MINERAL INTELLIGENCE FOR EUROPE

Deliverable 2.1

Report describing the processes developed for updating the electronic European Minerals Yearbook

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GENERAL INTRODUCTION

About MINTELL4EU:

The European Union has identified security of supply, improvement in environmental management and resource efficiency as key challenges for the raw materials sector. Data regarding the location and spatial distribution of primary and secondary raw materials, with respect to exploration, exploitation, production and trade activities, underpin decision making in government and industry. Given the dynamic character of such data, regular updates of comprehensive, reliable and harmonized information across borders are required. The overall aim of MINTELL4EU is to improve the European Knowledge Base on raw materials as there are several sources of non-harmonized data with different coverages developed for different purposes during national and international projects over recent decades. All data are shared at the European Geological Data Infrastructure, EGDI.

Tasks include updating the electronic Minerals Yearbook produced in the Minerals4EU project as well as extending the spatial coverage and quality of data currently in the Minerals Inventory. Furthermore, MINTELL4EU aims to increase the degree of harmonization, communication and interaction between existing data platforms, with the ambition of reaching a fully operational and reliable data knowledge management system, fulfilling the European needs and taking into account the Raw Materials Information System (RMIS) of the European Union. Finally, the applicability of the UNFC classification system for obtaining more accurate Pan-European mineral inventories are tested through a large number of case studies on different commodities across Europe. MINTELL4EU has 27 partners each representing a national or regional geological survey organisation from 25 European countries.

EXECUTIVE REPORT SUMMARY

This report describes the processes developed for updating the European electronic Minerals Yearbook (e-MYB). The e-MYB contains data for production data updates for 2014 to 2019, and trade data updates for 2014 to 2018. The e-MYB also contains resource, reserve and exploration data updates with a reference year of 2019. Production and trade data were collected by the British Geological Survey (BGS) as per their pre-existing programme of work regarding the provision of minerals data, and provided directly to the project via electronic data transfer. Data for exploration, resources and reserves were collected by means of an online survey which was completed by those project partners who had committed to data provision during project planning, and other participants from Geological Surveys across Europe. Resources and reserve data were prepared by data providers in multiple different forms, including using national reporting codes, internationally recognized CRIRSCO-compliant data forms and in some cases as UNFC data. The data were compiled and quality controlled, and available in a visual format, and as downloadable files, on the EGDI platform. This report outlines issues encountered during data collection and collation, detailed information regarding these issues are further reported in the Minerals4EU and ORAMA projects and their respective deliverables.

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1 INTRODUCTION

The main objective of Work Package 2 (WP2) was to update the electronic European Minerals Yearbook, which was originally created under the Minerals4EU project between 2013 and 2015.

The Minerals Intelligence Network for Europe project (Minerals4EU), which received funding from the European Union's Seventh Framework Programme (grant agreement number: 608921), produced as one of its key deliverables an electronic European Minerals Yearbook containing mineral statistical data for six data types relating to primary raw materials, alongside data for waste flows. The datasets for primary raw materials included:

- Production data for 2004 to 2013
- Import data for 2004 to 2013
- Export data for 2004 to 2013
- Resource data as at 31 December 2013
- Reserve data as at 31 December 2013
- Exploration data with a reference year of 2013

In each case, the project attempted to collect data for a total of 40 European countries and more than 60 mineral commodities. However, with the completion of the Minerals4EU project, these datasets remained static.

However, the compilation of mineral statistics undertaken by BGS, as part of the ongoing BGS-funded science programme, did not stop, and production data for later years were already available at the start of GeoERA MINTELL4EU. Under WP2, work has been carried out to update all six of these statistical datasets and to develop a system whereby the data are transferred to the central database using a more interoperable format than previously used.

WP2 was divided into 3 tasks (Table 1) but this report is structured according to the datasets: production data; trade data (imports and exports); resources and reserves data; and exploration data. For each data type, this report outlines the basic data collection steps, the issues encountered, solutions adopted and lessons learned for the future.

