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Mapping of the available business opportunities in the ESEE region (D6.1.)

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List of Acronyms

ALB	Albania
BiH	Bosnia and Herzegovina
CRMs	Critical Raw Materials
ESEE	East and South East Europe
EU	European Union
FBiH	Federation of Bosnia and Herzegovina
HRV	Croatia
IPI	Industrial Production Index
GIS	Geographic Information Systems
MEI	Ministry of Energy and Industry, Republic of Albania
METE	Ministry of Economy, Trade and Energy, Republic of Albania
MKD	Northern Macedonia
MNE	Montenegro
M&Q	Mining and Quarrying
PRM	Primary Raw Materials
REE	Rare Earth Elements
RM	Raw Materials
RSK	Republic of Srpska
SRB	Serbia
SRM	Secondary Raw Materials
PFS	Prefeasibility Study
R&D	Research and Development
WMD	World Mining Data

EXECUTIVE SUMMARY

The present report constitutes Deliverable 6.1, entitled "Mapping of the available business opportunities in the ESEE region, prepared as a part of RESEERVE's Work Package 6 "SWOT/GAP analysis and business opportunities in the ESEE region".

As provisioned in the project description, the aim of this task is to utilize the results of WP3, WP4 and WP5 with the identified PRM and SRM resources and along with a dedicated group of stakeholders from WP2 to perform a screening exercise to identify those cases that have a potential to become marketable.

The present Deliverable includes the following chapters:

1. INTRODUCTION
2. METHODOLOGY
3. EVALUATION OF PRM
4. EVALUATION OF SRM
5. SUMMARY & CONCLUSIONS
6. REFERENCES

supported by the following Annexes:

ANNEX I. Questionnaire for Task Partners
ANNEX II. Questionnaire for Industrial Stakeholders
ANNEX III. PRM Resources of the 6 ESEE ESEE countries (Mines/ Quarries/ Greenfields)
ANNEX IV. Metal prices & Metal products variations in the period 2011-2020.
ANNEX V. SRM, Important Processing Waste Sites of the 6 ESEE countries
ANNEX VI. Maps

The primary source of information for this Deliverable is the RESEERVE West Balkan Mineral Register of (a) Primary Raw Material data, (b) Secondary Raw Material Data, https://reseerve.eu. Moreover, data presented in the relevant Deliverables of RESEERVE and National Thematic Workshops, Communication with the Project Coordinator, GeoZS, and the respective TPs along with the information compiled from an extensive Literature review were used in order to Map available Business Opportunities in the ESEE region, and particularly in the 6 ESEE countries examined. Due to the prevailing COVID-19 conditions that did not allow the organization of physical meetings since March 2020, the NTUA team paid extra efforts with emails and on line meetings to enhance the communication with selected stake holders for their input in Mapping business opportunities.

The analysis of **PRM** data, i.e. 437 PRM sites, regarding the potential of the examined mineral deposits, mines or greenfield sites to be considered as business opportunities was conducted taking into account a number of parameters such as:

- Geological potential**,** including information on the size of the mineral resources /reserves and the commodities involved, with emphasis on rare and precious metals as well as REEs,
- Status of the Mine: operating, under development, closed, abandoned,
- Finance and support**,** describing business environment, in combination to current metal prices, and their changes in the period 2011-2021,

- Opportunities or alternatively favourable conditions, such prevailing legal framework, conditions enhancing M&Q activities and Risks or alternatively negative aspects, conditions adversely affecting the development of RM sector, such as the availability of the technical staff with the needed skills.

For the assessment of the potential of **SRM** as business opportunities, the data initially provided by GeoZS in October 2020 and then structured in the form of the Mineral Register of Secondary Raw Materials (https://reseerve.eu/results) were used. The SRM categories taken into account are: Mining Waste Landfills, Processing Waste (Flotation Tailings), Processing Waste (Red Mud Dam), Slag/Ash Landfills [Slag/Ash Landfills (Smelter), Slag/Ash Landfills (Ironworks)]. In parallel with the Mineral Register of SRMs building, GeoZS undertook to highlight the most attractive cases, and concluded with a 26 *important fields* table corresponding to 43 waste facilities. The data provided for these cases include information on the related mining activity, the process from which the wastes were derived, quantitaties, composition, historical information, restoration status, e.tc. At a later stage this information was updated by GeoZs, concluding with 37 perspective cases.

The evaluation of above SRM sites as potential business opportunities was based on a number of parameters including waste type, waste potential depending on the quantity and quality of those materials, and other factors such as prevailing legal framework, processing methods e.tc.

Analysis of business opportunities within the recorded PRM and SRM sources in the 6 ESEE Countries was supported with analytical Maps created in ArcGIS 10.5.1 environment taking into account the Technical guidelines for Mineral Resources of the INSPIRE Directive.

To summarize the business opportunities related with the sustainable development of PRM s in the 6 ESEE countries, an integrated Table (Table 1) was constructed, where the business opportunities were classified as Low, Medium, High and Very High based on the following parameters:

- Geological Potential of examined commodity taking into account the size of the deposit, A, B, C,D and /or the number of deposits encountered in the same area
- Reserves type, (INSPIRE)
- Current status, Feasibility, Operating, Abandoned, etc. (INSPIRE)
- Occurrence of CRMs in the PRMs examined
- Perspective of the examined commodity and its variation in the last decade
- Proposals by the TPs
- Other aspects, such as Business Environment, Legal framework, Availability of skilled professionals and technical personnel etc.

As illustrated in Table 1, there are a significant number of business opportunities in the 6 ESEE Countries for PRM and the construction of the geodatabase of the West Balkan Mineral Register is a major step in mapping the availability of businesses opportunities.

Table 1: Summary of proposed business opportunities in the PRMs Resources of the 6 ESEE countries

Legend:	Low	Moderate	High	Very high	Unknown

Ore description / Rock / Mineral	Albania	Bosnia & Herzegovina		Croatia	Montenegro	North Macedonia	Serbia
		FBiH	RSK				
Metallic & Precious PRM commodities							
Antimony ore		Exploration to increase level of confidence and reserves	Exploration to increase level of confidence and reserves			Exploration to increase level of confidence and reserves	Exploration to increase level of confidence and reserves
Bauxite		Exploration to increase level of confidence and reserves; Geochemical research to assess content of CRMs	Exploration to increase level of confidence and reserves; Geochemical research to assess levels of CRMs.	Geochemical research to assess content of CRMs	Geochemical research to assess content of CRMs		
Chromite	Exploration to increase level of confidence and reserves						
Cobalt ore		Development of Mines					
Copper ore	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.					Development of Mines, and/or Green fields	Development of Mines, and/or Green fields
Gold ore	Exploration to increase level of confidence	Exploration to increase level of confidence and reserves					Development of Mines, and/or Green fields.
Iron ores, iron-nickel, nickel ores	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.			Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields	
Lead, Zinc, Lead+Zinc ores		Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.		Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.

Table 1: Summary of proposed business opportunities in the PRMs Resources of the 6 ESEE countries

Legend:	Low	Moderate	High	Very high	Unknown

Ore description / Rock / Mineral	Albania	Bosnia & Herzegovina		Croatia	Montenegro	North Macedonia	Serbia
		FBiH	RSK				
Metallic & Precious PRM commodities (cont.)							
Mangenese ore		Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.				Development of Green fields	
Mercury ore		Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.					
Molybdenium ore						Development of Mines, and/or Green fields	Exploration to increase level of confidence and reserves; Development of Mines.
PGE							
Titanium ore	Development of Mines, and/or Green fields						
Energy Commodities							
Coal (Lignite	Alternative uses of lignite & mined out areas, e.g. PV		Alternative uses of lignite & mined out areas, e.g. PV		Alternative uses of lignite & mined out areas, e.g. PV	Alternative uses of lignite & mined out areas, e.g. PV	Alternative uses of lignite & mined out areas, e.g. PV
Uranium							

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Ore description / Rock / Mineral	Albania	Bosnia & Herzegovina		Croatia	Montenegro	North Macedonia	Serbia
		FBiH	RSK				
Non Metallic PRM Commodities							
Barite							
Bentonite			Development of Mines				
Borates, Lithium							Exploration to increase level of confidence and reserves; Research for added value uses.
Calcite				Research for added value uses		Research for added value uses	Exploration to increase level of confidence and reserves; Research for added value uses.
RM for Cement production				Use in infrastructure & construction		Use in infrastructure & construction	
Chrysothallite			Research for added value uses				
Common clays, clays			Use in infrastructure & construction			Use in infrastructure & construction	
Common crushed rock aggregates				Use in infrastructure & construction	Use in infrastructure & construction		
Dimension stone	Use in infrastructure & construction		Use in infrastructure & construction	Use in infrastructure & construction	Use in infrastructure & construction		
Dolomite						Development of Mines	
Feldspars						Exploration to increase reserves	
Gypsum			Use in infrastructure & construction				

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Ore description / Rock / Mineral	Albania	Bosnia & Herzegovina		Croatia	Montenegro	North Macedonia	Serbia
		FBiH	RSK				
Non Metallic PRM Commodities (cont.)							
Hard rock aggregates				Use in infrastructure & construction; Research for added value uses.	Use in infrastructure & construction; Research for added value uses.		
Kaolinite							Development of Mines
Magnesite							Exploration to increase level of confidence and reserves Development of Mines
Phosphates	Development of Mines						
Quartz			Research for added value uses	Research for added value uses			
Sand and gravel aggregates				Use in infrastructure & construction			Use in infrastructure & construction
Talc			Research for added value uses				
Zeolites			Exploration to increase level of confidence and reserves; Development of Quarries.				Research for added value uses

For Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia Business opportunities with Very High and High Potential are mainly associated with Metallic Commodities, and include Exploration activities to increase the level of confidence and increase reserves, and Development of Mines or Green Field areas. In Croatia the majority of Business opportunities are related to the Exploration and Development of Mines of Non Metallic Commodities, emphasis placed in the development of added value products.

Untapped potential of mineral resources and presence of "strategic" metals are only some of the factors adding value to M&Q sector of these countries with long-term tradition in mining, processing and metallurgical activities

However, for the sustainable growth of business activities in the PRM sector, quality control of the data available regarding the type and size of resources/reserves available is needed according to international classification standards. Legislation updating and codification as well as development of long-term strategies for the development and exploitation of PRMs are also necessary to ensure a favourable business environment, attractive for inward investment in the sector. As is the case for many ESEE EU countries areas that need improvement include the lengthy and multi staged permitting procedures, the absence of Land planning provisions for the development of the Mineral Wealth. Environmental issues related to the delineation and sustainable management of Nature protected areas in compliance with EU regulation, as well as the reclamation of historic and/or abandoned site are only some of the issues to be resolved in order to improve the social acceptance of the sector in the ESEE countries examined. Low investments in R&D regarding the exploration, mining, processing and recovery of PRM, as well as the absence of skilled professional and technical personnel are some of the other aspects to be confronted for the enhancement of business opportunities.

Regarding SRMs, the majority of waste disposal sites recorded for the 6 ESEE countries are related to Mining Waste landfills, that account to 1.371 out of the 1.461 sites examined, i.e. 94%. More than half of the sites (851) are found in ALB territory. The area occupied for these Mining Waste landfills, ranges from 45 % of the overall area of waste disposal facilities for SRB to 82 % for HRV. These data are in agreement with the type of PRM mined and processed in the 6 ESEE countries. Distribution of some key-Elements (Cu, Pb-Zn, Cr, Ni, Al, and Fe-Mn) was assessed based on the corresponding area occupied by the disposal sites of these wastes. The main Element found in Mining Waste Landfills and Flotation tailings is Cu amounting to 37% and 56%, respectively. Cu is also a major Element in Slag Landfills, 26%, where the main Elements are Fe-Mn (40%). Generally speaking, the Iron and ferro-alloys metals (Fe, Mn, Cr, as per the INSPIRE Guidelines) are present in all types of facilities, i.e. Mining Landfills (28%), Processing Landfills (10%) and Slag Landfills (49%).

Regarding Mining wastes, based on international practice and due to the relatively increased areas as compared to the other facility types, occupying an area of 3.308,26 Ha, and the lack of data regarding their chemical composition, these wastes depending on their properties could be beneficially used, if inert or alkaline, to backfill mining voids, as construction material for restoration of old mining sites, aggregates in embankment, road, pavement, foundation and building construction

Regarding Processing wastes disposal facilities, including Flotation Tailings, occupying 1.866,37 Ha Red Mud, 240,44 Ha, and Metallurgical wastes Slag/Ash, 337,74 Ha, it was deduced that in Albania, (ALB) the processing waste disposal sites that could present potential for Business opportunities were related to flotation tailings and metallurgical slags originating from processing of Cu and Cr

ores. In Bosnia and Herzegovina, (BiH), in FBiH and mainly in SRK, and in Montenegro, (MNE) the most important processing waste facilities to be further examined are related to Red Mud from Aluminium production, followed by a number of Pb-Zn, Mn and Fe flotation Tailings disposal facilities. In North Macedonia, (MKD), the most sizeable processing waste facilities relates to tailings from the flotation of Cu ores, Pb-Zn, Sb ores, and a smaller smelter slags disposal facility. Almost 20% of the overall waste sites' area is occupied by processing waste facilities recorded for Serbia, (SRB). The most important sites found in Serbia are related to tailings from the flotation of Cu and Pb-Zn ores, followed by a number of Cu, Fe, Pb-Sb slags disposal areas.

Depending on their quantities and composition above processing wastes could be reprocessed for the recovery of the contained metallic values, consisting potential business opportunities. Recovery of CRM, Rare Earths from Red Mud constitute an opportunity to be further examined.

Based on the Mineral Register the majority of these SRM Important fields are not reclaimed, adversely impacting the quality of the surrounding and downstream environment. Environmental impacts recorded include the formation of Acid Mine Drainage, an acidic effluent with elevated content of dissolved metals that subsequently impacts the quality of surface and ground waters and soils, Air pollution due to air born dispersion of dust and waste fine particles as well as Loss of Landscape.

Finally an important criterion to identify business opportunities in the examined PRM and SRM resources was the presence of CRM in the above commodities.

This evaluation was qualitative for the commodities where CRMs were not the prime element, given that in these cases no data regarding their reserves were available in the Mineral Registers.

One business opportunity of primary importance for countries like Croatia, Bosnia & Herzegovina and Montenegro is the evaluation of bauxite deposits regarding the potential recovery of Bauxite, consisting a CRM, as well as the other contained CRMs. Moreover, deposits of CRM such as Co, Sb and Ti are encountered in Albania and North Macedonia.

1. INTRODUCTION

RESEERVE project is a RIS KAVA project, mapping the mineral sources of the six ESEE countries: Albania, Bosnia and Herzegovina, Croatia, Serbia, Montenegro and North Macedonia, currently not included in the existing data platforms. The main project outcome is the creation of the *West Balkan Mineral Register for Primary* and *Secondary* mineral resources. The register will be a starting point to integrate the region into pan-European Minerals Intelligence Network and bring it closer to the common minerals market.

This action benefits investments at Balkan countries, taking into consideration the high risk encountered for the development of a mineral project and especially during its first stages.

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2. METHODOLOGY

2.1 GENERAL

For this Report, data presented in the relevant Deliverables of the RESEERVE project were examined. Sources of information for D6.1 include:

(1) RESEERVE Project deliverables

- *D3.2 "Report on the Evaluation of the PPM database"*
- *D3.3 "Development, description and testing of a prototype workflow"*
- *D4.1 "Report on competent sources and existing primary raw materials data"*
- *D5.1 "Report on competent sources and existing secondary raw materials data"*
- *D6.2 "Fact Sheet for the West Balkan Countries Status in Mining"*
- *D6.3 "SWOT and Gap analysis for the ESEE region"*
- *D4.3 "Report on creating West Balkan Mineral Register of PRM data.*
- *D5.3 "Report on creating West Balkan Mineral Register of SRM data*

(2) *RESEERVE West Balkan Mineral Register of (a) Primary Raw Material data,* (*b) Secondary Raw Material Data*, *https://reseerve.eu/*

(3) Materials presented in the National Thematic Workshops conducted in the period 2018-2020, where members of the NTUA team participated

(4) INSPIRE Directive, 2007/2/EC, Infrastructure for Spatial Information in Europe, D2.8.III.21 Data Specification on Mineral Resources –Technical Guidelines

(5) Literature Review

Prior to the analysis and evaluation of the above Primary and Secondary Raw Materials, the term business opportunity was defined. In economics, this term is used as a packaged business investment that allows the buyer to begin a business (*Entrepreneur, 2020*).

The present report focuses on the identification of business opportunities arising at the different stages of a mining project, from the initial stage of mineral exploration of PRM to the stage of mine production, ore processing as well as reprocessing of SRM for the recovery of contained mineral values. Consequently, business opportunities might arise from the exploration of minerals potential, to services like consultancy[1]. Valorising those deposits constitutes a multi-faceted challenge for companies, with a high range of activities needed, resulting in a high number of possibilities for making businesses, in diverse fields.

As mentioned by Seeger (*Seeger, 2019*), "mining business case needs to be marketed to mining investors and there are two key documents: the mining investor presentation and the mining

[1]And other cases, e.g. temporary developers, transportation, brokerage, financial consulting, equipment-based, machine sales, drilling, risk assessment services, power supply, equipment leasing, software and technology, security and safety services and even data mining

business plan…the key contents of both documents are the project summary, location, ownership, licenses, leadership, geology and exploration, resources and reserves, development strategy, mining, processing, infrastructure, market, logistics, mine development team, environmental and social aspects, the economic analysis and project plan…".

The analysis of **PRM** data regarding the potential of the examined mineral deposits, mines or greenfield sites to be considered as business opportunities was conducted for the 6 ESEE countries examined, taking into account a number of parameters such as:

- **Geological potential,** with information stemming initially from *D3.2*, the correspondence with the TP, and the West Balkans Mineral Register on PRM uploaded at the RESEERVE website on 23/12/2020. In this sense, geological potential includes information on the size of the mineral resources /reserves and the commodities involved, with emphasis on rare and precious metals as well as REEs.
- **Finance and support,** describing business environment, in combination to current metal prices, and their changes in the period 2011-2021,
- **Opportunities or alternatively positive aspects,** such as the existence of laws and regulations, enhancing M&Q activities and
- **Risks or alternatively negative aspects**, adversely affecting conditions for the development of RM sector, such as the availability of the technical staff with the needed skills.

Above parameters were based on the Rating Agencies from the Survey of Mining Companies 2018 of Fraser Institute (*D3.3*). It is also noted that the Quality of the Geological Database consist one of the most important factors, for company decisions to invest in various countries, and for reducing the risk of those high risk mine investment activities (Figure 2.1-1).

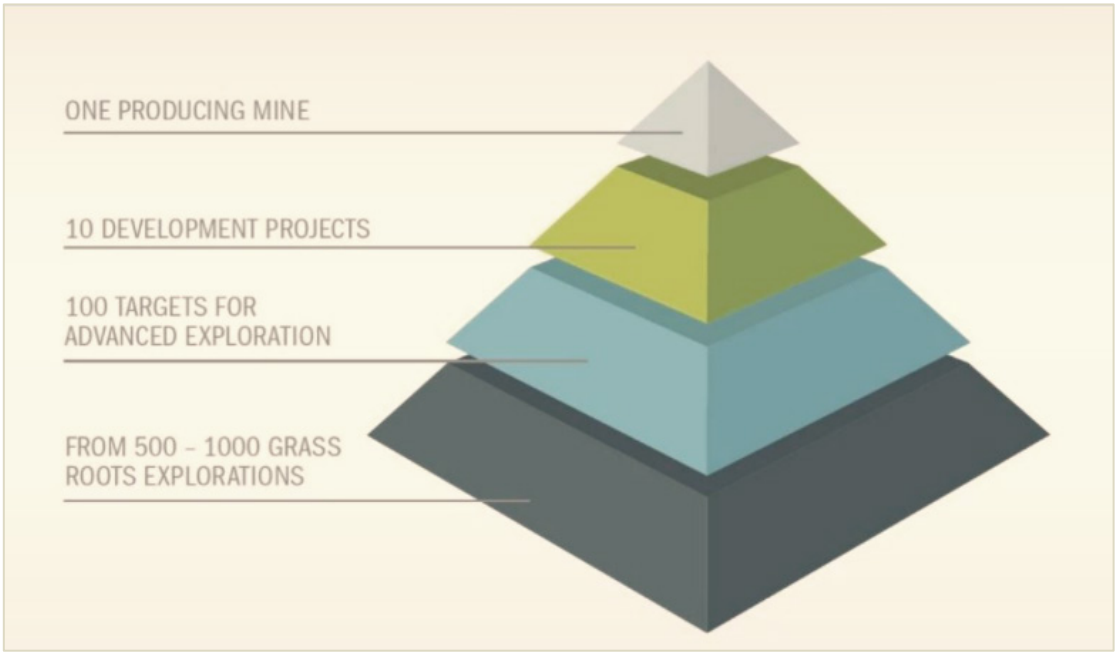


Figure 2.1-1: 1 in 1,000 exploration projects becomes a mine (Graphic Courtesy Fraser Institute[2]).

[2] https://www.fraserinstitute.org/file/permit-times-for-mining-exploration-pyramid-infographicjpg

Firstly, in order to assess the potential business opportunities in the 6 ESEE countries, the list of selected stakeholders including Industrial Stakeholders, Policy makers, and Geological Surveys were collected for each country via emails sent in September 2020 to the RESSERVE TPs, see ANNEX I. This correspondence referred to the 10 deposits initially submitted by each country, 70 in total, and summarized in *D3.2*, that were then reported.

Furthermore, after determining the factors that affect the development of business opportunities in the M&Q industry, summarized in Table 2.1-1 below, questionnaires were addressed to a dedicated group of industrial stakeholders, so as to collect the relevant available information for the deposits with economic potential. The questionnaires are included in ANNEX II.

Table 2.1-1: Rating Agencies for the 6 ESEE countries

• **Geological potential**	• **Trade (Imports, exports)**
• **Finance & Support**	• **Political stability**
• **Legal system**	• **Level of security**
• **Taxation system**	• **Quality of the geological database**
• **Disputed land claims - areas of protection**	• **Labour regulations-employment agreements**
• **Infrastructure**	• **Availability of labour/skills**
• **Socioeconomic agreements - R&D**	

The survey was circulated by email to 40 Industrial stakeholders, in the period September to October 2020. Industry locations are seen in Figure 2.1-2.

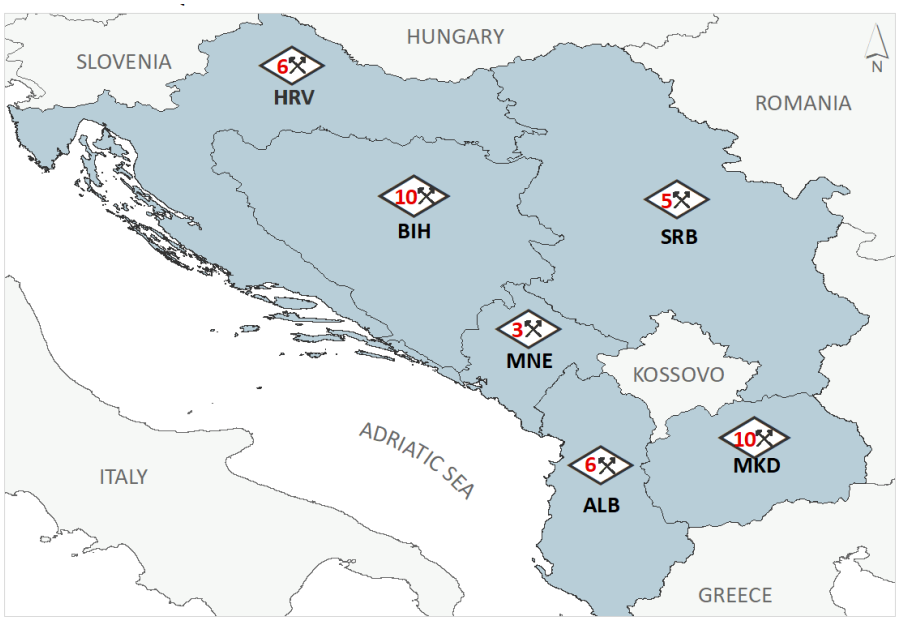


Figure 2.1-2: Number of Industrial stakeholders conducted with questionnaires at examined ESEE countries. Map created using ArcGIS 10.5.1.

Due to the prevailing COVID-19 conditions, completed questionnaires were received only from Tara Resources AG / Brskovo Mine d.o.o., and Balkan Exploration and Mining d.o.o., operating in MNE and

SRB, respectively. Rio Sava Exploration d.o.o. also responded that they could not provide requested data for confidentiality reasons. .

The above responses were used for the assessment of available business opportunities in MNE, and SRB.

Finally the *PRM data* presented in the RESEERVE West Balkan Mineral Register, uploaded on the RESEERVE website in December 2020 were examined. As reported in *D 4.3*, 473 PRM sites described with 27 attributes are included into Mineral Register. Among them, there are 248 metal sites and 225 sites of industrial minerals and construction materials".

These PRM sites described with 20 attributes, 18 derived from the Mineral Register and *D 4.3*, and 2 added by the NTUA team, are presented in ANNEX III for each of the countries examined. The selected attributes are given below:

General data:

- Mines (active or greenfield), (INSPIRE)
- Municipality of mineral deposit
- X and Y WGS84 (World Geodetic System) coordinates, (INSPIRE)
- Country in which deposit, (INSPIRE)

Technical data:

- *Ore description or Commodity*
- *Commodity group, (INSPIRE)*
- Site's Current status (operating, closed, abandoned, feasibility etc.), (INSPIRE)
- Mining method (open pit, underground, quarrying etc.)
- Concessionaire's name, (INSPIRE)
- Mineral reserves (calculated in tonnes), (INSPIRE)
- Reserves type (proved, probable etc.), (INSPIRE)
- Concentration of useful component in ore

Geological data were divided into:

- Type of mineral deposit (INSPIRE)
- Size of mineral deposit (INSPIRE)
- Age of mineral deposit (INSPIRE)
- Hosting rock type,
- Major (INSPIRE), minor and trace minerals (according to their abundance),
- Final product (produced or could be produced from raw material, (INSPIRE).

Additional data were also compiled through literature review, and communication with RESEERVE TPs**.** The results of the **PRM** data evaluation regarding potential business opportunities in the 6 ESEE countries are presented in **Chapter 3** of this Deliverable. Maps with the PRM resources were created in ArcGIS 10.5.1 for each of the 6 ESEE countries examined using the INSPIRE Directive Technical Guidelines -Data Specification on Mineral Resources. The maps are included in ANNEX VI in high resolution.

Subsequently, in order to assess the potential of **SRM** as business opportunities, SRM (*Ec.europa.eu. RM, 2020)*, consisting waste or/and by-products to be recycled, and injected back into the economy, the data initially provided by GeoZS in October 2020 and then structured in the form of the *Mineral Register of Secondary Raw Materials* (https://reseerve.eu/results) were used. The Register provided data on "basic geographical information of each site, type of waste landfill, geometry and primary extracted elements". In parallel with the Mineral Register of SRMs building, GeoZS undertook to highlight the most attractive cases, among the Register's records, regarding the inclusion of materials of economic interest. GeoZS concluded with a 26 *important fields* table corresponding to 43 waste facilities. The data provided for these cases by GeoZS include information on the related mining activity, the process that derived the waste, quantitative figures, composition, historical information, restoration status, etc. At a later stage this information was updated by GeoZs, concluding with 37 perspective cases.

Within the framework of the present Deliverable, all RESEERVE data sources were used. However, after examination of the available information, the NTUA team concluded with 37 waste sites for evaluation.

The Table presenting the detailed information available for the 37 important fields is given in ANNEX IV. The SRM categories taken into account are: Mining Waste Landfills, Processing Waste (Flotation Tailings), Processing Waste (Red Mud Dam), Slag/Ash Landfills [Slag/Ash Landfills (Smelter), Slag/Ash Landfills (Ironworks)].

The evaluation of above SRM sites as potential business opportunities was based on a number of parameters including waste type, waste potential depending on the quantity and quality of those materials, and other factors such as prevailing legal framework, processing methods e.tc. SRM evaluation results are presented in **Chapter 4** for the 6 ESEE countries examined. A Map with the SRM resources were created in ArcGIS 10.5.1 for the overall area of the 6 ESEE countries examined (Map 7).

2.2 CRITERIA FOR THE EVALUATION OF PRM

In the following section the criteria used to assess the economic potential of examined PRM deposits to consist business opportunities are presented.

2.2.1 GEOLOGICAL POTENTIAL

Geological potential, (i.e. size and category of the ore deposit/resources/reserves and commodities involved) is one of the most important factors, in fact a prerequisite, controlling whether an area of interest could be considered as a business opportunity.

Complexity of the geological formations, continuity of the ore body, depth of the deposit, size and grade of mineable portion of the ore body, mining method, type of the ore deposit, and mining/metallurgical procedures used for the ore extraction, are only some characteristics, in association to the area's geology, that a mining company should deal with at a mining project.

2.2.2 FINANCIAL DATA

Prevailing financial status and supportive actions for sector's development, as well as business environment and endowment for ESEE countries are essential factors that determine the development of industrial sector for each region of interest.

Market environment and technological advances determines whether a mineral deposit will be exploited or it will be classified as uneconomic for exploitation (*Skinner, 2015*). Market factors, such as commodity prices, cost of capital needed to develop a mine rapidly change.

Commodity prices depend on many factors, such as geography of the economic deposit, with countries having large share of production or consumption determining prices, commodity characteristics, emergency & crisis situations e.tc (*Papp, et al., 2008*). In line with the emergency situations, pandemic of 2020 has already affected the trends in the prices of the main metals *(Cofacecentraleurope, 2020).*

Current metal prices constitute an important indicator to conclude what are the most promising business opportunities to invest in PRM, and a preliminary approach was applied in this study**.** This deliverable presents current metal prices of the metals contained in the PRM of the ESEE countries examined, as well their variation in the last decade, 2011-2021.

2.2.3 OTHER ASPECTS

Other factors examined in the present Deliverable to assess potential business opportunities in the PRM sector are the favourable conditions or pros, enhancing the development of mining activities, and the negative aspects or cons, adversely impacting the commencement and continuation of mining PRM. Factors such as deposit's geographic location, access to transportation, political stability of the region, availability of skilled labour force, are only some of the factors to be examined to assess the feasibility and sustainability of a mining activity. This analysis was conducted on a country level, elucidating thus the multifaceted approach for the development of business opportunities in the M&Q sector.

2.3 CRITERIA FOR THE EVALUATION OF SRM

The criteria used to assess SRM sites in the ESEE countries examined regarding their potential to consist business opportunities are presented below. However, it should be noted that the basic principles applied for PRMs as per their potential exploitation coincide with the parameters applied in the evaluation of secondary resource (SRM).

2.3.1 WASTE POTENTIAL

Waste potential in the sense of this deliverable (i.e. size and category of the waste and commodities involved) is one of the most important factors, actually a prerequisite, controlling whether an area of interest could be considered as a business opportunity. This parameter emphasizes on quantitative and qualitative data of SRM, in the countries examined, with the above properties determining the Waste Potential for future use.

2.3.2 WASTE TYPE

One of the criteria used to evaluate the potential exploitation of SRM is their categorization in line with their Waste Type, as produced from different mining and metallurgical activities. Each category of SRM has a wide range of metal concentrations, and different extractable metals. Furthermore, based on the international experience, as well as historic data regarding various extractive and metallurgical wastes, it is assumed that these wastes will include the mined or processed.

As already stated, the waste categories taken into account are the categories included Register's categories, i.e.: Mining Waste Landfills, Processing Waste (Flotation Tailings), Processing Waste (Red Mud Dam), Slag/Ash Landfills [Slag/Ash Landfills (Smelter), Slag/Ash Landfills (Ironworks)].

2.3.3 FINANCIAL DATA

The data already presented for PRM will be also used for SRMs.

2.3.4 OTHER ASPECTS

Favourable and adverse conditions for conducting investments on the reprocessing and reusing of SRM at the 6 countries of ESEE region were also examined. An additional parameter taken into account for the evaluation of SRM as compared to PRM, relates to the environmental impacts in the broader area of the waste sites that may be considered as a positive or an adverse parameter respectively, depending on the specific site conditions.

3. EVALUATION OF PRM

In this Chapter parameters such as countries geological potential, financial status, and other aspects were examined in order to outline the cases of PRM to be considered as potential; business opportunities for the examined 6 ESEE countries.

3.1 ALBANIA (ALB)

3.1.1 GEOLOGICAL POTENTIAL

Based on the RESEERVE data available for the country, i.e. *D.4.1*, *D.3.2*, Communication with the respective TP within Task 6.1, as well as the relevant information included in the *RESEERVE Balkan Mineral Register of PRM* (https://reseerve.eu/), see ANNEX III, Table III-1, Albania presents a remarkable potential for metallic PRMs, consisting mainly of chromites, iron-nickel and copper ore deposits. PRM of Albania are presented in Map 1**,** prepared for this Deliverable in compliance with INSPIRE Technical Guidelines using ArcGIS 10.5.1.

Regarding chromites and the iron-nickel ore deposits they are 'arranged' from north to south in parallel and sometimes close **to the line between Albania with Republic of North Macedonia and Kosovo.**

All chromites ore deposits reported in RESEERVE are currently exploited in twelve (12) operating underground mines, while five of them are located at the municipality of Bulqizë, a major chromites mining area in Albania. Based on the data of Albanian TP, the deposits sites, with their corresponding classification, as per the INSPIRE guidelines, are as follows: Batër (unknown), Bulqizë (D), Vlahën (D+), Krastë(D+), Thekën (D+), Kalimash 2 Tr 1 (C), Qafë Bulli (C), Kalimash 1 TR 7 (C), Kalimash 3 Tr. 6, 6A,A (D), Zogaj 3 (D), Katjel (D+), Batër (D). As can be seen, most of the related deposits may be characterized as Small to Medium Sized, with the exception of the Bulqizë mine classified as Medium Sized to Large. Regarding the Kalimash mining operations in this area started in 1978 and during the period of 1978 to 1997, 1,650,000t of chromite ore were produced until 2000. Moreover, as reported by the *National Agency of Natural Resources, Albania (AKBN, 2008),* mineral resources/reserves of all mines in the Kalimash area are estimated to 5,100,000 t, with an average grade of 18-23%Cr2O3, with higher ore grade expected in depth, also indicating the high chromium potential of the region (*AKBN, 2008*). These data are in general in agreement with the reserves listed in the RESEERVE Mineral Register of PRM for Albania, see Table III-1, ANNEX III.

Albania's geological potential of chromium ore is significant for the economy, with its main deposits being under production. High exports of chromite ores is also recorded to Europe[3] and other countries[4] *(Oec.world, Albania)*. As noted in Chapter 3.1.2, for improved economic outcome and increasing added value vertical integration of chromium's activities could consist a sustainable option.

The other important metallic PRM resource included together with chromites in the Commodity Group under the name *Iron and ferro-alloys metals,* as per the INSPIRE guidelines, includes one nickel and nine (9) iron-nickel ore deposits. Iron-nickel mines operating currently are: Bitinckë

[3]E.g. Serbia, Montenegro, Republic of North Macedonia, Italy, Malta, Switzerland, Greece e.tc.

[4] E.g. China, Turkey, United Arab Emirates e.tc.

(Underground, C+); Skroskë (Underground, C+); Trull (Open pit, D+); Kodra e Trullit (Underground, D+); Debrovë (Open pit, D+); Kapshticë (Open pit, D-); and the Mamëz open pit nickel ore mine (C).

Other cases include the site Liqeni i Kuq (Municipality of Librazhd, Greenfields), which refers to the development, and more specifically the feasibility study for the exploitation of a new iron-nickel ore deposit, presently classified as C. Finally, the current status of two underground mines (Guri i Kuq and Prenjas), of C size deposits is reported as Care and maintenance.

Cobalt is reported to be present as a minor metal in five (5) Iron-nickel cases, i.e. Bitinckë, Skroskë, Trull, Kodra e Trullit and Debrovë.

Concluding, ALB presents remarkable geological potential of iron-nickel ore, however, as reported in RESEERVE D.3.2 *"these resources estimation is not JORC compliant*. Bitinckë and Guri i Kuq, according to the RESEERVE Mineral Register have proved Ore Reserves of approximately 52-53Mt, each, could be considered as potential business opportunities. Based on data reported in *AKBN, 2008,* the metal's average content estimated to 1.63% Ni for Bitinckë, and 0.95 to 0.97% Ni for Guri i Kuq (*AKBN, 2008, D3.2)* Based on the above, these deposits present geological potential for future development and their exploitation will be determined by the prevailing market environment, as described in Chapter 3.1.2.

Regarding copper, and based on available data, all the ALB deposits reported in the RESEERVE Mineral Register fall within the range of Medium sized to Large sized deposits, as per the INSPIRE guidelines, based on the Cu contents given in relation to the deposit's size in tones. More specifically, the status of the mines is as follows:

Copper (underground) mines, presently operating include: Munellë; Spaç; Gurth - (Plakez); Qafë Bari. Four Greenfields sites, namely a site at the Fushë Arrëz Municipality and the deposits at Perlati Jugor, Çiflig and Nikoliq 2, concern copper ore resources under development at feasibility stage status, consisting thus potential business opportunities.

In addition, the Munellë deposit may be considered as a potential business opportunity. Munellë constitutes a Cu-massive, sulphides, polymetallic deposit, containing in addition to copper lead, zinc, gold and cobalt. It is formed in the crustal sequence overlying the Eastern-type massif of Mirdita ophiolites, a few km to the East (in the hanging-wall) of the Mirdita's main detachment fault ((*Sauvé, et al., 2018)*. Munellë's estimated resources amount to 6,325,245t (RESEERVE *D3.2*, *West Balkan Mineral Register PRM)*, with an average copper's content of 1.175% (*MEI, 2017*) As reported by the USBM, the site's mineral production in the first quarter of 2011 was to reach 300,000 Million t/yr (*Plachy, 1990*), accounting for more than half of the country's copper production. Munelles's polymetallic mine is characterized by varying mineral distribution; an ore body of about 1 Mt is reported to present a very high quality with average copper content 4 to 5%, zinc 3% and gold 4 gr/t, silver 65gr/t along with other elements such as selenium, stibium e.tc. (*MEI, 2017,* while other sources refer its mineralization ranging from 0.2 to 1.5 % copper, and 0.4 to 1.6% zinc (*Plachy, 1990*).

Nikoliq 2 and Perlati Jugor are characterized as small to medium size copper deposits. Nikoliq 2 constitutes a quartz-sulphur copper mineralization hosted in the gabbroic massif of Kaptena, at the NE part of Albania, while Perlati Jugor is another volcanogenic massive sulphidation (VMS) of Cyprus – type (*Kaza, et al., 2012; METE, 2010*). Perlati Jugor resources are three times higher than these of Nikoliq 2. Further exploration activities are needed in order to upgrade the categorization of estimated resources, in compliance with recognized standard code. Taking this into account it may

be deduced that in addition to Munellë, the Perlati Jugor could consist another deposit of economic interest, after confirming resources, and copper metal content data.

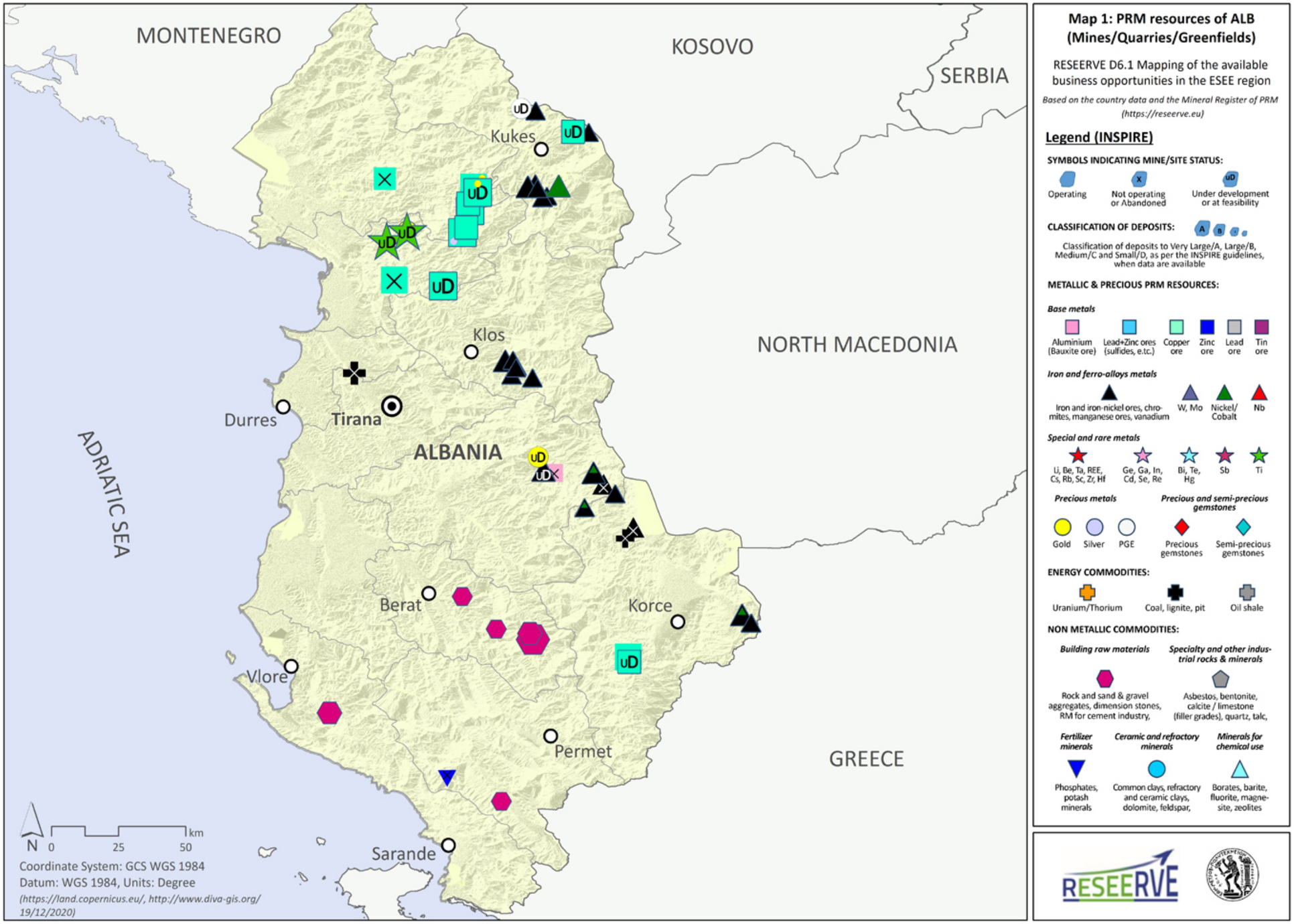
Based on data provided by the Task Partner from Albania, Bregu i Bjbest and Dardhe consist green areas, with no interest expressed to the present for their development. Bregu i Bjbest located close to Kosovo border in Tropoja massif is characterized as a PGM deposit in the geological setting of Tropoja ultramafic massif (*Boshnjaku & Kulici, 2002*). According to the information provided within *D3.2* the estimated reserves are about 550kg Pt, whereas in the Mineral Register reserves of 355.884t are reported, possibly indicating the low geological potential of the area. As for Dardhe, an aluminum ore occurrence, its resources are estimated to 460,000t, indicating the limited geological potential of the site. The same stands for the Gjazuj closed gold mine (orogenic gold, porphyry rock type), while the green site's Babje gold deposit is currently at the feasibility study stage, with 331.600t reserves, being thus a potential business opportunity.

Finally, two cases that warrant particular attention, as potential business opportunities, are the green areas Butmi and Sukaxhi (Municipality of Lezhë), where large deposits (class B+) of Ti-magnetite have been found and are presently at the feasibility stage.

Non-metallic PRMs of significance for ALB include the six (6) operating quarries at Qafë Bari, Milove (2 quarries), Gjorm, Novaj and Dervican for the production of limestone dimension stone and the operating quarry at Vodicë Bogdani, where sandstone dimension stone is produced. With the exception of the Milove quarry deposit that is exploited by Topi Eki Shpk and is described in the RESEERVE Mineral Register as class A (namely Very large deposit), the rest cases concern Small to Medium sized deposits (as per the INSPIRE guidelines). A Small phosphates deposit has also been reported at Fushë Bardhë with open pit mining in the past, presently not operating.

Regarding the Energy commodities group, Albania is a Mineral-Fuels producer with a total production of 1.272.070t for 2018, as reported in the World Mining Data (WMD) 2020 report. This production comprises 295.800t lignite, 910.670t petroleum and 82Mio m^3 natural gas. In is noted that in the ALB PRMs list of RESEERVE Mineral Register, two underground coal mines, i.e. Rinas F. Prezë (Medium sized deposit) and Malinë (Small deposit) were reported. Given the EU action to combat climate change, aiming at the gradual transition to other, than fossil fuel, energy sources in the next decade, and taking into account that these mines are underground, they are not considered as potential business opportunities.

It should be mentioned that the evaluation of the geological potential of all above mentioned areas was based on data not in compliance with an internationally recognized standard code, e.g. **JORC resource estimation** (*RESEERVE D3.2*). Therefore, additional exploration activities are required to improve the confidence level of the feasibility assessment for new investments at the sites that exhibit a potential for business opportunities.



Map 1: PRM Resources of Albania – ALB (Mines/ Quarries/ Greenfields

3.1.2 FINANCIAL DATA

In Albania numerous efforts aiming to create and maintain a strong industrial sector are recorded. The country relies on mining sector, however, a climate of high uncertainty for the future moves of the specific sector is also observed (*RESEERVE D6.2*), with many concerns expressed by international mining companies for the investment climate. In agreement with the above recent publications of EBRD note that the capital endowment and the business environment in ALB are characterized as medium for developing investment activities (*EBRD, 2017*; *D6.2)*.

The current mining activities are related to metallic ores (i.e. chromite, copper, iron – nickel and nickel – silicate ore). As seen in Figure 3.1-1, ALB is one of the international chromium ore producers.

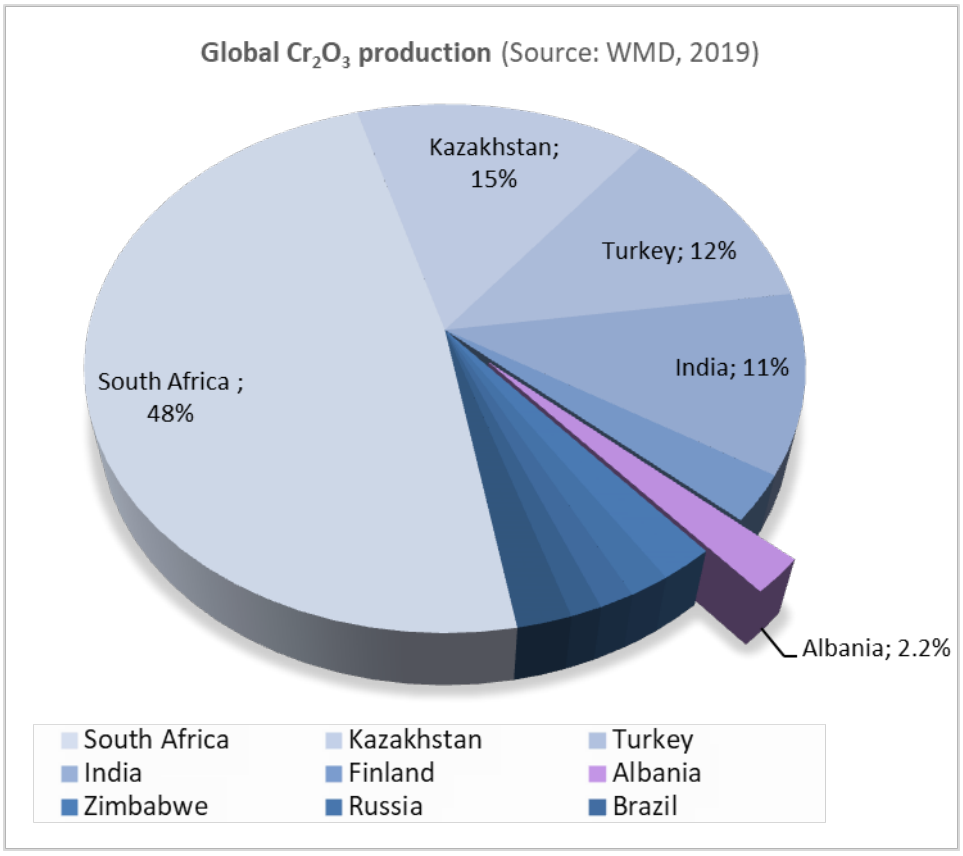


Figure 3.1-1: World players in chromium ore production (2017), including ALB

Moreover, minerals production also includes industrial minerals (e.g. kaolin and clay, gypsum, salt), as well as aggregates (e.g. dolomite, olivinite, limestone, limited production of sandstone and quartz. The contribution of mining activities to the GDP of ALB indicates an increasing trend prior to the beginning of pandemic (*TradingEconomics, Albania*).

Assuming that the geotechnical and geochemical characteristics of the deposits that present economic interest are accurately described, current prices of the relevant metals are also examined since they constitute important indicators in the process of selecting the most important business opportunities in ALB's mining industry. As already noted the metals of interest include chromium, copper, iron-nickel, as well as aluminum and platinum (Chapter 3.1.1).

Table 3.1-1 presents the above metal prices for 2011, 2019, and 2020 (see **ANNEX IV**). Comparing the 2020 prices with these of 2011, a decrease in most of the metals of interest is observed possibly attributed to the long recession period after 2010. When data of December 2020 are compared with the respective values of 2019, an increase was recorded, with copper presenting the highest change, followed by nickel. For these metals the lowest values of 2020 were recorded in middle – end of March2020, see **ANNEX IV**, coinciding with the outburst of the COVID-19 pandemic.

Table 3.1-1: Prices[5] for the metals of interest for ALB[6]

Metal of Interest	Metal Price			2020 price change as per 2011 (%)	2020 price change as per 2019 (%)
	2011	2019	2020		
Al ($/tn)	1.945,00	1.770,50	2.012,50	3,47%	13,67%
Cr ($/tn)	12.150,00	6.150,00	6.575,00	-45,88%	6,91%
Cu ($/tn)	7.415,50	6.155,50	7.838,50	5,70%	27,34%
Fe ore, 63,5% grade ($/tn)	-	-	135,56	-	+57.43%
Ni ($/tn)	18.570,00	14.220,00	17.342,00	-6,61%	21,95%
Pt (AM/PM AVG $/ tr.oz)	1.436,00	933,50	1.002,50	-30,19%	7,39%

Regarding chromium, ALB production amounts to 2.2% in global scale, **Figure 3.1-1.** Chromium trading differs from the other metals, since these are traded through the metal markets, whereas chromium[7] is traded under contracts, mainly directly between miners and foundries, preventing thus the speculators influence on the metal price. However, it is noted that Cr price shows an average downward trend during the period 2011-2020. As such, a long-term purchase commitment is required to ensure the economic viability of a potential new supplier in the chromium market (*KWG Resources*)**.** Finally, business opportunity for the chromium market in ALB is not related only to new sites exploitation, but on the vertical integration including the various stages of production and distribution of the relevant products and/or the supplying services.

In conclusion and taking into account historical data for the last decade (2011-2020[6]), it is concluded that the economic environment for copper and nickel exploitation allows considering these metals as potential investment opportunities for ALB. Specifically, based on Metal Bulletin data, it seems that copper price as of 15/12/2020 is very close to the price of 2011 for the same date, despite the average downward trend for the period 2011-2020. Ni also seems promising for business opportunities, since it shows an average upward trend during the last five years.

3.1.3 OTHER ASPECTS

The main favourable conditions present in Albania for business opportunities in the PRM are related with the Albanian geological potential, as well as with the continual growth of investments in mining sector. As described in the SWOT Analysis, see *RESEERVE D6.3*, there is a broad range of benefits that

[5] Prices for second semester of December

[6] Metal Bulletin, https://www.metalbulletin.com/

[7] Either as chromite or ferrochrome

could assist the growth of Albania's investment activities in the mining sector. More specifically ALB is characterized by:

- **Long mining tradition;** as documented from historical data, as well as available mapping from the Albanian Geological Survey reports, accessible to the public.
- **Significant mineral resources**; largely untapped, with the most important economic deposits located sparsely at the northern and eastern part of the country, Map 1**.**
- **Economy**; increasing trend for the contribution of M&Q activities in the country's GDP till 2018, as well as a high level of privatization of mining activities allowing future investments.

On the other hand, there are issues that need to be resolved for the support of PRM business opportunities in ALB, including:

- **Availability of data**; need for the harmonization of the available data on resources/reserves with international standards, e.g. JORC,
- **Licensing procedures**; comprising a key deterrent for foreign investments (*RESEERVE D6.2*)
- **Political & legislative framework**; ALB is not an EU member[8], a fact potentially impacting the business environment for foreign investors (*MEI, 2015*). As recently reported by the Ministry of Energy and Industry of the Republic of Albania, the country needs reforms to the strategic planning of the mining sector (*MEI, 2015*)
- **Economy**; an additional barrier is the medium level recorded for the capital endowment and the business environment in ALB (*EBRD, 2017*; *RESEERVE D6.2*). Most recent data till July 2020 regarding the income from M&Q sector (*TradingEconomics, Albania*) indicate a decrease in its contribution, affected by the emergency situation due to Covid-19,
- **Land use planning**; protected areas are not delineated to the present, in compliance with Natura 2000 requirements, and
- **Human resources**; the decreasing demographic trend and the absence of skilled professional employees, and technical staff, in mine exploration/exploitation, as well the low values for research and development index, adversely impact the growth of the M&Q sector.

[8]Ongoing EU accession negotiation being implemented while the full membership being expected in the year of 2020.

3.2 BOSNIA AND HERZEGOVINA (BIH)

3.2.1 GEOLOGICAL POTENTIAL

Based on the RESEERVE data available for the country, i.e. *D.4.1*, *D.3.2*, Communication with the respective TP within Task 6.1, as well as the relevant information included in the RESEERVE Balkan Mineral Register of PRM (RESEERVE website), see ANNEX III, Table III-2, BiH presents a remarkable potential for PRM. PRM of BiH are also presented in Map 2, prepared for this Deliverable in compliance with INSPIRE Technical Guidelines using ArcGIS 10.5.1.

