

# **4**

## **A new mining strategy to make Andalusia a frontrunner on sustainable mining**

---

The chapter starts with an overview of the relevant international and national policy framework for mining development in Andalusia, emphasising the need for a national mining strategy to support a sound mining value chain in Spain and the transition to a low-carbon economy. Then, it analyses Andalusia's mining policy and provides recommendations to make the updated regional mining strategy a powerful tool to help Andalusia become a frontrunner in sustainable raw material technologies and practices to support the European climate neutrality goal and increase local well-being.

---

## Assessment and recommendations

### Assessment

- The European Union's new priorities, driven by the Green Deal, the new Industrial Strategy and the Raw Materials Strategy, will stimulate the future demand for sustainable raw materials in Europe and support programmes to develop environmentally friendly mining value chains to attain climate neutrality by 2050. This represents an opportunity for Andalusia to leverage its mining sector and become a frontrunner in the development of clean energy technologies and circular processes to support a reliable supply of sustainable raw materials.
- Spain is one of the few European Union (EU) countries with mining resources that does not have a national strategy on mining or minerals. Despite current efforts for national co-ordination, the lack of a national strategy on mining development leads to missed opportunities to spur synergies across regional mining ecosystems and among national policy strategies to boost innovation, attract investment and increase well-being. Furthermore, the absence of sound national co-ordination mechanisms prevents the establishment of a coherent approach for environmentally sustainable mining and a greater sharing of mining benefits with local economies. Developing a national mining strategy will help to better mobilise the potential of the Spanish mining sector, strengthen its alignment with EU climate goals and support regional development.
- Andalusia's updated mining strategy for the short and medium terms (2027) is a unique opportunity to support the transition to a low-carbon economy while facilitating new growth opportunities for local communities. This mining strategy should overcome the shortcomings of the previous strategy. These include establishing a clear and long-term vision for mining activities in the region that is well-aligned to its regional development goals and identifying concrete outcome objectives with a timeframe of actions. It also needs to enhance the engagement of municipal governments and communities, strengthen co-ordination with other regional development policies and improve national and international collaboration.

### Recommendations

#### ***Improving national co-ordination on mining to help attain EU strategic goals and support national and regional development and well-being***

For this, the Spanish national government should:

1. Develop a national strategy on raw materials and/or mining. This strategy should build on the ongoing process of developing the *road map for the sustainable management of raw materials*. The strategy should include a long-term vision for mining development, clear mechanisms for co-ordination with other national development policies, tools to promote environmentally sustainable mining processes and technologies, as well as strategies to attract investors, improve communication and boost the well-being of local communities.
2. Improve the financial and institutional capacity of the Geological and Mining Institute of Spain (IGME) to help co-ordinate the national mining strategy and boost its research and exploration activities. This institute can also help promote the Spanish mining value chain internationally. Spain may find of interest the structure and role of the Geological Survey of Finland (GTK).

***Strengthening the Andalusia Mining Strategy 2021-27 to make the regional mining value chain a frontrunner in environmentally sustainable mining and an engine to increase income and well-being***

For this, the regional government should:

3. Define a unified vision of the role of mining for regional development by:
  - Agreeing on a clear vision for mining development in the updated mining strategy. This vision should include a long-term timeline (e.g. 2050 as the EU Green Deal) and be comprehensive to mobilise all of the comparative advantages of the region. This requires consensus within the regional government and across different actors at the local level (municipalities, companies, universities and communities).
  - Enhancing the mining brand in the region and creating a plan to promote it internationally as part of the mining strategy. This brand and its promotion activities need to be developed and co-ordinated with other branding strategies and actors in the region. The brand should aim to attract new firms and skilled workers, based on an image of an innovative business environment that produces essential materials and know-how for the low-carbon transition.
4. Establish concrete objectives with measurable targets and a timeframe of actions in the mining strategy. This includes refining existing indicators and creating a timeframe for objectives by indicating which axis and action lines are a priority for the next few years (e.g. 2021-27) and which ones are inscribed in a longer timeline (2030).
5. Strengthen the monitoring framework of the new mining strategy by:
  - Differentiating among outcome and output indicators to measure long-term objectives and operative tasks differently.
  - Developing horizontal indicators that measure transversal objectives in the strategy and avoid duplication across specific tasks, while creating complementarities.
6. Improve the involvement of municipal governments and local communities in the mining strategy by:
  - Aligning the new mining strategy with municipal development plans. This can be done through formally frequent dialogue sessions with municipal governments and their early involvement in the development process of the strategy and its monitoring.
  - Improving co-operation with municipalities through the new institutional platform to promote research and development (R&D) in mining and the proposed multi-stakeholder co-ordination platform for mining development.
  - Including in the new strategy a guideline/toolkit to structure and implement benefit-sharing mechanisms for mining in Andalusia. This includes identifying the models used in the region and facilitate capacitation programmes for companies and communities to make the most of the benefit-sharing process.
7. Unlock synergies with other regional policy strategies and promote local networks to support a regional mining cluster based on innovation by:
  - Establishing a formal mechanism within the regional government to better co-ordinate the different sectoral policies (e.g. aeronautic, industry, construction) with the aim to mobilise the innovative potential of the mining sector. This mechanism should gather representatives from different units of regional and municipal governments.
  - Promoting in the new mining strategy the creation of a multi-stakeholder platform for mining development that gathers all relevant actors in the mining value chain to identify synergies and projects of common interest. This should include representatives from companies of different sizes, universities and the third sector as well as local governments. This group

should have a role in the preparation and monitoring of the mining strategy. The platform can help promote network activities and the international visibility of actors. For this, the regional government can get inspiration from the Mining Finland programme.

8. Boost collaboration with other Spanish mining regions, EU mining initiatives and Portuguese mining regions to promote joint mining projects, enhance knowledge and funding access by:
  - Developing partnerships with regional mining initiatives in Spain (e.g. the Iberian Sustainable Mining Cluster). Andalusia's new mining strategy should map out the existing national and regional mining initiatives and specify the mechanisms to involve Andalusia in those initiatives, articulate common projects and promote a co-ordinated approach to reach European support programmes.
  - Taking an active role in the EU mining networks to promote common projects with EU mining regions and consolidate Andalusia's role as the bridge for EU mining innovation and sustainable practices with Latin American and North African markets. This collaboration should also aim at improving the competitiveness and internationalisation of local small- and medium-sized enterprises (SMEs) in the mining ecosystem.
  - Defining the new mining strategy tools and flagship projects to materialise the co-operation with Portuguese regions located in the geological formation of the Iberian Pyrite Belt (IPB). This can involve a common strategy to attract investors and reach EU funding.

## Introduction

Andalusia is the largest mining producer in Spain and benefits from a diverse mining value chain with the potential to contribute to the EU climate neutrality goals and create high-value-added jobs and greater well-being. The new European Green Deal has placed at the top of the agenda the need for raw materials and sustainable mineral transformation processes as a cornerstone to support the EU climate neutrality goal by 2050. This long-term strategy offers Andalusia the support and opportunities to leverage on its mining value chain to become a frontrunner in green technologies and low-carbon mining practices.

To harness this strategic potential, Andalusia needs to fully mobilise the strengths of its mining sector and address its structural challenges. As mentioned earlier in this report, the region benefits from a strategic geographic location with important access to non-European markets, an international, diverse mining and industrial environment and a community supportive of mining with a young demographic structure. The region has long faced a number of structural challenges to mobilise these strengths and create high-value-added activities. These are notably a low innovative business ecosystem around mining, a large share of low-value-added SMEs and entrepreneurship along with an outdated regulation for mining development (Chapter 3).

Realising all of the potential of Andalusia's mining ecosystem requires sound governance mechanisms and a clear strategy that creates strong networks and consensus towards a unified vision of development. The process of preparing the new Andalusia mining strategy for 2021-27 is an opportunity to create the right conditions to help attain higher growth and quality of life through high-value-added activities across the mining value chain.

This chapter provides recommendations to improve the governance mechanisms around mining that can already be introduced in its new regional mining strategy for 2021-27. With effective planning and implementation, this strategy could help Andalusia become a frontrunner in green technologies and sustainable extraction and transformation practices of raw materials. The chapter starts with an overview of the international and national institutional environment for mining development in Andalusia, emphasising the need for a national mining strategy to support a sound mining value chain in Spain and the region. It then provides a number of policy recommendations to enhance Andalusia's mining strategy for 2021-27.

## External forces shaping Andalusia's mining strategy

### ***Andalusia has the potential to play a key role in the EU goal of climate neutrality***

The EU has defined access to certain types of minerals and metals as a strategic priority to support the transition to an economy with net-zero greenhouse gas emissions. The European Commission (EC) has developed a number of strategies that recognise the strategic role of mining for a sustainable and resilient future. The European Green Deal identifies the access to raw materials as a “strategic security question” to become climate-neutral by 2050 (Box 4.1). Likewise, the new Industrial Strategy for Europe aims to reinforce EU industrial autonomy on access to raw materials, underlying that the transition to climate neutrality could replace today's reliance on fossil fuels with one on raw materials (EC, 2020<sup>[1]</sup>).

### Box 4.1. The European Green Deal

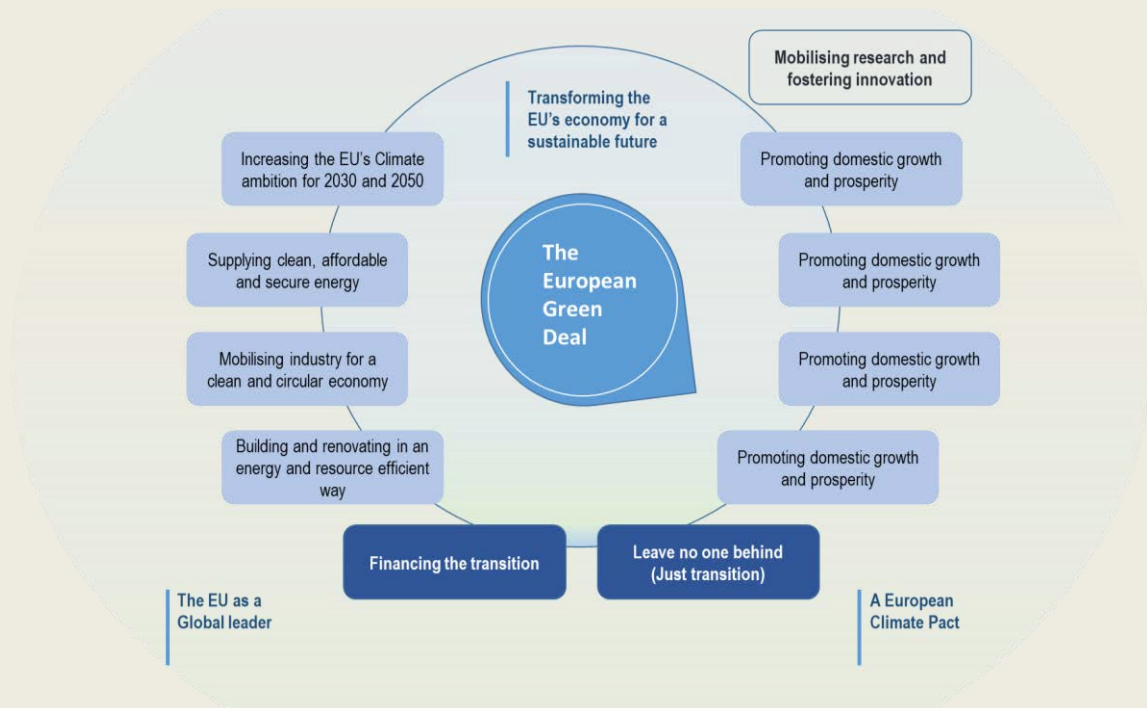
The European Green Deal is a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy with net-zero emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use.

It also aims to protect, conserve and enhance the EU's natural capital and protect the health and well-being of citizens from environment-related risks and adverse impacts. At the same time, this transition must be just and inclusive by putting people first and paying attention to the regions, industries and workers who will face the greatest challenges.

The EC has presented an initial roadmap of the key policies and measures needed to achieve the European Green Deal, which will be updated as needs evolved. All EU actions and policies will have to contribute to the European Green Deal objectives. As part of the Green Deal, the EC will refocus the European process of macroeconomic co-ordination to integrate the United Nations (UN) Sustainable Development Goals (SDGs), to put sustainability and the well-being of citizens at the centre of economic policy and SDGs at the heart of the EU's policymaking action.

This deal includes various elements and objectives (Figure 4.1). Acknowledging the overall goal of supporting the circular economy by increasing recycling rates of materials, the access to resources is a strategic security question for Europe's ambition to deliver the Green Deal. Ensuring the supply of sustainable raw materials, in particular those necessary for clean technologies, digital, space and defence applications, by diversifying supply from both primary and secondary sources, is, therefore, one of the prerequisites to make this transition happen.

