tin alloys (tin bronze)	impurity	CuSn5	0,02	< 0,1 %
		CuSn6	0,02	< 0,1 %
		CuSn8	0,02	< 0,1 %
copper zinc alloys	impurity	CuZn5	0,05	< 0,1 %
		CuZn10	0,05	< 0,1 %
		CuZn15	0,05	< 0,1 %
		CuZn20	0,05	< 0,1 %
		CuZn28	0,05	< 0,1 %
		CuZn30	0,05	< 0,1 %
		CuZn33	0,05	< 0,1 %
		CuZn36	0,05	< 0,1 %
		CuZn37	0,1	< 0,1 %
		CuZn40	0,3	< 0,3 %
		CuZn42	0,3	< 0,3 %
copper zinc alloys, complex (special brass)	impurity	CuSn3Zn9	0,1	< 0,1 %
		CuZn21Si3P	0,10	< 0,1 %
		CuZn23Al3Co	0,05	< 0,1 %
		CuZn31Si1	0,8	up to 1%
	functional	CuZn31Si1	0,2 - 0,8	up to 1%
		CuZn35Ni3Mn2AlPb	0,2 - 0,8	up to 1%
		CuZn37Mn3Al2PbSi	0,2 - 0,8	up to 1%
		CuZn40Mn2Fe1	0,2 - 0,8	up to 1%
copper zinc lead alloys (free cutting brass)	functional	CuZn35Pb1	0,8 - 1,6	up to 2 %
		CuZn35Pb2	1,6 - 2,5	up to 2,5 %
		CuZn36Pb2As	1,7 - 2,8	up to 2,5 %
		CuZn36Pb3	2,5 - 3,5	up to 3,5 %
		CuZn37Pb0,5	0,1 - 0,8	up to 1%
		CuZn38Pb2	1,6 - 2,5	up to 2,5 %
		CuZn38Pb3	1.6 - 3,5	up to 3,5 %
		CuZn39Pb2	1,6 - 2,5	up to 2,5 %
		CuZn39Pb3	2,5 - 3,5	up to 3,5 %
		CuZn40Pb2	1,6 - 2,5	up to 2,5 %
		CuZn43Pb2Al	1,6 – 3,0	up to 3,5 %

[1] A list of all lead containing copper alloys (impurity and functional) which are presently standardized in European standards can be obtained upon request

Slags, copper smelting (EC number 266-968-3)

Slags, copper smelting, is a metal-containing, complex UVCB substance, often called "final copper slag". It is one of the three key end products coming out of the copper smelting process – the other two are copper metal and sulphur dioxide (converted into sulphuric acid for sale to the chemical industry). Under REACH, Final Copper Slag is defined as a "Substance produced, from heterogeneous mixtures of copper contained material formed during the copper production, by reduction at high temperature in molten state (i.e. melting and processing in a furnace) or by flotation processes. Main constituents are iron silicate and calcium-aluminium silicates, with the amount of non-ferrous metals reduced to the lowest extent economically and technologically viable".

The European industry has invested substantially, during the last 10-15 years, to reduce the non-ferrous metal content in "Final Copper Slags" in order to ensure their continued acceptance as construction products. The lead content of the slag streams varies between 0.02 and 0.65% and is mainly present as galena (lead sulphide), or in metallic form. The human health classification under REACH is based on elemental and mineralogical compositions and in vitro-bio-accessibility tests in gastric fluids, in accordance to the international protocol ASTM D 5517-07. These demonstrate that "Final Copper Slags" do not merit environmental or human health classification entries if a cut-off value of 0.3% is used as cut-off value.

Based on confidential data, collected by ECI under its REACH Copper Consortium, the EU production of "Final Copper Slags" is 3.5 million tonnes/year. These materials, not classified under the current CLP guidelines, are used as construction materials and have been included in CEN TC 154 "Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas". The commercial value of these slags is almost zero but their use avoids costs and environmental burdens of land filling.