Bosnia and Herzegovina (BiH) is a typical mining country in which numerous mineral deposits and countless occurrences of various metallic and non-metallic mineral PRMs are found. BiH has long tradition in exploration, exploitation and processing of minerals. The formation and distribution of PRM deposits in space and time are closely related to the Adriatic carbonates platform (bauxites), as well as the Dinarides ophiolite zone, where one can find magnesite, chromite, chrysotile-asbestos and talc deposits, as well as Ni, Co and Au bearing ore deposits due to hydrothermal activity. Further, the Durmitor Nappe, Panonian-Golija-Macedonia Nappe and Mid-Bosnian Schist include various PRMs, like quartz, quartzite, barite, iron, gold, antimonite, fluorite, gypsum-anhydrite, lead-zinc-barite, manganese, cinnabar and others (*Hrvatović, 2005*).

In agreement with the geological profile of the country, BiH has many Aluminium (Bauxite ore) PRM sites, including numerous occurrences. Specifically, fifty-three (53) sites with bauxite mineralization are reported in the Mineral Register of RESEERVE, the majority of which (48 areas) located in the Federation of Bosnia and Herzegovina (FBiH) territory which accounts for 51% of the country's geographical surface. The FBiH bauxites are accumulated in two groups, one at the north western part of the Federation, while the second one is extending in parallel to the southern border of the country with Croatia, see Map 2.

Based on the data for FBiH, including the Register, some of the following cases may be of interest for business opportunities:

(1) The Abandoned open pit mine in Jasenica - Lušci – Palanka, where the bauxite deposit is estimated to be around 15.000.000t, characterized as Medium sized deposit, i.e. class C, according to the INSPIRE guidelines. However, it should be mentioned that in the *RESEERVE D3.2* report, this tonnage has been defined by the TP as 'inferred resources', implying thus the need for additional activities in order to increase the confidence level regarding Aluminium reserves.

(2) Five (5) Small deposits with size ranging from 1.000.000t to 6.000.000t, corresponding to five Abandoned or Not Operating, NO, mines, including: the not operating open pit mine of Skočaj (5.000.000t / deposit Class D); the NO underground mine of Vranjska – Gudavac (1.000.000t / deposit Class D); the Abandoned, A, underground mine of Pritoka - Tihotina – Javornjača (1.000.000t / deposit Class D); the A underground mine of Suvaja – Šolaje (5.500.000t / deposit Class D); the A open pit mine of Krnjeuša - Mijačica (6.000.000t / deposit Class D+). The latter was included in the list of 10 Best business opportunities reported in *RESEERVE D3.2*, however the tonnage of this mine has also been defined by the TP as 'inferred resources'.

(3) Twenty-five, (25), cases of unknown bauxite resources were also included in the RESEERVE Register for the FBiH. Given that bauxite is included in the CRMs list of Europe 2020, a more detailed assessment of these cases would be required for ranking business opportunities.

The remaining seventeen (17) cases of the FBiH data entries, out of forty-eight in total corresponding to bauxite resources in the Register, are characterized by the TP as 'occurrences', namely insignificant resources, at present, with size (tonnes) in a range of a few thousands of tons to approximately 750.000t (Široki Brijeg).

All above 48 sites are presented in Map 2. As for the sites described as 'occurrences', i.e. not corresponding to an appropriate deposit class in INSPIRE, for the purposes of this Report and in order to also include them in Map 2, their class is defined as D- (see Table III-2, ANNEX III). In this way the overview for bauxite resources in FBiH is more complete based on the data provided by the TP.

In the second administrative entity of BiH, namely the Republic of Srpska, (RSK), a few bauxite ore deposits are reported. These deposits are currently being exploited in operating open pit mines located at Gradina, Braćan, Crvene stijene, Kosturi, Crveni pijesci-Pleće. No data are available on the size of these deposits in tonnes, however, in the Register are characterized as Large deposits (Class B, as per the INSPIRE Guidelines).

Other metallic PRMs are also found in BiH, such as chromites, iron-nickel ores, lead-zinc ores, copper ores and manganese. In addition to these, precious and rare metals are found like gold, cobaltium, mercury and antimonium.

Chromites in BiH are considered as of low quality. Only three sites were reported for this PRM, all of them related to abandoned mines, with the C class deposit of Duboštica (FBiH) presenting the higher potential. The Copper PRMs also look rather limited, since there is one occurrence in Čavka (RSK) and two abandoned mines in FBiH (Mačkara, Mračaj) containing Hg, with unknown reserves.

Many (16) iron-nickel deposits and occurrences exist, mainly in FBiH, corresponding mostly to abandoned mines with small sized deposits. There is only one operating mine located at Ljubija (RSK), an open pit mine with a class B deposit. The deposit of Smreka (FBiH) is described as Very large (class A) and has been proposed by TP as business opportunity. The rest of the proposed cases concern four abandoned, D class deposits located at Droškovac (FBiH) Radovan (FBiH) Tovarnica (FBiH) and Vardište (RSK). The latter was characterized as Large deposit (B) in the RESEERVE Mineral Register; however, within *D3.2* it was reported that 62.300t and great potential reserves exist there. This case has been proposed by the SRK TP in D.3.2 as a business opportunity possibly due to the fact that this is an iron-nickel ore.

From the above it is deduced that further exploration investments and analysis of the market environment needs are required before the commencement of new exploitation activities at these sites of FBiH.

PRMs of great interest are the lead, zinc and lead-zinc ores of the country, since they are present as Large, (B) and Very large, (A) deposits, while four cases concern Greenfields and mines under development, or construction. Presently two operating mines are reported: the Srebrenica-Sase (RSK) underground operating mine, with a class B deposit, containing Ag, Ge, Ga, and In and the Očekalj – Prgoševo (Olovo, FBiH) underground operating mine, with a class A deposit. The last has been proposed by the TP, as business opportunity. As for the Greenfields under development, they

include the class B deposit of Rupice (FBiH), that contains Au, Ag, and Sb and the class C deposit at Veovača that contains Ag. Both these cases have been proposed as business opportunities. The other two Greenfields reported concern two deposits of size B in Srebrenica (Vitlovac and Kazani, RSK), containing Ag, Ge, Ga, which are in the phase of construction. There are two more areas with lead and zinc ores, the Brezik (FBiH), abandoned open pit mine with deposit of class C and the Čelebići (RSK) of class B.

Regarding magnesium, a metal included in the CRM list for EU, magnesite mineralization seems rather poor at present concerning only abandoned small size deposits in RSK (Duvnica, Slatina, Šnjegotina-Vrbanja). These resources are considered as limited in the specific case, and indicate that further exploration activities are needed to upgrade their category. The high magnesium content is a positive indicator, i.e. 44 - 47% MgO, whereas the possible presence of SiO_2 and CaO constitutes a deterrent factor given that the area of Teslić (Slatina) is characterized by increased CaO levels (*Operta, & Bušatlić, 2018*). To verify whether these sites could present business opportunities their geological potential along with the prevailing market conditions need to be further examined.

Manganese ores are reported as occurrences (Banjalučka Kozara/RSK, Borašnica-Šuplji Kuk/FBiH, Gacko/RSK, Rudo/RSK, Uzlomac/RSK), small size deposits (Kajtezovac and Podzvizd in FBiH) and some C class deposits all located in FBiH (Vrnograč, Čevljanovići, Popović Polje, Radostovo and Vrnograč). The only mine operating currently (intermittently) is the one located at Popović Polje (FBiH). With the exception of the latter case, the BiH manganese resources are characterized by the TP as potential**,** indicating the need for further exploration, mainly at Vrnograč and Čevljanovići that present tonnages of 6.000.000t and 3.000.000t, respectively. However, the ore grade with Mn content above **40%**, and other contained elements add value to the specific mineralization[9].

Regarding precious and rare metals, the Bakovići (FBiH) gold ore deposit concerns a Greenfields mine under development which is proposed by TP as business opportunity.

Another site of interest is the B class Co deposit of Brezik – Tadići (FBiH), also proposed by the TP as business opportunity.

Finally, other metallic PRMs are Sb (Podkozara-Kordići-Podhomara (RSK) /D (not operating) and Čemernica (FBiH)/C (abandoned) and Hg in the form of cinnabar (FBiH).

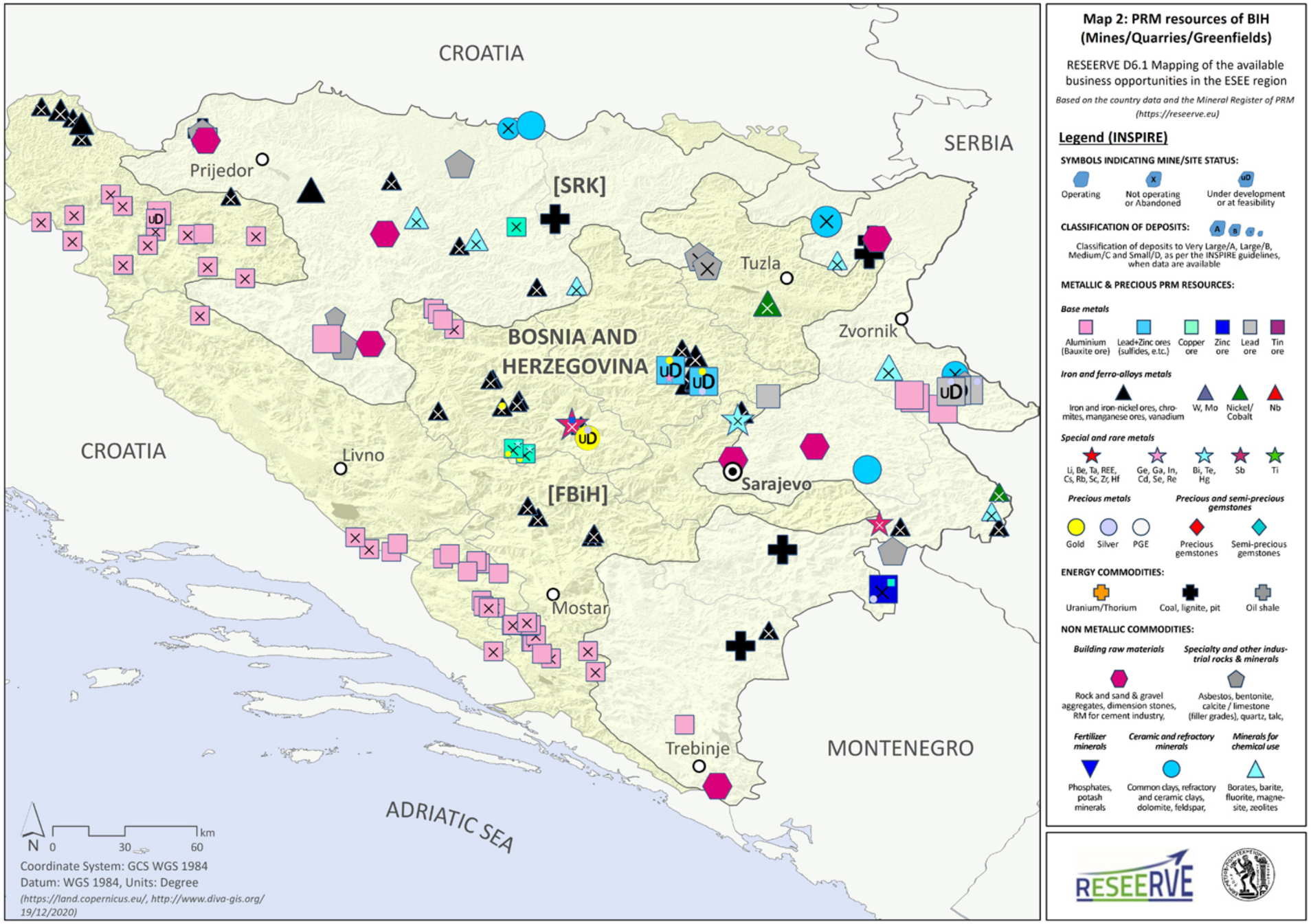
Non-metallic PRMs are found only in the territory of SRK, including:

- Two large bentonite deposits in RSK (Sokolac - operating, Lješljani - care and maintenance), the large Kaolin deposit of the Kobaš operating mine, and the abandoned kaolin mine in Tegare
- Two large deposits of fire clay in the mines of Kovanj and Pukiš (care and maintenance)
- The large deposit in Grab for the production of calcite sand and gravel aggregates, currently operating.
- The large limestone deposits at Vučjak, Podromanija, Lapišnica, Planina Vranovina, which all correspond to operating quarries for the production of dimension stone.
- Two medium gypsum deposits (Dočići, Petkovac), currently Operating.
- Two medium Quartz open pit operating mines (Malešić, Martinac)

[9] For example existing iron is beneficial for manganese's uses, because of its uses to iron and steel production.

- The large talc deposit at Žarkovac was reported within *D3.2* as having 7.000.000t resources. It is proposed as business opportunity.
- Two large zeolites deposits in Dubnica (B) and Novakovići (C), proposed as business opportunities.

Regarding energy commodities eight operating open pit coal mines exist in the RSK territory [Gacko (2), Ugljevik (2), Stanari, Miljevina, Luke, Lješljani] exploiting large deposits (class B). According to World Mining Data (WMD) 2020 report, BiH's Mineral-Fuels production in 2018 was 14.378.767t, corresponding exclusively to lignite extraction. Based on these data BiH's is the second, after SRB, most important lignite producer among the 6 ESEE countries examined. Given the EU action to combat climate change, aiming at the gradual transition to other, than fossil fuel, energy sources in the next decade, and taking into account that these mines are mostly open pit mines, they are considered as potential business opportunities for alternative uses, e.g PHs.



Map 2: PRM Resources of Bosnia and Herzegovina – BiH (Mines/ Quarries/ Greenfields)

3.2.2 FINANCIAL DATA

In Bosnia and Herzegovina the existing administrative division has often an adverse impact on the country's economic model and future businesses in RM sector. As analysed in *D6.3*, country's drawbacks need to be examined in depth, and resolved for the sustainable development of the sector. To further assess the economic potential of the deposits examined, prices of the metals of interest for the period 2011 to 2020 are given in Table 3.2-1.

Table 3.2-1: Prices[10] for the metals of interest for BiH

Metal of Interest	Metal Price			2020 price change as per 2011 (%)	2020 price change as per 2019 (%)
	2011	2019	2020		
Ag ($/tr.oz)	29,75	17,04	26,16	-12,08%	53,54%
Al ($/tn)	1.945,00	1.770,50	2.012,50	3,47%	13,67%
Au (AM/PM AVG $/ tr.oz)	1.637,50	1.477,95	1.874,63	14,48%	26,84%
Cr ($/tn)	12.150,00	6.150,00	6.575,00	-45,88%	6,91%
Cu ($/tn)	7.415,50	6.155,50	7.838,50	5,70%	27,34%
Fe ore, 63,5% grade ($/tn) [11]	-	-	135,56	-	+57.43%
Li_2CO_3 (CNY/ t) [12]	-	-	38.882,21	-	-26,4%
Mg ($/tn)	3.150,00	2.175,00	2.500,00	-20,63%	14,94%
Mn ($/tn)	2.875,00	1.595,00	2.200,00	-23,48%	37,93%
Ni ($/tn)	18.570,00	14.220,00	17.342,00	-6,61%	21,95%
Pb ($/tn)	1.933,50	1.909,00	1.957,00	1,22%	2,51%
Pt (AM/PM AVG $/ tr.oz)	1.436,00	933,50	1.002,50	-30,19%	7,39%
Zn ($/tn)	1.862,50	2.328,00	2.808,00	50,77%	20,62%

The highest increase in 2020 as compared to 2019 prices was reported for iron, followed by silver, manganese, copper, nickel and zinc, whereas lithium prices decreased.

Regarding industrial minerals, and specifically for zeolites, there is an increasing demand[13], providing a supportive evidence for the exploitation of the sites reported for RSK (*360marketupdates*). As for

[10] Metal Bulletin, except Fe ore

[11] Iron ore price on 04/12/2020 (*Tradingeconomics_IronOre*)**Error! Hyperlink reference not valid.**. *Iron ore prices refer to Iron Ore Fine China Import 63.5 percent grade Spot Cost and Freight for the delivery at the Chinese port of Tianjin.It is used to make steel for infrastructure and other construction projects. The biggest producers of iron ore are China, Australia and Brazil. Others include India, Russia, Ukraine and South Africa.*

[12] Li_2CO_3 price on 04/12/2020 (*Tradingeconomics_Lithium)*. *Trading Economics provides Lithium pricing based on spot prices for Lithium Carbonate, 99.5% Li_2CO_3 min, battery grade, traded in China. Lithium is a silver-white light metal. Lithium hydroxide is used in batteries for electrical vehicles and mobile phones. Lithium hydroxide is produced from a chemical reaction between lithium carbonate and calcium hydroxide. The biggest lithium producers are Australia, Chile, Argentina and China. The largest lithium importers are China, Japan, South Korea and the United States.*

talc, factors driving its market, such as the increasing use of thermoplastics in the automotive material, will also result in increasing demand for forthcoming years (*Mordorintelligence_Talc*).

In summary, FBiH includes a big number of sites OI: Operating Intermittently or OC: Operating Continuously, NO: Not operating sites, A: Abandoned or deposits UD: Under Development, of aluminium, Bauxite ores, lead, zinc, silver, and gold, as well sites of chromium and manganese. As for iron there is a number of A: Abandoned sites in FBIH, Table III-2 a, ANNEX III. Furthermore, country's low exports of iron, and aluminium ores compared to other commodities[14] suggest that the potential market size needs to be defined prior to further investing activities (*Oecworld_BiH*).

For RSK due to the increasing demand in global scale for industrial minerals such as talc, the market size needs to be examined when the feasibility of their exploitation is assessed. Regarding boron and lithium reported for the Labucka mine, the numerous uses of lithium for the shift to a greener economy, and the predictions for increasing demand for the upcoming years, suggest that the exploitation of Li deposits may be considered as business opportunities for the country's mining industry, despite price decrease recorded during 2020. As for magnesites, the revitalisation of the abandoned mines could be profitable, taking into account that the diversification into new primary export products is generally viewed as a positive development for a country (*Oecworld_BiH*).

3.2.3 OTHER ASPECTS

For the two political entities; Federation of Bosnia and Herzegovina, and Republic of Srpska, and based on the National Thematic Workshop SWOT analysis data, the parameters that could assist in the development of the country's mining sector include:

- **Long mining tradition;** BIH has a long mining history, starting by Celts, Illyrians and Romans, indicating the experience of the society to these activities,
- **Reported Mineral wealth & planning for potential investment**, summarized in Table III-2 of ANNEX III**,**
- **Economic parameter;** an increasing trend in the contribution of the M&Q sector in the GDP values was recorded till 2017, the higher values recorded for FBiH *(RESEERVE D6.2)*
- **Land use planning;** the number and respective areas of protected sites in BiH are considered as low, see ***D6.3*****.**

On the other hand, parameters that could adversely impact the development of the mining sector in BiH include;

- **Political & legislative framework**; legislation framework, tax regulations etc. differ in the administrative units of FBiH and RS and are not harmonized with EU legislation adversely impacting investment activities. Also, the country might be characterized by low political stability.
- **Economic environment**; despite the increasing trend for M&Q activities recorded till 2017, BiH is characterized by low to medium mining business potential, limited mineral endowment, within a "strict" business environment, as analysed in D6.3,

[13] From the water treatment industry and their increasing use as refrigeration adsorbents.

[14] For example, exports of zinc and lead ores calculated to 2.02%, and 1.8% respectively.

- **Availability of data**; the lack of compliance of the geological data available with an internationally recognized standard code is expected to adversely impact future investments,
- **Licensing procedures**; a complicated framework, lengthy procedures for permitting mining operations consist obstacles in investing activities and inward investments,
- **Land use planning;** protected areas in BiH are not delineated in compliance with Natura 200 requirements, adversely impacting spatial planning of M&Q activities,
- **Human resources**; Decrease in the population of skilled professional and technical staff with the expertise required in the mining sector also contributes to an adverse environment for future investments.

3.3 CROATIA (HRV)

3.3.1 GEOLOGICAL POTENTIAL

Based on the RESEERVE data available for the country, i.e. *D.4.1*, *D.3.2*, Communication with the respective TP within Task 6.1, as well as the relevant information included in the RESEERVE Balkan Mineral Register of PRM (RESEERVE website), see ANNEX III, Table III-3, and presented in Map 3, Croatia's metallic PRMs potential looks rather low at present. More specifically, only aluminum mineralization has been reported, in the form of böhmite contained in many small sized scattered bauxite deposits.

Rovinj's deposit located in the NE end of the country is the only one presently under exploitation in Croatia, (since 2019). All other bauxite deposits are located in the centre of Croatia, in the area which extends from Zadar to Split and are not presently exploited. The specific sites are as follows:

ČveljoDolac; Buhakuće; Ervenik; Kalun; KrsteRadas; Mamutovac; Moseć; Promina; Bilišani (unknown resources); Kruševo (unknown resources); Maslenica (unknown resources); Vinovo (unknown resources).

The above sites consist of old bauxite mines which operated from1960 (roughly) to 1978, when their operation was stopped since it was characterized as non-profitable. The first six sites refer to underground mines, while the remaining ones and the presently operating mine at Rovinj refer to open pit mines.

According to the information provided by the Croatian stake holders, the Croatian bauxite deposits contain CRMs such as Ti, V and Ga; however, there are no data available regarding content and the corresponding resources and reserves of these elements. Moreover, and as described in the RESEERVE Mineral Register of PRM, the bauxite deposits have not been classified in compliance with international standards, such as the JORC and correspond to *unknown* type of reserves (INSPIRE). Along the same lines no data are included in the Register for the concentrations of useful component in the deposits. However, for sites Čveljo Dolac, Krste Radas, and Mamutovac contents of Al_2O_3 ranging from 43 to 47% (*Krasić, et al., 2006; Kruk, et al., 2014*), are reported in the relevant literature, a content higher than the 30% presently referred as the cut-off grade for exploitation (*Bridenbaugh, 2018*).

Despite the current non –operational status of the Croatian bauxite mining sector, it is considered that due to the country's geological profile as well as relevant published information, there are possibilities to locate new bauxite deposits in the not yet explored area from Kirmenjak to Poreč (*Krasić, et al., 2006)*. Therefore, it might be of economic interest to perform a comprehensive prospecting in the areas of interest with the application of novel exploration techniques in order to increase aluminum resources and estimate/classify them according to the international standards. Furthermore, the existence of CRMs such as Ti, V, Ga or any other trace metals of significance in bauxite should be verified and the corresponding resources should be estimated and classified accordingly.

In the non-metallic PRMs sector, Croatia exhibits a remarkable activity, mainly in the field of aggregates, both crushed rock as well as sand and gravel, and dimension stones. More specifically, 27 sites entries are reported in the RESEERVE Register concerning limestone quarries and open pit

mines. In these sites rocks are extracted and processed for the production of crushed rock aggregates, suitable for common construction applications (e.g. roads, concretes etc.). There is no information in the Register regarding the quantities of reserves for these entries. Regarding their current status (INSPIRE), three of them are abandoned (BelskiDol, MadonaPiccola, Šumber II), five are not currently operating, [Podberam, Antenal, Monte Pozzo, Podbadanj (no concessionaire), Zakojnica (no concessionaire)], while the other 19 are operating (Glavice, BijeliVir, Bojna, Dubac, Dubrava, Gradišće, Klis-Kosa, Križice, Mironja, Plovanija, Strmetjevac, Španidigo – Sjever, Španidigo – Jug, Šumber, Šumetlica, Valtura, Veprštak, Zapužane, Žminj).

Besides limestone, dolomite is also quarried in seven (7) sites of Croatia for the production of crushed rock aggregates (Batinjska Rijeka, Jovanovica, Križ, Očura II, Sipina – Hum, Skočaj, SvetiKriž – Rudomar), while there are three, (3) more dolomite quarries at the status of 'abandoned' or 'non-operating' (Lovno-Lovno 2, Očura,, Veličanka II).

In addition to the above mentioned rock types, hard rocks are also extracted for aggregates' production, like amphibolite (Vetovo, medium sized deposit), dolerite (Hruškovec– operating, Hruškovec IV – abandoned), granite (Srednja Rijeka I - operating, Trešnjevica – abandoned), and andesite (Fužinski Benkovac). Such materials are generally used for specific applications. For example amphibolites may be used for the production of rockwool, while hard rock aggregates may be used for railways construction.

Finally, in the aggregate sector, quartzitic clastic sediments are being extensively exploited in Croatia for quartz sand and gravel aggregate production (Abesinija, Autoput, Crvene Stijene, Gašpar Sjever, Hrastovljan, Jagnježđe 2, Keter, Klara), and quartz sand for other, than aggregate, purposes (Štefanec).

Common clays are also extracted (Cerje Tužno, CerjeTužno 1, Cukavec II, Orahovica, Rečica) for the production of clay building materials, such as bricks and roof tiles.

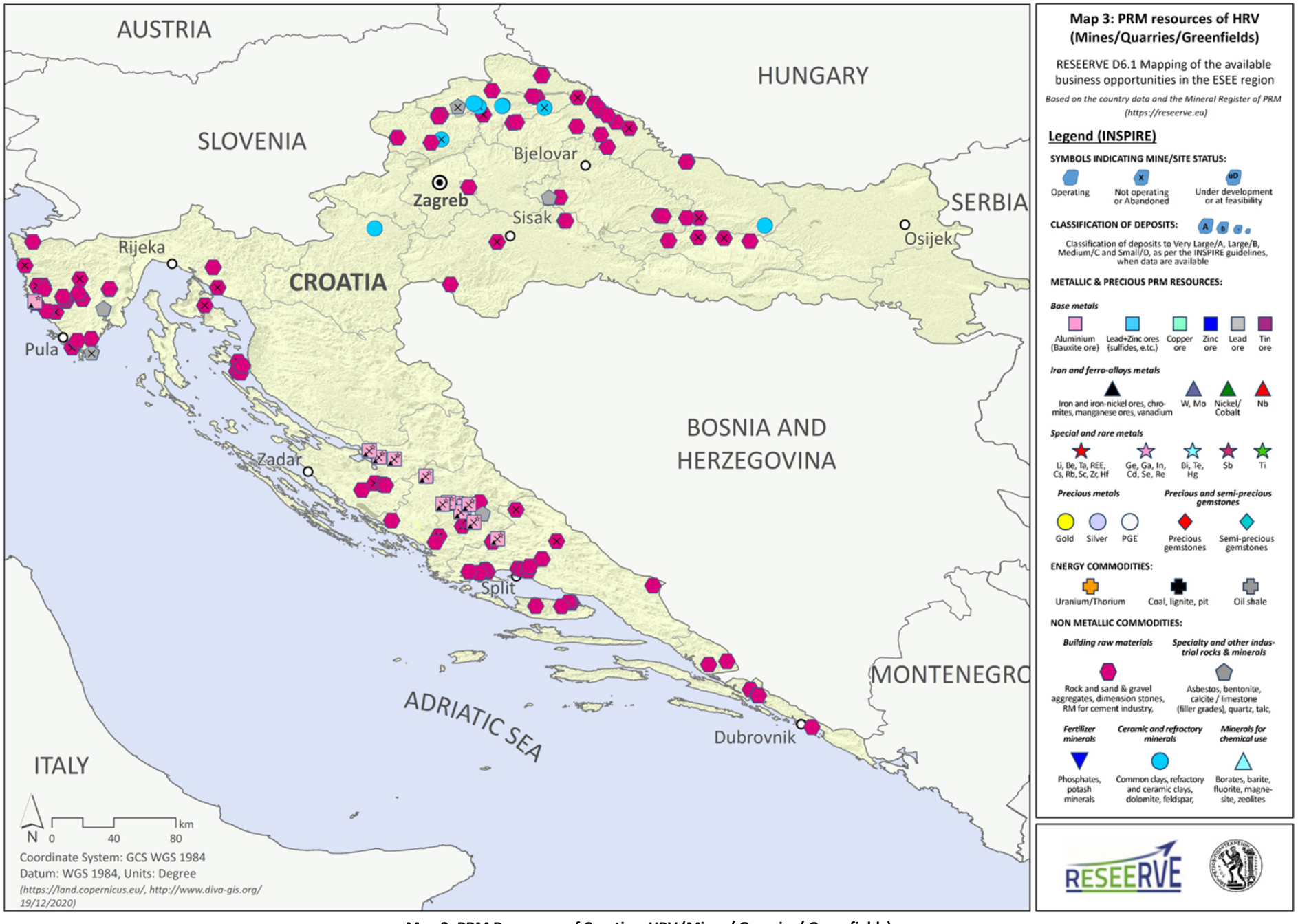
Calcite raw material is also exploited, most probably to feed the cement industry (Sveti Juraj, Sveti Kajo, Kolovoz) and other industries for the production of calcite industrial mineral (Most Raša, Parčić).

In the dimension stone sector, 23 extraction sites are operating for the production of limestone dimension stones. Three (3) sites are underground mines (Kanfanar-Jug, Kanfanar-Dvigrad, Kanfanar-Sjever), 5 sites are open pit mines (Lisičić II, Plano, Ivana, Redi, Seget-Sjever), and the rest 15 are quarries (Visočani, Pučišća, PučišćaKupinovo, Pučišća Punta –Barbakan, PučišćaSivac, BratižaNakal–Potok, Čvrljevo 1, Čvrljevo Ime Isusovo, Kirmenjak-Jug, Kršine, Lisičić, Mironja II, Valtura–Ližnjan, Vrsine, Dragonjik). In addition, five (5) quarries (Kirmenjak-Sjever, Krtolin, Kukalj Kave, Sveti Ante, and Valkarin) and two (2) open pit mines are abandoned (Vinkuran, Žitnić).

Regarding untapped resources of industrial minerals and rocks found in Croatia, the dimension stone mine at Kanfanar – Jug, and the dimension stone quarry at Visocani have untapped resources of 2.700.000 m^3, and 2.000.000 m^3 respectively (*RESEERVE D6.2*). Another example is Kosovo Polje, an area with gypsum deposits already under exploitation, where geological reserves amount to 30.000.000t, approximately. Moreover, calcite material is extracted by the cement industry at Sv. Juraj-Sv.Kajo, with geological reserves estimated to 200.000.000t.

From the above analysis regarding the non-metallic PRMs of Croatia, it is concluded that the country presents notable activity in the field of limestone crushed rock aggregates, as well as sand and gravel aggregates. It is known that such commodities are addressing local markets, in general, while their marketability is directly related with the constructive sector evolution. On the other hand Croatia also produces hard rock aggregates for more specific applications and the extracted rocks (e.g. amphibolites) have a greater potential for other uses also (e.g. production of rock wool). Furthermore, the possibility to produce abrasive grades from these rocks may be examined as a potential business opportunity. There are also many calcite and quartz sand deposits, which are of interest for the chemical and other industries, should their properties comply with the specific standards per use. Such materials can be used as raw materials for high added value filler products. Moreover, production of ready-mixed mortars appropriate for insulation and buildings repairs is a current trend in business opportunities and for this purpose there are various and very diverse products in the market produced by mixing hard rock, calcite, quartz and other minerals and additives. To identify the above potential the assessment of the market environment is necessary in all cases. As for the abandoned quarries, alternative uses may be examined, such as installation of recycling units for the production of recycled aggregates, or artistic interventions, given that Croatia is a country hosting many cultural and touristic activities.

Finally, Croatia is the only country among the 6 ESEE countries examined where lignite is not extracted for energy production. According to the World Mining Data (WMD) 2020 report, HRV's 2018 Mineral-Fuels production was 1.716.100t, including 732.100t of petroleum and 1.230Miom^3 of natural gas.



Map 3: PRM Resources of Croatia – HRV (Mines/ Quarries/ Greenfields)

3.3.2 FINANCIAL DATA

Croatia has a beneficial business environment in general, due (among other factors) to its favourable position. However, regarding metallic PRM the potential is low with only bauxite reported as metallic PRM, whereas as already stated the country presents notable activity in the field of limestone crushed rock aggregates, as well as sand and gravel aggregates.

Metals of interest for Croatia are mainly Aluminum, Gallium and Vanadium, while Ti should be also taken into account. Three years were considered for the metal prices for aluminum, gallium and vanadium, namely 2011, 2019 and 2020 in a date close to the 25th of December for each year and their changes as compared to 2011 and 2019 are presented in Table 3.3-1. The metal price variation for Al and Ga in the period 2011-2020 is presented in ANNEX IV**.** The price of gallium shows a high increase (58,73%), whereas the price of vanadium remained rather stable in the period 2019-2020. As for aluminum a remarkable increase was also recorded.

Table 3.3-1: Prices[15] for the metals of interest for HRV

Metal of Interest	Metal Price			2020 price change as per 2011 (%)	2020 price change as per 2019 (%)
	2011	2019	2020		
Al ($/tn)	1.945,00	1.770,50	2.012,50	3,47%	13,67%
Ga ($/kg)	570,00	157,50	250,00	-56,14%	58,73%
V_2O_5 (USD/lb)[16]	-	-	5.1	-	-3.77%

Ga (CRM) is used in photovoltaic applications, robotics and other novel uses, while V (CRM) is also important for robotics applications. The fact that these two metals, contained as traces in bauxites, as well as bauxite are included in the list of Critical Raw Materials for Europe 2020, combined with their price increase since 2017 and more specifically during the last year, create a favourable environment for new investments in this field to increase the country's bauxite reserves and identify in parallel the Ti, Ga, V available quantities. The first step to this direction is the performance of a detailed prospecting, followed by a pre-feasibility study.

Regarding the non-metallic PRMs, emphasis should be given to the development of new added value products by exploiting hard rocks, calcite and quartz resources. The further development of the cement industry is also of interest, since there is an abundance of raw materials suitable for cement production. Taking into account the increasing trend of manufacturing and construction activities in Croatia as well as in the neighbouring ESEE countries, the sector of building raw materials seems to present opportunities for future investments.

3.3.3 OTHER ASPECTS

Aspects beneficial for the exploitation of PRM in Croatia include:

- **European membership;** Croatia is EU Member State since 2013, providing a good investments climate for foreign investors.

[15] Metal Bulletin (https://www.metalbulletin.com/)

[16] Calculations in line with the price of Vanadium Pentoxide fused flake with minimum of V_2O_5 98%

- **Mining heritage and long tradition;** Croatia has a strong M& Q heritage, including the familiarity of society with the sector's activities.
- **Economic aspect** Croatia provides a good climate for businesses in general. Increasing trends in the economic turnover of construction (*Ceicdata, Croatia_Construction*), and manufacturing activities (*Ceicdata, Croatia_Manufacturing*) has a positive impact on the sector, since the above activities are highly related to industrial minerals extraction.
- **Legislation;** As stated in *D6.3*, the Mining Geological Country Plans and the new Mineral Strategy under preparation, in combination to the other guidelines, are parameters contributing to a positive environment for investing in M&Q activities.
- **Protected areas;** Mapping and delineating protected areas in line with Natura 2000, the key instrument for biodiversity protection in the EU, will be helpful for future investments in M&Q sector. Data available for Natura sites management enhances the harmonious co-existence of human activities and natural environment.
- **Mineral resources;** The potential resources of CRM, including bauxite, along with an abundance of building raw materials occurring in different locations across the country, are some of the advantages for sector's growth.
- **Geographic location:** The direct proximity to Adriatic, facilitating sea transportations is a strong advantage for the exports of Raw Materials extracted in the country.

The main disadvantages for PRM development in Croatia are:

- **Limited diversification;** the limited number of metallic minerals and the limited diversity of non-metallic PRMs offered for exploitation presently, does not provide a wide range of options for investment activities.
- **Level of confidence regarding mineral resources and reserves;** The absence of harmonization of the available data with world classification systems, and the fact that no systematic regional exploration activities have been performed over the last 30 years, are major drawbacks for the prompt development of operating mines.
- **Economy;** the absence of leading international mining companies, combined with the decreasing trend of the contribution of the M&Q activities (*RESEERVE D6.2*) in Croatia's GDP, adversely impact M&Q activities,
- **Legislation;** There is no clear state strategy for minerals development, including the necessary funding for state exploration.
- **Land use planning;** Spatial planning of PRMs needs further development.

3.4 MONTENEGRO (MNE)

3.4.1 GEOLOGICAL POTENTIAL

Based on the RESEERVE data available for the country, i.e. *D.4.1*, *D.3.2*, Communication with the respective TP within Task 6.1, as well as the relevant information included in the RESEERVE Balkan Mineral Register of PRM (RESEERVE website), see ANNEX III, Table III-4, MNE presents a remarkable potential for PRM. PRM of MNE are also presented in Map 4, prepared for this Deliverable in compliance with *INSPIRE Technical Guidelines* using ArcGIS 10.5.1. The major PRMs of the country are presented in the following paragraphs.

Regarding bauxites, two municipalities, namely Nikšić and Cetinje are the country's major mining centres. Many small size (INSPIRE) bauxite deposits are located in the Municipality of Nikšić, while only four out of them are being exploited currently, at the operating mines of Zagrad, Durakov do I, Biocki stan and Stitovo II, with total proved ore reserves (INSPIRE) of 13.863.510t. All four mines were proposed by the MNE TP as business opportunities. The rest bauxite sites in Nikšić concern eight Greenfields areas with small size bauxite deposits and bauxite occurrences corresponding to 5.466.000t of proved reserves and 4.318.000 of probable reserves, in total. All of them are at the stage of feasibility study, and this is indicative of the increasing importance of the mineral sector in the country, as well of the potential for future business opportunities.

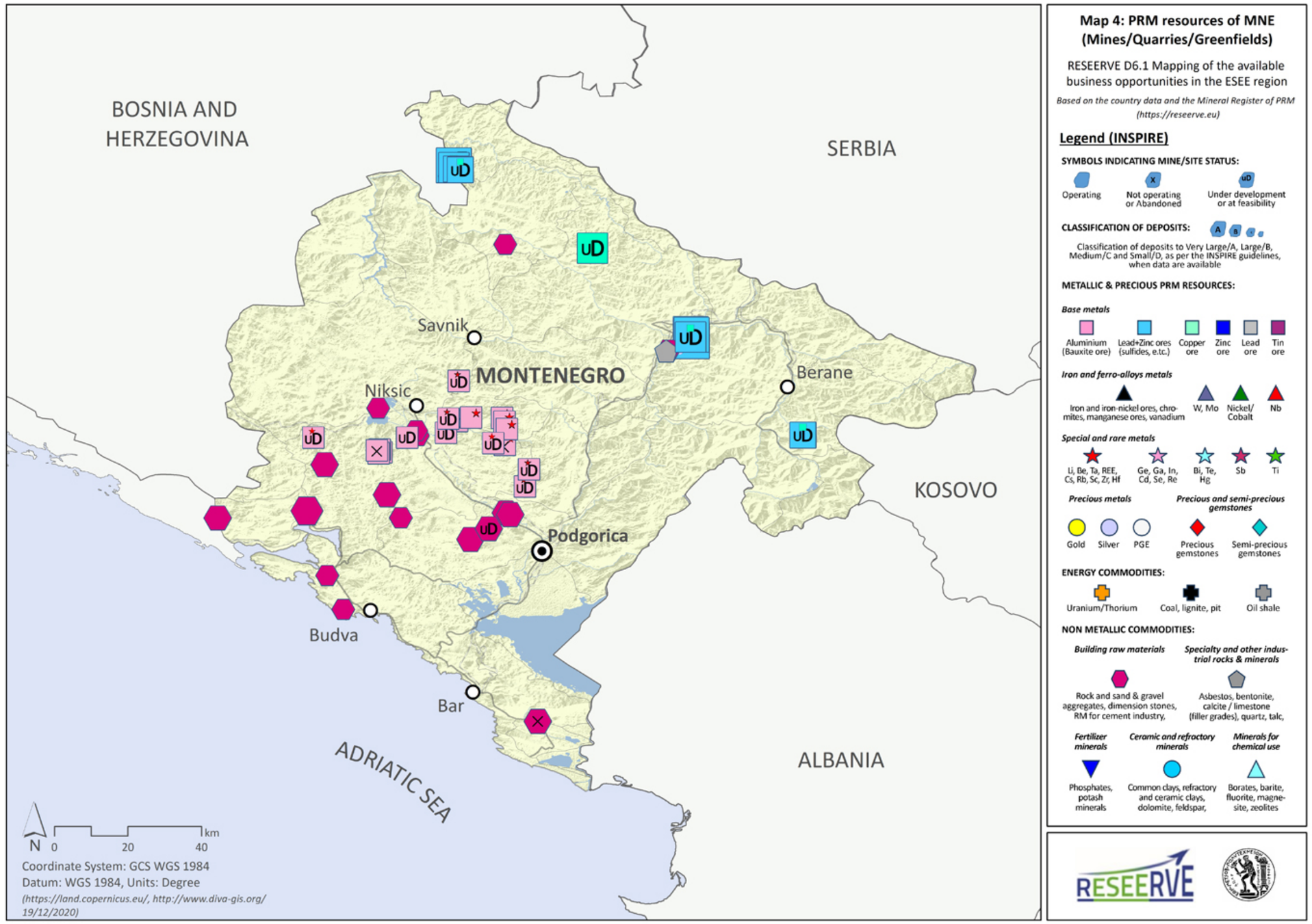
In the second bauxite mining municipality of MNE i.e. the Municipality of Cetinje, there are mainly occurrences corresponding to approximately 1.300.000t of bauxites in total, classified as Proved or Probable reserves (INSPIRE), as well as one small deposit (Ranjava vlaka-Kruščica) with 2.250.000t Probable reserves.

Another developing PRM project, proposed as business opportunity, concerns a large copper ore deposit of 7.300.000t (Probable ore reserves) with Cu 0,075% at Varine (Greenfields) which is currently at the feasibility stage.

Montenegro is developing also its lead-zinc mining sector, mainly in the municipalities of Mojkovac, Pljevlja and Berane. Five Greenfields areas (Strmošne bare (Sjekrica), Paljevine, Djurdjeve vode, Ribnik and Igrišta) are at the feasibility stage. They are reported as medium sized to large deposits, having an overall potential of ~3,5Mt with rather low lead contents in the range of 0,89%-1,42% and zinc contents in the range of 1%-6,4%. Given that Pb and Zn present a market rather stable or increasing over the last decade, respectively, the above green field cases reported is assumed to present potential for business opportunities. The other lead-zinc areas concern the operating mine Suplja Stijena exploiting a very large deposit (A class) of 16Mt proved reserves, and the closed mines Brskovo, Zuta prla, Visnjica of high tonnages (medium to very large), but with lower Zn contents. All four cases are proposed by the TP as business opportunities.

The non-metallic PRM potential of MNE is rather limited and conventional, concerning extraction of mineral raw materials for the production of (mostly) crushed rock aggregates, as well as sand & gravel aggregates, and dimension stone (limestone) used in the construction industry. Almost all areas concern operating quarries exploiting small to medium sized deposits.

Regarding the Energy commodities group, lignite extraction is reported for MNE, with total production of 1.595.900t for 2018, as based on World Mining Data (WMD) 2020 report. However, in the MNE PRMs list of the RESEERVE Mineral Register no coal mines were included.



Map 4: PRM Resources of Montenegro – MNE (Mines/ Quarries/ Greenfields)

3.4.2 FINANCIAL DATA

Taking into account the types of PRMs encountered in MNE, metals of interest include Al, Cu, Pb and Zn. The metal prices for aluminum, copper, lead and zinc and their changes as compared to 2011 and 2019 are presented in Table 3.4-1, whereas the price variation for above metals in the period 2011-2020 is presented in ANNEX IV. Three years were considered for the metal prices, namely 2011, 2019 and 2020 in a date close to the 25th of December for each year. It is noted that the metals Al, Cu and Zn show a notable price increase in 2020, as compared to those of 2019, whereas when compared with 2011 a significant increase is noted only. As for the Pb price it seems to remain stable over the last decade, while Zn price shows a rather remarkable upward trend over the last decade.

Table 3.4-1: Prices[17] for the metals of interest for MNE

Metal of Interest	Metal Price			2020 price change as per 2011 (%)	2020 price change as per 2019 (%)
	2011	2019	2020		
Al ($/tn)	1.945,00	1.770,50	2.012,50	3,47%	13,67%
Cu ($/tn)	7.415,50	6.155,50	7.838,50	5,70%	27,34%
Pb ($/tn)	1.933,50	1.909,00	1.957,00	1,22%	2,51%
Zn ($/tn)	1.862,50	2.328,00	2.808,00	50,77%	20,62%

Based on exports trade of MNE, there is a high share of zinc and lead ores, calculated about to 23% and 12%, respectively (*Oec.world, Montenegro*) while the copper exports are relatively low. Despite the small country's area, World Mining Data for the year of 2018 (*Reichl, et al., 2020)* reports that Montenegro produces 0,14% of bauxite, 0.08% share of zinc, and 0.06% of lead of the global mining production.

3.4.3 OTHER ASPECTS

As analysed in D6.3, aspects affecting positively the development of PRM in MNE, include:

- **Geological potential;** Montenegro has notable resources of copper, lead, zinc, and aluminum ores, whereas the Russian GKZ classification system is applied for the characterization of its resources.
- **Business environment;** MNE provides a favourable businesses environment, characterized by its good taxation system,
- **Economic framework;** Lead prices show a stable trend, whereas zinc prices show notable upward trends in the last decade.
- **Legal framework;** legislation applied in geological exploration, mining, environment, and activities taken so as to improve regulations, and
- **Infrastructures;** improvement of infrastructure is one of the main priorities of the MNE government, with positive impacts for forthcoming M&Q projects.

On the other hand, the obstacles for the growth of RM sector, are the following:

[17] Metal Bulletin (https://www.metalbulletin.com/)

- **Economy;** As reported by World Bank Montenegro is a small, open economy, particularly vulnerable to external shocks, as it relies heavily on capital inflows from abroad to stimulate its growth.
- **Legislation;** the lengthy and complicated procedures for obtaining concessions and exploration licenses, and the absence of protection actions for minerals resources, are some examples of the issues that may adversely impact the development of the M&Q sector,
- **Land use planning**; limited development in the mountainous areas is a positive aspect, but the possibility of developing touristic activities, might be harmful for M&Q activities, resulting in conflicting interests among economic activities. Moreover, the absence of harmonization of country's protected areas in accordance with Natura 2000 might also pose a constraint in the development of the RM sector, and
- **Environment management;** the pollution recorded for mining sites, such as the lead and zinc mine of Suplja Stijena (*Mining South East Europe, 2020*), affects in a negative way the social image of M&Q activities.

3.4.4 SCREENING EXERSICE FOR MNE

This section includes a screening exercise for the Brskovo project in MNE based on the data provided by the small company Tara Resources AG / Brskovo Mine d.o.o. which undertook the Brskovo zinc, lead and copper deposit development, including also the deposits of Zuta Prla – Visnica in response to the Questionnaire, see ANNEX II, forwarded by the NTUA team in September 2020.

The examined mine under discussion, currently at "late-stage evaluation and permitting" phase has an ore body of 20 m thickness with contents 1,5% zinc, 0,75% lead, 0,12% copper, while there is also silver with a content of 0,5 oz/t.

After evaluation of the available information provided in the questionnaire (see ANNEX II), Key-conclusions were deduced reflecting the company's views regarding the factors that currently adversely impact the development of mining activities in MNE.

The questions set were:

1. What's the ranking of factors that mostly impact exploration/exploitation at the specific economic deposits?
2. How satisfied are you with the conditions prevailing in Montenegro?

After examining the graphic presentation of the answers (Figures 3.4-1 - 3.4-2) it can be seen that the factors which mostly affect the decision in starting an exploration or exploitation project, are:

- The country's Level of Security,
- The Quality of the Geological Database,
- The prevailing market and Trading Conditions, and
- The country's Taxation System.

From the graphs below, it is noted that Geological Potential is considered a minor factor as compared to the Quality of Geological Database, while Legislative Framework, and Duration & permitting process are factors ranked with lower scores.

The Company also noted that MNE Taxation System is satisfactory, creating a good environment for foreign investments, while the Regulatory Framework is considered adequate and predictable.

Infrastructures needed for the Brskovo project are already in place, while infrastructure improvements needed such as offsetting the existing railway system are in progress. Regarding the location of the project, it was noted that despite the proximity of the project to National parks, there were no conflicting interests, with the proposed mining activities.

Absence of State aid for investments, inexperience of public authorities in permitting and political uncertainty are some of the challenges that need to be resolved in the future. Moreover, it was noted that the absence of skilled manpower in the project area may force Tara to seek labour from other areas.

Figure 3.4-1: Main Factors impacting exploration/exploitation; Brskovo project, Tara Resources AG / Brskovo Mine d.o.o, October 2020.

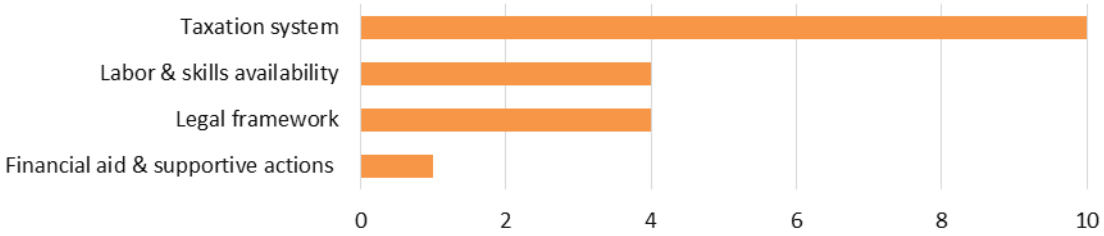


Figure 3.4-2: Level of satisfaction with prevailing conditions for development, permitting and operation of mining activities; Brskovo project, Tara Resources AG / Brskovo Mine d.o.o, October 2020

3.5 REPUBLIC OF NORTH MACEDONIA (MKD)

3.5.1 GEOLOGICAL POTENTIAL

Based on the RESEERVE data available for the country, i.e. *D.4.1*, *D.3.2*, Communication with the respective TP within Task 6.1, as well as the relevant information included in the RESEERVE Balkan Mineral Register of PRM (RESEERVE website), see ANNEX III, Table III-5, the Republic of North Macedonia is rich in valuable and rare metallic PRMs, with some of them included in the CRMs list (Europe 2020). It is worth mentioning that almost half of the 52, (see Map 5), PRM mining sites (i.e. 22 cases) reported in the Mineral Register, concern projects in Greenfields, either at the feasibility stage (16 cases), or Under development (1), or at the stages of construction (3) and construction/pending approval (2).

Antimony (CRM) is one of MKD's important and rare metallic PRMs, found in Lojane and Alšar areas as a Very large and a Large deposit, respectively. The Lojane deposit (Abandoned mine) contains 5% Sb, 4% As, trace metals such as Ga and Se, has been proposed by the MKD TP as business opportunity. The other rare CRM in MKD is the Mitrašinci titanium – iron ore containing 3-12% TiO_2, with unknown reserves.

The country owns also metallic PRMs of the iron and ferro-alloys metals' group, such as iron ores in small deposits ranging from 1.000.000 to ~10.000.000t, with the Tajmište deposit (4.400.000t) being under development, considered by the TP as business opportunity. Metallic RM of the same commodities group are the iron-nickel ores, including a very large molybdenum deposit that has been found in the Greenfields area of Strelci, currently at the stage of feasibility study, and the molybdenum-copper-gold ore at Petrošnica with unknown reserves. Among the iron nickel deposits the Rakle is a Very large deposit with 200.000.000t reserves, currently being studied for the feasibility of its exploitation. As for chromite resources, they are rather insignificant.

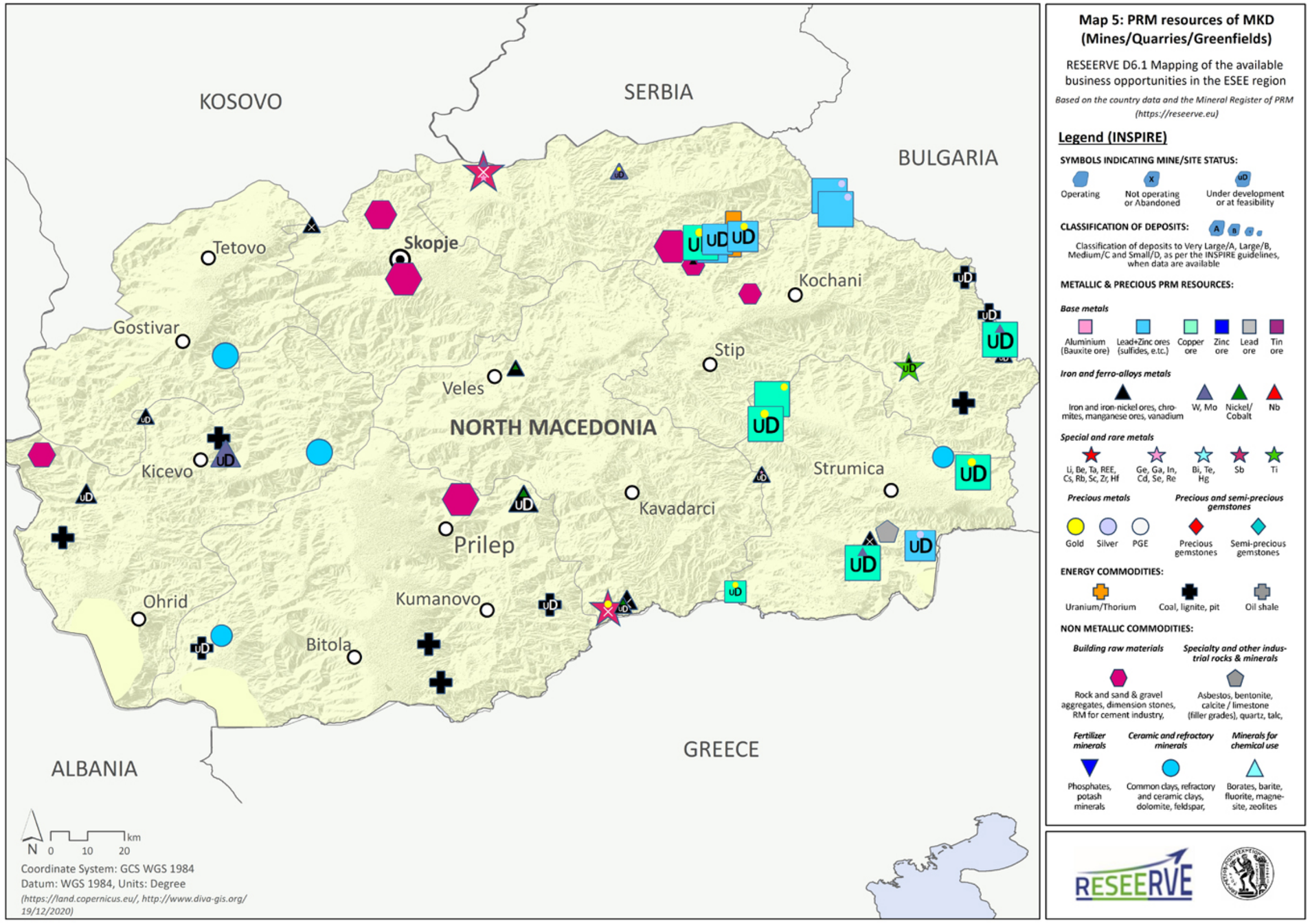
On the contrary, there is high copper mineralization potential mainly of porphyry type, in the form of very large deposits which, with the exception of the Bučim operating mine, are under development, either at the construction stage or/and at pending approval status. These are Ilovica (493.000.000t), Plavica and Crn Vrv (51.750.000t), Borov Dol (62.000.000t), Kazan Dol (23.900.000t), Kadiica (69.000.000t) and Konjsko with unknown reserves. With the exception of Konjsko, all the other copper sites have been proposed by the MKD TP as business opportunity. These deposits contain Au and in some cases Mo (*Sutphin, EU02PC*). The Buchim mine exploits a porphyry copper deposit in the Buchim – Damjan - Borov Dol ore district. For the recovery of the copper concentrate leaching methods in combination with electowinning are applied, allowing the efficient processing of lower copper ore grades (*Angelov, 2015*). Mining activities in the area are expected to expand when mining of the Borov Dol ore body will start, contributing to regional economy.

