Taking stock of standardisation and systematisation requirements of EU MS minerals data

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Introduction

MIN-GUIDE: a brief introduction

The Horizon 2020-funded MIN-GUIDE project (www.min-guide.eu/) aims to support the secure and sustainable supply of minerals in Europe through the development of a major new online repository, outlining guidance and the latest in good practices for minerals policy decision makers. The project’s key objectives are (1) to provide guidance for EU and EU Member States’ minerals policy, (2) to facilitate minerals policy decision-making through knowledge co-production for transferability of best practice minerals policy, and (3) to foster community and network building for the co-management of an innovation-catalysing minerals policy framework. MIN-GUIDE will profile relevant policy and legislation in Europe, identifying innovation-friendly good practices through quantitative indicators, qualitative analysis of country-specific framework conditions, and the compilation of minerals statistics and reporting systems. These insights will form the basis of the project’s key output: an online Minerals Policy Guide (referred to in this document as ‘the Policy Guide’).

The project is structured in 8 work packages (WPs) (see Table 1). The content-rich work packages are WPs 2-6.

WP2 will produce a comprehensive, and well-structured, knowledge repository of EU level and EU Member States’ mineral policies and governance frameworks. WPs 3-5 will identify, benchmark, and elaborate good practices on policy innovation capacity according to the different activities along the whole mining value chain (permitting, exploration, extraction, cross-border exploitation, processing, waste management, recycling, remediation and mine closure) and WP6 will review the mineral data base and recommend standardisation and systematic reporting requirements for EU Member States.

Table 1: The MIN-GUIDE work packages

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MIN-GUIDE – D6.1 Standardisation and systematization of EU MS minerals data: taking stock
Executive summary

Introduction

The EU Commission is concerned about the European RM supply as clearly stated in the Raw Materials Initiative. But for an accurate analysis and global studies on the situation of RM and the mining industry in Europe, it is key to have and provide reliable information on mining data, mineral resources as well as mining statistics.

This deliverable of WP6 tackles the European state of the art of a global and simplified analysis of the situation of mining intelligence in Europe, by surveying official and non-official data sources and EU projects related to mineral raw materials and statistics at EU level. This deliverable pretends to fill the gaps on the current inventories of mining data, projects and mining statistics in Europe.

The job done

This work has three clearly differentiated but complementary parts: identification and inventory of projects, statistical information and standards.

The first part consisted on the identification and description of European H2020 projects in progress or recently completed (from 2009 onwards) on or related to mineral Raw Materials and closely related subjects. The task included the identification and description of relevant EU projects addressing the state of the art of mineral statistics, exploration, production, trade and reserves and resources (The results of this research are included in Appendix 1).

The second part is dedicated to reviewing existing mineral statistics. It covers compiling information on available data from the existing databases, identifying availability and access. The information gathered is included in Error! No se encuentra el origen de la referencia. 2. A database that shows a preliminary survey on the available information and projects regarding mineral statistics in EU, regarding production, exploration, trade and resources estimates.

The third part of the deliverable deals with the review of the current situation of mineral resources reporting systems and the standards used in resource classifications in the EU and EU MS countries as well as those existing globally.

These three parts are concatenated, so that from the first one we extracted a list of selected projects that are more directly related with mining and mineral statistics and the data then used in the second part. In the second part we carry out an analysis of a selection of commodities and we survey the difficulties of finding specific data such as problems due to statistical data being aggregated, difficulties in the location of the repositories, etc. Part of these conclusions serve as a basis for the preliminary proposal of disaggregated codes and solutions for the mining statistics from the official information sources: Prodcom – Eurostat

Main findings
Below we highlight the most relevant findings of the deliverable:

a. Inventory of EU projects

1. We have identified 66 EU projects related to mineral raw materials, but out of these, very few are related to mineral statistics (only 12%). And this, in spite of the fact that reliable statistical data and easy to find information, is crucial for policy makers and industrial stakeholders.

2. One of the main problems that have been detected in many of the projects analysed, is the availability of updated information once the project is over. An investment of more that 400-700M€ in the Raw Materials Initiative related projects, has not resulted in permanent updated mining data source.

b. Mining statistics

1. Through a detailed questionnaire, we have identify the low use and lack of user friendly features of the official EU sources of mineral data and minerals-mining statistics. This results in the fact that researchers and other stakeholders are more interested in the use of non-official mineral yearbooks and data sources.

2. We have also acknowledged that the most used statistics and maps related to mining and mineral resources in Europe, only refer to metallic ores. It would be advisable that such figures include the resources and the production of dimensional stones, aggregates and industrial minerals. These added inputs will give a more realistic image of the mining industry in Europe and its minerals and rock resources.

3. With regard to the use of official European statistical data and the usefulness of current statistical codes, since June 2017 the MIN-GUIDE project has had an extensive collaboration with DG GROW. As a result of such collaboration, this deliverable has also focused on the data gaps and disaggregation analysis in EUROSTAT – PRODCOM list. We have thus provided input and a case study to DR Grow proposal on Non Energy Raw Materials.

c. Resources and reserves codes

We have made a compilation of the standards on mining reserves worldwide including those at European level. Two main families of standards have been identified: Economic/Industrial oriented systems (The CRIRSCO family) and Economic and social oriented systems (The United Nations Framework Classification). In the next deliverable (D6.2) we will establish the best practices on standardization and codes, define the existing gaps, and explore the pathways that are currently being used to tackle them.

d. Other

1. In order to store updated information or links to the various projects, the survey carried out, points out that the adequate information portal should be the Raw Materials Information System portal

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MIN-GUIDE – D6.1 Standardisation and systematization of EU MS minerals data: taking stock
of the Joint Research Centre\textsuperscript{2} but it should also include information on all relevant EU projects, as well as links to the official EU databases, such as Eurostat etc., and in a user friendly format. Unfortunately, the portal is not yet fully operative.

2. In order to offer guidance and a conductive thread to mining data, information and statistics at EU level it might be interesting to create a consultative body at European level in mining. Although this could be a potential result of the whole MINGUIDE project, the initial results obtained from the WP6 clearly show that the EU needs in its long-term strategy, the inception of a European Mining Agency.

**Work Package description**

WP 6 has identified and compiled all available information on the non – energy mineral statistics and reporting systems (systematic and standardised) on exploration, production, trade and resources estimates in Europe.

The result of the work carried out, is a comprehensive repository (table excel file – Appendix 1) of EU level as well as EU Member State level, of mineral statistics inventory regarding exploration, production, trade and reserves and resources.

We have also acknowledged the data coverage gaps detected in the available sources, and drafted a summary of the needed developments in the field of mineral intelligence capacity.

This work package is strongly interlinked with WP2 in order to understand the pros and cons of the different mineral policies that are currently being applied in the EU as well as to carry out an analysis of whether it is necessary to have reliable and consistent baseline data sources on exploration, production, trade, reserves and resources of the mining industry in the EU

We have thus compiled EU level and EU MS mineral statistics on exploration, production, trade and reserves and resources which comprises:

1. Identification and description of relevant EU projects addressing the state of the art available of mineral statistics, exploration, production, trade and reserves and resources
2. Compiling information on available data from existing databases, identifying availability and access.

The results obtained concerning mineral statistics and reporting systems (systematic and standardised) will be included as a part of the MIN-GUIDE Online Policy Guide (henceforth referred to as “the Guide”).

We have conducted a literature and desk research (indicated footers as references) – of the available information from EU projects, in order to map existing EU level and EU MS mineral statistics, related to production, exploration and resources estimates.


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The data collection system has been completed with information from EU MS Geological Surveys, based on existing networks and adequate questionnaires (both by mailing and by direct contacts during the project’s policy labs).

This deliverable is, thus, a summary of the work carried out by task 6.1 dedicated to compiling EU level and EU MS mineral statistics on exploration, production, trade and reserves and resources.

The results of this survey will be presented in Policy Lab 5, that will be held in Madrid between May 22 and 27, 2018. A project by project fact sheet has also been produced and included in an Annex of this document.
Challenges for minerals data collection and processing

When analysing mining and mineral data in Europe the following problems should be addressed:

1. Lack of a standardised classification of reserves and resources, with due consideration for existing reporting standards currently used for different purposes and in different countries.
2. There is currently no regular minerals statistical reporting at EU level. The Raw Material Information System (RMIS) of the Joint Research Centre, is trying to address this gap, but is not fully operational yet.
3. The competent authorities in the EU MS lack management capacity for mineral information, including national raw material resource base and materials flows surveillance.
4. There are few initiatives tackling EU MS data heterogeneity regarding schematic and linguistic interoperability (except may be the Minerals4EU project).
5. There is a lack of provision of economic/technical mineral exploration and production data to decision makers and the general public.
6. The European Union industrial production statistics are presented annually according to a survey which is based on the PRODCOM list (statistical classification). This list comprise a large number of commodities related to mining and manufacturing (including metallurgy and metal processing). The problem is that we find out that many commodities are aggregated and the list loses much of its usefulness: we highlight these as EUROSTAT PRODCOM data gaps. Since June 2018 the MIN-GUIDE project has had an extensive collaboration with DG GROW on the matter of EUROSTAT PRODCOM data gaps and disaggregation analysis. As a result, the first state of the art and data gap identification is included within this D6.1, whilst some recommendation and gap analysis will be included in D 6.2. Within this deliverable we are also providing input and a case study to DR Grow PRODCOM proposal on Non Energy Raw Materials. The idea in not to solve the problem of aggregation /disaggregation in data in mineral and mining production and trading in Europe, neither is it the purpose of this work to change the current statu quo, we only aim to find and try to solve some of the existing gaps in a well-tuned system. We will focus on the various existing world and national mining codes, and we will propose some guidance to improve the existing nomenclature, for example by disaggregating statistical data on CRM\(^3\), industrial minerals, aggregates, dimensional stone, etc. We will also focus on some metals that are aggregated into one data entity (such as lead, zinc and tin) from different mines and geological settings (tin).
7. Scattered information and data on minerals and mining in EU funded and other granted projects. The EU search and data engine CORDIS includes all EU founded projects, but the content, data availability and search ability needs to be addressed on a project by project basis through their individual websites. Besides information cannot be easily found with respect to the update of the data sources and websites.

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\(^3\) Critical Raw Materials
Knowledge information and mineral statistics

Non-energy raw materials are as important to the EU, both in terms of production volume and value. However, this reality may not be so clear or well understood, as many people understand only metallic mining when using the term mining.

Whilst metallic ores are more or less well studied at EU level (both in terms of technical and statistical studies and sources and specific initiatives that deal with them i.e. The Raw Materials Scoreboard, DG GROW 2016.4), industrial minerals and dimensional stones lack of enough relevant studies and reports at the EU level.

Metallic minerals, industrial minerals, dimensional stones and aggregates are often analysed separately, in studies that somehow emphasize the decay of metallic mining in Europe, but do not highlight enough the world-class importance of the industrial minerals and dimensional stone industry in Europe (see Figure 1 and ore map Figure 2 for instance).

This situation in the field of data and statistics in the EU is crucial if we consider the EU mineral policy context, as defined in the Raw Materials Initiative, (RMI. COM 2008) which aims to ensure:

- A sustainable supply of RM from global markets
- A sustainable supply of primary RM within the EU
- Resource efficiency and promote supply of secondary RM through recycling

However, those basic objectives cannot be achieved if the information available on minerals resources of Europe is biased towards a part of the mining sector, thus blinding the real situation of the sector, and focusing wrongly in the less important resources of the Union.

Another of the key achievements pretended by the RMI is the promotion of the circular economy models, based on a more efficient industry, minimising the generation of waste and optimization the use of both primary and secondary resources.

Obviously, key in the circular economy concept is the fact that as new technologies are developed new applications of known materials are implemented or known materials are used in different industries.

Some of these raw materials are produced locally in the EU but not in sufficient amounts, knowing the right information and referring to accessible updates information is, again, a key factor for the development of these framework ideas.

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MIN-GUIDE – D6.1 Standardisation and systematization of EU MS minerals data: taking stock
It is important to highlight that the European Commission, through the European Innovation Partnership (EIP) on Raw Materials, aims to raise the industry's contribution to the EU’s GDP, to around 20% by 2020, by securing its access to raw materials.

One of the pillars of such commitment, is the knowledge information systems and making available reliable data on mining and minerals. In summary EU policies, need good and reliable statistics, accessible, friendly and maybe in the right level of disaggregation for the analysis of the various commodities.

Figure 1: Evolution of the main mining regions in the world in the last 160 years (Source: EIT)

Europe is a big consumer of raw materials and, in the past, has been a big raw materials producer. However, the truth is that today the EU is mainly a raw materials importer.

Figure 2 shows the production of mineral resources in Europe and the rest of the World.

The image, though, shows a distorted reality, as the data used in the graphs do not include building stones (dimensional stones and aggregates) and all industrial minerals although for some industrial

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6 One of the problems is that it is very difficult to analyse the mining market in Europe as a whole, since the official figures normally only reflect the existing mining sectors individually (metallic ores, energy minerals, industrial minerals or aggregates) and never all the mining sectors altogether. Good information from each sector can nevertheless be found for example in the EU industrial mineral association website (http://www.ima-europe.eu/) or in the EU aggregates sector website (http://www.uepg.eu/)
minerals such as magnesite, fluorspar, sepiolite, kaolin, and potash, Europe is today a world class producer.

Other interesting figures which are not easy to find in official records, include some critical raw materials such as barite, graphite, vanadium, tungsten or cobalt, materials that are still mined in Europe and were very important globally during the 19th and 20th century (Spain was a major producer of tungsten, Norway of cobalt, Belgium, France and others for barite, etc.).

On the other hand, the EU mining industry, apart from producing some of the above-mentioned minerals and rocks, is mainly an importer of minerals and an exporter of knowledge, legislation and technology.7

And it is worthwhile mentioning also that some EU MS mineral legislation and some EU norms on standardisation are, in many cases, adopted worldwide (CEN Standardization is an example), and EU standards are the result of its intense technological improvements which are then exported worldwide together with the new advanced technology.

Europe, due to its particular geological diversity and world-class metallogenic regions (pyritic belt, Scandinavian craton, granitic batholiths, sedimentary basins and diapirs, etc.) has been a major mining continent since the Roman times until the second half of the 20th century.

Some of the deposits are exhausted, but many of the abandoned tailings and orphan mining sites not yet being restored or remediated, can contain useful elements that either were not known or were not recovered at the times of the mine’s activity8.

Obviously in order for it to be useful, mineral information or knowledge should be duly available, or at least easy to find.

If a European company is producing or requires a certain commodity for its industrial processes, it needs reliable and easy to find information (for example it is important to know, where the mineral resources are located) in a quick research, to take sometimes strategic investment decisions.

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7 https://europa.eu/european-union/topics/trade_en
8 European Commission through H2020 has funded some projects focusing on this recovery
The situation at this very moment in the EU is that the available official sources (European Commission sites and national ministries and geological surveys) of mining and mineral information are very scattered, and make it difficult to conduct a rapid analysis of the existing resources and mining statistics in Europe.

As we will see later, from the results of our questionnaires, many mining researchers use the already existing yearbooks because of its easiness of use as well as for the reliable and easy to find data contained. Some other experts use EU projects databases and search engines, particularly Minerals4EU and ProMine, but they randomly use official EU data and websites (Eurostat, RMIS, etc.).

On the other hand, a non-specialised user can find it very difficult to find official information and reliable data. For example: At this moment it is extremely difficult, to answer this simple question: ¿What is the production of each of the CRMs in Europe?.

As commented above, we have found out that the available sources of information are, at this moment, widely dispersed and located in EU founded projects (i.e. Minerals4EU, Minventory, etc), the European Union Raw Materials Knowledge Base (EURMKB) of the JRC and the RMIS, Eurostat and Prodcom.

1. Part 1: Identification and description of relevant EU projects

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9 BRGM
10 SNL Metals & Mining
11 Mainly from sources such as the British Geological Survey, the United States Geological Survey and the Austrian Federal Ministry for Digital, Business and Enterprise)
This part covers major activities that encompass the identification and description of relevant EU projects addressing the state of the art of mineral statistics, exploration, production, trade and reserves and resources.

