



MinLand: Mineral resources in sustainable land-use planning

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Authors: Agnes Raaness¹, Nike M. Luodes², Ronald Arvidsson³, Henrik Schiellerup¹, and WP3 task 3.3 Working Group:

Arranz-González Julio César¹²; Barnes Jerry⁹, Berger Gerald⁷, Berne Sybil⁹, Carvalho Jorge M.F.⁴, Delgado-Arenas Pedro¹², Diego Murguía⁶, Dijkstra Joris¹⁸, Dinis Paula C.¹¹, Endl Andreas⁷, Fernández-Naranjo Francisco Javier¹², Forsgren Anders¹⁴, Galos Krzysztof¹⁰, Grönholm Sari S. T.², Gugerell Katharina⁵, Gunter Tiess⁶, Hatzilazaridou Kiki¹⁶, Koivuhuhta Auri I.², Kot-Niewiadomska Alicja¹⁰, Långbacka Bo O.², Langendoen Magnus¹³, Laukó Ágnes¹⁷, Lisboa José Vitor⁴, Marasmi Christian¹⁵, Maria João Figueira¹¹, Van der Meulen Michiel¹⁸, Nikolaos Arvanitidis³, Panagiotopoulou Chrysa¹⁹, Rauhala Jarmo E.², Rodríguez-Gómez Virginia¹², Stanley Gerry⁸, Torppa O. Akseli², Tost Michael⁵, Tuomela Pekka², Vadillo-Fernández Lucas¹², *Vitor Manuel Dias Duque*¹¹, Wertichová Blažena⁶, Witterman Tessa T.¹⁸, Åkerhammar Peter³

¹Norges Geologiske Undersøkelse NGU, Norway (Task 3.3 leader)

²GTK Geological Survey Of Finland, Finland (WP3 Leader – Case studies of land use planning in exploration and mining, Task 3.2 Leader)

³SGU Sveriges Geologiska Undersökning, Sweden (Project Coordinator)

⁴Laboratorio Nacional de Energia E Geologia I.P. LNEG, Portugal

⁵Montanuniversität Leoben, MUL, Austria

⁶Minpol GmbH, Agency for International Minerals Policy, Austria (WP5 leader – Common framework for natural resource planning)

⁷Wirtschaftsuniversität Wien, WU, Austria

⁸Department of Communications, Climate Action And Environment, GSI, Ireland

⁹MacCabe Durney Barnes Ltd MDB, Ireland

¹⁰Polska Akademia Nauk Instytut Gospodarki Surowcami Mineralnymi I Energia - Division of Mineral Policy MEERI PAS, Poland

¹¹Direcção-Geral De Energia e Geologia DGEG, Portugal

¹²Instituto Geológico y Minero de España IGME Sp, Spain



¹³ Länsstyrelsen Västerbotten LV, Sweden.

¹⁴ Boliden Mineral Ab, Sweden

¹⁵ Regione Emilia Romagna RER Italy

¹⁶ Institutouto Geologikon Kai Metalleftikon Erevnon IGME Gr, Greece

¹⁷ Geological And Geophysical Institute of Hungary (Mfgi), Hungary (*Sári Katalin and Horváth Zoltán*)

Mining and Geological Survey of Hungary (MBFSZ)

¹⁸ Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek TNO

¹⁹ National Technical University of Athens – NTUA, Greece

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Table of Contents

Table of Contents	2
Introduction	3
Description of the legislative systems framework relating to land use and minerals	7
Vertical and horizontal approach	7
Differences in addressing different type of materials	9
Type of resources and ownership of (unexploited) mineral resources	9
Permitting.....	11
Relation between land use planning and minerals	13
Land use planning	13
Existence or absence of a separate mineral plan	14
Safeguarding of minerals and co-existence of land use.....	14
Data on mineral resources	16
Value of equal footing and stakeholder involvement.....	17
Valorisation of minerals and other land use and value on equal footing.....	17
Inclusion of infrastructure.....	19
Stakeholder engagement in land use planning.....	19
Conclusions	20

Introduction

The scope of WP3 is to form a base of cases for analysing **how exploration and extraction of mineral raw materials are integrated in land use planning and practices at all levels** of implementation (national, regional, local), seeking the harmonization and convergence in national approaches towards minerals policies and land-use planning policies and practices.