Table 1: GeoERA MINTELL4EU - Work Package 2 Task List

Task Number	Task Description
2.1	Production data updates for 2014 to 2017 and trade data updates for 2014 to 2016
2.2	Production data updates for 2018 and 2019 together with trade data updates for 2017 and 2018
2.3	Resources, reserves and exploration data updates with a reference year of 2019

2 PRODUCTION DATA

The BGS has been a collector and collator of global mineral production data for more than 100 years. The data are stored in a BGS central database and this is used to produce an annual publication 'World Mineral Production'.

2.1 Data collection

Data are collected by a team of skilled geologists and data analysts, who have extensive experience with mineral statistics. Each person is responsible for a number of countries. A range of organizations in each country, including but not limited to government ministries, geological surveys, trade associations, statistical offices and other relevant organisations were contacted and data requested. In addition, country experts search for documents on websites of organizations and publicly listed companies. Country experts review and revise existing data and are constantly searching for improved datasets or potential new data sources. Finally, BGS staff then fill in the remaining gaps using secondary sources of information or estimates, informed by the available information.
In most cases, data are gathered from multiple sources for each country, data rarely sit in national central databases where information can be automatically and freely downloaded or harvested. A further detailed explanation of the data collection methodology has been described in the Minerals4EU deliverable D4.3 'Report on availability of mineral statistics'. During the WP2 data collection survey, partners were given the opportunity to provide production data where available (see MINTELL4EU deliverable D5.3.2 'Integration of the e-Minerals Yearbook into the MIN4EU database' for further details of the survey). Data that were provided by partners were entered into the BGS database and provided to the project via the harvesting procedures outlined below in section 6. Mineral production data for the time period 2014 – 2019 data were provided for the following 40 countries: Albania, Austria, Belgium, Bosnia & Herzegovina, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Greenland, Hungary, Iceland, Ireland, Italy, Kosovo, Latvia, Lithuania, Luxembourg, Malta, Montenegro, Netherlands, North Macedonia, Norway, Portugal, Poland, Romania, Slovakia, Slovenia, Serbia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom. This is the same country list used in the Minerals4EU project. Data for the commodities presented in the electronic Minerals Yearbook (e-MYB) may not be representative of all commodities produced in these countries. For example, data for some energy commodities were specifically excluded.

2.2 Issues encountered and solutions adopted

As explained above, freely available data in the format required for this process don't exist in any one central place. Data are collected from a large variety of sources by a team of experts. Data provided by partners were incorporated in the BGS database and provided to the project.

An overview of the issues encountered and solutions adopted are presented in Table 2.

Table 2: Production data – issues encountered and solutions adopted

Issues encountered	Solutions adopted
Inconsistent units	Decide on a 'standard' to be used, research a method of converting to that standard, recalculate supplied figures to the standard.
Inconsistency caused by some data being reported as 'gross weight' while others are 'metal content'	Decide on a 'standard' for the specific commodity, research for suitable metal grades in order to convert data to the standard (in either case) and recalculate the necessary figures to match the standard.
Data supplied does not include all the mineral commodities produced in a country	Research for additional primary data sources, if there are no data forthcoming from other primary data sources, research for potential secondary data sources or develop a method for making a suitable estimate.
Data supplied for a commodity is shown as a dash (i.e. "–") rather than a figure	Investigate whether this means production has ceased or whether data have just become 'not available'. If the former then it can be entered as 'zero', if the latter then alternative sources should be sought or an estimate made.
Existing data supplier does not reply	Research for additional primary data sources, if there are no data forthcoming from other primary data sources, research for potential secondary data sources or develop a method for making a suitable estimate.
Delay in reports being released	Research for additional primary data sources, if there are no data forthcoming from other primary data sources, research for potential secondary data sources or develop a method for making a suitable estimate.
Reports are not in a familiar language (English)	Use the language knowledge of colleagues or translate using online translation tools.
Some countries and companies use fiscal years rather than calendar years	This cannot always be overcome. Some companies release quarterly reports or monthly reports and a figure can be produced in a calendar year from this. In some instances, a fiscal year has to be used and this is clarified in the footnotes.

