METALLICO

Deliverable 6.2

# Mining policies and circular economy

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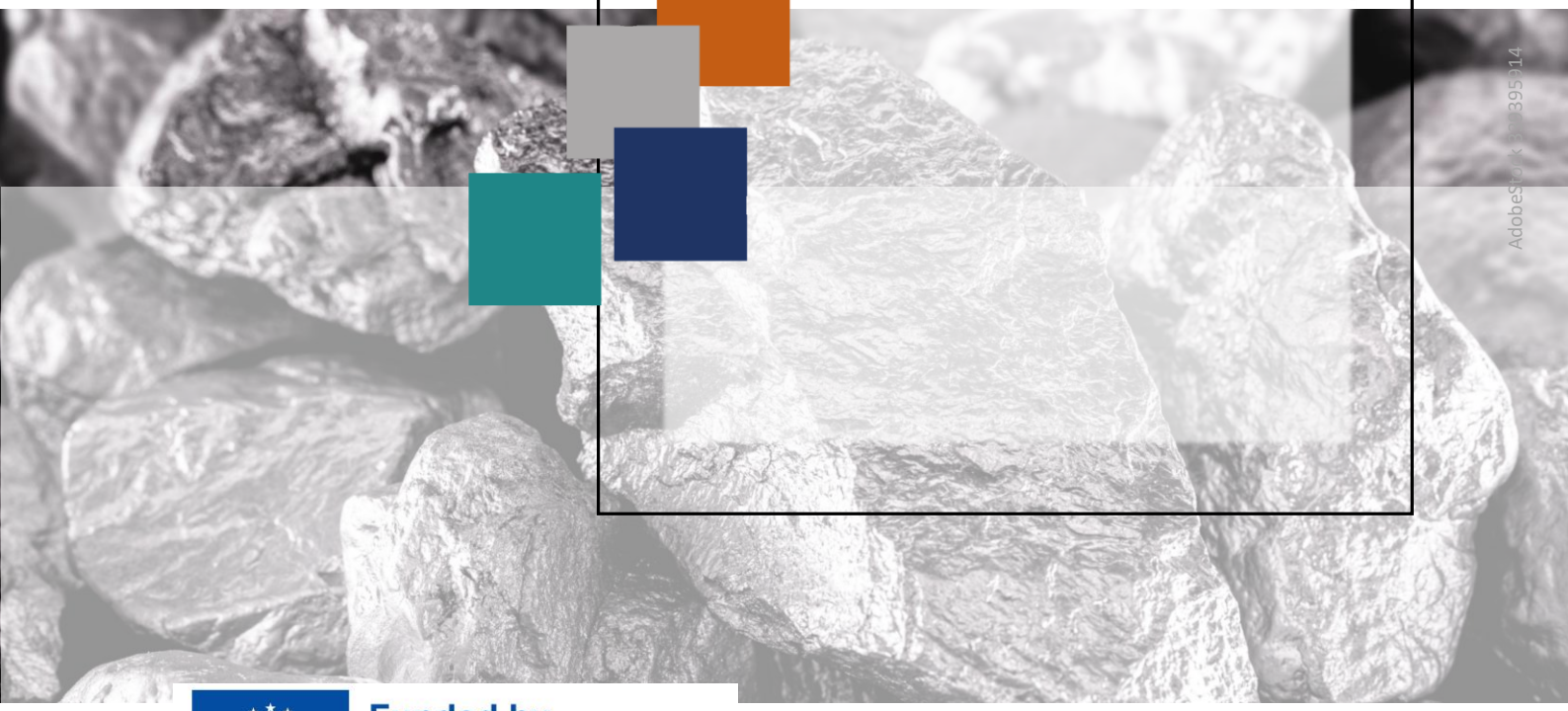

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## Document history

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| 1 | September 2023 | At Clave | Virginia del Río<br>Ramón Rodríguez<br>Juan Requejo |
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| 3 | September 2023 | At Clave | Virginia del Río |

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# Summary

This deliverable is aimed to conduct a comprehensive and critical review of national mining policies and strategies within Europe to analyse how they incorporate Circular Economy principles and measures from different approaches and perspectives.

Our research is based in a qualitative analysis supported by the use of *Computer Assisted/Aided Qualitative Data Analysis Software* – CAQDAS (ATLAS.ti), and also includes a quantitative exercise (correlation analysis of Circular Economy codes throughout the complete list of documents).

Three main sources of information have been used: Raw Materials Information System (RMIS), developed and hosted by the Joint Research Centre (JRC), which provides relevant information and mainly two reports from the European projects MIN-GUIDE and MINLEX; CRM– European Commission and search engines, as Google.

The list of strategic instruments that has been analysed includes 13 countries (Austria, Czechia, Finland, Germany, Greece, Ireland, Netherlands, Norway, Poland, Portugal, Romania, Sweden and UK) and Andalusia as reference region in Spain, recently become a Southern hub for the European Institute of Innovation and Technology (EIT) Raw Materials.

After reviewing the mentioned strategic documents, the following key ideas have been concluded in relation to how the different European mining policies conceive the path towards a Circular Economy model in mining:

- Prioritization of Circular Economy in mining
- Efficiency and reduction in raw material consumption
- Sustainability and environmental restoration
- Creation of new jobs
- Need for a basic research on the secondary resources and their processing
- Innovation and technological advancements
- Private-public collaboration, incentives and engaging with stakeholders
- Need for a renewed legislative framework
- Education and awareness

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## Disclaimer

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# 1. Introduction

The transition towards a more sustainable and resilient economy requires a re-evaluation of our current resource management strategies along their whole lifecycle. The mining sector, as a significant contributor to global resource extraction, plays a pivotal role in this transition. In this report we aim to critically review national and regional mining policies and strategies, with a particular focus on their integration of circular economy principles.

The circular economy model promotes the reduction, reuse, and recycling of materials, aiming to minimize waste and make the most of resources. It represents a systemic shift that builds long-term resilience, generates business and economic opportunities, and provides environmental and societal benefits. However, the integration of these principles into mining strategies is a complex task that requires a careful balance between economic development, environmental protection, and social responsibility.

In this report, we focus on the case of Andalusia, a region that has recently become a hub for the European Institute of Innovation and Technology (EIT) Raw Materials. Andalusia's mining strategic instrument will be compared with other European mining areas in Poland, Finland, Sweden or Portugal, among others.

To conduct this review, we have gathered a comprehensive set of documents outlining the mining strategies of various European countries (not all of them included in the European Union). These documents, ranging from national to regional mining strategies, considering raw material policies to specific mineral strategies, provide a rich source of data for our analysis.

Our methodology combines the use of ATLAS.ti, a powerful tool for qualitative data analysis, with a semantic and expert review of the documents. This approach allows us to extract key themes, compare strategies across different contexts, and identify best practices and areas for improvement.

Through this work, we aim to contribute to the ongoing dialogue about sustainable resource management in the mining sector. We hope that our findings will provide valuable insights for policymakers, industry leaders, and other stakeholders in their efforts to promote a more sustainable and circular economy.

In a significant development for the mining sector, Andalucía has recently been established as a hub for the European Institute of Innovation and Technology (EIT) Raw Materials. This initiative is part of the EIT's mission to foster innovation in the raw materials sector across Europe. The hub in Andalusia represents a strategic location due to the region's rich mining history and its ongoing importance in the European mining sector.

The main objective of the Regional Center Southern Spain is to increase the presence of EIT Raw Materials in the South of Spain (Andalucía, Extremadura and Murcia), a relevant mining area, addressing all topics of the EIT Raw Materials with special attention to exploration, extraction and processing.

The creation of the EIT Raw Materials hub in Andalusia is expected to stimulate innovation and research in the mining sector, particularly in areas related to the circular economy and sustainable resource management. It provides a platform for collaboration among various stakeholders, including research institutions, industry, and government, to work together on innovative solutions for the raw materials sector.

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This development positions Andalusia at the forefront of efforts to integrate circular economy principles into mining practices. As such, it serves as a valuable reference point for our analysis of mining strategies and their alignment with the goals of the circular economy.

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## 2. Objectives

The objectives of this report are:

1. Conduct a comprehensive and critical review of national mining policies and strategies within Europe.
2. Emphasize the analysis of how these policies and strategies incorporate principles of the circular economy.
3. Use the case of Andalusia, a recently established hub for the European Institute of Innovation and Technology (EIT) Raw Materials, as a reference point for the analysis.
4. Complement the analysis with a comparative study of other prominent European mining areas, including Finland, Sweden, Poland and Portugal, among others.

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# 3. Methodology

## 3.1. Data collection

In this report, we take into account the up to date national mineral strategies in UE countries, which have different aims:

a) to create the right framework conditions for mining,

b) to ensure coherence between regional and local strategies and other relevant policies,

c) to streamline permitting procedures, and

d) to integrate different policy instruments.

## 3.2. Information sources

To identify national and regional mineral strategies in Europe, we have used the following sources:

- The Raw Materials Information System (RMIS). Developed and hosted by the Joint Research Centre (JRC), is the EC's reference knowledge platform on non-food, non-energy raw materials from primary to secondary sources. The RMIS includes a number of thematic sections, covering a broad range of topics relevant to raw materials policy. Among them:
    - Member states legislation: https://rmis.jrc.ec.europa.eu/member-states-legislation-08b84e
        - In this section, relevant information is provided using the reports from two European projects: MIN-GUIDE and MINLEX.
    - EU Country Profiles provide data and indicators for EU countries. https://rmis.jrc.ec.europa.eu/country-profiles#/
- CRM – European Commission - https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en
- Search engines: Google.

After conducting a thorough review of all the sources, the countries that have approved mining resource planning instruments, in addition to having current legislation concerning raw materials, have been identified.

When documents were not available in English from their official source, they were translated using Google Translator.

All documents were standardized to a PDF format with OCR applied.

## 3.3. Data analysis

For the information analysis, we considered the following units:

- Vision and mission of the strategies.
- Main challenges and objectives.
- Key measures and proposed actions.
- Relationship of the strategies with the Circular Economy.

The analysis procedure encompassed:

- Strategy reading and processing using the ATLAS.ti tool.
- Personalized review and analysis of information excerpts related to the analysis units.
- Identification of key ideas and main insights.

The ATLAS.ti processing included:

1. Primary Document import: The collected information was imported into ATLAS.ti as primary documents.
2. Word Frequency tool: Used to detect recurring terms, providing an initial grasp of prevalent themes.
3. Coding and quotations: Our methodology focused on coding and creating quotations. The coding schema combined self-defined categories and those identified using ATLAS.ti's 'Word Frequency' tool. For coding, tools like 'Text Search' and 'GREP Search' were employed.

The codes used represent the thematic areas and specific topics that were of interest for the analysis of the mining strategies, such as:

- Circular Economy: This includes topics like circularity, reuse, recovery, recycling, reprocessing, secondary resources and valorization.
- Strategies: This encompasses vision, mission, principles, challenges, objectives, measures, priorities, environmental considerations, governance, impact, raw material areas and best practices.
- Materials: The focus here is on different types of materials, including critical raw materials, metals, minerals, oil and raw materials in general.
- Waste management: This section delves into disposal, facility management, mine waste, mining waste management, tailings, and general waste management.
- Transversal topics: These are overarching themes that might cut across various sections of the strategies, such as societal considerations, marine mining, the mining sector in general, and water-related issues.

These coded segments, known as 'quotations', offered a detailed look into how specific ideas were being discussed across different data sources. We further made use of ATLAS.ti's feature allowing us to assign multiple codes to a single quotation, ensuring a nuanced and multifaceted analysis.

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4. Additional tools: We also employed other ATLAS.ti tools, 'Code Co-occurrence', 'Code-Document Table', 'Memos', 'Comments', and 'Networks', to supplement our analysis.
5. Analysis: After coding and organizing the data into quotations, the 'Query Tool' was used for cross-referencing and analysing patterns. ATLAS.ti's semantic analysis feature was useful in visualizing relationships between codes, ensuring a comprehensive understanding of the discourse. The “concept analysis” tool was also used to detect significant noun phrases, such as “circular economy”.

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# 4. Results

## 4.1. List of mining strategies

The selected countries and their respective strategies are summarised in Annex 1. The list of the documents is shown below:

2012. The Austrian Mineral Resources Plan (AUTMINPLAN).

2017. Raw materials policy of the Czech Republic in the area of mineral materials and their resources. Ministry of Industry and Commerce. Czechia has a Secondary Raw Material Policy from 2014.