The collection of studies on industrial and mineral policy land use cases performed in WP3 is going to enrich the data repository created in WP2, where information on legislative regulations form a frame to understand the settling of the cases. The analysis of the interactions between mineral and land use at different levels, and performed in different legislative systems, makes it possible to custom design strategies for reaching the objective of the MinLand project. These include stronger tools for the safeguarding of important mineral deposits; support the implementation of the INSPIRE directive; increase the transparency in land use and mineral extraction planning; to facilitate an equal assessment of mineral exploration and extraction compared to other types of land use. These challenges will be further explored in WP 4, 5 and 6 and the case studies will generate the data required for the subsequent analyses, following the framework defined in the deliverable D3.1 and partly summarized in D3.2.

The 16 cases in this study have been selected to cover past and current exploration, extraction and quarrying sites, mining projects, as well as land use planning practices dealing with past, current and potential future mineral extraction.

There are a large variety of commodities covered within the case studies; metallic ore, industrial minerals and construction materials/aggregates are all included. The area covered by the cases also varies greatly, from very local and only 0.1 km² to whole countries.

There are several ways to group the cases and some cases overlap within different categories:

- Land use planning related to exploration and exploitation in protected or vulnerable areas (such as Natura 2000 or UNESCO World Heritage sites) and areas with an indigenous population:
 - Hungary: Mining of Perlite in Tokaj Wine district. UNESCO world heritage site.
 - Poland: Extending the Czatkowice Limestone Mine within the Krakow Valleys Landscape Park.
 - Portugal: Somincor Neves Corvo polymetallic mine within a Natura 2000 area.
 - Finland: Mine operations at Kevitsa. Reindeer herding.
 - Sweden: Mine operations by Boliden in the Skellefteå field. Mining operations at Fäbodtjärn, Västerbotten. Reindeer herding, compensation measures for infringements upon sensitive nature.
 - Italy: Land use process on closure of mine.
 - Norway: Safeguarding mineral deposits in Nordland County. Reindeer herding and nature protection
 - Greece: Extraction activities in the vicinity of areas of archaeological importance
- Cases addressing policy making
 - Austria: implementation of the Austrian Mineral Resource Plan as a soft/voluntary or an enforced instrument in two federal states
 - Greece: creation of a zoning definition for aggregates

- Sweden: Land use planning tools with linkages of mineral raw materials and land use policies/practices, methodologies and procedures; mineral data applied in land use management.
- Portugal: Portuguese method of including mineral resources in land use planning
- Spain: Spanish method of including mineral resources in land use planning: Aggregates of the West Ribera del Ebro.
- Norway: Applying new basis data on mineral resources to land use planners in Nordland County.
- Ireland: Life-cycle of three Pb and Zn mines at different stages and land use planning processes
- Austria: Implementation of the Austrian Mineral Resource Plan in spatial planning in the federal states of Tyrol and Styria
- Greece: Mineral and land use planning procedures
- Netherlands: policy related to aggregates

Table 1 summarizes the type of mineral commodities covered. The table also shows if the cases include minerals currently considered an EU Critical Raw Material (CRM), the phases of activities covered by the case, potential or existing exploitation methods, as well as the scale of the case.

Table 1 Summary of cases; mineral commodities, phase of activities, exploitation methods, scale and mineral ownership.