2.3 Lessons learned

- It's important to understand that this is not a simple task that can be understood and quickly completed. The ideal situation is to ensure an experienced organisation leads on task completion.
- To allow for sufficient time to complete this task, careful estimation of the time required is necessary in order to adequately fund the work.
- A complete and final commodity list should be established at the early stages of the project to avoid retrospective edits to the database.

3 TRADE DATA (IMPORT AND EXPORTS)

The BGS has compiled trade data, along with mineral production data, since 1913. In more recent years data have not been collected on an annual basis due to the availability of other online databases (see procedure outlines in the section 3.1) and to some extent as a result of limited budgets.

3.1 Data collection

Trade data are purchased from a third party by the BGS, purchasing these data speeds up the process of gathering the volume of data needed to accurately depict mineral trade. These data are then assessed by a small team of data analysts on a both a commodity by commodity and a country by country basis to ensure consistency and completeness and split by trade type. The reference year of 2018 was used for this project.

The data are then further quality controlled. BGS consults other online databases such as UN Comtrade or Eurostat to establish the accuracy or otherwise of the data, checking any anomalous looking data or filling in any gaps. The compilation of data from different sources into one BGS-hosted database, along with careful quality assessment, allows for the most complete data set to be used to portray mineral trade accurately.

Mineral trade data for the time period 2014 – 2018 data were provided for the following 40 countries: Albania, Austria, Belgium, Bosnia & Herzegovina, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Greenland, Hungary, Iceland, Ireland, Italy, Kosovo, Latvia, Lithuania, Luxembourg, Malta, Montenegro, Netherlands, North Macedonia, Norway, Portugal, Poland, Romania, Slovakia, Slovenia, Serbia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom.

Trade flows that are considered too small (where the figure was <1 of the unit reported) are frequently not included in the finalised tables in order to avoid them becoming cumbersome. No distinction is made for trade between European countries and countries outside of Europe.

3.2 Issues encountered and solutions adopted

Table 3: Trade data – issues encountered and solutions adopted

Issues encountered	Solutions adopted
Amalgamation of trade codes: Import and export data are reported using a number of different systems of trade codes. The most common being the 'Harmonised System' (HS), also known as 'Combined Nomenclature' (CN), used by UN Comtrade and Eurostat. Despite this structure, trade in many minerals cannot	Data resolution is irresolvable in the short term.

be separately distinguished, even at the greatest level of available detail.	
Part figures are reported, missing elements of the total figure. This is particularly noticeable if the figure is an amalgamation of a number of codes.	Look at other sources for that particular number to see if it is supplied elsewhere are a whole or an estimate is made for the element that is missing.
Counties with a large port can have their imports and exports data inflated	Alternative sources sometimes provide more realistic data.
Standard units are not reported	We make a conversion so that the table shows all the data using the same unit.
Discrepancies in the data reported e.g. too many decimal places	Look at alternative sources or reconstruct the trade figure.
Missing data, suppressed or confidential data not reported	Reconstruct the data and see what other countries report they are importing from or exporting to a particular country.

3.3 Lessons learned

- This task is very time consuming due to the significant quantities of data involved and the iterative nature of the task.
- Not all trade data are available from any one source, purchasing data from a body that compiles these professionally and comparing and augmenting the data from other freely available international data sets results in the most accurate single data set for use.
- Although useful to have all the relevant data in the same place, it's questionable as to the value of this data, due to the significant amount of time consumed and large size of the data sets compiled. For future projects it would be worthwhile engaging with stakeholders who are specifically interested in trade to consider whether it should be included in future version of this data set.

4 RESOURCES AND RESERVES DATA

Data for resources and reserves are available from many different sources. These data were first collected by the Minerals4EU project by means of a one-off Excel-based survey that was sent out to individual partners and data providers and compiled centrally. This survey was repeated for the MINTELL4EU project but using an online digital survey form instead with the aim of improving consistency (mainly in code lists) and allowing an easier method of data handling once collected.