2010. Finland Minerals Strategy. Ministry of Employment and the Economy.

2010. The German Government's raw materials strategy. Safeguarding a sustainable supply of non-energy mineral resources for Germany. Federal Ministry of Economics and Technology (BMWi).

2012. National Policy for the Exploitation of Mineral Resources. Ministry of Environment, Energy and Climate Change of Greece.

2022. Policy Statement on Mineral Exploration and Mining. Critical Raw Materials for the Circular Economy Transition. Government of Ireland (not included on MINLEX or MINGUIDE due to its recent publication)

2022. National raw materials strategy: material resources for the major transitions. Government of Netherlands (not included on MINLEX or MINGUIDE due to its recent publication).

2023. Norwegian Mineral Strategy. Norwegian Ministry of Trade, Industry and Fisheries (not included on RMIS- JRC neither on MINLEX or MINGUIDE reports).

2022. National Raw Materials Policy. Ministry of Climate and Environment (not included on MINLEX or MINGUIDE reports due to its recent publication).

2012. National Strategy for Geological Resources. Portugal

2017. Mining Strategy of Romania. 2017-2035.

2013. Sweden Minerals Strategy. For sustainable use of Sweden's mineral resources that creates growth throughout the country (2013). Swedish Ministry of Enterprise, Energy and Communications.

2022. Resilience for the Future: The United Kingdom's Critical Minerals Strategy. HM Government (not included in MINLEX and MINGUIDE). Also, Resource Security Action Plan: Making the most of valuable materials. (2012). Department for Environment, Food and Rural Affairs (DEFRA) and Department for Business Innovation & Skills (BIS).

2023. Strategy for sustainable mining of Andalusia (Spain). Department for Industry, Energy and Mining of Andalusian Regional Government.

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## 4.2. Global word frequency

In the analysis of European mining strategies using ATLAS.ti, several key terms emerged, offering insights into the primary areas of focus within these strategies. The term "**mining**" dominated with 5.008 mentions, followed closely by "**mineral/s**" and "**material/s**" with 3.596 and 3.439 mentions respectively. Other notable terms include "**raw**", "**resource/s**", and "**environment/s/al/ally**", with mentions ranging from approximately 2.000 to 3.000. The frequency of these terms provides an immediate indication of the strategies' emphasis on **resource extraction, management, and environmental considerations**. This report delves deeper into the significance of these terms and their implications in the context of European mining policies.

### 4.2.1. Main results

The term "**mining**", with 5.008 mentions, stands out as the central theme, underscoring the strategies' primary focus on mining practices, regulations, and implications. "Mineral/s" and "Material/s", with 3596 and 3439 mentions respectively, indicate an emphasis on the types of resources extracted and their subsequent applications. The mention of "raw" 2928 times suggests a focus on primary resources, emphasizing the importance of unprocessed materials in the mining sector.

"**Resource/s**", mentioned 2.217 times, delves into the management, conservation, and availability of mining assets. The environmental implications of mining are evident with "Environment/s/al/ally" being cited 2.144 times, indicating a conscious effort to balance resource extraction with ecological preservation. "Development", with 1.961 mentions, likely pertains to the growth, technological advancements, and infrastructural progress in the mining sector.

The strategic positioning and long-term vision of mining are highlighted with "**Strategic/strategy**" being mentioned 1.492 times. The broader industrial context of mining is captured with "Industri/al/es" and "Industry" garnering 1320 and 1056 mentions respectively. The specific focus on "Oil" and "Shale", with 1.315 and 1.083 mentions, points towards the significance of oil shale mining in the European energy landscape. Lastly, "Energy", cited 1.281 times, reinforces the inextricable link between mining and energy production, emphasizing the role of mining in powering economies.

### 4.2.2. Grouped by semantic meaning

- **Resource extraction:** "Mining", "Mineral/s", "Material/s", "Raw", and "Resource/s" collectively emphasize the extraction and utilization of primary resources. Their frequent mentions underscore the strategies' focus on optimizing the extraction processes, ensuring resource availability, and managing these assets sustainably.
- **Environmental considerations:** "Environment/s/al/ally", "Water/s", "Impact/s", and "Waste" group together to highlight the ecological implications of mining. The strategies seem to prioritize sustainable practices, water conservation, waste management, and minimizing adverse environmental impacts.
- **Strategic and industrial focus:** "Strategic/y", "Industri/al/es", "Industry", "Oil", "Shale", and "Energy" collectively indicate the strategic importance of mining in the broader industrial and

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energy sectors. The emphasis suggests a forward-looking approach, considering the long-term energy needs and the role of mining in fulfilling them.

- **Operational aspects:** "Development", "Activities", "Management", and "Deposits" provide insights into the operational side of mining. From site development and day-to-day activities to the management of operations and identification of deposits, these terms underscore the comprehensive nature of the strategies.

In conclusion, the word frequency analysis paints a detailed picture of European mining strategies. The data suggests a balanced approach, emphasizing those broad concepts related to mining (mining, mineral/s, (raw) material/s, resource/s) but also some interesting views about environmental and sustainability approaches and a concern about materials supply and their criticality. The strategies reflect a comprehensive understanding of the mining sector's challenges and opportunities, aiming for sustainable growth and ecological preservation (focusing on impacts, natural assets and waste management).

| Word | Count | Word | Count |
|---|---|---|---|
| mining | 5.008 | management | 1.074 |
| mineral/s | 3.596 | industry | 1.056 |
| material/s | 3.439 | deposits | 1.013 |
| raw | 2.928 | sustainable/bility | 920 |
| resource/s | 2.217 | waste | 836 |
| environment/s/al/ally | 2.144 | supply | 831 |
| development | 1.961 | natural | 826 |
| strategic/y | 1.492 | activities | 822 |
| industri/al/es | 1.320 | water/s | 810 |
| oil | 1.315 | impact/s | 690 |
| energy | 1.281 | critical | 687 |
| production | 1.188 | geological | 666 |
| shale | 1.083 | | |

Table 1. Word frequency table

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## 4.3. Code to document correlation analysis of Circular Economy

When analysing the frequency with which circular economy-related codes appear in the different European mining strategies, as determined by coding with ATLAS.ti, the results are as follows.

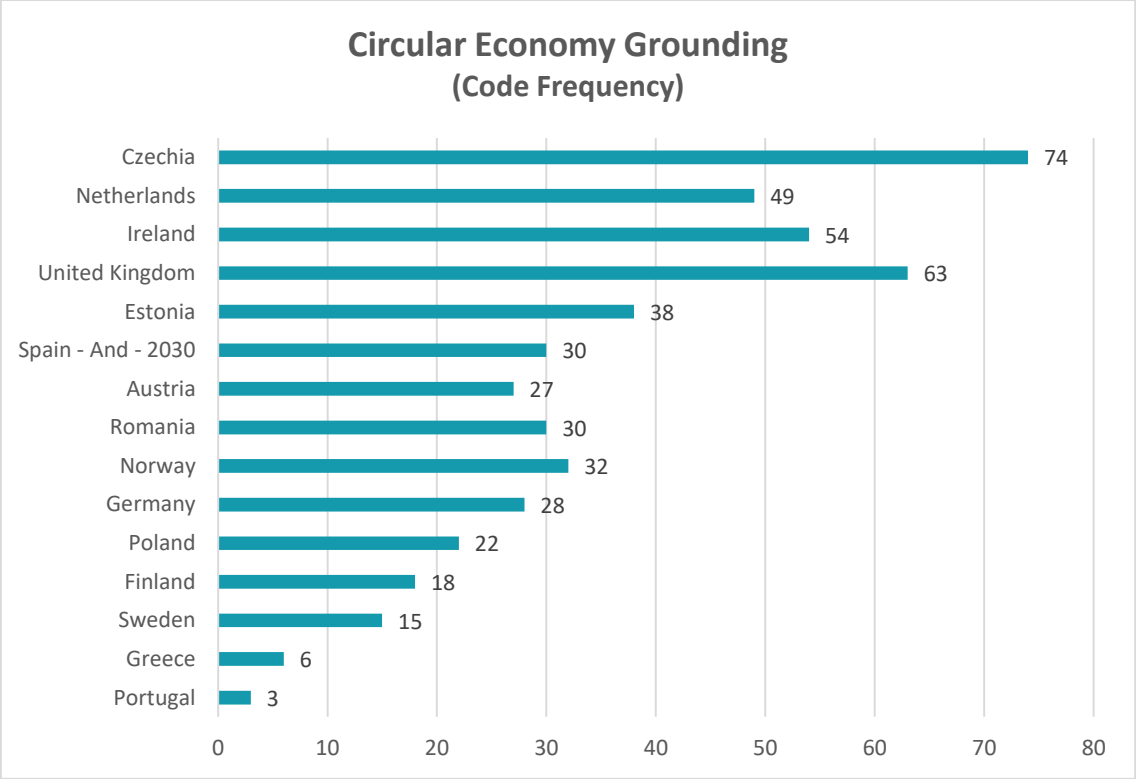



Figure 1. Circular Economy Grounding

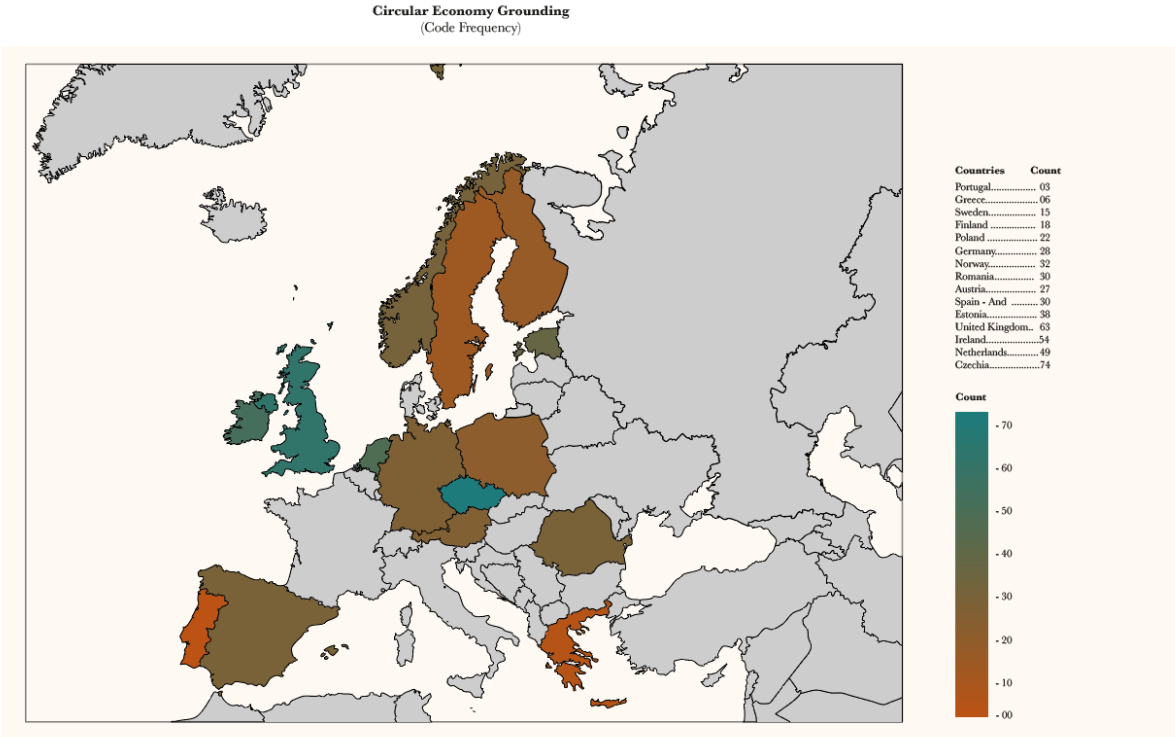



Figure 2. Map of Circular Economy Grounding (Code Frequency)

The data reveals a diverse range of integration levels of circular economy principles across European countries. The frequency of codes related to the circular economy in mining strategies varies, with some countries demonstrating a higher emphasis than others.