The first step taken has been to compile all relevant EU funded projects (mainly those financed by the European Commission) in the form of individual projects factsheets and to perform a summary table in excel format (see appendix 1). This table will be exported into the MINGUIDE website.

The inventory carried out included:

- A description of the fields of the project that are aligned with main MINGUIDE topics and fields (mineral statistics, production, exploration, trade, reserves and resources).
- A literature and desk research on the available information from EU projects, in order to map the existing EU level and EU MS mineral statistics related to:
  - Production
  - Exploration
  - Trade
  - Resources estimates

1.1. Methodology – Questionnaire

1.1.1. Data collection system and sources of information

A desktop research was performed using the following data sources from the EU:

- Community Research and Development Information Service (CORDIS)\textsuperscript{12}:
- EU founded project VERAM (\url{www.veram.eu}): this project has an updated user-friendly search tool-repository on EU founded projects. It is also a platform to identify and address gaps and complementarities.
- SCRREEN: Not available yet, but it is important to highlight that this project will collect and organise all of the data generated in other projects, associations; initiatives etc. and develop a data portal\textsuperscript{13}.

As detailed below, the desktop research was complemented with a questionnaire collected from July to September 2017 to selected experts in the IGME global network and to the MINGUIDE stakeholder database that included Geological Surveys, policy makers, Universities, experts, private and public companies and related agencies. We received 15 replies via e-mail, and other 12 during direct interview at the Policy Lab 4 in Athens.

1.1.2. Scope

\textsuperscript{12} \url{http://cordis.europa.eu/home_es.html}
\textsuperscript{13} Source of information: SCRRREEN brochure 2017
The main scope of the questionnaire was to contribute both to the relevant mineral Raw Materials project database (Part1) and to the mining statistical knowledge base (Part2).

The objective was to identify whether the stakeholders (specialist and non-specialists) are aware of the different nomenclatures in data analysis in the mining sector, the existing standards of mineral resources classifications (if they know any and which one they use), where do they search for mining statistical info and other resources at EU MS and EU level, etc.

As commented, the questionnaire was first distributed online to selected contacts in the MINGUIDE stakeholder database with special focus on European Geological Surveys Organization (EuroGeosurveys) members and later distributed among the Policy Lab nº 4 celebrated in Athens.

- The 4 questions formulated were:

QUESTION 1: List the relevant EU projects you are aware of relating to mineral statistics, exploration, production trade and reserves where you or your institution is involved, include name, acronym and web site if any, of: a) Projects generating data b) Technology/innovation projects c/ Other.

QUESTION 2: Existing mineral databases from your country, indicate where to find them. Do you use any European database? Availability of mineral statistics: exploration, production, trade and reserves. Where can be found? In which format are they available?

QUESTION 3: a) Indicate which standards are used for mineral resources classification (PERC, UNFC, etc.) within your institution or company. b) Although you might not use them currently, what other standards are you familiar with?

QUESTION 4: Where do you usually find/look for information regarding minerals data and statistics a) In Europe b) In your country"

1.1.3. Results from the questionnaire on relevant mineral Raw Materials project database and the mining statistical knowledge base

The results have been graphically represented, differentiating the results from the on-line questionnaire and the questionnaire in the Policy lab, as they are different type of stakeholders (see Figure 3 to Figure 8).

The most active target groups have been the specialists (35% geological surveys and 35% policy makers and ministries), the rest are members of the project consortium not specialist in mining data or statistics. We have obtained information about 12 EU MS Countries and 1 Non EU MS country. We had no replies from 16 EU MS countries (Figure 3).

Figure 4 shows the source of information that respondents use to find data and statistics about minerals and mining. It is relevant to highlight that experts look for information outside their country – and at EU level – in geological surveys yearbooks and search engines, that are not “official sources".
Some of the most relevant minerals yearbooks are those from the British Geological Survey (BGS), United States Geological Survey (USGS) and the Austrian Federal Ministry for Digital, Business and Enterprise.

Many also consider as very relevant the EU funded project Minerals4EU.

Only 2% of respondents use EUROSTAT and RMIS (Figure 4). Some use consultant companies for obtaining data and statistical information.

Strictly regarding mineral databases (see Figure 5) we obtained the same results as stated previously, EU funded projects (PROMINE, Minerals4EU) are used as well as USGS, BGS and mining data repositories; RMIS and INSPIRE sites are official sites and only consulted by 8%.

Figure 3: Origin of replies
**Figure 4:** Sources of information for mineral data and statistics consulted by questionnaire respondents.

The difference between Figure 4 and Figure 5 is that the first is the answer to the question, in general, ¿where do you look for information for mineral data and statistics?: sources of information means databases and also consulting and experts. Figure 5 is more specific: ¿Which existing mineral databases do you know?

Therefore, we can conclude that according to our survey, experts use less often the official EU information sources of mineral data and statistics.
Figure 5: Mineral databases and info searched by respondents
Respondents—generally speaking—were not aware of mineral resources classification standards such as PERC or UNFC (Figure 6). The email questionnaire was sent to the MINGUIDE stakeholders database and to geological surveys, which is a more specialised targeted group (oriented to geology and mining) than the policy lab respondents (which includes also policy makers). This means that although the knowledge of the subject is somehow higher among experts, the matter is widely unknown.
To the question of which standards they use for resource estimations: 8 replies were “I don’t know” in the policy labs, but only 3 in the e-mail questionnaire. This proves that the respondents of the last group were a more targeted geological-mining data audience. It is interesting to highlight that both questionnaires have replies about “former Russian classification” which emphasize the Russian background of some EU countries. UNFC and PERC were mentioned in both groups of respondents.
We sent the questionnaire to stakeholders by email and during policy lab 4 in Athens (21-22 September 2017). We received feedback from many EU funded projects where the respondents were involved (Figure 8). The complementarity between email and policy lab 4 questionaries' was relevant. The respondents to the email questionnaire were involved in more geology/mining oriented projects while policy oriented projects were more common in the policy lab respondents.
1.2. List of projects oriented to minerals raw materials

1.2.1. Input data

In order to complete this task, we have prepared a table and a project-by-project fact sheet which are included and summarised in Appendix 1. These projects are mainly FP7 and H2020 funded, but we have also included some other relevant ones. The sample selection was based on IGME’s expert’s criteria.

A summary and indication of what the fact sheets project summary includes in order to meet the proposal requirements is:

- Aims of the project
- Objectives achieved
- Costs involved
- Databases created
- Data sources used
- Web accesses available

The following sources of information were used:

- CORDIS website
- 2017 Raw Materials Week personal interviews
- Questionnaire (e-mail and Policy Lab Athens) part 1 of this report

The summary Project by Project sheet (appendix 1) has the following fields of information by columns:

- Acronym: Project Acronym, in case of an EU funded Project it is the name that appears in the Commission page and CORDIS
- ID: MIN-GUIDE internal WP6 code for numbering and identification
- Project official ID: in case of FP/ and H2020 projects this is the Grant Agreement code. In other funding schemes, the registered code is indicated if available.
- Title: Full title of the Project
- Starting / End: In EU Commission funded projects this are the official dates
- Status: two options: closed Project or ongoing Project
- Relates to (principal and secondary): According to the MINGUIDE GA we have classified the projects in several categories: mineral statistics, exploration, production, trade, reserves and resources and “others”. We use dropdown menus and highlighted the main topic covered as “principal” and keep the term “secondary” to better define the Project topic. We have included another column to add more information using mining, law, recycling, circular economy, environment and “free” topics.
MIN-GUIDE Value Chain relevance. We have classified all the selected projects according to the MIN-GUIDE classification:

- EXPL: streamlined permitting procedures
- EXPL: safe and fast remote exploration
- EXPL: greater depth exploration
- EXPL: reduced environmental impact
- EXTR: streamlined permitting procedures
- EXTR: reduced grade deposit mining
- EXTR: safer and more efficient greater depth extraction
- EXTR: increased environmental performance
- min and metal PROC: reduced grade deposit mining
- min and metal PROC: safer and more efficient greater depth extraction
- min and metal PROC: increased environmental performance
- MINE CLOSURE / WASTE management: mining waste reuse/recycling/valorisation
- MINE CLOSURE / WASTE management: waste water management
- MINE CLOSURE / WASTE management: mine site reclamation/rehabilitation for subsequent uses
- DEEP SEA MINING: streamlined permitting procedures
- DEEP SEA MINING: clear, sensible and feasible guidelines for EIA (environmental Impact Assessment)
- DEEP SEA MINING: cross-border exploitation legislation/policy harmonisation
- DATA and knowledge base
- N/A or Not Relevant

In the case of the relation to the MIN-GUIDE Project (in general- not focus only in WP6) we have selected 3 categories:

- Closely related
- Somewhat related
- Non-related

Concerning the type of results, we have analysed one by one the project’s final report or website and we have indicated what we think is the main output of the project to its stakeholders. We have also classified the kind of result is offers in the form of:

- Reports
- Publications: general public
- Guidelines
- GIS-map
- Other

Total cost and EU contribution for the project.

Website: Almost all the projects have their own website.

CORDIS link: We include this for all the EU Commission funded: FP7 and H2020.

Leader: We indicate which institution is coordinating or leading the Project, and its country.

Participants: We indicate the number of partners excluding the leader.

Last update within the Excel database.
1.2.2. Result analysis

We have studied in detail a total of 66 projects related to Raw Materials and minerals resources since 2009, mostly EU Commission funded (see Appendix 1- excel file). 61% of the projects analysed were H2020, 25% FP7 (see Figure 9), 46 are ongoing projects and 20 are closed projects (Figure 10). We have used these projects only because for practical industrial purposes or policy establishing objectives and in particular in the minerals industry, information older than 2009 is probably of lesser interest.

The average EU funding of the 66 projects analysed was almost 5 million euros (4.853.948,82 )

![Figure 9: Funding source](image)

MIN-GUIDE – D6.1 Standardisation and systematization of EU MS minerals data: taking stock
Figure 10: Projects status

Figure 11: Project topics and mining value chain relevance

MIN-GUIDE – D6.1 Standardisation and systematization of EU MS minerals data: taking stock
Figure 11 shows the selected project topics and their assigned value chain relevance. 62% of the projects are related to the objectives of MINGUIDE, most (40%) are related in its main topic to mineral production, 31% relate in its secondary topic to reserves, and resources information. 32% of the projects had mining as other topic. As for the MINGUIDE value chain relevance, only 39% were related to data and knowledge base information whereas 61% were not.

Figure 12: Countries leading projects

Among the 28 countries, 17 have been leading at least one project, 2 are non EU Members (Norway and Switzerland), 11 EU countries have not lead any RM project (at least of those analysed). These countries are Bulgaria, Cyprus, Croatia, Czech Republic, Estonia, Latvia, Lithuania, Luxemburg, Malta, Romania and Slovakia.

In some cases, it can be logical not to be involved in such RM projects, because these are countries were the mining sector is almost non-existent. Examples of these are Malta and Luxembourg. However, we would like to highlight that there are some important mining countries, which have not been involved in RM research (with EU funding sources) such as Bulgaria, Czech Republic, Romania or Slovakia, with abundant mineral resources and a relevant mining and quarrying sector. Cyprus for instance is one of the historical copper mining sites since biblical times. It is important to involve this countries in order to have a broader view of the mineral Raw Materials industry in EU.
Figure 13: Number of partners involved in each project

The average number of partners involved in each project is between 11 and 15 (Figure 13).

We have also analysed the main outcomes of the projects, and in 28% of the cases, the main product was a report or document. Prototypes and tests were around 15% of the project results. We have also noticed that the above aggregation of project information is complex due to the fact that there are many different project philosophies and concepts, and in fact, many of them were often related to networking in itself (9%) (Figure 14) although networking does not necessarily produces factual results.
Figure 14: Type of results – products availability

Figure 15: Minerals and mining statistic info
The statistical info obtained during this research will be used in the next chapter of this report, but as a general conclusion, we could affirm that, in fact, very few projects address this important European problem of update and readily available mineral intelligence. MINERALS4EU and PROMINE are two clear exceptions to the rule as the first provides a wealth of mineral statistical data (but only for 2013) and the second provides a detailed map of the mineral resources occurrences in Europe and information on the resources of some of those deposits mapped.

88% of the projects analysed have no relation at all to minerals or mining statistical info, only 8% relate to reserves and resources, and very few to mining trade and production (1%) (See Figure 15).

The benefit of this study was to identify which EU funded project provided relevant information on mining resources and mining statistical info and knowledge information base on RM and CRM. This will be analysed more deeply in the next chapter.

1.3. Minerals and society

As we have already seen, the European Commission has a strong commitment towards a stable supply of raw materials to Europe and promoting the use of its own resources\textsuperscript{14}. The CRM list 2017 is one important result of this commitment. As we have seen in the previous chapter, there are many projects and funds destined to research and establish networks in the field of Raw Materials.

However, the Raw Materials Initiative makes no impact if the potential European mining projects never have the opportunity to start.

The MINLEX\textsuperscript{15} Project has highlighted that one of the obstacles or barriers to the development of "greenfield" mining projects are the environmental aspects. However, we must not forget another important barrier to mining in Europe: The European public opinion overall is not in favour of mining projects in its territory (the "not in my backyard" theory\textsuperscript{16}). Therefore, in addition to environmental issues, we must also point out the need of a "social licence" or social acceptance, which are critical for mining projects in Europe. It is important to bring mining and raw materials closer to Society.

Possibly the "Achilles heel" of all European projects—as such as those that have been analysed—is the way they share the results with the public in the EU.

It is very important to report good mining practices and achievements and spread this news among all EU stakeholders, particularly including those who in general oppose mining. Many of the projects often focus on the mining sector itself, (thus, never reaching the other stakeholders involved) and it is crucial to be courageous and move to engage in outreach among the affected public.

In mining, the environmental issue has already been incorporated into the projects in all their phases, from the preliminary design and feasibility to the mine closure process. Even though mining is the first

\textsuperscript{14} https://ec.europa.eu/growth/sectors/raw-materials/policy-strategy_es
\textsuperscript{15}https://publications.europa.eu/en/publication-detail/-/publication/18c19395-6dbf-11e7-b2f2-01aa75ed71a1/language-en
industry ever to include the environmental mitigation and reclaiming within their formal administrative and technical procedures, it took a great effort to integrate it thoroughly in the system. Nobody discusses this matter nowadays - since it is completely inserted in the Environmental Impact Assessment and in the laws and rules for mine closure and rehabilitation. The same should happen with the social acceptance of mining projects: to incorporate them into guidelines, less technical data and more user friendly – easy to understand information and more awareness.

It is widely accepted\(^\text{17}\) that Social Acceptance of mining begins with information in early stages of education and public awareness, there are very few initiatives within the activities and projects funded by the European Commission oriented towards society including primary and secondary schools (as mentioned during the Raw Materials Week 2017):

- Suscritmat (www.suscritmat.eu)
- EIT – RM@Schools (www.rmschools.isof.ch.it)
- European Minerals day (www.mineralsday.eu)

Some geological surveys also have their own didactic programs (Fig 16) oriented to these educational targets.