4.1 Data collection

The MINTELL4EU survey was developed as an online survey tool where users had individual log in credentials and were able to upload data on individual commodities. A full 'User Guide' was compiled by GeoZS [T2.3 'GUIDELINES for electronic input form for Resources, Reserves, Exploration and Production data']. The classification systems used for reporting statistics for resources and reserves are not consistent across the countries covered by the e-MYB. Some countries have developed a 'national reporting code', or adapted a system of reporting from another source, which addresses their individual needs and requirements. Other countries use one or more of the internationally recognised systems of reporting, which are often required by stock exchanges or financial investors. In other countries 'resources' may not have been estimated in accordance with any system of reporting, or data exists which are categorised only as 'historical estimates'. These have been included in the e-MYB, as in the Minerals4EU project, because they indicate firstly that a particular commodity does exist within that country and secondly because they give a broad indication of the quantity that may be involved.

Data for resources and reserves are available from many different sources, however, this survey was sent out to Geological Surveys that were involved in the MINTELL4EU project specifically on this occasion, rather than other organizations within each country. Data providers were given the option to provide data in different forms, namely CRIRSCO-compliant data on resources and reserves, historical data, or other types of non-compliant data. Providers could also provide data using the United Nations Framework Classification (UNFC) format. Each (non-UNFC) data entry typically comprises Commodity Name, Amount, Grade, Grade unit, Classification Method Used, Category, Comments. Not all countries were able to provide data, however, data from 2013 are still available to view in the EGDI. Mineral resources and reserve data were provided by the following 17 countries: Albania, Belgium, Cyprus, Czechia, Denmark, Finland, France, Greenland, Hungary, Ireland, Italy, Norway, Slovenia, Spain, Sweden, Ukraine, United Kingdom. Eight countries provided data using the UNFC format in this survey, compared to 1 country in Minerals4EU. A full quality assessment and quality control exercise was conducted on the data between July and September 2021 by the WP2 lead. Further details of the UNFC scheme and its applicability have been published by the ORAMA project deliverable 1.5 'Good practice guidelines for harmonization of resources and reserve data' and the MINTELL4EU deliverables 4.1 'Case study review with guidance and examples for applying the UNFC to European mineral resources' and 4.2 'Report on harmonization issues, data gaps and challenges, reviewing also the quality of Pan-European aggregated inventories for selected commodities'.

4.2 Issues encountered and solutions adopted

Given the range and quantity of data collected, there were significant challenges in compiling the data. A full quality assessment and quality control exercise was undertaken in order to address any issues with the final data delivered.

Where known, the system of reporting used for the resources and reserves data included in the e-MYB is stated alongside the statistics. The UNFC method of reporting was used by some countries. The variation in the system of reporting means that it is not possible to compare directly resources and reserves between countries, it also means that total tallies of metal resources and reserves are incalculable across Europe. The Minerals4EU Deliverable 4.3 'Report on availability of mineral statistics' outlined the challenges associated with the use of different styles of reporting.

Additional complicated factors to consider when recording statistics for resources and reserves are the variations in 'cut off grades' used for certain deposits, revisions to the internationally recognised systems of reporting (e.g. JORC), and the units used both for the statistics themselves and the grade.

Table 4: Resources and reserves data – issues encountered and solutions adopted

Issues encountered	Solutions adopted
Mixed data delivery using UNFC and other resources and reserves data types	Data delivered as UNFC were displayed with the other UNFC data and a comment was added to the resources tab that further data were available in the UNFC format.
Inconsistencies across UNFC data; where data providers are attempting to compile or convert their existing data to UNFC can cause some problems. Inexperience, or a different understanding of the UNFC system by the data provider, can result in some issues with the data. Inconstancies between data providers on what is 'economic' or not can cause some issues for example	All data underwent thorough QA and any issues identified were referred back to the original data provider to find a solution. This involved either a revision of the data provided, or a comment added for further clarification of the data.
Amalgamated non-compliant and CRIRSCO-compliant data; it was not possible to separate out the CRIRSCO-compliant data in these instances resulting in compliant data masked by non-compliant data	The data provider was unable to provide more detailed information; a comment was added to the database to say this included compliant data for specific deposits.
National code omitted from the original categories when designing the survey	Data were provided through the comments field; the code was subsequently added to the database during the QA process and the inputted data updated.