Copper concentrates

Copper concentrates are natural, not chemically modified, UVCB substances, produced in, or imported into, Europe. Information collected from 41 ore bodies world-wide, indicates lead concentrations ranging between <0.01 to 13%, with lead present in the form of galena. A typical copper concentrate has a lead content of 0.05% and does not merit CLP classification at the current cut-off value of 0.3% for reproductive lead toxicity. Concentrates with high lead contents do need to be classified.

Concentrates are a very important intermediate step between the mining of copper containing ores and final metal production. Approximately 14% of the EU's annual copper demand is met from concentrates produced at EU based mines. A further 16% is produced by EU based smelters/refiners, based on the imports of bulk concentrates from countries such as Chile and Indonesia. According to the International Copper Study Group, the 2011 EU demand for copper concentrates was 1.5 million tonnes with a market value of **2,600 million €.**

Proposed "classification scenario"

KEMI's proposal is that the classification cut-off value for reproductive effects induced by lead (and by read-across also lead compounds) in alloys, slags and concentrates would be reduced from 0.3 to 0.03%.

Lead is present as an impurity or functional element in copper alloys and as a natural impurity in the copper industry's complex, metal-containing UVCB substances, identified as slags, copper smelting slags and copper concentrates, usually at concentrations above 0.03%.

Copper alloys

The proposal would impact most of the CEN standardised “lead-free” alloys. Most of these are currently not classified, but would become classified as reproductive toxicants (see table 1).

Useful to mention that, lead is added as a functional alloy constituent because lead, embedded as tiny globules (e.g. in brass alloys), acts as lubricant and, most importantly, as a chip breaker, allowing high performance machining of semi-products without continuously damaging the product itself or the production tools. In addition, Pb exhibits corrosion inhibition characteristics, minimising the corrosion/metal release of other constituent substances.

The combination of these three properties presents a significant challenge in the search for a suitable substitute for Pb. Nevertheless, over the last 10-15 years, the industry has reduced, to a minimum, the amount of Pb needed for a series of copper alloys while still fulfilling downstream customer requirements. This was successfully achieved by either reducing, as far as technically feasible, the Pb content in the alloy itself and/or by adding other elements. There are, however, still uses which make leaded copper alloys unavoidable. This has, for example, been acknowledged in the RoHS and ELV directives by exempting lead in copper alloys up to 4 % from the general lead restriction.

Another significant challenge in the efforts to replace substances of concern has been to avoid impacting one of the most valuable characteristics of copper alloys – their recyclability. As elsewhere in the world, the European copper industry has explored the use of bismuth (Bi) as a replacement for lead. However, Bi exhibits a series of technically and environmentally relevant disadvantages. Amongst other adverse outcomes, bismuth seriously impacts copper alloy recycling loop[2].

Today, the content of lead in “lead-free” copper alloys is at a level considered to be the “lowest level technically feasible”. Not being able to recycle end of life alloys requires the use of more expensive primary metals which has pushed up prices for consumers. The introduction of a reprotox classification, not only for “lead free” but also for all lead containing copper alloys, is expected to motivate end-users to substitute with other materials (most likely steel or plastics). ECI estimates that this could threaten 30% of the copper-alloys market

Slags

For the CEN standardised “final copper-slag”, a reduction of the lead classification limit would mean a shift from no-classification to classification, as a reproductive toxicant, of almost all “final copper slags”.

This would, most likely, result in their non-acceptance as construction products and turn an economically valuable by-product into a waste. The latter would attract land fill fees, delivering a further serious debit to the global competitiveness of copper production in the EU.

Concentrates:

The proposal would result in the classification, as a reproductive toxicant, of most “concentrates” produced in, or imported into, the EU. This would have important consequences for transport and international trade. Unless this classification became global, it would make it more difficult for the EU to source the concentrates it needs to meet metal demand.

[2] See also : http://www.eurocopper.org/doc/uploaded/Bismuthnonsuitability.pdf

The consequence of this classification on global mining operations is outside the scope of this analysis.

Boundaries of the SEA

The study evaluates the consequences of the proposed scenario, within the European Union, in the mid-term. The impacts cover the potential threats for European industry as part of the global market.