Figure 4.1. Elements of the European Green Deal

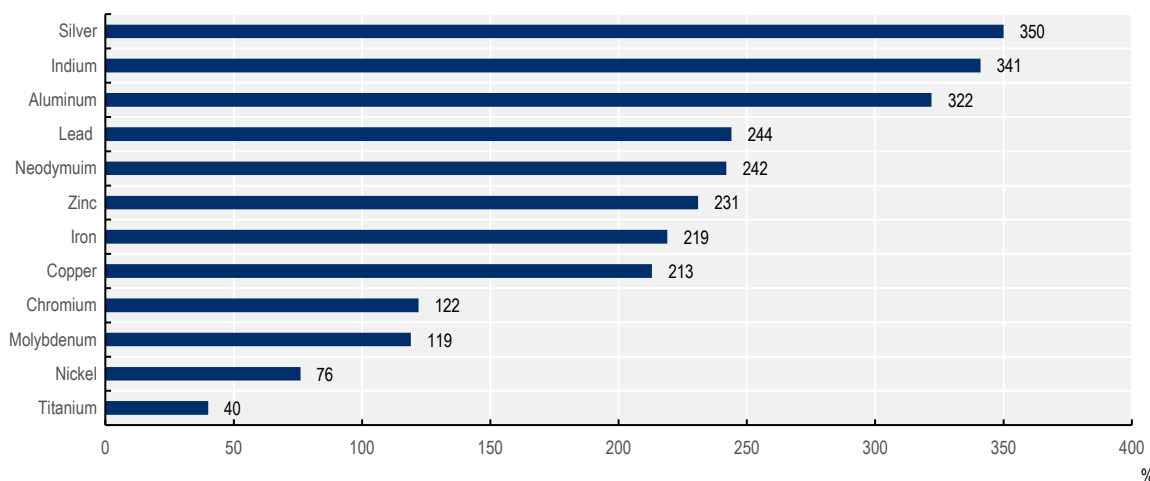


Source: EC (2019<sup>[2]</sup>), *The European Green Deal*, [https://ec.europa.eu/info/sites/info/files/european-green-deal-communication\\_en.pdf](https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf).

In this context, raw materials stand out as essential inputs for the development of technologies that are needed to achieve the EU climate goal (EC, 2020<sub>[11]</sub>). These technologies include wind turbines, batteries, fuel cells and autonomous cars among others. Clean energy technologies tend to require more minerals than fossil fuel-based counterparts. An electric car uses five times as much minerals as a conventional car and an onshore wind plant requires eight times as much minerals as a gas-fired plant of the same capacity (IEA, 2020<sub>[3]</sub>).

The amount of some of the minerals required for these technologies is in some cases greater than the current production levels. Some pre-COVID scenarios to attain climate neutrality by 2050 estimated that the EU would need up to 18 times more lithium and 5 times more cobalt in 2030 compared to the current supply to meet the demand for electric vehicle batteries and energy storage (EC, 2020<sub>[11]</sub>). While this is particularly the case for new and rare minerals (e.g. cobalt, lithium), the demand is also expected to increase for other traditional metallic minerals, such as copper, the main product from Andalusia's mining production (Figure 4.2).

**Figure 4.2. Relative change in demand for minerals from energy technologies (without storage) through 2050**



Note: Change in demand according to the International Renewable Energy Agency (IRENA) renewable energy roadmap scenario (Remap) relative to base scenario = 4-degree scenario.

Source: World Bank Group (2020<sub>[4]</sub>), *Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition*, <http://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf>.

Pursuing sustained access to raw materials is then a strategic matter for economic resilience. Currently, many of the raw materials needed to develop green technologies in Europe are sourced from elsewhere and concentrated in a few producers. For example, China provides 98% of the EU's supply of rare earth elements (REE), whereas South Africa supplies 71% of the EU's platinum. While import dependency is not a critical issue per se, the commercial reliance on only a few sources can create production and sourcing risks. In fact, the COVID-19 pandemic exposed the vulnerability of some markets that faced supply shortages because of distortions in global value chains (OECD, 2020<sub>[5]</sub>). Sourcing risks are a particular production concern in the context of the shortage of some rare minerals (see Table 4.1) that are in high demand due to their use in technological innovations (electric vehicles, solar panels, etc.).

In response to this, the EU strategy on raw materials establishes a number of priority actions to increase resilience and build the path to a model of open strategic autonomy in raw materials (EC, 2020<sub>[11]</sub>) (Box 4.2). The strategy builds on the identification of a number of critical non-energy and non-agricultural raw materials that are highly important for the sustainability of the EU industry. Those critical raw materials (30)

are especially relevant for the EU goal of resource security, though this also applies to other raw materials, including metallic and industrial minerals, aggregates and biotic material that represent the backbone for sustainable production.

The strategic actions of this European strategy on raw materials aim to promote greater diversification of mineral sources and resource efficiency and circularity (reuse and recycling of materials). Besides the need for reliant and resilient sourcing of minerals, the extraction and transformation process needs to adopt an environmentally sustainable process. The growing demand for materials coupled with the environmental consequences of uncontrolled mineral extraction, processing and waste, is likely to jeopardise the actions towards a low-carbon economy. To address multiple goals, EU raw materials strategy along with the industrial strategy have proposed the development of new industrial alliances on raw materials. This includes financial and strategic support for projects in collaboration with different actors. For example, it can leverage on the European Investment Bank's new energy lending policy to support projects relating to the supply of critical raw materials.

#### Box 4.2. EU's Raw Materials Initiative and its role in the EU COVID-19 recovery plan

Access to resources is a strategic security question for Europe. The new EU industrial strategy aims to reinforce Europe's open strategic autonomy, with a future vision of increased global reliance on raw materials to sustain growth. Many of these minerals are sourced from outside the EU, in a context where global competition is becoming fiercer (EC, 2020<sup>[6]</sup>).

Achieving resource security requires action to diversify supply from both primary and secondary sources, reduce dependencies and improve resource efficiency, including sustainable product design. This is true for all raw materials but is even more necessary when it concerns those raw materials that are critical for the EU.

In this context, the EC has developed a list of critical raw materials for the EU since 2011, which is updated every three years. In 2020, the assessment to identify these materials screened 83 materials (5 more than in 2017), based on the average for the most recent 5 years. Economic importance and supply risk are the two main parameters used to determine criticality for the EU.

The resulting list of critical raw materials provides a factual tool to support EU policy development. The EC takes the list into consideration when negotiating trade agreements or seeking to eliminate trade distortions. The 2020 EU list contains 30 materials:

**Table 4.1. 2020 Critical Raw Materials**

Antimony	Hafnium	Phosphorus
Baryte	Heavy Rare Earth Elements	Scandium
Beryllium	Light Rare Earth Elements	Silicon metal
Bismuth	Indium	Tantalum
Borate	Magnesium	Tungsten
Cobalt	Natural graphite	Vanadium
Coking Coal	Natural rubber	<b>Bauxite</b>
Fluorspar	Niobium	<b>Lithium</b>
Gallium	Platinum Group Metals	<b>Titanium</b>
Germanium	Phosphate rock	<b>Strontium</b>

Note: New critical raw materials, as compared to 2017, in bold.

Source: EC (2020<sup>[1]</sup>), *Critical Raw Materials Resilience: Charting a Path towards Greater Security and Sustainability*, European Commission



As if the challenge to achieve sustainable raw materials security was not enough, the COVID-19 crisis has revealed just how fast and how deeply global supply chains can be disrupted. The Commission has proposed an ambitious COVID-19 recovery plan to increase resilience and open strategic autonomy and to foster the transition towards a green and digital economy.

The Commission sees critical raw materials as one of the areas where Europe needs to be more resilient in preparation for future shocks and to have more open strategic autonomy. The EU should act urgently to ensure a secure, sustainable supply of raw materials, pooling the efforts of companies, sub-national and national authorities as well as the EU institutions (EC, 2020<sup>[1]</sup>). To achieve this, the EU action plan for critical raw materials should:

- -Develop resilient value chains for EU industrial ecosystems;
- -reduce dependency on primary critical raw materials through circular use of resources, sustainable products and innovation;
- -strengthen the sustainable and responsible domestic sourcing and processing of raw materials in the European Union, and
- diversify supply with sustainable and responsible sourcing from third countries, strengthening rules-based open trade in raw materials and removing distortions to international trade

The Commission intends to develop and implement these priority objectives and the action plan with the help of Member States and stakeholders, in particular the European Innovation Partnership on Raw Materials and the Raw Materials Supply Group. It will also draw on the support and expertise of the European Institute of Innovation and Technology (EIT) Raw Materials.

Source: EC (2020<sup>[1]</sup>), Critical Raw Materials Resilience: Charting a Path towards Greater Security and Sustainability, European Commission

European countries and regions with the right mining potential and know-how have a unique opportunity to benefit from these European strategies and their support programmes to unlock new growth opportunities. The European Green Deal strategy has explicitly highlighted the need for “climate and resource frontrunners’ to develop the first commercial applications of breakthrough technologies in key industrial sectors by 2030” (EC, 2019<sup>[2]</sup>). Priority areas of investment include clean hydrogen, fuel cells and other alternative fuels, energy storage and carbon capture, storage and utilisation. Certain European mining regions, such as Andalusia, and their business ecosystems are well-positioned to meet this technological demand through a low-carbon production process across the mining value chain.

Andalusia is in fact one of those regions that are instrumental for the EU strategy of raw materials. As mentioned in previous chapters, Andalusia is the largest mining producer in Spain and holds the greatest deposits of metallic minerals in the country, which includes copper, a basic material for power transmission. The region stands out by its foreign-based mining and transformative business ecosystem that has invested in installed capacity and technology to extract and transform minerals in line with high environmental standards. Andalusia is also a leading producer of non-metallic (NM) minerals in Spain and Europe, notably gypsum, marble and cement.

The diverse and relevant mining ecosystem of Andalusia would allow the new green technologies to have a greater impact on mining-related carbon emission and in those of connected activities. Technologies to reduce fossil fuel consumption from mines and the use of water (and other resources) in the mining process can have an incremental effect on all of the mines located in the region. Furthermore, new innovations to reduce carbon emission in mineral transformation and facilitate recycling and reuse of metallic and NM minerals would have a direct impact on the carbon footprint of Andalusia’s mining sector and other connected sectors, notably construction (e.g. through innovations in cement or gypsum). Furthermore, the geographic location with access to Africa and cultural proximity to Latin America represent important

strategic assets for Spain and the EU as market opportunities to export environmental mining practices and technologies.

Mobilising Andalusia's mining value chain potential to accelerate the transition to a low-carbon economy requires political and strategic support from national and regional governments, with a clear vision to unlock growth opportunities and increase well-being through mining-related economic activities.

### ***The lack of a Spanish mining policy is an obstacle to unlocking growth opportunities***

A national mineral (or mining) strategy is a core policy of national interest to secure a sustainable supply of raw materials, ensure economic resilience and support the transition to a low-carbon economy. A national mining strategy is useful to co-ordinate and boost growth and well-being in a country by leveraging the local mining and industrial competitive advantages. National mining strategies also help countries set clear rules on permit award and regulation processes, support the co-ordination across regional mining projects and among development strategies at the national level, unlock innovation and ensure the environmental sustainability of mining projects (OECD, 2021<sup>[7]</sup>).

Spain is one of the few EU countries with mining production that does not have a national mineral strategy/policy (Table 4.2). Instead, mining policy in Spain is a combination of the regional mining policies. While the national state has exclusive powers over the foundations of the mining law, which is the main legislation for mining in Spain, the regions are the ones in charge of mining policy design, mining permitting and mining policy implementation (Chapter 3). Furthermore, as mentioned in Chapter 3, the existing Spanish mining law is very old (1973) and the country lacks overarching legislation that compiles all the new regulations, for example on environmental and waste management.

**Table 4.2. National mining policies in selected EU countries with mining production**

	National mining or mineral strategy/policy
Austria	Yes
Bulgaria	Yes
Czech Republic	Yes
Finland	Yes
France	No
Ireland	Yes
Germany	Yes
Greece	Yes
Portugal	Yes
Poland	Yes
Spain	No
Sweden	Yes

At the national level, the Ministry for the Ecological Transition and the Demographic Challenge (MITERD) is in charge of mining with a limited role in strategic planning. This ministry, through the Directorate General for Energy Policy and Mines, has a general monitoring role, mainly in charge of overseeing mining security, waste mining and issues related to mining processes when a mine is located across two regions. It also manages the sectoral statistics and promotes guidelines on sectoral practices. While the national government promotes the exchange of good practices around administrative procedures and regulations, this exchange takes place on a case-by-case basis and should be reinforced with a more active role from regions as competent authorities.

At the regional level, different regional ministries are responsible for mining issues. In the case of Andalusia, the Ministry of Economic Transformation, Industry, Knowledge and Universities has the main responsibility on mining development. Through the Secretary of Industry and Mining (regional vice-ministry level), the ministry elaborates the regional mining strategy, co-ordinates the regulatory and licensing process and interacts with private companies.

Since 2020, the ministry has made further efforts to co-ordinate mining policy and began a process to establish a *roadmap for the sustainable management of raw materials* (MITERD, 2020<sup>[8]</sup>). This roadmap aims to guarantee the supply of mineral resources for Spain in a more sustainable and efficient way while maximising benefits throughout the value chain. With this road map, the national government acknowledges that the transition to a climate-neutral economy in 2050 will involve increasing consumption of certain mineral raw materials and that the COVID-19 crisis calls for a greater need to ensure economic resilience through raw materials.

This roadmap could be used to complement other national directives for the sustainable mining process. They include the National Energy and Climate Plan 2021-30 (PNIEC), which establish the need to develop new tools for research and innovation in energy and climate and update information on mineral reserves. Also, the Long-Term Strategy (ELP), which highlights the relevance of the circular economy process and the extraction of minerals under high environmentally sustainable standards, by reducing the reliance on mineral imports.