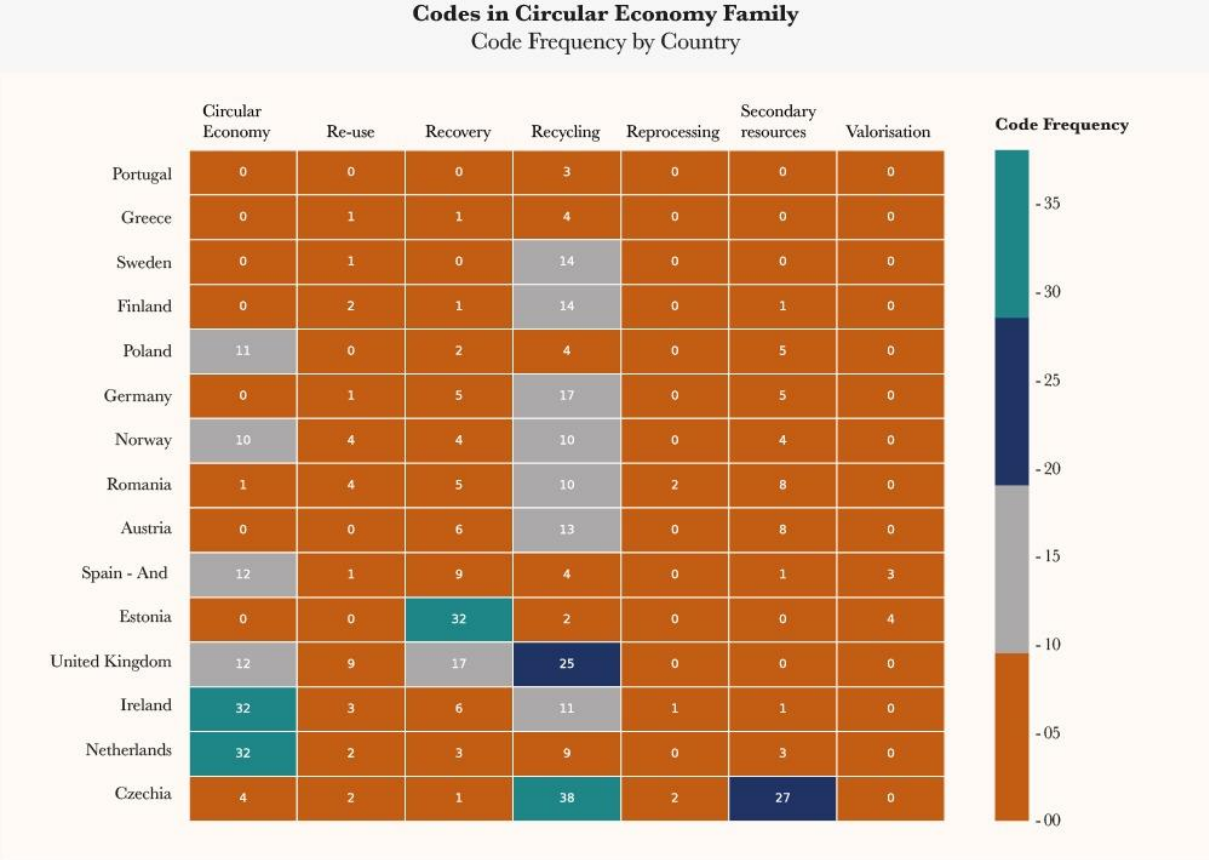
On one group we have countries with **high emphasis on Circular Economy**, like Czechia (74 mentions), United Kingdom (63 mentions), Ireland (54 mentions) and Netherlands (49 mentions).

The next group is composed by countries with **moderate emphasis on Circular Economy**, like Estonia (38 mentions[1]), Norway (32 mentions), Spain (Andalusia Region strategy), Romania (30 mentions), Germany (28 mentions) and Austria (27 mentions).

At last, we have the group of countries with **emerging emphasis on Circular Economy**, like Poland (22 mentions), Finland (18 mentions), Sweden (15 mentions), Greece (6 mentions) and Portugal (3 mentions).

[1] It has been included in the analysis although Estonia's national plan refers to the use of oil shale, which is not under the scope of this document.

### 4.3.1. Codes in circular economy family




| | Circular Economy | Re-use | Recovery | Recycling | Reprocessing | Secondary resources | Valorisation |
|---|---|---|---|---|---|---|---|
| Portugal | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| Greece | 0 | 1 | 1 | 4 | 0 | 0 | 0 |
| Sweden | 0 | 1 | 0 | 14 | 0 | 0 | 0 |
| Finland | 0 | 2 | 1 | 14 | 0 | 1 | 0 |
| Poland | 11 | 0 | 2 | 4 | 0 | 5 | 0 |
| Germany | 0 | 1 | 5 | 17 | 0 | 5 | 0 |
| Norway | 10 | 4 | 4 | 10 | 0 | 4 | 0 |
| Romania | 1 | 4 | 5 | 10 | 2 | 8 | 0 |
| Austria | 0 | 0 | 6 | 13 | 0 | 8 | 0 |
| Spain - And | 12 | 1 | 9 | 4 | 0 | 1 | 3 |
| Estonia | 0 | 0 | 32 | 2 | 0 | 0 | 4 |
| United Kingdom | 12 | 9 | 17 | 25 | 0 | 0 | 0 |
| Ireland | 32 | 3 | 6 | 11 | 1 | 1 | 0 |
| Netherlands | 32 | 2 | 3 | 9 | 0 | 3 | 0 |
| Czechia | 4 | 2 | 1 | 38 | 2 | 27 | 0 |

Table 2. Coding in Circular Economy by country

The integration of circular economy principles into European mining strategies is indicative of the continent's evolving approach to sustainable mineral resource management. The analysis of the co-occurrence of circular economy-related sub-codes within the mining strategies yields following results:

- **Circular Economy:** Countries with more mentions to Circular Economy are Ireland (32 mentions) and Netherlands (32 mentions).
- **Recovery:** Estonia (32 mentions), United Kingdom (17 mentions) and Spain -Andalusia region (9 mentions) are the countries with more mentions to recovery.
- **Recycling.** Countries with more mentions to recycling are Czechia (38 mentions), United Kingdom (25 mentions) and Germany (17 mentions).
- **Secondary resources:** Czechia (27 mentions) stands out with a significant emphasis on secondary resources.
- **Valorisation:** Spain (Andalucia region) (3 mentions) and Estonia (4 mentions) are the only countries with mentions of valorisation.
- **Diverse approaches:** Norway demonstrates a balanced approach, with mentions across multiple sub-codes, including the general "Circular economy" (10 mentions), "Re-use" (4 mentions), "Recovery" (4 mentions), and "Recycling" (10 mentions). Romania also showcases

a diverse integration of circular economy principles, with mentions in "Re-use" (4 mentions), "Recovery" (5 mentions), "Recycling" (10 mentions), and "Secondary resources" (8 mentions).

- **Limited or no emphasis:** Portugal and Greece have limited mentions across the circular economy sub-codes.

## 4.4. Strategies summary

### 4.4.1. ANDALUSIA REGION (SPAIN). 2023. STRATEGY FOR SUSTAINABLE MINING OF ANDALUSIA. Department for Industry, Energy and Mining of Andalusian Regional Government.

#### Vision and mission

Andalusian mining is seen as a strategic ally in the fight against climate change and the decarbonisation of the economy, with the challenge of making Andalusia a global benchmark in mining innovation, digitization and *metal recovery*.

The primary goal of the Andalusian strategy is to progress towards competitive and responsible mining, as a dynamic and innovative activity that generates quality employment and is respectful of the environment.

#### Goals

- Adding value to the territory by increasing per capita income, the Gross Added Value and sectoral employment.
- Increasing innovation intensity.
- Achieving a higher level of transformation of the extracted mineral resources.
- Boosting the contribution of critical raw materials to the European market.
- Consolidating a strong community of Andalusian mining service companies (in number and size).
- Promoting energy improvement in mining operations in terms of efficiency and renewable generation, by reducing their energy intensity and increasing renewable generation for self-consumption.
- Encouraging the measurement and reduction of the carbon footprint.
- Enhancing the safety of workers, reducing accident rates (incidence rate).
- Improving job quality.
- Progressing in administrative agility and simplification, by reducing administrative deadlines.
- Reducing the impact of mining on the environment and waters.

#### Strategic axes

The action plan of the Andalusian strategy consists of 4 axes around which the lines of action are organized. The 4 axes are:

1. Strengthening of administrative capacities
2. Development of knowledge and technology
3. Promotion of sustainable activity
4. Social and economic boost of the activity and the territory

### Circular Economy

The Andalusian strategy has a section dedicated to the Circular Economy, whose main key ideas are the following:

- Circular Economy principles: The sector's production processes are increasingly aligned with the principles of the circular economy, following the Andalusian Circular Economy Law 3/2023.
- Ornamental rock subsector: Materials previously considered waste are now used as raw materials for various products, including those in the ornamental sector.
- Initiatives: Efforts in different subsectors include water recycling, valuable substance extraction from effluents, and efficient land management. However, there's room for improvement.
- Andalusian companies: They generally favor the implementation of Circular Economy processes, which will lead to better utilization of mining waste, generating economic value and addressing environmental challenges.
- European projects: Some EU projects like METALLICO, ORIENTING, and COLLECTORS focus on recovery treatments and new processes in the field.
- Material balance: An area for improvement is the territorial material balance, ensuring construction materials are considered in territorial planning, promoting their recovery, and enhancing the use of local materials.

## 4.4.2. AUSTRIA. 2012. THE AUSTRIAN MINERAL RESOURCES PLAN (AUTMINPLAN)

There is a more updated document, called the Master Plan 2030, which also pertains to mining, but it has not been located. The reference to this document is provided through an academic article (Reichhardt, A et al. 2022. Raw materials master plan 2030 – A raw materials strategy for Austria).

### Main Objective

The primary focus of Austria's mining strategy is to ensure the supply of raw materials. This is highlighted by the emphasis on securing raw material supply and proposing specific actions in the area of recovery. The strategy also underscores the importance of adapting carefully to the economic conditions and raw material situations in the coming years.

The European Commission's Raw Materials Initiative, which includes increasing resource efficiency and promoting recycling, further supports this objective. Austria has been recognized for its success in implementing the recommendations of the "Leoben Study 2004" in the Commission's communications (page 40).

#### Circular Economy and Related Processes: Secondary Resources Mining (Recycling, Revalorisation, Re-use)

Importance of Secondary Cycles (Recycling): The strategy mentions the significance and possibility of secondary cycles in the supply of mineral raw and basic materials.

The European Commission identified Austria's Mineral Resources Plan as a *"best practice" example for an active raw materials security policy*. The plan meets the Commission's requirements in terms of spatial planning, including a digital geological knowledge base, transparent methodology for mineral resource exploration, and the identification and protection of mineral resource deposits (page 11).

#### "Raw Materials Areas" in Austria's Mineral Resources Plan

- Definition. Raw material areas are defined as all areas which have been identified using objective and systematic analytical methods and which contain mineral raw materials. In view of expected technological advances and bearing in mind ecological and social aspects it is assumed that it will be possible to use such materials commercially in the medium to long term.
- Raw Materials Safegarding Areas. Mineral areas worthy of safeguarding are mineral areas which have no or minimal conflicts with other land use plans. They follow a traceable mineral planning process designed to avoid conflicts with raw material extraction. They should be kept for the extraction of raw materials, but there should be no mandatory requirement to actually use the occurrences for mineral extraction.
- Focus on Sustainable Extraction: The strategy highlights the importance of extracting raw materials in areas without potential conflicts and prioritizing existing or previously used business facilities. The possibility of temporary dedication and multifunctional landscape use is mentioned, as well as the need to plan extraction where it is compatible with water protection. When identifying safeguarding areas, is emphasized that all measures should be taken in advance to reduce the consumption of primary raw materials (construction raw materials, ores, industrial minerals, energy raw materials) through the recycling of old materials and waste, "urban mining," and the application of technologies that save on raw materials and energy, as well as technologies that are efficient in raw materials and energy, among others.

### 4.4.3. CZECHIA. 2017. RAW MATERIALS POLICY OF THE CZECH REPUBLIC IN THE AREA OF MINERAL MATERIALS AND THEIR RESOURCES

#### Vision and main objectives

Vision: “efficient and sustainable provision and use ore, non-ore, energy, construction also of non-traditional and high-tech mineral resources for the benefit of residents and competitive national economy of the Czech Republic”.

Main goal: to present and maintain an optimal scope of activities through which the government will direct the utilization of domestic mineral resources and balance deficits in certain materials.