3) IDENTIFIYING AND ASSESSING IMPACTS

Under the proposed restriction scenario the following impacts are considered.

Economic

- ⇒ Changes in sales and production
- ⇒ Changes in employment
- ⇒ Changes in innovation and research
- ⇒ Changes in product quality
- ⇒ significant loss in value of products containing copper alloys and copper alloy scrap which are already in the market

Environmental

- ⇒ Increase in emissions through the need to import primary copper, primary zinc, primary nickel and other metals used in alloys in primary form versus EU recycling.
- ⇒ Reduction of copper recycling.
- ⇒ Reduction of recycling of products containing copper alloys in the market
- ⇒ Increases in waste streams (copper scraps and copper slags)

Health

- ⇒ Reduction of the exposure of lead from consumer goods

Social

- ⇒ Changes in employment at EU level

Trade and wider economic impacts

- ⇒ Threat to competitiveness outside Europe
- ⇒ Changes in international trade

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Economic

The reduction in the classification cut-off value would result in the classification, as a reproductive toxicant, of:

⇒ Many copper alloys, especially the copper brasses, characterised as "lead-free" after more than 15 years of investments and innovations

⇒ Almost all final copper slags, with minimal non-ferrous metal contents, used as construction products, again following years of innovations and investment

⇒ Most copper concentrates produced in, or imported into, Europe

Classification will have serious consequences for industry competitiveness, market prices, product substitution and transportation.

Copper alloys

In 2011, 1.426 million tonnes of copper (source IWCC) were used in the EU to produce lead-containing copper alloys. These are valued at 1.4 billion Euros.

Classification, as a reproductive toxicant, is expected to shift markets towards a voluntary or mandatory (authorisations and restrictions) reduction of use and substitution to other materials. This substitution does not, a priori, affect the community. Nevertheless there are products where a substitution is technically difficult and/or where copper alloys represent an important functional and/or esthetical advantage.

For some applications, where lead is added for functionality reasons, the lead content could potentially be reduced to <0.03% through substitution. However, as one example of the challenges in doing so - despite extensive efforts between the copper and automotive industries, it has not been possible to substitute lead in alloys used in applications such as injectors and valves for fuel efficiency, plus fittings and connectors for braking and traction control for passenger safety. This has, for example, been acknowledged in the RoHS and ELV directives by exempting lead in copper alloys up to 4 % from the general lead restriction

Most of the "lead-free" copper alloys contain impurities of lead between 0.02 to 1 %. These lead impurities are the result of contamination of scrap with leaded material during the past decades of recycling. Ultimately, these copper-alloys would need to come from primary raw materials, not from recycling, devaluating the existing materials in the market and increasing end user prices across the community.

It is estimated that under the proposed scenario, 30% of the copper alloy market (**4 billion €/yr**), is at risk for substitution. Assuming employment is a direct function of production, a 30% reduction in the production of copper alloys would result in the loss of **5,000 jobs**.

Additionally, in the EU, the competitiveness of copper producers is lower than outside EU. EU operational costs are higher, mainly due to environmental compliance, energy and labour costs, while product revenues are set globally through mechanisms such as the London Metal Exchange. It is the existence of a well established recycling chain for metals, such as copper, that has sustained the industry and its workforce. The inability to directly use EU sourced scrap alloys will increase the demand for primary, and therefore imported, raw materials coming from mining. It will further lower the added value for European production and could lead, eventually, to **closure, or delocalisation to other regions**.

Additionally, when copper alloy scrap can't be used any more for the production of new materials it will lose most of its **financial value**. This is particularly true for leaded brass scrap and pure metallic scrap which is used directly at the fabricators site.