This road map is welcomed as a useful step towards greater co-ordination of mining, yet it is still at an early stage and would require formal tools and a unified vision to co-ordinate regional mining value chains. The MITERD has scope to perform a more active co-ordinating role in relation to mining policy, through a clear strategic vision on the role of mining for regional development and a policy approach that fosters regional co-operation on mining investment and promotes policy complementarities among mining and other national sectoral plans. Without overall co-ordination, the multiplicity of regional strategies leads to duplication of actions and investments among regions, which decrease efficiency and make for missed opportunities for knowledge exchange and innovation in the country.

**Table 4.3. Role of national and regional governments in mining development in Spain**

Ministry for the Ecological Transition and the Demographic Challenge	Regional government (in Andalusia: the Ministry of Economic Transformation, Industry, Knowledge and Universities)
<ul style="list-style-type: none"> <li>• Mining security and management of explosives</li> <li>• Waste mining</li> <li>• Mining processes when a mine is located across two regions</li> <li>• Sectoral statistics</li> </ul>	<ul style="list-style-type: none"> <li>• Regional mining strategy</li> <li>• Regulatory and licensing process</li> <li>• Investment attraction</li> <li>• Geological study and information</li> </ul>

The EC has highlighted the importance of national mineral policies to ensure that mineral resources are exploited in an economically viable way and based on sustainable development principles (EC, 2011<sup>[9]</sup>). In its 2011 communication on raw materials, the EC identified the development of the national mineral policy as a mechanism to foster the sustainable supply of raw materials and harmonise mineral policies with other national policies, including a commitment to provide an appropriate legal and information framework. Likewise, the private sector in Spain has repeatedly highlighted the need for a national strategy on mining. The Spanish Confederation of Mineral Raw Materials Industries (PRIMIGEA) initiated a conversation with national authorities to raise awareness of the advantages of a co-ordinated national strategy for Spain, in terms of productivity, business attractiveness and improvement of social perception on mining.

### ***A new national mining strategy would add value in a number of areas***

A Spanish mineral policy could help regions develop projects around the mining value chains that create new job opportunities for regions. The development of business ideas around the national mining value chain could help Spain overcome some of its most pressing challenges, including population decline, high unemployment rates and low levels of innovation. Given that mining is highly localised in the territory, usually taking place in rural locations, planning for new business opportunities in this sector could contribute to retaining and attracting the population to rural places and bring with it high-value-added jobs.

A national policy strategy can mobilise the diversity and richness of Spanish mining value chains (e.g. leading mining and energy companies, mineral manufacturers and refineries) and such co-ordination can create synergies among firms of different sizes and within different sectors to boost innovation rates in the country. These types of co-ordinated actions are a priority for a country to compete in a global market where the need for minerals to support green technologies has become a growing source of productivity and well-being.

To this end, the national government of Spain, particularly the MITERD, should leverage the roadmap for the sustainable management of raw materials to develop a national mineral strategy to accelerate the transition to a low-carbon economy and create new opportunities for regional growth.

Spain could follow some good practices of other national mining or mineral strategies. Many OECD national mining or minerals strategies set a vision for development, define specific co-ordination mechanisms with other strategic plans and strategies to attract investors and boost the well-being of local communities. Some of these strategies are designed in close collaboration with private actors and communities, which provides greater legitimacy and ownership of the objectives. Box 4.3 provides a summary of three OECD national mining plans (Canada, Finland and Germany). These national plans have multiple common objectives such as fostering growth and innovation, reducing environmental impacts from mining projects and ensuring a sustainable supply of raw materials.

Many regions in Spain have experience in developing regional mining policies, which could be leveraged by the national strategy. Andalusia, Castilla la Mancha and Murcia, among others, all have different regional policies to support the development of the mining sector and its value chain. Each region has expertise in involving local stakeholders in the development of the strategy, defining priorities and creating indicators to monitor the implementation.

Furthermore, the Geological and Mining Institute of Spain (IGME) has room to play a stronger role in national mining development. The IGME serves as a repository of geological information that gathers the outcomes from various regional geological research. However, this institute does not have a strategy for long-term exploration or research around minerals and materials. Instead, it conducts research on the basis of projects with specific funding (national, regional or EU funding). In other OECD countries (e.g. Finland, Sweden), national geological bodies play an active role in co-ordinating exploration around the country and researching materials, technologies or transformation processes. In Finland, for example, the geological institute is in charge of co-ordinating and conducting the national mineral strategy and supporting the international promotion of the country's mining potential (Geological Survey of Finland, 2010<sub>[10]</sub>). Spain can improve the capacity of its IGME to help co-ordinate mineral research and exploration, as well as promote the Spanish mining value chain internationally.

In summary, the development of the Spanish mining (or mineral) strategy can help the country better contribute to the EU goal of climate neutrality, accelerate the national transition to a low-carbon economy and support regional development and well-being. For this, the national government, particularly the MITERD, should:

- Develop a national strategy on raw materials and mining. This strategy should build on the ongoing process of developing the *road map for the sustainable management of raw materials*. The strategy should include a long-term vision for development, clear horizontal co-ordination mechanisms with

other development policies, tools to promote environmentally sustainable mining processes and technologies, as well as strategies to attract investors and boost the well-being of local communities.

- Improve the capacity of the IGME to help co-ordinate mineral research and exploration, as well as promote the Spanish mining value chain internationally.

### **Box 4.3. Mineral or metal strategies in Canada, Finland and Germany**

#### **Canadian Minerals and Metals Plan**

The Canadian Minerals and Metals Plan, established in 2019, sets a vision to make Canada the leading mining nation, home to a competitive, sustainable and responsible minerals industry that benefits all Canadians. The plan defines six strategic directions to achieve this vision:

1. Canada's business and innovation environment for the minerals sector is the world's most competitive and most attractive for investment.
2. Increased economic opportunities for Indigenous peoples and supporting the process of reconciliation.
3. The protection of Canada's natural environment underpins a responsible, competitive industry. Canada is a leader in building public trust, developing tomorrow's low-footprint mines and managing the legacy of past activities.
4. A modern and innovative industry supported by world-leading science and technology – across all phases of the mineral development cycle.
5. Communities welcome sustainable mineral development activities for the benefits they deliver.
6. A sharpened competitive edge and increased global leadership for Canada.

#### **Finland's Minerals Strategy 2010 with a vision for 2050**

Finland's 2010 Minerals Strategy is the guiding document that outlines the route for the future of mining in the country and sets the vision for 2050. The government has set the target to make Finland a global pioneer in the sustainable utilisation of minerals, with the mineral sector as one of the foundations of its national economy. To achieve this, the Minerals Strategy has set three strategic objectives:

1. Promote domestic growth and prosperity.
2. Solve global mineral chain challenges.
3. Mitigate environmental impact.

#### ***The German government's Raw Materials Strategy***

In 2010, the German Federal Government elaborated elements of a raw materials strategy on the basis of intensive dialogue between industry and policymakers. The Federal Chancellor established an inter-ministerial Committee on Raw Materials – chaired by the Federal Ministry for Economic Affairs and Technology (BMWi) – to identify problems for commerce deriving from raw materials and to produce inter-ministerial solutions. The committee is chaired by BMWi. This strategy sets nine objectives:

1. Reducing trade barriers and distortions of competition.
2. Helping German commerce to diversify its sources of raw materials.
3. Helping commerce to develop synergies from sustainable economic activity and enhanced materials efficiency.
4. Developing technologies and instruments to improve the conditions for recycling.

5. Establishing bilateral raw materials partnerships with selected countries.
6. Doing research into substitution and materials in order to create new options.
7. Focussing research programmes relating to raw materials.
8. Creating transparency and good governance in raw materials extraction.
9. Integrating national measures with European policy on raw materials.

Source: Federal Ministry of Economics and Technology (2010<sup>[11]</sup>), *The German Government's Raw Materials Strategy*, <https://foes.de/pdf/rohstoffstrategie%20bundesregierung%20englisch.pdf>; Geological Survey of Finland (2010<sup>[10]</sup>), *Finland's Mineral Strategy*, [http://projects.gtk.fi/export/sites/projects/mineraalistratagia/documents/FinlandsMineralsStrategy\\_2.pdf](http://projects.gtk.fi/export/sites/projects/mineraalistratagia/documents/FinlandsMineralsStrategy_2.pdf).

## Mining strategy of Andalusia, from old to new

The experience across several OECD countries and regions has shown that strategic planning for extractive sectors is an important tool for growth, environmental protection and increased well-being. A mining strategy connects the different actors across the mining value chain and promotes external networks by clarifying the role of mining for regional and national development. In a context where mining faces concerns from some parts of the society, a well-designed strategy can help raise awareness among local communities of the opportunities and challenges involved in mining development and outline ways to better share the mining benefits.

### **Objectives and structure of the Andalusia Mining Strategy 2013-20**

Andalusia developed a mining strategy in 2013 in light of the growing relevance of mining in the regional economy. During the years after the 2008 financial crisis, Andalusia's mining sector underwent a transformative period with decreasing extraction of NM minerals due to the crisis in the construction sector, while metallic mining experienced an increased demand due to higher international prices of materials and technological advances that made old mines profitable (Regional Ministry of Work, Business and Trade, 2013<sup>[12]</sup>). The trend of increasing profitable metallic mining has continued during recent years (Chapter 3).

This mining strategy leveraged the 2013 Agreement for the Economic and Social Development of Andalusia, signed between Andalusia's regional government and a pool of representatives from the private sector and civil society. This agreement positions the mining sector as one of the pillars to support the regional development by underlying its relatively high levels of productivity. The strategy also aimed to be a continuation of the Management Plan of Mineral Resources 2010-13, conceived as a planning instrument to strategically orient research activities and exploitation of mineral resources (Regional Ministry of Work, Business and Trade, 2013<sup>[12]</sup>).

The Andalusia Mining Strategy 2013-20 was built around the following 4 objectives, each of them with a strategic axis (5 in total) and action lines (13 in total) (Table 4.4):

- Unlocking mining potential in Andalusia and creating employment and improvement of mining competitiveness.
- Improving public services linked to the mining sector, adapting public to sector needs.
- Integrating an environmental aspect into mining activity and increasing the value of Andalusia's mining heritage to boost the tourism, cultural, social and economic sectors.
- Boosting and developing the implementation of a framework on labour relations, with a specific focus on occupational health and safety.

The strategy is built hierarchically with action lines defining specific tasks and identifying the actors in charge in order to meet the specific axis and, in turn, the objective. The four objectives emerged from a comprehensive diagnostic of the mining potential, the socio-economic relevance of the mining value chain and the environmental effects of the activity. This is a welcome diagnostic that used data from different regional ministries, statistical agencies and business associations, and identified the characteristics of the mining value chain of different minerals in terms of employment, production and weight at the provincial level. The diagnosis also elaborated a detailed analysis of the strengths and weaknesses in the value chain. Some of those challenges are still present in the region and closely related to those identified in this report (Chapter 3).

**Table 4.4. Objectives, axes and actions of the Andalusia Mining Strategy 2020**

Objectives	Axes	Action lines
Unlocking mining potential in Andalusia and creating employment and improvement of mining competitiveness	1. Promoting Andalusia's mining potential	1.1 Increasing knowledge of mining potential 1.2 Boosting government support to mining activity 1.3 Enhancing image and social perception of mining 1.4 Supporting research on the mining potential (e.g. deposits)
	2. Enhancing the business environment around mining	2.1 Expanding research, innovation, co-operation and competitiveness 2.2 Promoting trade and internationalisation
Improving public services linked to the mining sector, adapting public to sector needs	3. Modernising mining policy and governance	3.1 Improving administrative management 3.2. Co-ordinating mining policy across government bodies 3.3 Strengthening the online information portal
Integrating the environment into mining activity and increasing the value of Andalusia's mining heritage to boost touristic, cultural, social and economic sectors	3. Integrating the environmental aspect into the mining activity and increasing the value of Andalusia's mining heritage	4.1 Supporting the environment 4.2 Strengthening linkages with tourism and culture
Boosting and developing the implementation of a framework on labour relations, with a specific focus on occupational health and safety	5. Boosting human capital	5.1 Promoting occupational risks' prevention, health and safety 5.2 Increasing training and qualification

Source: Regional Ministry of Work, Business and Trade (2013<sup>[13]</sup>), *Estrategía Minera de Andalucía 2020*, [https://ws050.juntadeandalusia.es/portalandaluzdelamineria/pamapps/archivos/archivos\\_pormian/Estrategia\\_Minera\\_de\\_Andalusia\\_2020.pdf](https://ws050.juntadeandalusia.es/portalandaluzdelamineria/pamapps/archivos/archivos_pormian/Estrategia_Minera_de_Andalusia_2020.pdf).

Besides the detailed diagnosis and well-structured hierarchy of actions, Andalusia's strategy also stands out with:

- A comprehensive mapping of its links with other policy instruments and strategies at the international and regional levels. Andalusia's strategy aligns with a number of EU strategies on industrial and mining development, including the 2008 EU initiative on raw materials, and with a large variety of regional sectoral policies, including economic, energy, industry, tourism, environment and land management plans (Table 4.5). This strategic effort is welcomed and reveals the government's will to leverage regional development through the synergies between mining and the local economy.
- A detailed monitoring and evaluation framework for the implementation of the action's lines. For this, the Regional Ministry of Work, Business and Trade co-operated with other public entities, business and labour associations as well as universities and technological centres to gather information for the monitoring and evaluation indicators. These partnerships are relevant as the

indicators also monitor the actions that some local actors need to conduct for the attainment of the objectives.