Duplicating effort with national databases	Some data providers questioned the necessity for this survey as they already provide data in a centralized national database, and as such they did not provide the data. BGS entered the data manually in order to ensure completeness of the dataset.
Code list for production used for resources and reserves	Data providers had to choose a commodity for their data input sometimes these were incorrect or misleading, for example Tungsten (mine production, metal content). Resources and reserves are not 'mine production' data.
Missing commodities on the code list	Data providers provided the information separately to the survey manager in an Excel format. These were added manually to the database during the QA.
Some data providers simply do not have a national central database or even a compilation of these data. Or if they do they are as historical estimates which may include newly reassessed and compliant data	A comment was added where the data added were non-compliant but included CRIRSCO-compliant data.
Data providers unable to delete data entered erroneously	In this iteration of the survey data providers were unable to delete any data entries. Typically, the data provider added a comment to delete the row, or contacted GeoZS directly to highlight necessary deletions, which was completed during the QA.

4.3 Lessons learned

- Overall, the use of an online platform to collect the data is easier than using individual Excel forms to collect the data. The former allows the survey creator to have better control over the data being entered.
- UNFC gives the scope for allowing comparison across borders, particularly where data are not reported according to a CRIRSCO-compliant code. The provision of data using an internationally recognised compliant code also allows for the comparison of data. CRIRSCO-compliant data are more reliable in that they have been assessed by a competent person and signed off on as such.
- UNFC data, where data providers are attempting to compile or convert their existing data to UNFC, can cause some problems. Inexperience of the data provider in the use of UNFC can result in inconstancies between data providers on what is 'economic' or not.
- A thorough QA and QC procedure is necessary to ensure issues described in table 4 above are picked up and rectified, however, this is a time consuming and challenging task given the substantial amount of data provided.

- Some data providers simply do not have a national central database or even compilation of these data. Sometimes a national central database can contain historical estimates which may include newly reassessed and compliant data. When this is the case it is not possible to separate the compliant data from the uncompliant data.
- Clear and sensible INSPIRE-compliant code lists are to be outlined and tested in advance of the survey release.
- Standardized code lists are that are understood and used by all partners are essential so that reserve and resource datasets become harmonized.
- It is not possible to compile aggregated EU UNFC figures because many data providers did not provide this type of data.

5 EXPLORATION DATA

Data for exploration activities were collected under the MINTELL4EU project, these data were first collected by the Minerals4EU project by means of a one-off Excel-based survey that was sent out to individual partners and data providers and compiled centrally by BGS. This survey was repeated for the MINTELL4EU project but using an online digital survey form instead with the aim of improving consistency and allowing an easier method of data handling once collected.

5.1 Data collection

Data were collected during the same survey and using the same survey platform as the resources and reserve data collection exercise. Mineral resources and reserve data were provided by the following 7 countries: Albania, Cyprus, Finland, Hungary, Italy, Slovenia, Spain.

5.2 Issues encountered and solutions adopted

Many data providers were unable to deliver the full suite of data requested. Visualisation of exploration, without collecting spatial data, is challenging.

Table 5: Exploration data – issues encountered and solutions adopted

Issues encountered	Solutions adopted
Missing data	Data for metrics such as the amount of money spent on exploration are least likely to have been available. No solution was available for this missing metric.
Data are confidential; for example, where there are only a few explorers for a particular commodity within a country	Where data are confidential, a 'c' was added to the EGDI display function indicating data exist but were confidential.

5.3 Lessons learned

- Overall, the use of an online platform to collect the data is easier than using individual Excel forms to collect the data. The former allows the survey creator to have better control over the data being entered.
- Some data providers simply do not have a national central database or do not collect data for one or more of the metrics required.