The lead-zinc sector presents a high potential with Large to Very large lead-zinc deposits found in five areas. From these, the underground mines in Toranica, Sasa (Svinja Reka-Petrova Reka) and Zletovo are operating continuously, exploiting PRM resources containing Pb in the range of 3,97% - 5,81% and Zinc 2,04%-2,78%. In addition to these mines, three other deposits in Greenfields areas are at the stage of feasibility study, namely Bašibos, Jamište and Blizanci.

Regarding Building materials, MKD is extracting and processing marbles, limestone and quartzite for the production of dimension stone and as raw materials for the cement industry. Among these, the quartzite at Crn Vrv could be of interest as business opportunity for the production of quartz suitable for high added value uses (e.g. filler, optical uses e.tc.), due to high silica content of the rock (>98%). However, a potential drawback may be the relatively low tonnage (2.647.499t). The very large deposit (164.969.771t) of dolomitic marble at Sivec is also a site of potential interest, not only due to the size of the deposit, but also due to high MgO contents (19,6%-21,7%). Therefore, mining part of the deposit for the production of Mg could be examined as a feasible alternative.

Regarding energy commodities five operating open pit coal mines are reported in the MKD territory [Suvodol, Brod-Gneotino, Oslomej West, Ratevski Širini and Piskupština] exploiting Small deposits (class D). These depoists are included in the RESEERVE Mineral Register, while four Greenfields [Zvegor-Stamer, Lavci, Star Istevnik and Mariovo] at the feasibility stage were also reported. According to the World Mining Data (WMD) 2020 report, MKD's Mineral-Fuels production for 2018 was 4.946.486t, corresponding exclusively to lignite extraction.

Concluding, despite the country's small size, a remarkable variety of sites with valuable and rare metallic PRMs, with some of them included in the CRMs list (Europe 2020), as well as non-metallic PRMs are found in the territory of MKD. Its mining sector is developing taking into account that not only it includes PRMs such as lead, zinc, copper, antimony, iron ores and iron nickel, but as already mentioned, almost half of the sites reported in the RESEERVE Mineral Register correspond to Greenfields or/and projects being at the stage of feasibility study or under development. This by itself consist a favourable environment for business opportunities in the mining sector. However, potential delays encountered for permitting new mining projects should be taken into account, as well as the availability of experts and specialized technical personnel.



Map 5: PRM Resources of Republic of North Macedonia – MKD (Mines/ Quarries/ Greenfields)

3.5.2 FINANCIAL DATA

MKD is characterized as having a low to medium mining, business potential, however international mining companies have started to be present in the country. According to the World Mining Data for 2018 (*Reich, et al, 2020*), MKD is included in the list of the world important lead producers (Figure 3.5-1), while the country is reported as an important zinc and copper producer.

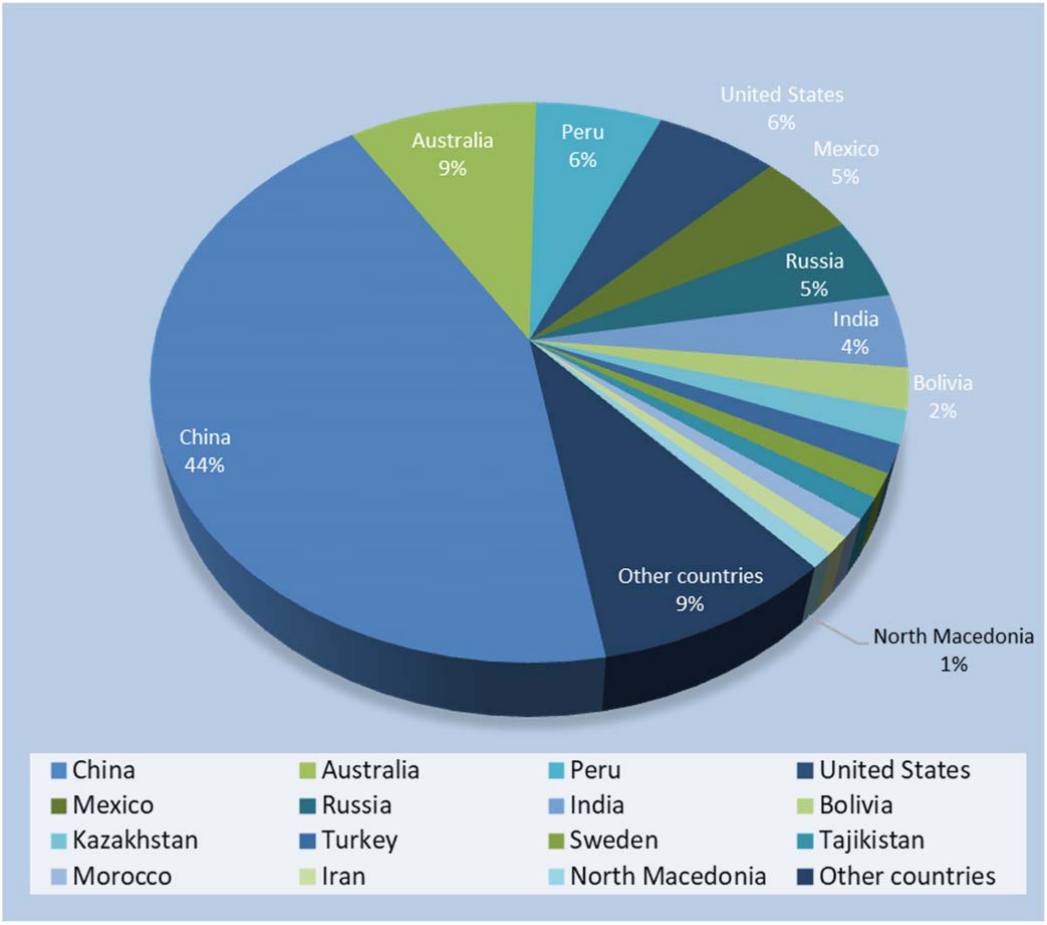


Figure 3.5-1: International Lead ore production, highlighting the share in MKD.

Taking into account the types of PRMs encountered in Northern Macedonia, statistics are given concerning the prices' variation for the metals of interest in Table 3.5-1 and ANNEX IV. Three years were considered for the metal prices, namely 2011, 2019 and 2020 in a date close to the 25th of December for each year. As seen in Table 3.5-1, copper, a very important commodity and a metal of interest for MKD, presents a remarkable price increase in 2020 as compared to 2019, while 15% of the country production is exported (*Oec.World, MKD*). MKD has also the potential to develop nickel and iron deposits, two major metallic commodities, where the country's exporting activity is still limited. Finally, the antimony deposits of MKD must be mentioned, since this metal is included in the CRM list of Europe 2020. However, antimony analysts consider that despite the price increase in 2020, as compared to 2019, it is still not expected to swiftly recover back the higher prices recorded

during 2016-2018 (see ANNEX IV). Also an average downward trend is recorded for the decade 2011-2020.

Table 3.5-1: Prices[18] for the metals of interest for MKD

Metal of Interest	Metal Price			2020 price change as per 2011 (%)	2020 price change as per 2019 (%)
	2011	2019	2020		
Ag ($/tr.oz)	29,75	17,04	26,16	-12,08%	53,54%
Au (AM/PM AVG $/ tr.oz)	1.637,50	1.477,95	1.874,63	14,48%	26,84%
Cu ($/tn)	7.415,50	6.155,50	7.838,50	5,70%	27,34%
Fe ore, 63,5% grade ($/tn) [19]	-	-	135,56	-	57.43%
Ni ($/tn)	18.570,00	14.220,00	17.342,00	-6,61%	21,95%
Pb ($/tn)	1.933,50	1.909,00	1.957,00	1,22%	2,51%
Sb ($/tn)	12.500,00	5.925,00	6.812,50		
Zn ($/tn)	1.862,50	2.328,00	2.808,00	50,77%	20,62%

Concluding, MKD produces and exports important metal commodities, such as copper, that shows a high market perspective. Business opportunities may also exist in the iron and nickel field, where low export activities are recorded. As for antimony, a possible investment at the present circumstances might not be profitable, but, given the high Sb contents of the MKD deposits and the fact that Sb is a CRM, a business opportunity may be also present there.

3.5.3 OTHER ASPECTS

Favourable conditions for the M&Q activities in the territory of MKD are:

- **Long mining history**; MKD has a traditional experience in exploration and exploitation procedures,
- **Mineral wealth &interest from foreign investors;** diversification of ores and industrial minerals providing multiple options for investments. MKD includes untapped mineral resources for metallic commodities of large markets, such as lead, zinc, copper, and nickel,
- **Economy;** despite country's low to medium mining business potential (*EBRD, 2017*; *RESEERVE D6.2*), and the emergency Covid-19 situation of 2020, MKD's IPI for M&Q activities records increasing values for the end of 2020 with the industry, including mining, manufacturing and utilities, being the second largest sector,
- **Legislation framework;** many efforts are recognized to improve country's legislative framework, and remove the constraints for the further development of the industrial sector.

Parameters that may adversely affect the RM sector development include:

[18] Metal Bulletin (https://www.metalbulletin.com/), except Fe ore

[19] Iron ore price on 04/12/2020 (*Tradingeconomics_IronOre)*. *Iron ore prices refer to Iron Ore Fine China Import 63.5 percent grade Spot Cost and Freight for the delivery at the Chinese port of Tianjin. It is used to make steel for infrastructure and other construction projects. The biggest producers of iron ore are China, Australia and Brazil. Others include India, Russia, Ukraine and South Africa.*

- **Availability of data;** despite reserves classification and categorization in line with the Russian classification of reserves, there is a need for categorization in accordance to the JORC/PERC resource estimation,
- **Legislation framework &licensing procedures**; a need for a modernized Law on Mineral Resources policy, and a long-term strategy is reported as well as the unification of the administration issuing permits and approvals. Simplification of concessions is also needed,
- **Exploration activities**; A relative recession in exploration activities is currently noticed that may adversely impact the development of the mining sector,
- **Human resources**; demographic records indicate a slight decrease of human potential, as presented in D6.3. Also, a shortage of skilled professionals is reported due to the low interest for RM education programs, and the lack of specialists in the field of geology also contributing to a non-friendly environment for investments,
- **Land use planning;** the absence of plans for spatial development, and the determination of exploration and exploitation zones by the State, is another issue that creates constraints in investment activities. Furthermore, the fact that protected areas are not determined in accordance with Natura 200 requirements, is another issue, and
- **Environment perspective;** many projects were implemented for the reclamation of a number of historically polluted sites, but on the other, there is a certain number of exploration/exploitation concessions revoked due to environmentally and legally induced reasons.

3.6 SERBIA (SRB)

3.6.1 GEOLOGICAL POTENTIAL

Based on the RESEERVE data available for the country, i.e. *D.4.1*, *D.3.2*, Communication with the respective TP within Task 6.1, as well as the relevant information included in the RESEERVE Balkan Mineral Register of PRM (RESEERVE website), see ANNEX III**,** Table III-6, Serbia is rich in PRMs, with some of them included in the CRMs list (Europe 2020). A favourable complexity in its geological profile, including a large number of rock formations with a variety of lithological composition, petrology features, age as well as metallogenic specialization is recorded. The territory of Serbia is subdivided into main geotectonic units, as classified in the Dinarides, the Vardar Zone, the Serbo-Macedonian Massif, the Carpatho – Balkanides and Neogene sediments, with the last one covering the older formations at the northern parts of the country (*Jelenković, et al., 2008)*. 54 PRM sites, reported in the RESEERVE Mineral Register of PRMs are seen in Map 6.

A number of the most important PRM cases are located in the Municipality of Bor (See ANNEX III-6). Bor metallogenic zone constitutes perhaps the most significant one in the country, where more than 650 Million t of copper ore corresponding to 4.93 Million t of copper metal and 280 tons of gold, have been produced in the area since 1902 (*Jelenković, et al., 2008)*.

Based on the RESEERVE Mineral Register some medium sized, but mainly large and very large copper deposits are hosted in Bor territory with copper ore resources of the class of 4 billion tonnes. Out of these 1,7 billion tons correspond to probable and proved reserves, while the remaining is reported in the Register as unknown type of Reserves (INSPIRE). The mining activity of Bor includes the mines of Čukaru Peki - Lower zone, Čukaru Peki - Upper zone, Veliki Krivelj, Mali Krivelj, Bor – Jama, Borska reka, Cerovo Complex and Cerovo Primary and the Korkan Greenfield project, currently under development, consisting thus a new business opportunity area in the country.

Besides the huge copper deposits of Bor, other areas hosting very large deposits (Class A, INSPIRE) is the municipality of Majdanpek (582.810.000t), the municipality of Medveđa (250.000.000t) and the municipality of Žagubica, increasing thus total probable and proved reserves, almost to1 billion tonnes.

Gold is contained in many of the above deposits, while the sites of Korkan and Bigar Hill, consist two sediment-hosted gold mineralization deposits of 12.300.000t, and 30.600.000t, respectively, however, of unknown type of Reserves (INSPIRE). These deposits presently constitute projects under development, being thus potential business opportunities. However, technical challenges exist for their sustainable exploitation, given that these deposits are characterized by extremely fine-grained disseminated gold, hosted primarily within arseno pyrite (*Arehart, 1996*). Based on literature, gold concentrations of Bigar Hill are estimated to be 0,8 to 1,3 g/t, while both of them constitute deposits being partially defined (*Jelenković, et al., 2008)*. In a future exploitation of those sites, arsenic known for its hazardous properties ought to be managed in an environmentally safe manner.

In the Čukaru Peki mines, a porphyry copper - gold mineralization is under exploitation. Čukaru Peki presents a great potential to be developed and e ranked among the most important deposits of copper and gold, in a global scale (*Jelenković, et al., 2008)*.

Another important metallic PRM found in SRB are the lead – zinc deposits with resources of 22 million tonnes. Among them special emphasis is given to the Greenfields Babe scarn deposit currently under development, consisting thus a business opportunity.

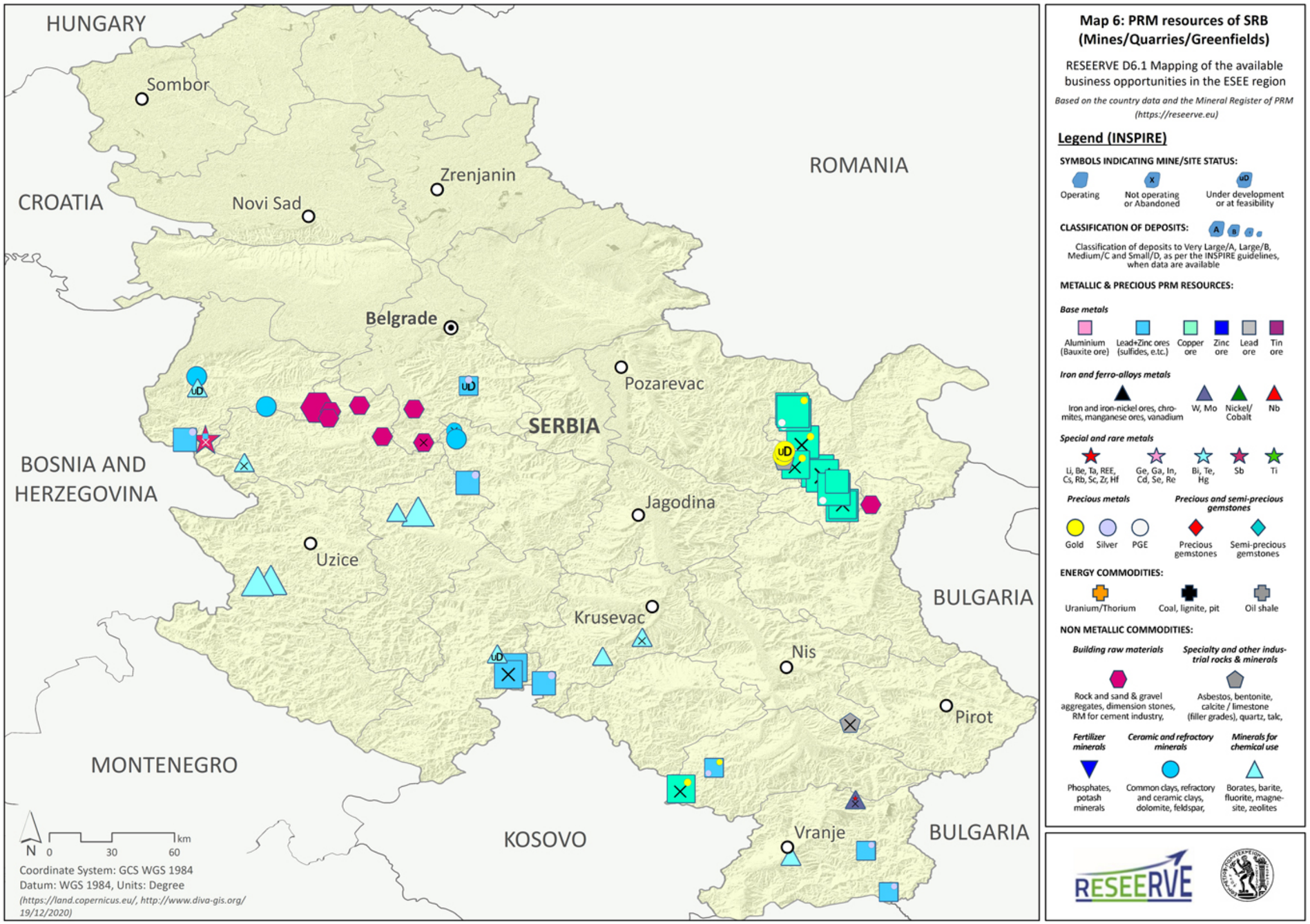
The Mačkatica mine with a large molybdenum ore deposit is reported as a site of interest, however of unknown type of reserves. This mine ceased its activities in 1952. The major minerals present are molybdenite, quartz and pyrite, while rhenium, a CRM, is also present, suggesting that this mine could be a business opportunity for development (*Vujanovic, 1959*).

Other PRMs included in the CRM list are Borates and Barite, all of unknown resources' size and type. Potential business opportunities may be linked with the Li deposit of Jadar (under development) and the borates of Piskanja (also under development). Jadar is reported as a highly – promising deposit, with lithium occurring in jadarite, a lithium borate that has the potential to produce both lithium carbonate and boric acid. As for Piskanja, with estimated inferred resources of 11.2 million t, B occurs in the minerals of colemanite, and ulexite, with contents varying from 28,8% to 30,8% B_2O_3 (*Rathore, 2015*).

In addition to borates, other non-metallic PRMs of interest are:

- Zeolites exploited in the operating mines of Korminjoš, Jablanica I and Igroš – Vidojevići
- Kaolinite exploited in the operating mines of Kranjani, Beli Majdan, Garasi, Ćirica potok – Krušik and bentonite (Jelenkovac – Zaplanje)
- Magnesite extracted in the open pit operating mine of Brezak (unknown resources) and the open pit operating mines Krive Strane i Torine, Šira lokalnost Čačka and Ribnica that exploit very large (class A) deposits.

Finally, it is notedthat despite the fact that no coal mines were included in the country's list in the RESEERVE PRMs Mineral Register, significant lignite quantities are extracted in SRB annually. Specifically, SRB is a Mineral-Fuels producer with total production for 2018 of 38.923.232t, as based on World Mining Data (WMD) 2020 report. This production comprises 37.652.520t lignite, 910.712t petroleum and 450Miom^3 natural gas. Thus, SRB is highly depended on lignite for energy production and issues concerning the gradual transition to other, than fossil fuel, energy sources in the future must be taken into account, including the alternative use of open pit coal mines following their closure.



Map 6: PRM Resources of Serbia – SRB (Mines/ Quarries/ Greenfields)

3.6.2 FINANCIAL DATA

Serbia constitutes one of the countries of the Balkan Peninsula having a long mining history, and characterized by the presence of leading mining companies, as well as a promising environment for future investments in M&Q activities. Due to its complexity of its geology, leading to the occurrence of metallic and non-metallic mineral resources, the country hosts world-class orebodies (e.g. copper, lead-zinc, Li, Mo).

The prices for the metals of interest and their changes for 2020 as compared to 2011 and 2019 in a date close to the 25th of December for each year are presented in Table 3.6-1, whereas the price variation for above metals in the period 2011-2020 is presented in ANNEX IV.

In the period 2020 to 2019 the highest increase was recorded for silver, copper, and gold. Lithium price is formed from the main producers that in line with WMD are; Australia, Chile, Argentina, as well as the main consumers, such as China.

Table 3.6-1: Prices[20] for the metals of interest for SRB

Metal of Interest	Metal Price			2020 price change as per 2011 (%)	2020 price change as per 2019 (%)
	2011	2019	2020		
Ag ($/tr.oz)	29,75	17,04	26,16	-12,08%	53,54%
Au (AM/PM AVG $/ tr.oz)	1.637,50	1.477,95	1.874,63	14,48%	26,84%
Cu ($/tn)	7.415,50	6.155,50	7.838,50	5,70%	27,34%
Li_2CO_3 (CNY/ t) [21]	-	-	38.882,21	-	-26,4%
Mo (USD/kg)	-	-	23.39	-	+7.44%
Pb ($/tn)	1.933,50	1.909,00	1.957,00	1,22%	2,51%
Zn ($/tn)	1.862,50	2.328,00	2.808,00	50,77%	20,62%

Taking into account the exporting activities of Serbia**,** country's highest shares recorded for lead and zinc (11.8%, and 6.34%, respectively), while for the other metals exports are low or absent. Therefore, it is assumed that priority needs to be given in the commodities not presently included in the country's exporting activities.

3.6.3 OTHER ASPECTS

As described in D6.3, favourable conditions prevailing in Serbia for the development of the mining sector include:

[20] Metal Bulletin, except Fe ore

[21] Li_2CO_3 price on 04/12/2020, (*Tradingeconomics_Lithium). Trading Economics provides Lithium pricing based on spot prices for Lithium Carbonate, 99.5% Li2CO3 min, battery grade, traded in China. Lithium is a silver-white light metal. Lithium hydroxide is used in batteries for electrical vehicles and mobile phones. Lithium hydroxide is produced from a chemical reaction between lithium carbonate and calcium hydroxide. The biggest lithium producers are Australia, Chile, Argentina and China. The largest lithium importers are China, Japan, South Korea and the United States.*

- **Mining history**; Serbia's presents a millennium tradition of mining activities for metals such as Cu, Au, Ag, Pb, and Zn, resulting in the formation of highly educated professionals from differentiated disciplines, and the existence of historical data of geological exploration for further research.,
- **Un-exploitable mineral resources & interest from foreign investors;** the diversification observed on the available ores, provides differentiated options for investments. Serbia has a large potential of mineral resources, with many of them characterized as strategic for the EU (such as lithium, borates e.tc.), and
- **Economical parameter;** SRB has a long-term mining business potential. The presence of leading international mining companies combined with the favourable business environment as well the increase of GDP till the year of 2017, consist positive aspects for Serbian business environment.

Constraints for the sector's growth in SRB include:

- **Mining methods and deposits characteristics**; the existence of small to medium deposits or deposits that need to be exploited in more depth, presents a constraint in the fast growth of M&Q activities,
- **Legal framework**; updating of mining and environmental legislation is required ,
- **Social acceptance**; ineffective communication to the wider society for M&Q activities, and the importance of RM materials in daily life,
- **Land use planning**; the harmonization of country's protected areas with Natura 2000 requirements is not yet conducted, whereas the existence of national parks within areas presenting potential for PRM consist barriers, and
- **Environment**; the reclamation and effective rehabilitation of the abandoned mines constitute issues that need to be resolved to improve the social acceptance of the sector.

3.6.4 SCREENING EXERSICE FOR SRB

The second screening exercise was conducted for the Babe project whose development was undertaken by Balkan Exploration and Mining d.o.o. This company, located in Belgrade is a member of Zijin Mining Enterprise (China), with a staff 15 of employees. This company is an investor in SRB since 2003, operating more than 15 exploration projects

The Babe project, is a deposit in the stage of exploration development. The thickness of the deposit is 6.8 m, containing 4% lead, 2% zinc, 0.25% copper, and 130 g/t silver, with the ore reserves estimated to 6.5 Million t.

The information provided in the completed questionnaire, ANNEX II, were used for a screening exercise. The results presented in the Figures 3.6-1 and 3.6-2 correspond to the following questions:

1. What are the factors that mostly impact exploration/exploitation at the specific economic deposits?
2. What's the company's level of satisfaction in line with the conditions in the country of Montenegro?

The response to the first question indicates that the Quality of the created Geodatabase, in combination to the Geological Potential, are two of the most important factors for the development

of an examined deposit, while Socioeconomic Agreements, and Disputed Land Claims ranked at the last places. As in the case of MNE, Balkan Exploration and Mining d.o.o. is also satisfied with the Tax regulations prevailing in Serbia. The lowest level of satisfaction was recorded, as in the case of MNE, for the non-existent Financial Aid and Support for M&Q, while as opposed to Tara Resources AG / Brskovo Mine d.o.o., Balkan Exploration and Mining d.o.o. declares more satisfied for the Availability of Labour Force, and the existing Legal Framework.

Finally, despite that the Economic Framework of a country really affects the investments growth, Balkan Exploration and Mining d.o.o. highlights that this will not have impacts on its investments. Other issues such as in relation to Land Use Planning are also not included for the case of Babe project.

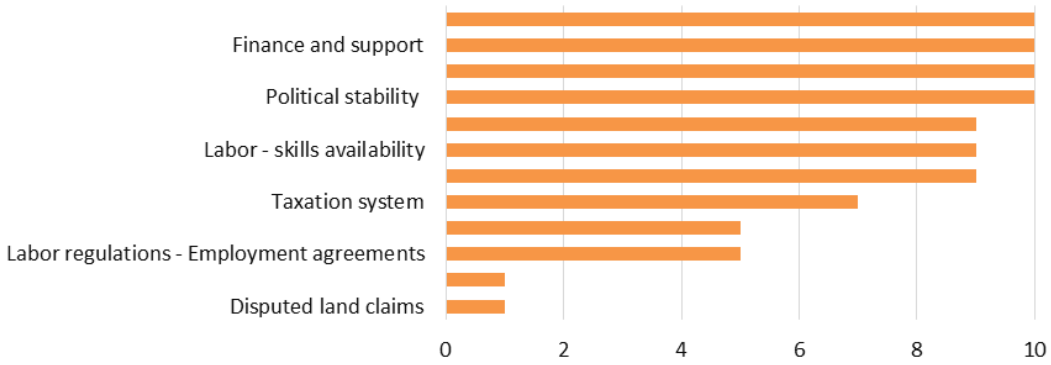


Figure 3.6-1: Main Factors impacting exploration/exploitation; Babe project, Balkan Exploration and Mining d.o.o., October 2020.

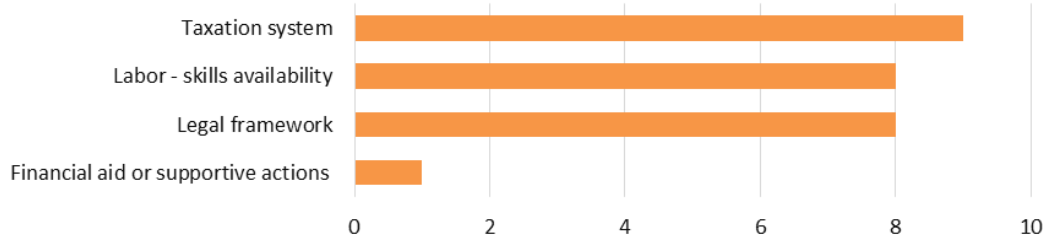


Figure 3.6-2: Level of satisfaction with prevailing conditions for development, permitting and operation of mining activities; Babe project, Balkan Exploration and Mining d.o.o., October 2020.

4. EVALUATION OF SRM

4.1 INTRODUCTION

As stated in *D6.2*, in line with *EU Raw Materials Scoreboard 2018*, extractive waste comprises materials generated during ore extraction and processing, resulting in a number of disposed wastes and byproducts with varied composition and environmental characteristics. In addition to the extractive wastes SRM stemming from the processing of Raw Materials include Red Mud, and slags/Ashes. Thus, waste emanating from mining, beneficiation processing and metallurgical processing of PRM may be inert materials but also materials containing increased levels of heavy metals that may pose adverse impacts to the environment and human health. Within this framework it is deduced that for the sustainable management of natural resources, prevention, minimization, reuse and recycling of waste, consist one of the main priorities of mining enterprises of today. A graph presenting the hierarchy in extractive waste management is presented in Figure 4.1-1 below.

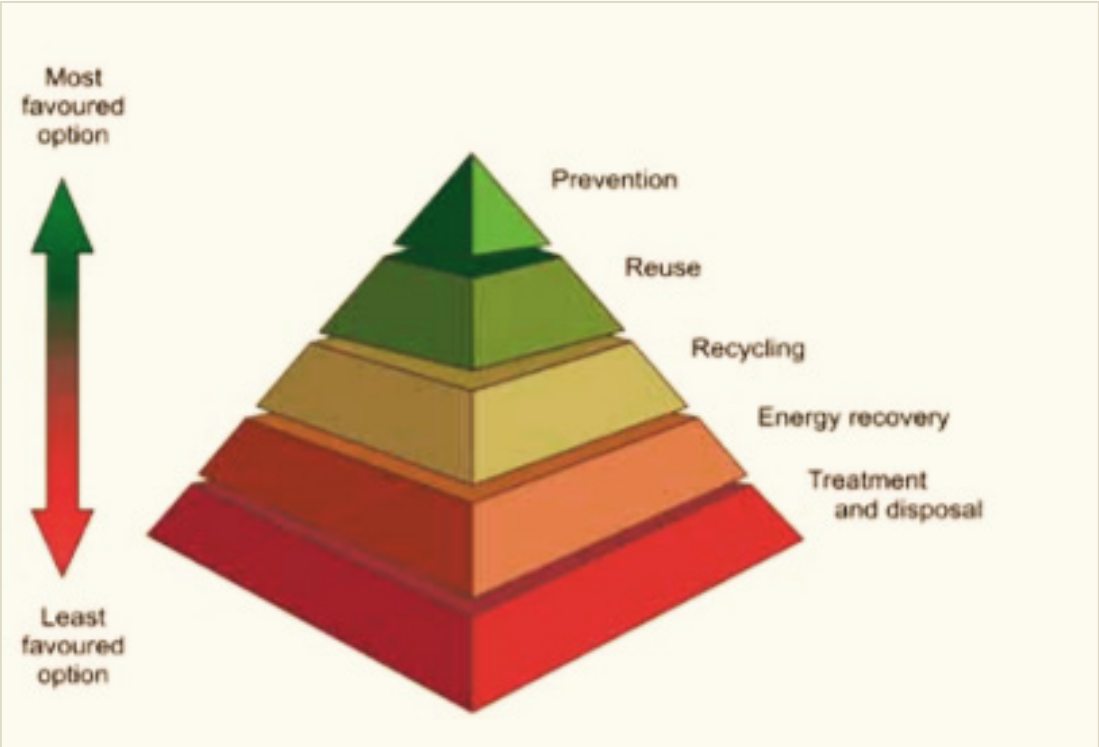


Figure 4.1-1: Options regarding management of extractive waste (*Lottermoser, 2011*).

Sustainable management of natural mineral resources consist a major EU policy and priority and potential mineral resources, such as the secondary ones (SRMs) should be exploited delaying thus the depletion of primary raw materials (PRMs).Moreover it is well known that many manmade mineral deposits, being the waste of mining activities or the afterwards treatment of concentrates, may include valuable critical raw materials, like REEs and rare metals (e.g. as in the case of red mud, the waste of alumina production from bauxite). A prerequisite for SRMs exploitation is to know *where these resources are* and *what they contain.* The categorization of wastes stemming from ore extraction, ore processing and concentrates' metallurgical treatment and the creation of a common

dataset for improving the poorly organized or scarce information in the ESEE region, is one of the EU priorities. This chapter is implemented in line with RESEERVE WP5 and presents information towards the aforementioned directions, by recording and evaluating the SRM sites of the ESEE countries under examination, their spatial distribution, historical information, as well as quantitative and qualitative data.

4.2 WASTE TYPES IN ESEE COUNTRIES

Three major groups of waste related with mining activities may be defined, in general. These are: *Mining wastes*, *processing wastes* and *metallurgical wastes*, with different options regarding their reuse or recycling. Potential uses of these wastes are presented in Table 4.2-1.

However it should be noted that the mining sector in the ESEE countries is still, in many cases, a traditional one and thus only a few of these proposed practices are implemented in most operating mining sites (*Lottermoser, 2011*). In addition to the exploitation perspective of SRMs, the existence of waste facilities indicates countries' potentially polluted areas that require the implementation of waste management planning, and the application of the basic principles of circular economy.

Focusing to the scope of this Deliverable SRM data available for the 6 ESEE countries collected within WP5 of the RESEERVE project were evaluated. This information was structured in the form of the *Mineral Register of Secondary Raw Materials* (https://reseerve.eu/results) including "basic geographical information of each site, type of waste landfill, geometry and primary extracted elements". Moreover GeoZS undertook to highlight the most attractive cases, among the Mineral Register's 1.461 records, regarding their content of materials of economic interest. GeoZS concluded with a 26 *important fields* table corresponding to 43 waste facilities forwarded to NTUA in October 2020. The data provided for these cases by GeoZS include information on the related mining activity, the process from which the wastes emanated, quantitative figures, composition, historicainformation, restoration status, e.tc. These data were recently updated by GeoZS and the NTUA team concluded with a list of 37 waste facilities presenting higher interest for further examination.

Within the framework of this Deliverable, and in order to Map business opportunities within SRM in the 6 ESEE countries all potential RESEERVE data sources were used. Based on the Mineral Register of SRMs, statistics were produced concerning each ESEE country examined for the participation of each waste type, in the overall country's waste disposal sites, based on the waste site surface area, as given in the Register. It is noted that the waste categories taken into account are the categories listed in the Register, namely: Mining Waste Landfills, Processing Waste (Flotation Tailings), Processing Waste (Red Mud Dam), Slag/Ash Landfills [Slag/Ash Landfills (Smelter) + Slag/Ash Landfills (Ironworks)]. The results are presented in Figures 4.2-1 - 4.2-, below.

Table 4.2-1: Reuse and recycling options for mining, processing and metallurgical wastes accumulating at mine sites (Based on *Lottermoser, 2011*, modified by the authors)

Waste type		Reuse and recycling option
Mining wastes	Wasterocks	• Resource of minerals and metals • Backfill for open voids • Landscaping material • Capping material for waste repositories • Substrate for revegetation at mine sites • Aggregate in embankment, road, pavement, foundation and building construction • Asphalt component • Feedstock for cement and concrete • Sulphidic waste rock as soil additive to neutralize infertile alkaline agricultural soils
	Mine waters	• Dust suppression and mineral processing applications • Recovery of metals from AMD waters • Drinking water • Industrial and agricultural use • Coolant or heating agent • Generation of electricity using fuel cell technology • Engineered solar ponds to capture heat for electricity generation, heating, or desalination and distillation of water
	Mine drainage sludge	• Extraction of hydrous ferric oxides for paint pigments • Extraction of Mn for pottery glaze • Flocculant / adsorbant to remove phosphate from sewage and agricultural effluents
Processing wastes	Tailings	• Reprocessing to extract minerals and metals • Waste reduction through targeted extraction of valuable minerals during processing • Sand-rich tailings mixed with cement used as backfill in underground mines • Clay-rich tailings as an amendment to sandy soils and for the manufacturing of bricks, cement, floor tiles, sanitary ware and porcelains • Mn-rich tailings used in agro-forestry, building and construction materials, coatings, cast resin products, glass, ceramics and glazes • Bauxite tailings as sources of alum • Cu-rich tailings as extenders for paints • Fe-rich tailings mixed with fly ash and sewage sludge as lightweight ceramics • Energy recovery from compost– coal tailings mixtures • Phlogopite-rich tailings for sewage treatment • Phosphate-rich tailings for the extraction of phosphoric acid • Ultramafic tailings for the production of glass and rock wool • Carbon dioxide sequestration in ultramafic tailings and waste rocks
Metallurgical wastes	Bauxite red mud	• Treatment of agricultural and industrial effluents • Raw material for glass, tiles, cements, ceramics, aggregate and bricks • Treatment of AMD waters • Carbon dioxide sequestration • Recovery of CRM, Rare Earths
	Historical base metal smelting slags	• Production of concrete and cement • Use as fill, ballast, abrasive and aggregate • Extraction of metals (e.g. Cu, Pb, Zn, Ag, Au)
	Phospho-gypsum	• Soil amendment • Building and construction material • Extraction of elements and compounds (e.g. U, Y, REE and calcium sulphate)

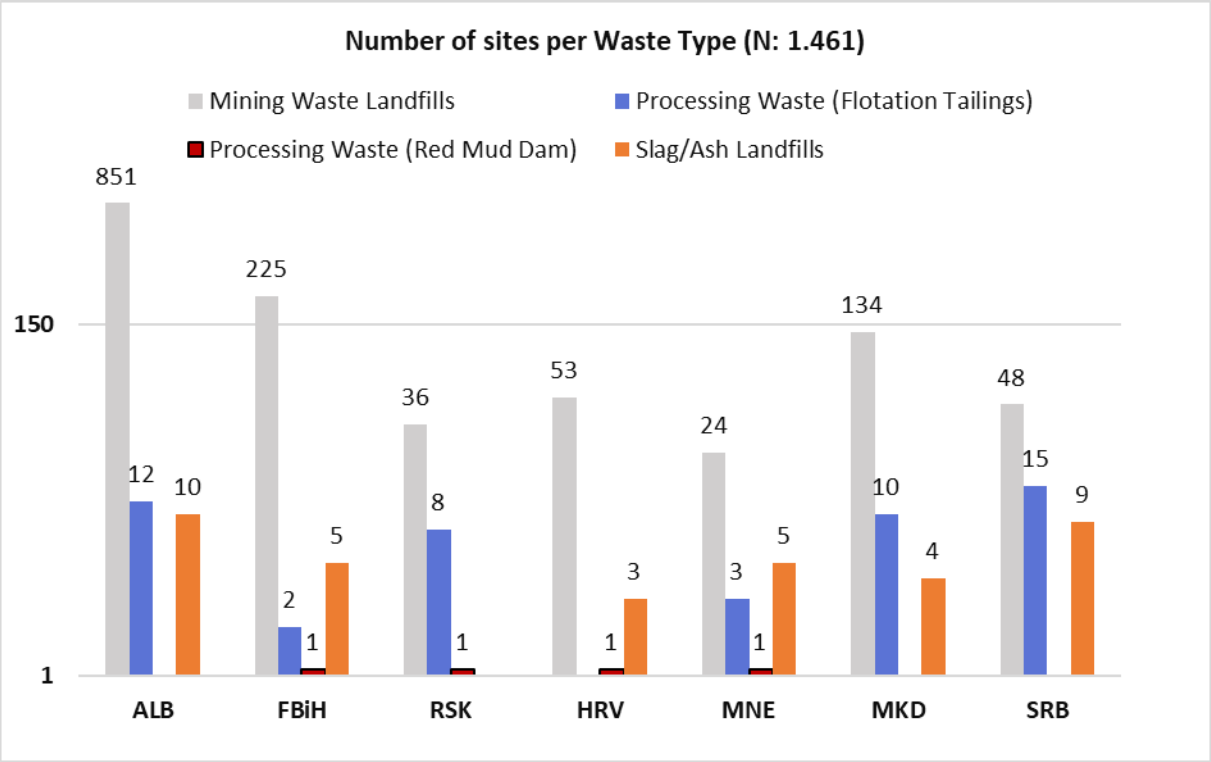


Figure 4.2-1: Number of waste sites per type of waste in the 6 ESEE countries, based on 1.461 site records of the RESEERVE Mineral Register of SRMs. The Slag/Ash Landfills category comprises smelter and ironworks landfills.

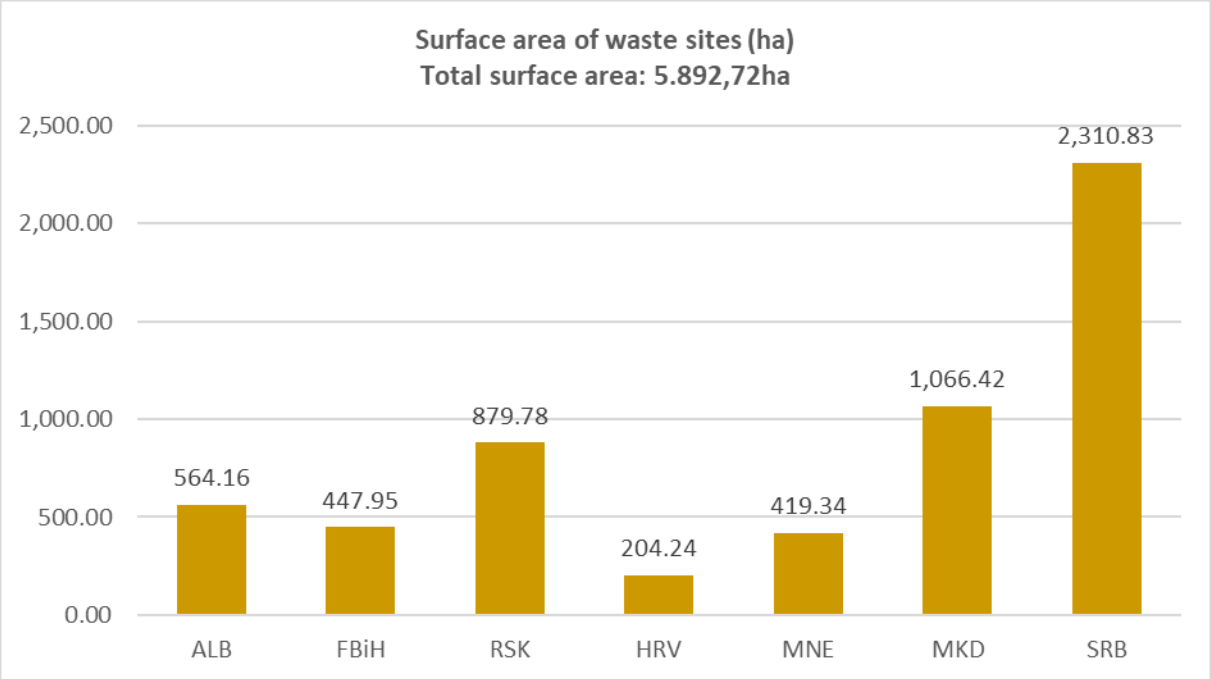


Figure 4.2-2: Area (ha) occupied by waste sites in the 6 ESEE countries, based on 1.461 waste site records of the RESEERVE Mineral Register of SRMs

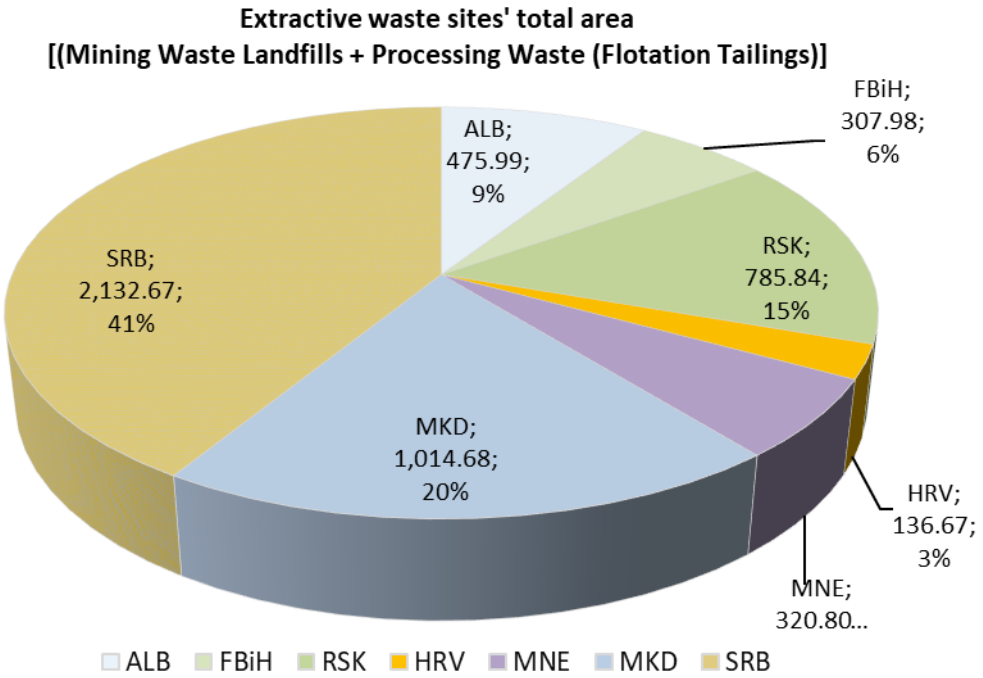


Figure 4.2-3: Total area (ha) occupied for the disposal of extractive waste in the 6 ESEE countries, based on 1.461 waste site records of the RESEERVE Mineral Register of SRMs.

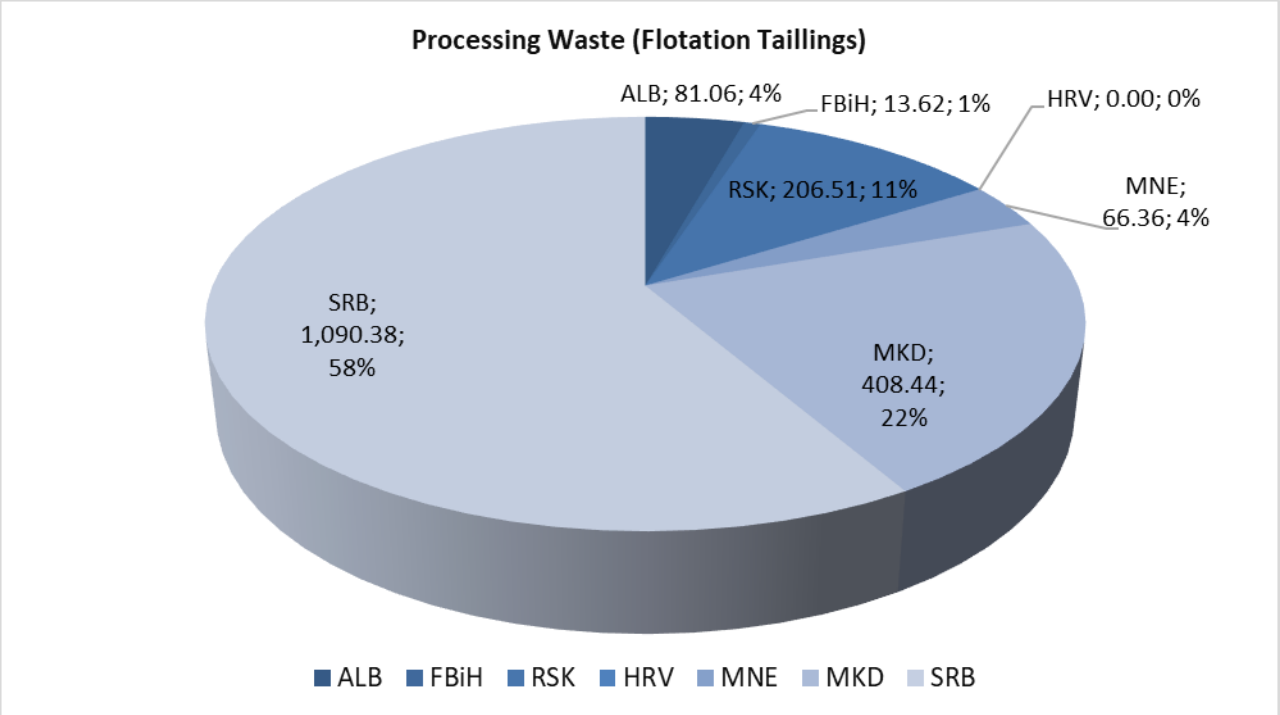


Figure 4.2-4: Area (ha) occupied for the disposal of Processing Waste (Flotation Tailings) in the 6 ESEE countries, based on 1.461 waste site records of the RESEERVE Mineral Register of SRMs.

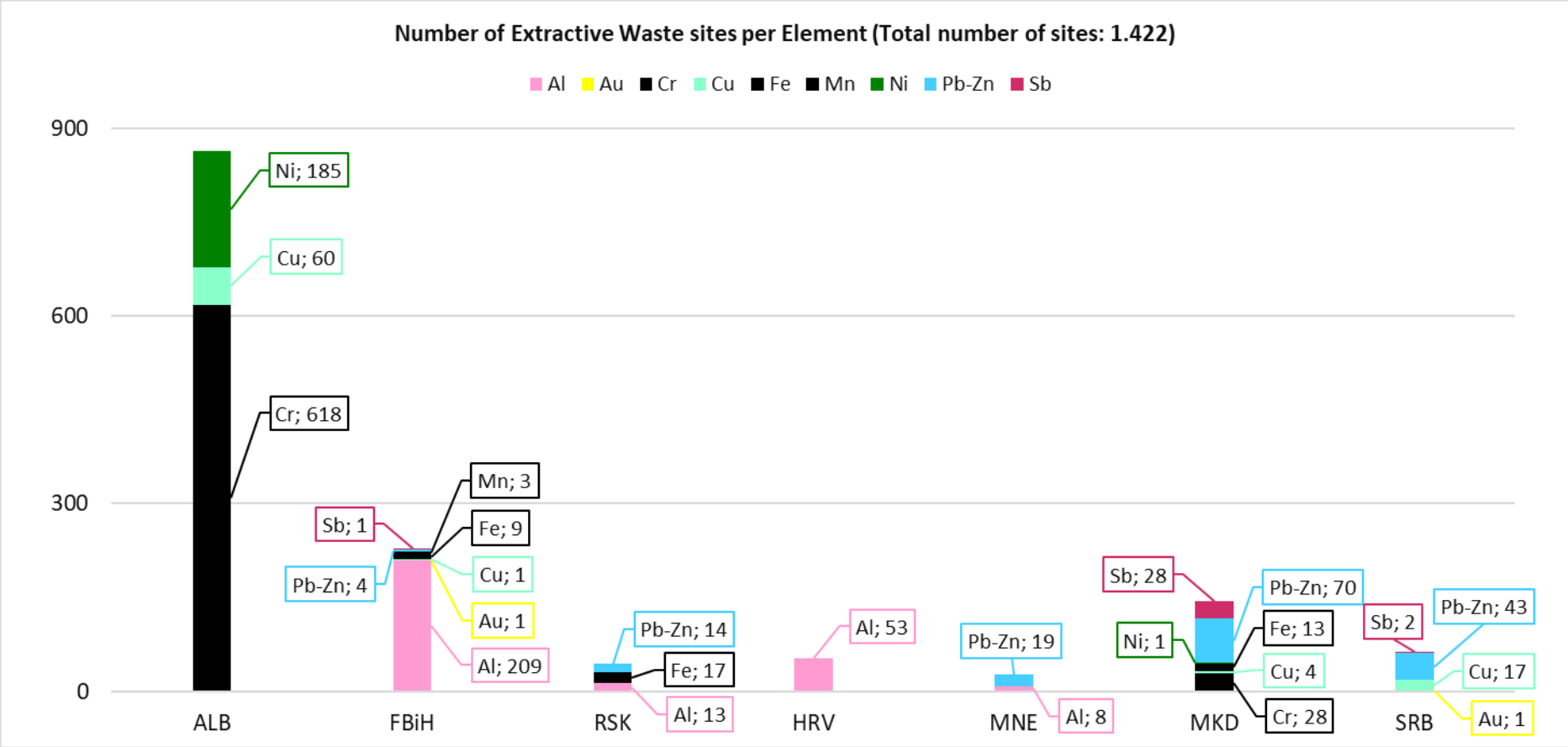


Figure 4.2-5: Number of extractive waste sites [Mining Waste Landfills & Processing Waste (Flotation Tailings)] related with a specific Element in the 6 ESEE countries, based on 1.461 waste site records of the RESEERVE Mineral Register of SRMs.