**Table 4.5. Regional sectoral plans outlined in the Andalusia Mining Strategy**

	Overall goal	Synergies with the Andalusia Mining Strategy (selected)
The Agenda for Employment: Andalusia Economic Plan 2014-20	Promote economic growth and employment in coherence with the European Cohesion Policy within the framework of the Europe 2020 Strategy	The sub-objective on modernising traditional sectors where there is high specialisation includes a number of actions for mining development
Andalusian Innovation Strategy 2020	Establish objectives regarding research, innovation and the use of information and communication technology (ICT), as well as the specialisation priorities	The objective of sustainable use of endogenous resources includes a focus on environmentally sustainable mining as an engine of territorial growth
Energy Strategy of Andalusia 2020	Transition towards a low-carbon energy system	The sub-objective on promoting and financing actions to improve energy efficiency and use of renewable energies supports the uptake of green energy in mines and linked activities
Industrial Strategy of Andalusia 2020	Strategic orientation of the industrial policy in line with economic, social and environmental plans in order to improve competitiveness based on innovation	Various objectives including an efficient industry, technological improvement, internationalisation and innovative SMEs can all enhance the mining value chain
Sustainable Tourism Plan of Andalusia 2020	Improve the creation and diffusion of touristic assets and promote the rehabilitation of tourism destinations	Developing new tourist attractions, including industrial, mining and scientific tourism as well as enhancing the link between tourism of events (e.g. Mining and Minerals Hall) and other tourist attractions
Environmental Plan of Andalusia 2020	Reduce climate change, attain socio-economic development with an environmental approach and recognise the potential of green jobs	The objective of reaching greater well-being and employment with lower environmental impacts places mining as a key sector to promote the energy transition
Comprehensive Development Plan for the Construction Sector and a Sustainable Rehabilitation	Increase employment and professional qualification in construction and make this sector an international referent in innovation	Improving innovation and co-ordination in the construction value chain is closely linked with a sustainable mining sector

Source: Regional Ministry of Work, Business and Trade (2013<sup>[13]</sup>), *Estrategía Minera de Andalucía 2020*, [https://ws050.juntadeandalusia.es/portalandaluzdelamineria/pamapps/archivos/\\_archivos\\_/pormian/Estrategia\\_Minera\\_de\\_Andalusia\\_2020.pdf](https://ws050.juntadeandalusia.es/portalandaluzdelamineria/pamapps/archivos/_archivos_/pormian/Estrategia_Minera_de_Andalusia_2020.pdf).

However, the 2020 mining strategy carries a number of drawbacks that can be addressed during the updating process of the strategy for 2021-27. The most relevant missing points in the strategy are:

- A clear vision to define the role of mining for regional development.
- Concrete objectives with a timeframe of actions in the short and long terms.
- Strategies to involve local actors (provincial governments, public interest groups, universities and communities) from design to implementation and evaluation of the strategy.
- Clear goals and implementation mechanisms for cross-sectoral co-ordination.
- Clear strategies to improve the collaboration at the national and international levels.

The next sections will explore each of these areas of improvement to build a 2021-27 (or longer) mining strategy that helps Andalusia's mining value chain become a frontrunner to meet EU climate goals and increase income and well-being for local communities.



### ***Defining a clear vision of the role of mining for regional development***

Setting a clear and ambitious goal in the strategy is useful to align efforts within the government, create partnerships with international actors and attract new investors. The goal of the current mining strategy is rather broad, aiming at “becoming the planning instrument that strategically guides research activities and exploitation of mineral resources in the territory of Andalusia in accordance with social interests and in co-ordination with economic, land use and environmental planning”. For this goal, the strategy identified four objectives described (Table 4.4) but without a clear vision of what the ultimate outcome is when achieving these four objectives.

An overarching objective for the strategy needs to clarify the role of Andalusia’s mining value chain in the future of regional and national development with a specific dateline. The overall objective should emerge from an initial diagnosis (similar to that done for the 2020 strategy) of the strengths and weaknesses of the mining sector and its potential to support other economic sectors and well-being goals. This ultimate vision should have a timeline that can be linked with the end of the strategy (2030) or with other national or EU strategies (e.g. 2050 as the EU Green Deal).

The vision also needs to be comprehensive to mobilise all comparative advantages of the region and not only from the mining sector. By going beyond mining, it can integrate other strategic visions of economic sectors and exploit synergies. Furthermore, it has to be ambitious to promote actions to solve the bottlenecks for development. For example, in the case of Finland, the national mineral strategy has three strategic objectives with four thematic actions that aim to achieve a single vision for 2050 making Finland “a global leader in the sustainable utilisation of mineral resources where the mineral sector is a key foundation of the national economy” (Geological Survey of Finland, 2010<sup>[10]</sup>) (Box 4.4).

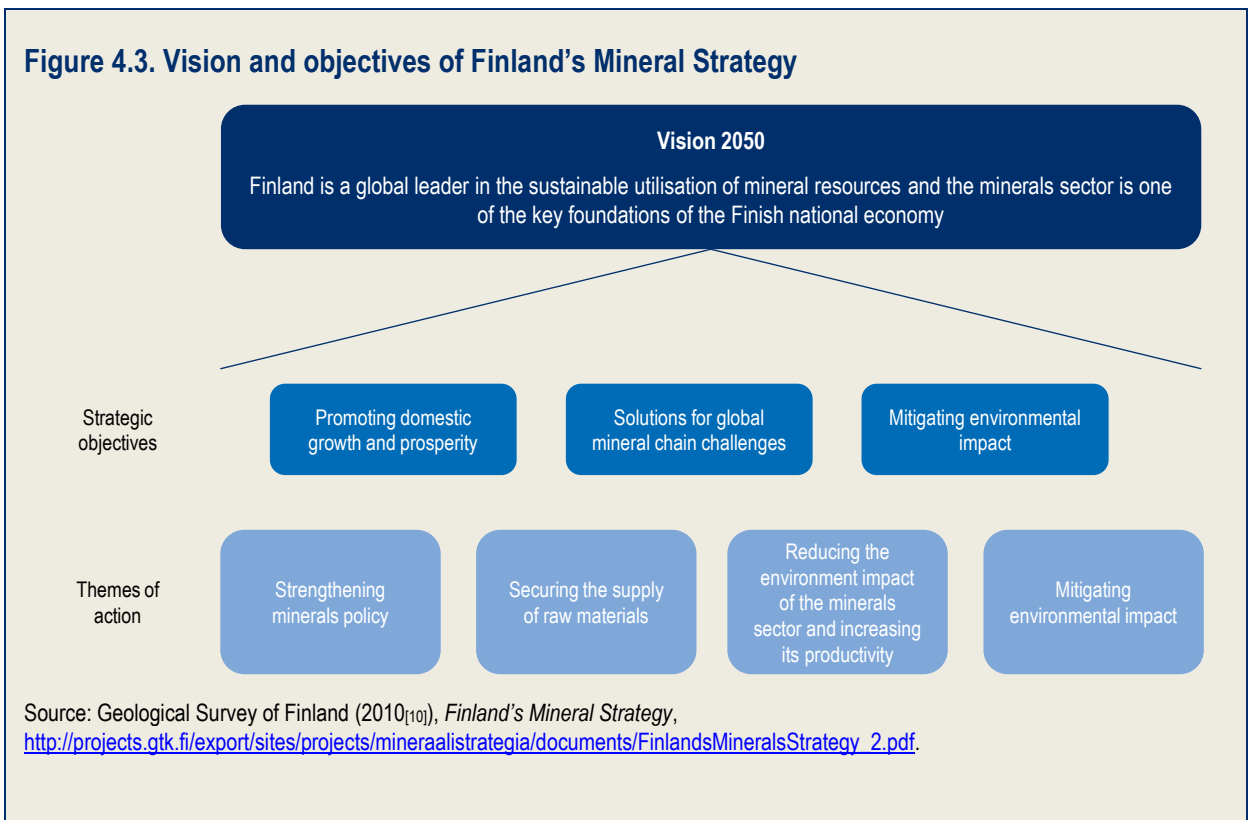
Developing this overarching vision requires consensus within the regional government and across different actors at the local level. This vision needs to gather views on the role of mining for local development and the concerns of the effects of this activity on the environment and society. According to the OECD (2018<sup>[14]</sup>), some useful techniques to set strategic visions are interactive methods of brainstorming and roundtable discussions. This vision is usually defined first by a small group of main stakeholders and then shared with wider stakeholder groups for discussion and consensus. The vision statement should be concise, short, clearly written, easy to remember and should clearly provide future direction (Vági and Rimkute, 2018<sup>[14]</sup>).

#### **Box 4.4. Vision and objectives in the National Mineral Strategy of Finland**

Finland’s diverse mineral resources represent a significant part of the Finnish national wealth. Finnish expertise and innovations in the minerals sector also have a significant global impact, through the provision of exploration and mining equipment and processing technologies and services. Effective utilisation of Finnish mineral resources both secures the supply of raw materials and creates the prerequisites for balanced and sustainable regional development far into the future. Through the country’s expertise in the minerals sector, Finland can also actively promote a global minerals economy that is both efficient and socially and environmentally responsible, as well as generate new international business opportunities.

Three strategic objectives and 4 distinct themes of action that involve 12 action proposals have been defined to facilitate the implementation of the mineral strategic vision (Figure 4.3).

**Figure 4.3. Vision and objectives of Finland's Mineral Strategy**



*Materialising the vision through a regional brand: A raw material talent system*

Regional branding contributes to building territorial identity and is an important aspect in a global business environment. A common branding is more than a question of labelling: it could be used to shape the vision, projects and stakeholders that can be empowered to join forces and act stronger together. Andalusia is mainly renowned for its touristic and cultural characteristics, which place it as one of the most attractive regions for tourists in Spain (de las Herras Pedrosa, Jambrino and Iglesias, 2013<sub>[15]</sub>). Yet, Andalusia also has a rich mining history, current competitive geology and diverse mining value chain, which can be better promoted. The region also hosts one of the most important events in mining in Europe (the Mining and Minerals Hall), which has repeatedly attracted more than 10 000 participants (Box 4.5).

The common vision on the role of the mining sector could be materialised through a clear brand that makes the region internationally visible as an attractive place for a new way of mining and processing minerals. By benefitting from its nature-based touristic appeal and its progress in renewable energy production, Andalusia should establish an image that goes beyond mining as a purely extractive sector towards a branding where the region is seen as a raw material talent system with a local high-tech business environment that produces essential minerals and materials for the low-carbon transition. It would help the region to gain visibility internationally and pull investors into high-value-added activities.

This regional branding can involve other ministries and in parallel to the vision. The objectives defined for the regional brand on Andalusia's capacity to transform materials sustainably could be manifold:

- Promote the geographic location (close to Africa) and cultural proximity with Latin America as well as its geology and good infrastructure to attract innovative companies working on sustainable mineral extraction and transformation processes, and development of green technologies.
- Advertise the mild climate, beaches and culture to pull in skilled workers able to meet the industry's needs.

- Improve the image of mining by moving away from the old-fashioned view of activity with high environmental impact and low-quality jobs to one closer to modern mining that follows strict standards and utilises technology to reduce environmental effects and provide high-value-added jobs for men and women of all ages.

As part of the branding effort, Andalusia could be distinct as a mining jurisdiction within international mining rankings or lists. One first step to propose is for Canada's Fraser Institute to consider including Andalusia as a stand-alone region within its Annual Survey of Mining Companies. This survey is a key industry indicator of the mining potential and investment attractiveness of selected countries and regions and currently encompasses Andalusia within Spain. However, Spain does not appear every year (it is not present in the 2019 edition) and the country players' responses (as a whole and not by region) to the institute's survey tend to be rather low (Yunis and Elmira, 2021<sup>[16]</sup>). There are several countries (Argentina, Australia, Canada, the United States) that are surveyed on a per-region basis and this would help position Andalusia as an established and up-and-coming mining jurisdiction.

#### Box 4.5. The Mining and Minerals Hall

As part of Andalusia's public policy on promoting its mining industry, the regional government identified the advantage of creating an Andalusian international congress (Action 1.2.1 of the Andalusia Mining Strategy 2020). Under this initiative, Andalusia hosted one of the world's leading industry conferences. With this, Andalusia boosted its international image, which can continue to grow by considering its participation in other events such as the African and Latin American INDABA in South Africa, EXPOMIN in Chile and PERUMIN in Peru.

This event – a joint project with AMINER, the Andalusian mining company's sectoral institution – takes place every two years and is a meeting point for mining sector participants as well as a forum to present and showcase Andalusian mining to the world. The conference's maiden edition was held in November 2015 and was named at the time the Metallic Mining Hall. A total of 114 exhibitors and 10 000 participants attended this first event. The conference was again repeated in October 2017, with a total attendance of 130 exhibitors and 11 000 participants. The event has been gathering momentum and for its latest edition was re-named the Mining and Minerals Hall (MMH), catering for the NM mining sector as well.