Annex	Country	Title	Type of mineral resources	EU CRM	Phase of activity in case				Exploitation method			Scale				Extent km ²	Minerals owned by
					Pre-exploration &	Undiscovered/	Known resource/	Rehabilitation/Post	Open-pit/quarry	Mine/Underground	None	Local	Regional	Federal	National		
1	Sweden	Fäbodtjärn	Ores	Au		Yes	Yes			Yes		Yes				0,1	State
2	Spain	Mining-environmental planning in the West Ribera del Ebro	Aggregates				Yes		Yes				Yes			350	State
3	Sweden	Boliden Area Operations (Skellefteå field)	Ores	Zn, Cu, Pb, Au, Ag, Au, Te	Test Antimony	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			16630	State
4	Norway	Nordland county	All	Fe, Cu, Zn, Ni, Be, REE, graphite, apatite, quartz, calcite marble, dolomite marble, talc, crushed rock, gravel and natural	Be, REE, P, Si and graphite	Yes	Yes	Yes	Yes	Yes	Yes		Yes			38 456	Both state and private
5	Ireland	Mineral Planning for Lead and Zinc in Ireland	Ores	Zn, Pb	Yes	Yes	Yes	Yes		Yes		Yes	?			35	State
6	Poland	"Czatkowice" Industrial Limestone Mine	Industrial	Limestone		Yes			Yes				Yes			0,81	

Table 1 continued. Summary of cases; mineral commodities, phase of activities, exploitation methods, scale and mineral ownership.

Annex	Country	Title	Type of mineral resources		EU CRM	Pre-exploration & land use planning	Undiscovered/ exploration	Known resource/ exploitation	Rehabilitation/Post -extract.	Open-pit/quarry	Mine/Underground	None	Local	Regional	Federal	National	Extent km ²	Minerals owned by
7	Finland	Kevitsa	Ores	Ni, Cu, Au, Pt, Pd, Co	Pd, Pt, Co			Yes		Yes			Yes				14	State
8	Sweden	Mertainen	Ores	Fe, Apatite				Yes		Yes			Yes	?		?	13	State
9	Italy	BAISO "Varicolori" clays	Industrial	Clays					Yes	Yes			Yes				3	Private
10	Portugal	Portugal land use planning innovative methodology for mineral resources	All			Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	92212	Both.
11	Greece	Mineral and land use planning procedures with emphasis on best practice example of aggregate resources' exploitation	Aggregates			Yes				Yes				Yes				Private.
12	Austria	Austrian mineral resource plan	All			Yes									Yes	Yes	83879	State, Private, Free-to-mine and private
13	Portugal	Somincor Neves Corvo polymetallic underground mine	Ores	Cu, Zn, Pb			Yes	Yes			Yes		Yes					
14	Hungary	Tokaj wine region - Historic Cultural Landscape	Industrial	Perlite		Yes	Yes	Yes		Yes				Yes			10000	State
15	Greece	Bauxite mines in Fokis	Ore	Bauxite		Yes	Yes	Yes	Yes	Yes	Yes			Yes		Yes		State
16	Netherland	Policy on aggregates	Aggregates							yes	yes					National	101.500	Private

Description of the legislative systems framework relating to land use and minerals

There are large differences in legislations and policies in the countries represented in the case study.

The survey explores the processes and policy frameworks which include minerals in land use planning, and how these have been applied in the individual cases. These data will be analysed, along with data from WP2, in order to deliver the overall land use and mineral policy framework needed to formulate a good practice manual.

The analysis of the relations between land use and minerals legislative frameworks will be assessed in WP4.

Vertical and horizontal approach

The survey includes an evaluation of the vertical and horizontal structure for the land use planning of areas containing, or having potential to carry, mineral resources. The case data are used to analyse whether the systems have a vertical approach, integrating all aspects of a specific sector through all administrative levels, or a horizontal approach integrating all the several planning aspects at a specific administrative level.

It is evident that several countries adopt a top down approach when defining strategies and implementing these. Ireland, Sweden, Norway, Finland, Greece, Poland, Portugal, Netherlands present national programmes/objectives that affect regional/province/local planning. At the same time, implementation at regional and local levels are driven by regional/local-specific objectives and considers also the development goals of nearby regions, as explained for example in the Portuguese case.