![Figure 16: Didactic suitcase of the Geominero Museum (Spanish Geological Survey) to teach the recognition of minerals and their uses in daily life\(^\text{18}\)](image)

Mines museum and mine parks have been introduced in the MINGUIDE project, particularly during the mine closure Policy Lab 4 workshop in Athens, as initiatives to generate resources and address the very negative aspects of the orphan mine sites. Within the framework of the Initiative of Raw Materials of the European Union, these show mines have two very important contributions:


\(^\text{18}\) More information at: http://www.igme.es/ZonaInfantil/maletas.htm) Mineral briefcase. IGME’s Museo Geominero initiative to raise society awareness about the applications of minerals

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- In the field of the circular economy, they contribute to close the loop. The abandoned mining sites or orphaned sites (which could be considered as waste under the waste disposal directives) return to the economic circle as an asset that produces economic benefits and that diminishes the environmental ecological impact.
- Contributes very directly to information and social awareness, as many of its visitors are primary students, more permeable to information and discourses aligned to mining respectful of the environment and use of minerals in daily life.
2. Part 2: mineral statistics

2.1. Databases and available data: Objectives and scope

This task covers compiling information on available data from the existing databases, identifying availability and access (see Appendix 2 – excel file). As it has been mentioned earlier, the EU Commission is concerned about the European RM supply. For accurate analysis and studies on the situation of RM and mining industry in Europe it is key to have reliable information on mining data, mineral resources as well as mining statistics. This task addresses this needs through a practical approach identifying sources of information and the gaps, and improvements that can be undertaken. We, thus, focus on three aspects:

- EU funded projects that provide information on mining statistics and mining resources in Europe
- Non EU official sources of information on mining statistics and data
- EU official sources of information (mainly EU web sites)

One important outcome from the previous was that raw materials experts and in general stakeholders, do not often search for information from official EU sources (RMIS, Eurostat-PRODCOM). However, in general they rely on user-friendly and easy to find repositories and yearbooks, such as those provided by the Austrian Federal Ministry of Science, Research and Economy, or the British or US geological survey’s.

We will analyse in this chapter the reasons for this through a comprehensive example case in which we will track all the possible paths from a research objective to the results obtained: We will analyse the EU production data for one commodity, comparing different countries and different years. This case study will help us to identify the gaps or issues that we face when doing a quick research on commodities or statistics at EU level and EU MS level.

When researchers, policy makers, or any stakeholder interested in the mineral raw materials in the EU, search for information about RM in the EU (data, resources and/or statistics), the following questions need to be provided for to make it user-friendly and reliable for the user:

- Where do I have to look if I need information, for instance, on a certain commodity?
- In the case of CRM: where are they in Europe? Which countries produce them? Where are the mines located if any?
- Which is the EU and EU MS production during a particular period of time for a certain commodity?
2.2. Databases in EU funded projects

For some time now, there has been a need to group and standardize information about mineral resources. The question is what level or quality of information should be accessible and shareable? Several projects have shared information regarding mineral resources and data on resources and reserves. With regard to statistical data on production and trade, information is much scarcer and the information are reports and studies instead of research projects.
Table 2 summarizes and compiles information on all the existing projects at EU level, which provide relevant mineral statistics on production, trade, exploration and resources. The preliminary survey on mineral statistics in the EU and EU MS Countries is in Appendix 2.

In addition, there are private companies providing detailed commodity studies at a Global Scale (Roskill. https://roskill.com/), but they are not free of charge.

We would like to highlight some of these projects:

- Minerals Intelligence Network for Europe (Minerals4EU19). This is one of the most relevant EU founded projects related to primary raw materials. We highlight the webpage within the project entitled: “European minerals yearbook20” with available disaggregated information on commodities updated until the year 2013. It has information on: Production, Import, Export, Resource, Reserve and Exploration of primary resources, as well as information on secondary resources. The search engine uses 4 different fields:
  o By country
  o By commodity – for primary minerals
  o By category (for mineral – based waste flows)
  o Data search (case studies on commodities from waste and other yearbook-related documents)

- ProMine21. Has a web-GIS portal about mining resources in Europe and one of the most cited EU mining resources map. At the time of the we conducted our research we had some difficulties to enter the portal.

- MICA (Mineral Intelligence Capacity Analysis). The project will launch at the beginning of 2018 the European Raw Materials Intelligence Capacity Platform22 with data on mineral production, resources etc.

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19 http://minerals4eu.brgm-rec.fr/
20 http://minerals4eu.brgm-rec.fr/m4eu-yearbook/theme_selection.html
21 http://promine.gtk.fi/
22 http://www.mica-project.eu/?page_id=18
Table 2: EU funded projects related to mineral statistics. (The information of this table has been extracted from Appendix 1 and from the desktop research).

<table>
<thead>
<tr>
<th>Project Acronym</th>
<th>Project ID (WP6 nomenclature)</th>
<th>Mineral statistics on:</th>
<th>Updated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Production</td>
<td>Trade (import-export)</td>
</tr>
<tr>
<td>Minerals4EU</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Promine</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>MICA</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>SCRREEN</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Eurogeosource</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Minland</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Prosum</td>
<td>no</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

We also would like to highlight some other projects and initiatives such as ONEGEOLOGY, Eurogeosource and Minland.

¡Error! No se encuentra el origen de la referencia. 2 shows a preliminary survey on available information and projects regarding mineral statistics in EU regarding production, exploration, trade and resources estimates. This table will be improved and analysed during the Policy Lab 5, and the final gaps identification and future pathways to establish the needs will be elaborated in Deliverable 6.2.
2.3. Unofficial EU Mineral Statistics

The British Geological Survey, through their webpage MineralsUK\(^23\) provides a link to their downloadable publication in pdf entitled “European mineral statistics. 2010-14”. This is a comprehensive 5 year compilation on statistical information about minerals and metals in Europe. It provides production, export and import tables for all EU members, EU candidates and Norway and Switzerland – a total of 36 countries. Includes more than 70 different mineral commodities from Aluminium to Zirconium, plus statistics relating to primary aggregates and cement. It is divided into 2 sections: individual country and commodity. In the same page it is possible to find the downloadable books (pdf) for the five-year period from 1994-1998 to 2009-2013. The search can be done by individual country as well as by commodity.

The United States Geological Survey (USGS) is also an important international data source\(^24\). The USGS annually publishes a country by country report entitled “Minerals Yearbook” - a very comprehensive and common format report. It is easy to compare countries using tables and it is available online in pdf format. Both BGS and USGS data represent estimates resulting from comprehensive cross-checking of various sources. Another source is the Austrian Federal Ministry for Digital, Business and Enterprise, which also elaborates a World mining data report\(^25\).

It is possible to obtain information on mineral production and trade such as gravel and sand industry, cement industry natural stones, etc. provided by industrial associations.

We have detected in the previous section, that these reports from the USGS and British Geological Surveys and the Austrian Federal Ministry of Science, Research and Economy are frequently consulted. We highlight its user-friendly layout, easy to find information and quality/reliable data. They can be consulted commodity by commodity, like tungsten, silver, gold, and commodities are not aggregated as we will see later on with official EU information sources (Eurostat, Materials Flows, etc.)

\(^{23}\) https://www.bgs.ac.uk/mineralsuk/statistics/europeanstatistics.html

\(^{24}\) https://minerals.usgs.gov/minerals/pubs/country/index.html

\(^{25}\) http://www.world-mining-data.info/
2.4. EU Official Information – mineral statistics

2.4.1. RMIS

RMIS (Raw Materials Information System) is the Commission’s reference web-based knowledge platform on non-energy, non-agricultural raw materials from primary and secondary sources. It provides an overview of the European raw materials context, its policy mandate, goal and scope. It is a tool supporting public awareness.

The JRC Raw Materials Information System has a web page\(^{26}\) with a window called “Economics and trade”. Clicking on it, there are two buttons named “Country” and “Product”. We then selected a country

\(^{26}\) http://rmis.jrc.ec.europa.eu/
and a product, but at the moment of the search (September 2017 – January 2018) the system seems to be still under construction and responds “work in progress”(Figure 18).

**Figure 18: RMIS webpage and search engine- searching by country profiles**
Figure 19: RMIS search by commodity

At the EU level, we find 2 official sources of statistical information\(^27\) (data sources): PRODCOM and EW-MFA

2.4.2. PROCOM-Eurostat

PRODCOM is the Eurostat’s production statistics database, and it provides comparable data at the national and the European level. PRODCOM reports the products that are sold on the market. These include physical data for both volumes sold and total production volumes. Data in total volumes is more comprehensive, because it includes the extracted minerals extracted by companies.

Since June 2018, the MIN-GUIDE project has had an extensive collaboration with DG GROW on the matter of EUROSTAT PRODCOM data gaps and disaggregation analysis. As a result, the first state of the art and data gap identification is included within this D6.1, whilst some recommendation and gap analysis will be included in D 6.2. Within this deliverable, we are also providing input and a case study to DR Grow PRODCOM proposal on Non Energy Raw Materials. The idea in not to solve the problem of aggregation /disaggregation in data in mineral and mining production and trading in Europe, neither is it the purpose of this work to change the current status quo, we only aim to find and try to solve some of the existing gaps in a well-tuned system. We will focus on the various existing world and national mining codes, and we will propose some guidance to improve the existing nomenclature, for example by disaggregating statistical data on CRM\(^28\), industrial minerals, aggregates, dimensional stone, etc. We will also focus on some metals that are aggregated into one data entity (such as lead, zinc and tin) from different mines and geological settings (tin).


\(^28\) Critical Raw Materials
In the MINGUIDE WP6 analysis, we focused only in two divisions of the section B “Mining and quarrying”, as these are the most interesting for the WP6 MINGUIDE objectives:

- Division 07: mining of metal ores
- Division 08: other mining and quarrying

We did not analyse the mining support services (Division 09)

We also focused only in mining (mining ores) and mining concentrates (as a result of the ore dressing process). The analysis of manufacture of chemicals, non-metallic products, basic metals, etc. is out of our scope. Metals and refined products are considered as metallurgical products.

The limit between metallurgical products and concentrates is often difficult to establish. Mining and ore dressing is located in the mine or in its very close surroundings (mining district), and the resulting final product is the concentrate, which is a rich content value product (mineral) but not the metal itself, e.g: lead (the mineral galena), tungsten (the minerals wolframite or scheelite), etc. The metal is then separated from the mineral concentrate in the metallurgical process. Metallurgical plants in Europe (like smelters) do not necessarily receive the ore from European mines or ore dressing plants, but from the rest of the world. These metallurgical plants are not often related to mining districts. In some commodities the metallurgical process is performed in the mine itself, thus the metal is obtained directly in the mine, with an added value: e.g. gold mining, copper cathodes, etc.

In the case of by-products, we consider that, if these are obtained through an ore concentration–dressing process, then it should be included statistically as a mining–concentrate product. But if it is obtained after a metallurgical process it has to be regarded separately.

Table 3 shown below, illustrates the current PRODCOM list that is under review by the EU Commission with the support of MINGUIDE WP6.
<table>
<thead>
<tr>
<th>PRODCOM</th>
<th>Description</th>
<th>Physic.unit</th>
<th>Reference to Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>NACE: 07.10</td>
<td>Mining of iron ores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPA: 07.19.10</td>
<td>Iron ores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.10.10.00</td>
<td>Iron ores and concentrates (excluding roasted iron pyrites)</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>NACE: 07.29</td>
<td>Mining of other non-ferrous metals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPA: 07.29.11</td>
<td>Copper ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.29.11.00</td>
<td>Copper ores and concentrates</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>CPA: 07.29.12</td>
<td>Nickel ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.29.12.00</td>
<td>Nickel ores and concentrates</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>CPA: 07.29.13</td>
<td>Aluminium ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.29.13.00</td>
<td>Aluminium ores and concentrates</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>CPA: 07.29.14</td>
<td>Precious metal ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.29.14.00</td>
<td>Precious metal ores and concentrates</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>CPA: 07.29.15</td>
<td>Lead, zinc and tin ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.29.15.00</td>
<td>Lead, zinc and tin ores and concentrates</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>CPA: 07.29.19</td>
<td>Other non-ferrous metal ores and concentrates n.e.c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.29.19.00</td>
<td>Other non-ferrous metal ores and concentrates n.e.c.</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>NACE: 08.11</td>
<td>Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPA: 08.11.11</td>
<td>Marble and other calcareous ornamental or building stone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.11.11.33</td>
<td>Marble and travertine, crude or roughly trimmed</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>08.11.11.35</td>
<td>Marble and travertine merely cut into rectangular or square blocks or slabs</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>08.11.11.50</td>
<td>Limestone and other calcareous ornamental or building stone of an apparent specific gravity &gt; 2.5</td>
<td>kg</td>
<td>I</td>
</tr>
<tr>
<td>CPA: 08.11.12</td>
<td>Granite, sandstone and other ornamental or building stone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.11.12.33</td>
<td>Granite, crude or roughly trimmed</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>08.11.12.35</td>
<td>Granite merely cut into rectangular (including square) blocks or slabs</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>08.11.12.20</td>
<td>Sandstone</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>08.11.12.90</td>
<td>Porphyry, basalt, quartzites and other ornamental or building stone, crude, roughly trimmed or merely cut (excluding calcareous ornamental or building stone of a gravity &lt; 2.5, granite and sandstone)</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>CPA: 08.11.20</td>
<td>Limestone and gypsum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROD</td>
<td>Description</td>
<td>Physical unit</td>
<td>P</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------</td>
<td>---</td>
</tr>
<tr>
<td>08.11.20.30</td>
<td>Gypsum and anhydrite</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>08.11.22.30</td>
<td>Limestone flux, limestone and other calcareous stone used for the manufacture of lime or cement (excluding crushed limestone aggregate and calcareous dimension stone)</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>CPA: 08.11.30</td>
<td>Chalk and uncalcined dolomite</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>08.11.30.10</td>
<td>Chalk</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>08.11.30.30</td>
<td>Dolomite, crude, roughly trimmed or merely cut into rectangular or square blocks or slabs excluding calcined or sintered dolomites, agglomerated dolomite and broken or crushed dolomite for concrete aggregates, road metalling or railway or other ballast</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>CPA: 08.11.40</td>
<td>Slate</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>08.11.40.60</td>
<td>Slate, crude, roughly trimmed or merely cut into rectangular or square blocks or slabs</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>NAGE: 06.12</td>
<td>Operation of gravel and sand pits; mining of clays and kaolin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPA: 08.12.11</td>
<td>Natural sands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.12.11.30</td>
<td>Silica sands (quartz sands or industrial sands)</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>08.12.11.50</td>
<td>Construction sands such as clayey sands; kaolinitic sands; felsic acid sands (excluding silica sands, metal bearing sands)</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>CPA: 08.12.12</td>
<td>Gravels, chippings and powders; pebbles, gravel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.12.12.10</td>
<td>Gravels and pebbles of a kind used for concrete aggregates, for road metalling or for railway or other ballast, shingle and flint</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>08.12.12.20</td>
<td>Crushed stone of a kind used for concrete aggregates, for road metalling or for railway or other ballast (excluding gravel, pebbles, shingle and flint)</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>08.12.12.50</td>
<td>Gravels, chippings and powders of marble</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>08.12.12.60</td>
<td>Gravels, chippings and powders of travertine, marl, marble, limestone and other monumental stone</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>CPA: 08.12.13</td>
<td>Mixtures of slag and similar industrial waste products, whether or not incorporating pebbles, gravel, shingle and flint for construction use</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>08.12.13.60</td>
<td>Mixtures of slag and similar industrial waste products, whether or not incorporating pebbles, gravel, shingle and flint for construction use</td>
<td>kg</td>
<td>S</td>
</tr>
<tr>
<td>CPA: 08.12.21</td>
<td>Kaolin and other kaolinitic clays</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>08.12.21.40 *</td>
<td>* Kaolin, not calcined</td>
<td>kg</td>
<td>T</td>
</tr>
<tr>
<td>08.12.21.60</td>
<td>Kaolinitic clays (ball and plastic clays)</td>
<td>kg</td>
<td>T</td>
</tr>
</tbody>
</table>