The latest edition took place in October 2019 and included a total of 150 exhibitors and more than 10 000 attendees. According to AMINER, the MMH is now considered to be among the most relevant (if not already the leading) Spanish mining industry event and one of the most important events in Europe.

Source: Mining and Minerals Hall (n.d.<sup>[17]</sup>), MMH, el evento de la minería del siglo XXI, <https://mmhseville.com/#> (accessed on January 2021)

In summary, the regional government of Andalusia should implement a number of actions to define the role of mining for regional development and establish an overarching common objective in the new strategy:

- Agreeing on a clear vision for mining development in the updated mining strategy. This vision should include a long-term timeline (e.g. 2050, as the EU Green Deal) and be comprehensive to mobilise all of the region's comparative advantages. This requires consensus within the regional government and across different actors at the local level (municipalities, companies, universities and communities). This vision should be aligned to make Andalusia a frontrunner in meeting EU climate goals.

- Enhancing the mining brand in the region and creating a plan to promote it internationally as part of the mining strategy. This brand and its promotion activities need to be developed and co-ordinated with other promotion strategies and actors in the region. The brand should aim to attract new firms and skilled workers. It should help change the image of regional mining to a raw material talent region with an innovative business environment that produces essential materials and know-how for the low-carbon transition.

### ***Improving the strategy with concise objectives, a timeframe of actions and sound monitoring***

The strategic planning for mining development requires the definition of different levels of objectives formulated in a concise manner. The current strategy has two levels, four general ones and five strategic (also called axes) (Table 4.4). Some of the four objectives in the current strategy are lengthy and cover a large array of topics in one single statement. For instance, the third objective “Integrating environment with mining activity and increasing the value of Andalusia’s mining heritage to boost touristic, cultural, social and economic sectors” covers a goal on the environment and on tourism at the same time. Furthermore, the multiplicity of goals is not clarified in the axis, which in the former example has a similar formulation to the general objective.

The objectives need to involve a short- and long-term timeframe. The current strategy does not classify objectives or axes according to a timeframe, overlooking that some tasks take longer to achieve than others. In very practical terms, a timeframe of objectives is needed to set the order of priorities and thus the action lines. While the general objectives are usually defined for the long term or the culmination of the strategy, they can also be ordered in a sequential timeframe. In turn, the axis (or specific objective) should be organised according to ambitious but realistic deadlines.

To make a new mining strategy with clear goals ordered in a sequential time, the regional government of Andalusia should:

- Establish objectives that represent a clearer and longer-term goal, framed with basic statements in a way that informs the direction of the strategic actions. Andalusia could use the SMART (specific, measurable, achievable, realistic and time-bound) model to define the length and formulation of objectives (Box 4.6).
- Create a timeframe for objectives by indicating which axis and action lines are a priority for the next few years (e.g. 2021-24) and which ones are inscribed in a longer timeline (2030).

#### **Box 4.6. Governance SMART model to define general objectives in a strategy**

Objectives serve as the basis for creating the framework of the policy and are fundamental to the monitoring and evaluation of performance.

The suitability of objectives should be tested against the so-called SMART model. Objectives should be:

- Specific – an objective must be concrete, describing the result to be achieved, and focused, contributing to the solution of the problem.
- Measurable – an objective should be expressed numerically and quantitatively in relation to a specific benchmark and should allow the progress of implementation to be tracked.
- Action-oriented/attainable/achievable – an objective should motivate action and should state what is to be improved, increased, strengthened, etc., but should also be reachable.

- Realistic – an objective should be realistic in terms of time and available resources.
- Time-bound – the realisation of the objective should be specified in terms of a time period.

The set of objectives should tell the “story” of the strategy in a logical and sequential way, so they should be logically connected. They should be connected to all of the defined and selected problems that require reform and – where multiple layers of objectives are used – should be linked to each other, in order to provide a complete picture of the reforms envisaged.

Source: Vági, P. and E. Rimkute (2018<sup>[14]</sup>), “Toolkit for the preparation, implementation, monitoring, reporting and evaluation of public administration reform and sector strategies: Guidance for SIGMA partners”, <https://doi.org/10.1787/37e212e6-en>.

### *Strengthening the monitoring and evaluation process*

As mentioned before, Andalusia’s mining strategy has a comprehensive monitoring framework of mining strategy. This framework includes a number of specific tasks with performance indicators to measure the implementation status of each action line. For example, Action line 1.2 “Boosting government support to mining activity” includes two specific tasks: “Development of the Mining and Minerals Hall in Seville (MMH)” and “Promotion of strategic sectors of the region for investment attraction”. Each specific task includes a number of performing indicators to track its achievement. As a single task requires actions from different local actors in charge (government agencies or private sector), the monitoring framework evaluates the status implementation for each of the actors.

Andalusia has the scope to improve the monitoring framework of the new strategy through a clear differentiation among outcome and output indicators (Box 4.7). Most indicators in the 2020 strategy measured the achievement of operative tasks rather than the ultimate achievement of the actions. Indicator-measuring operative tasks are considered as output indicators that track the operative actions needed to achieve the axis or specific objectives (Schumann, 2016<sup>[18]</sup>). In turn, outcome indicators measure the reason for implementing the actions in the first place. In the previous example, the monitoring indicators for Action line 1.2 measure whether the MMH was conducted and the promotion of the strategic sector was undertaken. However, there is no outcome indicator to track whether the tasks in Action line 1.2 led to a greater attraction of investment or requests for permits.

#### **Box 4.7. Example of a result policy chain in the EU**

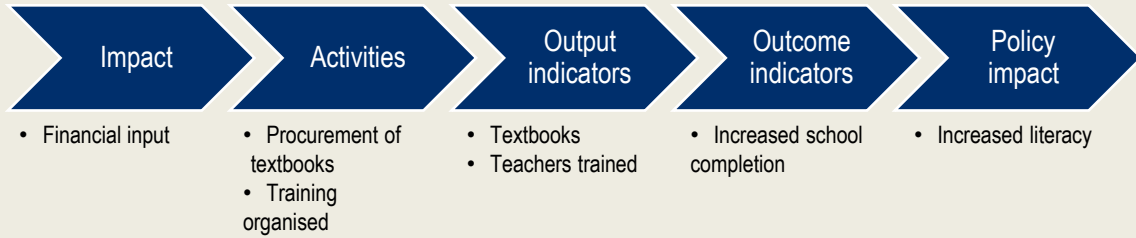
The monitoring of the achievements of the 2014-20 European Cohesion Policy is based on specific indicators (common indicators), associated with the priority axis, category of regions (where relevant) and investment priority in each European operational programme. Each indicator has a baseline target to reach and is monitored during the entire programming period.

Figure 4.4 below shows an example of how an EU-funded project – in the field of early childhood education – would trigger (measurable) changes at different levels forming a “result chain”. After the initial financial commitment and the activities implemented on the ground, it generates a direct output (in this example, the number of textbooks distributed to the students and the teachers trained by the project), producing the intended outcome of the project (increasing school completion). The outcomes of multiple projects generate the overall policy impact (e.g. increased literacy).

Indicators associated with each stage of the chain should be carefully monitored and evaluated against suitable counterfactuals (what would have happened without the project/policy?). Monitoring and

evaluation should be part of gradual, transparent evidence-based policy learning (Crescenzi, de Blasio and Giua, 2018<sup>[19]</sup>).

**Figure 4.4. Example of result chain in the EU**



Source (figure): Adapted from EC (n.d.<sup>[20]</sup>), *EuropeAid - DEVCO 06 - Quality and Results*, European Commission; Crescenzi, R., G. de Blasio and M. Giua (2018<sup>[19]</sup>), "Cohesion policy incentives for collaborative industrial research. Evaluation of a smart specialisation forerunner programme", <https://doi.org/10.1080/00343404.2018.1502422>; Crescenzi, R. (n.d.<sup>[21]</sup>), "Indicators for territorial public policy: the case of the European Union".

The new strategy also needs to avoid duplication, while promoting horizontal indicators. The current strategy does not have indicators with a sense of complementarity and transversality. Some key challenges like innovation in the mining value chain are measured separately within different actions lines. In this case, these types of horizontal goals should have a horizontal indicator that gathers all of the different efforts on this matter. These types of horizontal indicators help improve the clarity over the responsibilities of each ministry or local actors and avoid duplication of some performance indicators. For instance, in the current strategy, the action on supporting research on mining potential (Action line 1.4) includes specific tasks on articulating measures to promote research, something similarly measured in the action line on expanding research, innovation, co-operation and competitiveness (2.1).

Objectives and monitoring indicators in the strategy can also be linked with global agendas. Linking objectives and outcome indicators to global agendas such as the SDGs can have a twofold benefit. On the one hand, it can help improve social and political perception on mining and reveal the benefits of this sector over regional well-being. On the other, this alignment can help identify and develop synergies with the regional strategies and link local objectives with longer timeframes. Many OECD regions have linked different sectors with SDGs (OECD, 2020<sup>[22]</sup>).

To improve the monitoring framework of the new mining strategy, the regional government of Andalusia should:

- Differentiate among outcome and output indicators to measure ultimate objectives and operative tasks differently.
- Develop horizontal indicators that measure transversal objectives in the strategy and avoid duplication across specific task indicators, while creating complementarities.

### ***Involving municipal governments and local communities in the mining strategy***

The updated mining policy has scope to further take into account the municipal development strategies and the communities' needs and vision. While the diagnosis for the 2020 strategy analysed the mining characteristics of municipalities, the strategy fell short in identifying specific roles for municipal governments to meet strategic objectives and strategies to create partnerships with communities for policy implementation. As mines are geographically located, mining requires a place-based policy approach that accounts for the singularities of the hosting areas. It is instrumental to define the possible effects of mining

on local economies and ensure local governments are aligned with the policies so as to increase social license to operate mining ventures.

### *Collaborating with municipal governments*

Involving local governments in the strategic planning for mining development provides legitimacy and consolidates the vision, objectives and implementation mechanisms of the strategy. Local governments are complementary to the strategy as they provide a local vision and support with resource management and policy implementation. In Andalusia, municipal governments can be key players in supporting the mining permit process by creating a dialogue mechanism with local communities and addressing environmental concerns.

The 2020 mining strategy lacks clarity on the roles of municipal governments in mining development. Unlike with the private sector, the preparation and monitoring process of the strategy rarely states the role of local governments in the definition or achievement of the strategic objectives. For example, in the monitoring framework, only a few indicators monitor the actions of municipal governments to meet the goals.

Integrating municipal development plans and views in the mining strategy can be done through active and formal co-ordination mechanisms. While the regional government has regular interaction with local governments, this co-ordination is not formally institutionalised. Instead, it occurs through a case-by-case scenario for specific projects or to address particular issues. Aligning the mining strategy with the municipal development plans should be the first step to closer collaboration. The regional government should also establish a formal communication channel to ensure the continuity of co-ordination over time. This channel could be included within a formal multi-stakeholder platform on mining development that meets regularly (see next section).

### *Involving local communities in the mining strategy*

The updated mining strategy also needs to strengthen the engagement of local communities and public interest groups within policy design and implementation. Defining mechanisms to involve citizens in future development and incorporate their feedback can improve the quality of policy outcomes (OECD, 2020<sup>[23]</sup>). Local dwellers not only have a better knowledge of local conditions but also the capacity to adapt policies according to the context. Greater participation of communities in policy definition increases public satisfaction, ownership and trust in the policy (OECD, 2017<sup>[24]</sup>). Modalities of engagement vary from basic communication, the weakest form of engagement, to full coproduction and co-delivery of policies with a balanced share of power among stakeholders (OECD, 2020<sup>[23]</sup>).

A first step in the engagement with communities would be to involve public interest groups in the preparation and monitoring process of the new strategy. It is worth noting that the Secretary of Industry and Mining of Andalusia has tried in the past to identify and involve community representatives and public interest groups in the mining policy process but it encountered challenges in identifying the right counterpart at the local level and obtain an active response and participation.

Apart from the private sector and universities, with which the regional government seems to have frequent interaction, the Secretary of Industry and Mining of Andalusia should establish institutional channels to engage with the local community. Some OECD regions have implemented citizens' platforms combined with local elected officials, local businesses and other relevant stakeholders (universities), which contribute to promoting specific regional development strategies and oversee implementation (Box 4.8). The General Secretary of the Industry and Mining could also find useful the engagement strategy that Canada undertook when designing its national mineral plan.

### Box 4.8. The Citizen Engagement Summit

The Baltic Urban Lab is a European initiative based on the concept of people-private-public partnership (4P), involving a wide variety of projects in Nordic countries.

Within this framework, a project for the inclusion of citizens in deciding on climate change adaptation options was carried out in 2011 called “Citizens vote on climate change adaptation options in Kalundborg”. Kalundborg is a municipality located on the island of Sjælland in Denmark and home to 20 000 inhabitants. It is threatened by the impacts of climate change as it has a coastline, lowlands and sensitive areas with delta characteristics. Sea level rise and changes in rainfall, as well as infrastructure and water quality, are the main risks associated with climate change. The municipality of Kalundborg together with the Danish Board of Technology (DBT) organised a citizens’ summit where 350 local citizens discussed how Kalundborg should adapt to a future with a warmer climate.