6 ELECTRONIC DATA TRANSFER FROM BGS

The MINTELL4EU project established the ability to transfer data electronically using a method that is more interoperable than the Excel sheets used previously. The service can provide data outputs if required by a user, but for the extraction of data by GEUS, GML is preferred, and this service provides it by default.

6.1 Method

The relevant data for the e-MYB are extracted from the World Mineral Statistics database, held by the BGS. This requires comparing and correlating the database 'codes' for commodities, units, etc. with the INSPIRE 'code-list' terms used by the MINTELL4EU project for the e-MYB. This is re-usable on an annual basis with minimal updates. These data are then moved outside the BGS firewall in order for these to be accessible externally. A Web Feature Service (WFS) was then set up using this external database. The service is public and can be used by any party to obtain e-MYB data, using any software client that understands the WFS protocol.

To access the data the user must enter this URL: http://ogc2.bgs.ac.uk/cgi-bin/mintell/ows.

This service can be used by project partners to update their database; GEUS set up a central database, called MIN4EU database, that encompasses the e-MYB and the spatial data for resources that have been collected elsewhere within Minerals4EU, MINTELL4EU and other relevant projects. The BRGM Minerals4EU platform will be discontinued at the end of 2021.

BGS received additional internal funding from the BGS Innovation Flexible Fund (IFF), this allowed the BGS World Mineral Statistics database to be updated to include a spatial element (a centroid) for each country, and to make it more interoperable with BGS and external datasets. Prior to this, the exported e-MYB data had to be joined to centroid data from an alternate source, to enable the WFS (which requires a spatial component). This IFF work has had the benefit of meaning that the external database doesn't need to be manually created each year for the electronic transfer to happen, via the WFS. As BGS publishes new data, the data accessed by the service will update automatically and will be available to European partners.

6.2 Issues encountered and solutions adopted

Table 6: Electronic data transfer – issues encountered and solutions adopted

Issues encountered	Solutions adopted
Capacity; having sufficient available staff with the right skills to develop the work	Staff with the necessary skills had time 'booked' in advance to ensure delivery of the project.
Terms (or codes) are missing	The code list is set by INSPIRE/CGI (i.e. is it INSPIRE-compliant). The code list

	was extended where needed to fulfil the project needs.
Problematic to finalise 'code lists; this non-harmonisation caused some delays with the resources/reserves/exploration survey. In particular there wasn't a 'standard' way in which people listed mineral commodity names	A column was added to the 'code list' that specifies the use, so for example for the e-MYB the code lists uses one set of commodity names but for the Minerals Inventory (i.e. the spatial resource layers) there's a subtly different list, etc.

6.3 Lessons learned

- It is a complicated process that involves multiple skilled staff at different organisations, along with attempting to manage non-interoperable datasets and databases.

- Automation is very difficult and requires human intervention at many points.

7 DATA VISUALISATION

The data compiled for the MINTELL4EU project has been published as a series of interactive maps on the EGDI (Figure 1). Countries that have available data on production, resources, reserves and trade are highlighted when the chosen metric is selected.