Objectives:

- Creation of a new raw materials policy.
- Response to global changes in the mineral raw materials market.
- Influence of the European raw materials strategy, especially the "Raw Materials Initiative".

The strategy reflects Czechia's proactive stance towards understanding and adapting to the ever-evolving landscape of the global mineral raw materials market.

### Key Actions and Proposed Measures

- Emphasis on efficient extraction and use of mineral resources.
- Support for research in raw material usage.
- Promotion of waste-free technologies.
- Highlight on regional raw material policies for specific analysis of mineral potential.

### Circular Economy

- Focus on recycling processes, including lithium batteries for cobalt extraction.
- Advocacy for smart recycling and full utilization of mineral resources.
- Mention of revalorization of materials.
- Aligned with principles of the "Secondary Raw Materials Policy of the Czech Republic".

### Secondary Raw Materials Policy of the Czech Republic

The main **vision** of the Secondary Raw Material policy is "Conversion of waste into resources" and whose main goals include especially:

- Increasing self-sufficiency of the Czech Republic in raw material resources by substituting primary resources with secondary ones.
- Support for innovation ensuring the acquisition of secondary raw materials in a quality suitable for further use in industry.
- Support for the use of secondary raw materials as a tool for reducing the energy and material intensity of industrial production while simultaneously eliminating negative impacts on the environment and human health.

Main **objectives** of the Secondary Raw Material Policy:

- Objective 1. Enhance the self-sufficiency of the Czech Republic in raw material resources by substituting secondary raw materials for primary resources.
- Objective 2. Support innovation ensuring extraction of secondary raw materials in a quality suitable for further use in industry.
- Objective 3. Support the use of secondary raw materials as a tool to reduce energy and material demands of industrial production while eliminating negative impacts on the environment and human health.
- Objective 4. Initiate support for education to ensure skilled workers in the field of secondary raw materials to support the competitiveness of the Czech Republic.
- Objective 5. Update the range of statistical surveys for processing material accounts, which will enable to process the mass balance of the secondary raw materials in the Czech Republic's economy.

The implementation of the Secondary Raw Materials Policy of the Czech Republic is gradually taking place through the fulfillment of specific tasks set out in the Action Plan to support increasing the self-sufficiency of the Czech Republic in raw material resources supply.

Furthermore, the strategy stablishes its "intentions regarding the use of raw materials in waste from past mining. With the advent of new technologies, the use of raw materials from dumps and landfills becomes economically interesting and sludge ponds that have not yet been used". This mainly concerns so-called critical raw materials and metals. The intention is to define and evaluate these sources of critical raw materials and analyze the technological possibilities of their acquisition. On the basis of the exploratory work carried out so far, the aim would be:

- Elaborating a categorization of selected resources in existing mining waste and define promising areas with valuable resources.
- Analyzing methods for their technological processing, possibilities of using innovative mining procedures and methods of ecological monitoring of processing and mining.
- Monitoring new recycling technologies, the output of which are substances comparable in quality to the starting raw materials (recovery of accompanying/critical metals from tailings and dumps).
- Classifying the selected localities based on the evaluation of their exploration.

### 4.4.4. ESTONIA. 2013. National Development Plan for the Use of Oil Shale 2016 – 2030

The only mining national plan in Estonia refers to the use of Oil Shale, which is not under the scope of this document.

### 4.4.5. FINLAND. 2010. Finland Minerals Strategy. Ministry of Employment and the Economy

#### Vision.

VISION 2050. Finland is a global leader in the sustainable utilisation of mineral resources and the minerals sector is one of the key foundations of the Finnish national economy.

Finland's minerals strategy emphasizes the significant role of mineral resources in the nation's economic and industrial landscape. The strategy outlines a comprehensive approach to ensure sustainable and competitive growth in the mineral sector.

#### Strategic objectives

- Promoting domestic growth and prosperity
- Solutions for global mineral chain challenges
- Mitigating environmental impact

#### Objectives and Purpose

- Global competitiveness: The strategy underscores the need for Finland to enhance its global competitiveness in the minerals sector.
- Dynamic regional development: Emphasizing the importance of fostering regional growth and development through mineral resources.
- Secure supply of raw materials: Ensuring a stable and reliable supply of essential raw materials is a core tenet of the strategy.
- Life cycle thinking: Adopting a holistic approach to mineral resource utilization, emphasizing sustainability throughout the resource's life cycle.

### Actions and proposals

#### Strengthening minerals policy

- Governmental recognition of the minerals sector in policy programs and parliamentary agendas.
- Clear definition of mineral policy objectives and ensuring a stable operational environment.
- Ministry of Employment and the Economy to enhance its facilitative role.
- Active role in the EU's Raw Material Initiative and collaboration with EU mining countries.
- Promote good governance and infrastructure in developing countries.
- Improve financing opportunities and boost Finnish ownership in the sector.
- Explore tax incentives and assess state ownership concerning mineral resources.

#### Securing the supply of raw materials

- Enhance the collection and distribution of geoscientific and environmental data.
- Reduce permit processing times and refine permitting procedures.
- Integrate mineral resource supply into land-use planning.
- Prioritize the supply of aggregates to urban centers and *promote recycling and reuse.*

#### Reducing the Environmental Impact of the Minerals Sector and Boosting Productivity

- Improving material and energy efficiency in the minerals sector.
- Encouraging recycling and reuse of waste materials and by-products.
- Promoting green economy businesses through inter-sectoral cooperation.
- Fostering cooperation between local residents, businesses, and regulatory authorities.

#### Strengthening R&D Operations and Expertise

- Launch a research program under Tekes (Finnish Funding Agency for Technology and Innovation) focused on innovative solutions across the mineral utilization chain.
- Integrate the minerals sector into long-term educational planning.
- Strengthen educational resources and ensure research funding for leading global research.
- Structure specialized training programs to meet future needs.

### Circular Economy

- The action “Reducing the environment impact of the minerals sector and increasing its productivity” includes a sub action 8. The material and energy efficiency of machinery, equipment and processing technologies within the minerals sector are further improved. *Incentives are created for the recycling and re-use of stockpiled waste materials, tailings, mineral products* and earth materials associated with construction industries. Encourage the presentation of an annual award for excellence and achievement in resource efficiency. (YM, TEM, Tekes, companies, VTT, GTK, Motiva Oy)”
- The action: “Securing the supply of raw materials” includes a sub action: […] Impediments to the recycling of aggregates are eliminated by developing *incentives for recycling and re-use, and through logistic solutions relating to management of stockpiles, rates of consumption data and*

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*designation of intermediate storage sites serving multiple municipalities*. Pp 17, Action Proposals.

- There is mention to the EU's Raw Material Initiative, specifically: 10) Promote recycling and facilitate the use of secondary raw materials in the EU.
- "However, recycling can only partially meet the current demand for minerals. For example, more than 80% of copper is recycled but due to rapidly increasing demand, and the fact that the average life of copper products is more than 30 years, recycling covers only one-third of current needs. The increased use of metals can be considerably slowed through careful product planning based on material efficiency and recycling. Price increases, as well as adoption of new and replacement materials, can also lower the demand for traditional raw materials". (Global Challenges). p4.

### Material and Energy Efficiency

- Emphasis on improving the material and energy efficiency of machinery, equipment, and processing technologies in the minerals sector.
- Recognition of the importance of resource efficiency, with the proposal of an annual award for excellence in this domain.

### Recycling and Re-use

- Creation of incentives for recycling and re-use, especially for stockpiled waste materials, tailings, mineral products, and construction-related earth materials.
- Acknowledgment that while metals and minerals are non-renewable, their derived products have long lifespans and can be effectively recycled.
- Emphasis on promoting recycling and facilitating the use of secondary raw materials.
- Addressing impediments to recycling, especially in the context of aggregates, by developing recycling incentives and logistic solutions.
- Recognition that recycling alone cannot meet the current demand for minerals.
- Highlighting that recycling is becoming more efficient globally and in the EU, but there's a challenge with recyclable materials being exported, both legally and illegally, to developing countries.

### Alternative Raw Materials and Material Substitution

- Exploration of alternative and recycled aggregate materials, such as recycled aggregates, demolition waste, and potentially waste rocks from mining activities.
- The volume of these alternative materials is expected to rise, suggesting a transition towards more sustainable resources.
- Emphasis on the need to remove legislative obstacles to recycling and promote innovative R&D to design new products.
- Mention of skills and focused research on innovative extraction technologies, recycling, material substitution, and resource efficiency.
- Acknowledgment of the growing demand for certain metals due to the expansion of ICT, which creates a need for new mines and more effective recovery techniques.

Environmental and Community Considerations

- Addressing challenges like enhanced recycling of materials, efficient resource use, finding alternative and new materials, and mitigating adverse environmental impacts.
- Promotion of sustainable mining practices defined by advances in resource use efficiency, intelligent systems, and recycling initiatives.
- Emphasis on cooperation between local residents, companies, and regulatory authorities for the holistic well-being of communities throughout the mining lifecycle.

### 4.4.6. GERMANY. 2010. The German Government's raw materials strategy

#### Vision

"Safeguarding a sustainable supply of non-energy mineral resources for Germany".

#### Objectives

- Reducing trade barriers and distortions of competition;
- helping German commerce to diversify its sources of raw materials;
- helping commerce to develop synergies from sustainable economic activity and enhanced materials efficiency;
- *developing technologies and instruments to improve the conditions for recycling;*
- establishing bilateral raw materials partnerships with selected countries;
- doing research into substitution and materials in order to open up fresh options;
- focussing research programmes relating to raw materials;
- creating transparency and good governance in raw materials extraction;
- *integrating national measures with European policy on raw materials.*

#### Strategy Measures

Guarantees for United Financial Loans:

- Insurance for financing raw materials projects abroad against risks.
- Offer long-term supply contracts to German companies processing raw materials.
- Consideration to expand to the first processing stage.

Investment Guarantees:

- Support German firms' direct investments in developing and emerging economies.
- Offer protection against political risks from state intervention.

Export Guarantees (Hermes Insurance):

- Support for German equipment manufacturers to develop new markets.
- Insure export transactions against non-payment by foreign clients.

Geological Studies Prior to Commercial Exploration:

- Geological surveys, especially in oceans and frontier areas, to improve knowledge about potential global mineral resources.

- Contribute to Germany's scientific and technical infrastructure.
- Studies include potential resources like manganese nodules in the deep Pacific Ocean (Clarion-Clipperton Zone)

Promoting Exploration:

- Address the capital needs for exploration projects, particularly in non-OECD countries.
- Examine the possibility of supporting exploration through conditionally repayable loans.
- Ensure that exploration projects consider environmental protection.

Domestic Extraction of Raw Materials:

- Germany has significant domestic raw materials reserves.
- Address concerns over competing land uses leading to supply problems.
- Achieve a balance between raw material extraction and other land uses, like housing and infrastructure.
- Encourage the Länder (regions) to consider raw material supplies in their spatial planning.

### Other Noted Measures and Initiatives:

Transparency Initiative (EITI) (Extractive Industries Transparency Initiative):

- Support for transparency in financial flows related to mineral extraction.
- Partnership with African countries like Ghana, DR Congo, and Liberia.

Research Ministry's initiative:

- New support measure on the sustainable use of strategically relevant raw materials.

Sustainable Development:

- Ensure that activities follow the principle of sustainable development.
- Integrate economic, environmental, and social aspects of raw materials policy-making.

Raw materials productivity:

- Enhance productivity in industries like steel through innovative technologies.

Intelligent use of resources:

- Develop strategies to reduce dependency on critical metals.

Development policy measures:

- Create a pro-investment climate in partner countries.
- Emphasis on vocational training.

European Commission's Raw Materials Initiative:

- Support the initiative and its efforts to integrate raw materials policy into the EU's 2020 Strategy.

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#### Circular Economy

Secondary raw materials from buildings:

- Unused residential buildings can serve as sources for secondary raw materials.
- City and municipal buildings alone provide billions of tonnes of mineral construction materials and millions of tonnes of metals available for recycling after demolition.
- Anticipated increase in material stock by 20% by 2020, emphasizing the significance of raw material recovery.
- Ongoing research projects to gauge the potential of these materials.

Promoting sustainable use of resources:

- A new support measure by the Research Ministry focuses on the sustainable use of strategically relevant raw materials.
- Encourage material-specific approaches to create *substitution strategies*, reducing reliance on critical metals.