Before the summit, citizens were given relevant information material and presented with the pros and cons of the different adaptation options obtained through a scenario workshop. The methodology used for the workshop was to present to local stakeholders the implications of the possible flooding of the Kalundborg area. On this basis, they developed different solutions to the challenges in a scenario workshop. Finally, citizens debated and voted on these options.

As a result, two-thirds voted in favour of phasing out the current land use – mostly farmland – to turn it into wetlands, rather than building dykes. In terms of the period for action, the vast majority of citizens (90%) requested that the municipality act now and develop long-term plans based on climate change scenarios. Thanks to the participatory nature of the decision-making process, local politicians were able to make broader decisions taking into account a broader view of local interests.

Source: Interreg Central Baltic (2012<sup>[25]</sup>), “Citizens vote on climate change adaptation options in Kalundborg”, <https://www.balticurbanlab.eu/goodpractices/citizens-vote-climate-change-adaptation-options-kalundborg>.

### Box 4.9. Engagement strategy in the Canadian Minerals and Metals Plan

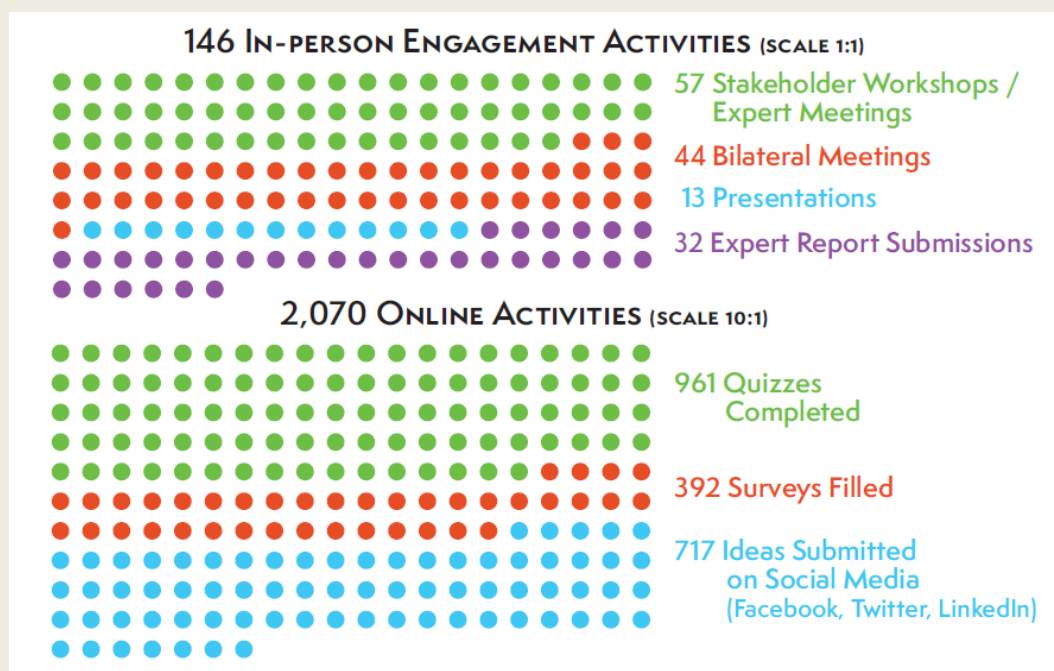
The Canadian Minerals and Metals Plan includes a vision, principles and strategic directions that governments, industry and stakeholders can pursue to drive industry competitiveness and long-term success. This generational initiative aims to raise Canadians’ awareness of the importance of the minerals and metals sector, respond to ongoing and emerging challenges and help position Canada for opportunities offered by an evolving economy.

This plan was informed by engagement with Indigenous peoples, innovation experts, private companies, industry associations, non-governmental organisations, young people, other stakeholders and partners, as well as Canadians from across the country.

The government developed an engagement approach with civil society to gather main concerns, ideas and suggestions to fit into the plan. This engagement process included in-person activities with workshops, bilateral meetings and expert report submissions. It also adopted online activities through quizzes, surveys and ideas submitted through social media (Figure 4.5).



Figure 4.5. Analytics of the engagement strategy in the Canadian Minerals and Metals Plan



Source: Government of Canada (2019<sup>[26]</sup>), *The Canadian Minerals and Metals Plan*, [https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/CMMP/CMMP\\_The\\_Plan-EN.pdf](https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/CMMP/CMMP_The_Plan-EN.pdf).

Reflecting the community interest in the strategy also needs to clarify the mechanisms and measures to increase local benefits from mining activities. Host communities tend to be on the front line regarding the negative externalities from mining ventures, while benefits span across regional governments and firms. A clear framework on benefit-sharing agreements can help mining regions promote a more even distribution of the benefits of mining ventures. If well designed, these agreements are important tools to increase economic opportunities and quality of life for host communities and reduce social conflict around mining (O'Faircheallaigh, 2013<sup>[27]</sup>). There are different types of benefit-sharing agreements:

- Monetary benefits (also known as benefit funds) include payments, profit sharing, tax-sharing (e.g. royalties) and investment funds.
- Non-monetary benefits comprise local hiring, skills development, education, cultural support and environmental protection and remediation. In terms of governance, agreements can be government-controlled, voluntary company-led initiatives, partnership models among others (Söderholm and Svahn, 2014<sup>[28]</sup>).

Besides the type of agreement, the extent to which benefit-sharing agreements deliver robust results for communities comes down to how they are governed and implemented. Some agreements are privately negotiated and legally enforceable (some non-monetary benefits agreements), while others are general financial structures with revenues collected by governments (e.g. benefit funds). These agreements can be government-controlled, voluntary companies-led initiatives, partnership models or ownership and control models. While the government leads actions in the government-controlled type, it may equally play some role in voluntary, company-led and partnership models as a facilitator (Box 4.10).

In Andalusia, distribution of benefits from mining operations occurs through tax/royalties and company-led voluntary initiatives. Taxes from mining operations in Andalusia are collected at the regional level and distributed to various activities, including but not restricted to the development of mining communities.

Private companies such as CLC have established programmes to promote local development through funds to support local SMEs and entrepreneurship as well as activities for economic diversification. Leveraging these initiatives and promoting clear structures to increase their local impact would benefit from a clear route map at the regional level.

#### Box 4.10. Lessons from benefit-sharing agreements in the context of Indigenous communities

Benefit-sharing agreements and funds are often established at the onset of resource development or the extraction process and set out a financial or working relationship that spans its lifetime. Benefits may include payments, profit sharing, local hiring, skills development, education, cultural support and environmental protection and remediation.

Benefit sharing takes several forms and governance types:

**Table 4.6. Benefit-sharing models and governance types**

A. Government-controlled benefit sharing	
Resource sharing revenues/benefit funds	Sharing of industry revenues collected by governments with Indigenous peoples and/or communities. This includes but is not limited to taxes, royalties, penalties, permits and other fees.
Local content obligations	Targets for the hiring of local workers and procurement of local goods and services may be included in host government agreements with companies and in some cases is legislated. Government-mandated local content is frequently interpreted as "national" content, rather than targeting local and Indigenous communities.
Mandatory social investment	Social investment spending can be mandatory as part of a host government agreement or national legislation, whereby companies are required to invest in infrastructure programmes, such as road construction or health facilities, as a condition of their licence.
B. Voluntary company-led initiatives	
Voluntary engagement	Companies may voluntarily engage in community engagement and/or investment in addition to their mandatory obligations under the law. For example, the International Council on Mining and Metals (ICMM) <i>Community Development Toolkit</i> and <i>Good Practice Guide: Indigenous Peoples and Mining</i> .
Strategic social investment	Social investment spending on programmes is designed to survive beyond the life of the industrial project and/or to create value for the industrial project. These might include micro-credit programmes, local livelihood support programmes, skills training, enterprise development support or conservation programmes.
C. Partnership model	
Voluntary local content initiatives	Companies may develop partnership programmes based on voluntary targets and initiatives to train and bring in the local and Indigenous workforce to a project, with training and enterprise support linked to opportunities to secure employment or contracts, often with an element of preferential contracting. This may or may not form part of a wide benefit-sharing agreement.
Privately-negotiated benefit-sharing agreements	Benefit-sharing agreements are negotiated directly with communities and may include payments, profit sharing, local hiring, skills development, education, cultural support and environmental protection. These are likely to be closely related to impact assessments and may also provide the basis for a process that reflects principles aligned with the concept of free, prior and informed consent (FPIC). Benefit-sharing agreements may include benefit funds: the payment and management of royalties from development activities to affected Indigenous communities and peoples.
D. Ownership and control	
Communities' ownership	Communities' ownership of companies or equity shares in enterprises involved in extracting or processing resources or enterprises providing services to the industry. Opportunities can be enhanced through government support and preferential contracting.

Communities control	In the case of Indigenous peoples, control relates to Indigenous peoples' right to determine their own development priorities and strategies and includes participation in strategic-level decision-making on resource-related policies, programmes and regulations, including resource mapping, zoning and land allocation and environmental processes (such as remediation) and FPIC.
Source: Adapted from Raderschall, L., T. Krawchenko and L. Leblanc (2020 <sup>[29]</sup> ), "Leading practices for resource benefit sharing and development for and with Indigenous communities", <a href="https://dx.doi.org/10.1787/177906e7-en">https://dx.doi.org/10.1787/177906e7-en</a> and Wilson, E. (2019 <sup>[30]</sup> ), "What is benefit sharing? Respecting Indigenous rights and addressing inequities in Arctic resource projects", <a href="http://dx.doi.org/10.3390/resources8020074">http://dx.doi.org/10.3390/resources8020074</a> .	

In sum, to improve engagement and make sustainable partnerships with municipal governments and local communities for mining development and support even distribution of its benefits, the new mining strategy should:

- Align the new mining strategy with municipal development plans. This involves ensuring frequent dialogue with municipal governments and early involvement in the development process of the strategy. Co-operation with municipalities can be done through the renewed technological centre for mining and the proposed multi-stakeholder co-ordination platform for mining development.

Include in the new strategy a guideline/toolkit to structure and implement benefit-sharing mechanisms from mining in Andalusia. It includes outlining the models used in the region and facilitates capacitation programmes for organisations and communities to make the most of the benefit-sharing process.

### ***Unlocking synergies with other policy strategies/sectors to boost innovation***

Mining activity has important links with the local economy, especially with regards to services. Yet, in Andalusia, the links of the mining sector with other economic activities seems low, with particular scope to improve linkages with the service sector (Chapter 3). In fact, the mining strategy for 2014-20 lacks objectives to upscale associated services to mining operations and link them with mining firms. While the mining strategy maps the different regional strategic policies with which mining development has a potential relationship (economic, innovation, environmental), the strategy does not describe the tools or institutional mechanism to co-ordinate policies across the different sectoral strategies.

The new mining strategy needs to map the contribution of mining to regional development and smart specialisation strategies. The updating process of the regional development plan 2021-27 is a good opportunity for the regional government to recognise the potential of the mining value chain to meet regional goals. This new development plan of Andalusia (Strategy for Economic Transformation of Andalusia 2021-27) aims to prepare the local economy and population to face the increasing global challenges related to digitalisation, globalisation of value chains, climate change and low demographic growth (Regional Government of Andalusia, 2019<sup>[31]</sup>). To this end, the region has set five main priorities of development for the period 2021-27 (Table 4.7).

**Table 4.7. Objectives of the Strategy for Economic Transformation of Andalusia 2021-27**

Objectives	Mechanism
Increase regional competitiveness	Transformation of regional productive fabric through innovation and assimilation of new technologies by companies, especially SMEs. At the same time, it aims to reinforce entrepreneurship, new industries and advanced services, modernisation of traditional sectors as well as adapting the educational system. All these actions will contribute to attaining greater productivity gains.
Transitioning towards a low-carbon economy and preparing for the consequences of climate change	Through supporting the prevention of risks, the management of water resources and the reduction of polluting emissions. At the same time, understanding these challenges as an opportunity for the transition towards a low-carbon economy and the development of new energy systems and alternatives such as the circular economy.
Correcting the structural backwardness of Andalusia's economy	Improving the transport network and the digital connectivity to reduce the cost of distance, achieve higher levels of integration and real convergence.
Reducing the levels of inequality and the risk of social exclusion	Strengthening health policies, care for dependency, housing, as well as the activities of public services on employment and training.
Contributing to the reduction of existing territorial imbalances within Andalusia	Through differential and specialised attention to supra-municipal areas that make up coherent areas, due to their physical, functional and socio-economic characteristics or the existence of inter-municipal co-operation formulas. It will promote integrated and sustainable urban and rural development, based on the unique characteristics of each area.

Note: Objectives are taken from a preliminary version of the strategy. They can differ in the final document.

Source: Regional Government of Andalusia (2019<sub>[31]</sub>), "Aprobación de la formulación de la Estrategia para la Transformación Económica de Andalusia (ETEA) 2021-2027", *Boletín Oficial de la Junta de Andalusia*, No. 218, page 47.