* - Modified heading of the List 2010
<table>
<thead>
<tr>
<th>MINATURE:</th>
<th>Description</th>
<th>Physical unit</th>
<th>P</th>
<th>Reference to Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPA: 08.12.22</td>
<td>Other clays, andalusite, kyanite and sillimanite, mullite, chamotte or dinas earths</td>
<td>kg</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>08.12.22.10</td>
<td>Bentonite</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.12.22.30</td>
<td>Fireclay</td>
<td>kg</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>08.12.22.50</td>
<td>Common clays and shales for construction use (excluding bentonite, fireclay, expanded clays, sodic and kaolinitic clays); andalusite, kyanite and sillimanite; mullite; chamotte or dinas earths</td>
<td>kg</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>NAGE: 08.91</td>
<td>Mining or chemical and fertiliser minerals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPA: 08.91.11</td>
<td>Natural calcium or aluminium calcium phosphates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.91.11.00</td>
<td>Natural calcium phosphates; natural aluminium calcium phosphates and phosphorite chalk</td>
<td>kg</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>CPA: 08.91.12</td>
<td>Unroasted iron pyrites; crude or unrefined sulphur</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.91.12.00</td>
<td>Unroasted iron pyrites; crude or unrefined sulphur (including recovered sulphur)</td>
<td>kg</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>CPA: 08.91.19</td>
<td>Other chemical and fertiliser minerals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.91.19.00</td>
<td>Other chemical and fertiliser minerals</td>
<td>kg</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>NAGE: 08.93</td>
<td>Extraction of salt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPA: 08.93.10</td>
<td>Salt and pure sodium chloride; sea water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.93.10.00</td>
<td>Salt (including desalted salt but excluding salt suitable for human consumption) and pure sodium chloride, whether or not in aqueous solution or containing added anti-caking or free-flowing agent.</td>
<td>kg</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>NAGE: 08.99</td>
<td>Other mining and quarrying n.e.c.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPA: 08.99.10</td>
<td>Bitumen and asphalt, natural asphalt and asphalitic rock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.99.10.00</td>
<td>Natural bitumen and natural asphalt asphalites and asphalitic rocks</td>
<td>kg</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>CPA: 08.99.21</td>
<td>Precious and semi-precious stones (excluding industrial diamonds), unworked or simply sawn or roughly shaped</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.99.21.00</td>
<td>Precious and semi-precious stones (excluding industrial diamonds), unworked or simply sawn or roughly shaped</td>
<td>c/k</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>CPA: 08.99.22</td>
<td>Industrial diamonds, unworked or simply sawn, cleaved or crushed, pumice stone, emery; natural corundum, natural garnet and other natural abrasives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.99.22.00</td>
<td>Industrial diamonds, unworked or simply sawn, cleaved or crushed, pumice stone, emery; natural corundum, natural garnet and other natural abrasives</td>
<td>kg</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>CPA: 08.99.29</td>
<td>Other minerals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.99.29.00</td>
<td>Other minerals</td>
<td>kg</td>
<td>T</td>
<td></td>
</tr>
</tbody>
</table>

* = Not included in the list 2016
Table 3: Draft PRODCOM list 2017

PRODCOM – statistics by Product. These provide statistics on the production of manufactured goods. The term comes from the French "PRODuction COMmunautaire" (Community Production) for mining, quarrying and manufacturing; sections B and C of the Statistical Classification of Economy Activity in the European Union (NACE 2).

The Statistical classification of economic activities in the European Community, abbreviated as NACE, is the classification of economic activities in the European Union (EU); the term NACE is derived from the French Nomenclature statistique des activités économiques dans la Communauté européenne. Various NACE versions have been developed since 1970. NACE is a four-digit classification providing the framework for collecting and presenting a large range of statistical data according to economic activity in the fields of economic statistics (e.g. production, employment and national accounts) and in other statistical domains developed within the European statistical system (ESS). NACE Rev. 2, a revised

http://ec.europa.eu/eurostat/web/prodcom/data/excel-files-nace-rev.2

Figure 20: Example of a downloadable excel file with Prodcom-Eurostat statistics and search for commodity

PRODCOM – statistics by Product. These provide statistics on the production of manufactured goods. The term comes from the French "PRODuction COMmunautaire" (Community Production) for mining, quarrying and manufacturing; sections B and C of the Statistical Classification of Economy Activity in the European Union (NACE 2).

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http://ec.europa.eu/eurostat/web/prodcom/data/excel-files-nace-rev.2


http://ec.europa.eu/eurostat/web/prodcom
classification, was adopted at the end of 2006 and, in 2007, its implementation began. The first reference year for NACE Rev. 2 compatible statistics is 2008, after which NACE Rev. 2 will be consistently applied to all relevant statistical domains.\(^{32}\)

Within this deliverable we will focus on the Prodcom list\(^{33}\) (Table 3) which includes a table for minerals data from NACE: 07.10 (Mining of iron ores) to NACE: 09.99 (Other mining and quarrying). Normally each mining commodity has three levels of detail:

- Level 1: NACE 07.29 Mining of other non-ferrous metal ores
- Level 2: CPA: 07.29.11 Copper ores and concentrates
- Level 3: 07.29.11.00 Copper ores and concentrates

2.4.3. RAMON

On the other hand, the database RAMON – Reference and Management of Nomenclatures (included in Eurostat), has a metadata base of combined Nomenclatures (2016) that describes the commodities with a different coding system than the one used by PRODCOM. For example, in Section V for Mineral Products\(^ {34}\) the code 2601, which is dedicated to iron ores and concentrates, also includes roasted iron and pyrites, whilst the former PRODCOM code 07.10.10.00 for iron ores and concentrates, explicitly excludes roasted iron pyrites.

2.4.4. Prodcom vs Combined Nomenclature

We should be aware that the PRODCOM list and the Combined Nomenclature have different purposes:

- **PRODCOM:** “PRODCOM is the title of the EU production statistics for Mining, Quarrying and Manufacturing, and belongs to the Sections B and C of the Statistical Classification of Economic Activities in the European Community (NACE Rev. 2).”

- **Combined Nomenclature:** “The Combined Nomenclature is the goods classification used within the EU for the purposes of foreign trade statistics. It is also used by Directorate General "Taxation and Customs Union" of the European Commission for customs duty purposes.”

- With regards to terminology, RAMON is a server providing access only to nomenclatures (and not to raw data), but is not a nomenclature itself. The comparison made within this deliverable is, thus, not between PRODCOM and RAMON, but between the PRODCOM List (2016) and the Combined Nomenclature (2016).


The PRODCOM list groups several commodities (e.g. precious metal ores and concentrates under the code 07.29.14.00 and lead, zinc and tin ores and concentrates under the code 07.29.15.00). For these and other commodities, the RAMON Nomenclature separates subcategories. In the case of the first example cited (precious metal ores-07.29.14.00) RAMON indicates only two substances: “silver” and “other”. In the second case (lead, zinc and tin ores and concentrates 07.29.15.00) RAMON distinguishes lead, zinc and tin (codes 26077, 2608, 2609 respectively). We do not fully describe all the commodities in the various systems, but just these few, to highlight that the RAMON list is more comprehensive.

The following bullets indicate where production data can be found in NACE (PRODCOM):

- NACE 07.10 – Mining of iron ores
- NACE 07-20 – Mining of other non – ferrous metal ores
- NACE 08.11 – Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate
- NACE 08.12 – Operation of gravel and sand pits; mining od clays and kaolin
- NACE 08.91 – Mining of chemical and fertilizer minerals
- NACE 08.93 – Extraction of salt
- NACE 08.99 – Other mining and quarrying n.e.c

The main constraints of the PRODCOM data are the following:

1. The level of aggregation
2. Some relevant raw materials such as the CRM, industrial minerals and ornamental stone, are not considered, although some EU countries are world class producers of them.
3. Data are not aligned with the trade statistics and economy–wide Material Flow Accounts (EW-MFA)
4. Data can be displayed as metallic raw ore (mining production) and as concentrates (ore dressing-production)

2.4.5. Economy Wide Material Flow Accounts EW-MFA

Economy-wide material flow accounts (EW-MFA) provide an aggregated overview, in thousand tonnes per year, of the material flows in and out of an economy. EW-MFA cover solid, gaseous, and liquid materials, except for bulk flows of water and air. The general purpose of EW-MFA is to describe the interaction of the domestic economy with the natural environment and the rest of the world economy in terms of flows of materials (excluding water and air)\(^ {35} \).

The Economy Wide Material Flow Accounts (EW-MFA) refer to two types of material flows:

(1) Material flows between the national economy and its natural environment. This consists of the extraction of materials (i.e. raw, crude or virgin) from and the discharge of materials (often called residuals) to the natural environment;

\(^{35}\) Extracted textually from: http://ec.europa.eu/eurostat/web/environment/material-flows-and-resource-productivity
(2) Material flows between the national economy and the rest of the world economy. This encompasses imports and exports. Imports and exports refer to the volume of manufactured goods only, not to the volume of raw materials extracted for the production of these goods: “This means that the national economy is considered entirety in EW-MFA but inter-industry deliveries of products are not described.” (Regulation 691/2011, p. 12).

The Eurostat database offers various options for downloading data (XLS, TSV, etc. see figure below), and depending on the purpose of use, different extraction methods are better suited.
Figure 21: EW-MFA search tool\textsuperscript{36}

![EW-MFA search tool](http://ec.europa.eu/eurostat/web/environment/material-flows-and-resource-productivity/database)

Figure 22: Gold domestic extraction.

2.5. Case study 1. How and where to find information on EU mineral and mining statistics

In this part we highlight the difficulty of accessing official data and their interpretation. It is complicated to study many commodities due to the fact that the data from several commodities are aggregated in the official sources. For example, due to this aggregation of commodities, it is almost impossible to analyse CRM statistics at European level. To visualize this, we have prepared an example in order to see the different data sources, compared them, and also highlighted the possible gaps.

We have selected two EU MS countries (Spain and Greece) with important mining activities (both quarrying and metal mining). Then we have searched for all the available data on mineral statistics: production, exploration, trade and resources, from official EU level data, National data and unofficial sites (we have not included EU research projects), and from two different years: 2012 and 2016 (to check if the information is or not regularly updated).

The commodities chosen for the exercise were:

- Gold
- Lead
- **Tungsten (is a CRM)**
- Salt (NaCl)
- Potassium chloride- sylvite and carnalite (KCl)
- **Fluorspar (is a CRM)**
- Granite

We chose gold to highlight a metal that is aggregated together with silver in PRODCOM statistics. Lead is exploited in some EU Countries and is also aggregated in the EU statistics with other metals such as tin, with a complete different metallogenic origin. This aggregation does not match mining or geological settings as there are no tin mines with lead production and vice-versa. Tungsten and Fluorspar are Critical Raw Materials (CRM) in the EU, with relevant EU production. Some EU countries such as Spain, France, Austria, Germany or Poland are major producers or have important resources of salt (Halite (NaCl) and Sylvite (KCl)). We also chose granite as a relevant building and dimensional stone as the EU is the major global producer.

The aim of the exercise is to compare data at EU level and at National level and check if the data are or not aggregated.

The search for databases has been accomplished between 10/10/2017 and 18/10/2017

- EW-MFA Material flow accounts
- National, official statistics
- Other sources
The following Table 4 helps to visualise and highlight the difficulties in the search for mineral statistics, using only two countries and seven commodities.
<table>
<thead>
<tr>
<th>Commodity (mineral production)</th>
<th>Type of mineral</th>
<th>PRODCOM code</th>
<th>Description</th>
<th>Year</th>
<th>EU official Statistics</th>
<th>EW-MFA Material Flow Accounts</th>
<th>National Official statistics*</th>
<th>Other statistics (non official)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2012</td>
<td>C (confidential)</td>
<td></td>
<td>5139643 kg sold volume</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>496011 kg</td>
<td>4033146 t (Chemical and fertilizing mineral)</td>
<td>612000 t (K2O content)</td>
<td>436000 t (K2O content)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2016</td>
<td>281654 kg</td>
<td></td>
<td>107000 t</td>
<td>128090 t</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2012</td>
<td>-</td>
<td></td>
<td>10714000 t</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2016</td>
<td>-</td>
<td></td>
<td>12500000 t</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2016</td>
<td>-</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2012</td>
<td>-</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2016</td>
<td>-</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2016</td>
<td>-</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 4: Production in tons (other units indicated)

37 http://ec.europa.eu/eurostat/web/prodcom/data/excel-files-nace_rev_2
39 We could find official Greek statistics in English, only in Greek/Cyrillic. We used USGS statistics and also compare with Spanish USGS ones.
40 MF229 Other non ferrous metals (aggregated)
41 Salt is divided into 3 categories: mineral salt, springs and marine: 2786 + 101+1222 (thousand tons)
42 2 categories of salt
43 Other chemical and fertilizer minerals 08911900. Not disaggregated, include many more substances
44 Not disaggregated, can also be under 08911900.
45 Fluorspar is divided into 3 categories: acid, metallurgical and ceramics: 98+2+7 (thousand tons)
46 Also 3 categories of fluorspar CaF2 content
47 Two categories for granite: ornamental (682 thousand tons) and other used (10032 thousand tons). In this last category probably is included crushed granites for aggregated and ballast.
48 Only ornamental
The above analysis gives the following results:

**PRODCOM**

Using PRODCOM codes it is not easy to find a commodity in the tables: first it is necessary to go to the legend list and match the code with the mineral or commodity, then surf each of the codes. Additionally:

- Gold is not disaggregated in PRODCOM, so it is not possible to find the gold production. The code is 07291 Precious metal ores and concentrates.
- There is no specific category for lead. Lead is aggregated in 07291500 Lead, Zinc and tin, ores and concentrates. It is important to highlight that the term "metal ore" refers to a raw mining production data, whilst the term concentrates refers to the result of mineral processing concentration process- Therefore, these are not equivalent and should not be added.
- Tungsten which is a CRM is under 07291900 "Other non-ferrous metal ores and concentrates”
- Salt has its own category under PRODCOM 08931000 Salt (including denatured salt but excluding salt suitable for human consumption) and pure sodium chloride, whether or not in aqueous solution or containing added anti-caking or free-flowing agents
- Carnalite and sylvite: Spain is a major producer with underground mines. We have not found a specific category for these minerals. We assume that they are to be found under 08911900 “other chemical and fertilizing minerals”.
- Fluorspar has no category and is a CRM with relevant EU production.
- Granite is recorded under the category: 08111233 “Granite, crude or roughly trimmed, the quantity is abnormally low. There is another category 08111236 granite merely cut into rectangular block or slabs with no production for Spain and Greece, which is seems strange, because both countries are producers (see statistical sources in Appendix 2).

**MATERIAL FLOW ACCOUNTS**

The drawbacks of this statistics are:

- Gold is not disaggregated, but put together with Gold, silver, platinum and other precious metals (code MF226).
- Lead is disaggregated in the MFA (which is not the case in Prodcom): code MF223
- There is no specific code for tungsten under Other non ferrous metals MF229
- There is no specific code for potassium chloride, KCl sylvite and carnalite and fluorspar. We assume that they are to be found under Chemical and fertilizing mineral Code MF34.
- Granite is not available as a separate data item, but aggregated into MF31: Marble, granite, sandstone, porphyry, basalt, other ornamental or building stone (excluding slate). These commodities are completely different and have no coherent geological nor similar processing or export practices etc.
3. Part 3: Resources reporting systems - Standards and resource classifications in the EU and EU MS countries

3.1. Definition of Reporting Systems

One of the challenges that the mining industry faces globally is creating systems for sharing geological knowledge and mining resources classification and reporting.

There are two main families of reporting systems:

- Economic/Industrial oriented systems: The CRIRSCO family
- Economic and social oriented systems: The United Nations Framework Classification

In parallel to the European initiatives for a minerals knowledge base (ProMine, Minerals4EU) and all those previously analysed) international bodies based in Europe such as the UNECE (United Nations Economic Commission for Europe), have been developing the UNFC-2009. The European Union has promoted the use of this classification by the European funded project EuroGeosource to harmonise data concerning energy and mineral resources. As stated by Esteban Pérez (2016), it is fundamental not to confuse the UNFC classification system with the PERC, as the latter is thought to generate reports (Reporting Code) oriented to the economical assessment of mineral deposits used in mining viability projects and in the stock markets reporting for listed companies.