The restriction scenario will directly affect **innovation.** Both producers (smelters) and manufacturers have invested, over many 15 years, in the development of efficient recycling techniques to recover copper scrap. The European metal industry is nowadays leading the recycling industry and developing a new economy out of this resource. It has achieved a large reduction in the concentration of lead in copper-alloys reaching 0.02-1% (Table 1). The proposed classification scenario will, in one act, wipe out the value of all this effort. It will affect the recycling market and will result in increased exports of EU scrap to countries with much lower yield recoveries and far poorer standards for human health and the environment. Possibly, industry will not find advantageous anymore to invest in research for copper scrap products in the EU.

This loss of potential innovation in the copper alloy industry may not necessarily be supplemented by innovations in other sectors.

Slags

The smelting industry has also invested, over the last 10- 15 years, in the development of technologies to lower the lead concentrations in "clean" copper slags allowing them to be used as construction products. This proposal would completely negate this investment. Slags will be classified in Europe but not outside. These slags, now valuable products, will become a hazardous waste and will have serious economic consequences for the copper smelting industry as well as for the slag using industries. The slags used as construction products will need to be substitutes by other mineral resources and at a cost for the environmental and the availability of resources.

This will probably induce:

⇒ Increased costs of copper and copper products

⇒ No further industry attempts to produce "clean slags"

⇒ Loss of competitiveness and jobs in the copper industry

⇒ delocalisation of copper production outside Europe

It will affect the whole chain of producers, transporters and users.

Concentrates

Concentrates production and transport are a high investment for the industry. Costs for transport, loading, unloading and storage will dramatically increase if concentrates are classified as reproductive toxicants.

This will probably induce:

⇒ Increased costs of copper and copper products

⇒ Loss of competitiveness and jobs in the copper industry

⇒ Considering that concentrates are subject to world-wide trade, classification only in Europe will induce trade distortions and eventually delocalisation of copper production to outside Europe

It will also affect the whole chain of producers, transporters and sellers.

Environmental

The main environmental impacts will be

⇒ lower uses of lead containing alloys and slags will reduce environmental lead exposure The relative contributions of these to the total lead emissions in Europe are however expected to be negligible

⇒ a decrease in the recycling value and thus the recycling rate of copper alloys. Under the restriction scenario, goods that will be substituted by copper-alloys with Pb content lower than 0.03% will make it impossible to use these scrap qualities directly at the fabricators site for the production of new products from the identical materials (just melting and casting) Recycling will need to include secondary smelting and refining processes and higher needs of primary production may be anticipated.

- It will increase the environmental foot print of those materials, increasing land use, energy consumption, CO2 emissions and acidification potential.
- Smelters, therefore, will have to process much more lead containing scraps than before with the aim to remove the lead from the material. This results in a significant higher environmental impact than just melting and casting lead containing material at the fabricators site without the aim (and the technical equipment) to remove the lead from the alloy.
- Reducing the lead content in the alloys will not necessarily induce a reduction in environmental lead concentrations because, depending on the market dynamics, this may also lead to a shift from secondary to primary copper production. Copper concentrates contain a range of metals, including lead at various concentrations (typical around 0.05 % but up to 13% Pb). A shift in copper production from less secondary (use of scrap) to more primary (concentrates as raw material) copper production will therefore increase the amount of "new lead" imported in the EU and subsequently used and/or land-filled.

⇒ increased production of slag wastes and reduced efforts in producing "clean slags"

Health

The proposed classification scenario was initiated to protect small children from potential lead-induced "neurodevelopmental effects". These sensitive populations are not present at the workplace and therefore reduced classification cut-off values will not deliver measurable benefit. Lead exposures at the work-place are already well regulated/accounted for in the copper industry via lead occupational exposure limits (usually biological limit values (BLVs)).

The proposed classification scenario will reduce the exposure of lead from copper alloy consumer goods in the community and copper slags used as construction products. Some of these may beneficial to children. However, the most relevant exposure products are already regulated (e.g. drinking water directive, jewellery, toys directive, voluntary industry initiatives on textiles, and the proposed restriction on consumer articles). Furthermore, there are not, at this stage, human health studies that can quantify the effects of massive consumer goods/construction materials with a lead content of 0.03%

Social

Employment will be affected under the classification scenario. The loss of competitiveness of copper smelters will drive production outside Europe.