The new mining strategy can identify the role of the local mining value chain to attain the five objectives in this regional development plan. Some links include:

- Increasing the productivity in the mining value chain can help Andalusia to enhance its regional competitiveness (Objective 1 of the economic strategy). Mining is one of the most productive sectors in the region due to the important participation of multinational companies that compete in the global market through innovation. Leveraging the international characteristics and technological progress in this sector can support local innovation and productivity (Chapter 3).
- The relatively high productivity and connectivity of the regional mining sector, particularly the metallic subsector, can ultimately support the convergence of the regional economy towards higher income levels (Objective 3 in the economic strategy).
- Efforts in the mining value chain to reduce carbon emissions across the mining value chain can accelerate the regional transition towards a low-carbon economy (Objective 2 in the economic strategy). Mining companies are increasingly investing in new technologies to minimise environmental impact in terms of water consumption and land restoration. This practice and technological progress can also support circular practices in other related sectors and enhance the environmental outcomes of the regional industry.
- Mining activity can also help Andalusia reduce the territorial and income inequality in the region. Mining extraction in Andalusia is located in rural municipalities, where it represents the main income source. Huelva, the mining province in the region, has in fact a higher gross domestic product (GDP) per capita and productivity than the regional average. Likewise, the labour demand of mining in rural places can attract unemployed population from other provinces and migrants, thus contributing to reducing regional income inequality. Supporting the connections of the mining extraction with other activities in the rural places can help to meet a more balanced territorial development.

Furthermore, the right co-ordination with the regional smart specialisation strategy can make the mining sector an engine of innovation in Andalusia. The regional Smart Specialisation Strategy 2014-20 was built on six objectives that aim to create a common framework of intelligent specialisation, in which ICT and

support infrastructures allow the development of creative environments where networking constitute basic dimensions for the advancement of innovation (Table 4.8). The fifth objective of this strategy acknowledges the relevance of environmentally sustainable management of natural resources, leveraging metallic mining as a referent of innovation in the region (Regional Government of Andalusia, 2012<sub>[32]</sub>).

**Table 4.8. Objectives of Andalusia’s Smart Specialisation Strategy 2014-20**

1.	An Active Andalusia, in which entrepreneurs can make their projects come true, creating wealth and quality employment for all, developing an innovative and high-productivity economic model that advances in convergence with Europe.
2.	An Advanced Andalusia where quality education and training promote talent, a talent necessary for research of excellence in universities, knowledge agents and companies, and also necessary for entrepreneurs and companies to transform that knowledge into new industrial products and innovative services.
3.	An Andalusia Open to people and exchange, articulated inland and internationalised, that benefits more from the elements that differentiate it (its geographical position, climate, natural environment, rural environment, marine environment and system of medium cities) in which Andalusia is a benchmark; improving competitiveness and achieving greater social and economic growth.
4.	A Healthy Andalusia, attractive to work, live and visit with a high quality of life and well-being in which health, food, leisure and culture converge.
5.	A Sustainable Andalusia, more efficient, in which natural resources are valued in an intelligent way and in which progress continues in respecting and protecting the environment.
6.	A Social Andalusia in which all citizens participate actively and responsibly in public life, within the framework of an inclusive society in which cultures, history and traditions are elements of cohesion and co-operation, with each administration more agile, transparent and respectful in the management of the public.

Source: Regional Government of Andalusia (2012<sub>[32]</sub>), *Innovation Strategy of Andalusia 2020 (RIS3)*, <https://www.juntadeandalucia.es/export/dupaljda/Documento-Ris3-version-final-8-27-02-15.pdf>.

To promote closer collaboration among mining and the smart specialisation strategy of Andalusia, the mining strategy needs to outline the different links with sectors identified as the pillars of regional innovation. Some of these sectors include aerospace and aeronautics, renewable energies, environmental industries and services, construction and tourism. These sectors not only require specific minerals and materials to improve their competitiveness but can also benefit from the technologies and practices developed from mining companies (water management, automation of process, etc.). If Andalusia is to boost innovation, the regional government needs to create the co-ordination mechanisms to put into action the synergies among these key sectors, as mining policies on their own cannot unlock all of the potential of the mining value chain and related activities. To promote such horizontal co-ordination among policies, many OECD regions and countries have established inter-ministerial committees in the form of advisory councils, platforms, networks or regional committees as well as conditionality schemes to combine deferent policies (OECD, 2017<sub>[33]</sub>).

Ensuring greater co-ordination between the different autonomous authorities in charge of infrastructure and services within the region can also facilitate the development of mining projects. Energy, ports, water, IT and logistics are all the responsibility of different areas of the administration, in some cases under non-centralised agencies (e.g. *Andalusian Energy Agency, Public Agency of Ports of Andalusia*). Including these authorities within the platform for dialogue on mining development should be an important strategy to co-ordinate service and infrastructure policies. Likewise, the active participation as a facilitator of Andalusia’s Innovation and Development Agency is a key aspect to promote effective co-operation across the government to unlock the potential synergies on innovation between mining and other sectors.

Making the most of the mining sector’s contribution to the regional objectives requires governance arrangements to promote policy complementarities across ministries and levels of government. To mobilise the co-ordination among levels of governments, the regional government of Andalusia should:

- Implement a formal inter-ministerial platform within the Government Council of the regional government to co-ordinate sectoral policies focused on mobilising the potential of mining

development. This mechanism should involve regional ministries, governmental provinces and some key non-centralised agencies responsible for key service and regional infrastructure (e.g. *Andalusian Energy Agency*). It is important for this collaboration to set objectives in the short and long terms and make them publicly available.

### *Promoting local networks and a mining cluster to boost innovation*

As mentioned in Chapter 3, Andalusia has the potential to develop a strong cluster around mining. Clusters have been identified as a well-established mainstay of regional development policy that can promote economies of scale and innovation within a group of firms connected through one or more linkages (colocation, skills, input-output relationships) (OECD, 2018<sup>[34]</sup>).

The region has different strengths across the mining value chain that can be mobilised to form an international competitive cluster, including foreign-based international mining and manufacturing companies, the connection to external markets and an extensive network of universities and research centres, among others. A well-functioning cluster often requires policy to support sound linkages and spill-overs among the regional economic activities in a related industry (Ketels, 2017<sup>[35]</sup>). In Andalusia, those linkages inside the mining environment are fragmented. Chapter 3 has already explored the institutional setting that can help Andalusia create sustainable linkages. Acknowledging the mechanisms to improve those links within the new mining strategy can institutionalise the channels for collaboration among local actors and build the path toward higher value-added activities.

The region has already some traditional clusters located in specific municipalities, which are socio-economically relevant and can be further scaled up. The Macael Marble District (MDD) has been the area where regional policies have tried to strengthen a cluster dynamic around NM mining in the past (Chapter 3). The regional government has conducted a number of policy actions to boost co-operation within this ornamental marble industry in Almería, including branding and internationalisation strategies. Yet, the MDD remains composed of small and micro companies, along with some big players that struggle to benefit from agglomeration economies and collaboration. The absence of clear links with other types of mining or sectors and the lack of collaboration based on demand-driven projects led to a growth stagnation in this marble ecosystem.

Developing a cluster cannot be a top-down policy led by policymakers. Instead, policy should create the right conditions for co-operation among local actors, beyond simple geographical proximity (colocation) (Crescenzi, Nathan and Rodríguez-Pose, 2016<sup>[36]</sup>). Companies already integrated around a similar industry can exploit a number of linkages including social collaboration (existing or previous business collaboration between two actors), innovation (partnerships on research) and commercial collaboration, among others. Andalusia has had some experience of these type of dialogues, particularly in the formation of the Andalusian aeronautical cluster, which involved high-level meeting with local actors to agree on roadmaps and a schedule of commitments. This cluster allowed the arrival of new companies and collaboration with suppliers.

In the specific case of the mining sector in the region, the NM sector can further collaborate with the construction sector to attain the regional goals of producing more sustainable construction materials. This type of mining can also benefit from practices and technologies from metallic extraction. Likewise, the metallic mining industry can exploit stronger collaboration with refineries and manufacturing players, especially on research partnership and commercial collaboration through clear project-based co-operation, aiming at developing the green process and technologies required by the EU Green Deal.

To support a closer collaboration among local actors in the mining value chain and facilitate the formation of an innovative cluster, the new mining strategy should:

- Formalise in the new mining strategy the creation of the multi-stakeholder co-ordination platform for mining development that gathers all relevant actors in the mining value chain to identify

synergies and projects of common interest. This group should have regular meetings, in a formal setting, and help prepare and monitor the mining strategy. For this, the regional government can get inspiration from the Mining Finland programme, which is a membership fee-funded association that provides various services to its members (Box 4.11).

- Include support programmes for collaboration among firms and local actors to generate and diffuse ideas and improve connections to the external market.

#### Box 4.11. Mining Finland programme

- The Mining Finland programme is a non-profit and membership fee-funded association promoting export of Finnish mining technology, foreign investments to Finnish mining cluster and facilitating R&D and education collaboration among mining sector actors working in Finland or co-operation with Finnish companies. It was one of the Finnish government's initially publicly funded growth programmes.
- This platform now condenses all of the information related to the mining activity in the country in a single website. It includes information on current active mines, exploration mining projects and the perspective of resources. The platform also displays the current composition of the Finnish mining cluster and promotes the mining and services companies established in the country.
- Mining companies, universities and other associated companies need to pay an annual fee to be members of the programme. The membership gives companies and organisations access to all of the services offered by the programme, including:
  - Company visibility on programme websites, brochures and publications.
  - Direct contact with international mining industry actors, Finnish embassies and Business Finland export centres.
  - Free participation in the programme's international trade shows, congresses and roadshows, excluding own travel and accommodation costs.
  - Free participation in the programme's networking and match-making events, excluding own travel and accommodation costs.
  - Generic training events.
  - Access to GTK's and Business Finland's expert services and network.

Source: Mining Finland (2020<sup>[37]</sup>), *Mining Finland Programme*, [www.miningfinland.com](http://www.miningfinland.com) (accessed on 15 November 2020).

### ***Enhancing national and international collaboration***

Multi-level governance co-ordination is a key ingredient to implement an efficient territorial approach for sustainable development. Given the autonomy of Spanish regions to develop their own mining strategy and the commonalities among different regional markets, increased co-ordination among regional governments can lead to a stronger mining business environment. At the same time, the prominent role of European policies to increase self-sufficiency in raw materials, provide funding to sustain regions in transition and promote smart specialisation strategies, among others, is an opportunity for regional strategies to find common ground on macro-national policies and pursue their implementation at the local level.

### *Boosting collaboration with other Spanish mining regions*

Different regions in Spain play a relevant role in the mining and mineral value chain and mining production of the country (Chapter 2). Given the regional autonomy in Spain, different regional governments with mining potential have developed their own mining strategies. Many of the regional strategies recognise the potential of the mining sector to boost regional industry and support rural economies as well as the increasing strategic importance at the EU level.

Each Spanish mining region has its own competitive advantages and hosts different types of minerals. Some are planning to phase out coal-related mining (Asturias, Castilla y León), others have ornamental stones and rather small aggregates mining forms (Castilla-La Mancha, Galicia), while yet more have a higher specialisation in industrial minerals and transformation (Catalunia). Some Spanish regions are also global leaders in the production of specific raw materials, as is the case of Castilla y León with slate production.

Collaboration with these regions can be instrumental to share good practices for mining development, unlock synergies and develop new projects. Furthermore, due to the relatively small weight of the Spanish mining sector in global markets, promoting critical mass in mining ventures and associated projects should be seen a main objective of regional co-operation. For example, regional co-operation in research, in education and training and in shared branding can boost competitiveness of regional business networks.

Despite the lack of national co-ordination, some regional initiatives have aimed to support stronger collaboration across mining regions in Spain. The most prominent of those is the Iberian Sustainable Mining Cluster (ISMC) set-up by the International Center in Advanced Materials and Raw Materials of the Castilla y León region. This is a national cluster that brings together over 60 companies and organisations from the mining sector and its associated services with the aim to promote sustainability and circularity while fostering competitiveness and innovation in the mining value chain. The cluster is creating regional offices and units (subclusters) as part of a National AEI (*National business association of excellence and innovation*). The initiative has already presented more than seven projects to obtain funds from the EU and finance circular economy strategies. Andalusia can better collaborate with this initiative to reach greater funding and attain critical mass.

Regions that submit a joint project to EU funds increase the probability of being selected for technical assistance and financing. The type of projects that cover more than one single geographical area and aim to have a greater impact in a territory have preferential access to finance from the European Bank for Reconstruction and Development (EBRD) or the European Investment Bank (EIB). Furthermore, this collaboration can improve knowledge on mining practices and innovations. For example, Asturias and Castilla y León have made great progress in the rehabilitation of old mining sites by creating hubs that are specialised (Castilla y León) or part of international networks (Asturias) on this specific topic.

To improve collaboration with other Spanish regions, Andalusia's Secretary of Industry and Mining together with the regional government should:

- Map Spanish initiatives for mining development and promote partnerships with them. The new mining strategy should specify the goals of these regional partnerships.
- Involve Andalusia in existing regional initiatives for mining development in the country to articulate common projects and apply for EU funding. This can involve joining the ISMC.

### *Increasing co-operation with European regions and EU strategies*

Andalusia's mining strategy acknowledges the relevance of close co-ordination with EU strategies and initiatives, including the EU Green Deal, the EU Raw Materials Initiative and the EU industrial policy, among others. As mentioned before, the EC plays a decisive role in the mining development of European countries. EU policies determine many aspects of environmental regulations, mining operation and closing.