Domestic extraction with a sustainable focus:

- The approach to domestic raw material extraction emphasizes a balance between economic, ecological, and social aspects.
- Recognizes the potential to achieve mutual benefits between raw materials extraction and other land uses, such as recreation, landscape design, and environmental biotopes.

### 4.4.7. GREECE. 2012. National Policy for the Exploitation of Mineral Resources.

#### Vision

"In cooperation with the State, the society and the enterprises of the extractive industry sector, we lay down public policies in order to turn the mineral resources into a catalyst for the national economic recovery and growth".

#### Mission

- To promote and reveal mineral resources and assign their exploitation through international tenders in order to maximize the benefits for the national economy.
- To valorize the mineral resources through rational exploitation processes and apply the principles of sustainable development.
- To ensure significant offsets for the local society and socially fair allocation in conformity with the relevant national revenue.

#### Goals and Objectives

- **Supply:** Constant and sustainable supply of MRM to society in harmony with national development policies.
- **Environmental Protection:** Implement practices that mitigate the impact of the extractive industry on the environment and human health.
- ***Sustainability:*** *Saving MRM through eco-efficient production practices and extending their lifecycle through recycling.*

- **Local Community Benefits:** Harmonize the needs of local communities with the development potential of mining activities, providing more than just financial and employment benefits.

### Main Policy Axes

**1. Integration of mineral resources in development policy:** Integrating the guidelines of the national policy for the exploitation of mineral resources into all individual policies and plans to ensure optimal exploitation and the common interest.

**2. Adequate land-use planning:** Integrate the national policy of MRM into the country's land-use planning policy. Address the specific nature of the mining industry, its links to natural deposit locations, and the spatial requirements for mining activities.

**3. Codification and modernization of quarry/mining legislation:** Simplify, clarify, and modernize the licensing system. Emphasize the application of Best Available Techniques, strengthen the role of inspection authorities, and ensure strict implementation of regulations.

**3.a. Legal framework for environmental permit:** Ensure that the production of MRM aligns with sustainable development principles. The environmental permit process should be transparent, involve the local community, and ensure the involvement of public administration.

**3b. Legal framework for the exploitation of aggregate quarries:** Ensure a long-term supply of aggregates to the market at an acceptable transport cost and modernize the licensing system.

**4. Promotion of dialogue & acceptance by the local society:** Emphasize the application of sustainable development rules and seek 'social approval' for mining activities. Foster trust-based relations between the State, industry, and social partners.

**5. Education, research, and innovation:** Adapt geoscience courses to the modern needs of the extractive industry, promote research and innovation in the sector, and ensure continuous training for industry professionals.

***6. Efficient use of MRM including substitution, reuse, recycling:*** *Ensure rational management and minimization of all mining waste. Complete the legislative framework about recycling raw materials and using by-products and waste.*

### Fundaments

- **Knowledge about the country's mineralogy potential:** Ensure all MRM deposits are registered and documented. Encourage exploration to identify new MRM deposits and promote R&D programs.
- **Ensuring and promoting the sustainability of the MRM:** Examine the importance of Greek MRM based on various criteria, such as importance at different levels, production, distribution, consumption, needs, demand, and market trends.
- **Integration of variations and perspectives of the European and global market:** Coordinate with various stakeholders for laying out the national mining policy concerning the import/export framework of raw materials.
- **Exploiting the country's mining potential with respect to the environment:** Ensure the exploitation aligns with sustainable development principles.

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#### Circular economy

- **Resource efficiency:** Emphasize MRM saving through best eco-efficient production practices, promoting recycling and extended resource lifecycle.
- **Environmental restoration:** Implement best practices to reduce the extractive industry's environmental impact, ensuring post-mining site restoration and land-use planning for future purposes.

### 4.4.8. IRELAND. 2022. Policy Statement on Mineral Exploration and Mining. Critical Raw Materials for the Circular Economy Transition. Government of Ireland.

#### Vision

"Minerals are, and will continue to be, an essential element of our daily lives. As society continues to need minerals it is therefore critical that these minerals are extracted in a socially and environmentally responsible manner, enforced by strong legislation".

#### Objectives

- Ensure a stable, robust and transparent regulatory framework that supports environmentally sustainable mineral exploration and mining;
- Maximise the contribution that sustainable exploration and mining can make to our society, economic development and the transition to net-zero greenhouse gas emissions through the supply of the raw materials necessary for our sustainable development.

#### Main actions and measures

Guided by these principles:

- Theme of Robust and Stable Regulation
- Theme of Increasing awareness and participation
- Theme of Sustainable development.
- Building Capacity and Access to Knowledge
- International Co-operation

Summary of main actions:

- **Regulation:** Ensure a stable, robust, and transparent regulatory framework that supports sustainable mineral exploration and mining.
- **Awareness and participation:** Increase public awareness and participation in the decision-making process around the granting/renewal of prospecting licenses and mining leases.
- **Sustainable development:** Align the mining policy with Ireland's commitments under the UN Sustainable Development Goals. The policy will balance economic, social, and environmental considerations, seeking to improve living standards without exhausting Ireland's natural resources.

- **Capacity and knowledge:** Build capacity and access to knowledge to ensure that the mining sector is well-equipped with the necessary information and skills.
- **International co-operation:** Engage in international cooperation to ensure that Ireland's mining strategy aligns with global best practices and standards.

#### Circular Economy

- **Circular Economy transition:** The circular economy offers an alternative to the traditional linear model of production and consumption. In the circular economy, resources are kept in use for as long as possible, extracting maximum value from them, and then recovering and regenerating products and materials at the end of their life.
- **Role of minerals:** Materials management and the sustainable sourcing and use of critical raw materials are central to the vision for minerals and mining in Ireland. These are key components of the circular economy transition.
- **Recycling:** Although Ireland and the EU's metal demand cannot be met solely from recycling, recycling, including the recycling of minerals and metals, can significantly contribute to the security of raw materials supply and improve the circularity of materials in the national economy.
- **Research:** "research to better understand the life cycle of minerals developed in Ireland (cradle to recycling) and to better understand the demand for different minerals in Ireland (including Critical Raw Materials), the EU and globally as we transition towards net-zero greenhouse gas emissions by 2050".

### 4.4.9. NETHERLANDS. 2022. National raw materials strategy: material resources for the major transitions

#### Mission

"The goal of this national raw materials strategy is to improve security of supply of critical raw materials in the medium term".

"It is important for many businesses to have sufficient availability of critical resources. In particular, the production of renewable energy technologies for the energy transition is increasing demand for minerals and metals such as lithium, cobalt and rare earth elements. These raw materials are also used in digital technologies, healthcare technologies and material. This makes control over critical raw materials worldwide not only a key economic issue but increasingly also a geopolitical one. Europe is a key player, but it is also in a vulnerable position".

#### Main Objectives

- Improve security of supply of critical raw materials in the medium term.
- Tackle vulnerabilities in raw material supply chains and reduce adverse effects on people and the environment.
- *Promote circularity and innovation in the use of critical raw materials.*
- Enhance sustainability in international supply chains.
- Build knowledge and monitor raw material supply chains.

### Main measures and actions

1. Circularity and Innovation:

- *Promote research and innovation in the field of circular economy.*
- Integrate the raw materials strategy into mission-driven innovation policy.
- Explore the pros and cons of refining capacity in the Netherlands.

2. Critical Raw Materials:

- Advocate for sustainable European mining and refining in the context of the Critical Raw Materials Act.
- Determine the Netherlands' position on the potential of mining for critical raw materials in Europe.

3. Diversification:

- Explore diversification strategies to reduce dependence on specific critical raw materials.

4. Greater Sustainability in International Supply Chains:

- Support greater sustainability in international supply chains through responsible business conduct.
- *Research social and environmental risks in critical raw material supply chains.*
- Promote the use of export credit instruments for Dutch companies.

Knowledge Building and Monitoring:

- Establish a Dutch monitoring system and provide businesses with relevant information.
- Enhance knowledge on raw material supply chains and their environmental and social impacts.

### Circular Economy

- The strategy emphasizes the importance of circularity in the use of critical raw materials.
- It promotes “research and innovation, for example in the field of circular economy (complementing the National Circular Economy Programme 2023-2030), and research into social and environmental risks in critical raw material supply chains”.
- The strategy aims to integrate the raw materials strategy into mission-driven innovation policy, focusing on circularity of critical raw materials.
- It explores the potential of refining capacity in the Netherlands, which aligns with circular economy principles.

> *“Innovative industrial players could design wind turbines, batteries and solar panels in such a way that the critical materials they contain can be extracted at the end of the product’s life and reused for production purposes."*

### 4.4.10. NORWAY. 2023. Norwegian Mineral Strategy. Norwegian Ministry of Trade, Industry and Fisheries.

#### Vision

"The Norwegian Government's overarching ambition is for Norway to develop the world's most sustainable mineral industry".

#### Mission

The Norwegian Government will *facilitate profitable recycling of raw materials*, and work closely with the rest of Europe to secure critical value chains.

#### Objectives, aims and purpose

- The strategy underscores the significance of the mineral industry in Norway, emphasizing its role in the nation's economic development.
- It aims to ensure that mineral resources are utilized efficiently, with a focus on sustainable practices that minimize environmental impact.

#### Main actions and measures

1. Norwegian mineral projects must be implemented faster

- The strategy emphasizes the need for expedited implementation of mineral projects in Norway.
- This is crucial to leverage the increasing international demand for minerals and metals.
- Norway's geology is rich in mineral resources, making it essential to manage these resources effectively.
- The new Minerals Act introduced in 2010 was a significant step towards simplifying regulations in the minerals sector, ensuring transparent and predictable framework conditions for the industry.

*2. The Norwegian mineral industry must contribute to the circular economy*

- The rising demand for minerals and the challenges of unstable markets necessitate a focus on the circular economy.
- Stable access to minerals is vital for economic growth and industrial activities.
- Norway's considerable mineral resources must be managed efficiently to ensure growth and the creation of profitable companies.
- The strategy highlights the importance of recycling metals and efficient use of minerals for sustainable waste and resource management.

3. The Norwegian mineral industry must become more sustainable

- The mineral industry in Norway aims to be among the world's most environmentally friendly.
- The industry is encouraged to seek long-term, future-oriented solutions.
- There's a focus on cleaner production with reduced use of chemicals, effective tailings disposal solutions, and opportunities for waste rock reduction and alternative uses.
- The strategy also emphasizes the need for more knowledge about the environmental impact of mineral operations.

4. Norwegian mineral projects need good access to private capital

- Access to private capital is essential for the growth and development of mineral projects in Norway.
- The strategy recognizes the varying research activities of companies in the mineral industry, influenced by factors such as company size and type of activity.
- Research and knowledge development are vital for the evolution of an efficient, profitable, and environmentally-friendly mineral industry.

5. Norway will continue to be a stable supplier of raw materials for green value chains

- Norway aims to be a significant contributor to Europe's access to mineral resources.
- The country is already an important producer of several commodities exported to European and other markets.
- The strategy emphasizes Norway's role in ensuring a stable supply of raw materials essential for the production of green technologies and products.

### Circular Economy

- The strategy acknowledges the increasing international demand for minerals and the challenges posed by unstable markets, emphasizing the importance of the circular economy.
- Norway's abundant mineral resources must be managed efficiently to ensure growth and the creation of profitable companies. The strategy underscores the significance of recycling metals and the efficient use of minerals for sustainable waste and resource management.
- The strategy touches upon the environmental concerns associated with mineral extraction. It mentions the emission of chemicals during certain mineral activities and the generation of large amounts of waste rock that may not have other uses.
- The strategy emphasizes the goal to minimize the amount of waste rock. It suggests that waste rock may often have potential for other purposes, such as landfill in construction projects, covering for waste tips on land, or as additives in the production of other construction materials. However, transport costs and low unit prices for these products limit the possibilities for alternative use or sale.

> *" Certain types of mineral activity lead to large amounts of waste rock that has no other use and which must be deposited. It is a goal to minimize the amount of waste rock. The waste rock may often have the potential to be used for other purposes."*
>
> *"Even with optimal use of gangue and tailings, it will usually be necessary to deposit waste rock that cannot be used or traded for another purpose".*

- The strategy also mentions the backfilling of gangue or tailings in underground or open-cast mines as a method to reduce the amounts of residual masses that must be deposited elsewhere.