The Irish case demonstrates a “top-down” planning system, with the NPF (National Planning Framework) formulating a policy which supports extractive industry. The policy is implemented in the Regional Planning Guidelines (RPGs) (soon to be replaced by the Regional Spatial and Economic Strategies (RSES)), which contain directives supporting extractive industries. The lower hierarchy level includes the County Development Plan and the Local Area Plan, which specify strategies and objectives which support regional development, but do not stress the safeguarding of minerals.

Also, the Portuguese case demonstrates a top-down approach: A National Program (National Program for the Land Use Policy) provides the framework for Regional Programs, and these provide the framework for the Municipal Plans. The leader of the reviewing process is the municipal authority, operating with the support of the regional authority (CCDR), and a Commission that integrates representatives of several public interests. At municipal level (the municipal land use plans), land use is defined according to the higher-level strategic documents.

In Poland the top-down approach has the governmental National Spatial Development Concept and the Action Plan of NSDC 2030 (the most important national strategic document on spatial planning management) as the leading documents at country level, whereas provincial spatial development plans exist at regional level. The local level handles the permitting procedures.

In Netherlands the national government drafts structure visions, which are a broad-stroked frames of reference providing planning guidance to local and regional spatial planning authorities. Provinces form the most important public stakeholder group when it comes to (superficial) mining activities.

A top-down strategic approach is also applied in Finland, where land use plans are defined at regional level including national objectives and the lower level works according to higher-level plans. The local authorities have

the possibility to make decision on land use at municipal level and there is interaction between local and regional/national authorities.

In Hungary government decrees define the strategies and the roles in a top-down approach. Older decrees were aimed at the protection of mineral resource areas from sterilization, whereas more recent decrees aim to minimize mining activities and to value the Outstanding Universal Value of the property. Local governments have decision-making rights and may prepare a land use plan which is sent to the Regional Chief Architect, who can declare if the plan is adoptable. The local board may adopt the plan even if the Regional Chief Architect has objections. The final land-use plan is controlled by the County Administrative Office acting on behalf of the central state and can be nullified only if it breaks the law. During preparation of the plan, feedbacks from different authorities/bodies defined by law must be collected. The Mining and Geological Survey of Hungary (MBFSZ) is the body which provides feedback on land use affecting mineral resource areas.

Spain has a top-down approach having the Autonomous Communities establishing the general framework for land use planning development. The Autonomous Communities develop detailed land-use plans, divide the territory into regions, and establish land use categories, which are in certain cases under the jurisdiction of the municipal governments. A regional land-use plan is proposed by the Councillor for the Environment of the Autonomous Region to the Government of the region through a Regional Decree. The regions are independent in land use development, and the system includes the Territorial Strategy of the region, the Regional Land-Use Plans (POT), the Territorial Action Master Plans, the Sectorial Plans and Projects of Inter-municipal Incidence (horizontal coordination with the plans of neighbouring spatial units) and other territorial management instruments.

In Norway there is a top-down planning system with three levels of land-use plans: national, regional and local, developed by the national government, regional planning authorities and municipal councils respectively. Sometimes the regional authorities take care of local planning in term of organisation of planning work and preparation of planning proposals. Strategies are applied to each level and the regional/national level can directly affect the municipal planning level. The regional level and municipal level authorities cooperate to establish the strategies in liaison with central government bodies, organisations and institutions which may be affected by the planning work. Plans, which may have a significant impact on the environment or the society, must prepare a planning programme, addressing also societal safety, risk and vulnerability. The Directorate of Mining may object when land-use plans are targeting areas with resources classified as national/international or regional important.