The metal symbol is in accordance with the D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE.

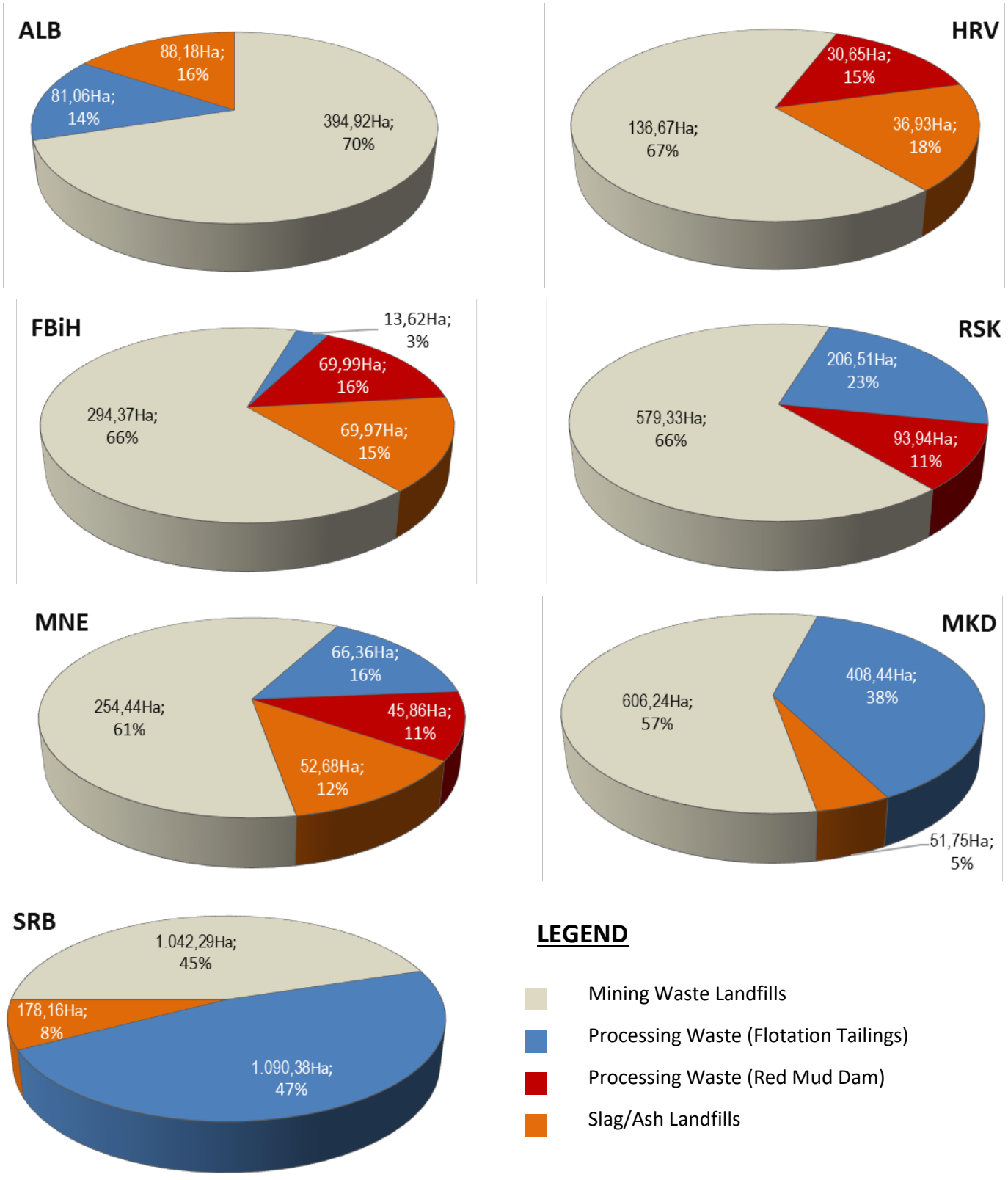


Figure 4.2-6: Distribution of waste sites' area, per waste category, based on 1.461 site records in total of the RESEERVE Mineral Register of SRMs, for the 6 ESEE countries

4.3 SRM RESOURCES IN ESEE COUNTRIES

As mentioned above, GeoZS undertook to highlight the most important cases, among the 1.461 waste sites recorded in the Mineral Register, regarding their content of materials of economic interest. This information was recently updated by GeoZS, regarding the selection of important SRM Fields. After examining available information, for the scope of the present Deliverable three tables were prepared that included sites of interest as SRM resources in the 6 ESEE countries. It is noted that:

(1) In the RESEERVE SRMs Mineral Register, the only category of Processing/Beneficiation Wastes reported separately is the Flotation tailings. Thus, it is assumed that all other types of processing waste, e.g. tailings from heavy media separation, magnetic separation are most possibly included, in the category of Mining Wastes.
(2) Mining Wastes sites have not been included in the GeoZS analysis of Important fields, since they are not of interest at this point of the study.

Furthermore, the 37 sites proposed as potential SRM resources and thus potential business opportunities, were grouped in three groups, as follows:

- Processing Waste (Flotation Tailings): 28 waste disposal sites are presented in Table 4.3-1 below (see also ANNEX V).
- Processing Waste (Red Mud Dam): 3 waste disposal sites are presented in Table 4.3-2, below (see also ANNEX V).
- Processing Waste (Slag/Ash Landfills): 6 waste disposal sites are presented in Table 4.3-2, below (see also ANNEX V).

All 1.461 waste sites of the RESEERVE Mineral Register are shown in Map 7. The map presents the location of these sites, with symbols indicating the Element parameter listed in the Register. The symbols used are in compliance with the *D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE*, similarly to the PRM maps, presented in Chapter 3. In Map 7, and in order to highlight the 37 sites reported as Important fields, a larger Element symbol was used marked with a distinctive cross. The size of the symbol does not correspond to the class of the SRM deposit.

Table 4.3-1: List of Important Flotation Tailings disposal areas in the 6 ESEE countries [22]. Data are arranged per country.

Environmental impact column legend: **1**: Acid Mine Drainage, AMD; **2**: Dam-failure, AMD; **3**: Air pollution, Loss of landscape, Soil contamination, Surface water pollution, Groundwater pollution; **4**: Air pollution, Loss of landscape, Soil contamination, Waste overflow, Deforestation and loss of vegetation cover, Surface water pollution, Groundwater pollution

No	Mine		Processing facility (Name, Location)	Waste facility location/ Field	Site area[23] (m^2)	Deposition period	Deposit status	Amount/ Weight (Million t)	Chemical composition[24]	Restoration	Environmental impact
	Country	Name, Location									
1	Albania	Munelle, Tuc	Fabrika 2 e pasurimit FushArrez	Fushë Arrëz	18,097 (18,565)	1984-1991	Closed/ Abandoned	3,1	Cu: 0,22 %	(No) Restored by nature	1
2		Rehove	Fabrika e pasurimit Rehove	Rehove	4,318	1980-1991	Closed/ Abandoned	0,61	Cu: 0,15 %	(No) Restored by nature	1
3		Reps	Enrichment factory 1 & 2 Reps	Reps/Spaç (1)	5,188	1970-1990	Closed/ Abandoned	3,7	Cu: 0,18 %	Restored	1
4				Reps/Spaç (2)	4,940 (5,141)						
5				Reps/Spaç (3)	2,259 (1,949)						
6		Rubik, Derven, Perlat	Fabrika e pasurimit Rreshen	Rreshen	3,210	1984-1990	Closed/ Abandoned	0,44	Cu: 0,18 %	Restored	1
7		Kurbnesh mine	Enrichment factory of copper (closed)	Kurbnesh	12,612	1961-1990	Closed/ Abandoned	3,6	Cu: 0,17 %	Restored	2
8	Bosnia & Herzegovina	Veovača (FBiH)	Rudnikolova, cinkaibarita Veovaca; Flotacija Tisovac	Veovača	5,433 (5,602)	-	Closed/ Abandoned	2	Ag: 18 ppm, Pb: 0,41%, Zn: 0,51%	No	3
9		Sase tailing site (RSK)	Flotation pool Sase	Srebrenica-1	5,281 (6,044)	-	Active	2	Ag: 6,4 ppm, Au: 0,14 ppm, Mn: 0,9%, Pb: 0,27%, Zn: 0,29%	Yes (active)	3
10				Srebrenica-2	3,817 (4,364)				Ag: 4,1 ppm, Au: <0,1 ppm, Mn: 1,2%, Pb: 0,23%, Zn: 0,51 %		

[22] Based on information provided by GeoZS and the RESEERVE SRM Mineral Register (https://reseerve.eu)

[23] Based on the RESEERVE SRM Mineral Register; Figures in parentheses are based on GeoZS updated data.

[24] Based, mainly on GeoZS updated data.

Table 4.3-1: List of Important Flotation Tailings disposal areas in the 6 ESEE countries [22]. Data are arranged per country.

Environmental impact column legend: **1**: Acid Mine Drainage, AMD; **2**: Dam-failure, AMD; **3**: Air pollution, Loss of landscape, Soil contamination, Surface water pollution, Groundwater pollution; **4**: Air pollution, Loss of landscape, Soil contamination, Waste overflow, Deforestation and loss of vegetation cover, Surface water pollution, Groundwater pollution

No	Mine		Processing facility (Name, Location)	Waste facility location/ Field	Site area [23] (m^2)	Deposition period	Deposit status	Amount/ Weight (Million t)	Chemical composition [24]	Restoration	Environmental impact
	Country	Name, Location									
11	Montenegro	Šupla Stijena	Flotation facility	Gradac	12,614	-	Closed/ Abandoned	3	Ag: <4 ppm, Pb: 0,19%, Zn: 0,39%	No	3
12	(North Macedonia)	Lead and zinc mine Zletovo	Flotation facility	Probištip (1)	22,501 (24,409)	1928-1939; 1945-	Active	30	Ag: 21 ppm, Mn: 5,3%, Pb: 0,68%, Zn: 0,58%	Yes (active)	4
13				Probištip (2)	40,049 (40,359)				Ag: 9,7 ppm, Mn: 2,1%, Pb: 0,32%, Zn: 0,33%		
14				Probištip (3)	31,956 (32,880)				Ag: 7,7 ppm, Mn: 2,9%, Pb: 0,30%, Zn: 0,30%		
15		Lead and zinc mine Sasa		Sasa-1	12,473	1965-	Active	20	Ag: 4,3 ppm, Mn: 0,7%, Pb: 0,33%, Zn: <0,2%	Yes (active)	3
16				Sasa-2	12,140				Ag: 5,0 ppm, Mn: 0,7%, Pb: 0,33%, Zn: <0,2%		
17				Sasa-3	23,497				Ag: 4,4 ppm, Mn: 1,7%, Pb: 0,57%, Zn: 0,36%		
18		Lead and zinc mine Toranica		Toranica	12,410	1987-	Active	10	Ag: 4,4 ppm, Mn: 1,5%, Pb: 0,66%, Zn: 0,37%	Yes (active)	3
19		Antimony mine Lojane)		Lojane-1	2,022	1923 - 1979	Closed/ Abandoned	0,5	Sb: >1,0 %	No	3

Table 4.3-1: List of Important Flotation Tailings disposal areas in the 6 ESEE countries [22]. Data are arranged per country.

Environmental impact column legend: **1**: Acid Mine Drainage, AMD; **2**: Dam-failure, AMD; **3**: Air pollution, Loss of landscape, Soil contamination, Surface water pollution, Groundwater pollution; **4**: Air pollution, Loss of landscape, Soil contamination, Waste overflow, Deforestation and loss of vegetation cover, Surface water pollution, Groundwater pollution

No	Mine		Processing facility (Name, Location)	Waste facility location/ Field	Site area[23] (m^2)	Deposition period	Deposit status	Amount/ Weight (Million t)	Chemical composition[24]	Restoration	Environmental impact
	Country	Name, Location									
20	Serbia	RTB Bor, Bor	Flotation facility, Bor	Flotation deposit (1)	17,660	-	Closed/ Abandoned	28	Ag: <4 ppm, Au: 0,31 ppm, Cu: <0,1%	No	4
21				Flotation deposit (2)	36,735				Ag: <4 ppm, Au: 0,40 ppm, Cu: <0,1%		
22		Lead and Zinc Mine GROT Joint Stock Company Vranje, KrivaFeja	Flotation facility	Grot	25,606	1974-	Active	5,5	Ag: <4 ppm, Mn: 1,2 %, Pb: 0,37 %, Zn: <0,2 %	Yes (active)	4
23		Lead and Zinc Mine Lece	Flotation facility	Lece	20,636 (23,096)	1954-2001	Active	2,7	Ag: <4 ppm, Au: 0,33 ppm	Yes (active)	4
24		Lead and Zinc Mine Suva Ruda		Rudnica	11,411		Closed/ Abandoned	5,5	Ag: <4 ppm, Pb: <0,2%, Zn: <0,2%	No	4
25				Kukanjica Potok	8,813				-		
26		Mine Rudnik		Rudnik	39,984 (40,763)	1953-	Active	8,7	Ag: 15 ppm, Pb: 0,50 %, Zn: 0,44 %	Yes (active)	4
27		Lead and Zinc Mine Veliki Majdan	Flotation facility, Veliki Majdan	Veliki Majdan-1	2,106 (2,244)	1930-	Active	1,9	-	Yes (active)	4
28				Veliki Majdan-2	3,441 (3,455)						

Table 4.3-2: List of Important Red Mud Dams in the 6 ESEE countries [25]

No	Waste facility Location	Site area[26] (m^2)	Deposition period	Deposit status	Chemical composition[27]	Environmental impact
1	Dobro Selo (Bosnia & Herzegovina) (FBiH)	69,990 (70,341)	1979-1992	Closed/ Abandoned	Al_2O_3 (in total) 17,13%; Al_2O_3 (dissolved) 0,88%; REE: 1.300 ppm	Air pollution, Loss of landscape, Soil contamination, Surface water pollution, Groundwater pollution
2	Birač (Dulici) (Bosnia & Herzegovina) (RSK)	93,942	-	Active	REE: 550 ppm	
3	Podgorica (Montenegro)	45,858	-	Active	REE: 1.200 ppm	Air pollution, Loss of landscape, Soil contamination, Surface water pollution, Groundwater pollution

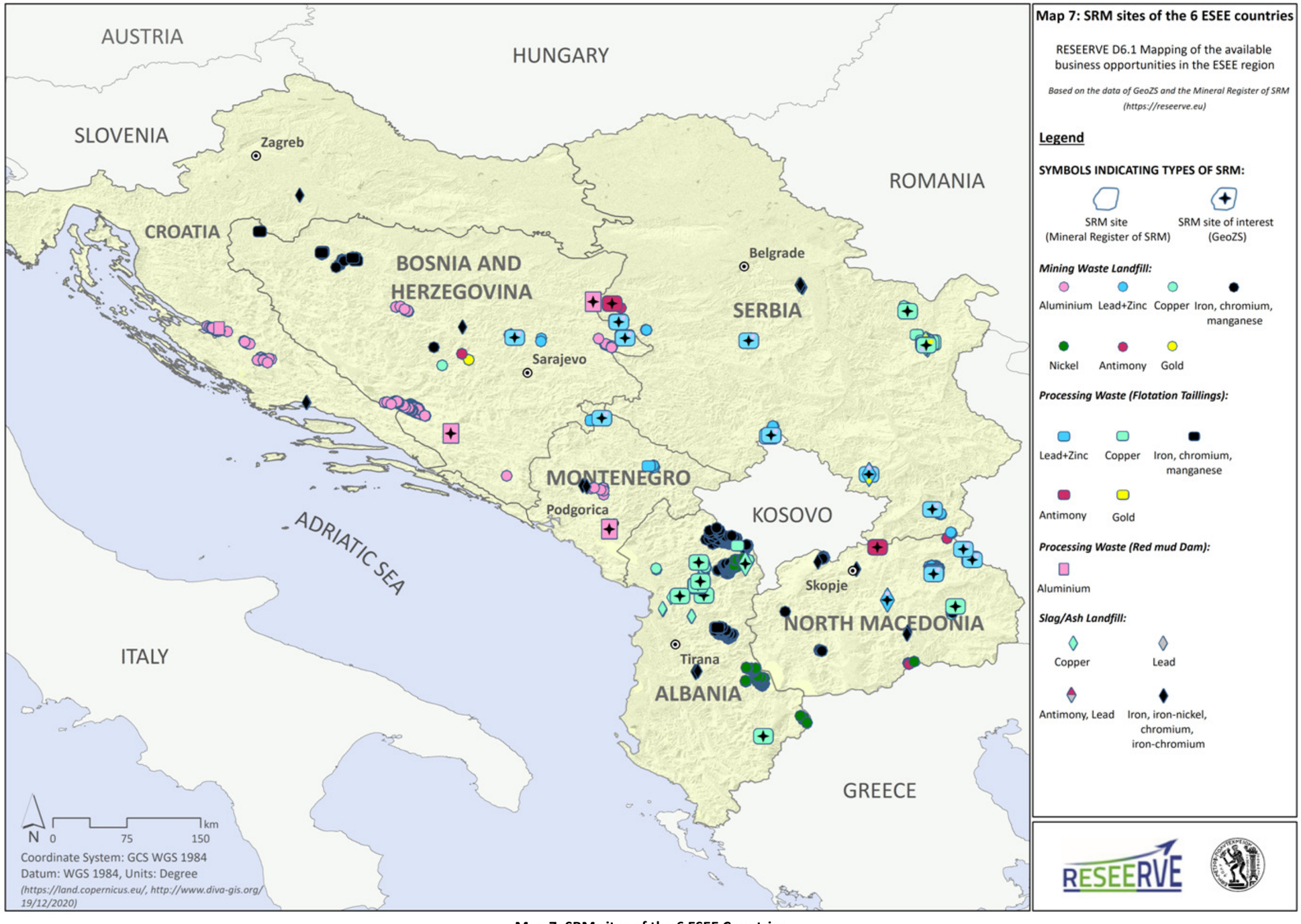
Table 4.3-3: List of Important Sludge and Ash Landfill areas in the 6 ESEE countries [25]

No	Processing facility (Name, Location)	Waste facility location/ field	Site area[26] (m^2)	Amount/ Weight (Mt)	Chemical[27] composition	Environmental impact (stability, erosion, element emission)
1	Fabrika e pasurimit Golaj (Albania)	Kukës	12,707	0,35	-	Acid Mine Drainage
2	RTB Bor plant for smelting of copper concentrate (Serbia)	Bor/Bor-1	73,274 (71,389)	50	Ag: <4 ppm, Au: <0.1 ppm, Cu: 0.40 %, Mo: 0.11 %, Zn: 0.79 %	Air pollution, Loss of landscape, Soil contamination, Waste overflow, Deforestation and loss of vegetation cover, Surface water pollution, Groundwater pollution
3		Bor/Bor-2	3,029 (19,007)		-	
4		Bor/Bor-3	28,774 (8,906)		-	
5	Smelter Zajaca (Serbia)	Zajača	4,674 (4,929)	0,60	Ag: 14 ppm, Au: 0.19 ppm, Sb: 0.85 %	Soil contamination, Waste overflow, Surface water pollution, Groundwater pollution
6	Sluge (metallurgic) (North Macedonia)	Veles	3,787	1,8	Ag: 39 ppm, Cu: 0.70%, Mn: 1.1 %, Pb: 2.5 %, Zn: 8.3 %	Air pollution, Loss of landscape, Soil contamination

[25] Based on information provided by GeoZS and the RESEERVE SRM Mineral Register (https://reseerve.eu)

[26] Based on the RESEERVE SRM Mineral Register; Figures in parentheses are based on GeoZS updated data.

[27] Based mainly on GeoZS updated data



Map 7: SRM sites of the 6 ESEE Countries

4.4 OTHER ASPECTS

Current status of SRM, and particularly the Important fields of processing wastes suggests that a possible investment is advantageous, taking into consideration ESSE region's mineral potential, as well that the many of the significant sites for SRM are in operation. Other favourable conditions for the exploitation of SRM sites consist the key – position of the countries the growth of economic activities, as well the efforts from the ESEE countries to develop new skills and to acquire know-how.

On the other hand, there are aspects adversely impacting the economic recovery of SRMs in the ESEE countries examined. These parameters include the limited data available on the chemical composition of these wastes, including the presence of hazardous elements that could prevent their reprocessing and reuse activities. Other aspects presenting constraints in the SRM valorisation is the legal framework, regarding waste transportation. Finally, moderate research level for reprocessing these wastes, in combination to the difficulties in obtaining the social license to operate are indicators of the low acceptance of those activities that also leads to the absence of skilled managers and technical personnel for the growth of this type of these circular economy activities.

5. SUMMARY & CONCLUSIONS

5.1 BUSINESS OPPORTUNITIES OF PRM

Based on the data highlighted in Chapter 3 of the present Deliverable, as well as the detailed information provided in ANNEX III for the PRM resources, and the financial data, Metal prices for the metals of interest figured in Annex IV, in order to summarize the business opportunities related with the sustainable development of PRM s in the 6 ESEE countries, an integrated Table (Table 5.1-1) was constructed. The business opportunities were classified as Low, Medium, High and Very High based on the following parameters:

- Geological Potential of examined commodity taking into account the size of the deposit, A, B, C,D and /or the number of deposits encountered in the same area
- Reserves type, (INSPIRE)
- Current status, Feasibility, Operating, Abandoned, etc. (INSPIRE)
- Occurrence of CRMs in the PRMs examined
- Perspective of the examined commodity and its variation in the last decade
- Proposals by the TPs
- Other aspects, such as Business Environment, Legal framework etc.

Moreover, a number of cases were classified as of Unknown potential for business opportunities, mainly due to lack of information, i.e. size of the deposit, reported in the RESEERVE Mineral Register of PRMs. Also it should be mentioned that a number of commodities such as coal and common commodities such as raw materials for the cement production or aggregates were not consistently included in the PRM Mineral Register for the 6 ESEE countries examined.

As illustrated in Table 5.1-1 there is a significant number of business opportunities in the 6 ESEE Countries for PRM and the construction of the geodatabase of the West Balkan Mineral Register is a major step in mapping the availability of businesses opportunities.

For Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia Business opportunities with Very High and High Potential are mainly associated with Metallic Commodities, and include Exploration activities to increase the level of confidence and increase reserves, and Development of Mines or Green Field areas. In Croatia the majority of Business opportunities are related to the Exploration and Development of Mines of Non Metallic Commodities.

Untapped potential of mineral resources, and presence of “strategic” metals are only some of the factors adding value to M&Q sector of these countries with long-term tradition in mining, processing and metallurgical activities

However, for the sustainable growth of business activities in the PRM sector, quality control of the data available regarding the type and size of resources/reserves available is needed according to international classification standards. Legislation updating and codification as well as development of long-term strategies for the development and exploitation of PRMs are also necessary to ensure a favourable business environment, attractive for inward investment in the sector. As is the case for many ESEE EU countries, to improve the business environment areas that need improvement include the lengthy and multi staged permitting procedures, the absence of Land planning provisions for the development of the Mineral Wealth. Environmental issues related to the delineation and sustainable

management of Nature protected areas in compliance with EU regulation, as well as the reclamation of historic and/or abandoned site are only some of the issues to be resolved in order to improve the social acceptance of the sector in the ESEE countries examined. Low investments in R&D regarding the exploration, mining, processing and recovery of PRM, as well as the absence of skilled professional and technical personnel are some of the other aspects to be confronted for the enhancement of business opportunities.

Table 5.1-1: Summary of proposed business opportunities in the PRMs Resources of the 6 ESEE countries

Legend:	Low	Moderate	High	Very high	Unknown

Ore description / Rock / Mineral	Albania	Bosnia & Herzegovina		Croatia	Montenegro	North Macedonia	Serbia
		FBiH	RSK				
Metallic & Precious PRM commodities							
Antimony ore		Exploration to increase level of confidence and reserves	Exploration to increase level of confidence and reserves			Exploration to increase level of confidence and reserves	Exploration to increase level of confidence and reserves
Bauxite		Exploration to increase level of confidence and reserves; Geochemical research to assess content of CRMs	Exploration to increase level of confidence and reserves; Geochemical research to assess levels of CRMs.	Geochemical research to assess content of CRMs	Geochemical research to assess content of CRMs		
Chromite	Exploration to increase level of confidence and reserves						
Cobalt ore		Development of Mines					
Copper ore	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.					Development of Mines, and/or Green fields	Development of Mines, and/or Green fields
Gold ore	Exploration to increase level of confidence	Exploration to increase level of confidence and reserves					Development of Mines, and/or Green fields.
Iron ores, iron-nickel, nickel ores	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.			Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields	
Lead, Zinc, Lead+Zinc ores		Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.		Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.	Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.

Table 5.1-1: Summary of proposed business opportunities in the PRMs Resources of the 6 ESEE countries

Legend:	Low	Moderate	High	Very high	Unknown

Ore description / Rock / Mineral	Albania	Bosnia & Herzegovina		Croatia	Montenegro	North Macedonia	Serbia
		FBiH	RSK				
Metallic & Precious PRM commodities (cont.)							
Mangenese ore		Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.				Development of Green fields	
Mercury ore		Exploration to increase level of confidence and reserves; Development of Mines, and/or Green fields.					
Molybdenium ore						Development of Mines, and/or Green fields	Exploration to increase level of confidence and reserves; Development of Mines.
PGE							
Titanium ore	Development of Mines, and/or Green fields						
Energy Commodities							
Coal	Alternative uses of lignite & mined out areas, e.g. PV		Alternative uses of lignite & mined out areas, e.g. PV		Alternative uses of lignite & mined out areas, e.g. PV	Alternative uses of lignite & mined out areas, e.g. PV	Alternative uses of lignite & mined out areas, e.g. PV
Uranium							

Table 5.1-1: Summary of proposed business opportunities in the PRMs Resources of the 6 ESEE countries

Legend:	Low	Moderate	High	Very high	Unknown

Ore description / Rock / Mineral	Albania	Bosnia & Herzegovina		Croatia	Montenegro	North Macedonia	Serbia
		FBiH	RSK				
Non Metallic PRM Commodities							
Barite							
Bentonite			Development of Mines				
Borates, Lithium							Exploration to increase level of confidence and reserves; Research for added value uses.
Calcite				Research for added value uses		Research for added value uses	Exploration to increase level of confidence and reserves; Research for added value uses.
RM for Cement production				Use in infrastructure & construction		Use in infrastructure & construction	
Chrysothallite			Research for added value uses				
Common clays, clays			Use in infrastructure & construction			Use in infrastructure & construction	
Common crushed rock aggregates				Use in infrastructure & construction	Use in infrastructure & construction		
Dimension stone	Use in infrastructure & construction		Use in infrastructure & construction	Use in infrastructure & construction	Use in infrastructure & construction		
Dolomite						Development of Mines	
Feldspars						Exploration to increase reserves	

Table 5.1-1: Summary of proposed business opportunities in the PRMs Resources of the 6 ESEE countries

Legend:	Low	Moderate	High	Very high	Unknown

Ore description / Rock / Mineral	Albania	Bosnia & Herzegovina		Croatia	Montenegro	North Macedonia	Serbia
		FBiH	RSK				
Non Metallic PRM Commodities (cont.)							
Gypsum			Use in infrastructure & construction				
Hard rock aggregates				Use in infrastructure & construction; Research for added value uses.	Use in infrastructure & construction; Research for added value uses.		
Kaolinite							Development of Mines
Magnesite							Exploration to increase level of confidence and reserves Development of Mines
Phosphates	Development of Mines						
Quartz			Research for added value uses	Research for added value uses			
Sand and gravel aggregates				Use in infrastructure & construction			Use in infrastructure & construction
Talc			Research for added value uses				
Zeolites			Exploration to increase level of confidence and reserves; Development of Quarries.				Research for added value uses

5.2 BUSINESS OPPORTUNITIES OF SRM

For the purposes of this Deliverable, data available in the *West Balkan Mineral Register for SRM* were examined in order to assess and Map potential business opportunities related with the reuse and reprocessing of the wastes emanating from the mining, processing and metallurgical activities.

The waste categories taken into account are the categories listed in the Register, namely: Mining Waste Landfills, Processing Waste (Flotation Tailings), Processing Waste (Red Mud Dam), Slag/Ash Landfills [Slag/Ash Landfills (Smelter) + Slag/Ash Landfills (Ironworks)].

The majority of SRM sites recorded for the 6 ESEE countries are related to Mining Waste Landfills, that account to 1.371 out of the 1.461 sites examined, i.e. 94%. More than half of the sites (851) are found in ALB territory (see Figure 4.2-1). The area occupied for these Mining Waste Landfills, ranges from 45 % of the overall area of waste disposal facilities for SRB to 70 % for ALB. These data are in agreement with the type of PRM extracted and processed in the 6 ESEE countries, as well as the number of mines/plants operating in the field. For example in ALB extraction activities are performed in many different mines resulting in an increased number of waste sites, whereas in SRB mining activities are focused in a limited number of mine and processing of Base metals. Distribution of some key-Elements (Cu, Pb-Zn, Cr, Ni, Al, Fe-Mn) was assessed as per the participation of the corresponding waste sites' surface area, within the framework of *D5.3 RESEERVE Report* (See Figure 5.2-1). As seen the main Element found in Mining Waste Landfills is Cu (37%). This is also the main element found in Processing Waste Landfills (56%). Cu also is a major Element in Slag Landfills, 26%, where the main Elements are Fe-Mn (40%).

Based on international practice and due to the relatively increased areas of Mining Wastes as compared to the other facility types, occupying an area of 3.308,26 Ha, and the lack of data regarding their chemical composition, these wastes depending on their properties could be beneficially used, if inert or alkaline, to backfill mining voids, as construction material for restoration of old mining sites, aggregates in embankment, road, pavement, foundation and building construction.

From the evaluation of the data available on the Important fields of Processing wastes disposal facilities, including Flotation Tailings, occupying 1.866,37 Ha Red Mud, 240,44 Ha, and Metallurgical wastes Slag/Ash, 477,76 Ha, it was deduced that:

- In Albania, (ALB) the processing waste disposal sites that could present potential for Business opportunities were related to flotation tailings and metallurgical slags originating from processing of Cu and Cr ores,
- In Bosnia and Herzegovina, (BiH), and mainly SRK, and in Montenegro, (MNE) the most important processing waste facilities to be further examined are related to Red Mud from Aluminium production, followed by a number of Pb-Zn, Mn and Fe Flotation Tailings disposal facilities.
- In North Macedonia, (MKD), the most sizeable processing waste facilities relates to tailings from the flotation of Cu ores, combined with a number of flotation tailings from Pb-Zn, Sb ores, and a smaller smelter slags disposal facility.
- Almost 20% of the overall waste sites' area is occupied by Processing waste facilities recorded for Serbia, (SRB). The most important sites found in Serbia are related to tailings

from the flotation of Cu and Pb-Zn ores, followed by a number of Cu, Fe, Pb-Sb slags disposal areas.

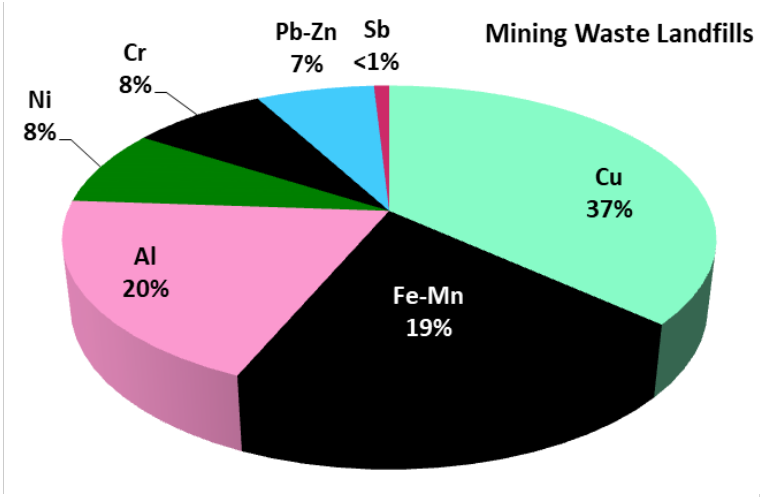


Figure 5.2-1**(a):** Mining Waste Landfills

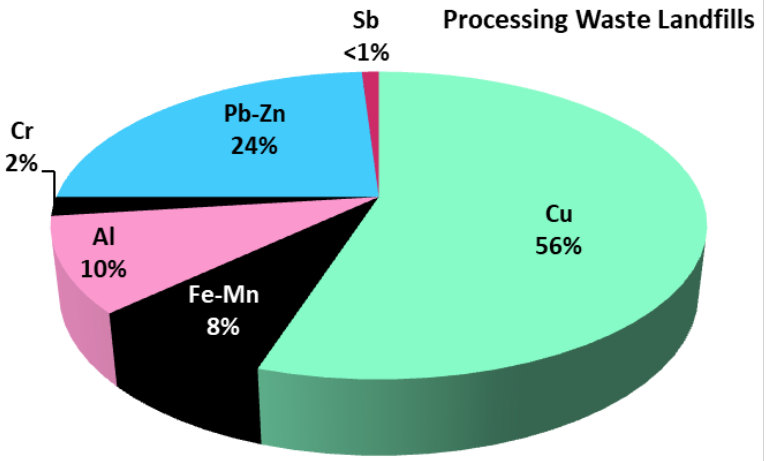


Figure 5.2-1 **(b):** Processing Waste Landfills

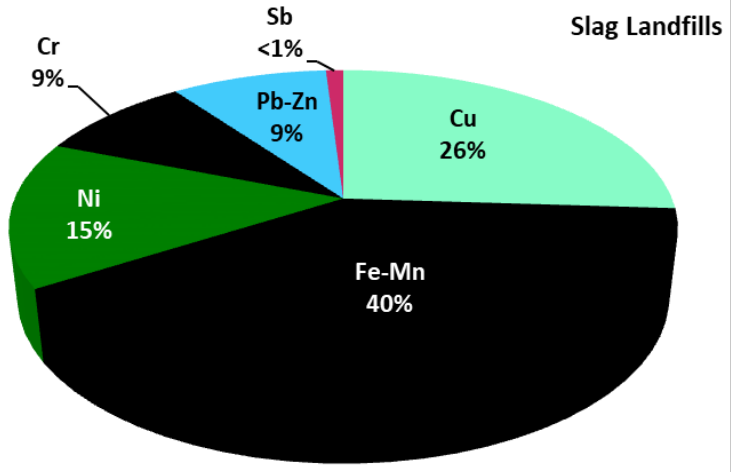


Figure 5.2-1 **(c):** Slag Landfills

Figure 5.2-1: Distribution of surface area per main Element of the RESEERVE Mineral Register of SRMs in <u>Mining Waste Landfills, Processing Waste Landfills and Slag Landfills</u>,as presented in p.18 of the RESEERVE Report on creating West Balkan Mineral Register on SRM data (***D5.3***), Version 1.0 11|2020

Depending on their quantities and composition above processing wastes could be reprocessed for the recovery of the contained metallic values, consisting potential business opportunities, emphasis placed in the recovery of CRM, Rare Earths from Red Mud.

Based on the Mineral Register the majority of these SRM Important fields are not reclaimed, adversely impacting the quality of the surrounding and downstream environment. Environmental impacts recorded include the formation of Acid Mine Drainage, an acidic effluent with elevated content of dissolved metals that subsequently impacts the quality of surface and ground waters and soils, Air pollution due to air born dispersion of dust and waste fine particles as well as Loss of Landscape.

The statistics of SRM resources recorded in the relevant Mineral register, for the 6 ESEE countries, as compared with relevant data of EUROSTAT, regarding the M&Q waste sector are given in Table 5.2-1.

Table 5.2-1: Data for M&Q waste for the 6 ESEE countries.

Country Code	Generation of waste by NACE Rev. 2 activity, 2016[28]			Number of sites Total, 1.461	Total Surface Area of Disposal (Ha)	Significant waste site cases – Business Opportunities (See Tables 4.3-1, 4.3-2 and 4.3-3)	
	M&Q (%) of total waste	HAZ (%)	NHAZ (%)			Number	Percent (%)
ALB	66,7%	nd	nd	873	564,16	8/37	21,6%
BiH	1,6%	0,20%	99,80%	278	1.327,73	5/37	13,5%
HRV	12,0%	0,55%	99,45%	57	204,24	0/37	0%
MNE	19,2%	99,60%	0,40%	33	419,34	2/37	5,4%
MKD	49,2%	1,90%	98,10%	148	1.066,62	9/37	24,3%
SRB	78,5%	44,27%	55,73%	72	2.310,83	13/37	35,1%

Scale bar:	Low value				High value

5.3 CRM IN PRMS AND SRMS

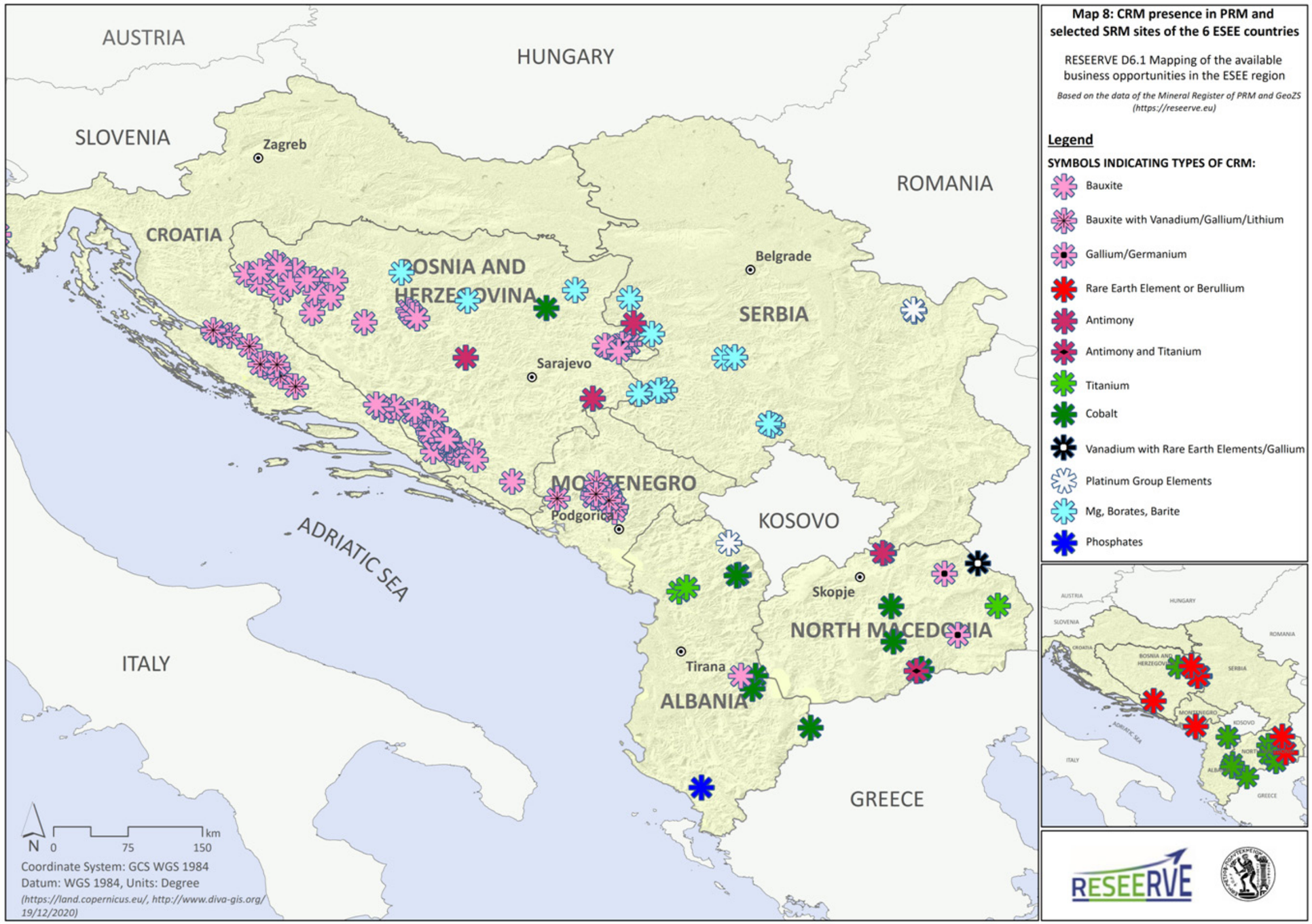
Finally an important criterion to identify business opportunities in the examined PRM and SRM resources was the presence of CRM in the above commodities.

This evaluation was qualitative for the commodities where CRMs were not the prime element, given that in these cases no data regarding their content were available in the Mineral Registers.

Based on available data the spatial distribution of CRM in the 6 ESEE countries is given in Map 8**.**

One business opportunity of primary importance for countries like Croatia, Bosnia & Herzegovina and Montenegro is the evaluation of bauxite deposits regarding the potential recovery of Bauxite, constituting a CRM, as well as the other contained CRMs. Moreover, deposits of CRM such as Co, Sb, Ti are encountered in Albania and North Macedonia.

[28] *RESEERVE D6.2*



Map 8: CRM presence in PRM and selected SRM sites of the 6 ESEE Countries

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D3.3: “Development, description and testing of a prototype workflow”

D4.1: and “Report on competent sources and existing primary raw materials data”

D5.1: Report on competent sources and existing secondary raw materials data”

D6.2: “Fact Sheet for the West Balkan Countries Status in Mining”

D6.3: “SWOT and Gap analysis for the ESEE region”

D4.3: “Report on creating West Balkan Mineral Register of PRM data”

D5.3: “Report on creating West Balkan Mineral Register of SRM data”

RESEERVE West Balkan Mineral Register of (a) Primary Raw Material data, (b) Secondary Raw Material Data, https://reseerve.eu/

Material presented in the National Thematic Workshops conducted in the period 2018-2020

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ANNEXES

ANNEX I. QUESTIONNAIRE FOR TASK PARTNERS

Following sections summarize information for the Industrial Stakeholders and the Policy Makers, as provided by the respective TPs using the corresponding Questionnaires. These data were used to identify the most appealing Business Opportunities for the 6 ESEE countries.

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

D6.1 Mapping of the available business opportunities in the ESEE region: List of Stakeholders to cooperate with regarding PRM

List of Industrial and other Stakeholders

Within the preparation of D6.1 the **following Tables include the groups of Industrial stakeholders**, as derived from the 6 ESEE countries respectively, regarding Primary Raw Materials. These Tables are sent for your review and confirmation that these are the industries operating the deposits. Moreover, if data are available, please add to these Tables the companies that have expressed their interests to develop the deposits of economic importance, currently not operating.

Furthermore, for each of the 6 ESEE countries the Policy Makers and Geological Surveys are included. NTUA will contact these stakeholders in order to discuss with them and finalize the most appealing business opportunities, regarding Primary Raw Materials.

ALBANIA, ALB

Completed by Ledi Moisiu, Geological Survey of Albania, 14/09/2020

Please verify that the following industries have the rights for the exploitation of the deposits listed in Albania (Table I-1). Please clarify which are the industries that have already production from those deposits adding an X for each one of them.

Please also provide the name of the companies that have expressed their interests to develop the deposits of economic importance, currently not operating, with no production (such as **Nikoliq 2, South Perlat, Dardhe, Bregu i Bibes, Guri i Kuq, Bitincka**).

Table I-1. List of Industrial Stakeholders for Albania

N°	Deposits of Economic Importance	Industrial Stakeholders
1	Munella	Beralb Sh.A *(actually the*production is interrupted cause of no good opportunities in the market *)*
2	Nikoliq 2	
3	South Perlat	
4	Vlahen mine	*Vlahen Mining shpk (the deposits has changed the stakeholder and actually are doing only the preliminary works)*
5	Kalimash 1	*Illyria Minerals Industry Sh.A (X)*
6	Bulqize	AlbChrome (X)
7	Dardhe	*Green/free area*
8	Bregu i Bibes	*Green/free area*
9	Guri i Kuq	*North Star Mining sh.p.k (momently are waiting for better market conditions)*
10	Bitincka	*Albanian Nickel Group sh.p.k (momently are waiting for better market conditions)*

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Table I-2. List of Policymakers & Geological Surveys for Albania

N°	Other Stakeholders
1	Geological Survey of Albania
2	Extractive Industry Transparency Initiative
3	*Ministry of Energy and Infrastructure*
4	*National Agency of Natural Resources*
5	*National Agency for Planning Territory*

For the deposits (where no industrial stakeholders are inserted/are empty) even that are of economic importance, still no interest is expressed. Those deposit may considered as free are or green area
*Data provided/confirmed by the Task Partners are given in italics

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Bosnia and Herzegovina – BIH

Federation of Bosnia and Herzegovina.

Completed by Ismir Hadjarević, Geological Survey of the Federation of Bosnia and Herzegovina (FB&H), 28/08/2020

Republik of Srpska

Completed by Glavas Spasoje, Geological Survey of the Republic of Srpska, 02/09/2020

Table I-3. List of Industrial Stakeholders for Bosnia and Herzegovina

N°	Deposits of Economic importance	Metal (symbol)	Industrial Stakeholders (Concessionare)	Current status of deposit
		Federation of Bosnia and Herzegovina		
1	Rupice	*Pb, Zn, Ag, Au*	*Easter mining d.o.o. Sarajevo (Adriatic Metals Plc.)*	*Under development**
2	Veovača	*Pb, Zn, Ag*	*Easter mining d.o.o. Sarajevo (Adriatic Metals Plc.)*	*Under development*
3	Smreka	*Fe*	*Rudnik željezne rude d.d. Vareš (The company is bankrupt)*	*Abandoned*
4	Droškovac	*Fe*	*Rudnik željezne rude d.d. Vareš (The company is bankrupt)*	*Abandoned*
5	Olovo (Očekalj - Prgoševo)	*Pb*	*Geomet d.o.o. Olovo (Mineco)*	*Operating continuously*
6	Brezik	*Fe*	*Rudnik željezne rude d.d. Vareš (The company is bankrupt)*	*Abandoned*
7	Radovan planina	*Fe*	-	*Abandoned*
8	Tovarnica	*Fe*	-	*Abandoned*
9	Jasenica-Lušci Palanka	*Al*	*Rudnik boksita d.d. Bosanska Krupa (The company is bankrupt)*	*Abandoned*
10	Krnjeuša-Mijačica	*Al*	-	Abandoned
11	Bakovići	*Au*	*BBM d.o.o. Sarajevo*	*Under development*
12	*Dubоštica*	*Cr*	*Seven Plus d.o.o. Sarajevo*	*Under development*
13	*Popović Polje*	*Mn*	*Rudnik mangana d.d. Bužim*	*Operating intermittently, Stopped working in 9/2020*

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

N°	Deposits of Economic importance	Metal (symbol)	Industrial Stakeholders (Concessionare)	Current status of deposit
			Republik of Srpska	
14	Mountain Čavka	*Cu*	*"New Resources" d.o.o. Banja Luka*	*Under development*
15	Area of Banjalučka Kozara	*Mn*	-	*Abandoned*
16	Mountain Uzlomac	*Mn*	-	*Abandoned*
17	Vardište	*Ni*	-	*Abandoned*
18	Area of Lopare	*Li*	*"AR-CORE" d.o.o. Laktaši*	*Under development*
19	Snjegotina - Vrbanja	*Magnesite*	-	*Abandoned*
20	Milošev jarak - Bukovački jarak	*Magnesite*	-	*Abandoned*
21	Mušići - Žarkovac (Ozren)	*Talc*	-	*Abandoned*
22	Dubnica - Rajići	*Zeolite*	-	*Abandoned*
23	Novakovići	*Zeolite*	*"Stiv invest" d.o.o. Laktaši*	*Operating intermittently*

Table I-4. List of Policymakers & Geological Surveys for Bosnia and Herzegovina

N°	Other Stakeholders
1	Geological Survey of the Federation of Bosnia and Herzegovina (FBiH)
2	Geological Survey of the Republic of Srpska (RS)
3	Federal Ministry of Energy, Mining and Industry; Sector of Mining (FBiH)
4	Ministry of Industry, Energy and Mining (RS)
5	*Ministry of Economy of the Canton Sarajevo; Sector for Energy, Water Management, Entrepreneurship and Catering,* (FBiH)
6	*Ministry of Economy of the Herzegovina-Neretva Canton; Sector of Industry, Energy and Mining, (FBiH)*
7	*Ministry of Economy of the Tuzla Canton, (FBiH)*
8	*Ministry of Economy of the Zenica-Doboj Canton; Sector of Industry, Energy and Mining, (FBiH)*
9	*Ministry of Economy of the Una-Sana Canton, (FBiH)*
10	*Ministry of Economy of the Central Bosnia Canton, (FBiH)*
11	*Ministry of Economy of the West Herzegovina Canton, (FBiH)*
12	*Ministry of Economy of the Canton 10, (FBiH)*
13	*Ministry of Economy of the Bosnian-podrinje Canton Goražde, (FBiH)*
14	*Ministry of Economy and Physical Planning of the Posavina Canton, (FBiH)*

*Data provided/confirmed by the Task Partners are given in italics

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CROATIA (HRV)

Completed by Dedić Željko, Croatian Geological Survey, 15/09/2020

Please verify that the following industries have the rights for the exploitation of the deposits listed in Croatia (Table I-5). Please clarify which are the industries that have already production from those deposits adding an X for each one of them. Please also provide the name of the companies that have expressed their interests to develop the deposits of economic importance, currently not operating. with no production (such as **Cveljo Dolac, Buha Kuce, Ervenik, Kalun, Krste Radas, Mamutovac, Mosec, Promina, Bilisani, Krusevo, and Maslenica**).

Table I-5. List of Industrial Stakeholders for Croatia

N°	Deposits of Economic Importance	Industrial Stakeholders	Phase of deposit development
1	Cveljo Dolac	*No interested*	
2	Buha Kuce	*No interested*	
3	Ervenik	*No interested*	
4	Kalun	*No interested*	
5	Krste Radas	*No interested*	
6	Mamutovac	*No interested*	
7	Mosec	*No interested*	
8	Promina	*No interested*	
9	Rovinj	GEO - 5 d.o.o. Rovinj	*Bauxite,*
10	Bilisani	*No interested*	
	Krusevo		
	Maslenica		
11	Kanfanar – Jug	*KAMEN d.d.*	*Ornamental stones*
12	Sv. Juraj - Sv. Kajo	*CEMEX Hrvatska d.d.*	*Raw materials for the production of cement*
13	Kosovo Polje	*KNAUF d.o.o. Uzdolje*	*Gypsum*
14	Visocani	*DUBAC d.o.o. Dubrovnik*	*Ornamental stone*
15	Podberam	*CESTA d.o.o. Pula*	*Crushed stone, aggregate*

Table I-6. List of Policymakers & Geological Surveys for Croatia

N°	Other Stakeholders
1	Croatian Geological Survey
2	Ministry of Economy, Entrepreneurship and Crafts; Directorate for Investment, Industry and Innovation, Mining Sector

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MONTENEGRO (MNE)

Completed by Bozica Jovanovic, and Vasilije Abramovic, Geological Survey of Montenegro, 02/09/2020

Please verify that the following industries have the rights for the exploitation of the deposits listed in MNE (Table I-7). Please clarify which are the industries that have already production from those deposits adding an X for each one of them. Please also provide the name of the companies that have expressed their interests to develop the deposits of economic importance, currently not operating, with no production (such as **Strmošne bare, Varine**).

Table I-7. List of Industrial Stakeholders for Montenegro

N°	Deposits of Economic Importance	Industrial Stakeholders	Phase of deposit development
1	Šuplja stijena (Stara jama, Zapadna struktura, Istočna struktura)	*Gradir Montenegro d.o.o.* *Balkan Mining PTY, West Australia*	*Operating*
2	Brskovo	*Tara Resources d.o.o., Podgorica*	*Late-stage evaluation and permitting*
3	Žuta prla	*Tara Resources d.o.o., Podgorica*	*Operating*
4	Višnjica	*Tara Resources d.o.o., Podgorica*	*Operating*
5	Zagrad	*Uniprom metal d.o.o., Niksic*	*Operating*
6	Đurakov do I	*Uniprom metal d.o.o., Niksic*	*Operating*
7	Biočki stan	*Uniprom metal d.o.o., Niksic*	*Operating*
8	Štitovo II	*Uniprom metal d.o.o., Niksic*	*Operating*
9	Strmošne bare (Sjekirica)	*Green/free area*	
10	Varine	*Green/free area*	

Table I-8. List of Policymakers & Geological Surveys for Montenegro

N°	Other Stakeholders
1	Geological Survey of Montenegro
2	Ministry of Economy, Directorate for Mining and Geological Researches

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REPUBLIC OF NORTH MACEDONIA (MKD)

Completed by Trajce Stafilov, Macedonian Ecological Society, 03/08/2020

Please verify that the following industries have the rights for the exploitation of the deposits listed in MKD (Table I-9). Please clarify which are the industries that have already production from those deposits adding an X for each one of them. Please also provide the name of the companies that have expressed their interests to develop the deposits of economic importance, currently not operating, with no production (such as **Rankovci - Ginovci**).