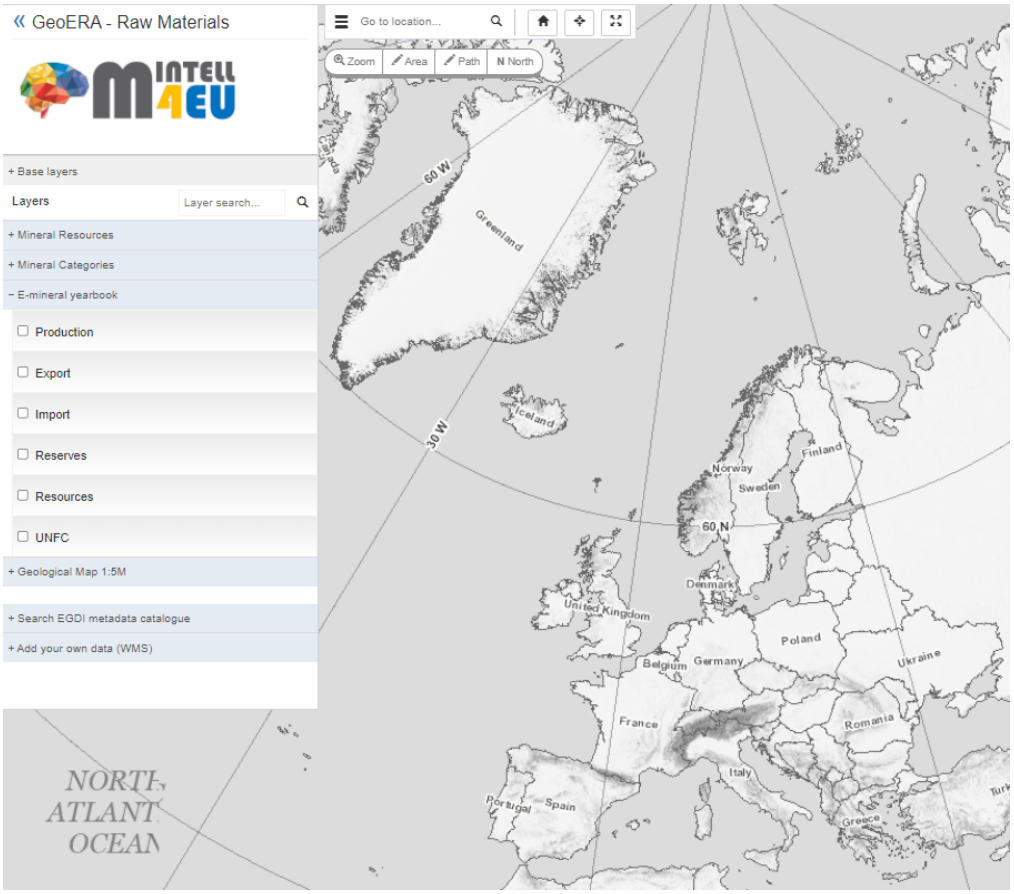

Figure 1: Overview of the MINTELL4EU EGDI data viewer.

7.1 Method

The integration of the new MINTELL4EU data with previous data collected for the Minerals4EU project are outlined in the MINTELL4EU deliverable D5.2 'Recommendations for integration of results into the GeoERA Information Platform'.

In the EGDI, data for the MINTELL4EU project is found under the 'E-mineral yearbook' tab and data for production, trade, resources, reserves, UNFC and exploration can be selected and toggled on and off depending on the user needs (Figure 2). Data for individual countries are available in a table in a pop up when the country is selected.