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### 4.4.11. POLAND. 2022. National Raw Materials Policy. Ministry of Climate and Environment.

#### Aims and strategic objectives

- **Ensuring permanent access** to mineral deposits by intensifying activities related to prospecting, exploration and documentation of mineral deposits (including the so-called anthropogenic deposits) performed by both the Polish Geological Survey, as well as the geological and mining industry and entities implementing geothermal projects (including municipalities).
- **Protecting mineral deposits and cooperation** of competent authorities to secure the supply chain.
- **Aligning with other policies:** the NRMP is designed to be in harmony with other significant national strategies, notably the Energy Policy of Poland until 2040 and the National Environmental Policy 2030. This alignment ensures a cohesive approach to environmental sustainability and energy security.

#### Main actions and measures

1. Provision of Access to Raw Materials from Mineral Deposits:

- Determine national demand for mineral raw materials up to 2050.
- Identify strategic and critical raw materials for the Polish economy.
- Assess national potential for current and future raw material needs.
- *Analyse abandoned deposits for re-exploitation.*
- Analyse potential of prospective mineral deposits and thermal waters.
- Determine sources of scarce raw material imports to Poland.

2. Prospecting, Exploration, and Documentation of Mineral Deposits:

- Develop a plan for documenting mineral deposits by the Polish Geological Survey.
- *Re-evaluate plan for exploring documented mineral deposits.*
- Cooperate directly with the Polish Geological Survey in exploration/verification.
- Prospect and explore thermal water deposits.
- Harmonize Polish classification of mineral resources with international standards.
- Assess possibilities of mineral deposits for critical and unconventional raw materials.

3. Providing Favourable Legal Conditions for Investors and Industry Development:

- Simplify and accelerate procedures related to geological and mining activities.
- Amend laws for the protection of documented mineral deposits.
- Digitalize geological work plans and computerize related procedures.
- Introduce regulations for anthropogenic deposits.
- Develop new extraction technologies.

4. Protection of Mineral Deposits:

- Secure access to mineral deposits for various purposes like RES, agriculture, and tourism.
- Select strategic mineral deposits for national and regional economy.
- Develop a methodology to classify minerals of strategic importance.
- Monitor obligations to disclose mineral deposits in planning documents.

5. International Cooperation in Securing Access to Raw Materials:

- Support Polish entities in acquiring strategic and critical raw materials abroad.
- Determine principles of international cooperation for securing mineral deposits.
- Implement measures related to prospecting and exploration of ocean bed mineral deposits.

*6. Acquiring Raw Materials from Anthropogenic Deposits and Supporting Circular Economy:*

- Inventory mining waste landfills and assess potentials for their use.
- Construct a knowledge base on raw materials from waste.
- Develop recovery of raw materials from waste, including processing technology.

7. Ensuring Consistency of Strategies by Significant Companies:

- Determine joint measures of the Chief National Geologist and the Polish Geological Survey for implementing strategies by significant companies.

8. Dissemination of Knowledge:

- Promote knowledge regarding geology and mining to build societal awareness.

### Circular Economy

- Transition to Circular Economy: The Strategy for Responsible Development for the period up to 2020 positions the NRMP as a pivotal project that champions the transition to a circular economy. This transition is vital for sustainable growth, ensuring that resources are used efficiently and waste is minimized.
- Strategic objective: "6. Acquiring Raw Materials from Anthropogenic Deposits and Supporting Circular Economy". "The national economy is characterised by a relatively high material intensity, which affects the dynamics of the depletion of non-renewable raw materials. This poses a threat to the further stable development of the Polish economy. For this reason, it becomes necessary not only to rationally use available resources, but also to *effectively manage mineral substances collected in waste disposal facilities and having properties similar to those of raw materials. These facilities, due to their specific nature, in certain cases may constitute anthropogenic deposits*".
- On 10 September 2019, the Council of Ministers adopted, by way of a resolution, the Roadmap of transition towards a circular economy. The document indicates that in Poland there is a great potential for improvement related to measures concerning industrial waste, in particular, from mining and extraction activities, industrial processing and energy generation and supply. Pursuing production activity generating less and less waste, as well as managing the largest possible amount of industrial waste from this activity in other production processes and in other sectors of the economy can significantly contribute to increasing the profitability of production in Poland and reducing its negative environmental impact.

### 4.4.12. PORTUGAL. 2012. National Strategy for Geological Resources. Portugal. (2012)

#### Vision

ENRG-RM (*Estratégia Nacional para os Recursos Geológicos — Recursos Minerais*) aims essentially at the time horizon of 2020 to make the mining industry competitive and ensure supply of raw materials, in a perspective of sustainability of the nation as a whole, establishing the necessary balance between economic, social, environmental and territorial issues, given the direct and indirect impacts of the activity.

#### Aim

- The strategy emphasizes the responsible exploitation of geological resources as a significant development avenue to bolster the national economy.
- A sustainable policy is advocated, addressing economic, social, and environmental aspects in a cohesive manner.
- The strategy recognizes the growing strategic importance of geological resources on a global scale.

#### Objectives

Axis A - Adequacy of the industry bases:

a) Redefine the role of government and other public sector concerning geological resources,
b) Enable the State to the correct execution of its role,
c) Adequacy of the applicable standards, by updating legal instruments, restructuring of contractual legal discipline, redefining the royalties system and other operating charges and regulating new realities.

Axis B - Development of knowledge and evaluation of the national potential:

a) Increase the knowledge of the national potential, with preliminary identification of exploitable resources in a mining development perspective;
b) Sharing of knowledge;
c) Specialized training;
d) Promoting synergies between public and private entities;
e) Promotion of the study of geological resources in teaching;
f) Attracting investors to available areas;
g) Promotion of exploration and exploitation rights without neglecting the sustainability of activities;
h) Monitoring of the developed mining activities.

Axis C - Dissemination and promotion of the national potential:

a) Direct and indirect development of communication activities;
b) Support and monitor the investor, through the creation of a Mining Investor Office (GAIM), within the General Directorate for Energy and Geology to function as a one- stop-shop and implementation of a single account manager system (key account manager).

Axis D - Economic, social, territorial and environmental sustainability:

a) Preservation of resources and ensured supply of raw materials;
b) Strengthening the capacity of producing agents;
c) Strengthening the marketing of raw materials in the domestic market;
d) Promotion of exports;
e) Involvement and development of local communities;
f) Protecting the health and safety of miners and the people living in the mining areas;
g) Land use planning;
h) Reduction of environmental liabilities;
*i) Full lifecycle approaching including recycling;*
j) Exploration and rehabilitation guarantees;
k) Strategic environmental assessment of plans and programs.

#### Main Actions and Measures

- The strategy introduces an action plan up to 2020, encompassing specific measures and actions across various axes.
- Establishment of the Mining Investor Assistance Office within the General Directorate of Energy and Geology.
- Emphasis on the conservation of resources and ensuring the supply of raw materials.
- Promotion of new techniques and technologies in the sector.
- Support for the creation of large wholesale and retail units near major urban centres.
- Measures to protect the health and safety of miners and residents in mining areas.

#### Circular Economy references

Few references to Circular Economy concepts and ideas have been found:

- The strategy acknowledges the indispensability of mineral resources to society, growth, and job creation in Europe and it emphasizes Europe's reliance on other countries for resource supply and the need for measures to ensure a safe and sustainable supply.
- Three pillars are highlighted: equitable and sustainable supply at international markets, promoting sustainable supply within the EU, and increasing resource use efficiency, promoting recycling.

### 4.4.13. ROMANIA. Mineral Strategy 2012-2035

#### Vision and Purpose

The mining sector must be a dynamic sector, which actively supports the economic development of the country and reducing the gaps compared to countries with a tradition in mining in the European industry (Sweden, Norway, Denmark). The mining industry is a global industry and must be approached accordingly. Request of mining products for the non-energy sector is growing both at the EU level and worldwide.

### Principles

- From an economic and social perspective, the strategy emphasizes the efficient use of resources, aiming to save a portion of the benefits for future generations. It seeks to internalize environmental and social costs, ensuring they are factored into economic projections. The strategy prioritizes a fair distribution of economic benefits, upholds fundamental human rights, and ensures communities' informed consent before initiating developments.
- Environmentally, the focus is on rectifying historical damages, especially concerning orphaned mines, and managing resources with an emphasis on environmental protection. Governance principles advocate for a democratic decision-making process, transparency at all levels, and collaboration with stakeholders. T*he strategy's overarching goal is to align with international standards for sustainable mining while considering the mineral life cycle and promoting recycling.*

### Strategic objectives

1. The repositioning of the mining field in the perspective of ensuring the necessary mineral resources the sustainable development of the country, with priority from domestic production;
2. Harmonization of the national interest in increasing the activities of the mining sector with the requirements of sustainable development;
3. Sustainable use of the country's mineral resources in harmony with the environment, protecting the objectives natural and cultural in the European context;
4. Responsible participation of communities in areas with mining potential in decisions and actions carried out during the entire life cycle of mining projects, in transparent conditions

### Circular economy

- Increasing resource efficiency: The strategy proposes to increase resource efficiency by aligning with the Circular Economy Package of the European Union. *This involves research and analysis of the extraction potential of both primary and secondary resources, promoting recycling of metals and minerals, and making efficient use of existing resources*. (Page 35)
- Environmental Protection and Applied Technologies: The mining industry's historical impact on the environment is acknowledged, emphasizing the importance of recovering the environment, *utilizing mining waste for various purposes, and economically recycling degraded lands.* (Page 14)
- Database Creation: A comprehensive database is proposed, covering a wide range of resources including secondary resources. This database will store data from exploration and mining activities, resources-reserves and other relevant data. (Page 34)
- Recovery of Secondary Resources: The strategy highlights the importance of developing new technologies for the recovery of secondary resources and industrial waste. This not only reduces the loss of these resources but also promotes sustainable development. (Page 14)
- SWOT Analysis on Secondary Resources: Strengths include appreciable secondary resources stored in settling ponds and tailings dumps, and the availability of exploitation and processing technologies for such materials. However, weaknesses include the absence of a legislative framework for exploiting secondary resources and the need for new processing plants. (Page 29)
- Promotion of Recycling: The strategy emphasizes reducing raw material consumption in the EU and decreasing dependency on imports to protect the environment. (Page 7)

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- Efficient Use of Resources: Companies are encouraged to minimize mining residues and develop a cycle for the reduction, reuse, and recycling of raw materials and products. This approach can create new job opportunities and promote creativity in work. (Page 69)
- Technological Advancements: The strategy envisions the development of new technologies for efficient mining activities. This includes new methods for treating secondary materials, efficient recovery of metals from waste, and innovative process control through intelligent systems. (Page 15)
- Water Management: The mining industry is expected to contribute to water management objectives by implementing effective methods to reduce water use and recycle wastewater. (Page 67)
- Reprocessing: The strategy mentions the reprocessing of technical uranium concentrates and the economically efficient reprocessing of old settling ponds and poor ore dumps while respecting environmental conditions. (Page 27, 35).

### 4.4.14. SWEDEN. 2013. Sweden Minerals Strategy. For sustainable use of Sweden's mineral resources that creates growth throughout the country (2013)

#### Vision

To create growth throughout Sweden by means of sustainable use of the country's mineral resources, in harmony with environmental, natural and cultural values. Sweden is strengthening its position as the EU's leading mining and minerals nation.

#### Mission

The aim of the Swedish minerals strategy is for Sweden, by using its strengths, to able to tackle challenges and utilise the opportunities presented so that we continue to develop as the EU's leading mining nation.

#### Strategic objectives

1. A mining and minerals industry in harmony with the environment, cultural values and other business activities.
2. Dialogue and cooperation to promote innovation and growth.
3. Framework conditions and infrastructure for competitiveness and growth.
4. An innovative mining and minerals industry with an excellent knowledge base.
5. An internationally renowned, active and attractive mining and minerals industry.

#### Main measures

There are eleven action areas to which a number of measures (19) are connected. A summary of them is as follows:

Resource Management:

- Analyse the potential for extraction and recycling of Swedish metal and mineral assets.
- Report on shot rock production data.

Industry Collaboration & Development:

- Establish a consultation manual between the reindeer and mining industries.
- Utilize cultural environments for both mining and tourism.
- Launch a National Minerals Forum for dialogue and coordination.
- Create a program for knowledge exchange when establishing new large-scale mines.
- Develop a manual for municipalities where mines are to be established.