Table I-9. List of Industrial Stakeholders for Republic of North Macedonia

N°	Deposits of Economic Importance	Industrial Stakeholders	Phase of deposit
1	Bucim Mine	Stakeholder: Solway Investment Group, Switzerland Concessionaire: Bucim DOO, Radovis	*Under production*
2	Borov Dol near Damjan*	Stakeholder: Solway Investment Group(X*) Concessionaire: Borov Dol DOOEL, Radovis (X)	*Under development – production in the end of 2020*
3	Ilovica	Stakeholder: Euromax Resources, Canada Concessionaire: Euromax Resources DOO Skopje	*Not yet production - work permit is currently revoked by the government – process of returning license in court procedure*
4	Prikovci (?) (Plavica, Kratovo)	Stakeholder: Genesis Resources LTD Australia Concessionaire: Silgen Resources International Ltd Kratovo	*Pending approval and main construction*
5	Kazan Dol	Stakeholder: SARDICH MC DOOEL export-import Skopje COPIN (Copper Investments JSC) Group	*Not yet production - work permit is currently revoked by the government*
6	Toranica Mine, Kriva Palanka	Stakeholder: Minstroy Holding AD, Sofia, Bulgaria Concessionaire:Bulmak - 2016 LtdToranica	*Under production*
7	Sasa	Stakeholder: Central Asia Metals PLC holding Concessionaire: SASA DOO Makedonska Kamenica	*Under production*
8	Zletovo Mine Dobrevo	Stakeholder: Minstroy Holding AD, Sofia, Bulgaria Concessionaire: Bulmak - 2016 Ltd Probistip	*Under production*
9	Rzanovo	Stakeholder: Euronickel Industries Ltd Kavadarci Concessionaire: no	*No production*
10	Kadiica	Stakeholder: Solway Investment Group, Switzerland Concessionaire: Kadiica Metal Ltd Pehčevo	*Exploration – plans to open*
12	Lojane, Lipkovo	Stakeholder: Kaltun Madencilik San, Turkey Concessionaire: Kaltun Maddendzilik Ltd Skopje	*Abandoned*
13	Strmoš, Probištip	Stakeholder and Concessionaire: Strmoš AD Nonmetalic Mines Probištip	*Under production*
14	Tajmište, Kičevo	Stakeholder and Concessionaire: AD Tajmište Kičevo	*Closed – plans for reactivation*

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Table I-10. List of Policymakers & Geological Surveys for Republic of North Macedonia

N°	Other Stakeholders
1	Geological Survey of the Republic of Macedonia
2	Ministry of Economy, Republic of Republic of North Macedonia Departments of Mineral resources
3	Ministry of Environment and Physical Planning, Republic of Republic of North Macedonia, Department of Industrial Pollution and Risk Management

SERBIA (SRB)

Completed by Vladimir Simic, Faculty of Mining and Geology, University of Belgrade 25/08/2020

Please verify that the following industries have the rights for the exploration/exploitation of the deposits listed in SRB (Table I-11). Please clarify which are the industries that have already production from those deposits adding an X for each one of them. Please also provide the name of the companies that have expressed their interests to develop the deposits of economic importance, currently not operating. with no production (such as **Bigar Hill, Chukaru Peki - Lower and Upper Zone, Jadar, Kiseljak, Korkan, Babe, Mackatica, Piskanja, and Valja Strz**).

Table I-11. List of Industrial Stakeholders for Serbia

N°	Deposits of Economic importance	Industrial Stakeholders	Phase of deposit
1	Bigar Hill	Avala resources doo, Beograd	*In exploration or under development*
2	Chukaru Peki - Lower Zone	SERBIA ZIJIN BOR - Rakita Exploration doo, Bor	
3	Chukaru Peki - Upper Zone	SERBIA ZIJIN BOR - Rakita Exploration doo, Bor	
4	Jadar	Rio Sava Exploration d.o.o. Rio Tinto Minerals	
5	Kiseljak	Avala resources doo, Beograd	
6	Korkan	Avala resources doo, Beograd	
7	Babe	Balkan Exploration and Mining d.o.o	
8	Mackatica	Avala resources doo, Beograd	
9	Piskanja	Balkan Gold doo Erin Ventures Inc.	
10	Valja Strz	Avala resources doo, Beograd	

Table I-12. List of Policymakers & Geological Surveys for Serbia

N°	Other Stakeholders
1	Geological Survey of Serbia
2	Ministry of Mining and Energy

For SRB, there is no production from any of the listed deposits, each is in exploration or development stage.

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ANNEX II. QUESTIONNAIRE FOR INDUSTRIAL STAKEHOLDERS

Questionnaire for industrial stakeholders, titled as "Mapping of the available business opportunities in the ESEE region: Questions for the Mining Industry Stakeholders" is included, aiming to the successful completion of WP6/Task 6.1. For this purpose, it was necessary to cooperate with industrial stakeholders to collect the available information for the mentioned criteria for Business Opportunities.

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SCOPE OF THE RESEERVE PROJECT

RESEERVE project is a RIS KAVA project, related to the EC/EIT objectives for regional innovation development that targets the following six countries of the West Balkan: Albania, Bosnia and Herzegovina, Croatia, Republic of North Macedonia, Montenegro and Serbia. RESEERVE is being implemented in the period **from 1st April 2018 to 31st March 2021**.

The main aim of the project is the mapping of the mineral resources - primary and secondary - of the 6 ESEE countries that are not currently included in the data platforms. Most countries of the EU, including the country of Slovenia, are already part of the Pan-European Minerals Intelligence Network, apart from the 6 ESEE countries. Specifically, **the project is a starting point** to integrate the region into the Pan-European Minerals Intelligence Network by filling and bridging existing information gaps across the West Balkan region.

National Technical University of Athens (NTUA), and in specific the School of Mining and Metallurgy Engineering is responsible for the WP6, with the title "SWOT/GAP analysis and Business opportunities in the ESEE region".

Within WP6, **Task 6.1 with the title "Mapping of the available Business Opportunities in the ESEE region"**, aims to utilize the results of WP3 and WP4 with the identified primary and secondary resources, and along with a dedicated group of stakeholders from WP2 make a screening exercise to **identify cases with the potential to become marketable.**

As a result, the specific questionnaire, was developedin order **to collect the additional information required in order to evaluate the Economic Deposits for each one of the 6 ESEE countries, to identify the factors that determine their economic value and to determine the parameters that may impact their potential exploitation,** such as the possible land use conflicts, the infrastructure available, the business development opportunities prevailing in at the corresponding country e.tc.

Following **Questionnaire** is divided into **3 categories, including**:

Part 1: Introductory Information: aims to determine the main characteristics of the company –

Part 2: Geological Potential for the Economic Deposit: aims to collect the available data for those Economic Deposits, so as to compare them in a later stage regarding the potential for further development

Part 3: Other Criteria: aims to provide us additional data for the examined Economic Deposits to determine advantages and disadvantages of those areas regarding future business opportunities.

Please complete the relevant information for your company with red letters font. In case that those data are confidential or not appropriate being in public domain, please inform us to take it into account.

Please complete the following questionnaire for each one of the Economic Deposit...

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PART 1: INTRODUCTORY INFORMATION

1.1. Company name:…
1.2. Deposit name:[Company input]
1.3. Stage of deposit development: [Company input]
1.4. Location of the Company: [Company input]
1.5. Annual revenue/turnover: [Company input]
1.6. Company Size*: Company input

**Please select one of the above: Micro, Small, Medium, Large, Enterprise*

1.7. Investment activities per year ($): [Company input]
1.8. Number of Employees: [Company input]
1.9. What is your company's experience (regarding the stages of exploration/exploitation of the components found at the specific Economic Deposit)? Please circle the right answer.

- 1 to 5 years
- 5 to 10 years
- 10 to 15 years
- Other*

**Please specify*

1.10. Is this the first investment of your company for exploration/exploitation of ore deposits in the specific country*? Have you invested for mineral exploration/exploitation at the specific country in recent years*?

**Please describe your activities.*

[Company input]

PART 2: GEOLOGICAL POTENTIAL FOR THE ECONOMIC DEPOSIT

2.1. DepositArea (m^2): [Company input]
2.2. Average Content of the component with economic value (1)(g/t or percentage): [Company input]*

**Please provide data if there are more than one component of economic value*

2.3. Average Thickness of the Ore Body(m): [Company input]
2.4. Ore Body Continuity*, *if data available*: [Company input]
2.5. Ore Reserve (tons): [Company input]
Mining method: [Company input]

2.6. Please list Technical characteristics of the ore body that may prevent its economic exploitation *if data available*
[Company input]

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PART 3: OTHER CRITERIA

3.1. Please rate the following factors that in your opinion mostly affect the exploration and exploitation of the specific Economic Deposit (Answer options: 1 to 10).

- **Geological potential**
- **Finance and support**
- **Legislation**
- **Taxation**
- **Disputed land claims**
- **Socioeconomic agreements**
- **Trade**
- **Political stability**
- **Labor regulations-employment agreements**
- **Quality of the geological database**
- **Level of security**
- **Availability of labor/skills**
- **Other***

**Please specify*

3.2. Are there any **financial aid or supportive actions** by the Government, regarding the development of the specific deposit?If yes, do you consider them as satisfactory?(Answer options from 1 to 10)?

[Company input]

3.3. Does the **current financial situation of the country** affect in a positive or negative way your decision of investing at the deposit area?Are/Were there any issues related to its **political stability and security**, characterized as helpful/harmful for your decision to invest in the specific country? Please describe.

[Company input]

3.4. How satisfied are you with the country's **legal framework**, regarding the development, permitting and operation of mining activities (Answer options from 1 to 10)? What are the aspects of the legislation framework in relation to the mining and metallurgical sector that need to be improved?

[Company input]

3.5. How satisfied are you with the country's **taxation system**, regarding the mining activities (Answer options from 1 to 10)? What are the **improvements** that can be made in the tax system so as to enhance the development of the mining sector?

[Company input]

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3.6. What is the **needed infrastructure**, as well the positive and negative aspects of the available network (road network, trails e.tc.) close to the deposit area? What are the needed **improvements**(in relation to the access to roads, power availability, port facilities e.tc.)?
[Company input]

3.7. Are there any conflicts regarding **land uses, protected areas** (Natural parks, International parks e.tc) for the areas in close proximity to the deposit? Please describe.
[Company input]

3.8. How satisfied are you with the country's **availability of skilled labor**, regarding the mining and metallurgical activities (Answer options from 1 to 10)?
[Company input]

3.9. In what way the **exporting activities of the specific components** of the examined economic deposit, affected your decision to invest?
[Company input]

3.10. Are there **any other issues** that you would like to add regarding your decision in investing at the deposit area, not covered in the above questions?
[Company input]

Thanks for your contribution

The RESEERVE NTUA Team

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ANNEX III. PRM RESOURCES OF THE 6 ESEE COUNTRIES (MINES/QUARRIES/GREENFIELDS)

Based on the country data and the Mineral Register of PRM

(*https://reseerve.eu*,21/1/2021)

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ALBANIA (ALB)

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Table III-1. PRM resources of Albania

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

Data are arranged in alphabetical order as per the first column of the table 'Ore description or commodity'

Legend: **Current Status(INSPIRE):** F: Feasibility, O: Operating, NO: Not operating, CM: Care and Maintenance, C: Closed; **Mining method (INSPIRE)** OPM: openPitMining, UM: undergroundMining, n.a.: unkown, Q: quarrying; **Reserves type (INSPIRE)** PPOR: Proved And Probable Ore Reserves, POR: Proved Ore Reserves

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Aluminium (Bauxite ore)	Base metals	Dardhë		Librazhd	41,106250	20,362740	NO	OPM	\	460.000	N/A	41,5	D-	PPOR	bauxite	Al2O3			Bauxite
Chrome ore	Iron and ferro-alloys metals	Bulqizë		Bulqizë	41,478623	20,224717	O	UM	Albchrome shpk	5.110.155	N/A	36,8	D	POR	ophiolite	Cr2O3			Crude ferroalloy ores (except vanadium and nickel), including manganese and manganiferous ores, chromium, molybdenum, tungsten, etc.
		Kalimash 3 Tr. 6, 6A,A		Kukës	42,046900	20,306930	O	UM	Bledi shpk	938.000	N/A	20	D	POR					
		Zogaj 3		Tropojë	42,304010	20,300470	O	UM	Bytyçi shpk	665.400	N/A	28	D	PPOR					
		Batër		Bulqizë	41,453920	20,234682	O	UM	ALB -CANAJ shpk	66.372	N/A	33,65	D	POR					
		Vlahën		Has	42,231955	20,478230	O	UM	Vlahen Mining shpk	2.340.000	N/A	27,5	D	POR					
		Krastë		Bulqizë	41,430071	20,220259	O	UM	ALBADITA shpk	1.890.200	N/A	25,09	D	POR				Pt	
		Thekën		Bulqizë	41,420160	20,290174	O	UM	RA - KROM Tirana shpk	1.630.500	N/A	28,42	D	POR					
		Kalimash 1 TR 7		Kukës	42,052410	20,274130	O	UM	Tur-Alb-Krom Shpk	1.154.000	N/A	20	C	POR					
		Kalimash 2 Tr 1		Kukës	42,056210	20,299460	O	UM		1.292.000	N/A	32	C	POR					
		Qafë Bulli		Peshkopi	41,477070	20,198760	O	UM	Albanian Chrome -ACR	1.186.000	N/A	40,58	C	PPOR					
		Katjel		Prenjas	41,037600	20,566760	O	UM	Victoria Invest International shpk	590.000	N/A	42,1	D	POR					
		Batër		Bulqizë	41,458607	20,236865	O	UM	KLOSI shpk		N/A	33,65	D	PPOR					
Coal	Energy commodities	Rinas F. Prezë		Vore	41,436460	19,694290	C	UM	\	173.964.000	N/A	0	C	PPOR	organicc				Bituminous coal underground mining
		Malinë		Pogradec	40,889410	20,600960	C	UM	\	18.345.000	N/A	0	D	POR					
Copper ore	Base metals	Qafë Bari		Fushë Arrëz	41,997188	20,075254	O	UM	Beralb Sh.A	338.000	N/A	1,81	C	POR	maficToUltramaficEffusiveVolcanism	Cu	Au	Co	Copper concentrates
		Munellë		Fushë Arrëz	41,973651	20,081507	O	UM	Beralb Sh.A	6.325.245	N/A	1,175	B	POR		Cu	Zn, Pb, Au, Ag	Cd, As, Co, Se, Te	
		Spaç		Mirditë	41,900965	20,055434	O	UM	Tete Albania Tunel&Mining Shpk	4.668.800	N/A	1,236	B	POR		Cu	Au	Co	
		Gurth - (Plakez)		Mirditë	41,918180	20,069040	O	UM		843.104	N/A	1,67	C	POR		Cu			
				Fushë Arrëz	42,033540	20,107030	F	n.a.	\	1.700.000	N/A	2,03	B	POR		Cu	Au		
			Perlati Jugor	Mirditë	41,724320	19,991450	F	n.a.	\	1.402.930	N/A	2,86	B	POR		Cu			
			Çiflig	Korçë	40,481470	20,613750	F	n.a.	Tirex Exploration. Sh.p.k	718.180	N/A	2,32	C	POR		Cu			
			Nikoliq 2	Has	42,234720	20,426380	F	n.a.	\	560.000	N/A	2,3	C	POR		Cu			
		Tuç		Fushë Arrëz	42,034358	20,096332	CM	UM	Beralb Sh.A	2.100.000	N/A	1,33	B	POR		Cu	Au	Co	
		Bregu i Geshtenjës		Korçë	40,497730	20,610360	CM	UM	Tirex Exploration. Sh.p.k	2.095.441	N/A	2,21	B	POR		Cu			
		Lak Roshi		Fushë Arrëz	42,051620	20,093309	CM	UM	Beralb Sh.A	1.979.060	N/A	1,452	B	POR		Cu	Zn, Au	Co	
		Derven		Mirditë	41,744010	19,827530	CM	UM	\	1.248.558	N/A	0,87	B	POR		Cu			
		Karm		Vau Dejës	42,079500	19,795990	CM	UM	Beralb sh.a	963.563	N/A	2,24	C	POR		Cu			

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Table III-1. PRM resources of Albania

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

Data are arranged in alphabetical order as per the first column of the table 'Ore description or commodity'

Legend:

Current Status(INSPIRE): F: Feasibility, O: Operating, NO: Not operating, CM: Care and Maintenance, C: Closed

Mining method (INSPIRE) OPM: openPitMining, UM: undergroundMining, n.a.: unkown, Q: quarrying

Reserves type (INSPIRE) PPOR: Proved And Probable Ore Reserves, POR: Proved Ore Reserves

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Dimension stone (limestone)	Building raw materials	Milove		Skrapar	40,555163	20,292259	O	Q	Topi Eki Shpk	60.395.672	N/A		A	PPOR	dimensionStone				Rough dimension LIMESTONE
		Novaj		Skrapar	40,589931	20,169019	O	Q	LED - BJON	570.000	N/A		D	PPOR					
		Dervican		Dropull	40,020959	20,186388	O	Q	Ndrico - 2010 shpk	98.710	N/A		D-	PPOR					
		Milove		Skrapar	40,575430	20,281428	O	Q	STONE PRODUCTION shpk	2.954.600	N/A		C	PPOR					
		Gjorm		Selenicë	40,312777	19,610925	O	Q	Topi Eki Shpk	2.138.400	N/A		C	PPOR					
Dimension stone (sandstone)		Vodicë Bogdani		Berat	40,698011	20,055704	O	Q	B & B Stone shpk	1.025.000	N/A		D	PPOR					Other rough dimension stone (slate, marble, trap rock, sandstone, and miscellaneous stone)
Gold ore	Precious metals		Babje	Librazhd	41,159070	20,309810	F	n.a.	\	331.600	N/A		Unknown	PPOR	orogenicGold	Au			Gold ore mining
		Gjazuj		Mirditë	41,906054	19,871206	C	UM	\	737.788	N/A	3,3	D-	PPOR					
Iron-nickel ore	Iron and ferro-alloys metals	Bitinckë		Devoll	40,637153	20,991347	O	UM	ALBANIAN NICKEL GROUP shpk	53.077.000	N/A	43,5	C	POR	laterite	Fe	Co		Iron ore mining
		Skroskë		Prrenjas	41,107346	20,494364	O	UM	Gerold shpk	28.195.300	N/A	48,2	C	POR			Co		
		Kapshticë		Devoll	40,609794	21,021813	O	OPM	EKIN MADEN NICKEL shpk	1.438.000	N/A	41,8	D	POR					
		Trull		Kukës	42,021458	20,338087	O	OPM	Llagnat sh.p.k	9.400.000	N/A	33,3	D	PPOR			Co		
		Kodra e Trullit		Kukës	42,016545	20,322986	O	UM	Nika BL shpk	5.995.650	N/A	33,3	D	PPOR			Co		
		Debrovë		Pogradec	40,991557	20,464446	O	OPM	Joal-06 shpk	3.850.000	N/A	28,4	D	PPOR			Co		
			Liqeni I Kuq	Librazhd	41,114150	20,326950	F	n.a.	\	20.071.620	N/A	41,35	C	PPOR					Crude iron ore (for direct-shipping or for treatment, concentration, etc.)
		Guri I Kuq		Pogradec	40,926110	20,627860	CM	UM	\	53.077.000	N/A	48,7	C	POR					
		Prenjas		Prenjas	41,069230	20,528480	CM	UM	\	26.280.000	N/A	46,6	C	POR					
Nickel ore		Mamëz		Kukës	42,055030	20,377690	O	OPM	Nickel Mine shpk	19.053.000	N/A	35,8	C	PPOR		Ni			Crude Nickel ore (for direct-shipping or for treatment, concentration, etc.)
PGE	Precious metals		Bregu Bibes	Tropojë	42,311480	20,252810	F	n.a.	\	355.884	N/A	43,5	D	POR	ophiolite	Pt	Pt	Pd,Os,Ir,Ru	All other metal ore mining
Phosphates	Fertilizer	Fushë Bardhë		Gjirokastër	40,095490	20,004350	NO	OPM	\	12.470.460	N/A	13	C	POR	residualOrSurficialPhosphorite	P2O5			Crude phosphate rock (ore or matrix)
Titanium-magnetite ore	Special and rare metals		Butmi	Lezhë	41,873270	19,803440	F	n.a.	\	49.584.312	N/A	5,77	B	PPOR	nonOrganic	Ti			Miscellaneous metal ores and concentrates, including Sb, Be, Hg, REE metals, Sn, and Ti
			Sukaxhi	Lezhë	41,906054	19,871206	F	n.a.	\	28.239.430	N/A	6,42	B	PPOR					

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BOSNIA & HERZEGOVINA (BIH)

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Table III-2. PRM resources of Bosnia & Herzegovina (BiH)

Table III-2.a. PRM resources of Federation of Bosnia and Herzegovina (FBiH)

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources –Technical Guidelines of INSPIRE)

Data are arranged in alphabetical order as per the first column of the table 'Ore description or commodity'

Legend:

Current Status (INSPIRE): PA:Pending Approval OI: Operating Intermittently, OC: Operating Continuously NO: Not operating, UD: Under Development, A: Abandoned

Mining method (INSPIRE): OPM: openPitMining, UM: undergroundMining

Reserves type (INSPIRE): PROV: Proved Ore Reserves, PROB: Probable Ore Reserves, N/A: Inaccessible Documentation

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Aluminium (Bauxite ore)	Base metals	Oštrelj		Sanski Most	44,759066	16,314853	PA	OPM	Marčeta impex d.o.o. Bijeljina	526.634		Unknown	D-	PROV	bauxite	Al			Bauxite
		Cerovi Doci		Posušje	43,470050	17,526770	OI	OPM	Rudnici boksita d.o.o. Posušje	11.462		Unknown	D-	PROV			Fe, Ti		
		Sobač - Tribistovo		Posušje	43,488880	17,388130	OI	OPM	Rudnici boksita d.o.o. Posušje	235.815		Unknown	D-	PROV			Fe, Ti, Si		
		Bojište		Sanski Most	44,702595	16,493754	OI	OPM	Rudnik boksita Jajce o.d.d.	101.557		Unknown	D-	PROV					
		Jasenjani		Mostar	43,132229	17,758470	OI	OPM	Rudnici boksita d.o.o.Široki Brijeg	13.427		Unknown	D-	PROV					
		Vučipolje-Tribistovo		Posušje	43,479039	17,513285	OI		Rudnik boksita d.o.o. Posušje	31.355		Unknown	D-	PROV					
		Volujak-Kadim		Posušje	43,514183	17,194992	OI		Rudnik boksita d.o.o. Posušje			Unknown	Unknown	N/A					
		Bešpelj		Jajce	44,423080	17,353070	OC	UM	Rudnik boksita Jajce o.d.d.	32.347		Unknown	D-	PROV			Fe, Ti		
		Crne Lokve - Gnjat		Široki Brijeg	43,440220	17,480280	OC	OPM	Rudnici boksita d.o.o.Široki Brijeg	12.434		Unknown	D-	PROV			Fe, Ti		
		Crvene Stijene		Jajce	44,404000	17,369000	OC	UM	Rudnik boksita Jajce o.d.d.	10.303		Unknown	D-	PROV			Fe, Ti		
		Mratnjača		Posušje	43,505370	17,413250	OC	OPM	Rudnici boksita d.o.o. Posušje	68.868		Unknown	D-	PROV			Fe, Ti		
		Poljane		Jajce	44,380220	17,388320	OC	UM	Rudnik boksita Jajce o.d.d.	133.442		Unknown	D-	PROV			Fe, Ti, Si		
		Studena - Vrila - Zagorje		Posušje	43,543810	17,218750	OC	OPM	Rudnici boksita d.o.o. Posušje	111.130		Unknown	D-	PROV			Fe, Ti, Si		
		Široki Brijeg		Široki Brijeg	43,433360	17,596140	OC	OPM	Rudnici boksita d.o.o.Široki Brijeg	749.864		Unknown	D-	PROV			Fe, Ti, Si		
		Skočaj		Bihać	44,747410	15,887110	NO	OPM		5.000.000	Potential	Unknown	D	PROB			Fe, Ti, Si		
		Vranjska - Gudavac		Bosanska Krupa	44,850620	16,146560	NO	UM		1.000.000	Potential	Unknown	D	PROB			Fe, Ti, Si		
		Kljevci		Sanski Most	44,694226	16,689133	NO					Unknown	Unknown	N/A					
		Krupske Uvale		Bosanski Petrovac	44,712901	16,314169	NO					Unknown	Unknown	N/A					
		Bosanski Doljani		Bihać	44,675553	16,003676	NO					Unknown	Unknown	N/A					
		Rečice-Dubrava		Čapljina	43,115443	17,792168	NO					Unknown	Unknown	N/A					
		Veledar		Čapljina	43,177770	17,718584	NO					Unknown	Unknown	N/A					
		Slipčići		Mostar	43,249962	17,702501	NO					Unknown	Unknown	N/A					

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Table III-2. PRM resources of Bosnia & Herzegovina (BiH)

Table III-2.a. PRM resources of Federation of Bosnia and Herzegovina (FBiH)

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources –Technical Guidelines of INSPIRE)

Data are arranged in alphabetical order as per the first column of the table 'Ore description or commodity'

Legend:

Current Status (INSPIRE): PA:Pending Approval OI: Operating Intermittently, OC: Operating Continuously NO: Not operating, UD: Under Development, A: Abandoned

Mining method (INSPIRE): OPM: openPitMining, UM: undergroundMining

Reserves type (INSPIRE): PROV: Proved Ore Reserves, PROB: Probable Ore Reserves, N/A: Inaccessible Documentation

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Aluminium (Bauxite ore)	Base metals	Šurmanci		Čapljina, Čitluk	43,177471	17,723652	NO					Unknown	Unknown	N/A	bauxite	Al			Bauxite
		Zelenikovac		Široki Brijeg	43,304251	17,582562	NO					Unknown	Unknown	N/A					
		Rasno		Široki Brijeg	43,331224	17,532038	NO					Unknown	Unknown	N/A					
		Cista		Široki Brijeg	43,310669	17,539484	NO					Unknown	Unknown	N/A					
		Kosmaj-Muse		Široki Brijeg	43,304443	17,559277	NO					Unknown	Unknown	N/A					
		Ćužići		Ljubuški	43,141025	17,576493	NO					Unknown	Unknown	N/A					
		Sridnje Brdo		Posušje	43,523444	17,112772	NO					Unknown	Unknown	N/A					
		Materića Uvala		Drvar	44,397683	16,479701	NO					Unknown	Unknown	N/A					
		Paleška Kosa		Dobretići	44,347241	17,430381	NO					Unknown	Unknown	N/A					
		Jasenica - Lušci - Palanka		Bosanska Krupa - Sanski Most	44,780270	16,327120	A	OPM	Rudnik boksita d.d. Bosanska Krupa	15.000.000	Potential	Unknown	C+	PROB			Fe, Ti		
		Pritoka - Tihotina - Javornjača		Bihać - Bosanski Petrovac	44,773170	16,009840	A	UM		1.000.000	Potential	Unknown	D	PROB			Fe, Ti, Si		
		Suvaja - Šolaje		Bosanska Krupa	44,806970	16,191210	A	UM	Rudnik boksita d.d. Bosanska Krupa	5.500.000	Potential	Unknown	D	PROB			Fe, Ti, Si		
		Bjelaj		Bosanski Petrovac	44,586913	16,192898	A	OPM		46.300	Potential	Unknown	D-	PROB			Fe, Ti		
		Bivolje Brdo		Čapljina	43,201675	17,735394	A	OPM		62.600		Unknown	D-	PROV					
		Selište-Krivodol		Mostar	43,236382	17,711334	A	OPM		94.630		Unknown	D-	PROB					
		Hodovo		Stolac	43,142541	17,930149	A	OPM		42.500		Unknown	D-	PROB					
		Krnjeuša - Mijačica		Bosanski Petrovac	44,661040	16,284625	A	OPM		6.000.000	Potential	Unknown	D+	PROB			Fe, Ti		
		Vinica		Tomislavgrad	43,568072	17,060920	A	OPM				Unknown	Unknown	N/A					
		Tavani-Jasenovac		Bosanski Petrovac	44,579891	16,509020	A	OPM				Unknown	Unknown	N/A					
		Bravsko Polje-Paunovac		Bosanski Petrovac, Ključ	44,536996	16,648467	A	UM				Unknown	Unknown	N/A					
		Korčanica		Sanski Most	44,699748	16,435006	A	OPM				Unknown	Unknown	N/A					
		Poplat		Stolac	43,064568	17,958463	A	OPM				Unknown	Unknown	N/A					
		Libina Glava		Čitluk	43,239105	17,645620	A	OPM				Unknown	Unknown	N/A					
		Mali Ograđenik		Čitluk	43,240915	17,649656	A	OPM				Unknown	Unknown	N/A					
		Gradnići		Čitluk	43,239899	17,717227	A	UM				Unknown	Unknown	N/A					
		Blatnica		Čitluk	43,249962	17,702501	A	UM				Unknown	Unknown	N/A					
Antimonium-zinc ore	Special and rare metals	Čemernica		Fojnica	43,992780	17,871070	A	UM	Miličević d.d. Kreševo	300.000		Unknown	C	PROV	veinPolymetallic	Sb, Zn		W, Au	Miscellaneous metal ores and concentrates, including Sb, Be, Hg, REE metals, Sn, and Ti

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Table III-2. PRM resources of Bosnia & Herzegovina (BiH)

Table III-2.a. PRM resources of Federation of Bosnia and Herzegovina (FBiH)

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources –Technical Guidelines of INSPIRE)

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Legend:

Current Status (INSPIRE): PA:Pending Approval OI: Operating Intermittently, OC: Operating Continuously NO: Not operating, UD: Under Development, A: Abandoned

Mining method (INSPIRE): OPM: openPitMining, UM: undergroundMining

Reserves type (INSPIRE): PROV: Proved Ore Reserves, PROB: Probable Ore Reserves, N/A: Inaccessible Documentation

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Chrome ore	Iron and ferro-alloys metals	Duboštica		Vareš	44,245687	18,331832	A	UM		1.000.000	Potential	Unknown	C	PROB	layeredComplex	Cr	Fe		Other ferroalloy concentrates (except Mo, V, and Ni), including Cr, Mn, W, etc.
		Borak		Vareš	44,274598	18,281002	A	UM				Unknown	Unknown	N/A	layeredComplex	Cr			
Cobaltium ore		Brezik - Tadići		Živinice	44,441830	18,601580	NO			3.000.000		Unknown	B	PROV	laterite	Co	Ni, Fe	W	All other metal ore mining
Copper-mercury ore	Base metals	Mačkara		Gornji Vakuf	43,880860	17,696908	A	UM				Unknown	Unknown	N/A	veinPolymetallic	Cu, Hg	Au, Ag		Miscellaneous metal ores and concentrates, including Sb, Be, Hg, REE metals, Sn, and Ti
		Mračaj		Gornji Vakuf	43,900360	17,652164	A	UM				Unknown	Unknown	N/A	veinPolymetallic	Cu, Hg	Au, Ag		
Gold ore	Precious metals	0	Bakovići	Fojnica	43,939780	17,929640	UD	UM	BBM Vareš	500.000	Potential	Unknown	C	PROB	orogenicGold	Au	Ag	As, Sb, Pb, Bi, Cu	Goldore mining
Iron ore	Iron and ferro-alloys metals	Orašac		Novi Travnik	44,081883	17,671428	NO	UM		200.000		Unknown	D-	PROB	skarnAndCarbonateReplacement	Fe			Iron ore mining
		Lisac		Novi Travnik	44,072152	17,665087	NO	UM		300.000		Unknown	D-	PROB					
		Nikolin Potok		Bugojno	44,040338	17,370580	NO			100.000		Unknown	D-	PROB					
		Crni Vrh		Jablanica	43,642968	17,743523	NO			200.000		Unknown	D-	PROB			Mn		
		Smreka		Vareš	44,156770	18,316530	A	OPM	Rudnik željezne rude d.d. Vareš - u stečaju	127.200.000		Unknown	A	PROV	shaleHosted				
		Vukulja A		Sanski Most	44,843370	16,595240	A	OPM		1.830.000		Unknown	D	PROV	carbonateHosted				
		Korita		Fojnica	43,986299	17,903656	A	UM		1.447.000		Unknown	D	PROB	skarnAndCarbonateReplacement		Mn		
		Pećine		Novi Travnik	44,160790	17,573709	A	UM		11.400		Unknown	D-	PROB					
		Borašnica-Brložine		Konjic	43,569672	17,944605	A	UM		445.000		Unknown	D-	PROB					Other ferroalloy concentrates (except Mo, V, and Ni), including Cr, Mn, W, etc.
		Krčevine		Novi Travnik	44,156755	17,566436	A	UM		400.000		Unknown	D-	PROB			Mn		Iron ore mining
		Droškovac		Vareš	44,152580	18,328510	A	UM	Rudnik željezne rude d.d. Vareš - u stečaju	5.600.000		Unknown	D+	PROV	shaleHosted				
		Radovan		Gornji Vakuf - Bugojno	44,054920	17,610280	A	OPM	Glanz Investment d.o.o. Sarajevo	8.300.000		Unknown	D+	PROV	skarnAndCarbonateReplacement		Au		
		Tovarnica		Jablanica	43,685630	17,704770	A	UM		6.100.000		Unknown	D+	PROV					
Lead ore	Base metals	Očekalj - Prgoševo		Olovo	44,095350	18,603580	OC	UM	Geomet d.o.o. Olovo	9.226.125		Unknown	A	PROV	carbonateHosted	Pb			Lead ore and zinc ore mining
Lead-zinc ore			Rupice	Vareš	44,192650	18,239290	UD	UM	Eastern Mining	7.187.772	Potential	Unknown	B	PROB	shaleHosted	Pb, Zn, Ag, Au	Cu, Sb, Hg		
			Veovača	Vareš	44,150870	18,362450	UD	OPM	Eastern Mining	7.039.621		Unknown	C+	PROV		Pb, Zn	Ag, Hg	Au, Cu	
		Brezik		Vareš	44,153502	18,339780	A	OPM	Rudnik željezne rude d.d. Vareš - u stečaju	15.600.000		Unknown	C	PROV		Fe	Pb, Zn		Iron ore mining

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Table III-2. PRM resources of Bosnia & Herzegovina (BiH)
Table III-2.a. PRM resources of Federation of Bosnia and Herzegovina (FBiH)

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources –Technical Guidelines of INSPIRE)
Data are arranged in alphabetical order as per the first column of the table 'Ore description or commodity'

Legend:
Current Status (INSPIRE): PA:Pending Approval OI: Operating Intermittently, OC: Operating Continuously NO: Not operating, UD: Under Development, A: Abandoned
Mining method (INSPIRE): OPM: openPitMining, UM: undergroundMining
Reserves type (INSPIRE): PROV: Proved Ore Reserves, PROB: Probable Ore Reserves, N/A: Inaccessible Documentation

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Mangenese ore	Iron and ferro-alloys metals	Popović Polje		Bužim	45,114350	16,037450	OI	OPM	Rudnik mangana d.d. Bužim	1.500.000		Unknown	C	PROV	sedimentaryManganese	Mn			Other ferroalloy concentrates (except Mo, V, and Ni), including Cr, Mn, W, etc.
		Vrnograč		Velika Kladuša	45,165949	15,958818	NO			6.000.000	potential	Unknown	C	PROB					All other metal ore mining
		Radostovo		Bužim	45,066714	16,038431	NO			1.200.000		Unknown	D	PROB					
		Kajtezovac		Velika Kladuša	45,135408	16,004713	NO			200.000	potential	Unknown	D	PROB					
		Čevljanovići		Ilijaš	44,035805	18,503514	A	UM		3.000.000	potential	Unknown	C	PROB			Fe		
		Podzvizd		Velika Kladuša	45,178672	15,887779	A	UM		250.000		Unknown	D	PROB					
		Borašnica-Šuplji Kuk		Konjic	43,581573	17,951981	A	UM		10.500	potential	Unknown	D-	PROB					
		Gornja Borovica		Vareš	44,179662	18,228504	A	UM				Unknown	Unknown	N/A			Fe		
Mercury ore	Special and rare metals	Draževići		Ilijaš	44,008410	18,490499	A	UM		1.000.000	potential	Unknown	C	PROB	sandstoneHosted	Hg			

Table III-2. PRM resources of Bosnia & Herzegovina (BiH)
Table III-2.b. PRM resources of Republik of Srpska (RSK)

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources –Technical Guidelinesof INSPIRE)
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Legend:

Current Status(INSPIRE): O: Operating, NO: Not operating, CM: Care and Maintenance, Const: Construction, A:Abandoned

Mining method (INSPIRE): OPM: openPitMining, UM: undergroundMining, SUBM:subsurfaceMining

Reserves type (INSPIRE): PROV: Proved Ore Reserves, PROB: Probable Ore Reserves, N/A: Inaccessible Documentation

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Aluminium (Bauxite ore)	Base metals	Gradina		Baraći	44310	16954	O	OPM	Rudnik boksita d.o.o. Mrkonjić Grad			Unknown	B	PROV	laterite	Al	Al	Fe. Si, Ti	Bauxite
		Braćan		Milići	44089	19152	O	OPM	BOKSIT a.d. Milići			Unknown	B	PROV	laterite			Fe, Ti, Si	
		Crvene stijene		Milići	44100	19131	O	OPM	BOKSIT a.d. Milići			Unknown	B	PROV	laterite			Fe, Ti, Si	
		Kosturi		Srebrenica	44048	19257	O	OPM	AD Rudnik boksita Srebrenica			Unknown	B	PROV	laterite			Fe, Ti	
		Crveni pijesci-Pleće		Trebinje	42867	18291	O	OPM	Boksiti d.o.o. Gacko			Unknown	D	PROV	laterite			Fe, Ti	
Antimonium ore	Special and rare metals	Podkozara-Kordići-Podhomara		N.Goražde	43621	19020	NO		Antimon d.o.o. Banja Luka			Unknown	D	PROV	shaleHosted	Sb	Sb	Pb, Zn, As, Hg, Tl, Au	Miscellaneous metal ores and concentrates, including Sb, Be, Hg, REE metals, Sn, and Ti
Borates	Minerals for chemical use	Labucka		Lopare	44603	18862	A		/			Unknown	D-	N/A	evaporite	B			Potash, soda, and borate mineral mining
Calcite sand and gravel aggregates	Building raw materials	Grab		Trebinje	42638	18414	O	OPM	Radanović company d.o.o. Trebinje			Unknown	B	PROV	unkown				Construction sand and gravel mining
Chrome ore	Iron and ferro-alloys metals	Orid, Mladikovine		Teslić	44504	17739	A		/			Unknown	D-	N/A	ophiolite	Cr	Fe		Crude ferroalloy ores (except V and Ni), including Mn and manganiferous ores, Cr, Mo, W, etc.
Chrysothallite	Specialty and other industrial rocks and minerals	Delić Brdo		Petrovo	44617	18346	A	OPM	/			Unknown	C	N/A	ophiolite				All other nonmetallic minerals
Clays (Bentonite)	Specialty and other industrial rocks and minerals	Sokolac		Šipovo	44286	17016	O	OPM	Bentonit a.d. Šipovo			Unknown	B	PROV	layeredComplex				Bentonite
		Lješljani		Novi Grad	45080	16490	CM	UM	Privredni preporod d.o.o. Banja Luka			Unknown	B	PROV	unkown				
Clays (Fire clay)	Ceramic and refractory minerals	Kovanj		Rogatica	43821	18974	O	OPM	Termag d.o.o. Rogatica			Unknown	B	PROV	unkown				Fire clay
		Pukiš		Lopare	44749	18822	CM	OPM	Fabrika opekarskih proizvoda a.d. Lopare			Unknown	B	PROV	unkown				

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Table III-2. PRM resources of Bosnia & Herzegovina (BiH)
Table III-2.b. PRM resources of Republik of Srpska (RSK)

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources –Technical Guidelinesof INSPIRE)
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Legend:
Current Status(INSPIRE): O: Operating, NO: Not operating, CM: Care and Maintenance, Const: Construction, A:Abandoned
Mining method (INSPIRE): OPM: openPitMining, UM: undergroundMining, SUBM:subsurfaceMining
Reserves type (INSPIRE): PROV: Proved Ore Reserves, PROB: Probable Ore Reserves, N/A: Inaccessible Documentation

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Clays (Kaolinite)	Ceramic and refractory minerals	Kobaš		Srbac	45108	17717	O	OPM	Rudnik kaolina Motajica a.d. Kobaš			Unknown	B	PROV	layeredComplex				Kaolin and ball clay (mining)
		Tegare		Bratunac	44177	19303	A	0	/			Unknown	C	PROV					
		Motajica		Srbac	45097	17633	A	0	/			Unknown	D-	N/A	graniticIgneousRocksAndPegmatites				
Coal	Coal, lignite, peat	Gacko		Gacko	43162	18500	O	OPM	Z.P. Rudnik i termoelektrana Gacko A.D. Gacko			Unknown	B	N/A	unkown				Other nonmetallic minerals
		Ugljevik		Ugljevik	44678	18993	O	OPM	Z.P. Rudnik i termoelektrana Ugljevik A.D. Ugljevik			Unknown	B	N/A	unkown				Other nonmetallic minerals
		Stanari		Stanari	44758	17807	O	OPM	EFT-Rudnik i termoelektrana Stanari d.o.o.			Unknown	B	PROV	organic				Processed bituminous coal and lignite shipped from surface operations
		Gacko		Gacko	43162	18500	O	OPM	Z.P. Rudnik i termoelektrana Gacko A.D. Gacko			Unknown	B	PROV	organic				Processed bituminous coal and lignite shipped from surface operations
		Ugljevik		Ugljevik	44678	18993	O	OPM	Z.P. Rudnik i termoelektrana Ugljevik A.D. Ugljevik			Unknown	B	PROV	organic				Processed bituminous coal and lignite shipped from surface operations
		Miljevina		Foča	43522	18657	O	OPM	Novi rudnik mrkog uglja Miljevina d.o.o. Miljevina			Unknown	B	PROV	organic				Bituminous coal and lignite surface mining
		Luke		Ugljevik	44628	18981	O	OPM	Terex inženjering d.o.o. Bijeljina			Unknown	B	PROV	organic				Bituminous coal and lignite surface mining
		Lješljani		Novi Grad	45080	16490	CM	UM	Privredni preporod d.o.o. Banja Luka			Unknown	B	PROV	organic				Bituminous coal underground mining
Copper ore	Base metals	Čavka		Prnjavor - Teslić	44729	17663	A	SUBM	/			Unknown	D-	N/A	ophiolite	Cu	Cu	Ti, Fe, Ni	Copper concentrates
Dimension stone (calcite)	Building raw materials	Vučjak		Ugljevik	44684	19011	O	OPM	Ruding a.d. Ugljevik			Unknown	B	PROV	unkown				Rough dimension Limestone
		Podromanija		Sokolac	43908	18778	O	OPM	Romanija putevi a.d. Sokolac			Unknown	B	PROV	unkown				
		Lapišnica		Istočno Sarajevo	43858	18473	O	OPM	Teko Mining Lapišnica d.o.o. Istoči Stari Grad			Unknown	B	PROV	unkown				
		Planina Vranovina		Banja Luka	44703	17172	O	OPM	Integral inženjering a.d. Laktaši			Unknown	B	PROV	unkown				

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Table III-2. PRM resources of Bosnia & Herzegovina (BiH)
Table III-2.b. PRM resources of Republik of Srpska (RSK)

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources –Technical Guidelinesof INSPIRE)
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Reserves type (INSPIRE): PROV: Proved Ore Reserves, PROB: Probable Ore Reserves, N/A: Inaccessible Documentation

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Gypsum	Building raw materials	Dočići		Šipovo	44292	17118	OI	OPM	/			Unknown	C	PROV	unkown				Gypsum
		Petkovac		Novi Grad	45052	16502	O	OPM	Japra a.d. Novi Grad			Unknown	C	PROV	unkown				
Iron ore	Iron and ferro-alloys metals	Ljubija	Kazani	Prijedor	44867	16894	O	OPM	ARCELOR MITTAL Prijedor			Unknown	C	PROV	bandedIron Formation	Fe	Si, Ba, Pb, Zn, Ca, Mn		Iron ore mining
		Okosovići		Čajniče	43607	19097	A		/			Unknown	D	N/A	unkown		Fe		
Iron-nickel ore	Iron and ferro-alloys metals	Vardište		Višegrad	43737	19467	A		/			Unknown	D+[i]	PROB	ooliticIronOrIronstone	Ni	Fe, Ni, Cr		Crude ferroalloy ores (except V and Ni), including Mn and manganiferous ores, Cr, Mo, W, etc.
Lead ore	Base metals	Srebrenica-Sase		Srebrenica	44118	19353	O	UM	GROSS d.o.o. Gradiška			Unknown	B	PROV	polymetallic Manto	Pb, Zn	Cd, Ag, Sn, Sb, S, Mn	Ga, In, Ge	Lead ore and zinc ore mining
			Vitlovac	Srebrenica	44117	19308	Const	UM				Unknown	B	PROV					
			Kazani	Srebrenica	44113	19287	Const	UM				Unknown	B	PROV					
Magnesite	Minerals for chemical use	Šnjegotina-Vrbanja		Čelinac	44763	17289	A		/			Unknown	C+[ii]	N/A	ophiolite				Other clay, ceramic, and refractory minerals including magnesite and brucite
		Slatina		Teslić	44508	17888	A		/			Unknown	D	N/A	ophiolite				
		Duvnica		Rudo	43,664	19,439	A		/			Unknown	D	N/A	ophiolite				
Mangenese ore	Iron and ferro-alloys metals	Banjalučka Kozara		Banja Luka	44,901	17,196	A	SUBM	/			Unknown	D-	PROB	sedimentary Manganese	Mn	Mn	Fe, Si	Crude ferroalloy ores (except V and Ni), including Mn and manganiferous ores, Cr, Mo, W, etc.
		Uzlomac		Čelinac	44,658	17,450	A	SUBM	/			Unknown	D-	PROB	sedimentary Manganese			Fe	
		Rudo		Rudo	43,607	19,466	A	SUBM	/			Unknown	D-	PROB	sedimentary Manganese			Fe, Si	
		Gacko		Gacko	43,220	18,606	A	SUBM	/			Unknown	D-	PROB	sedimentary Manganese			Si	
Quartz (Industrial mineral)	Specialty and other industrial rocks and minerals	Malešić		Zvornik	43,517	19,069	O	OPM	Debeljak d.o.o. Zvornik			Unknown	C	PROV	unkown	SiO2			Other industrial sand
Quartz (Industrial mineral)	Specialty and other industrial rocks and minerals	Martinac		Srbac	44,965	17,451	O	OPM	Bepro eksploatacija d.o.o. Laktaši			Unknown	C	PROV	unkown	SiO2			Other industrial sand
		Podrašnica		Mrkonjić Grad	44,393	16,986	O	OPM	/			Unknown	D	PROV	unkown	SiO2			Other nonmetallic minerals

[i] Based on D3.2 Report on the Evaluation of the PMR database for the country (Case No 4), the tonnage is reported 62.300t, while in the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, it is reported as Large Deposit (Column of the Mineral Register 'Size of deposit (INSPIRE)'.

[ii] Based on D3.2 Report on the Evaluation of the PMR database for the country (Case No 6), the tonnage is reported 4.000.000t, while in the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, it is reported as Small Deposit (Column of the Mineral Register 'Size of deposit (INSPIRE)'.

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Table III-2. PRM resources of Bosnia & Herzegovina (BiH)
Table III-2.b. PRM resources of Republik of Srpska (RSK)

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources –Technical Guidelinesof INSPIRE)
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Reserves type (INSPIRE): PROV: Proved Ore Reserves, PROB: Probable Ore Reserves, N/A: Inaccessible Documentation

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
		Petrovići		Bratunac	44,151	19,338	A		/			Unknown	D-	N/A	unkown	SiO2			Other nonmetallic minerals
Talc	Specialty and other industrial rocks and minerals	Žarkovac		Petrovo	44,584	18,376	A		/			Unknown	B+[iii]	N/A	ophiolite				Talc, soapstone, and pyrophyllite
Zeolites	Minerals for chemical use	Dubnica		Milići	44,202	19,054	A		/			Unknown	B+	N/A	unkown				All other nonmetallic minerals
		Novakovići		Čelinac	44,681	17,512	A	OPM	/			Unknown	C[iv]	N/A	unkown				
Zinc ore	Base metals	Čelebići	Vitlovac	Foča	43,374	19,034	NO	UM	Western mining d.o.o. Banja Luka			Unknown	B	PROV	polymetallic Manto	Pb, Zn	Cu, Ag		Lead and zinc concentrates

[iii] Based on D3.2 Report on the Evaluation of the PMR database for the country (Case No 8), the tonnage is reported 7.000.000t, while in the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, it is reported as Small Deposit (Column of the Mineral Register 'Size of deposit (INSPIRE)'.

[iv] Based on D3.2 Report on the Evaluation of the PMR database for the country (Cases No 9,10), the tonnage is reported 800.000t,(Dubnica) and 50.000t (Novakovići). In the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, they are both reported as Large Deposit (Column of the Mineral Register 'Size of deposit (INSPIRE)'.