The CRIRSCO template reporting as well as the PERC code allow data on mineral resources and exploration projects to be understood and compared by investors. UNFC is different from other resource classifications and management tools, and it is responsive to requirements of the 2030 Agenda for Sustainable Development (Griffiths 2017). UNFC is focused on data and common understanding language in a holistic approach, not just data on resources. There is an increasing application of the UNFC codes. UNFC puts emphasis on social and environmental considerations (the Y axis of the ¡Error! No se encuentra el origen de la referencia. indicates “Socio-economic viability”) and is not only focused on the economic feasibility and ore estimation (reserves/resources) as the CRIRSCO-PERC family do.

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The interpretation of terms such as “resources” and “reserves” for instance is not yet harmonised and may not be directly comparable across countries (see Minventory⁵²). There are though some sources of information, which are summarized below.

MINVENTORY is an EU portal that contains a directory of information provided by the relevant organisations in each state. The Minventory metadata portal is a directory of statistical data holders, the characteristics of the data they hold and – where possible – links to where the data may more easily be located. It covers the EU28 and a number of neighbouring countries. ⁵³ Figure 23 provides a simple overview of which stocks and flows are included in MINVENTORY web portal.

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Figures:

Figure 23: MINVENTORY flow chart (source: https://ec.europa.eu/jrc/en/scientific-tool/minventory)

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MIN-GUIDE – D6.1 Standardisation and systematization of EU MS minerals data: taking stock
3.2. International standards


The United Nations Framework Classification for Resources (UNFC) provides countries, companies, financial institutions and other stakeholders a tool for sustainable development of energy and mineral resource endowments. UNFC applies to energy resources including oil and gas; renewable energy; nuclear fuel resources; mineral resources; injection projects for the geological storage of CO₂; and the anthropogenic resources such as secondary resources recycled from residues and wastes.¹⁴

This classification is promoted by the United Nations Economic Commission for Europe (UNECE). This classification is different from other systems around the world as they are used for inventory of resources of general interest. UNFC should not be confused with mining investment standards such as PERC or CRISCO, which are not oriented only to mining exploration companies, investors and stock markets but to the public in general. UNFC looks for a common understanding and a holistic-integrated approach. It includes not just data on resources but also the social licensing. The Expert

Group on Resource Classification\textsuperscript{55} (formerly known as the Ad Hoc Group of Experts on Harmonization of Fossil Energy and Mineral Resources Terminology) is responsible for the promotion and further development of the \textit{United Nations Framework Classification for Resources (UNFC)}. 

![Graph showing the United Nations Framework Classification for Resources (UNFC) hierarchy.](https://www.unece.org/energy/se/unfc_gen.html)

**Figure 25**: UNFC (source: https://www.unece.org/energy/se/unfc_gen.html)

### 3.2.2. CRISCO

The Committee for Mineral Reserves International Reporting Standards (www.crirsco.com) is an international standard to promote best practices in the international reporting of Mineral Exploration Results (see: Roger Dixon: An overview of the CRIRSCO International Reporting and its relationship with UNFC 2009). The aim of CRIRSCO (Committee for Mineral Reserves International Reporting Standards) is to contribute to gaining and maintaining the users trust, by promoting high standards of reporting of mineral deposit estimates (Mineral Resources and Mineral Reserves) and of exploration progress (Exploration Results)\textsuperscript{56}.

The International Reporting Template (IRT) is a document that draws on the best of the CRIRSCO-style reporting standards, such as the JORC Code (Australasia), SAMREC Code (South Africa), PERC Reporting

\textsuperscript{55} https://www.unece.org/energy/se/egrc.html

\textsuperscript{56} http://www.crirsco.com/welcome.asp
Standard (Europe), CIM Guidelines (Canada), SME Guide (USA) and Certification Code (Chile). These reporting standards are recognised and adopted worldwide for market-related reporting and financial investment. The IRT is not a reporting code per se, and will not supersede the existing national reporting standards, it is rather a guideline for the content of these standards.57.

3.3. National standards

The following National Reporting Standards are in accordance with the principles of the CRIRSCO Template and can be found in the CRSICO web page:

- **Australasia**: The JORC Code (2012)
- **Brazil**: The CBBR Guide for Reporting Exploration Results, Mineral Resources, and Mineral Reserves
- **Canada**: The CIM Definition Standards for Mineral Resources and Reserves (2014)
- **Chile**: Certification Code for Exploration Prospects, Mineral Resources and Ore Reserves (2004)
- **Kazakhstan**: Code for the Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves
- **Mongolia**: Code for the Public Reporting of Exploration Results, Mineral Resources and Mineral Reserves (The MRC Code) 2014
- **United States of America**: The SME Guide for Reporting Exploration Results, Mineral Resources and Mineral Reserves (2014)

57 http://www.crirsco.com/template.asp
Figure 26: National standards in accordance with the CRIRSCO template (source [www.crirsco.com](http://www.crirsco.com))
4. Discussion: Preliminary gap survey

4.1. General remarks

WP6 has identified the data coverage gaps on the available mineral statistical sources in the EU and is conducting a summary of the required developments in the field of mineral intelligence capacity.

The gaps have been identified within this deliverable. However, the recommendations -that are just highlighted here- will be analysed in the next deliverable (June 2018) and after the Policy Lab 5 Workshop.

The Policy Lab 5 will be held in Madrid from 23 to 24 May 2018, and will cover the analysis of some relevant gaps identified in this deliverable and will co-develop the recommendations and conclusions for the Deliverable 6.2 “Standardization and systematization of EU MS minerals data: Exploring future pathways”

First, we have analysed by topics and results (hierarchy) the achievements of each project and type of results (maps, webs and inventories). Then we have selected some of the most relevant projects and official data source for mineral statistics. W have identify the low usability and lack of user friendly features of the official sources, which in turn means that there is more interest by researchers and other stakeholders in the use of non-official yearbooks and sources.

We have identified 66 projects relating to mineral raw materials but very few related to mineral statistics (only 12%). We want to highlight that reliable statistical data and easy to find information is crucial for policy makers. We also would like to highlight the observed lack of investment in projects related to public awareness on mining and the use of minerals. Social license is closely related to the knowledge of resources use and, thus, it is key for the EU Raw Materials initiative to have well-informed citizens. Only one EU funded project (Suscritmat) has been identified addressing this issue as well and another two initiatives: RM@School from EIT and EU Minerals Day.

We have also acknowledged that the most extended graphics and maps related to mining and mineral resources in Europe (see Figure 1 and Figure 2) only refer to metallic ores. Figure 1 will look very different if we include the production of industrial minerals, aggregates and dimensional stones. It would be advisable that such figures include the resources and the production of dimensional stones, industrial and chemical minerals. These added inputs will give a more realistic image of the mining industry in Europe and its minerals and rock resources. It is very common to hear about the “little global relevance of the mining sector in Europe” but this is only true if we consider the metallic mining as well as the gradual decrease of the formerly powerful coal mining. Europe is a relevant and even a major global producer of many mineral commodities such as granite, marble, limestone, sepiolite, potash salts, - fluorspar, etc. and has very relevant resources of barite, tungsten, cobalt, etc. It is thus the MINGUIDE project’s obligation to highlight such resources and show these facts to the authorities and policy makers not specialized in mineral resources.
4.2. Gaps and improvements in mineral statistics database and compilations

4.2.1. General overview

It is somewhat confusing that there are several official (Eurostat-EW MFA), and other non-official sources (yearbooks). In general Eurostat-EW MFA are aggregated statistics and they are not so useful for policy makers for their analysis of commodities such as gold, silver, lead, etc., and they do not include the CRMs.

CRMs grew in importance during the last few years and have been a specific object of analysis of the European Commission. Unofficial data such as the USGS database are disaggregated by commodity and are more in line with highly detailed national data such as those in Spain (mineral statistic “Estadistica Minera”).

These national sources are consulted by 21% of our questionnaire respondents, whilst the EU official sites are only consulted by 7% (see Figure 5). This points out the fact that EU official sources are currently randomly used, thus resulting in a low incidence in national policies design of the EU economic efforts to provide statistical and data knowledge to national authorities and other stakeholders.

On the other hand, EU funded projects provide additional statistical information such as mineral reserves, something that cannot be generally found in official and unofficial statistics, this being one of its main added values (i.e. Minerals4EU).

It is relevant to highlight that experts do not use too much the official EU information sources (see Figure 4 and Figure 5).

A solution could be to interweave and interact all EU projects, official statistics and unofficial compilations and centralize all of them in a single official portal of the European Commission such as the RMIS portal.

In addition, we must mention that today it is difficult to obtain some relevant information using the current data formats. For example, to answer the question How many metal mines are currently operating in Europe? can be extremely difficult to respond, however, this information is very relevant for a mining policy maker. How many of this mines are underground and how many open pit? This does not seem an easy or immediate question to answer.

In the PRODCOM list it could be useful to disaggregate some commodities. We think that the existing format is adequate – including ores and concentrates, because both are obtained in the mining site-


59 http://www.minetad.gob.es/energia/mineria/Estadistica/Paginas/Consulta.aspx

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plant and ore dressing facilities. The metallurgical process, however, is different, often located out of the mine site and can have concentrates from all over the world.

The new proposal of PRODCOM statistics (common effort of DG Grow with the MIN-GUIDE project) is a more disaggregated list of existing PRODCOM categories (ie. Disaggregated commodities) according to the more detailed RAMON methodology.\(^{60}\)

Aggregates are one of the most important mining activities in the EU and is included in the PRODCOM list. It is important not to separate mining of ores figures from aggregates and industrial minerals data and production, because by adding ores and other mining products we will show a more realistic figure than the “classical mining graphs of Figure 1 and Figure 2.

Some observations could be included in future studies and could clarify some misunderstanding regarding the interpretation of geological terms and commodities. One good example is “slate” that is a term that applies to a metamorphic rock originated from low-grade metamorphism in mudstones. Under the term of slates in dimensional stones sometimes are included rocks that strictly are not slates, such as some schists, and lutites. This is because some of this rocks show a foliation also called “slaty cleavage”. We consider an improvement to these classifications to indicate under the term slates which metamorphic rocks will be included. It would be reasonable to include the prescriptions of CEN/TC 246 EN 12670 Natural Stone Terminology. PRODCOM list refers to slate under the item CPA: 08.11.40. The same applied to gneiss and other common rocks used by the European dimensional stone industry, that could be clearly identify.

It is important to disaggregate the list in order to obtain information from different products and commodities. It will be also very useful if we can distinguish among them, which ones are considered critical raw materials.\(^{61}\) With disaggregated data it is possible to obtain real production statistics of all relevant commodities, including the Critical Raw Materials.

In many countries, as in the case of Spain, national reports produce statistical data substance by substance and later on- when send to the EU level they are "aggregated" for EU-Eurostat statistics and therefore information is lost. Later those aggregated commodities are very difficult (almost impossible) to track.

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We would like to highlight that the graph in Figure 27 shows some confusing information, mixing names of elements such as Lithium, Vanadium, Silver, with minerals like bauxite (to be coherent it should said aluminium or aluminium ore, feldspar, kaolin, etc.). Aluminium is also indicated in the lower right angle of the graph (which makes it more confusing). But we strongly recommend a breakdown - disaggregated data source by:

- Precious metals
- Basic metals
- CRM
- Some industrial / chemical minerals/rocks
- Dimensional stones

The Raw Material Initiative itself when published stated that all raw materials, even when the critical issue was not yet at stake, are important for the EU economy. We again highlight that a category

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code should be created for each of the CRM with actual production in Europe and include them explicitly into the new version of the PRODCOM list. As a reminder the current EU CRM\(^{63}\) are:

1. Antimony
2. Beryllium
3. Borates
4. Chromium
5. Cobalt
6. Coking coal
7. Fluorspar (Fluorite)
8. Gallium
9. Germanium
10. Indium
11. Magnesite
12. Magnesium
13. Natural graphite
14. Niobium
15. Phosphate rock
16. Platinum Group Metals
17. Heavy Rare Earth Elements
18. Light Rare Earth Elements
19. Silicon metal (silica)
20. Tungsten (Wolfram)

\(^{63}\) The criticality assessment was carried out in 2013. 20 raw materials were identified as critical from the list of 54 candidate materials. The extended list of CRMs includes 7 new abiotic materials and 3 biotic materials. In addition, greater detail is provided for rare earth elements by splitting them into heavy rare earth elements, light rare earth elements, and scandium. This 2013 list includes 13 of the 14 materials identified in the previous report, with only tantalum being removed from the EU critical material list. Six new materials enter the list: borates, chromium, coking coal, magnesite, phosphate rock, and silicon metal. Three of these are entirely new to the assessment. None of the biotic materials assessed were classified as critical.
### 4.2.2. PRODCOM new codes – sub codes Proposal

In the following tables we show next to the existing codes the modifications and disaggregated codes that are recommended based on the analysis made.

<table>
<thead>
<tr>
<th>Existing code</th>
<th>Prodcom code</th>
<th>Description</th>
<th>New code proposal 2018</th>
<th>Description</th>
<th>Observations and justifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPA: 07-10-10</td>
<td>Iron ores</td>
<td>Iron ores</td>
<td>07.10.10.00</td>
<td>Iron ores and concentrates (excluding roasted iron pyrites)</td>
<td>No modifications</td>
</tr>
</tbody>
</table>

**Figure 28: NACE 07.10 Mining of iron ores**

<table>
<thead>
<tr>
<th>Existing code</th>
<th>Prodcom code</th>
<th>Description</th>
<th>New code proposal 2018</th>
<th>Description</th>
<th>Observations and justifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPA: 07.29.11</td>
<td>Copper ores and concentrates</td>
<td>07.29.11.00</td>
<td>Copper ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPA: 07.29.12</td>
<td>Nickel ores and concentrates</td>
<td>07.29.12.00</td>
<td>Nickel ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPA: 07.29.13</td>
<td>Aluminium ores and concentrates</td>
<td>07.29.13.00</td>
<td>Aluminium ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPA: 07.29.14</td>
<td>Precious metal ores and concentrates</td>
<td>07.29.14.00</td>
<td>Precious metal ores and concentrates</td>
<td>CPA:07.29.14 New sub codes</td>
<td>CPA:07.29.14 New sub codes</td>
</tr>
<tr>
<td>07.29.14.00</td>
<td>Precious metal ores and concentrates</td>
<td>07.29.14.**</td>
<td>Silver ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.29.14.**</td>
<td>Gold ores and concentrates</td>
<td></td>
<td>Gold ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.29.14.**</td>
<td>Other precious metal ores and concentrates</td>
<td></td>
<td>Other precious metal ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPA: 07.29.15</td>
<td>Lead, zinc and tin ores and concentrates</td>
<td>07.29.15.00</td>
<td>Lead, zinc and tin ores and concentrates</td>
<td>CPA:07.29.15 New sub codes</td>
<td>CPA:07.29.15 New sub codes</td>
</tr>
<tr>
<td>07.29.15.**</td>
<td>Lead ores and concentrates</td>
<td></td>
<td>Lead ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.29.15.**</td>
<td>Zinc ores and concentrates</td>
<td></td>
<td>Zinc ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.29.15.**</td>
<td>Tin concentrates and concentrates</td>
<td></td>
<td>Tin concentrates and concentrates</td>
<td></td>
<td>Complete different metallogenic deposit than lead and zinc</td>
</tr>
<tr>
<td>CPA: 07.29.19</td>
<td>Other non-ferrous metal ores and concentrates n.e.c.</td>
<td>07.29.19.00</td>
<td>Other non-ferrous metal ores and concentrates n.e.c.</td>
<td>CPA:07.29.19 New sub codes</td>
<td>CPA:07.29.19 New sub codes</td>
</tr>
<tr>
<td>07.29.19.**</td>
<td>Manganese ores and concentrates</td>
<td></td>
<td>Manganese ores and concentrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>07.29.19.**</td>
<td>Cobalt ores and concentrates</td>
<td></td>
<td>Cobalt ores and concentrates</td>
<td></td>
<td>CRM</td>
</tr>
<tr>
<td>07.29.19.**</td>
<td>Chromium ores and concentrates</td>
<td></td>
<td>Chromium ores and concentrates</td>
<td></td>
<td>Relevant mining production in Finland.</td>
</tr>
<tr>
<td>07.29.19.**</td>
<td>Tungsten ores and concentrates</td>
<td></td>
<td>Tungsten ores and concentrates</td>
<td></td>
<td>Tungsten is a CRM with EU mining production (e.g. Spain 1,2% world production in 2014, Austria and Portugal) and other mines and mineral deposits in many EU countries</td>
</tr>
</tbody>
</table>
In Figure 29 it is crucial to consider metal by products, as for example silver obtained in Pb/Zn ore processing – that is an added value of the concentrate, or the lead in Fluorspar and Gold production. Or molybdenum that is generally produced as by-product of copper mining – we consider only mining and ore-dressing (ore concentration) but not metallurgical – roasted products.