Regulatory & Infrastructure:

- Evaluate initiatives to shorten environmental permitting lead-times.
- Support municipalities in detailed planning work for mining.
- Develop electric propulsion systems for trucks, promoting greener transportation.

Research, Innovation & Skills:

- Conduct a biometric review of the mining and minerals research area.
- Propose improved academia-business cooperation.
- Enhance understanding of geology's societal role and promote the industry as a workplace.
- Address the long-term skills supply needs of the industry.

International Relations & Investment:

- Assess Sweden's attractiveness as a mining country from an international viewpoint.
- Establish a platform for greater internationalization of the mining industry.
- Explore how Sweden can contribute to a sustainable mining industry in developing countries.
- Foster deeper government-level international contacts.

## Circular Economy

Recycling Tradition & Rare Metals:

- Sweden has a rich tradition of recycling, which should be further developed.
- Rare metals, increasingly found in end-of-life products, are becoming commercially viable for recycling. This recycling may require different technologies and approaches compared to traditional scrap metal management.

Resource Efficiency & End-of-Life Products:

- A significant resource base for metal production exists in the form of end-of-life products. Utilizing these resources can reduce the EU's dependence on primary mineral imports and enhance environmental sustainability.
- Metals can be infinitely recycled without losing their unique properties. However, recycling alone cannot meet the growing societal need for metals and minerals.

Research & Innovation in Recycling:

- Emphasis on identifying recycling and substitution initiatives within the mining and minerals research area.

European Raw Materials Initiative:

- The initiative proposes measures, including defining critical raw materials. Knowledge on these critical raw materials and their recycling status is essential.

Sustainable Mining & Environmental Harmony:

- Growth in the mining industry should respect environmental values, cultural environments, and other industries.
- Emphasis on sustainable technologies, waste prevention, recycling, and the use of new and substitute materials.

Increasing Resource Efficiency:

- Proposals to analyze the extraction and recycling potential for various metal and mineral assets in Sweden.

International Participation & Recycling Technology:

- Emphasis on promoting exports of mining equipment and recycling technology.

Sweden's Leadership in Recycling Technology:

- Sweden is at the forefront of recycling technology and has a strong global brand in the mining industry characterized by innovation, cost-efficiency, quality, and sustainability.

Recycling & Environmental Impact:

- Recycling and reuse are among the most energy-efficient measures to reduce the environmental impact of the mining and minerals industry.

Internationalization & Resource Efficiency:

- Sweden's strong global brand in the mining industry should be utilized to promote green, resource-efficient, recycling and energy-efficient technology.

### 4.4.15. UNITED KINGDOM. 2022. Resilience for the Future: The United Kingdom's Critical Minerals Strategy

#### Vision

In a challenging world, the UK's new critical minerals strategy intends to build resilience, mitigate risks and collaborate internationally.

#### Aim and mission

Aim: to mitigate risks and to improve resilience of critical mineral supply chains, increasing confidence in the UK's net zero transition, key manufacturing sectors and national security.

"The UK's first ever Critical Minerals Strategy sets out our plan to secure our supply chains, by boosting domestic capability in a way that generates new jobs and wealth, attracting investment and playing a leading role in solving global challenges with our international partners.

The UK aims to enhance its role in the critical minerals value chain, focusing on sustainable growth and innovation. The strategy emphasizes strengthening international trade relationships and ensuring resilient and transparent supply chains.

### Strategic Objectives

- Accelerate growth of the UK's domestic capabilities.
- Collaborate with international partners;
- Enhance international markets to make them more responsive, transparent and responsible.

### Main measures and actions

- Accelerate domestic capabilities by maximizing local production, rejuvenating mining skills, pioneering R&D in critical minerals, and *promoting a circular economy.*
- Collaborate with global partners to diversify supply, support UK businesses abroad, and strengthen international relationships for supply resilience.
- Enhance international markets by elevating global ESG standards, fostering transparent markets, and positioning London as the hub for responsible finance in critical minerals.

### Circular Economy

**Definition and Importance of Circular Economy:**

- Circular economy contrasts the traditional 'take, make, waste' approach. It emphasizes regeneration, restoration, and re-use throughout a resource's life cycle, ensuring products and materials remain in circulation for extended periods. This approach reduces waste and relieves pressure on primary (mined) resources. *(Page 40)*

**Domestic Production and Recycling:**

- The UK aims to maximize production along the critical minerals value chain, encompassing mining, refining, manufacturing, and recycling. This approach intends to foster job creation, economic growth, and environmental protection. *(Page 5)*
- The UK is enhancing its capabilities in recovery and recycling, especially in rare earth magnets used in electric vehicles and wind turbines. *(Page 24)*

**Innovation and R&D in Circular Economy:**

- The UK promotes innovation for a more efficient circular economy, focusing on recycling, reuse, resource efficiency, and substitution of critical minerals. (Page 25)
- Leading R&D initiatives are in place for the recovery and recycling of critical minerals, aiming to develop commercial-scale capabilities. *(Page 23)*

**Financial and Regulatory Support:**

- The UK government is exploring funding mechanisms to support companies in developing domestic capabilities in the circular economy of critical minerals. (Page 25)

- Regulatory interventions are being considered to promote re-use, recycling, and recovery of critical minerals. *(Page 25)*

International Collaboration and Partnerships:

- The UK is leveraging its international leadership position to promote the responsible development of supply chains and the circular economy. This includes improving existing ESG standards and ensuring UK businesses remain competitive. *(Page 30)*
- G7 leaders have agreed to enhance collaboration, focusing on promoting market circularity, diversifying, sharing insights, and building responsible and transparent critical mineral supply chains. *(Page 30)*

Challenges and Opportunities:

- As products become more complex, they are harder to recycle. For instance, a mobile phone can contain two-thirds of the elements from the Periodic Table. There's an opportunity to retain more critical minerals in the UK from end-of-life components rather than exporting them. (Page 23)
- Creating a more circular economy for critical minerals reduces waste and alleviates pressure on primary supply. This requires increased recovery, reuse, and recycling at the end of a product's life, better design, and new business models for durability and resource efficiency. *(Page 23)*

Examples of Ongoing Work and Projects:

- The UKRI National Interdisciplinary Circular Economy Research (NICER) Programme, a £30 million initiative, supports a circular economy hub and centres of excellence. (Page 24)
- Met4Tech is the Circular Economy Centre for Technology Metals, aiming to enable circularity in the production, use, and reuse of technology metals. (Page 24)
- Various companies and institutions, such as the University of Birmingham, Hypromag, GAP Group, Descycle, Britishvolt, Glencore, and Johnson Matthey, are actively involved in recycling and recovery initiatives. *(Page 24)*

# 5. Conclusions. Main insights regarding Circular Economy in European mining policies

After reviewing the mentioned strategic documents, the following key ideas have been concluded in relation to how the different European mining policies conceive the path towards a Circular Economy model in mining:

1. Prioritization of Circular Economy in mining

   All of the policy instruments explicitly identify the Circular Economy as a central component of their mining strategies. Some of these countries stand out for deepening their strategies into the requirements or needs that should be considered and not only include the concept as a strategic goal or general approach. These are: Finland, Sweden, Czech Republic, Poland and Romania. Also Andalusia regional mining policy, together with Norway and UK.

   It can also be concluded that the more recent its publication, the more likely it is that its contents will include this perspective and emphasis, in line with European Raw Materials and Circular Economy policies and initiatives. Also, the leading mining countries of Northern Europe are leading in this area, such as Sweden, that has a rich tradition of recycling, "which should be further developed".

2. Efficiency and reduction in raw material consumption

   The documents emphasize applying Circular Economy principles (both re-use, recycling and recovery from waste treatment) creates more sustainable sourcing and use of raw materials, minimizes waste and maximizes resource efficiency.

   However, they also note that recycling can only partially meet the current demand for minerals. Most metals can be infinitely recycled without losing their unique properties, but recycling alone cannot meet the growing societal need for metals and minerals. The EU's metal demand cannot be met solely from recycling, but recycling, including the recycling of minerals and metals, can significantly contribute to the security of raw materials supply and improve the circularity of materials in the national economy.

   It is also noted that a significant resource base for metal / mineral production exists in the form of end-of-life products (some of the documents apply the concept of "urban mining", specifically focused on e-waste and construction materials-waste –recycling buildings after demolition). Utilizing these resources can reduce the EU's dependence on primary mineral imports and enhance environmental sustainability.

3. Sustainability and environmental restoration

   The mining industry's historical impact on the environment is acknowledged, emphasizing the importance of recovering the environment, using mining waste for various purposes, and restoring degraded lands in an economically viable framework. Thus, it is highlighted the importance of implementing best practices to reduce the extractive industry's environmental impact, ensuring post-mining site restoration and land-use planning for future purposes.

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The mining industry is specifically expected to contribute to water management objectives by implementing effective methods to *reduce water use and recycle wastewater.*

4. Creation of new jobs

It also stands out the capacity that a Circular approach in mining has to create new job opportunities and even promote creativity in work (Romania).

5. Need for basic research on the secondary resources and their processing

One basic requirement that is often mentioned in the diverse documents involves research and analysis of the extraction potential of both primary and secondary resources. Thus, it would be required to develop inventories of mining waste landfills and assess potentials for their use.

Research is proposed as well to better understand the life cycle of minerals (cradle to recycling) and to better understand the demand for different minerals (including Critical Raw Materials) at national scope but also in the EU and globally. This research would also improve the contribution of mining to the transition towards net-zero greenhouse gas emissions by 2050.

Research is also claimed for constructing a knowledge base on raw materials from waste, including processing technology and for identifying recycling and substitution initiatives within the mining and minerals research area.

6. Innovation and technological advancements

It is also repeatedly emphasized the role of technology in driving the principles of the circular economy, leading to efficient resource use, waste reduction, and enhanced recycling processes. Consequently, to promote the development of new technologies for efficient mining activities is a key aspect of a circular mining model.

This includes new methods for treating secondary materials, efficient recovery of metals from waste, and innovative process control through intelligent systems.

7. Private-public collaboration, incentives and engaging with stakeholders

Several documents highlight the role of public-private partnerships in driving the circular economy and that public incentives should be created to boost the recycling and re-use of stockpiled waste materials, tailings and mineral products in general. Other documents propose exploring funding mechanisms to support companies in developing domestic capabilities in the circular economy of critical minerals.

It is also highlighted the need to engage with a variety of stakeholders, including municipalities, to promote and implement circular economy principles along the whole value chain. This is the case for Finland strategy that includes logistic solutions relating to management of stockpiles, rates of consumption data and designation of intermediate storage sites serving multiple municipalities.

8. Need for a renewed legislative framework

Several instruments have included the *absence of an updated legislative framework for exploiting secondary resources*, or even further, questioning the adequacy of the applicable standards, the need for restructuring of contractual legal discipline, redefining the royalties system and other operating charges and regulating new realities, such as the emerging need to reuse secondary resources, especially in the case of CRM.

The UK is however already considering relevant regulatory interventions to promote re-use, recycling, and recovery of critical minerals.

9. Education and awareness

Finally, some countries have also highlighted the need to raise awareness and educate stakeholders about the circular economy's benefits in the mining sector.

Raising public awareness and disseminating objectives, accurate information about the sector's innovations and state-of-the-art technologies stands out also as a priority. A holistic and encompassing approach to sustainability is highlighted, with a specific focus on the role of human capital and the significance of technical education.

Within the EU's mining strategies there's a pronounced emphasis on education, training and awareness. Another central theme revolves around the imperative of preserving and perpetuating specialized knowledge in geological and mining fields, ensuring that expertise is not lost over time.

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# Annex 1: List of mining strategies

### 5.1.1. AUSTRIA

2012. The Austrian Mineral Resources Plan (AUTMINPLAN) was prepared by the Minister of Economy which strives to achieve a broad consensus among the federal government, the federal states and businesses for safeguarding the supply of mineral resources. “Raw material areas” are defined as those which have been identified using objective and systematic analytical methods and which contain mineral raw materials. In view of expected technological advances and bearing in mind ecological and social aspects it is assumed that it will be possible to use such materials commercially in the medium to long term. Outside of these areas mining is also possible i.e. not forbidden by the AUTMINPLAN. The AUTMINPLAN itself has no legally binding character.