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CROATIA (HRV)

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Table III-3. PRM resources of Croatia

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

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Legend: **Current Status(INSPIRE):** O: Operating, OI: Operating Intermittently, NO: Not operating, A: Abandoned **Mining method (INSPIRE)** OPM: openPitMining, UM: undergroundMining, Q: quarrying

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Aluminium (Bauxite ore)	Base metals	Rovinj		Rovinj	45,108	13,644	O	OPM	GEO-5 d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown	bauxite	Al	Fe, Ti	Zr, V, Ni, Cu, Sr	Bauxite
		Čveljo Dolac		Promina, Drniš	43,934	16,091	NO	UM	/	Unknown	Unknown	Unknown	Unknown	Unknown			Si, Ti	Zn, Co, Ni, Mn, Cr, V, Cu, Ga	
		Buha kuće		Drniš	43,914	16,137	NO	UM	/	Unknown	Unknown	Unknown	Unknown	Unknown			Si, Ti	Zn, Co, Ni, Mn, Cr, V, Cu, Ga	
		Ervenik		Ervenik	44,093	15,914	NO	UM	/	Unknown	Unknown	Unknown	Unknown	Unknown			Si, Ti	Zn, Co, Ni, Mn, Cr, V, Cu, Ga	
		Kalun		Drniš	43,885	16,119	NO	UM	/	Unknown	Unknown	Unknown	Unknown	Unknown			Si, Ti	Zn, Co, Ni, Mn, Cr, V, Cu, Ga	
		Krste Radas		Promina	43,941	16,046	NO	UM	/	Unknown	Unknown	Unknown	Unknown	Unknown			Si, Ti	Zn, Co, Ni, Mn, Cr, V, Cu, Ga	
		Mamutovac		Promina	43,930	16,013	NO	UM	/	Unknown	Unknown	Unknown	Unknown	Unknown			Si, Ti	Zn, Co, Ni, Mn, Cr, V, Cu, Ga	
		Moseć		`	43,825	16,194	NO	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown			Si, Ti	Zn, Co, Ni, Mn, Cr, V, Cu, Ga	
		Promina		Biskupija, Drniš	43,928	16,164	NO	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown			Si, Ti	Zn, Co, Ni, Mn, Cr, V, Cu, Ga	
		Bilišani		Obrovac	44,192	15,731	NO	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown			Si, Ti	Zn, Co, Ni, Mn, Cr, V, Cu, Ga	
		Kruševo		Obrovac	44,203	15,643	NO	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown			Si, Ti	Zn, Co, Ni, Mn, Cr, V, Cu, Ga	
		Maslenica		Jasenice	44,241	15,586	NO	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown			Si, Ti	Zn, Co, Ni, Mn, Cr, V, Cu, Ga	
		Vinovo		Unešić, Muć	43,729	16,330	NO	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown			Si, Ti	Zn, Co, Ni, Mn, Cr, V, Cu, Ga	
Calcite (filler grade?)	Specialty and other industrial minerals	Most Raša		Raša	45,068	14,043	O	Q	I.T.V. d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown	carbonate Hosted				All other non metallic mineral mining
		Parčić		Drniš	43,875	16,244	O	Q	MIKROSIVERIT-ZA DOM d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Marlera		Ližnjan	44,812	13,975	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
Calcitic raw material (cement industry)	Building raw materials	Sveti Juraj		Kaštela	43,556	16,450	O	Q	CEMEX HRVATSKA d.d.	Unknown	Unknown	Unknown	Unknown	Unknown	alluvialPlacer				
		Sveti Kajo		Solin	43,549	16,473	O	Q	CEMEX HRVATSKA d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
		10. kolovoz		Klis	43,542	16,510	O	Q	CEMEX HRVATSKA d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					

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Table III-3. PRM resources of Croatia

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

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Ore description or Commodity		Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Clays (common)		Ceramic and refractory minerals	Orahovica		Orahovica	45,549	17,883	OI	OPM	KERAMIKA MODUS d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown	alluvialPlacer				Common (miscellaneous) clay and shale
			Rečica		Karlovac	45,532	15,617	OI	OPM	WIENERBERGER d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Cerje Tužno		Maruševec	46,260	16,198	O	OPM	CIGLANA CERJE TUŽNO d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Cerje Tužno 1		Maruševec	46,259	16,191	O	OPM	CIGLANA CERJE TUŽNO d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Cukavec II		Gornji Kneginec	46,243	16,358	O	OPM	LEIER-LEITL d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Cukavec		Gornji Kneginec	46,246	16,361	NO	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
			Jankovečko		Bedekovčina	46,049	16,004	NO	OPM	ZAGORKA d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Ludbreški Vinogradi Sjever i Ludbreški Vinogradi J		Ludbreg	46,233	16,603	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
			Lukavec		Ivanec	46,241	16,222	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
Common crushed rock aggregates	limestone	Building raw materials	Glavice		Slivno	42,997	17,556	O	Q	KREMENA d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown	aggregate				Crushed and broken limestone (mining and quarrying)
			Bijeli Vir		Zažablje	43,016	17,662	O	Q	OBŠIVAČ d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Bojna		Glina	45,208	16,057	O	Q	SCHWARZL d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Dubac		Župa dubrovačka	42,634	18,156	O	Q	PGM RAGUSA d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Dubrava		Šibenik	46,031	15,945	O	Q	LAVČEVIĆ d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Gradišće		Žminj	45,122	13,920	O	Q	BETON TOMIŠIĆ vl. Josip Tomišić	Unknown	Unknown	Unknown	Unknown	Unknown					
			Klis-Kosa		Klis	43,568	16,516	O	Q	POMGRAD GRADNJA d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Križice		Dugopolje	43,610	16,588	O	Q	STRABAG d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Mironja		Dubrovačko primorje	42,819	17,839	O	Q	DUBROVNIK CESTE d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Plovanija		Buje	45,454	13,633	O	Q	HOLCIM (HRVATSKA) d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Strmetjevac		Imotski	43,456	17,233	O	Q	D&M BAŠIĆ KAMENOLOMI d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Španidigo - Sjever		Rovinj	45,052	13,714	O	Q	MARIO vl. Mario Pustijanac	Unknown	Unknown	Unknown	Unknown	Unknown					
			Španidigo - Jug		Rovinj	45,052	13,714	O	Q	GEOCOP d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Šumber		Sveta Nedelja	45,182	14,077	O	Q	HOLCIM (HRVATSKA) d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Šumetlica		Pakrac	45,462	17,323	O	Q	SLAVONIJA d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Valtura		Pula	44,891	13,970	O	Q	Ministarstvo pravosuđa, Kaznionica u Valturi	Unknown	Unknown	Unknown	Unknown	Unknown					
			Vepršťak		Tisno	43,834	15,716	O	Q	SARAĐEN d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Zapužane		Polača	44,012	15,543	O	Q	MINERAL IGM d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Žminj		Žminj	45,156	13,897	O	Q	CESTA d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
ne d s	limestone	Building raw materials	Podberam		Pazin	45,240	13,906	NO	Q	CESTA d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown	aggregate				Crushed and broken
			Antenal		Novigrad	45,317	13,586	NO	Q	ANTENAL d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					

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Table III-3. PRM resources of Croatia

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

Data are arranged in alphabetical order as per the first column of the table 'Ore description or commodity'

Legend: **Current Status(INSPIRE):** O: Operating, OI: Operating Intermittently, NO: Not operating, A: Abandoned **Mining method (INSPIRE)** OPM: openPitMining, UM: undergroundMining, Q: quarrying

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
		Monte Pozzo		Rovinj	45,099	13,651	NO	Q	AR-INŽENJERING d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					limestone (mining and quarrying)
		Podbadanj		Crikvenica	45,189	14,706	NO	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
		Zakojnica		Vrbnik	45,085	14,631	NO	Q	/	Unknown	Unknown	Unknown	Unknown	Unknown					
		Belski Dol		Novi Marof	46,193	16,248	A	Q	/	Unknown	Unknown	Unknown	Unknown	Unknown					
		Madona Piccola		Bale	45,046	13,766	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
		Šumber II		Sveta Nedelja	45,179	14,076	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
	schist	Šumanovica		Brestovac	45,481	17,495	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
	amphibolite	Vetovo		Kutjevo	45,459	17,796	O	Q	VELIČKI KAMEN d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
	andesite	Fužinski Benkovac		Fužine	45,307	14,680	O	Q	KAMENOLOM FUŽINSKI BENKOVAC d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
	dolerite	Hruškovec		Ljubešćica	46,150	16,440	O	Q	KAMING d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Hruškovec IV		Kalnik	46,145	16,419	A	Q	/	Unknown	Unknown	Unknown	Unknown	Unknown					
		Batinjska Rijeka		Đulovac	45,606	17,271	O	Q	INTER-PROMET d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Jovanovica		Voćin	45,593	17,429	O	Q	HRVATSKE ŠUME d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Lovno-Lovno 2		Novi Golubovec	46,191	15,989	O	Q	GOLUBOVEČKI KAMENOLOMI d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
	dolomite	Očura II		Lepoglava	46,193	16,001	O	Q	HOLCIM (HRVATSKA) d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Sipina - Hum		Novi Golubovec	46,181	15,988	O	Q	GOLUBOVEČKI KAMENOLOMI d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Skočaj		Đulovac	45,604	17,292	O	Q	HRVATSKE ŠUME d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Sveti Križ - Rudomar		Tuhelj	46,060	15,751	O	Q	RUDOMAR d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Križ		Tuhelj	46,061	15,748	NO	Q	/	Unknown	Unknown	Unknown	Unknown	Unknown					
		Očura		Lepoglava	46,193	15,993	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
		Veličanka II		Velika	45,476	17,645	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
	gneiss	Mikleuška I		Kutina	45,576	16,722	O	Q	IGM MOSLAVINAKAMEN d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Mikleuška II		Kutina	45,576	16,727	O	Q	IGM MOSLAVINAKAMEN d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
	granite	Srednja Rijeka I		čazma	45,713	16,692	O	Q	GARJEVICAKAMEN d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Trešnjevica		Voćin	45,592	17,500	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					

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Table III-3. PRM resources of Croatia

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

Data are arranged in alphabetical order as per the first column of the table 'Ore description or commodity'

Legend: **Current Status(INSPIRE):** O: Operating, OI: Operating Intermittently, NO: Not operating, A: Abandoned **Mining method (INSPIRE)** OPM: openPitMining, UM: undergroundMining, Q: quarrying

Ore description or Commodity		Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Dimension stone	breccia calcite	Building raw materials	Pakovo Selo		Drniš	43,803	16,127	NO	Q	JADRANKAMEN d.d. u stečaju	Unknown	Unknown	Unknown	Unknown	Unknown	dimension Stone				Dimension stone mining and quarrying
	calcite		Pučišća		Pučišća	43,356	16,744	O	Q		Unknown	Unknown	Unknown	Unknown	Unknown					
			Pučišća Kupinovo		Pučišća	43,356	16,760	O	Q		Unknown	Unknown	Unknown	Unknown	Unknown					
			Pučišća Punta - Barbakan		Pučišća	43,358	16,749	O	Q		Unknown	Unknown	Unknown	Unknown	Unknown					
			Pučišća Sivac		Pučišća	43,359	16,742	O	Q		Unknown	Unknown	Unknown	Unknown	Unknown					
	limestone		Kanfanar-Jug		Kanfanar	45,110	13,824	O	UM	KAMEN d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Visočani		Dubrovačko primorje	42,852	17,798	O	Q	DUBAC d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Bratiža Nakal - Potok		Pučišća	43,336	16,703	O	Q	PASIKA d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Čvrljevo 1		Unešić	43,711	16,300	O	Q	ARHITEKTONSKI KAMEN d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Čvrljevo Ime Isusovo		Unešić	43,710	16,302	O	Q		Unknown	Unknown	Unknown	Unknown	Unknown					
			Kanfanar-Dvigrad		Kanfanar	45,119	13,813	O	UM	KAMEN d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Kanfanar-Sjever		Kanfanar	45,137	13,807	O	UM	KAMEN d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Kirmenjak-Jug		Poreč	45,180	13,696	O	Q	KAMEN d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Kršine		Šibenik	43,709	15,969	O	Q	KLES-MONT d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Lisičić		Benkovac	44,043	15,665	O	Q	VIKTOR vl. Viktor Bačić	Unknown	Unknown	Unknown	Unknown	Unknown					
			Lisičić II		Benkovac	44,039	15,679	O	OPM	STONE BAČIĆ d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Mironja II		Dubrovačko primorje	42,818	17,845	O	Q	KAMEN d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Plano		Trogir	43,540	16,261	O	OPM	JADRANKAMEN d.d. u stečaju	Unknown	Unknown	Unknown	Unknown	Unknown					
			Ivana		Trogir	43,538	16,272	O	OPM	ANA-KAMEN-PROJEKT d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Redi		Trogir	43,545	16,258	O	OPM	ADRIAKAMEN d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Seget-Sjever		Seget	43,531	16,224	O	OPM	ALAS-SEGET d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Valtura - Ližnjan		Ližnjan	44,881	13,890	O	Q	KAMEN d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Vrsine		Marina	43,538	16,164	O	Q	SENIOR d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Dragonjik		Nerežišća	43,338	16,553	O	Q	JADRANKAMEN d.d. u stečaju	Unknown	Unknown	Unknown	Unknown	Unknown					
			Kirmenjak-Sjever		Poreč	45,200	13,691	NO	Q	KAMEN d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Krtolin		Šibenik	43,744	15,990	NO	Q	/	Unknown	Unknown	Unknown	Unknown	Unknown					
			Kukalj Kave		Benkovac	44,052	15,617	NO	Q	/	Unknown	Unknown	Unknown	Unknown	Unknown					
			Sveti Ante		Trogir	43,550	16,257	NO	Q	CAVA PLANIT d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Valkarin		Poreč	45,199	13,658	NO	Q	KAMEN d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
			Vinkuran		Medulin	44,840	13,860	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
			Žitnić		Drniš	43,836	16,146	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					

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Table III-3. PRM resources of Croatia

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

Data are arranged in alphabetical order as per the first column of the table 'Ore description or commodity'

Legend: **Current Status(INSPIRE):** O: Operating, OI: Operating Intermittently, NO: Not operating, A: Abandoned **Mining method (INSPIRE)** OPM: openPitMining, UM: undergroundMining, Q: quarrying

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Gypsum	Building raw materials	Kosovo		Biskupija	43,942	16,225	O	Q	KNAUF d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown	evaporite				Gypsum
		Stipanovića Greben		Sinj	43,715	16,674	NO	Q	DRAGA-SADRA d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Vranjkovići		Vrlika	43,897	16,438	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
Quartz sand (industrial use)	Specialty and other industrial minerals	Štefanec		čazma	45,714	16,631	O	OPM	AGRARIA d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown	eluvialPlacer				Industrial sand mining
		Jerovec		Ivanec	46,242	16,100	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
Quartz sand and gravel aggregates	Building raw materials	Abesinija		Rugvica	45,772	16,163	O	OPM	IGM ŠLJUNČARA TRSTENIK d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown	aggregate	SiO_2			Construction sand and gravel mining
		Autoput		Đurđevac	46,006	16,968	O	OPM	MARIN MONT d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Crvene Stijene		Rab	44,703	14,816	O	OPM	PRIJEVOZ PUTNIKA MOREM vl. Josip Kordić	Unknown	Unknown	Unknown	Unknown	Unknown					
		Gašpar Sjever		Drnje	46,216	16,927	O	OPM	ŠARAN 2 vl. Marijan Gašpar	Unknown	Unknown	Unknown	Unknown	Unknown					
		Hrastovljan		Donji Martijanec	46,302	16,533	O	OPM	COLAS MINERAL d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Jagnježde 2		Legrad	46,260	16,892	O	OPM	IGMA d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Keter		Drnje	46,231	16,915	O	OPM	IGMA d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Klara		Novigrad Podravski	46,077	16,930	O	OPM	BAGARIĆ d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Prodorina II		Lukač	45,918	17,426	O	OPM	ROMIĆ-PROMET d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Prosenica I		Hlebine	46,151	17,018	O	OPM	IGMA d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Samotorac		Rab	44,695	14,838	O	OPM	PRIJEVOZ PUTNIKA MOREM vl. Josip Kordić	Unknown	Unknown	Unknown	Unknown	Unknown					
		Turčišće		Domašinec	46,421	16,586	O	OPM	MEĐIMURJE TEGRA d.d.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Turnišče		Sračinec	46,334	16,298	O	OPM	GALDI MINERAL d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Vidiskala		Rab	44,735	14,848	O	OPM	PRIJEVOZ PUTNIKA MOREM vl. Josip Kordić	Unknown	Unknown	Unknown	Unknown	Unknown					
		Zlatno Jezero		Peteranec	46,190	16,967	O	OPM	ZLATNO JEZERO d.o.o. u stečaju	Unknown	Unknown	Unknown	Unknown	Unknown					
		Žljebic		Sokolovac	46,125	16,790	O	OPM	HRVATSKE ŠUME d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Sekuline		Molve	46,114	17,094	NO	OPM	MINERAL-SEKULINE d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Turčišće I		Domašinec	46,421	16,589	NO	OPM	DAVID & COMPANY d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Turčišće II		Domašinec	46,426	16,592	NO	OPM	QUADRO d.o.o.	Unknown	Unknown	Unknown	Unknown	Unknown					
		Hampovica		Đurđevac	46,006	16,968	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
		Hrastovljan I		Sveti đurđ	46,294	16,558	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
		Krklant		Rab	44,758	14,824	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
		Netečje		Legrad	46,293	16,796	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
		Nova Drenčina		Petrinja	45,454	16,328	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					
		Prodorina 2		Lukač	45,922	17,430	A	OPM	/	Unknown	Unknown	Unknown	Unknown	Unknown					

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MONTENEGRO (MNE)

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Table III-4. PRM resources of Montenegro

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

Data are arranged in alphabetical order as per the first column of the table 'Ore description or commodity'

Legend: **Current Status(INSPIRE):** F: Feasibility, O: Operating, C: Closed A: Abandoned **Mining method (INSPIRE)** OPM: openPitMining, UM: undergroundMining, Q: quarrying PROV: Proved Ore Reserves, PROB: Probable Ore Reserves

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Aluminium (Bauxite ore)	Base metals	Zagrad		Niksic	42,7631	19,0861	O	OPM	Uniprom-Metali Nikšić d.o.o.	1.235.267	A+B+C1		D	PROV	bauxite	Al	Fe,Ti, Si	Mg,Ca,Na,K ,P,LREE,HR EE,Mn,Cr,Z r,V,Ni,Li	Bauxite
		Durakov do I		Niksic	42,7623	19,1618	O	UM	Uniprom-Metali Nikšić d.o.o.	3.736.141	A+B+C1		D	PROV			Fe,Ti, Si		
		Biocki stan		Niksic	42,7532	19,1678	O	UM	Uniprom-Metali Nikšić d.o.o.	5.158.465	A+B+C1		D	PROV			Fe,Ti, Si		
		Stitovo II		Jablanica	42,7352	19,1735	O	OPM	Uniprom-Metali Nikšić d.o.o.	3.733.637	A+B		D	PROV			Fe,Ti, Si		
			Bršno (Raline)	Niksic	42,7258	19,0244	F		-	2.580.000	B+C1		D	PROV			Fe,Ti, Si		
			Crvenjaci	Niksic	42,7004	19,1399	F		-	2.250.000	A+B+C1		D	PROV			Fe,Ti, Si		
			Đelov do	Nikšić	42,7143	18,6999	F		-	2.942.000	C1+C2		D	PROB			Fe, Ti, Si		
			Međeđe	Nikšić	42,7140	18,9296	F		Uniprom-Metali Nikšić d.o.o.	1.266.000	C1 + C2		D	PROB			Fe		
		Ranjava vlaka-Kruščica		Cetinje	42,6827	18,8555	C	OPM	-	2.250.000	C2		D	PROB			Fe		
		Liverovici		Niksic	42,7544	19,0517	A	OPM	-	5.300.000	A+B+C1		D	PROV			Fe,Ti, Si	Mg,Ca,Na,K ,P,LREE,HR EE,Mn,Cr,Z r,V,Ni,Li	
			Laz	Nikšić	42,7608	19,0303	F		-	143.000	B+C1	56,75% Al2O3, 8,56 %SiO2	D-	PROV			Fe, Ti, Si		
			Strašnica	Nikšić	42,8525	19,0557	F		-	242.000	B+C1	SiO2 23,60%, Al2O3 43,51 %	D-	PROV			Fe, Ti, Si		
			Javorak (Konjsko)	Nikšić	42,5942	19,2174	F		-	251.000	C1	Al2O3 49,91%, SiO2 15,54%	D-	PROV			Fe, Ti, Si		
			Međugorje	Nikšić	42,6365	19,2278	F		-	110.000	C2		D-	PROB			Fe, Ti, Si		
		Borova brda		Nikšić	42,6961	19,1684	C	OPM	-	300.000	A+B+C1		D-	PROV			Fe, Ti, Si		
		Poljane		Cetinje	42,6827	18,8555	C	OPM	-	571.284	B+C1		D-	PROV			Fe		
		Lazina		Cetinje	42,6852	18,8623	C	OPM	-	274.000	A+B+C		D-	PROV			Fe		
		Trebovinski pod		Cetinje	42,6785	18,8668	C	OPM	-	105.000	B+C1		D-	PROV			Fe		
		Ravna aluga		Cetinje	42,6760	18,8599	C	OPM	-	50.000	A+B+C1		D-	PROV			Fe		
		Kruščica (Trubjela)		Cetinje	42,6852	18,8623	C	OPM	-	80.000	C2		D-	PROB			Fe		
		Ranjava vlaka-Trubjela		Cetinje	42,6760	18,8599	C	OPM	-	225.000	C2		D-	PROB			Fe		

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Table III-4. PRM resources of Montenegro

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Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Common crushed rock aggregates (limestone)	Building raw materials	Krivošije donje		Kotor	42,5346	18,6847	O	Q	"W&R Dynamic Company Limited" doo - Kotor"	59.130.500	B+C1		B	PROV	aggregate		-		Dimension stone mining and quarrying
		Bjelotina		Herceg Novi	42,5170	18,4663	O	Q	"Bokić" d.o.o. – Herceg Novi	10.134.015	B+C1		C	PROV					
			Sađavac	Danilovgrad	42,4910	19,1292	F	Q	"Bemax" doo - Podgorica"	12.081.103	B+C1		C	PROV					
		Platac		Budva	42,2933	18,7736	O	Q	"Carinvest" doo - Budva"	6.929.036	B -		D	PROV					
		Štitarica - Taskavac		Mojkovac	42,9278	19,5684	O	Q	AD "Crnagoraput" - Podgorica"	2.736.653	B+C1		D	PROV					
		Grabova kosa		Nikšić	42,7186	18,9559	O	Q	"Đurković" doo - Nikšić	2.508.300	B+C1		D	PROV					
		Kuside		Nikšić	42,7859	18,8589	O	Q	AD "Mehanizacija i programat" - Nikšić"	9.820.868	B+C1+C2		D	PROV					
		Lješevići-Gajevi, Grbalj		Kotor	42,3764	18,7339	O	Q	Briv Construction d.o.o. iz Kotora	6.300.242	B+C1		D	PROV					
		Kameno more		Kotor	42,5385	18,6856	C	Q	-	4.930.746	B		D	PROV					
Copper ore	Base metals		Varine	Pljevlja	43,1775	19,3832	F	0	-	7.300.000	C1+C2	0,775% Cu	B	PROB	maficVolcanismMassiveSulphide	Cu	Cu	Ag,Au	Copper
Crushed rock aggregates (vulcanite)	Building raw materials	Štitarica - Okrugličkі krš		Mojkovac	42,9256	19,5632	O	Q	AD "Crnagoraput" - Podgorica"	7.225.379	B+C1		D	PROV	aggregate	SiO2	-		Dimension stone mining and quarrying
Dimension stone: limestone		Maljat		Danilovgrad	42,5297	19,1710	O	Q	AD "Mermer" - Danilovgrad"	4.642.625	A+B+C1 (block mass 322.205)		C	PROV	dimension Stone		-		
		Visočica		Danilovgrad	42,5255	19,1817	O	Q	AD "Šišković" - Danilovgrad"	2.357.925	B (block mass 207.497)		C	PROV			-		
		Tospude		Cetinje	42,6479	18,7279	O	Q	"Katunjanin" AD - Herceg Novi"	2.186.957	A+B+C1 (block mass 121,377)		C	PROV			-		
		Bobik		Cetinje	42,5739	18,8803	O	Q	"Kobra" AD - Budva	6.785.870	B+C1 (block mass 213.346)		C	PROV			-		
		Dolovi - Komani		Danilovgrad	42,4645	19,0844	O	Q	Jokić-Kimont -Kotor	2.346.932	A+B+C1 (block mass 110.827)		C	PROV		MgO	-		
		Krute		Ulcinj	42,0195	19,2490	C	Q	-	1.361.645	A+B (block mass 108.427)		C	PROV			-		
		Midova kosa		Nikšić	42,7307	18,9520	O	Q	"Željezara Nikšić""AD - Nikšić"	2.657.205	B+C1		D	PROV			-		
		Brankov krš		Cetinje	42,5178	18,9144	O	Q	"Kobra" AD - Budva	947.141	A+B+C1 (block mas 47.000)		D	PROV			-		

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Table III-4. PRM resources of Montenegro

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

Data are arranged in alphabetical order as per the first column of the table 'Ore description or commodity'

Legend: **Current Status(INSPIRE):** F: Feasibility, O: Operating, C: Closed A: Abandoned **Mining method (INSPIRE)** OPM: openPitMining, UM: undergroundMining, Q: quarrying PROV: Proved Ore Reserves, PROB: Probable Ore Reserves

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Lead-zinc ore	Base metals	Suplja Stijena		Pljevlja	43,3801	19,0440	O	OPM	"Gradir Montenegro" d.o.o. Pljevlja"	16.000.000	B+C1		A	PROV	polymetallicManto	Pb,Zn	Cu	Ag	Lead and zinc concentrates
		Zuta prla		Mojkovac	42,9676	19,6229	C	OPM	Brskovo Mine, d.o.o., Podgorica	19.330.000	B+C1	Pb+Zn 1%	A	PROV					
			Djurdjeve vode	Pljevlja	43,3747	19,0440	F		"Gradir Montenegro" d.o.o. Pljevlja"	1.186.000	B+C1	0,89% Pb, 4,77% Zn, 0,20% Cu	B	PROV					
			Igrišta	Mojkovac	42,9598	19,6227	F		Brskovo Mine, d.o.o., Podgorica	1.561.000	C1	0,93 %Pb+Zn ? 1%	B	PROV					
		Brskovo		Mojkovac	42,9500	19,6258	C	OPM	Brskovo Mine, d.o.o., Podgorica	8.200.000	B+C1	Pb+Zn 1%	B	PROV					
			Strmošne bare (Sjekrica)	Berane	42,7203	19,8976	F		-	385.000	C2		C	PROB					
			Paljevine	Pljevlja	43,3710	19,0500	F		"Gradir Montenegro" d.o.o. Pljevlja"	112.000	B+C1	0,94% Pb, 4,59% Zn, 0,12% Cu	C	PROV					
			Ribnik	Pljevlja	43,3691	19,0598	F		"Gradir Montenegro" d.o.o. Pljevlja"	160.000	B+C1	1,42% Pb, 6,40% Zn	C	PROV					
		Visnjica		Mojkovac	42,9658	19,6254	C	OPM	Brskovo Mine, d.o.o., Podgorica	6.700.000	B+C1	Pb+Zn 1%	C	PROV					
Sand and gravel aggregates (limestone)	Building raw materials	Ražano polje		Žabljak	43,1864	19,1695	O	Q	d.o.o. "Zeković Company" - Žabljak	486.621	B+C1		D-	PROV	aggregate	0	-		Dimension stone mining and quarrying

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NORTH MACEDONIA (MKD)

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Table III-5. PRM resources of North Macedonia

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

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Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Antimonium-arsenic ore	Special and rare metals	Alšar		Kavadarci	41,1505	21,9500	C	SUBM	-	490.651		3.25% Sb, 1.41% As, 0.11-0.22% Tl, 0.31-0.69g/t Au	B	PPOR	CarlinTypeCarbonateHosted	Sb, As, Ti	Fe, S, Au, Hg, Ba, Pb	Pb, Zn, Cu, U, Th	Miscellaneous metal ores and concentrates, including antimony, beryllium, mercury, rare-earth metals, tin, and titanium
	Special and rare metals	Lojane		Lipkovo	42,2200	21,6450	A	SUBM	Kaltun Maddendzilik Ltd Skopje	326.000		5% Sb, 4% As	A	PROB	maficToUltramaficIntrusion	Sb, As	Cr, Ti, Zn, Pb, Mo, Hg, Ni, Co	W, Ga, Se	All other metal ore mining
Calcite (filler grade?)	Minerals for chemical use	Memešli		Strumica	41,3379	22,6324	O	Q	AD Nemetali Ogražden	6.300.000		55.45% CaO, 0.45% MgO, 0.11% Fe2O3, 43.6% CO2	D	PROV	crushedstone				Crushed and broken limestone (mining and quarrying)
Calcitic raw material (cement industry)	Building raw materials	Usje		Kisela Voda, Sopište (Skopje)	41,9557	21,4493	OC	OPM	Titan cementarnica Usje AD Skopje	13.350.000		74 % CaCO3, 13.37 % SiO2, 4.59 % Al2O3, 2.26 % Fe2O3, 40.08 % CaO	A	PROV	layeredComplex				Raw materials for cement industry
Chrome ore	Iron and ferro-alloys metals	Raduša		Jegunovce	42,0878	21,2241	A	SUBM	-	484.000		20% Cr2O3	D	PROB	maficToUltramaficIntrusion	Cr	Cr		Ferroalloy ores, except vanadium
		Rabrovo		Valandovo	41,3185	22,5903	A	SUBM	-	45.000		42% Cr2O3	D-	PROB		Cr		Pt	
Clays (Illite, ceramics)	Ceramic and refractory minerals	Đupski Rid		Resen	41,0824	21,0036	O	OPM	Oranžerii-Hamzali AD Bosilovo	1.187.055		72.46 % Si?2, 10.18 % Al2?3, 6.12 % Fe2O3, 2.,69 % ?2?	C	PROV	layeredComplex				Clay and ceramic and refractory minerals mining

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Table III-5. PRM resources of North Macedonia

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Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Coal	Energy commodities	Suvodol		Novaci	41,0615	21,5104	OC	OPM	ELEM AD Skopje	58.349.080		40.7 % humidity, 26.25% ash, 1.14% Stotal, 40.11 coke, 13.26% Cfix, 6612 KJ/kg LHV	D	PROV	organic				Bituminous coal and lignite surface mining
		Brod-Gneotino		Novaci	40,9678	21,5400	OC	OPM	ELEM AD Skopje	67.922.683		48.01 % humidity, 14.7% ash, 0.78% Stotal, 0.15% Sash, 0.63% Sburn, 29.83% coke, 15.16% Cfix, 8437 K	D	PROV					
		Oslomej West		Kičevo	41,5663	20,9964	OC	OPM	ELEM AD Skopje	5.827.037		47.45 % humidity, 17% ash, 0.57% Stotal, 30.44% coke, 15.55% Cfix, 21.62% vol.matt, 35.55% burn.matt	D	PROV					
		Ratevski Širini		Berovo	41,6521	22,8192	O	OPM	BRIK Berovo AD	1.336.164		46.57 % humidity, 14.78% ash, 1.18% Stotal, 30.57% coke, 15.69% Cfix, 22.93% vol.matt, 38.62% burn.m	D-	PROV					
		Piskupština		Struga	41,3224	20,6149	O	OPM	INTERUNION - GROUP Ltd Skopje	2.746.794		37.76 % humidity, 18.28% ash, 0.55% Stotal, 38.9% coke, 20.62% Cfix, 24.04% vol.matt, 44.66% burn.ma	D-	PROV					
			Zvegor-Stamer	Delčevo	41,9600	22,8220	F		-	32.821.328		47.46 % humidity, 15.99% ash, 1.06% Stotal, 33.7% coke, 17.99% Cfix, 18.67% vol.matt, 36.66% burn.ma	D	PROV					
			Lavci	Resen	41,0521	20,9550	F		ELEM AD Skopje	26.950.000		58.29 % humidity, 13.45% ash, 0.96% Stotal, 0.35% Sash, 0.61% Sburn, 24.95% coke, 11.45% Cfix, KJ/kg	D	PROV					
			Star Istevnik	Delčevo, Pehčevo	41,8680	22,8820	F		ELEM AD Skopje	20.475.985		42.49 % humidity, 26.19% ash, 2.94% Stotal, 42.04% coke, 15.85% Cfix, 14.70% vol.matt, 30.55% burn.m	D	PROV					
			Mariovo	Prilep	41,1585	21,8073	F		-	96.727.876		36.56 % humidity, 23.18% ash, 1.20% Stotal, 16.85% Cfix, 23.41% vol.matt, 40.26% burn.matt., 39.44	D	PROV					

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Table III-5. PRM resources of North Macedonia

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Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Copper ore	Base metals		Ilovica	Bosilovo, Novo Selo	41,4825	22,8427	PA, Constr.		Euromax Resources Ltd Skopje	493.000.000		0.173% Cu, 0.269g/t ?u	A	PROV	porphyry	Cu, Au	Ag, Mo		Copper concentrates, gold concentrates
			Plavica and Crn Vrv	Kratovo, Probištip	42,0449	22,1761	PA, Constr.		Silgen Resources International Ltd Kratovo	51.750.000		0.35% Cu, 0.78g/t Au, 8.73g/t Ag	A	PROV	porphyry	Cu, Ag, Au	Pb, Zn		Copper concentrates, gold concentrates, silver concentrates
		Bučim	0	Radoviš, Štip	41,6617	22,3506	OC	OPM	Bučim Ltd Radoviš	34.580.000		0.3% Cu, 0.35g/t Au, 1.0g/t Ag	A	PROV	porphyry	Cu, Au, Ag	Fe, Mn, Mo, Bi, Se, Pd, Ti	Pb, Zn, Co	Copper concentrates
			Konjsko	Gevgelija, Kavadarci	41,1905	22,2609	F		-				Unknown	Inaccessible Documentation	polymetallic Manto	Cu, Au, Ag	Zn, As, Sb		Copper concentrates, gold concentrates, silver concentrates
			Borov Dol	Konče, Štip	41,6009	22,3354	Constr.		Borov Dol Ltd Radoviš	62.000.000		0.247% Cu, 0.19g/t ?u, 1.34g/t Ag	A	PROV	porphyry	Cu, Au, Ag	Fe, Mn, Mo	Pb, Zn	Copper concentrates
			Kazan Dol	Valandovo, Bogdanci, Dojran	41,2607	22,5725	Constr.		-	23.900.000		0.217% Cu	A	PROV	veinPolymetallic	Cu	Pb, Zn, Cd, As, Sb, Se, Te, W, Mo, Bi, Sn	Ag, Au, Co, Ni	Copper concentrates
			Kadiica	Pehčevo	41,8073	22,9084	Constr.		Kadiica Metal Ltd Pehčevo	69.000.000		0.213% Cu	A	PPOR	porphyry	Cu	Fe, Mn, Mo	Pb, Zn	Copper concentrates
Dimension stone – limestone	Building raw materials	Banjani		Čučer Sandevo (Skopje)	42,1131	21,3929	OC	Q	Rudnici Banjani Ltd Skopje	24.837.179		52-54 % CaO, 0.3-0.6 % R_2O_3, 1-2.5% SiO_2, 0.13-11.76% MgO	B	PROV	dimensionStone				Dimension stone mining and quarrying
Dimension stone – marble		Sivec		Prilep	41,4160	21,5886	OC	Q	Mermeren Kombinat AD Prilep	164.969.771		31-32.9% ???, 19.6-21.7% MgO, 0.04-0.0 % P_2O_3, 0.41-0.51% SiO_2, 0.05% Al_2O_3, 0.04-0.09 % Fe_2O_3	A	PROV					
Dimension stone – Quartzite		Crn Vrv		Kratovo	42,0354	22,1066	OC	Q	Sileks AD Kratovo	2.647.499		98.63% SiO_2, trace TiO_2, 0.1% Al_2O_3, 0% MgO, 0.83% Fe_2O_3, 0.07% CaO	A	PROV					
Dolomite (refractory)	Ceramic and refractory minerals	Brest, Suvi Dol		Makedonski Brod	41,5318	21,2432	O	OPM	Silika Mineral, Prilep	12.780.000		17.0-21.37% MgO, 31.06-33.50% CaO, 1.56-2.50% SiO_2, 0.73-1.20% R_2O_3	B	PROV	carbonate-hosted				All other non metallic mineral mining
		Peklište, Trnovo		Gostivar	41,7675	21,0127	O	OPM	Silika Mineral, Prilep	14.000.000		0.4-0.11 SiO_2, 31.23-32.9% CaO, 19.7-20.45%, 0.295-0.473 R_2O_3, 45.37-46.59% LOI	B	PROV					
Feldspathic raw material (ceramics)	Ceramic and refractory minerals	Hamzali		Bosilovo	41,5199	22,7696	OC	OPM	AD Nemetali Ogražden	6.457.258		69.28% SiO_2, 19.80% Al_2O_3, 0.09% Fe_2O_3, 0.47% CaO, 0.24% MgO, 9.46% Na_2O, 0.32% K_2O	C	PROV	graniticIgneousRocksAndPegmatites				Feldspar (crude, crushed, or ground)
Gypsum	Building raw materials	Kosovrasti		Debar	41,5255	20,5635	OC	OPM and UM	Knauf Radika Debar	13.785.000		32% CaO, 45% SO_3, 17.8% H_2O, 4% CO_2, 0.5% Al_2O_3	C	PROV	evaporite				Gypsum

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Iron ore	Iron and ferro-alloys metals		Pehčevo	Pehčevo	41,7705	22,9178	F		-	9.821.000		20-54 % Fe, 10-55 % SiO_2, 4-12 % Al_2O_3, 0.33 TiO_2, 0.35 % MnO, 0.05 % Cu	D	PROV	shorelineOrMarinePlacer	Fe	Mn, Cu, Pb, Zn, Al, Ti	Mo, Ni	Iron ore mining
			Iberli	Demir Kapija	41,4770	22,3251	F		-	2.753.000		18.44% Fe, 2.09% Zn, 0.2% Cu	D	PROV	skarnAndCarbonateReplacement	Fe, Zn, Cu	Mn, Ag, W, Be, Bi, Cd, Sr	Co, Mo, La, Ga, Ba, Cr	Ferroalloy ores, except vanadium
		Damjan	0	Radovis	41,6213	22,3432	A	OPM	-	1.000.000		45% Fe	D	PROB		Fe	Mn, Cu, Pb, Zn	Mo, Au, Ag, Sb, Ni	Iron ore mining
Iron ore (carbonate)			Tajmište	Kičevo, Mavrovo and Rostuše	41,6192	20,8178	UD		AD Tajmište Kičevo	4.400.000		36.92% Fe, 17.67% SiO_2, 9% Al_2O_3, 0.83 P	D	PPOR	bandedIronFormation	Fe			Iron ore mining
Iron-nickel ore		Groot	0	Veles	41,7374	21,7231	OC	OPM	Misa-MG DOEL Skopje	300.000		1.08% Ni, 25.13%Fe, 0.06% Co	D	PROB	laterite	Fe, Ni	Co		Ferroalloy ores, except vanadium
			Rakle	Prilep	4,1418	21,7426	F		-	200.000.000		16.3% Fe, 0.44% Ni, 0.05% Co, 1.24% Cr	A	PROB		Fe, Ni	Co, Cr		
			Studena Voda	Kavadarci	41,1562	21,9861	F		-	1.757.509		35.70% Fe, 1.079% Ni, 1.81% Cr, 0.06% Co	D	PROV		Fe, Ni	Co, Cr		
		Ržanovo		Kavadarci	41,1698	21,9949	C	OPM	-	38.359.892		31% Fe, 1% Ni	C	PROV		Ni, Fe	Co, Cr, Cu	Zn, V, Ti	
Lead-zinc ore	Base metals	Toranica		Kriva Palanka, Makedonska Kamenica	42,1593	22,4915	OC	SUBM	Bulmak - 2016 Ltd Toranica	5.610.000		3.97% Pb, 2.78% Zn, 315g/t Ag	A	PROV	skarnAndCarbonateReplacement	Pb, Zn, Ag	Fe, Cu, As, Bi, Mn		Lead and zinc concentrates
		Sasa (Svinja Reka-Petrova Reka)		Makedonska Kamenica	42,1267	22,5066	OC	SUBM	Sasa Ltd Makedonska Kamenica	12.651.000		4.32% Pb, 2.36% Zn	A	PROV		Pb, Zn, Ag	Ag, Cd, In, Co, Bi, Cu, Sb		
		Zletovo		Probištip, Kratovo	42,0332	22,2052	OC	SUBM	Bulmak - 2016 Ltd Toranica	9.716.000		5.81% Pb, 2.04% Zn	B	PROV	veinPolymetallic	Pb, Zn, Ag	Ag, Cd, Cu, In, Ga, Au	Bi, Mo,V	
			Bašibos	Valandovo	41,3028	22,7137	F		-	4.500.000		0.5-1.5% Pb, 1-3% Zn, 0.1-0.2% Cu	B	PROB	veinPolymetallic	Pb, Zn	Cu, Ag, Bi, Au	Fe, Mn	Lead ore and zinc ore mining
			Jamište	Probištip	42,0600	22,2796	F		-	1.500.000		0-11.6% Pb, 0.4-27.8% Zn, 380g/t Au, 0.4% Cd	B	PROB	polymetallicManto	Pb, Zn	Cu, Au, Cd		
			Blizanci	Probištip	42,0529	22,2172	F		-	3.185.935		5.5% Pb, 1-3% Zn, 2.61% Cu	B	PPOR	veinPolymetallic	Pb, Zn	Cu, Mn		
Mangenese ore	Iron and ferro-alloys metals		Stogovo	Debar, Centar Župa, Kičevo, Struga, Debarca	41,4301	20,6722	F		Skopski Leguri Ltd Skopje	3.386.731		20-25 % Mn, 5-6% Fe, 19-23% SiO_2, 1.5-0.3% P	C	PROB	sedimentaryManganese	Mn	Ni, Co, Cr, Fe, Mn		Ferroalloy ores, except vanadium
Molybdenum ore			Strelci	Kičevo	41,5280	21,0136	F		-	585.000		0.004-0.015% Mo, 25 g/t Re	A	PROB	graniticIgneousRocksAndPegmatites	Mo	Cu, Fe, Mn		Molybdenum concentrates
Molybdenum-copper-gold ore			Petrošnica	Staro Nagoričane	42,2195	21,9759	F		-			3-542ppm Mo, 7-367ppm Cu, 7-950ppb Au	Unknown	N/A	0	Mo, Cu, AU, Ag	Sb, Zn, Pb, Ba, Sn	Ni, Co, Te, Li, Be, Mg, Fe	All other metal ore mining

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Table III-5. PRM resources of North Macedonia

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

Data are arranged in alphabetical order as per the first column of the table 'Ore description or commodity'

Legend: **Current Status(INSPIRE):** UD: Under Development, F: Feasibility, PA: Pending Approval, Constr.: Construction, O: Operating, OC: Operating Continuously, C: Closed A: Abandoned, **Mining method (INSPIRE)** OPM: openPitMining, UM: undergroundMining, Q: quarrying, SUBM: subsurfaceMining PROV: Proved Ore Reserves, PROB: Probable Ore Reserves, PPOR: Proved And Probable Ore Reserves,N/A: Inaccessible Documentation

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Silica - aluminosilicate raw material (cement and ferro-alloys)	Building raw materials	Strmoš-Belo Brdo		Probištip	41,9893	22,1574	O	OPM	Strmoš AD Nonmetalic Mines Probištip	5.773.800		94.51 % SiO_2, 3.04 % Al_2O_3, 0.42 % Fe_2O_3, 0.25 % CaO, 0.07 % MnO, 0.13 % K_2O, 0.25 % Na_2O, 0.70 % SO	D	PROV	maficToUltramaficEffusiveVolcanism				All other non metallic mineral mining
Silica-alumina-iron raw material (cement)		Spančevo		Češinovo, Obleševo	41,9196	22,2968	O	OPM	Opalit Češinovo	1.693.208		78% SiO_2, 6.65% Al_2O_3, 4.60% Fe_2O_3, 0.42%caO	D	PROV	maficToUltramaficEffusiveVolcanism				Raw materials for cement industry
Titanium-iron ore	Special and rare metals		Mitrašinci	Berovo	41,7408	22,6862	F		-			15-35% Fe, 3-12% TiO_2	Unknown	PROB	maficToUltramaficIntrusion	Ti, Fe	Ni, V	Mn, Cr, Al	All other metal ore mining
Uranium ore	Energy commodities	Zletovska R???		Kratovo	42,0658	22,2562	C	UM	-	730.000		0.078% U_3O_8	A	PPOR	maficToUltramaficIntrusion	U	Th, Pb, Zn, Cu, Fe		Uranium-radium-vanadium ore mining

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

SERBIA (SRB)

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Table III-6. PRM resources of Serbia

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

Data are arranged in alphabetical order as per the first column of the table 'Ore description or commodity'

Legend: **Current Status(INSPIRE):** UD: Under Development, O: Operating, CM: Care And Maintenance **Mining method (INSPIRE)** OPM: openPitMining, UM: undergroundMining Proved And Probable Ore Reserves

Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Antimonium-zinc-lead ore	Base metals	Vinogradi - Rujevac		Ljubovija	44,3053	19,3903	CM	UM	EcoMet Reciklaža d.o.o., Loznica	1.100.000			Unknown	PPOR	laterite	Sb, Zn, Pb	Fe, As	As, Hg	Miscellaneous metal ores and concentrates, including antimony, beryllium, mercury, rare-earth metals, tin, and titanium
Barite	Minerals for chemical use	Bobija		Ljubovija	44,2052	19,5563	CM		Bobija Ljubovija				Unknown	Unknown	veinPolymetallic	Ba	Pb, Zn		Barite
Borates	Minerals for chemical use		Piskanja	Raška	43,3793	20,6474	UD		Balkan Gold doo Beograd				Unknown	Unknown	shorelineOrMarinePlacer				Potash, soda, and borate mineral mining
		Pobrđe		Raška	43,3927	20,6150	O	UM	JP PEU Ibarski rudnici				Unknown	PPOR					
Borates-lithium ore	Minerals for chemical use		Jadar	Loznica	44,5268	19,3541	UD		Rio Sava Exploration doo Beograd				Unknown	Unknown	nonOrganic	Li			Potash, soda, and borate mineral mining
Calcite (filler grade?)	Specialty and other industrial rocks and minerals	Potaj čuka		Žagubica	44,2158	21,8848	O	OPM	Magnohrom doo u restrukturiranju				Unknown	PPOR	skarnAndCarbonateReplacement				All other nonmetallic minerals
Clays (bentonite)	Specialty and other industrial rocks and minerals	Jelenkovac - Zaplanje		Vlasotince	43,0827	22,1709	CM	OPM	Kvarc doo Mladenovac				Unknown	PPOR	shorelineOrMarinePlacer				Bentonite
Clays (kaolinite)	Ceramic and refractory minerals	Kranjani		Valjevo	44,4467	19,6513	O	OPM	DP Kaolin Valjevo				Unknown	PPOR	ophiolite				Clay and ceramic and refractory minerals mining
		Beli Majdan		Loznica	44,5764	19,3516	O	OPM	Alas Holding ad Šabac				Unknown	PPOR	shorelineOrMarinePlacer				Kaolin and ball clay mining
		Garasi		Arandjelovac	44,3058	20,4720	O	OPM	Samot rudnik DOO				Unknown	PPOR	nonOrganic				
		Ćirica potok - Krušik		Arandjelovac	44,3418	20,4624	CM	OPM	Šamot				Unknown	PPOR	shorelineOrMarinePlacer				Clay and ceramic and refractory minerals mining

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Table III-6. PRM resources of Serbia

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

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Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Copper ore	Base metals	Majdanpek - North Revir		Majdanpek	44,4107	21,9319	O	OPM	Zijin Mining RTB Bor	177.000.000			A	PPOR	porphyry	Cu, Au	Se, PGE, Ag, Cd (recoverable)	W, Sn, Bi, Sb, As, Ba	Copper concentrates
		Majdanpek - South Revir		Majdanpek	44,4254	21,9239	O	OPM	Zijin Mining RTB Bor	388.000.000			A	PPOR	porphyry	Cu, Au	Se, PGE, Ag, Cd (recoverable)	W, Sn, Bi, Sb, As, Ba	
		Bor - Jama		Bor	44,0894	22,1006	O	UM	Zijin Mining RTB Bor	14.500.000			A	PPOR	porphyry	Cu, Au	Fe, Au	Fe, Mo, Pb, Zn	
		Veliki Krivelj		Bor	44,1236	22,1139	O	OPM	Zijin Mining RTB Bor	470.000.000			C	PPOR	polymetallic Manto	Cu, Fe	Cu	Zn, Pb, Sb, Fe, Ti	
		Čukaru Peki - Upper zone		Bor	44,0203	22,1359	CM	UM	Zijin Mining RTB Bor	52.000.000			A	PPOR	porphyry	Fe, Cu, As	Au, Ag, Pb, Zn	Fe, Zn, Cu, Mo, As, Sb, V, Ti, Sn, Se	
		Mali Krivelj		Bor	44,1476	22,0515	CM		Zijin Mining RTB Bor	220.000.000			A	PPOR	highSulphidation	Cu, Fe	Fe, Cu	Cu	
		Tenka 3 - North Revir		Majdanpek	44,4364	21,9187	CM	OPM	Zijin Mining RTB Bor	17.600.000			A	Unknown	polymetallic Manto	Cu, Fe	Pb, Zn, Ag, W, Mo, Bi, Sn, Fe	Au, Ag	
		Cerovo Complex		Bor	44,1683	22,0307	CM	OPM	Zijin Mining RTB Bor	238.000.000			A	PPOR	porphyry	Cu	Fe, Cu, Pb, Zn	Fe, Ti, Au	
		Cerovo Primary		Bor	44,1683	22,0307	CM	OPM	Zijin Mining RTB Bor	47.000.000			A	PPOR	porphyry	Cu	Fe, Cu, Pb, Zn	Fe, Ti, Au	
		Čoka Marin		Majdanpek	44,2936	21,9659	CM	UM	Zijin Mining RTB Bor	210.000			A	Unknown	porphyry	Cu, Au, Pb, Zn	Cu, Pb, Zn +/- Au-Ag, (Sn, S, As, Cd, Bi, etc.)	Fe, As	
		Čukaru Peki - Lower zone		Bor	44,0229	22,1384	CM	UM	Zijin Mining RTB Bor	2.300.000.000			B	Unknown	polymetallic Manto	Cu, Fe	Au, Fe, Cu	Mo	
		Kiseljak		Medveđa	42,7964	21,4409	CM		Dundee Precious Metals	250.000.000			B	PPOR	skarnAndCarbonateReplacement	Cu, Fe	Fe, Cu	Mo Pb, Zn, Ag	
		Valja Strž		Žagubica	44,1958	21,9353	CM		Dundee Precious Metals	50.000.000			B	PPOR	polymetallic Manto	Cu, Fe	Cu, Mo, Au	Pb, Zn, Fe	
		Borska reka		Bor	44,0909	22,0935	CM	UM	Zijin Mining RTB Bor	650.000.000			C	PPOR	polymetallic Manto	Cu	Cu	Mo, Fe, Pb, Zn, Au	

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Table III-6. PRM resources of Serbia

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

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Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Gold ore	Precious metals		Bigar Hill	Žagubica and Majdanpek	44,2354	21,8816	UD		Dundee Precious Metals	30.600.000			Unknown	Unknown	ophiolite	Au			Gold ore mining
			Korkan	Bor and Žagubica	44,2543	21,8894	UD			12.300.000			Unknown	Unknown	CarlinTypeCarbonateHosted				
Lead-zinc ore	Base metals		Babe	Barajevo, Sopot, Voždovac	44,5356	20,5248	UD		Balkan Exploration and Mining doo, Beograd	6.500.000			Unknown	Unknown	polymetallicManto	Pb, Zn, Ag	Fe, Cu, As		Lead and zinc concentrates
		Tenka 1,2 - North Revir		Majdanpek	44,4314	21,9175	O	OPM	Zijin Mining RTB Bor	1.450.000			B	Unknown	polymetallicManto	Zn, Cu	Fe, Pb, Au, Ag	Mn, W, Mo, Bi, Sn	Crude lead and zinc ores
		Rudnik		Gornji Milanovac	44,1176	20,5198	O	UM	Rudnik olova i cinka RUDNIK	3.000.000			C	PPOR	polymetallicManto	Pb, Zn	Fe, Cu, As	Bi, W, Ni, Co	Lead and zinc concentrates
		Belo Brdo		Leposavić	43,2526	20,8493	O	UM	Rudnik olova i cinka Kopaonik	2.800.000			C	PPOR	skarnAndCarbonateReplacement	Pb, Zn, Fe	As, Cu	Ag, Bi, Au	
		Veliki Majdan		Ljubovija	44,3040	19,3001	O	UM	Veliki Majdan d.o.o., Ljubovija	100.000			C	PPOR	skarnAndCarbonateReplacement	Pb, Zn	Fe, Cu, As	Ag, Sb, Hg, Ni, Co, Cd, In, Bi	
		Lece	0	Medveđa	42,8876	21,5832	O	UM	Koncern Farmakom M.B. Šabac	3.300.000			Unknown	PPOR	porphyry	Pb, Zn	Fe, Au	Cu, Sb	
		Podvirovi		Bosilegrad	42,3509	22,3360	O	UM	Bosil Metal d.o.o., Bosilegrad	500.000			Unknown	PPOR	shorelineOrMarinePlacer	Pb, Zn	Fe, Mn, Au, As	Cu, Ge, Cd, Ag, Au, Ti, Mo, Sn	
		Grot - Blagodat		Vranje	42,5294	22,2387	O	UM	Rudnik olova i cinka Grot a.d., Kriva Feja	420.000			Unknown	PPOR	shorelineOrMarinePlacer	Zn, Pb, Ag	Cd, Cu, Au, As	Fe, Ti, Cd, In, Se, Ta, Bi	
		Sastavci		Raška	43,3203	20,7165	CM	OPM	Farmakom M.B., Suva Ruda, Šabac	1.600.000			B	PPOR	skarnAndCarbonateReplacement	Pb, Zn	Fe, As	Cu, Ag, Cd, Sb, Au	
		Kiževak		Raška	43,2897	20,6954	CM	OPM	Farmakom M.B., Suva Ruda, Šabac	2.400.000			B	PPOR	polymetallicManto	Pb, Zn	Fe, Cu, As,	Sb, Cd, Ag	
Magnesite	Minerals for chemical use	Krive Strane i Torine		Čajetina	43,6982	19,6700	O	OPM	Magnohrom doo u restrukturiranju				A	PPOR	porphyry	Mg			Other clay, ceramic, and refractory minerals including magnesite and brucite
		Šira lokalnost Čačka		Čačak	43,9933	20,3059	O	OPM					A	PPOR					
		Ribnica		Čajetina	43,6924	19,6136	O	OPM					A	PPOR					
		Brezak		Čačak	43,9903	20,2152	O	OPM	Rudnik magnezita ŠUMADIJA Čačak				Unknown	PPOR	nonOrganic				

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Table III-6. PRM resources of Serbia

(Based on the Mineral Register of PRM, https://reseerve.eu, 21/1/2021, the country data and D2.8.III.21 Data Specification on Mineral Resources – Technical Guidelines of INSPIRE)

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Ore description or Commodity	Commodity group (INSPIRE)	Mines (INSPIRE)	Green-field (INSPIRE)	Municipality	Lat. WGS 84 (INSPIRE)	Lon. WGS 84 (INSPIRE)	Current Status (INSPIRE)	Mining method (INSPIRE)	Concessionare (INSPIRE)	Reserves (tones) (INSPIRE)	Reserves type	Conc. of Useful Component in Ore	Deposit Class (INSPIRE)	Reserves type (INSPIRE)	Type of deposit (INSPIRE)	Metal (INSPIRE)	Minor metal (symbol)	Metal trace (symbol)	Final product (INSPIRE)
Molybdenium ore	Iron and ferro-alloys metals	Mačkatica		Surdulica	42,7500	22,1930	CM	OPM	Dundee Precious Metals	177.000.000			Unknown	PPOR	laterite	Mo, Fe	Cu, Fe, Re, W	Pb, Zn, Fe, Ti, Ni	Molybdenum concentrates
Quartz sand and gravel aggregates	Building raw materials	Gumnište		Lajkovac	44,4428	19,8725	O	OPM	Leon doo Ub				A	PPOR	highSulphidation	SiO2			Construction sand and gravel mining
		Avala		Ub	44,4261	19,9292	O	OPM	Jugo-Kaolin doo Beograd				Unknown	PPOR	nonOrganic				
		Paležˇ		Ub	44,3175	20,1530	O	OPM	Kaolin ad Valjevo				Unknown	PPOR	nonOrganic				
		Gunjevac		Ub	44,4522	20,0540	O	OPM	Gunjevac doo Ub				Unknown	PPOR	nonOrganic				
		Oblaci		Zaječar	44,0233	22,2604	O	OPM	Jugo-Kaolin doo Beograd				Unknown	PPOR	ophiolite				
		Lazarevac		Lazarevac	44,4363	20,2890	O		Rudarski basen Kolubara Vreoci				Unknown	PPOR	ophiolite				
		Slatina IV		Ub	44,3966	19,9201	O	OPM	Jugo-Kaolin doo Beograd				Unknown	PPOR	CarlinTypeCarbonateHosted				
		Onjeg		Lazarevac	44,2912	20,3309	CM		Kolubara građevinar doo Beograd				Unknown	PPOR	shorelineOrMarinePlacer	SiO2			
Zeolites	Minerals for chemical use	Korminjoš		Vranje	42,5056	21,9150	O	OPM	Zeo World doo Beograd				Unknown	PPOR	shorelineOrMarinePlacer				All other nonmetallic minerals
		Igroš - Vidojevići		Brus	43,3691	21,1026	O	OPM	DP Geozavod-Nemetali Beograd				Unknown	PPOR					
		Jablanica I		Kruševac	43,4503	21,2728	CM	OPM	Contractor doo Beograd				Unknown	PPOR					

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ANNEX IV. METAL PRICES & METAL PRODUCTS VARIATIONS IN THE PERIOD 2011-2020

CONTENTS

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Silver – Ag

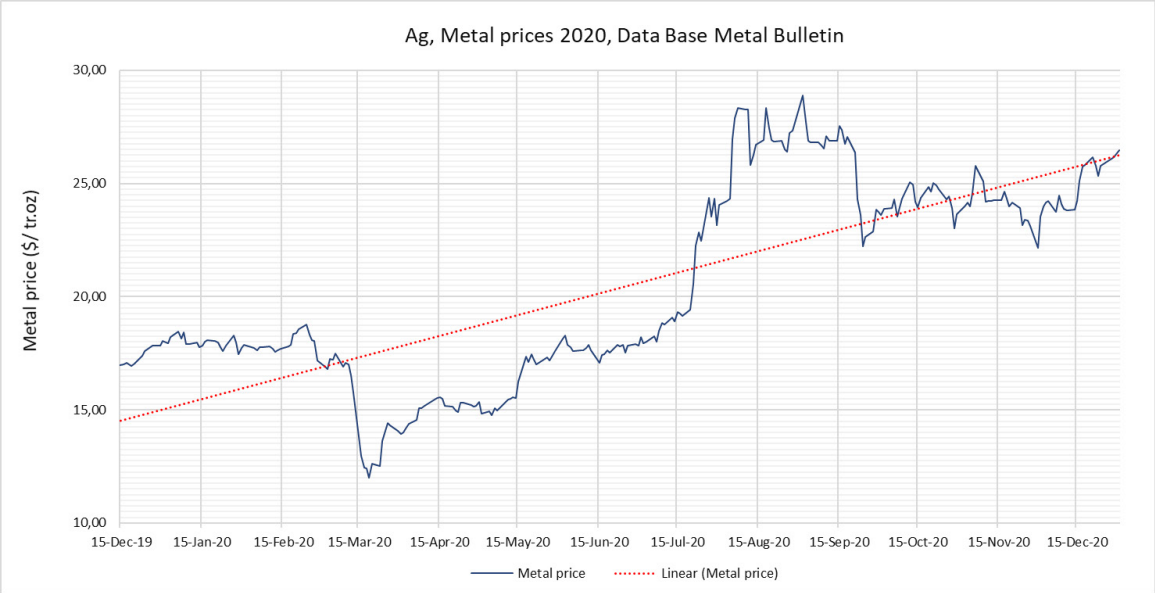

Figure IV-1: Monthly Variation of Ag price, USD/tr.oz per year, for 2020 (Source: Metal Bulletin).