<table>
<thead>
<tr>
<th>Existing Prodcom code</th>
<th>Description</th>
<th>New code proposal 2018</th>
<th>Description</th>
<th>Observations and justifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPA: 08.11.12</td>
<td>Granite, sandstone and other ornamental or building stone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.11.12.90</td>
<td>Porphyry, basalt, quartzite and other monumental or building stones…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.11.12.**</td>
<td>Quartzite (whether or not roughly trimmed or merely cut,…)</td>
<td>08.11.12.** basalt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.11.12.**</td>
<td>Other monumental or building stone (including porphyry)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 30: NACE: 08.11. Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate

In Figure 30, we introduce very few modifications. We propose to keep the same categories in CPA 08.11.11. However, we would like to highlight some “geological mistakes”: marble and travertine are under the same category, while geologically these are 2 rocks with complete different origin, Travertine is a sedimentary calcareous rock of spring or karstic origin whilst marble is a metamorphic rock, coming from the metamorphism of limestone or dolomites. In Dimensional stone fairs, travertines are often called or included in the same category of marbles, even called wrongly marble. Although is geologically confused, we suggest to keep this concept as it is because it can confuse trading codes and market. Again, here it would be reasonable to include the prescriptions of CEN/TC 246 EN 12670 Natural Stone Terminology.
We do suggest disaggregating category 08:11:12:90 that includes porphyry, basalt and quartzite and others. These rocks are geologically found in complete different settings and places. Therefore, it does not make any sense to mix these two commodities. We propose one category for each of three and “others” (see table on Figure 30).

<table>
<thead>
<tr>
<th>Existing Prodcom code</th>
<th>Description</th>
<th>New code proposal 2018</th>
<th>Description</th>
<th>Observations and justifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPA: 08.12.22</td>
<td>Other clays, andalusite, kyanite and sillimanite; mullite; chamottes</td>
<td>08.12.22.10 Bentonite (excluding sepiolite)</td>
<td>EU produces 17.9% of world bentonite (BGS 2014)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>08.12.22.** sepiolite</td>
<td>Spain (EU as well) is the world leading producer with the biggest known deposit</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>08.12.22** Chamottes</td>
<td>Should be placed in a separate category as strictly is not a mining product</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 31: NACE: 08.12. Operation of gravel and sand pits; mining of clays and kaolin**

Figure 29

Europe is responsible for 17.9% of world’s bentonite production with relevant production in Germany, Greece and Slovakia. However, regarding Sepiolite it is important to consider that this commodity alone, for most of the world production, comes from deposits of sedimentary origin located near Madrid, Spain.

<table>
<thead>
<tr>
<th>Existing Prodcom code</th>
<th>Description</th>
<th>New code proposal 2018</th>
<th>Description</th>
<th>Observations and justifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPA: 08.91.12</td>
<td>Unroasted iron pyrites; crude or unrefined sulphur</td>
<td>08.91.12 ** Unroasted iron pyrites</td>
<td>It make sense separate a mining product like pyrites from sulphur, in EU a metallurgical product but in other EU countries can be a mining product (native sulphur)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>08.91.12** Crude or unrefined sulphur (including recovered sulphur)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPA:08.91.19</td>
<td>Other chemical and fertiliser minerals</td>
<td>This category has no disaggregated commodities. Within this CPA code it can be possible to include some very relevant minerals,</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

produced in the EU and CRM

<table>
<thead>
<tr>
<th>Description</th>
<th>Existing Prodcom code</th>
<th>New code proposal 2018</th>
<th>Observations and justifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural barium sulphate (barite)</td>
<td>08.91.19.**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural borates</td>
<td>08.91.19**</td>
<td></td>
<td>CRM. There is not EU production but Turkey is the largest world producer</td>
</tr>
<tr>
<td>Feldspar</td>
<td>08.91.19.**</td>
<td></td>
<td>In 2014 Italy was the world second producer</td>
</tr>
<tr>
<td>Fluorspar</td>
<td>08.91.19.**</td>
<td></td>
<td>Relevant production at world level in Spain, Bulgaria, United Kingdom and Germany - CRM</td>
</tr>
<tr>
<td>Talc</td>
<td>08.91.19.**</td>
<td></td>
<td>Many countries in EU producers</td>
</tr>
<tr>
<td>Others not included previously</td>
<td>08.91.19.**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 32: NACE: 08.91 Mining of chemical and fertiliser minerals

Regarding NACE 08.93 extraction of salt we recommend to add the potassium salts: sylvite and carnalite. With relevant production and resources in Europe: Germany, Austria, Poland and Spain.

<table>
<thead>
<tr>
<th>Existing Prodcom code</th>
<th>Description</th>
<th>New code proposal 2018</th>
<th>Observations and justifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPA: 08.99.21</td>
<td>Precious and semi-precious stones (excluding industrial diamonds), unworked or simply sawn or roughly shaped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.99.21.00</td>
<td>Precious and semi-precious stones (excluding industrial diamonds), unworked or simply sawn or roughly shaped</td>
<td></td>
<td>Because of its world relevance we recommend to separate diamond data from other precious stones</td>
</tr>
<tr>
<td>08.99.21.**</td>
<td>diamonds unworked or simply sawn or roughly shaped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.99.21.**</td>
<td>Precious stones other than diamonds (emeralds, sapphire, tourmalines, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.99.21.**</td>
<td>Semi-precious stones (malachites, onyx, opals, etc)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Notes</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>08.99.21.**</td>
<td>Mining and quarrying for minerals and fossils for collection and ornaments</td>
<td>Minerals and specimens for collection such as the productive Navajun mines in Spain. Kongsberg silver specimens in Norway. Trade and production of fossils such as ammonites, trilobites, belemnites, etc.</td>
<td></td>
</tr>
<tr>
<td>CPA: 08.99.22</td>
<td>Industrial diamonds, unworked..., pumice stone, emery, (…)</td>
<td>It is important to separate such different products like diamonds, other natural abrasives and pumice</td>
<td></td>
</tr>
<tr>
<td>08.99.22.**</td>
<td>Industrial diamonds</td>
<td>Only natural ones</td>
<td></td>
</tr>
<tr>
<td>08.99.22.**</td>
<td>Natural abrasives (corundum, garnet, emery, etc)</td>
<td>Only natural ones not artificial-synthetic</td>
<td></td>
</tr>
<tr>
<td>CPA:08.99.29</td>
<td>Other minerals</td>
<td>We recommend to disaggregate some minerals such as graphite which is a CRM, magnesite, etc.</td>
<td></td>
</tr>
<tr>
<td>08.99.29.**</td>
<td>Natural graphite</td>
<td>Is a CRM with EU production, Norway is the main producer in Europe but also Austria and Germany. There are minor deposits in other countries: Spain, Romania, etc.</td>
<td></td>
</tr>
<tr>
<td>08.99.29.**</td>
<td>Magnesite</td>
<td>Spain and Austria have 2% world production, respectively (BGS 2014)</td>
<td></td>
</tr>
<tr>
<td>08.99.29.**</td>
<td>Diatomite and other siliceous minerals</td>
<td>EU36 produces 19,5 of world (BGS 2014) very relevant production and deposits in Denmark, France Spain and Germany</td>
<td></td>
</tr>
<tr>
<td>08.99.29.**</td>
<td>Quartz (other than natural sands)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08.99.29.**</td>
<td>mica</td>
<td>EU is relevant world producer. France (5,9%) and Finland (BGS 2014)</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 33: NACE: 08.99 Other mining and quarrying n.e.c.**

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5. Conclusions and future steps

We believe that our survey has clearly demonstrated that it is very important to include information on volume and value of the actual EU mining industry, products such as aggregates, industrial minerals and dimensional stones, into the official EU statistical mining data (often only referring exclusively to metallic ores).

Based on the data collected, we can conclude that the mining activity in EU is slowly declining, but the figures will be less dramatic if we were to include the bulk of mineral commodities and not only the metallic ores production. We can, thus, conclude that the public image that “There are no mines in EU” is certainly wrong. The public traditionally considers mining in Europa (probably resulting from media biased opinions) is only represented by metallic and coal mines. However, the reality is that mining in EU is mainly represented by quarrying for stones, industrial minerals (sometimes in underground mines) and aggregates.

In summary:

- We do not need more statistical data, what is needed is accessible and easy to find information that can then reach society. Common citizens must find information easily available and with a simple vocabulary.
- Information and knowledge needs to be readily available in an easy and understandable way and from official sources to decision-makers and all stakeholders.
- We need more research projects and permanent databases addressing minerals and mining data and knowledge (including statistics) oriented to society at all levels, from primary schools to policy and decision making stakeholders.

MINGUIDE WP 6 is currently supporting DG Grow C.2 “Resources efficiency and raw materials” in the working group on PRODCOM statistics. This Working Group is responsible for thoroughly preparing all dossiers in the area of PRODCOM Statistics, prior to the decisions to be taken in the Business Statistics Directors Group. WP6 is thus sharing good practices with the DG Growth with the final objective of providing all interested parties with understandable information, which eventually will help to improve the social perception of mining and its actors. After analysing EUROSTAT–Prodcom codes, our proposal is to establish sub codes and, thus, we recommend a disaggregation of commodities. With this, we will improve the current situation at EU level and will have reliable official data on key mineral resources such as CRM, metallic ores, industrial and chemical minerals and dimensional stones. The building blocks of mining in the EU, with relevant production and trade in Europe. Reliable data on every commodity is crucial when doing circular economy analysis.

One of the main problems that have been detected in many of the projects analysed in WP 6 is the availability of updated information once the project is over.

65 http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=1489
Based on our research we can conclude that the information on mineral resources and its production statistics etc. is difficult to find, there are many unofficial sources and few official sources which are not updated and many times the information is aggregated.

To assure the sustainability and continuity of the information obtained from projects and the subsequent feedbacks, we recommend to use one of the current EU systems such as the Raw Materials Information System REMIS66.

It is clear that minerals and mining should be interlocked in a modern society and this in turn should be included in any EU Raw Materials Initiative. Consequently, the WP6 has brought up some clear information gaps in the field of data knowledge and statistics of raw materials that could be eventually corrected by increasing the efforts in:

• Include the formal participation of societal stakeholders in research projects. The different stakeholders surveyed by WP6 show clearly this need. This will also be achieved by increasing the number of RM EU funded research projects oriented to society outreach.
• Include in research projects user friendly information platforms, including apps for smartphones, etc. Again this is clearly underpinned by the research carried out by WP6 which shows that access to statistical and mineral intelligence is not yet well developed in the EU.
• The improvement of the access to data knowledge and statistics would also be greatly increased if all stakeholders were involved in the use and diffusion of the information by increasing the number of open doors days and workshops at EU level (i.e. EU Mineral days)

As commented above the adequate information portal could be the RMIS portal, but including all relevant EU projects, as well as links to the official databases such as Eurostat etc., in a user friendly format. However, at the moment of the investigation some parts of RMIS web were not yet implemented.

Although this could be a potential result of the MINGUIDE project, the initial results obtained from the WP6 clearly show that the EU needs a longer term strategy such as the development of an European Mining Agency.

It is not the role of this deliverable to enter in detail of this proposal, but such institution would take care of the control and supervision of the EU mining legislation and policy framework as well as of the EU mineral Intelligence. In a similar way as other EU agencies such as the European Environmental Agency, the European Chemicals Agency or the Europe. IMedicines Agency.

Decentralised EU agencies play an important role in the EU. They help make Europe more competitive and a better place to live and work, thus serving the interest of EU residents as a whole.