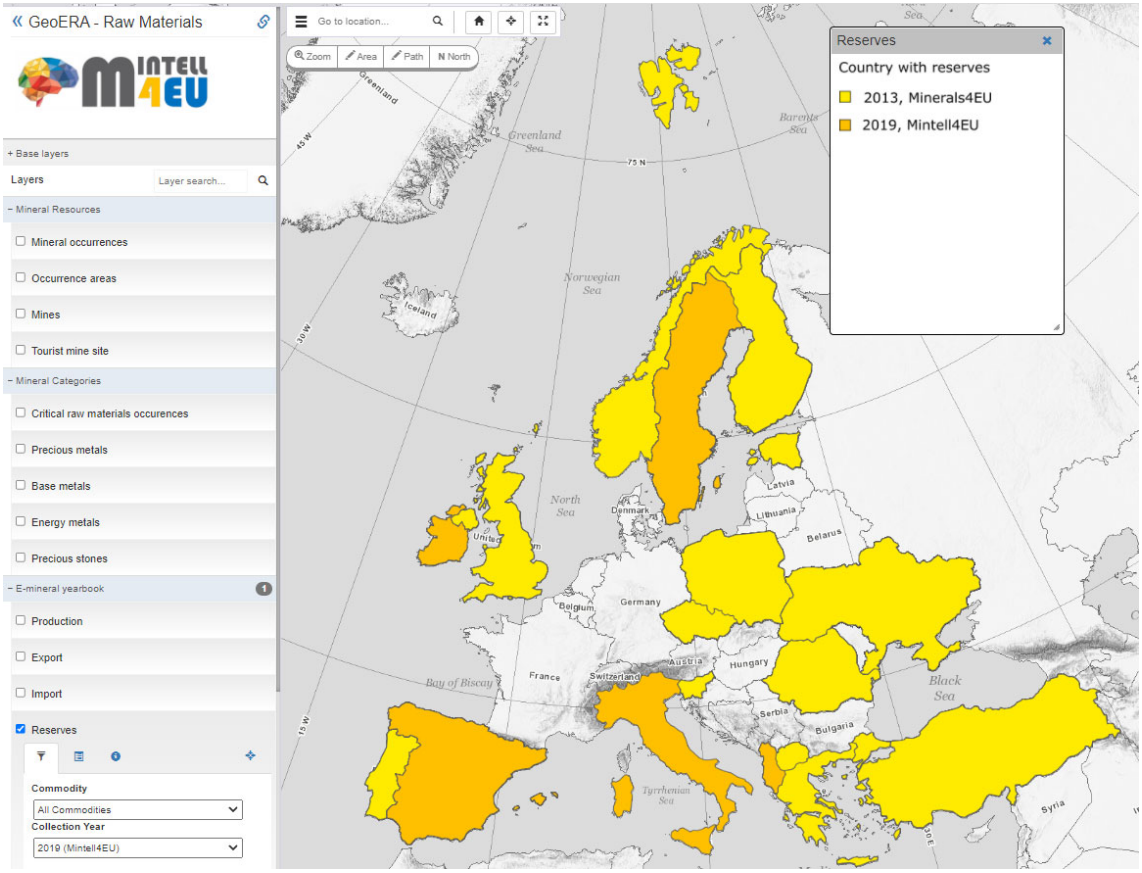

Figure 2: Visualisation of the reserves metric data. Data from both 2013 and 2019 are available on the EGDI.

7.2 Issues encountered and solutions adopted

Table 7: Data visualisation – issues encountered and solutions adopted

Issues encountered	Solutions adopted
Capacity; having sufficient available staff with the right skills to develop the work.	Staff with the necessary skills had time 'booked' in advance to ensure delivery of the project.
Terms (or codes) are missing.	A '#' has been used instead of a name in some instances to prevent null values. For examples, where the higher classification ('Commodity Group') doesn't exist in the INSPIRE-compliant database.
Data availability or form – where data were provided in 2013 but not in 2019 or different forms of data were provided in the two projects	Data for both 2013 and 2019 have been visualized in the EGDI to ensure all available data have been provided to the data users.

7.3 Lessons learned

- It is a complicated process that involves multiple skilled staff who understand the data that is being presented.
- The process is iterative, involving those designing the data visualisation platform and the data compilers.

8 CONCLUSIONS

Work Package 2 of the MINTELL4EU project has brought together data on mineral production, trade, resources, reserves and exploration in Europe, updating the data previously collected under the Minerals4EU project. These data are available to view using a map viewer on the EGDI and as downloadable data from the same source.

The project has provided a detailed update on mineral statistics for Europe and as such will be of great use to policy makers and those interested in European industry and trade.

Data on production and trade are directly comparable with data collected from the previous survey. Resource and reserve data have been updated with a reference year of 2019. All data have been quality assessed and controlled. Given the variable nature of the resource and reserve data provided it has not been possible to compile a whole number for any given commodity in Europe. However, more countries have used the UNFC method for data compilation and as such progress has been made towards this goal. The Minerals4EU project proposed that a CRIRSCO-compliant code could be a good way to achieve this and the Pan European Resources Code would have been a good alternative or indeed complimentary to UNFC, however, this doesn't consider the data available for historical estimates etc. and as such cannot give a complete picture of resource stocks, additionally some national resource classifications may be incompatible with CRIRSCO-compliant data.

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