These supranational policies have set mining development as a strategic tool to support the transition to a low-carbon economy and the resilience of European economies. Andalusia can leverage EU strategic and financial support as well as EU regional mining networks to strengthen its local mining environment in a sustainable fashion.

The next programming period of EU investment funds (2021-27) will allocate a greater role to projects around raw materials and ecological transition. Projects aiming to obtain critical raw materials from local sources (existing mines or waste materials or minerals) or to reduce CO<sub>2</sub> emissions in the extraction and transformation of minerals could find good financial and technical support from EU funds. Some of these facilities for technical support and funding are related to the EU Raw Materials Initiative, the EU Green Deal call for projects, EIB funding for raw materials and the Just Transition Fund. Accessing this international support will require a clear strategy to design and define projects in Andalusia.

Connecting with EU mining networks also needs to be a key objective for Andalusia's mining strategy. Networks, co-operation and political representation can be important elements in mining regions' economic and institutional processes. There are mining region networks throughout the world and the EU with different thematic or functional purposes (e.g. political or technical). The potential benefits of co-operation may vary according to the type of co-operation (formal/informal), the resources involved, the motivation and the organisations involved. Benefits from strengthened regional co-operation include:

- Increasing territories' profile and "voice".
- Achieving critical mass.
- Unlocking financial resources and a means of learning and exchanging best practices.
- Addressing innovation challenges.

The EU has a number of co-operation programmes promoting collaboration among mining and metallurgy regions across Europe. These programmes include:

- The Smart and Green Mining Regions of EU (REMIX) project, a network that links EU mineral-rich resource regions to support innovations of large- and small-scale companies in their regional mining value chains.
- The Mining and Metallurgy Regions of EU (MIREU) project, a network of mining regions aiming to develop guidelines and recommendations for the sustainable supply of mineral raw materials to the EU.
- The European Institute of Innovation and Technology (EIT) RawMaterials initiative. Funded by the EIT, this initiative aims to enable the sustainable competitiveness of the European minerals, metals and materials sector along the value chain by driving innovation, education and entrepreneurship.

Andalusia is currently part of MIREU and is involved in the development of the counsel of mining and metallurgic European regions (COMMER). The region is also participating in the INFAC project on mining exploration and is now taking part in the SUMEX project on sustainable mining exploitation. The regional government is also represented in the EIT RawMaterials operational group.

The region has scope to take a leading role in those initiatives, highlighting the specificities of its mining value chain (metallic and NM industry, proximity to cities, etc.). Using these networks to actively promote technological exchange and build common projects with other regions could be beneficial to spark new business opportunities in the region and gain international visibility.

Andalusia can also leverage these networks to consolidate its role in Europe as a bridge with Latin American and North African markets for EU mining innovation and sustainable practices. Putting in use the region's comparative advantage (its geographic location and cultural proximity with Latin America) can be a useful tool to create new partnerships and projects within the EU networks.

At the same time, the region shares a privileged geological location with Portuguese regions, which can be a driver for strategic co-operation. Andalusia has a unique opportunity to create a strong mining collaboration with southern regions of Portugal and is the only Spanish region located in the geological formation of the IPB, shared with other regions in Portugal, including Alentejo (Chapter 3).

Unlike Spain, Portugal has a clear national mining strategy and promotes active co-ordination to mobilise growth opportunities from mining development. Conducting a partnership with those regions in Portugal could also be a vehicle to structure a cross-border mining project and reach foreign investors and EU funds with a unified voice. The possibility and objective of this partnership should be materialised in the new strategy. Clearly setting the intention to promote cross-border collaborations on mining innovation and suitable practices could give a positive signal to the community, other regions and international companies.

To enhance the co-operation with EU mining initiatives and programmes and the collaboration with other EU mining regions, the regional government of Andalusia should:

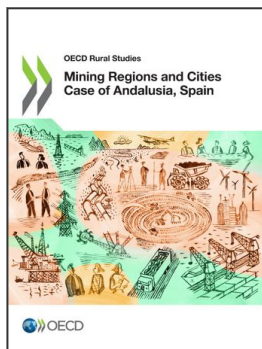
- Join the EU mining networks to promote the exchange of practices and collaboration on projects to mobilise assets of Andalusia's mining value chain. This involves creating partnerships for projects around sustainable practices on mining and technology developments.
- Define new mining strategy tools and projects to materialise the co-operation with Portuguese regions located in the geological formation of the IPB. This can involve a common strategy to attract investors and obtain EU funding.

## References

- Crescenzi, R. (n.d.), “Indicators for territorial public policy: the case of the European Union”. [21]
- Crescenzi, R., G. de Blasio and M. Giua (2018), “Cohesion policy incentives for collaborative industrial research: Evaluation of a smart specialisation forerunner programme”, *Regional Studies*, Vol. 54/10, pp. 1341-1353, <http://dx.doi.org/10.1080/00343404.2018.1502422>. [19]
- Crescenzi, R., M. Nathan and A. Rodríguez-Pose (2016), “Do inventors talk to strangers? On proximity and collaborative knowledge creation”, *Research Policy*, Vol. 45/1, pp. 177-194, <http://dx.doi.org/10.1016/j.respol.2015.07.003>. [36]
- de las Herras Pedrosa, C., C. Jambrino and P. Iglesias (2013), “La imagen de marca como elemento vertebrador del territorio. El caso andaluz”, *Actas – V Congreso Internacional Latina de Comunicación Social*. [15]
- EC (2020), *A New Industrial Strategy for Europe*, European Commission. [6]
- EC (2020), *Critical Raw Materials Resilience: Charting a Path towards Greater Security and Sustainability*, European Commission. [1]
- EC (2019), *The European Green Deal*, European Commission, [https://ec.europa.eu/info/sites/info/files/european-green-deal-communication\\_en.pdf](https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf). [2]
- EC (2011), *Tackling the Challenges in Commodity Markets and on Raw Materials*, European Commission, <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0025:FIN:en:PDF>. [9]
- EC (n.d.), *EuropeAid - DEVCO 06 - Quality and Results*, European Commission. [20]
- Federal Ministry of Economics and Technology (2010), *The German Government’s Raw Materials Strategy*, <https://foes.de/pdf/rohstoffstrategie%20bundesregierung%20englisch.pdf>. [11]
- Geological Survey of Finland (2010), *Finland’s Mineral Strategy*, Appointed by the Finnish Ministry of Employment and the Economy, [http://projects.gtk.fi/export/sites/projects/mineraalistrategia/documents/FinlandsMineralsStrategy\\_2.pdf](http://projects.gtk.fi/export/sites/projects/mineraalistrategia/documents/FinlandsMineralsStrategy_2.pdf). [10]
- Government of Canada (2019), *The Canadian Minerals and Metals Plan*, [https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/CMMP/CMMP\\_The\\_Plan-EN.pdf](https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/CMMP/CMMP_The_Plan-EN.pdf). [26]
- IEA (2020), “Clean energy progress after the Covid-19 crisis will need reliable supplies of critical minerals”, International Energy Agency, Paris, <https://www.iea.org/articles/clean-energy-progress-after-the-covid-19-crisis-will-need-reliable-supplies-of-critical-minerals>. [3]
- Interreg Central Baltic (2012), “Citizens vote on climate change adaptation options in Kalundborg”, <https://www.balticurbanlab.eu/goodpractices/citizens-vote-climate-change-adaptation-options-kalundborg>. [25]
- Ketels (2017), *Cluster Mapping as a Tool for Development*, Institute for Strategy and Competitiveness, Harvard Business School. [35]
- Mining and Minerals Hall (n.d.), *MMH, El evento de la minería del siglo XXI*, <https://mmhseville.com/#> (accessed on January 2021). [17]

- Mining Finland (2020), *Mining Finland Programme*, <http://www.miningfinland.com> (accessed on 15 November 2020). [37]
- MITERD (2020), “Consulta previa para la elaboración de la Hoja de Ruta para la gestión sostenible de las materias primas minerales”, Ministerio para la Transición Ecológica y el Reto Demográfico, [https://www.miteco.gob.es/es/prensa/201026nphojaderutamateriasprimasminerales\\_tcm30-515882.pdf](https://www.miteco.gob.es/es/prensa/201026nphojaderutamateriasprimasminerales_tcm30-515882.pdf). [8]
- OECD (2021), *Mining Regions and Cities Case of Västerbotten and Norrbotten, Sweden*, OECD Rural Studies, OECD Publishing, Paris, <https://doi.org/10.1787/802087e2-en>. [7]
- OECD (2020), *A Territorial Approach to the Sustainable Development Goals: Synthesis report*, OECD Urban Policy Reviews, OECD Publishing, Paris, <https://dx.doi.org/10.1787/e86fa715-en>. [22]
- OECD (2020), “Policy implications of Coronavirus crisis for rural development”, *OECD Policy Responses to Coronavirus (COVID-19)*, OECD, Paris, <https://www.oecd.org/coronavirus/policy-responses/policy-implications-of-coronavirus-crisis-for-rural-development-6b9d189a/>. [5]
- OECD (2020), *Rural Well-being: Geography of Opportunities*, OECD Rural Studies, OECD Publishing, Paris, <https://dx.doi.org/10.1787/d25cef80-en>. [23]
- OECD (2018), *Productivity and Jobs in a Globalised World: (How) Can All Regions Benefit?*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264293137-en>. [34]
- OECD (2017), “Mining regions and their cities: Scoping Paper”, OECD, Paris. [33]
- OECD (2017), *Trust and Public Policy: How Better Governance Can Help Rebuild Public Trust*, OECD Public Governance Reviews, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264268920-en>. [24]
- O’Faircheallaigh, C. (2013), “Community development agreements in the mining industry: An emerging global phenomenon”, *Community Development*, Vol. 44/2, pp. 222-238, <http://dx.doi.org/10.1080/15575330.2012.705872>. [27]
- Raderschall, L., T. Krawchenko and L. Leblanc (2020), “Leading practices for resource benefit sharing and development for and with Indigenous communities”, *OECD Regional Development Papers*, No. 01, OECD Publishing, Paris, <https://dx.doi.org/10.1787/177906e7-en>. [29]
- Regional Government of Andalusia (2019), “Aprobación de la formulación de la Estrategia para la Transformación Económica de Andalucía (ETEA) 2021-2027”, *Boletín Oficial de la Junta de Andalucía*, No. 218. [31]
- Regional Government of Andalusia (2012), *Innovation Strategy of Andalusia 2020 (RIS3)*, <https://www.juntadeandalucia.es/export/drupaljda/Documento-Ris3-version-final-8-27-02-15.pdf>. [32]
- Regional Ministry of Work, Business and Trade (2013), “Boletín Oficial de la Junta de Andalucía”, No. 105. [12]

- Regional Ministry of Work, Business and Trade (2013), *Estrategía Minera de Andalucía 2020*, [13]  
[https://ws050.juntadeandalusia.es/portalandaluzdelamineria/pamapps/archivos/\\_archivos\\_/pormian/Estrategia\\_Minera\\_de\\_Andalusia\\_2020.pdf](https://ws050.juntadeandalusia.es/portalandaluzdelamineria/pamapps/archivos/_archivos_/pormian/Estrategia_Minera_de_Andalusia_2020.pdf).
- Schumann, A. (2016), “Using Outcome Indicators to Improve Policies: Methods, Design [18]  
 Strategies and Implementation”, *OECD Regional Development Working Papers*, No. 2016/2,  
 OECD Publishing, Paris, <https://dx.doi.org/10.1787/5jm5cgr8j532-en>.
- Söderholm, P. and N. Svahn (2014), “Mining, regional development and benefit-sharing”, Luleå [28]  
 University of Technology.
- Vági, P. and E. Rimkute (2018), “Toolkit for the preparation, implementation, monitoring, [14]  
 reporting and evaluation of public administration reform and sector strategies: Guidance for  
 SIGMA partners”, *SIGMA Papers*, No. 57, OECD Publishing, Paris,  
<https://doi.org/10.1787/37e212e6-en>.
- Wilson, E. (2019), “What is benefit sharing? Respecting Indigenous rights and addressing [30]  
 inequities in Arctic resource projects”, *Resources*, Vol. 8/2, p. 74,  
<http://dx.doi.org/10.3390/resources8020074>.
- World Bank Group (2020), *Minerals for Climate Action: The Mineral Intensity of the Clean Energy [4]  
 Transition*, World Bank, Washington, DC,  
<http://pubdocs.worldbank.org/en/961711588875536384/Minerals-for-Climate-Action-The-Mineral-Intensity-of-the-Clean-Energy-Transition.pdf>.
- Yunis, J. and A. Elmira (2021), *Fraser Institute Annual Survey of Mining Companies 2020.*, [16]  
 Fraser Institut, <https://www.fraserinstitute.org/sites/default/files/annual-survey-of-mining-companies-2020.pdf>.



**From:**  
**Mining Regions and Cities Case of Andalusia,  
Spain**

**Access the complete publication at:**  
<https://doi.org/10.1787/47062327-en>

**Please cite this chapter as:**

OECD (2021), “A new mining strategy to make Andalusia a frontrunner on sustainable mining”, in *Mining Regions and Cities Case of Andalusia, Spain*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/197f0fc0-en>

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area. Extracts from publications may be subject to additional disclaimers, which are set out in the complete version of the publication, available at the link provided.

The use of this work, whether digital or print, is governed by the Terms and Conditions to be found at <http://www.oecd.org/termsandconditions>.