66 The European Commission’s (EC) Raw Materials Information System (RMIS) is being developed by the Joint Research Centre (JRC) in cooperation with the DG for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW). The RMIS is the Commission’s reference web-based knowledge platform on non-fuel, non-agricultural raw materials from primary and secondary sources http://rmis.jrc.ec.europa.eu/
6. Appendix 1: relevant EU projects – mineral Raw Materials
<table>
<thead>
<tr>
<th>Acronym</th>
<th>ID</th>
<th>Project ID</th>
<th>Leader</th>
<th>Type of results: database, map, report, other</th>
<th>Related to MINGUIE and topic relevance</th>
<th>Relates to MINGUIE value chain relevance</th>
<th>Other topics</th>
<th>Type of request: micro and macro, research, training, dissemination, coordination, networking, management, policy, legislation, etc.</th>
<th>Total cost €</th>
<th>EU contribution €</th>
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**MIN-GUIDE – D6.1 Standardisation and systematization of EU MS minerals data: taking stock**
<p>| Acronym | ID | Project ID | Funder under | Title | Starting | End | Status | Related to (principal) | Related to (secondary) | Other topics | MINGUIDE Value Chain Relevance | mineral statistics info | RELATED TO MINGUIDE | TYPE OF RESULTS database, map, report, other | Total cost € | EU contribution € | WEBSITE | CORDIS LINK | Leader | Participant (including leader) | Last update within this database |
|---------|----|-----------|--------------|-------|----------|-----|--------|-----------------------|----------------------|-------------|-------------------------------|------------------------|------------------|---------------------------------|---------------|---------------|---------|------------------|-------------------|------------------|
| ProPAT  | 13 | 637232    | H2020- EU.2.1.5.3 | Robust and affordable process control technologies for improving standards and optimizing industrial operations | 01/01/2015 | 31/02/2018 | ongoing project | others related | RM industry environment | N/A or Not Relevant | non related | none | report | 5,882,260,50 | 5,486,140,50 | <a href="http://pro-pat.eu">http://pro-pat.eu</a> | <a href="http://cordis.europa.eu/project/rcn/206413_1_en.html">http://cordis.europa.eu/project/rcn/206413_1_en.html</a> | MINING/ KOLB, RIVERA, INDUSTRIAL INNOVATIVE | Spain |
| MetalIntelligenCe  | 14 | 722677    | H2020- EU.1.3.1 | European Industrial Dislosures in future efficient minerals analysis, processing and training | 01/09/2016 | 31/08/2020 | ongoing project | production | others related | RM teaching | DATA and knowledge base | somewhat related | none | report | 1,196,958,56 | 1,196,958,56 | N/A | <a href="http://cordis.europa.eu/project/rcn/196996_en.html">http://cordis.europa.eu/project/rcn/196996_en.html</a> | COLLEGE OF THE HOLY &amp; UNRIVALLED TRINITY OF QUEEN ELIZABETH NEAR DUBLIN | Ireland |
| MINERAL EYE  | 15 | 673303    | H2020- EU.3.5.4 | Real-time on-line mineralogical analysis for the future efficient and more sustainable mining | 01/04/2016 | 30/11/2015 | closed project | exploration | reserves and resources | environment | EXPL: safe and fast remote exploration | closely related | none | report | 71,429,00 | 50,000,00 | N/A | <a href="http://cordis.europa.eu/project/rcn/199910_en.html">http://cordis.europa.eu/project/rcn/199910_en.html</a> | TINGATE PROJECT LIMITED OF ELIZABETH CAPE | England |
| MINATURA2020  | 16 | 642136    | 2020-EU.1.5.3 | Developing a concept for a European minerals deposit framework | 01/01/2015 | 31/01/2018 | ongoing project | reserves and resources | others related | RM environment | DATA and knowledge base | closely related | none | report survey | 2,092,687,50 | 2,092,687,50 | <a href="http://minatura2020.eu">http://minatura2020.eu</a> | <a href="http://cordis.europa.eu/project/rcn/205111_en.html">http://cordis.europa.eu/project/rcn/205111_en.html</a> | MINPOL GMBH Austria |
| MINLEX  | 17 | N/A       | study | Legal framework for mineral extraction and processing projects for exploration and exploitation in the EU | N/A | N/A | closed project | exploration | others related | RM Jaw | EXPL: streamlined permitting procedures | closely related | none | database | N/A | N/A | <a href="http://www.minlex.eu">http://www.minlex.eu</a> | Not in cordis | Mindal Austria |
| ERA-MIN 2  | 19 | 792328    | H2020- EU.3.5.3 | Implement a European wide coordination of research and innovation programs on raw materials to strengthen the industry competitiveness and the shift to a circular economy | 01/12/2016 | 30/11/2021 | ongoing project | reserves and resources | others related | RM coordination programs | DATA and knowledge base | closely related | none | report joint calls | 16,056,787,31 | 4,999,890,01 | <a href="http://www.era-min.eu">http://www.era-min.eu</a> | <a href="http://cordis.europa.eu/project/rcn/206432_en.html">http://cordis.europa.eu/project/rcn/206432_en.html</a> | FUNDAZIO PARA A CIENCIA E TECNOLOGIA Portugal |
| ROBUST  | 20 | 690432    | H2020- EU.3.5.3 | Robust subsea exploration technologies | 01/12/2015 | 31/01/2020 | ongoing project | exploration | reserves and resources | mining | aMines: cross border exploitation legislation / policy coordination | closely related | none | prototype | 5,866,772,50 | 5,866,772,50 | <a href="http://cordis.europa.eu/project/rcn/206432_en.html">http://cordis.europa.eu/project/rcn/206432_en.html</a> | <a href="http://cordis.europa.eu/project/rcn/206432_en.html">http://cordis.europa.eu/project/rcn/206432_en.html</a> | TIM LIMITED UK |
| VAMOS  | 21 | 642477    | H2020- EU.3.5.3 | Valide and Alternative Mine Operating System! | 01/02/2016 | 31/07/2018 | ongoing project | production | explorative | environment | EXPL: safe and fast remote exploration | closely related | none | prototype | 9,200,000,00 | 9,200,000,00 | <a href="http://vamos-project.eu">http://vamos-project.eu</a> | <a href="http://cordis.europa.eu/project/rcn/205111_en.html">http://cordis.europa.eu/project/rcn/205111_en.html</a> | MVT GROUP LTD UK |
| UNEXMIN  | 22 | 690008    | 2020-EU.1.5.3 | Autonomous Underwater Explorer for Flooded Mines | 01/02/2016 | 31/10/2019 | ongoing project | exploration | reserves and resources | environment | EXPL: safe and fast remote exploration | closely related | none | prototype | 4,869,565,00 | 4,868,865,00 | <a href="http://www.unexmin.eu">http://www.unexmin.eu</a> | <a href="http://cordis.europa.eu/project/rcn/205111_en.html">http://cordis.europa.eu/project/rcn/205111_en.html</a> | MIRKOLO EGYETEM Hungary |
| Acronym | ID | Project ID | Funder under | Title (top relevant is brown) relating in general to MINING/GEOLIGY partiality WP5 | Starting | End | Status | Relates to (principal) | Relates to (secondary) | Other topics | MINING/GEOLIGY Value Chain Relevance | Related to MINING/GEOLIGY | Mineral statistics in the RESILIENCE database, map, report, other | TYPE OF RESULTS: database, map, report, other | Total cost | EU contribution | WEBSITE | CORDIS LINK | Leader | Particip (including leader) | Last update within this database |
| MICA 26 | 688648 | H2020-EU.3.5.3. | Mineral Intelligence Capacity Analysis | 01/12/2015 | 31/01/2018 | ongoing project | project | mineral statistics | reserves and resources | cicular economy | DATA and knowledge base | closely related | production | database | 2.005.205,00 | 1.998.915,00 | <a href="http://www.m">http://www.m</a> ica-project.eu | <a href="http://cord">http://cord</a> is.europa.eu/ proj ects/en/205 309_en. htm | Nakragengezocht voor TOERAPAS NAJATWARTEN SCHAEPEF GRENET, TNO Netherlands | 16 | 24/08/2017 |
| GeoERA 27 | 771188 | H2020- EU.3.5.3.2. H2020-EU.3.5.3. | Establishing the European Geological Survey Research Area to deliver a Geological Service for Europe | 01/01/2017 | 31/12/2021 | ongoing project | reserves and resources | explorative networking | DATA and knowledge base | closely related | none | network joint cell | 31.303.030,39 | 10.000.000,00 | <a href="http://geoera">http://geoera</a> .eu/ | <a href="http://cord">http://cord</a> is.europa.eu/ proj ects/en/205 309_en. htm | State Survey of Denmark and Greenland, Denmark | 44 | 24/08/2017 |
| HiTechAlkCarb 28 | 689903 | H2020-EU.3.5.3. | Rare metals in carbonatite critical raw materials in alkaline rocks and Carbonatites | 01/02/2016 | 31/01/2020 | ongoing project | reserves and resources | explorative | mining | DATA and knowledge base | somewhat related | none | report | 5.395.296,00 | 5.395.296,00 | N/A | <a href="http://cord">http://cord</a> is.europa.eu/ proj ects/en/205 309_en. htm | THE UNIVERSITY OF DUNDEE, UK | 11 | 24/08/2017 |
| BEE Value Chain 29 | 456898 | H2020-EU.3.5.1. | Rare Earth Supply Chain and Material Flow Assessment of European Union | 01/10/2015 | 30/09/2017 | ongoing project | production | reserves and resources | recycling | DATA and knowledge base | closely related | none | report | 177.588,80 | 177.588,80 | <a href="http://www">http://www</a>. e-rare-project.eu | <a href="http://cord">http://cord</a> is.europa.eu/ proj ects/en/205 309_en. htm | Universiteit Leiden, Netherlands | 1 | 24/08/2017 |
| BioMoRe 30 | 642468 | H2020-EU.3.5.1. | New Mining Concept for Extracting Metals from Deep Ore Deposits using Biotechnology | 01/02/2015 | 31/03/2018 | ongoing project | production | reserves and resources | environment | mine and metal | PROC: increased environmental performance | closely related | none | prototype | 8.564.961,75 | 8.564.961,75 | <a href="http://www.b">http://www.b</a> iomore-project.eu | <a href="http://cord">http://cord</a> is.europa.eu/ proj ects/en/205 309_en. htm | NIKOHL POLSKA MEZSA, Poland | 23 | 24/08/2017 |
| CIRCULAR IMPACTS 33 | 703014 | H2020- EU.3.5.3.2. H2020- EU.3.5.3. | Measuring the IMPACTS of the transition to the CIRCULAR economy | 01/10/2016 | 30/09/2018 | ongoing project | reserves and resources | others related to RM | cicular economy | DATA and knowledge base | somewhat related | none | report | 501.280,00 | 501.280,00 | <a href="http://circular">http://circular</a> impact-project. eu | <a href="http://cord">http://cord</a> is.europa.eu/ proj ects/en/205 309_en. htm | INSTITUT FORRENSINGENIEURGI GmbH, Germany | 2 | 24/08/2017 |
| Acronym  | ID | Project ID | Funding under | Title (top relevant in brown) relating in general to MINGUIDE particularity WP6 | Starting | End | Status | Relates to (principal) | Relates to (secondary) | Other topics | MINGUIDE Value Chain Relevance | Related to MINGUIDE | Mineral Statistics Info | TYPE OF RESULTS | database, map, report, other | Total cost € | EU contribution € | WEBSITE | CORDIS LINK | Leader | Participants (including leader) | Last update within this database |
|----------|----|------------|---------------|-------------------------------------------------|---------|----|--------|----------------------|----------------------|-------------|---------------------|-----------------|------------------------|-----------------|--------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------------------------|
| INTRAW   | 35 | 6421300   | H2020- EU.3.3.1 | International cooperation on Raw materials | 01/03/2015 | 31/01/2018 | ongoing project | reserves and resources | others related to RM | networking | DATA and knowledge base | closely related | none | database | 2,111,375,00 | 2,104,801,88 | <a href="http://intraw.eu">http://intraw.eu</a> | EUR php net | EUROPEAN DES GEOLOGIES FRANCE | 14 | 24/06/2017 |
| VERAM    | 36 | 600188    | H2020- EU.3.3.1 | Vision and Roadmap for European Raw Materials | 01/12/2015 | 31/05/2018 | ongoing project | reserves and resources | others related to RM | circular economy | DATA and knowledge base | closely related | none | report | 1,431,498,75 | 1,431,498,75 | <a href="http://veram2050.eu">http://veram2050.eu</a> | EUR php net | EUROPEAN TECHNOLOGY PLATFORM ON SUSTAINABLE MINERAL RESOURCES | 10 | 24/06/2017 |
| MIN-GUIDE | 37 | 689527    | H2020- EU.3.3.1 | Minerals Policy Guidance for Europe | 01/02/2016 | 31/01/2019 | ongoing project | exploration | production | policy | DATA and knowledge base | closely related | none | database map | 1,999,625,00 | 1,999,625,00 | <a href="http://www.min-guide.eu">http://www.min-guide.eu</a> | EUR php net | NEHTA MINERALS INVESTMENTS LTD | 9 | 24/06/2017 |
| STRADE   | 38 | 689364    | H2020- EU.3.3.1 | Strategic Dialogue on Sustainable Raw Materials for Europe | 01/12/2015 | 30/11/2018 | ongoing project | trade | others related to RM | networking | DATA and knowledge base | closely related | none | report | 1,977,508,75 | 1,977,508,75 | <a href="http://stradeproject.eu">http://stradeproject.eu</a> | EUR php net | GEOKO INSTITUTE E.V. - INSTITUTE FOR ANGIOZPONIK GEOLGIES, Germany | 6 | 24/06/2017 |
| SOLSA    | 39 | 688669    | H2020- EU.3.3.1 | Sonic Drilling coupled with Automated Mineralogy and Chemistry On-Line-On-Mine Real-Time | 01/02/2016 | 31/01/2020 | ongoing project | exploration | reserves and resources | mixing | EXPL: safe and fast remote exploration | closely related | none | prototype software | 9,775,468,25 | 9,775,468,25 | <a href="http://www.salsa-min.org">www.salsa-min.org</a> | EUR php net | INRANET SE | 8 | 24/06/2017 |
| SIMS     | 40 | 780302    | H2020- EU.3.3.1 | Sustainable Intelligent Mining Systems | 01/06/2017 | 30/04/2020 | ongoing project | production | reserves and resources | mixing | EXTR: safer and more efficient greater depth extraction | closely related | none | prototype | 16,162,100,00 | 12,709,745,00 | <a href="http://www-e">http://www-e</a>. Mining Systems | EUR php net | ABB Sweden | 11 | 24/06/2017 |
| X-MINE   | 41 | 793070    | H2020- EU.3.3.1 | Real-Time Mineral X-Ray Analysis for Efficient and Sustainable Mining | 01/06/2017 | 31/05/2020 | ongoing project | exploration | reserves and resources | mixing | EXTR: reduced grade deposit mining | closely related | none | N/A | 32,064,712,50 | 9,318,197,25 | <a href="http://www.xmine.eu">http://www.xmine.eu</a> | EUR php net | TELELOGIS JETTOLENKSUNNITYTT YTT OY Finland | 13 | 24/06/2017 |
| ITERAMS  | 42 | 793480    | H2020- EU.3.3.1 | Integrated renewal Technologies for more sustainable raw materials supply | 01/06/2017 | 31/05/2020 | ongoing project | production | others related to RM | environment | EXTR: increased environmental performance | closely related | none | N/A | 7,915,364,25 | 7,915,364,25 | <a href="http://www.xmine.eu">http://www.xmine.eu</a> | EUR php net | TELELOGIS JETTOLENKSUNNITYTT YTT OY Finland | 15 | 24/06/2017 |
| BLUE MINING | 43 | 609530 | FP7-NMP  | Breakthrough Solutions for the Sustainable Exploration and Extraction of Deep Sea Mineral Resources | 01/02/2014 | 31/01/2018 | ongoing project | exploration | production | mixing | DEEP SEA MINING: clear, sensible and feasible guidelines for EU (environmental impact assessment) | closely related | none | prototype | 34,741,710,00 | 9,000,000 | <a href="http://www.bluer">http://www.bluer</a> efting.eu | EUR php net | HEC NL | 19 | 28/06/2017 |
| Real-Time Mining | 44 | 641888 | H2020- EU.3.3.1 | Real-time optimization of extraction and the logistics process in highly complex geological and selective mining settings | 01/04/2015 | 31/01/2019 | ongoing project | production | reserves and resources | mixing | EXTR: reduced grade deposit mining | closely related | none | N/A | 6,566,702,30 | 5,620,109,75 | <a href="http://www.xmin">http://www.xmin</a> e.eu | EUR php net | RHEINISCH - WESTFAELISCHE TECHNISCHE HOCHSCHULE Aachen, Germany | 11 | 28/06/2017 |
| METGROW+ | 45 | 690088 | H2020- EU.3.3.1 | Metal Recovery from Low Grade Ores and Wastes Plus | 01/02/2016 | 31/01/2020 | ongoing project | production | reserves and resources | environment | EXTR: reduced grade deposit mining | closely related | none | report | 7,911,462,50 | 7,911,462,50 | <a href="http://metgrow">http://metgrow</a> plus.eu | EUR php net | TELELOGIS JETTOLENKSUNNITYTT YTT OY Finland | 18 | 28/06/2017 |</p>
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<th>Leader (including leader)</th>
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**Title:** Providing geoscience data globally

**Starting:** 2007

**End:** 2017

**Status:** ongoing project

**Production:** reserves and resources

**Policy:** DATA and knowledge base

**GIS:** N/A

**EU contribution:** €1.108.669,31

**Total cost:** €0

**Other topics:** regional network

**MINEGUIDE Value Chain Relevance:** closely related

**MINING/Value Chain Relevance:** closely related

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** map - portal

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** EU Information and Policy Support System for Sustainable Supply of Europe with Energy and Mineral Resources

**Project ID:** 767533

**Project:** Sustainable Aggregates Planning in South East Europe

**MINEGUIDE:** N/A

**Value Chain:** production

**Other topics:** recycling

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** N/A

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** European Marine Observation and Data Network

**Project:** European Marine Observation and Data Network

**MINEGUIDE:** N/A

**Value Chain:** production

**Other topics:** reserves and resources

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** N/A

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** EU Information and Policy Support System for Sustainable Supply of Europe with Energy and Mineral Resources

**Project:** Knowledge Inventory for Hydrogeology Research

**MINEGUIDE:** N/A

**Value Chain:** environment

**Other topics:** mining

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** GIS

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** Mineral resources in sustainable land-use planning

**Project:** Mineral resources in sustainable land-use planning

**MINEGUIDE:** N/A

**Value Chain:** production

**Other topics:** reserves and resources

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** N/A

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** Mining and Metallurgy Regions of EU

**Project:** Mining and Metallurgy Regions of EU

**MINEGUIDE:** N/A

**Value Chain:** regional development

**Other topics:** exploratory

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** network

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** Integrated cross-sectorial approach to environmentally sustainable and resource-efficient aluminium production

**Project:** Integrated cross-sectorial approach to environmentally sustainable and resource-efficient aluminium production

**MINEGUIDE:** N/A

**Value Chain:** innovative process

**Other topics:** recycling

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** other

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** Production of scandium compounds and scandium aluminium alloys from European metallurgical by-products

**Project:** Production of scandium compounds and scandium aluminium alloys from European metallurgical by-products

**MINEGUIDE:** N/A

**Value Chain:** recycling

**Other topics:** mining waste management

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** other

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** EU Information and Policy Support System for Sustainable Supply of Europe with Energy and Mineral Resources