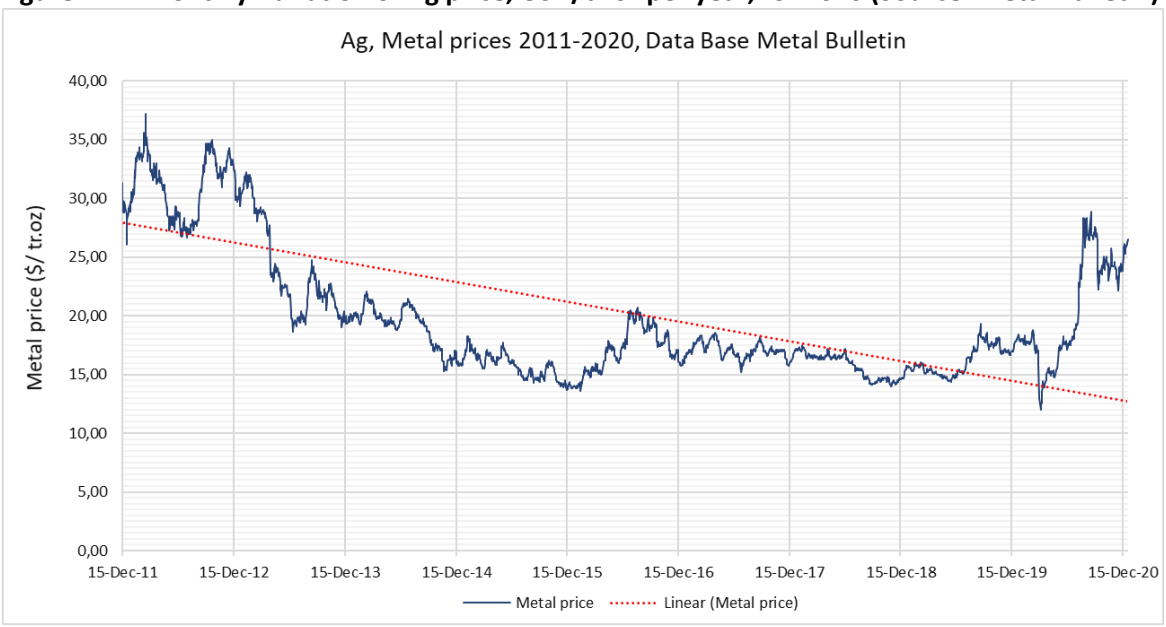

Figure IV-2: Annual Variation of Ag price, USD/tr.oz per year, 2011-2020 (Source: Metal Bulletin).

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Aluminium - Al

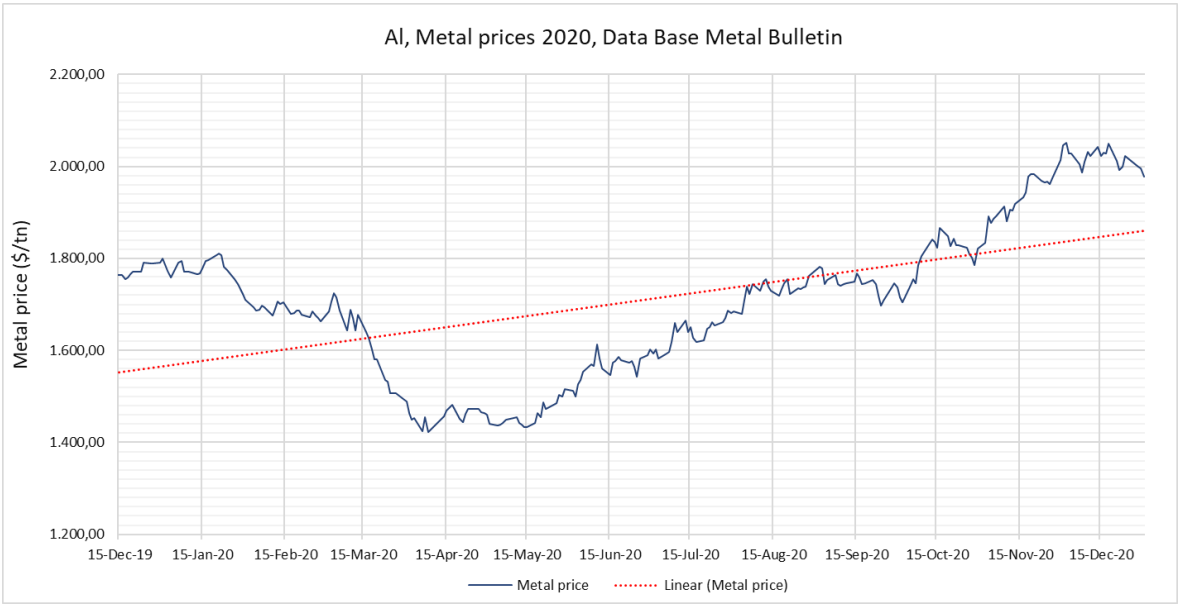

Figure IV-3: Monthly Variation of Al price, USD/tn per year, for 2020 (Source: Metal Bulletin).

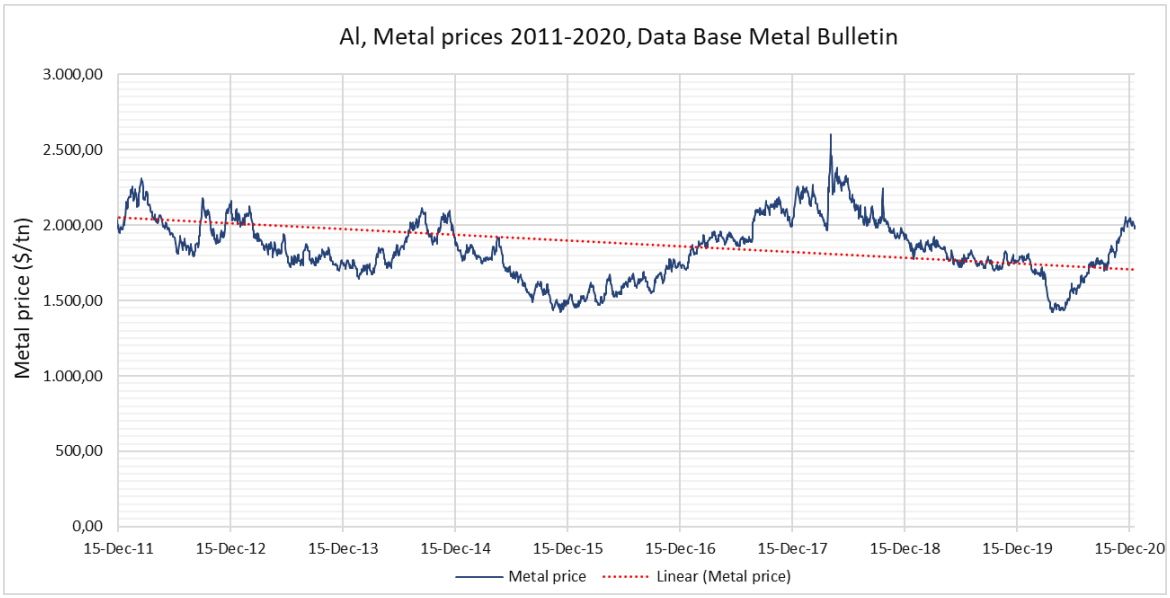

Figure IV-4: Annual Variation of Al price, USD/tn per year, 2011-2020 (Source: Metal Bulletin).

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Arsenic - As

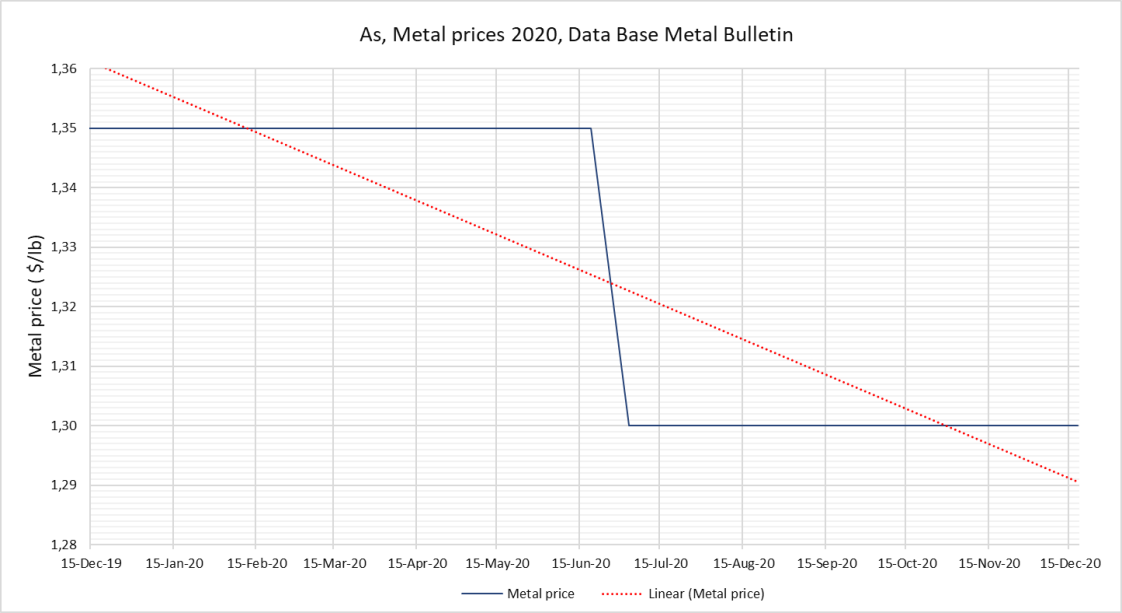

Figure IV-5: Monthly Variation of As price, USD/lb per year, for 2020 (Source: Metal Bulletin).

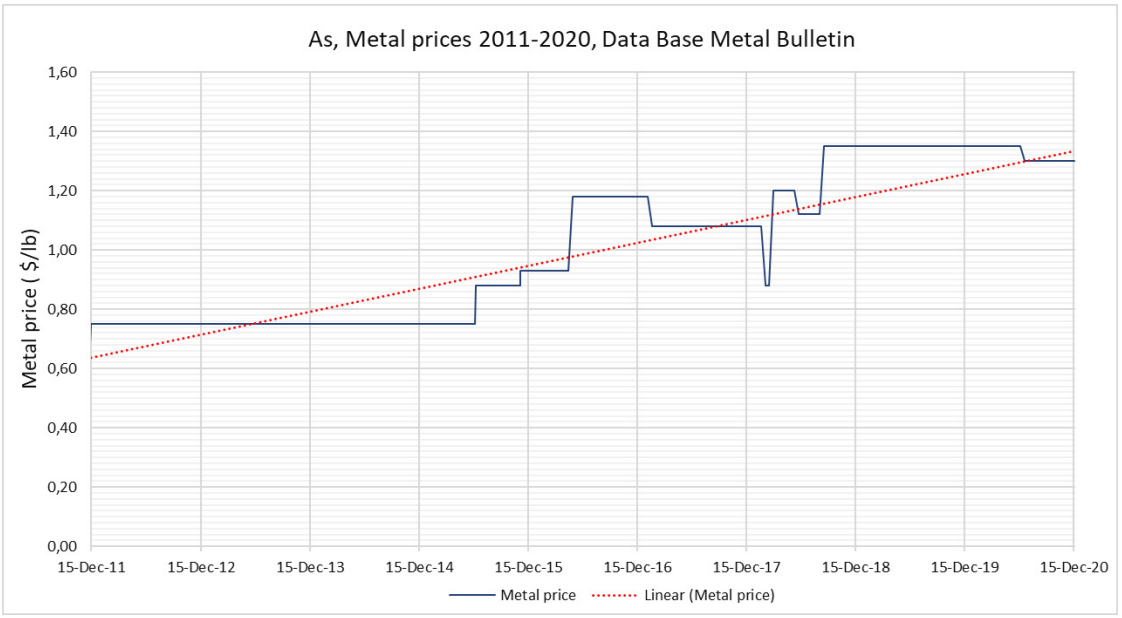

Figure IV-6: Annual Variation of As price, USD/lb per year, for 2020 (Source: Metal Bulletin).

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Gold – Au

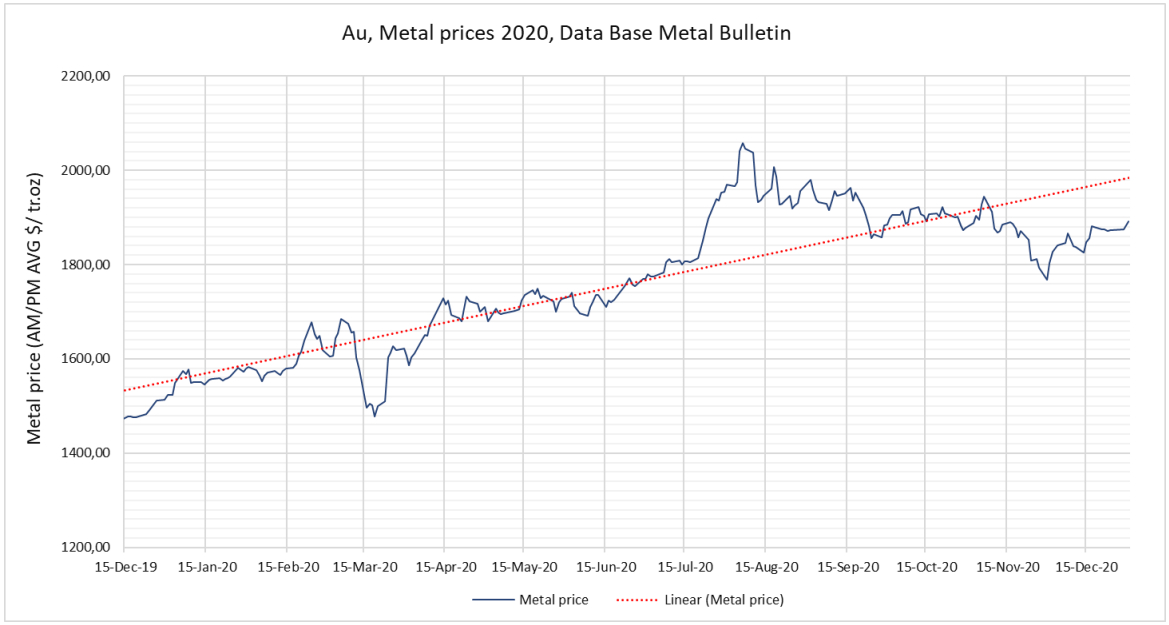

Figure IV-7 Monthly Variation of Au price, USD/tr.oz per year, for 2020 (Source: Metal Bulletin).

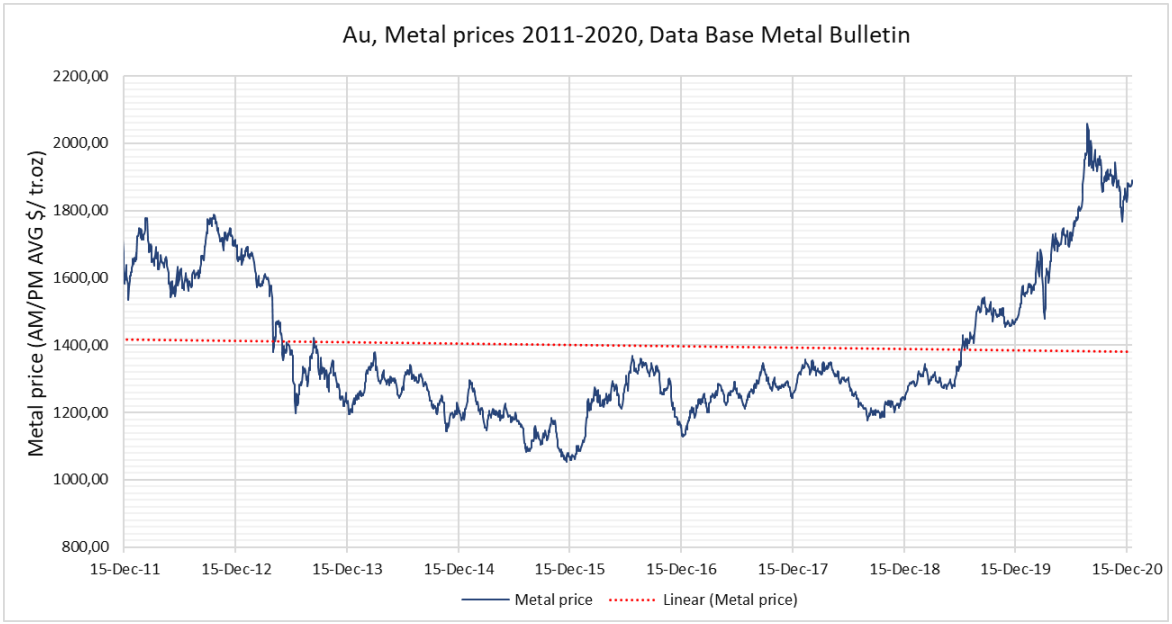

Figure IV-8: Annual Variation of Au price, USD/tr.oz per year, 2011-2020 (Source: Metal Bulletin).

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Chromium – Cr

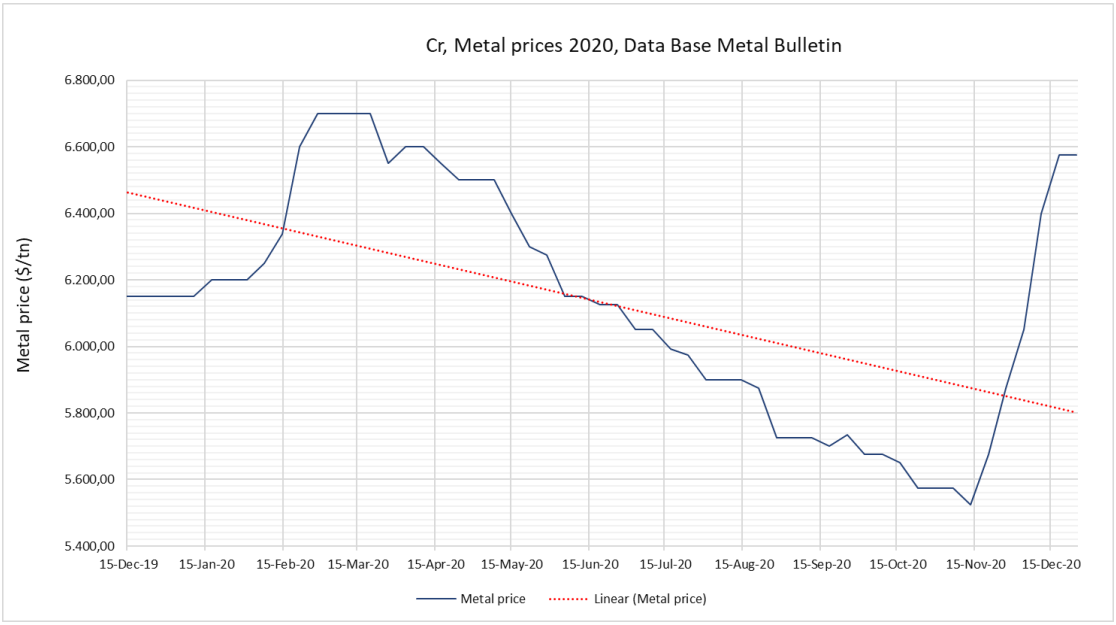

Figure IV-9: Monthly Variation of Cr price, USD/tn per year, for 2020 (Source: Metal Bulletin).

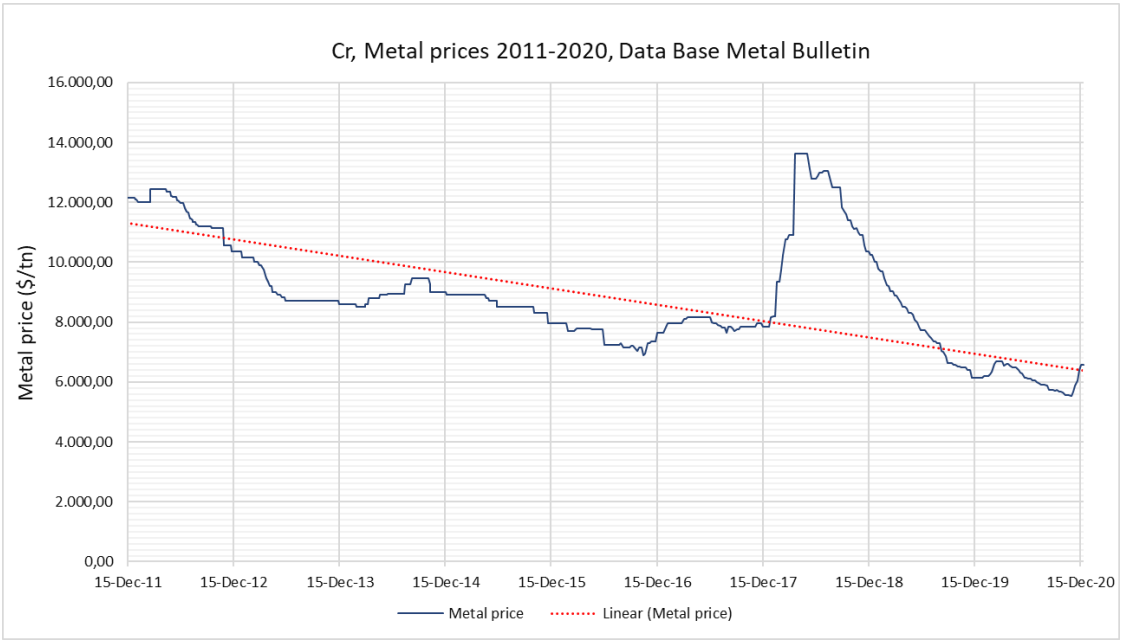

Figure IV-10: Annual Variation of Cr price, USD/tn per year, 2011-2020 (Source: Metal Bulletin).

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Copper – Cu

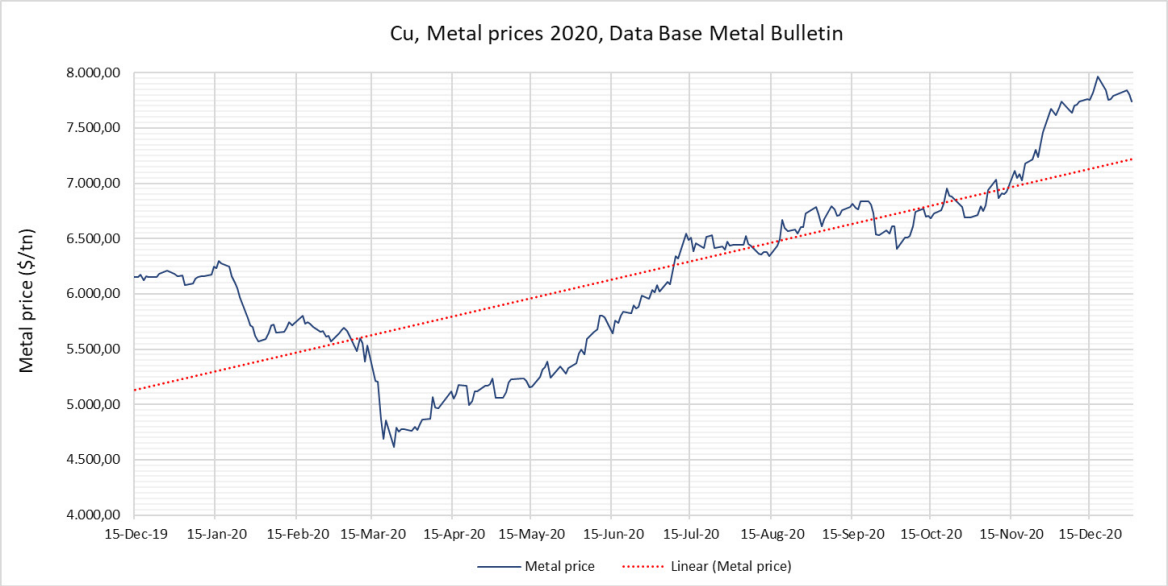

Figure IV-11: Monthly Variation of Cu price, USD/tn per year, for 2020 (Source: Metal Bulletin).

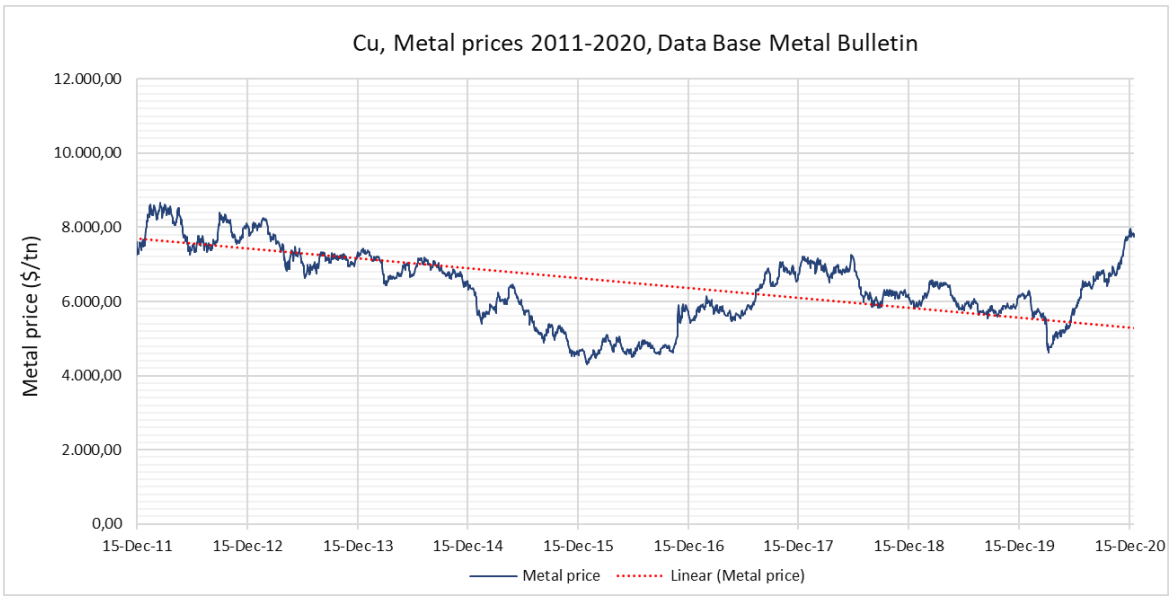

Figure IV-12: Annual Variation of Cu price, USD/tn per year, 2011-2020 (Source: Metal Bulletin).

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Iron - Fe

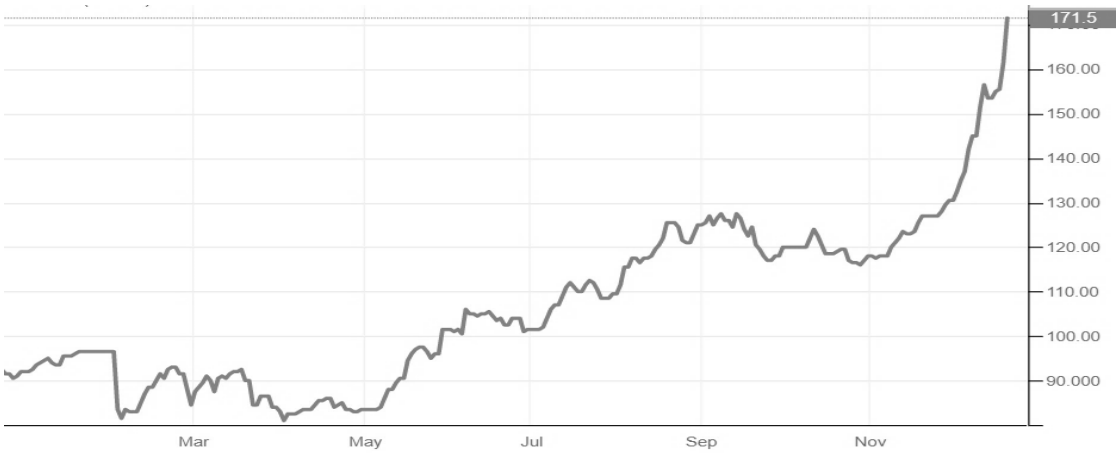

Figure IV-13: Variation of Fe price, USD/tn, for 2020 (Source . *Tradingeconomics_IronOre*).

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Gallium - Ga

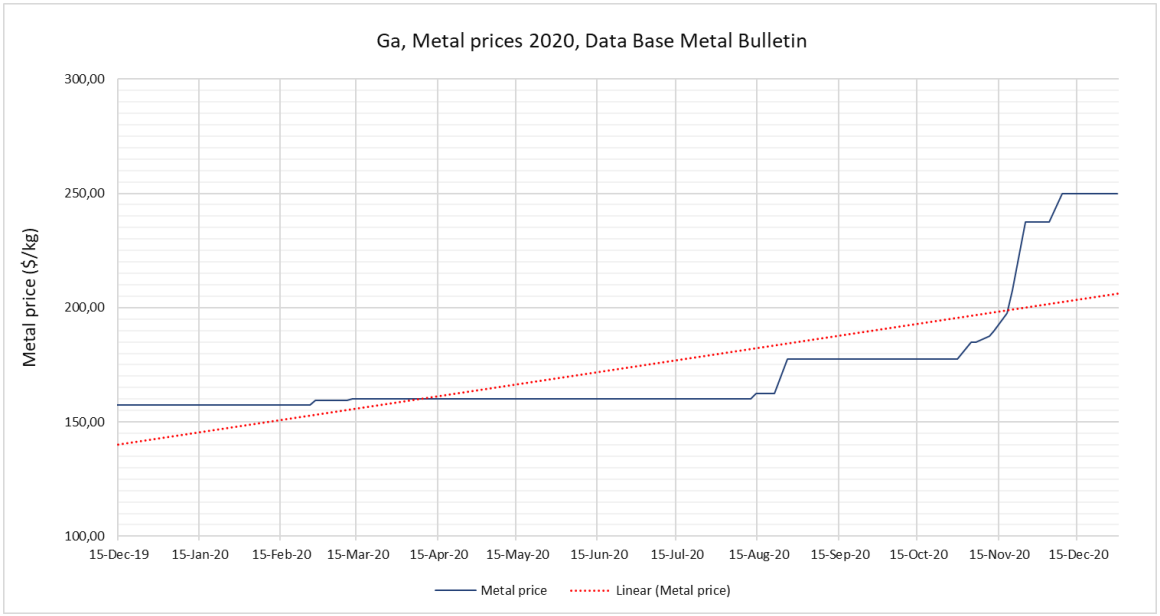

Figure IV-14: Monthly Variation of Ga price, USD/kg per year, for 2020 (Source: Metal Bulletin).

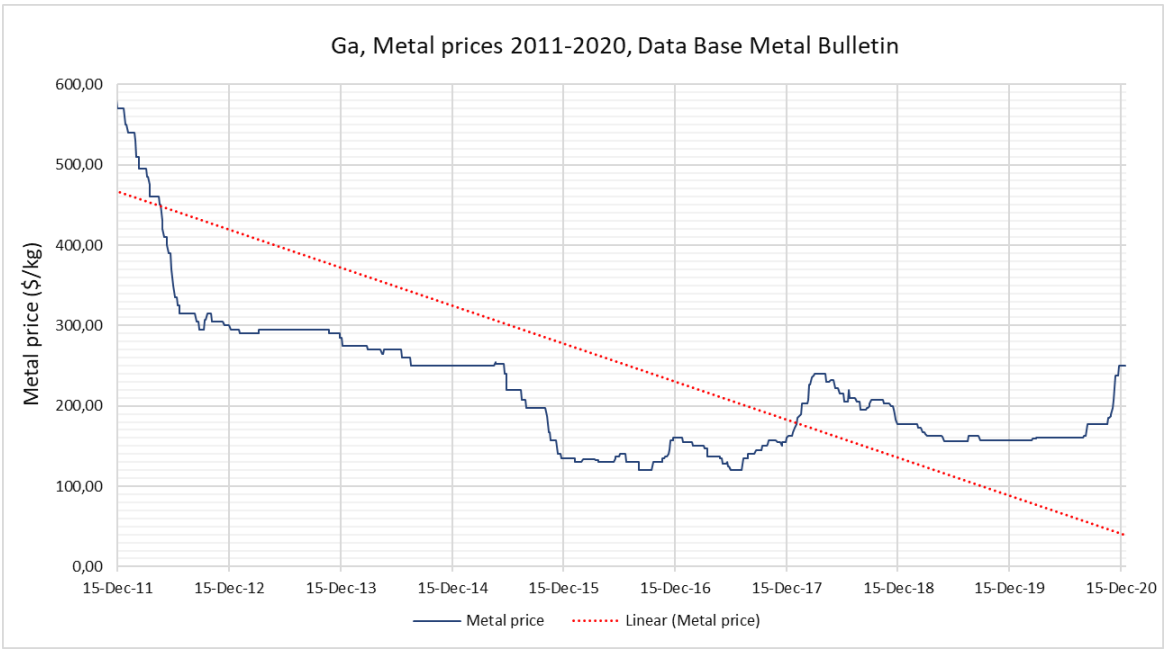

Figure IV-15: Annual Variation of Ga price, USD/kg per year, 2011-2020 (Source: Metal Bulletin).

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Lithium carbonate – Li_2CO_3

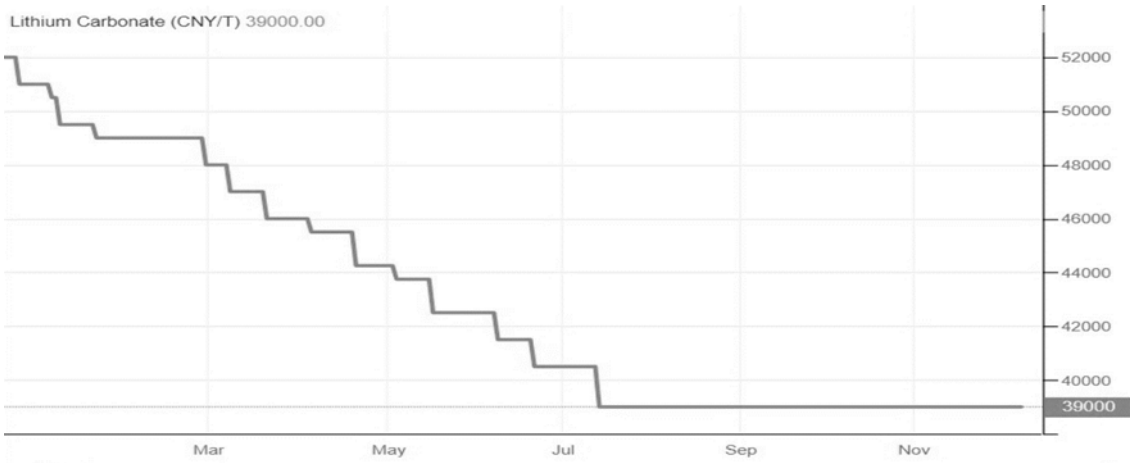

Figure IV-16: Variation of Li_2CO_3 price, CNY/t, for 2020 (Source: *Tradingeconomics_Lithium*).

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Magnesium – Mg

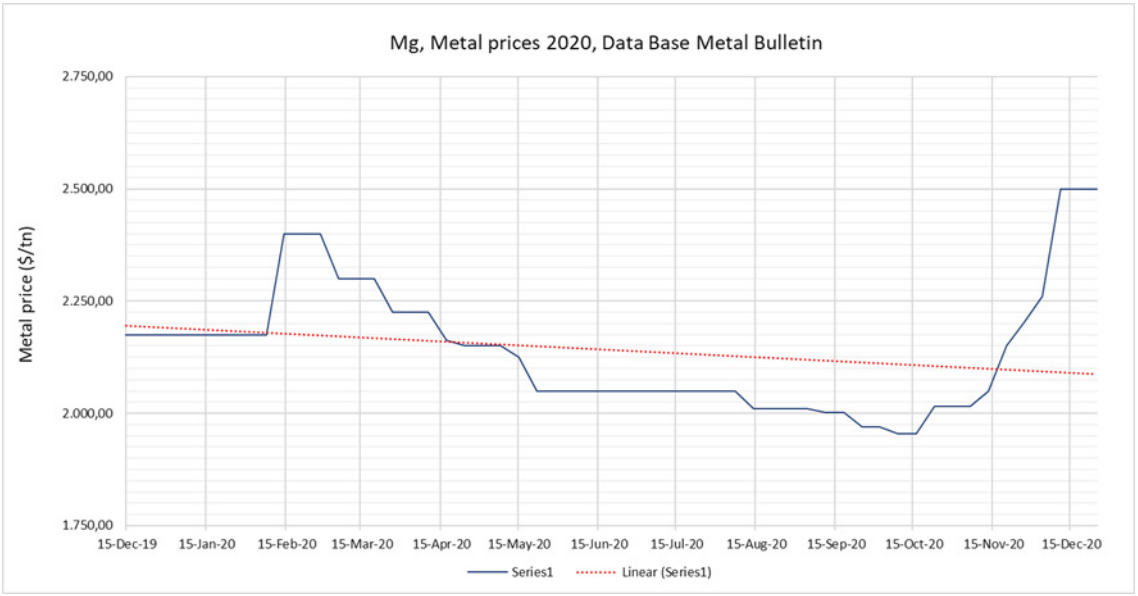

Figure IV-17: Monthly Variation of Mg price, USD/tn per year, for 2020 (Source: Metal Bulletin).

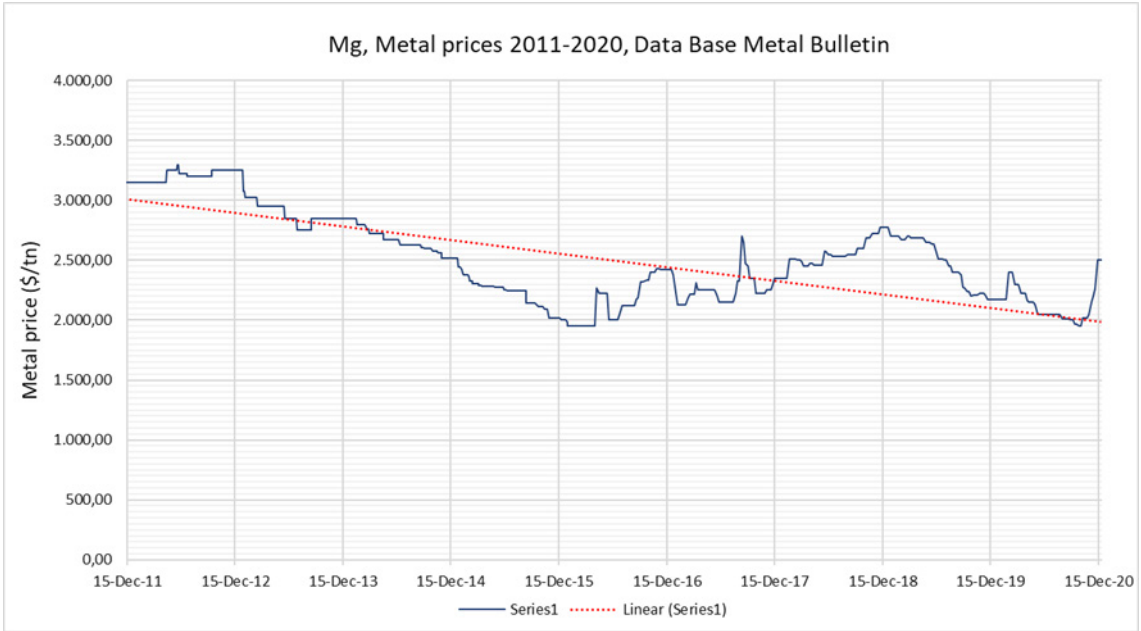

Figure IV-18: Annual Variation of Mg price, USD/tn per year, 2011-2020 (Source: Metal Bulletin).

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Manganese – Mn

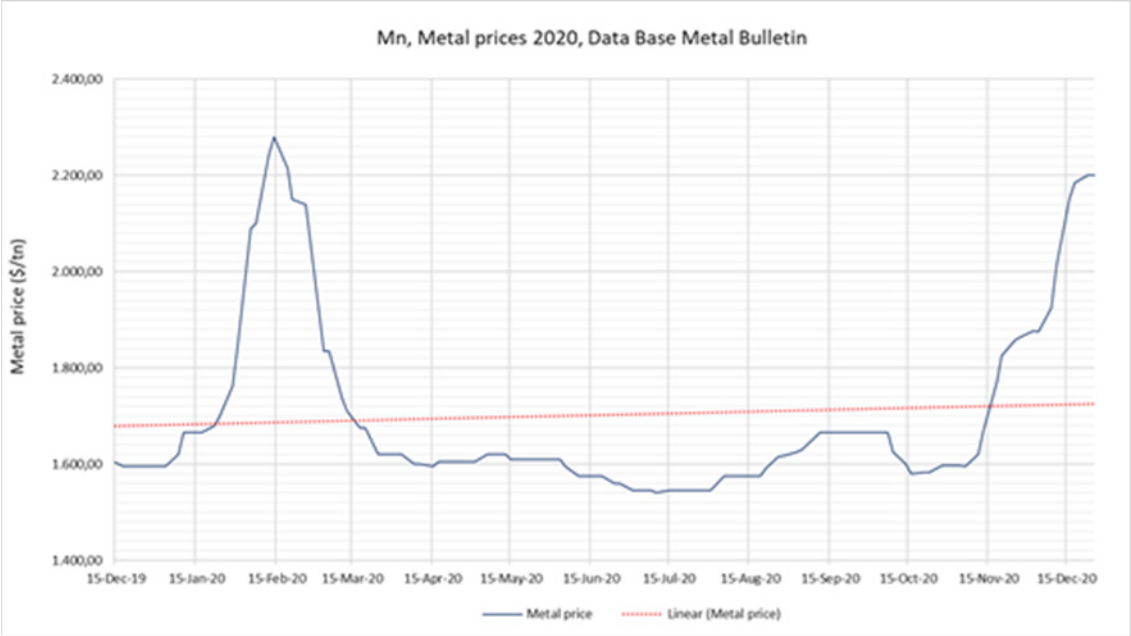

Figure IV-19: Monthly Variation of Mn price, USD/tn per year, for 2020 (Source: Metal Bulletin).

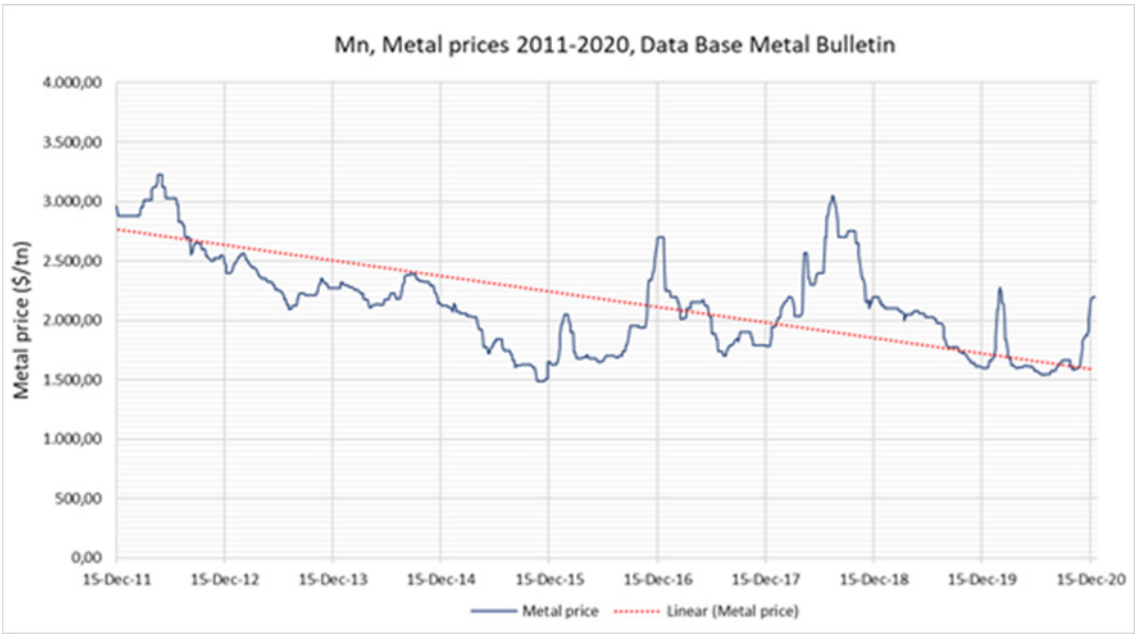

Figure IV-20: Annual Variation of Mn price, USD/tn per year, 2011-2020 (Source: Metal Bulletin).

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Molybdenum - Mo

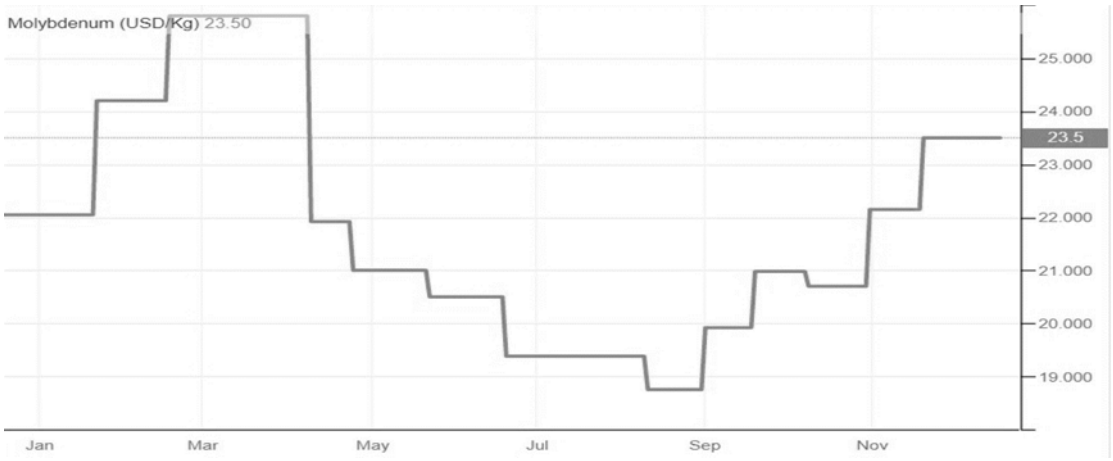

Figure IV-21: Variation of Mo price, USD/kg, for 2020 (Source: *Tradingeconomics_Molybdenum*).

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Nickel – Ni

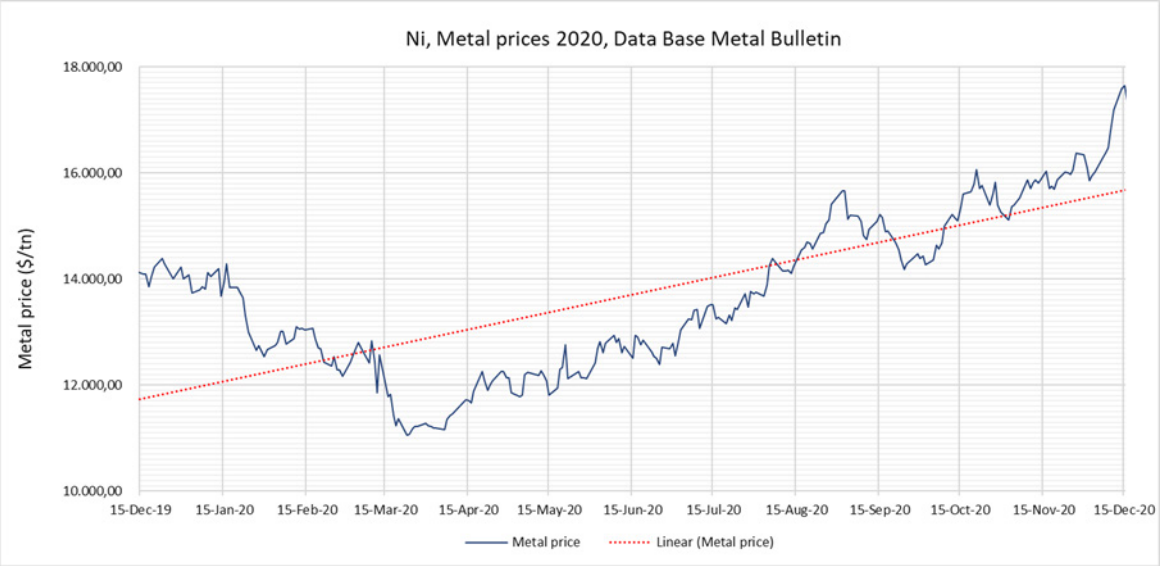

Figure IV-22: Monthly Variation of Ni price, USD/tn per year, for 2020 (Source: Metal Bulletin).

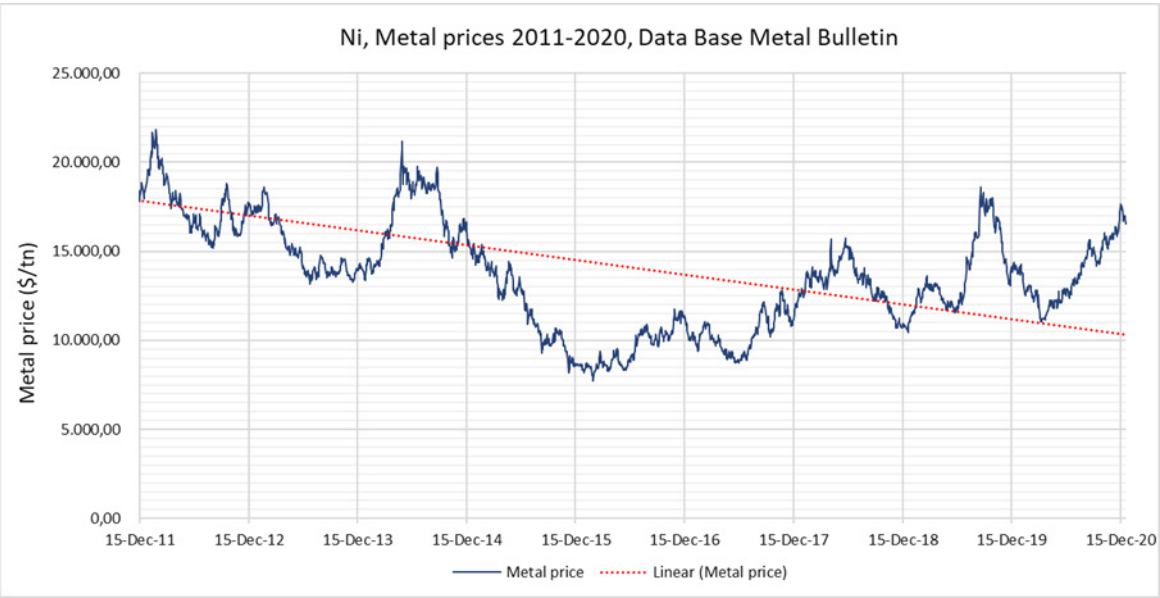

Figure IV-23: Annual Variation of Ni price, USD/tn per year, 2011-2020 (Source: Metal Bulletin).

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Lead - Pb

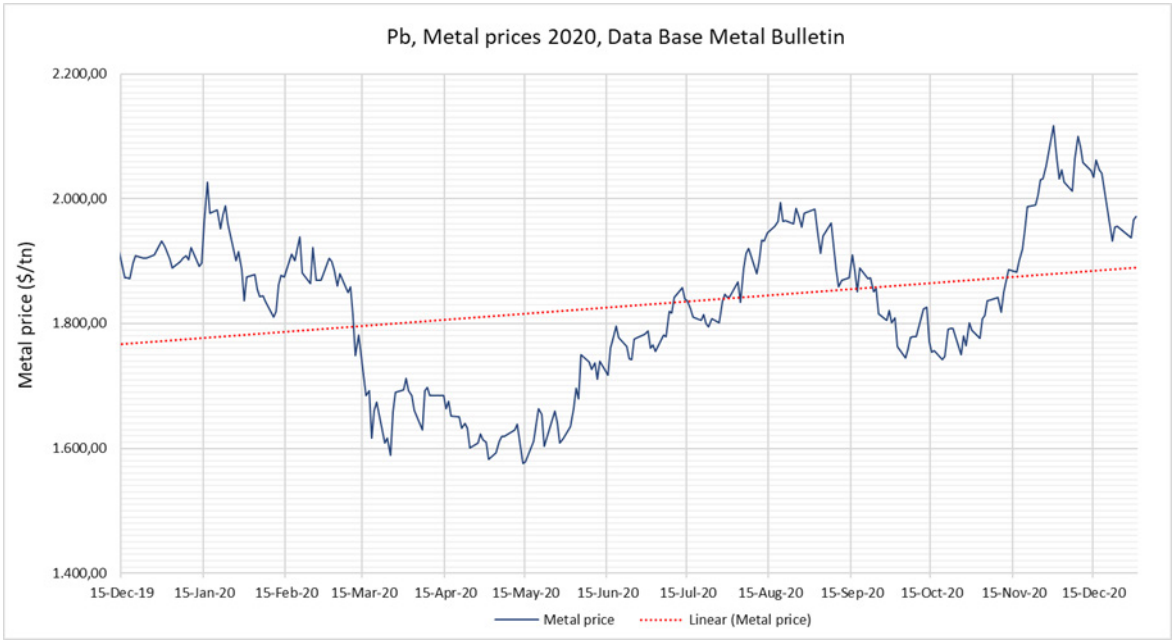

Figure IV-24: Monthly Variation of Pb price, USD/tn per year, for 2020 (Source: Metal Bulletin).