Trade and wider economic impacts

There are three main consequences of the classification scenario that will reduce competitiveness in the European copper industry.

First, the classification scenario will result in further lead restrictions and even authorisations. This will induce the need to redefine a "low-lead" alloy and a "final slag". All protocols and standards currently used in the international trade of alloys and slags will have to be reviewed. The EU industry has invested, for more than 15 years, resources in developing common protocols and standards. The restriction will require further research and investment, the feasibility of which is far from clear, particularly in the current depressed market environment.

Secondly re-classifications for lead in Europe do not necessarily mean that consumer goods shipped from outside Europe will be required to meet requirement. The classification scenario will require a large amount of auditing and information inside and outside Europe.

Thirdly, re-classification, especially of copper concentrates, will require changes in transport, loading/unloading/storage in Europe and not outside Europe. This will have consequences for the costs of copper production and may induce market distortions.

4) COMPARING THE SCENARIOS

This section compares the advantages and drawbacks of the proposed restriction scenario. The first section compares the impacts and tries to quantify them. The second part evaluates the distribution of impacts, clarifying who will be affected. It finishes with the uncertainty of the analyses and the conclusions.

In this section the impacts identify below will be assessed in a cost benefit matrix. This type of approach does recognise that there are impacts that cannot be quantified or monetised.

Comparison of impacts

This table shows the costs and benefits of the proposed restriction scenario, based on the impacts explained above

***Table2**: Qualitatively and quantitatively comparing the main costs and benefits*

Impact	Cost	Benefits
Economic	Additional cost in consumer goods made out of metals alloys and reduced market value of scrap	
	Substantial decrease in research and innovation by the copper industry to recover copper scrap	Innovations on substitutes
	Substantial decrease in research and innovation by the copper industry to reduce the non-ferrous metal content in "final copper slags"	Innovations on substitutes
	Decrease of the production of copper alloys in the EU. At risk: 30% of the alloy market; 4 billion Euro.	Increase of the production of substitutes
	Decrease or loss of the "final copper slags" market..	Increase of the production of substitutes
	Increased costs of copper concentrates, with market value of 2600 million Euro	
Environmental	Decrease in the recycled content of copper products.	
	Decrease in the end-of-life recycling rate of copper alloys containing products and therefore increase of the environmental footprint from copper-alloys not coming from scrap	
	Increased primary production and thus imports of copper concentrates leads to an increase in the amount of "new lead" imported in the EU and subsequently used and/or land-filled.	Reduction of the environmental releases of lead from consumer products (minor)
	End-of-life crap from products with lead containing alloys have to be "disposed" for at least the next 50 years	
	Increased production of slag-wastes and increased use of other resources as substitutes	
Health	Exposure to substitutes	Reduction of the exposure of lead of consumers using lead containing alloys (minor)
	Exposure to substitutes	Reduction of the exposure of lead from slags used in construction products
Social	Decrease of the competitiveness of the copper industry. Increase in the prices of copper and copper alloys	
	Estimated loss of employment by 30% within the copper alloy industry (5000)	
Trade and economic impacts	Increases in authority resources to audit the trade of unleaded alloys, final copper slags and concentrates	
	Re-definition of the chemical composition of nearly all copper alloys used in Europe	

Distribution of impacts

The cost and benefits are not spread equally within the production chain. While some impacts may affect consumers, other could be damaging for producers or authorities. In the table below the main targeted stakeholders are identified.

Table 3: *Distribution of Impacts*

Distribution analyse	Benefit from the proposed restriction	Cost of the proposed restriction
EU27 smelters and manufacturers		Decrease in the market share for copper alloys and the competitiveness of copper production. More difficult to compete for concentrate needs on global market.
NON-EU27 smelters and manufacturers	Increase in the availability of raw materials, coming from EU scrap. Easier access to the trade of copper concentrates.	
Consumers		Increases in copper and copper-alloys prices. Decrease in innovation to recover copper scrap.
Regulation authorities		Increase in the auditing of consumer goods manufactured outside Europe. In contradiction to several EU targets: promotion of recycling, avoid wastes, increase competitiveness, decrease of green house gas emission, decrease of energy consumption.