**Project:** Knowledge Inventory for Hydrogeology Research

**MINEGUIDE:** N/A

**Value Chain:** environment

**Other topics:** mining

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** GIS

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** European Marine Observation and Data Network

**Project:** European Marine Observation and Data Network

**MINEGUIDE:** N/A

**Value Chain:** production

**Other topics:** reserves and resources

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** N/A

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**Funder under:** Mining and Metallurgy Regions of EU

**Project:** Mining and Metallurgy Regions of EU

**MINEGUIDE:** N/A

**Value Chain:** regional development

**Other topics:** exploratory

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** network

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** Mineral resources in sustainable land-use planning

**Project:** Mineral resources in sustainable land-use planning

**MINEGUIDE:** N/A

**Value Chain:** production

**Other topics:** reserves and resources

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** other

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** Production of scandium compounds and scandium aluminium alloys from European metallurgical by-products

**Project:** Production of scandium compounds and scandium aluminium alloys from European metallurgical by-products

**MINEGUIDE:** N/A

**Value Chain:** recycling

**Other topics:** mining waste management

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** other

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** EU Information and Policy Support System for Sustainable Supply of Europe with Energy and Mineral Resources

**Project:** Knowledge Inventory for Hydrogeology Research

**MINEGUIDE:** N/A

**Value Chain:** environment

**Other topics:** mining

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** GIS

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** European Marine Observation and Data Network

**Project:** European Marine Observation and Data Network

**MINEGUIDE:** N/A

**Value Chain:** production

**Other topics:** reserves and resources

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** N/A

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** Mining and Metallurgy Regions of EU

**Project:** Mining and Metallurgy Regions of EU

**MINEGUIDE:** N/A

**Value Chain:** regional development

**Other topics:** exploratory

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** network

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** Mineral resources in sustainable land-use planning

**Project:** Mineral resources in sustainable land-use planning

**MINEGUIDE:** N/A

**Value Chain:** production

**Other topics:** reserves and resources

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** other

**CREDITS LINK:** http://www.ec.europa.eu/cordis/portal/

**Funder under:** Production of scandium compounds and scandium aluminium alloys from European metallurgical by-products

**Project:** Production of scandium compounds and scandium aluminium alloys from European metallurgical by-products

**MINEGUIDE:** N/A

**Value Chain:** recycling

**Other topics:** mining waste management

**MINING/Value Chain Relevance:** none

**MINING/Value Statistics Info:** none

**Type of RESSACT database, map, report, other:** other

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7. Appendix 2: Mining statistics in Europe: sources of information
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<th>Observations</th>
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<td>International Minerals Statistics and Information</td>
<td>United States Geological Survey (USGS)</td>
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<td>Prodcom annual data</td>
<td>Eurostat</td>
<td><a href="http://ec.europa.eu/eurostat/web/prodcom/data/excel-file-2">http://ec.europa.eu/eurostat/web/prodcom/data/excel-file-2</a></td>
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<td>African-European Georesources Observation System</td>
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<td><a href="http://eurare.brgm-rec.fr/download/dataset">http://eurare.brgm-rec.fr/download/dataset</a></td>
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<td>Mineral resources</td>
<td>EU Information and Policy Support System for Sustainable Supply of Europe with Energy and Mineral Resources</td>
<td><a href="http://maps.europressource.eu/">http://maps.europressource.eu/</a></td>
<td>Official source</td>
<td>N/A</td>
<td>N/A</td>
<td>N/F</td>
<td>Yes</td>
<td>“EuroGeoSource is a data portal, which allows access by Internet to the aggregated geographical information on mineral resources (metallic and non-metallic minerals, industrial minerals and construction materials: gravel, sand, ornamental stone etc.), coming from a wide range of sources in a significant coverage area of Europe (15 countries)”</td>
<td></td>
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<tr>
<td>Distribution of raw material resources</td>
<td>Establishing the European Geological Surveys Research Area to deliver a Geological Service for Europe</td>
<td><a href="http://geoera.eu/">http://geoera.eu/</a></td>
<td>Official source</td>
<td>N/F</td>
<td>N/F</td>
<td>N/F</td>
<td>N/F</td>
<td>“The GeoERA consortium will organise and co-fund together with the EC a joint call for transnational research projects that address the development of interoperable, pan-European data and information services on the distribution of geo-energy, groundwater and raw material resources. The Raw Materials Theme of the project will contribute to the development of minerals intelligence (Minerals Yearbook and Minerals Inventory).”</td>
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<tr>
<td>Critical raw materials</td>
<td>International cooperation on Raw materials</td>
<td><a href="http://intraw.eu/">http://intraw.eu/</a></td>
<td>Official source</td>
<td>Yes</td>
<td>N/F</td>
<td>N/F</td>
<td>N/F</td>
<td>“The outcome of the mapping and knowledge transfer activities will set a baseline to launch the European Union’s International Observatory for Raw Materials as a definitive raw materials intelligence infrastructure, operating globally. The Observatory will be a permanent operational body after project completion, with a clear strategy and management approach to provide critical raw materials intelligence data and information while aiming for the establishment and maintenance of strong long-term relationships with the world’s key players in raw materials technology and scientific developments.”</td>
<td></td>
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<tr>
<td>Primary and secondary raw materials</td>
<td>Mineral Intelligence Capacity Analysis</td>
<td><a href="http://www.mia-project.eu/wp-content/uploads/2016/03/D3-2_Final-inventory-of-data-on-raw-materials.pdf">http://www.mia-project.eu/wp-content/uploads/2016/03/D3-2_Final-inventory-of-data-on-raw-materials.pdf</a></td>
<td>Official source</td>
<td>Yes*</td>
<td>Yes*</td>
<td>Yes*</td>
<td>Yes*</td>
<td>One of the main objectives of the MICA project is consolidation of relevant data on primary and secondary raw materials. Link to the online metadata inventory (updated): <a href="http://metadata.mica-project.eu/md/metadata/home">http://metadata.mica-project.eu/md/metadata/home</a> (*: see links individually).</td>
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<tr>
<td>Mineral resources</td>
<td>Minerals Intelligence Network for Europe</td>
<td><a href="http://minerals4eu.brgm-rec.fr/">http://minerals4eu.brgm-rec.fr/</a></td>
<td>Official source</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Data search, map viewer and minerals yearbook. The yearbook is the most comprehensive compilation of publicly-available European minerals information, with detailed info between 2004-2013.</td>
<td></td>
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<tr>
<td>Material flow</td>
<td>Global material flows and demand-supply forecasting for mineral strategies</td>
<td><a href="http://www.minfuture.eu/">http://www.minfuture.eu/</a></td>
<td>Official source</td>
<td>N/F</td>
<td>N/F</td>
<td>N/F</td>
<td>N/F</td>
<td>One of the project activities includes “the creation of a web-portal to provide a central access point for material flow information, including links to existing data sources, models, tools and analysis”: <a href="http://minfuture.eu/themes/data">http://minfuture.eu/themes/data</a>. Data cannot be accessed from the links in the website.</td>
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<tr>
<td>Reserves and resources</td>
<td>Providing geoscience data globally</td>
<td><a href="http://geoearthnetwork.brgm.fr/content/eng/catalog-search?map4=europe&amp;dataset&amp;from=1&amp;to=20&amp;sortBy=relevance">http://geoearthnetwork.brgm.fr/content/eng/catalog-search?map4=europe&amp;dataset&amp;from=1&amp;to=20&amp;sortBy=relevance</a></td>
<td>Official source</td>
<td>Yes*</td>
<td>Yes*</td>
<td>N/F</td>
<td>Yes</td>
<td>Map data (free and open source) (*: see links individually).</td>
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<tr>
<td>Mineral deposits</td>
<td>Nano-particle products from new mineral resources in Europe</td>
<td><a href="http://ptrarc.gtk.fi/ProMiax/default.aspx">http://ptrarc.gtk.fi/ProMiax/default.aspx</a></td>
<td>Official source</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Pan-EU GIS based mineral resource and advanced modelling system for the extractive industry, showing known and predicted, metallic and non-metallic mineral occurrences across the EU. (Microsoft Silverlight extension required).</td>
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<tr>
<td>Mineral statistics</td>
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<td>Source</td>
<td>Link</td>
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<tr>
<td><strong>Reserves and resources</strong></td>
<td>Rare Earth Supply Chain and Industrial Ecosystem: A Material Flow Assessment of European Union</td>
<td><a href="https://www.universiteitleiden.nl/onderzoek/onderzoeksprojecten/wiskunde-en-natuurwetenschappen/onderzoek-systeem-supply-chain-investigaties-en-industrieel-onderzoek-a-een-materieel-flow-summerseason/european-union">link</a></td>
<td>Official source</td>
<td>N/F</td>
<td>N/F</td>
<td>N/F</td>
<td>N/F</td>
<td>The study will trace the entire value chain of rare metals from mining to intermediate products to final products and calculate the value addition in each stage.</td>
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<td><strong>Secondary raw materials and CRMs</strong></td>
<td>Prospecting secondary raw materials in the Urban mine and Mining wastes</td>
<td><a href="http://www.prosumproject.eu/urban-mine-knowledge-data-platform">link</a></td>
<td>Official source</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Primary and secondary raw materials data, easily accessible in one platform: <a href="http://www.prosumproject.eu/urban-mine-knowledge-data-platform">http://www.prosumproject.eu/urban-mine-knowledge-data-platform</a> --&gt; The Urban Mine Platform will launch at the IERC conference, 19 January 2018.</td>
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<td></td>
<td>Bulgaria</td>
<td>Underground reserves (ores and minerals)</td>
<td>National Statistical Institute</td>
<td><a href="http://www.nsi.bg/en/content/14683/underground-reserves">link</a></td>
<td>Official source</td>
<td>Yes</td>
<td>N/F</td>
<td>Yes</td>
<td>Yes</td>
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<td>Croatia</td>
<td>Inputs of raw materials in industrial production</td>
<td>Croatian Bureau of Statistics</td>
<td><a href="https://www.dzs.hr/default_e.htm">link</a></td>
<td>Official source</td>
<td>Yes</td>
<td>N/F</td>
<td>Yes</td>
<td>N/F</td>
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<td></td>
<td>Czech Republic</td>
<td>Reserves of minerals</td>
<td>Czech Geological Survey</td>
<td><a href="http://www.geology.cz/extra/extra-about-us/current-events/2017/07/13/20781">link</a></td>
<td>Official source</td>
<td>Yes</td>
<td>Yes</td>
<td>N/F</td>
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### EU MS (28)

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<th>Mineral statistics</th>
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<tr>
<td>Greenland</td>
<td>Mineral occurrences</td>
<td>Greenland Mineral Resources Portal</td>
<td><a href="http://www.greenmin.gl/geusmap/?mapname=greenland_portal&amp;lang=en#zoom=3.463045080883829&amp;lat=79.50000&amp;lon=33.97000&amp;visiblelayers=Topographic&amp;filter=&amp;layers=mineral_occurrences&amp;epsg=32644&amp;mode=map&amp;map_imagetype=png&amp;wkt=">http://www.greenmin.gl/geusmap/?mapname=greenland_portal&amp;lang=en#zoom=3.463045080883829&amp;lat=79.50000&amp;lon=33.97000&amp;visiblelayers=Topographic&amp;filter=&amp;layers=mineral_occurrences&amp;epsg=32644&amp;mode=map&amp;map_imagetype=png&amp;wkt=</a></td>
<td>Official source</td>
<td>Yes</td>
<td>Yes</td>
<td>N/F</td>
<td>N/F</td>
<td>Online interactive map (GIS data) with mineral occurrences and sites with mineral exploration/extraction license. Data downloads are available from the webshop + Geoscience DODEX Greenland Online database. Provides easy access to all non-confidential company geoscience reports received by authorities in Greenland and Denmark in accordance with the Mining Act for Greenland and associated regulations. The database contains full references and downloadable pdf-files of the reports and is searchable by alphanumeric and geographical criteria.</td>
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<td></td>
<td>Used natural resources</td>
<td>Geological Survey of Estonia</td>
<td><a href="http://www.egk.ee/osakondade-teenused/andmebaasid/geoloogiafond/">http://www.egk.ee/osakondade-teenused/andmebaasid/geoloogiafond/</a></td>
<td>Official source</td>
<td>N/F</td>
<td>N/F</td>
<td>N/F</td>
<td>N/F</td>
<td>Registry with reports. The online database is in Estonian only. (Not English available).</td>
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<tr>
<td>Germany</td>
<td>Rohstoffe (in German)</td>
<td>Federal Institute for Geosciences and Natural Resources</td>
<td><a href="https://www.bgr.bund.de/EN/Themen/Mi_t_rohstoffeProdukt_e/produkte_node_en.html">https://www.bgr.bund.de/EN/Themen/Mi_t_rohstoffeProdukt_e/produkte_node_en.html</a></td>
<td>Official source</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Downloadable reports (2009-2013) &quot;Deutschland – Rohstoffsituation&quot;. Maps are also available (<a href="https://www.bgr.bund.de/EN/Themen/Mi_t_rohstoffeProdukt_e/produkte_node_en.html?tab=Maps">https://www.bgr.bund.de/EN/Themen/Mi_t_rohstoffeProdukt_e/produkte_node_en.html?tab=Maps</a>).</td>
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<td>Italy</td>
<td>Geological maps</td>
<td>ISPRA</td>
<td><a href="http://www.isprambiente.gov.it/en/environmental-services/basic-environmental-monitoring/monitoring-geological-geographical-maps">http://www.isprambiente.gov.it/en/environmental-services/basic-environmental-monitoring/monitoring-geological-geographical-maps</a></td>
<td>Official source</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Geological Maps of Italy. Not publicly available.</td>
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<td><strong>Netherlands</strong></td>
<td>Spatial subsurface data</td>
<td>Geological Survey of the Netherlands</td>
<td><a href="https://www.miner.knmi.nl">https://www.miner.knmi.nl</a></td>
<td>Official Source</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Data related to the Mining Act not available yet. Although there are some free PDFs called &quot;annual reports&quot; (2003-2007) with info about gas and oil production and reserves related to a 10-year period.</td>
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<td><strong>EU MS (28)</strong></td>
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<td><strong>Spain</strong></td>
<td>Panorama minero (in Spanish)</td>
<td>Instituto Geológico y Minero de España</td>
<td><a href="http://www.igme.es/PanoramaMinero/PMLin.htm">http://www.igme.es/PanoramaMinero/PMLin.htm</a></td>
<td>Official source (only production compilation sources)</td>
<td>Yes</td>
<td>N/A</td>
<td>Yes</td>
<td>Yes</td>
<td>Annual PDF report. Include information about mines.</td>
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<td>Mineral statistics</td>
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<td>Official / not official source</td>
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<td>EU MS (28)</td>
<td>Spain</td>
<td>Estadística minera (in spanish)</td>
<td>Ministerio de energía, turismo y agenda digital</td>
<td><a href="http://www.minetad.gob.es/energia/mineria/Estadistica/PaginasConsultar.aspx">http://www.minetad.gob.es/energia/mineria/Estadistica/PaginasConsultar.aspx</a></td>
<td>Official source</td>
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<td>N/A</td>
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<td>Domestic extraction of raw materials</td>
<td>Statistics Sweden</td>
<td><a href="http://www.scb.se/en/finding-statistics/search/?query=r%C3%A5material&amp;Tab=">http://www.scb.se/en/finding-statistics/search/?query=råmaterial&amp;Tab=</a></td>
<td>Official source</td>
<td>Yes</td>
<td>N/A</td>
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<td>United Kingdom</td>
<td>Mineral resources</td>
<td>Centre for Sustainable Mineral Development</td>
<td><a href="http://www.bgs.ac.uk/mineralsuk/statistics/ukStatistics.html">http://www.bgs.ac.uk/mineralsuk/statistics/ukStatistics.html</a></td>
<td>Official source</td>
<td>Yes</td>
<td>Yes</td>
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