There is a more updated document, called the Master Plan 2030, which also pertains to mining, but it has not been located. The reference to this document is provided through an academic article (Reichhardt, A et al. 2022. Raw materials master plan 2030 – A raw materials strategy for Austria).

- Austrian Mineral Resources Strategy 2030. The vision of the Austrian Mineral Resources Strategy 2030 is for Austria to take a pioneering role in the strengthening of European industry. By means of the smart extraction and processing of primary and secondary raw materials with a focus on national deposits, value chains can be extended and Austria can be strengthened as a business location and industrial site.
- To promote progress and preserve prosperity among the Austrian population, it is indispensable to ensure comprehensive supply with raw materials by strengthening the domestic resource base and safeguarding secure international provision. Only an interaction of these factors can satisfy the needs for raw materials while at the same time increasing the resilience of the domestic raw materials industry.

### 5.1.2. CZECHIA

2017. Raw materials policy of the Czech Republic in the area of mineral materials and their resources. Ministry of Industry and Commerce.

- The policy aims to present and maintain an optimal scope of activities through which the government will direct the utilization of domestic mineral resources and balance deficits in certain materials.
- The objectives of the raw material policy are based on an analysis of the domestic raw material base and forecasts of future demands for mineral raw materials. To achieve these goals, specific tools and institutional background are specified.
- 93 pages document, which contextualizes mining in the Czech Republic, the future expectations for mining resources, the impacts of mining and the objectives to be achieved.
- Czechia has a Secondary Raw Material Policy from 2014.

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### 5.1.3. ESTONIA

2013. National Development Plan for the Use of Oil Shale 2016 - 2030

On their official web site (https://keskkonnaamet.ee/en/environmental-use-charges/mining) there is mention to these three documents, but all the links are not available.

- "Oil Shale Development Plan 2016 – 2030" (previously also the National Development Plan for the Use of Oil Shale 2008 - 2015).
- National Development Plan for the Use of Construction Mineral Resources 2011-2020 (implementation of the development plan completed on 30.11.2017).
- The basic "principles of crustal policy until 2050".
- In addition, MIN-GUIDE points that the National Development plan for the use of construction mineral resources is invalid since 30.11.2017.

### 5.1.4. FINLAND

2010. Finland Minerals Strategy. Ministry of Employment and the Economy.

- Three strategic objectives and 12 action proposals related to four distinct themes have been defined to facilitate implementation of the minerals strategic vision.
- The themes of the action proposals: I) Strengthening minerals policy; II) Securing the supply of raw materials; III) Reducing the environmental impact of the minerals sector and increasing its productivity, IV) Strengthening R&D capabilities and expertise.
- A 20-pages document whose strategic goals are: The significance of minerals, Global challenges, Minerals policy in the EU, The Finnish minerals sector, The minerals sector as an opportunity for Finland, Action proposals, Background material, The minerals strategy preparation process.
- It has a Mining Action Plan (2011) divided into sections.

### 5.1.5. GERMANY

2010. The German Government's raw materials strategy. Safeguarding a sustainable supply of non-energy mineral resources for Germany. Federal Ministry of Economics and Technology (BMWi).

- The National Policy (Declaration of intentions - unofficial) for the strategic planning and exploitation of the mineral resources was announced in 2012. It had the overall strategic goal to ensure the supply of MRM to the society in a sustainable way and in compliance with other national sectoral development policies by: 1. promoting and revealing mineral resources and assign their exploitation through international tenders in order to maximize the benefits for the national economy; 2. valorising the mineral resources through rational exploitation processes and apply the principles of sustainable development; 3. ensuring significant offsets for the local society and socially fair allocation in conformity with the relevant national revenue.
- It is a 24-pages document which main epigraphs are on supply sources of raw materials, raw materials efficiency, recycling, training of human resources, measures, cooperation and the UE and international context.
- The Federal Government aims to implement measures relating to these objectives in a balanced fashion following the principles of sustainable development. Here, equal weight should be given to economic, environmental and social aspects of a sustainable raw materials sector. Further to this, the Federal Government's raw materials strategy aims to take a holistic approach to raw

materials, with the closest possible integration of all national and international levels of raw materials policy-making.

- There is a review article of the strategy carried out by a university: "The Revised German Raw Materials Strategy in the light of global political and market developments". Martin Luther, Universität Halle – Wittenberg.

### 5.1.6. GREECE

**2012. National Policy for the Exploitation of Mineral Resources. Ministry of Environment, Energy and Climate Change**

- Referred in MIN-GUIDE for English translation as National Policy for the **Strategic Planning** and Exploitation of Mineral Resources.
- 10-pages document, stating that "the three axes of the policy that is being implemented currently are the following: 1) To promote and reveal mineral resources and assign their exploitation through international tenders in order to maximize the benefits for the national economy; 2) To valorise the mineral resources through rational exploitation processes and apply the principles of sustainable development; 3) To ensure significant offsets for the local society and socially fair allocation in conformity with the relevant national revenue". The document is structured in three contents: main policy axes, required policies and actions, and Actions Specifications.

### 5.1.7. IRELAND

**2022. Policy Statement on Mineral Exploration and Mining**. Critical Raw Materials for the Circular Economy Transition. Government of Ireland.

- Not included on MINLEX or MIN-GUIDE due to its recent publication.
- A 91-pages document whose strategic goals are: Ireland's Mineral Potential, Minerals, National, EU and International Policy Context, Mineral Exploration and Mining Policy, Implementation, Monitoring and Review of this Policy and Regulatory Framework.
- "The policy for mineral exploration and mining is to: i) ensure a stable, robust and transparent regulatory framework that supports environmentally sustainable mineral exploration and mining; and ii) maximise the contribution that sustainable exploration and mining can make to our society, economic development and the transition to net-zero greenhouse gas emissions through the supply of the raw materials necessary for our sustainable development".

### 5.1.8. NETHERLANDS

**2022. National raw materials strategy: material resources for the major transitions. Government of Netherlands.**

- Not included on MINLEX or MIN-GUIDE due to its recent publication.
- The Dutch government is focusing on five areas of action to improve critical raw material supply security: (1) circularity and innovation, (2) sustainable European mining and refining, (3) diversification, (4) greater sustainability in international supply chains, and (5) knowledge building and monitoring.
- 31-pages document that focuses on the explanation of the extraction of raw materials and its environmental impact and on society.

### 5.1.9. NORWAY

2023. Norwegian Mineral Strategy. Norwegian Ministry of Trade, Industry and Fisheries.

- Not included on RMIS- JRC neither on MINLEX or MIN-GUIDE reports.
- There is also a 2013. Strategy for the Mineral Industry. Norwegian Ministry of Trade and Industry. Not considered for this report.
- "The Norwegian Government's overarching ambition is for Norway to develop the world's most sustainable mineral industry. Norway is well positioned to succeed in this. We have significant mineral resources that can generate value creation, profitable jobs and at the same time make an important contribution to address the global possibilities and challenges the green and digital transitions. The Norwegian Government will facilitate profitable recycling of raw materials, and work closely with the rest of Europe to secure critical value chains".
- A 68-pages document whose strategic goals are: Minerals are of crucial importance to society, Sustainable mineral extraction, The Norwegian mineral industry, Norway's potential for future extraction of critical raw materials, Framework conditions for mineral extraction in Norway and The Government's five focus areas for a forward-looking mineral policy.

### 5.1.10. POLAND

2022. National Raw Materials Policy. Ministry of Climate and Environment.

- Not included on MINLEX or MIN-GUIDE reports due to its recent publication.
- 43 pages document that reviews current legislation and mining resources. The main objectives are: Provision of access to raw materials from mineral deposits, prospecting, exploration and documentation of mineral deposits, providing favourable legal conditions for current and future investors and the development and modernisation of the geological and mining industry, protection of mineral deposits, international cooperation in securing access to raw materials, acquiring raw materials from anthropogenic deposits and supporting the development of the circular economy, ensuring the consistency of strategies implemented by companies of significant importance for the state economy and companies performing a public mission with the activities of the Chief National Geologist acting as the Government Plenipotentiary for the National Raw Materials Policy and dissemination of knowledge.
- Relevant aspects appear in the geology and mining law.

### 5.1.11. PORTUGAL

2012. National Strategy for Geological Resources. Portugal. (2012).

- Its objective is to ensure the uptake of investments for exploration and exploitation of mineral resources balancing economic, social and environmental considerations and to promote the sustained growth of the mining sector. The strategy is structured around four main areas of action supported by a set of more specific measures and actions, some of them already in progress or even completed.
- 12 pages document reporting the approval of the National Geological Resources Strategy. A brief review of the current situation in Portuguese mining.
- The Law on Minerals Exploration and Extraction in English points out important aspects about mining waste.

### 5.1.12. ROMANIA

2017. Mining Strategy of Romania. 2017-2035.

- According to MIN-GUIDE, "The Economic ministry of Romania released a report in 2012 titled "mineral industry Strategy 2012–2035," which outlines a series of objectives and goals that the Government seeks to achieve. Among them are (a) ensuring the sustainable development of Romania's mineral resources; (b) the harmonization of the national interest and investment capital while meeting the mentioned sustainability requirements; and (c) reducing the dependence on imported primary energy resources and raw minerals and improving the transparency of the mineral industry".
- The final document accessed is a 85-pages text titled *Strategia Minieră a României 2017 – 2035*.

### 5.1.13. SPAIN

There is no strategic national instrument for the mining sector in Spain, being the most relevant milestone the recent approval of the:

2023. Strategy for sustainable mining of Andalusia (Spain). Department for Industry, Energy and Mining of Andalusian Regional Government.

Other regional strategies in Spain are:

- Castilla la Mancha Region. Plan Estratégico de Recursos Minerales no Energéticos de Castilla-La Mancha. Horizonte 2020. (2014) Consejería de Fomento.
- Comunidad Valenciana Region. Draft preliminary bill on sustainable mining of the Valencia Community. (2017). Draft of the Sustainable Mining Law of the Valencian Community Ministry of Sustainable Economy, Productive Sectors, Commerce and Work (Directorate General of Industry and Energy).
- Murcia Region. Progress of the management Plan Territory of mineral resources from the Region of Murcia. (2019). Región de Murcia. Consejería de Empleo, Universidades, Empresa y Medio Ambiente. Dirección General de Energía y Actividad Industrial y Minera.

### 5.1.14. SWEDEN

2013. Sweden Minerals Strategy. For sustainable use of Sweden's mineral resources that creates growth throughout the country (2013). Swedish Ministry of Enterprise, Energy and Communications.

- "This minerals strategy will increase the competitiveness of the Swedish mining and minerals industry so that Sweden maintains and strengthens its position as the EU's leading mining nation. Sweden's mineral assets are to be exploited in a long-term sustainable way, with consideration shown for ecological, social and cultural dimensions, so that natural and cultural environments are preserved and developed".
- A 52-pages document whose main epigraphs are on mining and minerals industry in harmony with the environment, dialogue and cooperation, innovative mining and minerals industry with an excellent knowledge base and implementation of the strategy.

### 5.1.15. SERBIA

No strategic planning for mining in this country was found after a comprehensive research. The following link was not useful to get access to it as initially expected: https://gs.gov.rs/mapa-sajta

### 5.1.16. UNITED KINGDOM

2022. Resilience for the Future: The United Kingdom's Critical Minerals Strategy. HM Government.

- Not included in MINLEX and MIN-GUIDE (UK is a non-EU country)
- "In a challenging world, the UK's new critical minerals strategy intends to improve the resilience of critical minerals supply chains. It aims to ensure that, in the decades to come, the minerals we will need to power our world in the future, can be made available in the quantities needed, extracted in responsible ways and supported by well-functioning and transparent markets. And, in doing that, we want to position the UK at the forefront of the green industrial revolution, create opportunities for UK businesses, and take opportunities to level up, innovate and tread more lightly on the earth – all whilst showing international leadership".
- 48-pages document: reasons why a strategy is necessary. Then the objectives and the cooperation necessary to achieve them are explained. Secondly, it focuses on markets, financial problems and transparency.
- Resource Security Action Plan: Making the most of valuable materials. (2012). Department for Environment, Food and Rural Affairs (DEFRA) and Department for Business Innovation & Skills (BIS). A 56-pages document. "This document has been developed in response to private sector concerns about the availability of some raw materials. It details how the Government recognises these issues, provides a framework for business action to address resource risks, and sets out high level actions to build on the developing partnership between Government and businesses to address resource concerns".

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