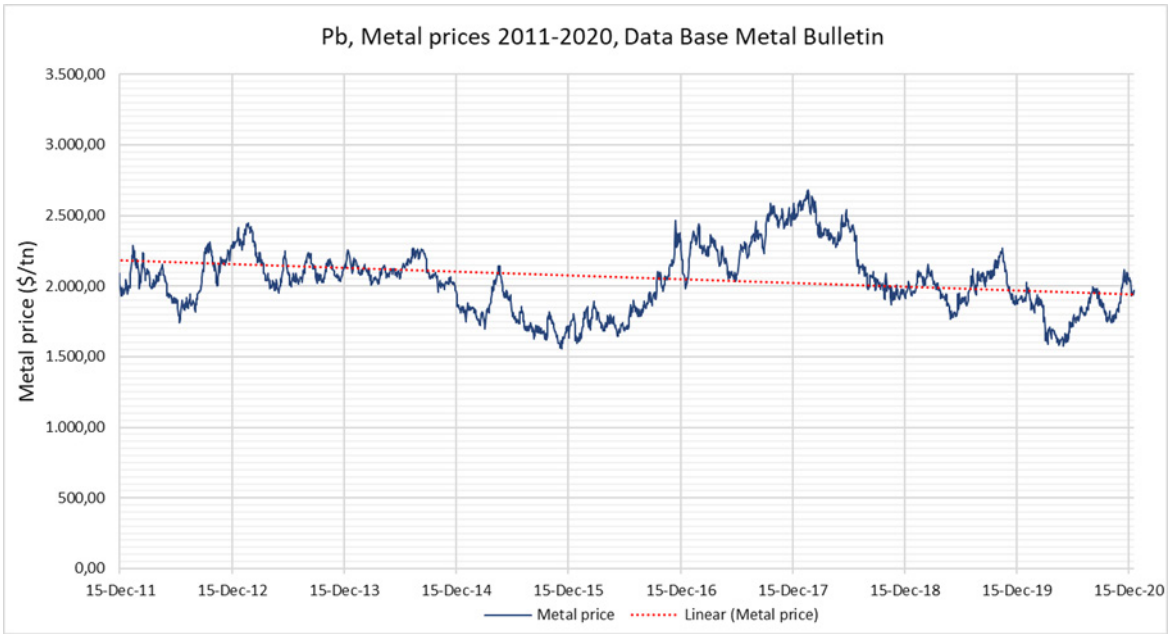

Figure IV-25: Annual Variation of Pb price, USD/tn per year, 2011-2020 (Source: Metal Bulletin).

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Platinum - Pt

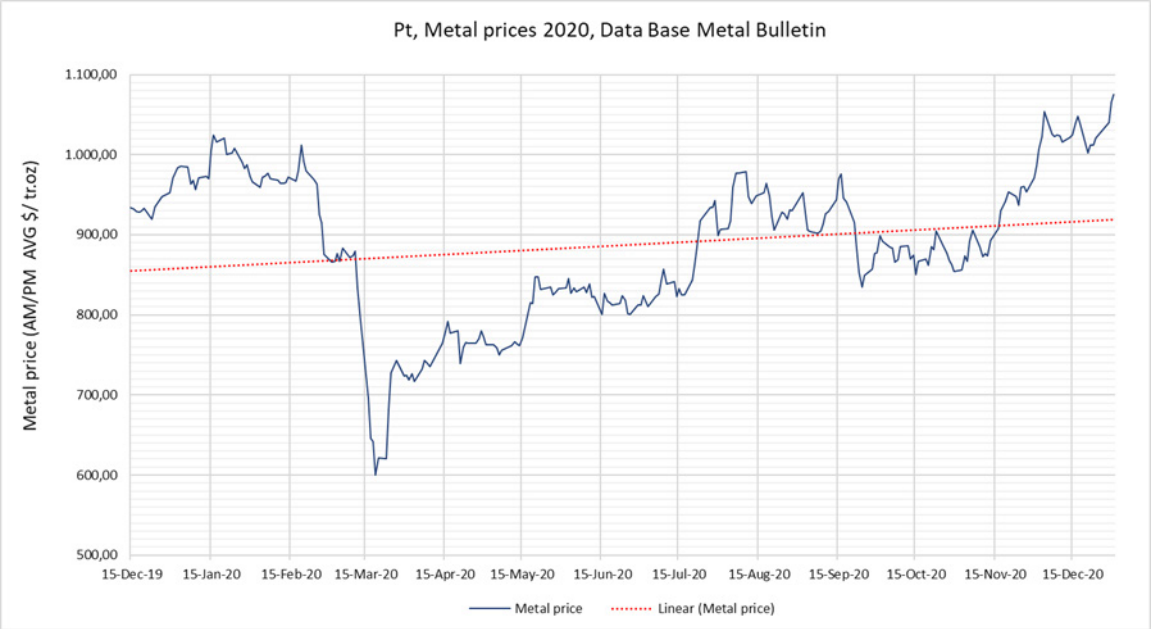

Figure IV-26: Monthly Variation of Pt price, USD/tr.oz per year, for 2020 (Source: Metal Bulletin).

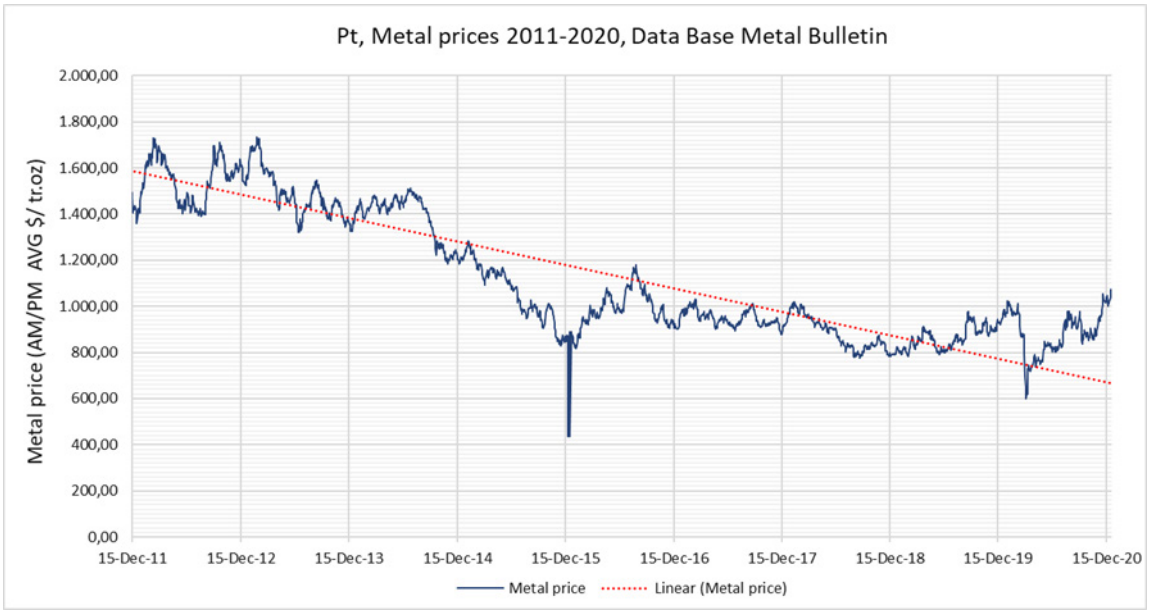

Figure IV-27: Annual Variation of Pt price, USD/tr.oz per year, 2011-2020 (Source: Metal Bulletin).

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Rhenium - Re

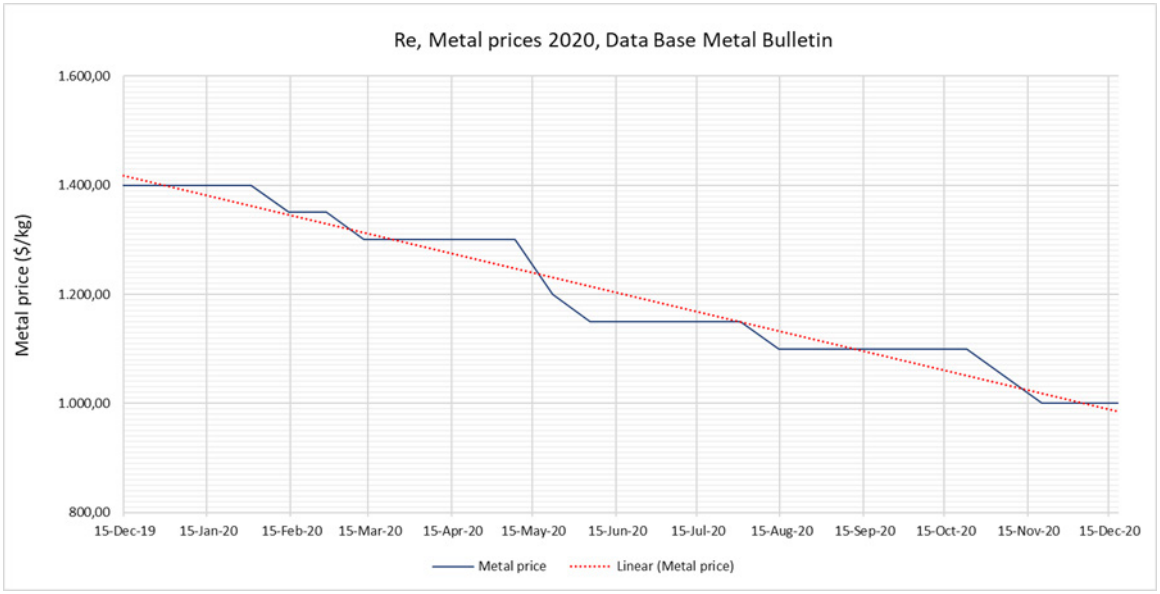

Figure IV-28: Monthly Variation of Re price, USD/kg per year, for 2020 (Source: Metal Bulletin).

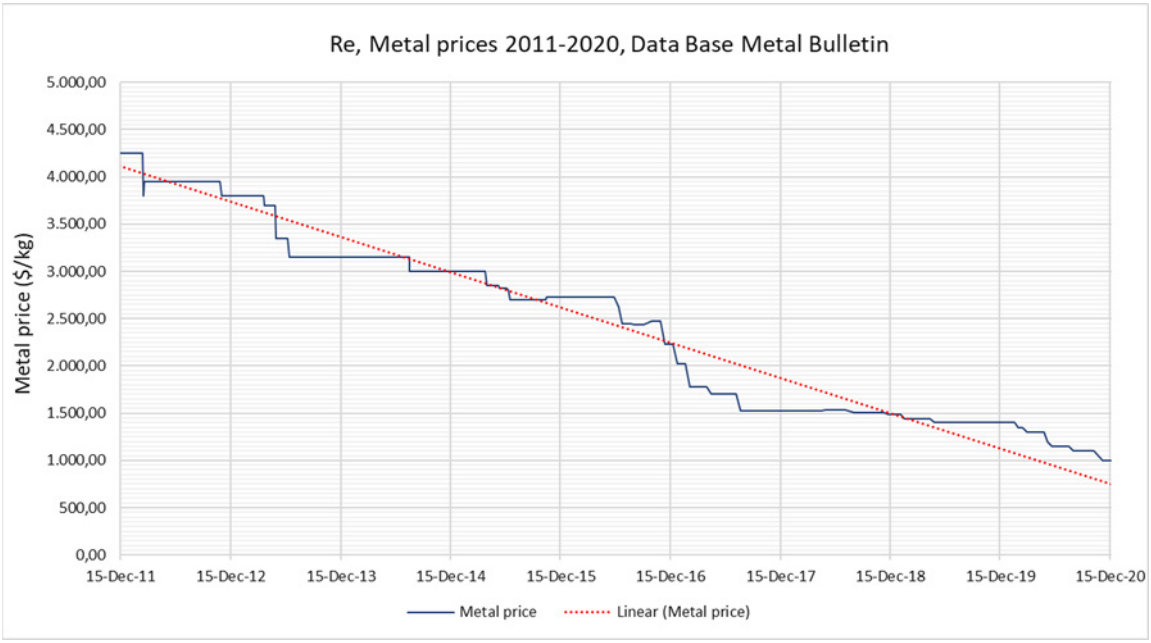

Figure IV-29: Annual Variation of Re price, USD/kg per year, 2011-2020 (Source: Metal Bulletin).

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Antimony - Sb

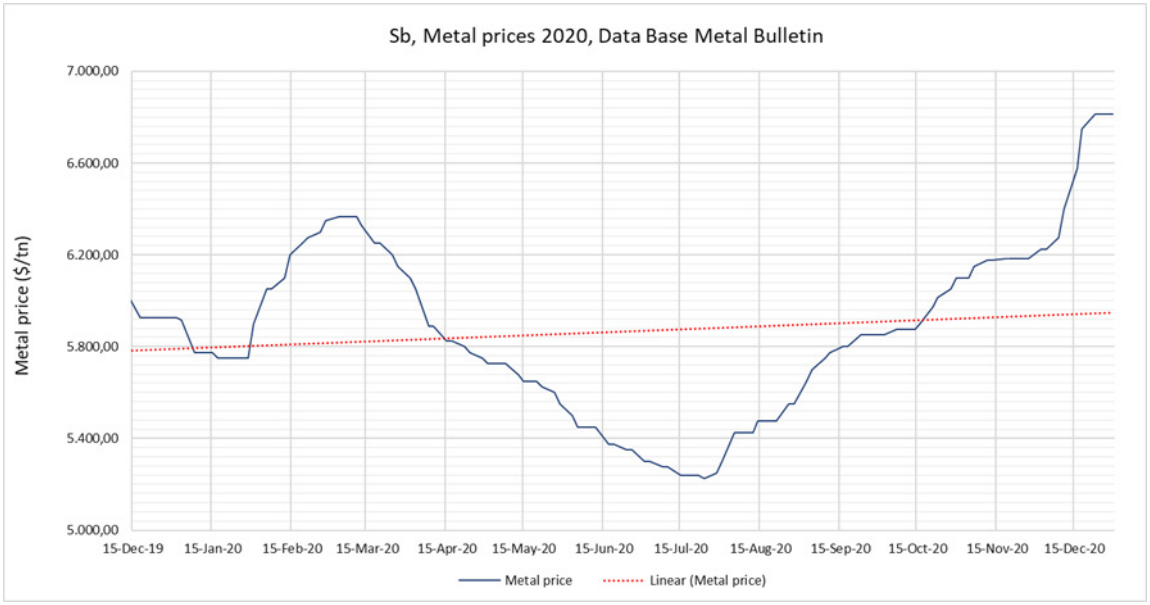

Figure IV-30: Monthly Variation of Sb price, USD/tn per year, for 2020 (Source: Metal Bulletin).

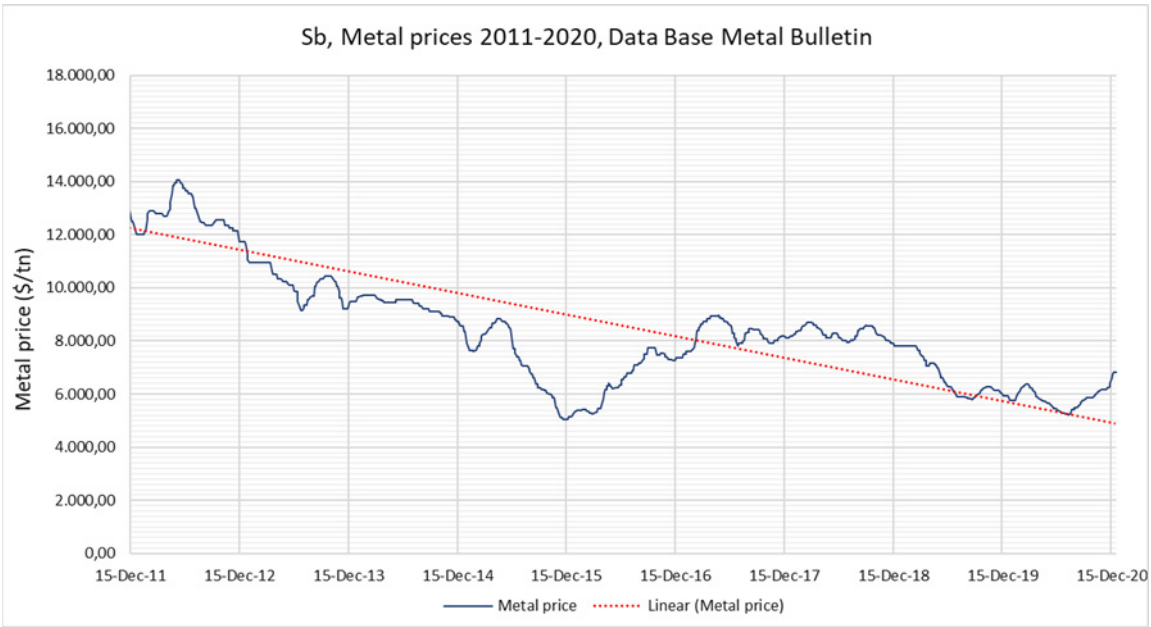

Figure IV-31: Annual Variation of Sb price, USD/tn per year, 2011-2020 (Source: Metal Bulletin).

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Vanadium pentoxide – V_2O_5

Figure IV-32: Variation of V_2O_5 price, USD/lb, for 2020 (Source: https://www.vanadiumprice.com).

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Zinc - Zn

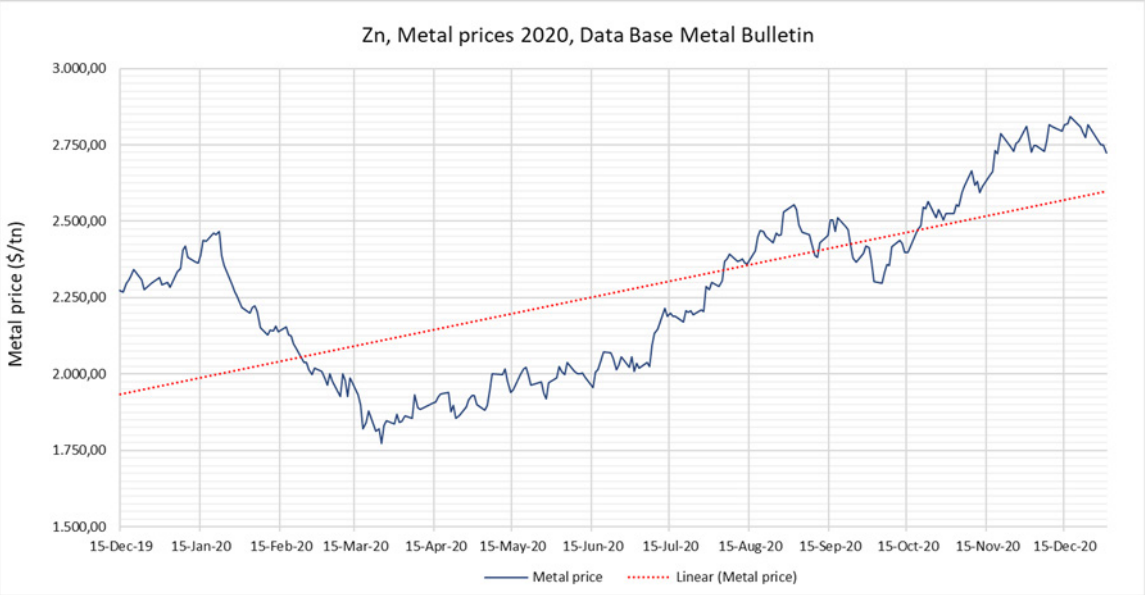

Figure IV-33: Monthly Variation of Zn price, USD/tn per year, for 2020 (Source: Metal Bulletin).

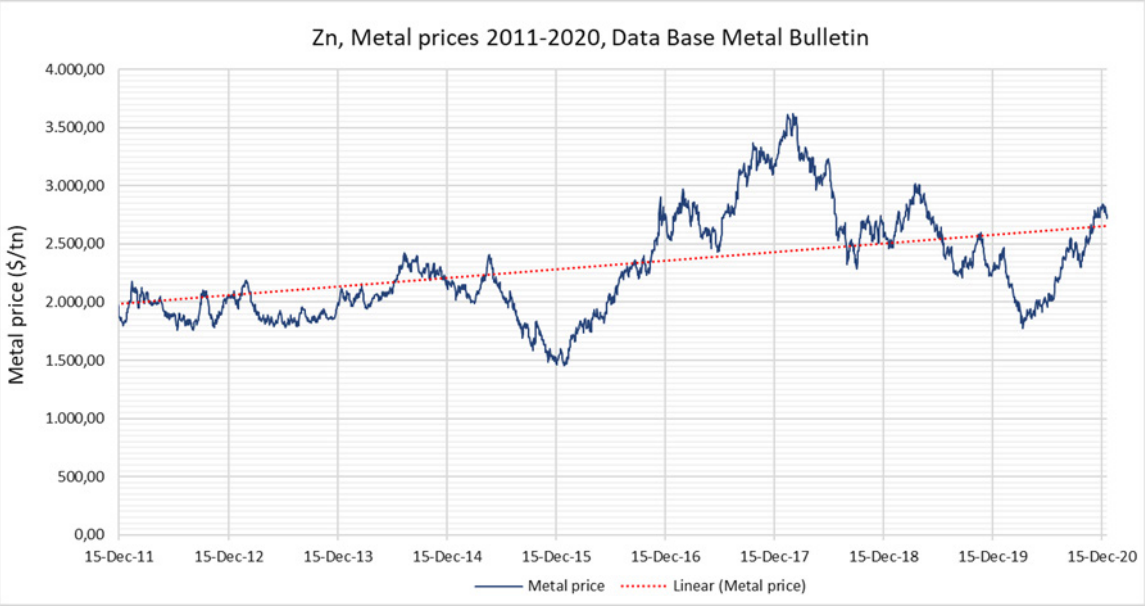

Figure IV-34: Annual Variation of Zn price, USD/tn per year, 2011-2020 (Source: Metal Bulletin).

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ANNEX V. SRM, IMPORTANT PROCESSING WASTE SITES OF THE 6 ESEE COUNTRIES

Based on the GeoZS data and the Mineral Register of SRMs

(https://reseerve.eu,21/1/2021)

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Table V-1. SRM, Important Processing Waste Sites of the 6 ESEE Countries

Based on the GeoZS data and the Mineral Register of SRM (https://reseerve.eu,21/1/2021)

Legend: **Mining /Processing facility Status Column**: **O:** Operating, **C:** Closed, **A:** Abandoned; **Deposit Status Column**: **Ac:** Active, **C/A:** Closed/Abandoned

(*) Based on the SRMs Mineral Register and GeoZS data; **(**)** Based on the SRM Mineral Register. Figures in parentheses are based on the updated GeoZS data; **(***)** Based mainly on the updated GeoZS data

Country Code	Mine (Name, Location)	Mining/Processing			No of fields	Waste			Municipality	Lat (*)	Lon (*)	Element	Site area, Ha (**)	Last manager	Deposition period	Deposit status	Amount /Weight (10^6t)	Chemical composition (***)	Restora-tion	Environmetal impact
		Activity description	Facility							(WGS84)										
			Name, Location	Status		Type	Location	Field												
ALB	Munelle,Tuc	Disposal of waste after separating the concentrate	Fabrika 2 e pasurimit FushArrez	O	1	Processing Waste (Flotation tailings)	Fushë Arrëz		Puke	42,079081	20,034520	Cu	18,097 (18,565)	Ministry of Energy	1984-1991	C/A	3,1	Cu: 0,22 %	(No) Restored by nature	Acid Mine Drainage
	Rehove		Fabrika e pasurimit Rehove	O	1		Rehove	Rehove	Korce	40,489631	20,622525		4,318	Ministry of Energy	1980-1991	C/A	0,61	Cu: 0,15 %		
	Reps		Enrichment factory 1 & 2 Reps	O	3		Reps	Reps/Spaç (1)	Mirdite	41,862641	20,022223		5,188	Ministry of Energy	1970-1990	C/A	3,7	Cu: 0,18 %	Restored	
							Reps	Reps/Spaç (2)		41,868899	20,022560		4,940 (5,141)							
							Reps	Reps/Spaç (3)		41,870439	20,028347		2,259 (1,949)							
	Rubik, Derven, Perlat		Fabrika e pasurimit Rreshen	O	1		Rreshen	Rreshen	Mirdite	41,772467	19,863018		3,210	Ministry of Energy	1984-1990	C/A	0,44	Cu: 0,18 %	Restored	
	Kurbnesh mine	-	Enrichment factory of copper	C	1		Kurbnesh	Kurbnesh	Kurbnesh	41,776920	20,080776		12,612	No manager	1961-1990	C/A	3,6	Cu: 0,17%	Restored	Dam-failure, Acid Mine Drainage
	Golaj, Nikoliq	Smelting process	Fabrika e pasurimit Golaj	O	1	Slag/Ash Landfills (Smelter)	Kukës	Kukës	Kukës	42,067823	20,459265		12,707	-	1988-1991	C/A	0,35	-	No	Acid Mine Drainage
BiH (FBiH)	Bauxite mines from west Herzegovina (Posusje, Siroki Brijeg, Citluk)	Waste disposal after separating alumina from bauxite	"Red Mud" dam	C	1	Processing Waste (Red Mud dam)	Dobro Selo	Dobro Selo	Citluk	43,260287	17,772092	Al	69,990 (70,341)	Aluminij d.d. Mostar	1979-1992	C/A	35	Al_2O_3 (in total) 17,13%; Al_2O_3 (dissolved) 0,88%; REE: 1.300 ppm	No	Air pollution, Loss of landscape, Soil contamination, Surface water pollution, Groundwater pollution
	Veovača	Disposal of waste after separating the concentrate	Rudnik olova, cinka i barita Veovaca; Flotacija Tisovac	C	1	Processing Waste (Flotation tailings)	Veovača - Mala Rijeka	Veovača	Vares	44,137251	18,354276	Pb-Zn-Ag	5,433 (5,602)	Rudnik olova, cinka i barita Veovaca	-	C/A	2	Ag: 18 ppm, Pb: 0,41%, Zn: 0,51%	No	
BiH (RSK)	Alumina Factory Zvornik	Waste disposal is performed after separating alumina from bauxite	"Red Mud" dam	O	1	Processing Waste (Red Mud dam)	Birač	Dulici	Zvornik	44,464425	19,070916	Al	93,942	Alumina a.d. Zvornik	-	Ac	40	REE: 550 ppm	Yes (active)	
	Sase tailing site	Disposal of waste after separating the concentrate	Flotation pool Sase	O	2	Processing Waste (Flotation tailings)	Sase	Srebrenica-1	(Srebrenica)	44,140021	19,358856	Pb-Zn-Ag	5,281 (6,044)	GROSS d.o.o. Gradiska	-	Ac	2	Ag: 6,4 ppm, Au: 0,14 ppm, Mn: 0,9 %, Pb: 0,27%, Zn: 0,29%	Yes (active)	
								Srebrenica-2		44,137490	19,358403	Pb-Zn-Ag	3,817 (4,364)					Ag: 4,1 ppm, Au: <0,1 ppm, Mn: 1,2%, Pb: 0,23%, Zn: 0,51 %		

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Table V-1. SRM, Important Processing Waste Sites of the 6 ESEE Countries

Based on the GeoZS data and the Mineral Register of SRM (https://reseerve.eu,21/1/2021)

Legend: **Mining /Processing facility Status Column**: **O:** Operating, **C:** Closed, **A:** Abandoned; **Deposit Status Column**: **Ac:** Active, **C/A:** Closed/Abandoned

(*) Based on the SRMs Mineral Register and GeoZS data; **(**)** Based on the SRM Mineral Register. Figures in parentheses are based on the updated GeoZS data; **(***)** Based mainly on the updated GeoZS data

Country Code	Mine (Name, Location)	Mining/Processing			No of fields	Waste			Municipality	Lat (*)	Lon (*)	Element	Site area, Ha (**)	Last manager	Deposition period	Deposit status	Amount /Weight (10^6t)	Chemical composition (***)	Restora-tion	Environmetal impact
		Activity description	Facility Name, Location	Status		Type	Location	Field		(WGS84)										
MNE	-	Waste disposal is performed after separating alumina from bauxite	Aluminium plant Podgorica	C	1	Processing Waste (Red Mud dam)	Podgorica	Podgorica	Podgorica	42,383114	19,218420	Al	45,858	-	-	Ac	25	REE: 1.200 ppm	Yes (active)	Air pollution, Loss of landscape, Soil contamination, Surface water pollution, Groundwater pollution
	Šupla Stijena	Disposal of waste after separating the concentrate	Flotation facility	O	1	Processing Waste (Flotation tailings)	Gradac	Gradac	Plevlja	43,399312	19,150530	Pb-Zn-Ag	12,614	-	-	C/A	3	Ag: <4 ppm, Pb: 0,19%, Zn: 0,39%	No	
MKD	Lead and zinc mine Zletovo	Disposal of waste after separating the concentrate	Flotation facility	O	3	Processing Waste (Flotation tailings)	Zletovo	Probištip -1	Probištip	41,994640	22,178645	Pb-Zn-Ag	22,501 (24,409)	Minstroj	1928-1939; 1945-	Ac	30	Ag: 21 ppm, Mn: 5,3%, Pb: 0,68%, Zn: 0,58%	Yes (active)	Air pollution, Loss of landscape, Soil contamination, Waste overflow, Deforestation and loss of vegetation cover, Surface water pollution, Groundwater pollution
								Probištip -2		41,986753	22,180519	Pb-Zn-Ag	40,049 (40,359)					Ag: 9,7 ppm, Mn: 2,1%, Pb: 0,32%, Zn: 0,33%		
								Probištip -3		41,974249	22,178241	Pb-Zn-Ag	31,956 (32,880)					Ag: 7,7 ppm, Mn: 2,9%, Pb: 0,30%, Zn: 0,30%		
	Lead and zinc mine Sasa		Flotation facility		3		Sasa	Sasa-1	Makedonska Kamenica	42,110387	22,522031	Pb-Zn-Ag	12,473	Central Asia Metals	1965-	Ac	20	Ag: 4,3 ppm, Mn: 0,7%, Pb: 0,33%, Zn: <0,2%	Yes (active)	
								Sasa-2		42,106481	22,526637	Pb-Zn-Ag	12,140					Ag: 5,0 ppm, Mn: 0,7%, Pb: 0,33%, Zn: <0,2%		
								Sasa-3		42,103203	22,532718	Pb-Zn-Ag	23,497					Ag: 4,4 ppm, Mn: 1,7%, Pb: 0,57%, Zn: 0,36%		
	Lead and zinc mine Toranica		Flotation facility		1		Toranica	Toranica	Kriva Palanka	42,200343	22,448699	Pb-Zn-Ag	12,410	Minstroj	1987-	Ac	10	Ag: 4,4 ppm, Mn: 1,5%, Pb: 0,66%, Zn: 0,37%	Yes (active)	
	Antimony mine Lojane		Flotation facility	C, A	1		Lojane	Lojane-1	Lojane	42,217930	21,665219	Sb	2,022	Public	1923-1979	C/A	0,5	Sb: >1,0%	No	
	Lead and zinc smelter Veles	Smelting and metallurgical processing	Sluge (metallurgic)	C	1	Slag/Ash Landfills (Smelter)	Veles	Veles	Veles	41,735952	21,755485	Pb-Zn-Ag	3,787	Metrudhem d.o.o.	1973-2002	C/A	1.8	Ag: 39 ppm, Cu: 0,70%, Mn: 1,1 %, Pb: 2,5%, Zn: 8,3%	No	Air pollution, Loss of landscape, Soil contamination
SRB	Zajača	Smelter	Smelter Zajaca	C	1	Slag/Ash Landfills (Smelter)	Zajača	Zajača	Zajača	44,449062	19,243221	Pb-Sb	4,674 (4,929)	Bankruptcy Trustee		C/A	0,6	Ag: 14 ppm, Au: 0,19 ppm, Sb: 0,85%	Yes	Soil contamination, Waste overflow, Surface water pollution, Groundwater pollution

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Table V-1. SRM, Important Processing Waste Sites of the 6 ESEE Countries

Based on the GeoZS data and the Mineral Register of SRM (https://reseerve.eu,21/1/2021)

Legend: **Mining /Processing facility Status Column**: **O:** Operating, **C:** Closed, **A:** Abandoned; **Deposit Status Column**: **Ac:** Active, **C/A:** Closed/Abandoned

(*) Based on the SRMs Mineral Register and GeoZS data; **(**)** Based on the SRM Mineral Register. Figures in parentheses are based on the updated GeoZS data; **(***)** Based mainly on the updated GeoZS data

Country Code	Mine (Name, Location)	Mining/Processing			No of fields	Waste			Municipality	Lat (*)	Lon (*)	Element	Site area, Ha (**)	Last manager	Deposition period	Deposit status	Amount /Weight (10^6t)	Chemical composition (***)	Restora-tion	Environmetal impact
		Activity description	Facility Name, Location	Facility Status		Type	Location	Field		(WGS84)										
SRB	RTB Bor, Bor	Smelting and metallurgical processing	Smelting of copper concenrate	O	3	Slag/Ash Landfills (Smelter)	Bor	Bor - Slag deposit (1)	Bor	44,069341	22,122337	Cu-Au-Ag	73,274 (71,389)	Public	-	Ac	50	Ag: <4 ppm, Au: <0,1 ppm, Cu: 0,40%, Mo: 0,11%, Zn: 0,79%	Yes (active)	Air pollution, Loss of landscape, Soil contamination, Waste overflow, Deforestation and loss of vegetation cover, Surface water pollution, Groundwater pollution
								Bor - Slag deposit (2)		44,079619	22,110398		3,029 (19,007)	RTB Bor, Bor		Ac	18	-		
								Bor - Slag deposit (3)		44,083875	22,103322		28,774 (8,906)	RTB Bor, Bor		Ac		-		
		Open pit and Underground exploitation / Ore processing / Flotation processing	Flotation facility	O	2	Processing Waste (Flotation tailings)	Bor	Bor - Flotation deposit (1)	Bor	44,072033	22,105737	Cu-Au-Ag	17,660	Public	-	C/A	28	Ag: <4 ppm, Au: 0,31 ppm, Cu: <0,1%	No	
								Bor - Flotation deposit (2)		44,066853	22,111709		36,735	Public				Ag: <4 ppm, Au: 0,40 ppm, Cu: <0,1%		
	Lead and Zinc Mine GROT Joint Stock Company Vranje, Kriva Feja	Underground exploitation / Ore processing / Flotation processing	Flotation facility	O	1	Processing Waste (Flotation tailings)	Grot, Kriva Feja	Grot	Vranje	42,564553	22,167324	Pb-Zn-Ag	25,606	Lead and Zinc Mine GROT Joint Stock Company Vranje	1974-	Ac	5,5	Ag: <4 ppm, Mn: 1,2%, Pb: 0,37%, Zn: <0,2 %	Yes (active)	
	Lead and Zinc Mine Lece			O	1		Lece	Lece	Medveda	42,885223	21,587758	Pb-Zn-Ag-Au	20,636 (23,096)	Bankruptcy Trustee	1954-2001	Ac	2,7	Ag: <4 ppm, Au: 0,33 ppm	Yes (active)	
	Lead and Zinc Mine Suva ruda	Underground exploitation / Ore processing / Flotation processing	Flotation facility	C	2	Processing Waste (Flotation tailings)	Rudnica	Rudnica (Rudnica-1)	Raska	43,234762	20,677601	Pb-Zn-Ag	11,411	Public	-	C/A	5,5	Ag: <4 ppm, Pb: <0,2%, Zn: <0,2%	No	
								Kukanjica Potok (Rudnica-2)		43,242655	20,695907	Pb-Zn-Ag	8,813					-		
	Mine Rudnik	Underground exploitation / Ore processing / Flotation processing	Flotation facility	O	1	Processing Waste (Flotation tailings)	Rudnik	Rudnik	Gornji Milanovac	44,108792	20,489802	Pb-Zn	39,984 (40,763)	Aco Ilic	1953-	Ac	8,7	Ag: 15 ppm, Pb: 0,50 %, Zn: 0,44 %	Yes (active)	Soil contamination, Waste overflow, Surface water pollution, Groundwater pollution
	Lead and Zinc Mine Veliki Majdan	Crushing - grinding, froth flotation. Concentrates are shipped for smelting, disposal of the flotation tailings.	Flotation facility	O	2	Processing Waste (Flotation tailings)	Veliki Majdan	Veliki Majdan-1	Ljubovija	44,282739	19,300595	Pb-Zn-Ag	2,106 (2,244)	Ciklomen-Mineco	1930-	Ac	1,9	-	Yes (active)	Soil contamination, Waste overflow, Surface water pollution, Groundwater pollution
								Veliki Majdan-2		44,279917	19,304274		3,441 (3,455)							

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

ANNEX VI. MAPS

Maps with PRM resources, SRM sites and CRM presence, created in ArcGIS 10.5.1 for each of the 6 ESEE countries examined using the INSPIRE Directive Technical Guidelines -Data Specification on Mineral Resources.

Map 1: PRM Resources of Albania – ALB (Mines/ Quarries/ Greenfields

Map 2: PRM Resources of Bosnia and Herzegovina – BiH (Mines/ Quarries/ Greenfields)

Map 3: PRM Resources of Croatia – HRV (Mines/ Quarries/ Greenfields)

Map 4: PRM Resources of Montenegro – MNE (Mines/ Quarries/ Greenfields)

Map 5: PRM Resources of Republic of North Macedonia – MKD (Mines/ Quarries/ Greenfields)

Map 6: PRM Resources of Serbia – SRB (Mines/ Quarries/ Greenfields)

Map 7: SRM sites of the 6 ESEE Countries

Map 8: CRM presence in PRM and selected SRM sites of the 6 ESEE Countries

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

MONTENEGRO
KOSOVO
SERBIA
NORTH MACEDONIA
GREECE
ALBANIA
ADRIATIC SEA
Kukes
Klos
Durres
Tirana
Berat
Korce
Vlore
Permet
Sarande
uD

N
0 25 50 km
Coordinate System: GCS WGS 1984
Datum: WGS 1984, Units: Degree
(https://land.copernicus.eu/, http://www.diva-gis.org/ 19/12/2020)

Map 1: PRM resources of ALB (Mines/Quarries/Greenfields)

RESEERVE D6.1 Mapping of the available business opportunities in the ESEE region

Based on the country data and the Mineral Register of PRM (https://reseerve.eu)

Legend (INSPIRE)

SYMBOLS INDICATING MINE/SITE STATUS:

Operating | Not operating or Abandoned | Under development or at feasibility

CLASSIFICATION OF DEPOSITS:

Classification of deposits to Very Large/A, Large/B, Medium/C and Small/D, as per the INSPIRE guidelines, when data are available

METALLIC & PRECIOUS PRM RESOURCES:

Base metals

Aluminium (Bauxite ore) | Lead+Zinc ores (sulfides, e.tc.) | Copper ore | Zinc ore | Lead ore | Tin ore

Iron and ferro-alloys metals

Iron and iron-nickel ores, chromites, manganese ores, vanadium | W, Mo | Nickel/ Cobalt | Nb

Special and rare metals

Li, Be, Ta, REE, Cs, Rb, Sc, Zr, Hf | Ge, Ga, In, Cd, Se, Re | Bi, Te, Hg | Sb | Ti

Precious metals | ***Precious and semi-precious gemstones***

Gold | Silver | PGE | Precious gemstones | Semi-precious gemstones

ENERGY COMMODITIES:

Uranium/Thorium | Coal, lignite, pit | Oil shale

NON METALLIC COMMODITIES:

Building raw materials | ***Specialty and other industrial rocks & minerals***

Rock and sand & gravel aggregates, dimension stones, RM for cement industry, | Asbestos, bentonite, calcite / limestone (filler grades), quartz, talc,

Fertilizer minerals | ***Ceramic and refractory minerals*** | ***Minerals for chemical use***

Phosphates, potash minerals | Common clays, refractory and ceramic clays, dolomite, feldspar, | Borates, barite, fluorite, magnesite, zeolites

RESEERVE

Map 2: PRM resources of BIH (Mines/Quarries/Greenfields)

RESEERVE D6.1 Mapping of the available business opportunities in the ESEE region

Based on the country data and the Mineral Register of PRM (https://reseerve.eu)

Legend (INSPIRE)

SYMBOLS INDICATING MINE/SITE STATUS:

Operating | Not operating or Abandoned | Under development or at feasibility

CLASSIFICATION OF DEPOSITS:

Classification of deposits to Very Large/A, Large/B, Medium/C and Small/D, as per the INSPIRE guidelines, when data are available

METALLIC & PRECIOUS PRM RESOURCES:

Base metals

Aluminium (Bauxite ore) | Lead+Zinc ores (sulfides, e.tc.) | Copper ore | Zinc ore | Lead ore | Tin ore

Iron and ferro-alloys metals

Iron and iron-nickel ores, chromites, manganese ores, vanadium | W, Mo | Nickel/ Cobalt | Nb

Special and rare metals

Li, Be, Ta, REE, Cs, Rb, Sc, Zr, Hf | Ge, Ga, In, Cd, Se, Re | Bi, Te, Hg | Sb | Ti

Precious metals | ***Precious and semi-precious gemstones***

Gold | Silver | PGE | Precious gemstones | Semi-precious gemstones

ENERGY COMMODITIES:

Uranium/Thorium | Coal, lignite, pit | Oil shale

NON METALLIC COMMODITIES:

Building raw materials | ***Specialty and other industrial rocks & minerals***

Rock and sand & gravel aggregates, dimension stones, RM for cement industry, | Asbestos, bentonite, calcite / limestone (filler grades), quartz, talc,

Fertilizer minerals | ***Ceramic and refractory minerals*** | ***Minerals for chemical use***

Phosphates, potash minerals | Common clays, refractory and ceramic clays, dolomite, feldspar, | Borates, barite, fluorite, magnesite, zeolites

CROATIA

SERBIA

Prijedor

[SRK]

Tuzla

Zvornik

BOSNIA AND HERZEGOVINA

uD

Livno

[FBiH]

Sarajevo

Mostar

Trebinje

MONTENEGRO

ADRIATIC SEA

N 0 30 60 km

Coordinate System: GCS WGS 1984

Datum: WGS 1984, Units: Degree

(https://land.copernicus.eu/, http://www.diva-gis.org/ 19/12/2020)

RESEERVE

AUSTRIA

HUNGARY

SLOVENIA

Bjelovar

Zagreb

Sisak

SERBIA

Osijek

Rijeka

CROATIA

Pula

BOSNIA AND HERZEGOVINA

Zadar

Split

MONTENEGRO

ADRIATIC SEA

Dubrovnik

ITALY

N 0 40 80 km

Coordinate System: GCS WGS 1984
Datum: WGS 1984, Units: Degree
(https://land.copernicus.eu/, http://www.diva-gis.org/ 19/12/2020)

Map 3: PRM resources of HRV (Mines/Quarries/Greenfields)

RESEERVE D6.1 Mapping of the available business opportunities in the ESEE region

Based on the country data and the Mineral Register of PRM (https://reseerve.eu)

Legend (INSPIRE)

SYMBOLS INDICATING MINE/SITE STATUS:

Operating | Not operating or Abandoned | Under development or at feasibility

CLASSIFICATION OF DEPOSITS:

Classification of deposits to Very Large/A, Large/B, Medium/C and Small/D, as per the INSPIRE guidelines, when data are available

METALLIC & PRECIOUS PRM RESOURCES:

Base metals

Aluminium (Bauxite ore) | Lead+Zinc ores (sulfides, e.tc.) | Copper ore | Zinc ore | Lead ore | Tin ore

Iron and ferro-alloys metals

Iron and iron-nickel ores, chromites, manganese ores, vanadium | W, Mo | Nickel/ Cobalt | Nb

Special and rare metals

Li, Be, Ta, REE, Cs, Rb, Sc, Zr, Hf | Ge, Ga, In, Cd, Se, Re | Bi, Te, Hg | Sb | Ti

Precious metals

Gold | Silver | PGE

Precious and semi-precious gemstones

Precious gemstones | Semi-precious gemstones

ENERGY COMMODITIES:

Uranium/Thorium | Coal, lignite, pit | Oil shale

NON METALLIC COMMODITIES:

Building raw materials

Rock and sand & gravel aggregates, dimension stones, RM for cement industry,

Specialty and other industrial rocks & minerals

Asbestos, bentonite, calcite / limestone (filler grades), quartz, talc,

Fertilizer minerals

Phosphates, potash minerals

Ceramic and refractory minerals

Common clays, refractory and ceramic clays, dolomite, feldspar,

Minerals for chemical use

Borates, barite, fluorite, magnesite, zeolites

RESEERVE

BOSNIA AND HERZEGOVINA

SERBIA

MONTENEGRO

KOSOVO

ALBANIA

ADRIATIC SEA

Savnik

Niksic

Berane

Podgorica

Budva

Bar

N

0 20 40 km

Coordinate System: GCS WGS 1984

Datum: WGS 1984, Units: Degree

(https://land.copernicus.eu/, http://www.diva-gis.org/ 19/12/2020)

Map 4: PRM resources of MNE (Mines/Quarries/Greenfields)

RESEERVE D6.1 Mapping of the available business opportunities in the ESEE region

Based on the country data and the Mineral Register of PRM (https://reseerve.eu)

Legend (INSPIRE)

SYMBOLS INDICATING MINE/SITE STATUS:

Operating | Not operating or Abandoned | Under development or at feasibility

CLASSIFICATION OF DEPOSITS:

Classification of deposits to Very Large/A, Large/B, Medium/C and Small/D, as per the INSPIRE guidelines, when data are available

METALLIC & PRECIOUS PRM RESOURCES:

Base metals

Aluminium (Bauxite ore) | Lead+Zinc ores (sulfides, e.tc.) | Copper ore | Zinc ore | Lead ore | Tin ore

Iron and ferro-alloys metals

Iron and iron-nickel ores, chromites, manganese ores, vanadium | W, Mo | Nickel/ Cobalt | Nb

Special and rare metals

Li, Be, Ta, REE, Cs, Rb, Sc, Zr, Hf | Ge, Ga, In, Cd, Se, Re | Bi, Te, Hg | Sb | Ti

Precious metals | ***Precious and semi-precious gemstones***

Gold | Silver | PGE | Precious gemstones | Semi-precious gemstones

ENERGY COMMODITIES:

Uranium/Thorium | Coal, lignite, pit | Oil shale

NON METALLIC COMMODITIES:

Building raw materials | ***Specialty and other industrial rocks & minerals***

Rock and sand & gravel aggregates, dimension stones, RM for cement industry, | Asbestos, bentonite, calcite / limestone (filler grades), quartz, talc,

Fertilizer minerals | ***Ceramic and refractory minerals*** | ***Minerals for chemical use***

Phosphates, potash minerals | Common clays, refractory and ceramic clays, dolomite, feldspar, | Borates, barite, fluorite, magnesite, zeolites

RESEERVE

KOSOVO

SERBIA

BULGARIA

Tetovo

Skopje

Kochani

Gostivar

Stip

Veles

NORTH MACEDONIA

Kicevo

Strumica

Kavadarci

Prilep

Ohrid

Kumanovo

Bitola

GREECE

ALBANIA

N 0 10 20 km

Coordinate System: GCS WGS 1984

Datum: WGS 1984, Units: Degree

(https://land.copernicus.eu/, http://www.diva-gis.org/ 19/12/2020)

Map 5: PRM resources of MKD (Mines/Quarries/Greenfields)

RESEERVE D6.1 Mapping of the available business opportunities in the ESEE region

Based on the country data and the Mineral Register of PRM (https://reseerve.eu)

Legend (INSPIRE)

SYMBOLS INDICATING MINE/SITE STATUS:

Operating | Not operating or Abandoned | Under development or at feasibility

CLASSIFICATION OF DEPOSITS:

Classification of deposits to Very Large/A, Large/B, Medium/C and Small/D, as per the INSPIRE guidelines, when data are available

METALLIC & PRECIOUS PRM RESOURCES:

Base metals

Aluminium (Bauxite ore) | Lead+Zinc ores (sulfides, e.tc.) | Copper ore | Zinc ore | Lead ore | Tin ore

Iron and ferro-alloys metals

Iron and iron-nickel ores, chromites, manganese ores, vanadium | W, Mo | Nickel/ Cobalt | Nb

Special and rare metals

Li, Be, Ta, REE, Cs, Rb, Sc, Zr, Hf | Ge, Ga, In, Cd, Se, Re | Bi, Te, Hg | Sb | Ti

Precious metals | ***Precious and semi-precious gemstones***

Gold | Silver | PGE | Precious gemstones | Semi-precious gemstones

ENERGY COMMODITIES:

Uranium/Thorium | Coal, lignite, pit | Oil shale

NON METALLIC COMMODITIES:

Building raw materials | ***Specialty and other industrial rocks & minerals***

Rock and sand & gravel aggregates, dimension stones, RM for cement industry, | Asbestos, bentonite, calcite / limestone (filler grades), quartz, talc,

Fertilizer minerals | ***Ceramic and refractory minerals*** | ***Minerals for chemical use***

Phosphates, potash minerals | Common clays, refractory and ceramic clays, dolomite, feldspar, | Borates, barite, fluorite, magnesite, zeolites

RESEERVE

HUNGARY
ROMANIA
CROATIA
SERBIA
BOSNIA AND HERZEGOVINA
MONTENEGRO
KOSOVO
BULGARIA
BULGARIA
Sombor
Zrenjanin
Novi Sad
Belgrade
Pozarevac
Jagodina
Uzice
Krusevac
Nis
Pirot
Vranje
uD
N
0
30
60
km
Coordinate System: GCS WGS 1984
Datum: WGS 1984, Units: Degree
(https://land.copernicus.eu/, http://www.diva-gis.org/ 19/12/2020)

Map 6: PRM resources of SRB (Mines/Quarries/Greenfields)

RESEERVE D6.1 Mapping of the available business opportunities in the ESEE region

Based on the country data and the Mineral Register of PRM (https://reseerve.eu)

Legend (INSPIRE)

SYMBOLS INDICATING MINE/SITE STATUS:

Operating | Not operating or Abandoned | Under development or at feasibility

CLASSIFICATION OF DEPOSITS:

Classification of deposits to Very Large/A, Large/B, Medium/C and Small/D, as per the INSPIRE guidelines, when data are available

METALLIC & PRECIOUS PRM RESOURCES:

Base metals

Aluminium (Bauxite ore) | Lead+Zinc ores (sulfides, e.t.c.) | Copper ore | Zinc ore | Lead ore | Tin ore

Iron and ferro-alloys metals

Iron and iron-nickel ores, chromites, manganese ores, vanadium | W, Mo | Nickel/ Cobalt | Nb

Special and rare metals

Li, Be, Ta, REE, Cs, Rb, Sc, Zr, Hf | Ge, Ga, In, Cd, Se, Re | Bi, Te, Hg | Sb | Ti

Precious metals | ***Precious and semi-precious gemstones***

Gold | Silver | PGE | Precious gemstones | Semi-precious gemstones

ENERGY COMMODITIES:

Uranium/Thorium | Coal, lignite, pit | Oil shale

NON METALLIC COMMODITIES:

Building raw materials | ***Specialty and other industrial rocks & minerals***

Rock and sand & gravel aggregates, dimension stones, RM for cement industry, | Asbestos, bentonite, calcite / limestone (filler grades), quartz, talc,

Fertilizer minerals | ***Ceramic and refractory minerals*** | ***Minerals for chemical use***

Phosphates, potash minerals | Common clays, refractory and ceramic clays, dolomite, feldspar, | Borates, barite, fluorite, magnesite, zeolites

RESEERVE

AUSTRIA
HUNGARY
SLOVENIA
Zagreb
ROMANIA
CROATIA
BOSNIA AND HERZEGOVINA
Belgrade
SERBIA
Sarajevo
MONTENEGRO
Podgorica
KOSOVO
ADRIATIC SEA
Skopje
NORTH MACEDONIA
ITALY
Tirana
ALBANIA
GREECE

N
0 75 150 km

Coordinate System: GCS WGS 1984
Datum: WGS 1984, Units: Degree
(https://land.copernicus.eu/, http://www.diva-gis.org/ 19/12/2020)

Map 7: SRM sites of the 6 ESEE countries

RESEERVE D6.1 Mapping of the available business opportunities in the ESEE region

Based on the data of GeoZS and the Mineral Register of SRM (https://reseerve.eu)

Legend

SYMBOLS INDICATING TYPES OF SRM:

SRM site (Mineral Register of SRM)
SRM site of interest (GeoZS)

Mining Waste Landfill:

Aluminium
Lead+Zinc
Copper
Iron, chromium, manganese
Nickel
Antimony
Gold

Processing Waste (Flotation Taillings):

Lead+Zinc
Copper
Iron, chromium, manganese
Antimony
Gold

Processing Waste (Red mud Dam):

Aluminium

Slag/Ash Landfill:

Copper
Lead
Antimony, Lead
Iron, iron-nickel, chromium, iron-chromium

RESEERVE

AUSTRIA
HUNGARY
SLOVENIA
Zagreb
ROMANIA
CROATIA
BOSNIA AND HERZEGOVINA
Belgrade
SERBIA
Sarajevo
MONTENEGRO
Podgorica
KOSOVO
ADRIATIC SEA
Skopje
NORTH MACEDONIA
ITALY
Tirana
ALBANIA
GREECE

N 0 75 150 km

Coordinate System: GCS WGS 1984
Datum: WGS 1984, Units: Degree
(https://land.copernicus.eu/, http://www.diva-gis.org/ 19/12/2020)

Map 8: CRM presence in PRM and selected SRM sites of the 6 ESEE countries

RESEERVE D6.1 Mapping of the available business opportunities in the ESEE region

Based on the data of the Mineral Register of PRM and GeoZS (https://reseerve.eu)

Legend

SYMBOLS INDICATING TYPES OF CRM:

- Bauxite
- Bauxite with Vanadium/Gallium/Lithium
- Gallium/Germanium
- Rare Earth Element or Berullium
- Antimony
- Antimony and Titanium
- Titanium
- Cobalt
- Vanadium with Rare Earth Elements/Gallium
- Platinum Group Elements
- Mg, Borates, Barite
- Phosphates

RESEERVE