Uncertainties

There are several assumptions in this SEA report that may need further study. The most relevant are:

Employment shifts. The reduction of share by copper-alloys and the resulting difficulties to use copper –alloy scrap may affect a wide range of persons that work indirectly for the copper industry.

The cost/benefits of the classification scenario for human health will depend on the acceptance of e.g. solubilisation and/or bio-elution tests as a measure to read-across the effects from soluble Pb compounds (e.g. Pb acetate) to the lead present in alloys and sparingly soluble minerals and structures (galena, slag silicates).

SEA results

Based on this analysis, it is unlikely that the proposed classification scenario will have more benefits for the EU than cost. The loss of jobs, the devaluation of the copper scrap chain and the price increases in copper products, copper-alloy products, final copper slags and concentrates will be a direct cost for the industry, its customers and the final consumers.

The content of lead, in lead-containing materials, is a controversial issue that has led to several European directives. It has further been recognised, in both the REACH and EU Classification guidelines, as well as in restriction scenarios, that alloys are "special mixtures" whose properties cannot reliably be predicted from the properties of each of the alloying elements. Similarly, slags and concentrates are lead-containing, sparingly soluble UVCBs whose properties cannot reliably be predicted from the properties of each of the constituent elements. Therefore, to assess the hazards of these materials, information on composition and metal-ion release potentials need to be considered.

To better understand these, the copper industry has already invested substantially to assess potential health effects from lead in such complex materials. The clearest examples are:

⇒ The Drinking Water Directive 98/83/EC (DWD). The newest legislation in drinking water is the development of the EN 15664 a CEN standard. In it, four Member States (D, F, NL & UK), took up the challenge to address the health-related issues identified by the DWD. The EN15664 (parts 1 and 2) defines a test method for metallic materials for their conformity (metal release) with the DWD. A broad range of copper alloys are proven to be suitable for use in contact with drinking water, while a few other copper alloys failed to pass the EN 15664 test. Of those that failed the test, some will potentially completely disappear from the market. However, others are essential to downstream industry (e.g. taps and pumps) to provide the technical characteristics required of their products. These essential alloys have undergone iterative modification by the European copper industry towards significantly lower levels of metal release. This enormous effort has generated a list of copper alloys that represents both positively approved materials and candidates still subject to the approval/evaluation process (see annexes 1-3).

⇒ Slags from copper smelting. The smelting industry has invested, during the last 10-15 years, in the development of techniques that have achieved a large reduction in the concentration of lead in “final copper slags” and, as a result, kept open the market for their use as a safe construction product. Final copper slags” has been registered, as a substance, under REACH. The REACH dossier’s classification conclusion is summarised as: “Slag, copper smelting (high quality slag products) do not meet the criteria for classification as dangerous to the environment/human health”. According to REACH Guidance, exposure assessment and risk characterisation is not required if the substance is not classified as dangerous. Nevertheless, given the high tonnage and various applications, the industry chose to demonstrate safe manufacturing and use. A risk based exposure assessment determined actual releases and potential risks from both the production and end-use applications. The assessment was focused on critical trace metals in the copper slag and critical exposure scenarios such as road construction. This allowed the industry to critically assess those slags that can be considered as “clean-slags” and used safely, and those that cannot.

In conclusion, this SEA advises an extension of this approach. Instead of a blanket reduction in the hazard cut-off value, continue to assess the exposure and use patterns of lead containing materials with due consideration of the complex matrixes and the exposed populations (children versus industry employees). This will ensure, on a case by case basis that the production/use scenarios are safe without seriously affecting the production, market and international trade of copper, copper alloys, final copper slags and copper concentrate

5) DATA AND REFERENCES

annex 1 : introduction to copper alloys list for products in contact with drinking water

annex 2 : 4MS acceptance of metallic materials for drinking water

annex 3 : copper alloys - 15 years of development

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