Sweden has specific national strategies; the concept of national interest is the base for the municipal and regional level's long-term planning. Land-use plans are only indicative, except for the detailed municipal development plans adopted by the municipalities and governed by the Planning and Building Act. Minerals are, however, considered in the land use planning through the tool "Areas of National Interest", which is the government's steering tool where twelve different land uses get included into the regular land use planning. This also ties together with the permitting process which provides a well thought of strategy for the inclusion of minerals into the land use planning. All concession minerals are included into this process. Areas of National Interest are weighted in an assessment of land use when specific needs arise, such as mining or conflicting land uses.

In Greece, the "National Planning Strategy" has been formulated by the Government with medium and long-term development goals. There are three levels of spatial planning: National, Special (sectorial) and Regional Spatial Plans. The National Plan provides a framework which is detailed into regional and local plans. The National Plan is followed by 4 special sector plans which affect the mining industry at different levels. A new plan "Special Spatial Plan for the Mineral Raw Materials", in accordance with the provisions of Law 4447/2016 is under development.

Region Emilia Romagna in Italy presents a mineral plan (sectorial) adopted vertically (regions, local level). Mineral plans are part of the provincial spatial plans, the municipality details local plans in harmony with regional plans (top-down approach).

Differences in addressing different type of materials

Even if most commodity types are covered by the case studies, there are great variations in how the different commodities are handled. This is evident from the descriptions of the WP3 cases as well as the answers to the WP2 survey. The premises for addressing the different type of materials are defined in the legislation for each country/state/region.

Type of resources and ownership of (unexploited) mineral resources

Because this case study is looking at mineral resources in land-based area planning, offshore resources, petroleum, natural gas and marine mineral resources are not included. Studying the answers from the WP2 and WP3 surveys, primary resources are generally covered by the legislations, whereas secondary resources (recycled mineral materials) are usually not. In addition, ownership of minerals is defined by the legislation in each country/federal state/region. As different commodity groups (metallic ores, industrial minerals and construction materials/aggregates etc) have different ownership, the commodity groups are treated differently in the land use planning and permitting processes in the various countries. Resources, such as natural sand and gravel may not even be a part of the mineral legislation but might be covered under the environmental acts.

Table 2 Summarizing ownership of minerals

Country	Ownership
Austria	Three types of ownership: <ol style="list-style-type: none"> 1) State-owned/Bundeseigene (federal state): Mainly energy raw materials 2) Free-to-mine/Bergfreie: Mainly metals and some industrial minerals 3) Landowner/Grundeigene: Mainly aggregates and some industrial minerals
Finland	Two types of ownership related to concession minerals or non-concession minerals: <ol style="list-style-type: none"> 1) State: <ol style="list-style-type: none"> a. Li, Rb, Cs, Be, Mg, Sr, Ra, B, Al, Sc, Y, lanthanides, Ac, Th, U and other actinides, Ge, Sn, Pb, As, Sb, Bi, S, Se, Te, Cu, Ag, Au, Zn, Cd, Hg, Ga, In, Tl, Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Re, Fe, Co, Ni, Pt and other metals of the platinum group. b. Graphite, diamond, corundum, quartz, bauxite, olivine, kyanite, andalusite, sillimanite, garnet, wollastonite, asbestos, talc, pyrophyllite, muscovite, vermiculite, kaolin, feldspar, nepheline, leucite, scapolite, apatite, baryte, calcite, dolomite, magnesite, fluorspar and cryolite

	2) Private/Landowner: Rock, gravel and sand, clay and organic soil
Greece	Two types of ownership: <ol style="list-style-type: none"> 1) State: "Metallic minerals/ores" 2) Land owner: "Quarry minerals" <ol style="list-style-type: none"> a. Aggregates b. Industrial minerals c. Marbles
Hungary	All minerals are state owned.
Ireland	Two types of ownership: <ol style="list-style-type: none"> 1) State 2) Private Stone, gravel, sand and clay are under different classification
Italy	Two types of ownership: <ol style="list-style-type: none"> 1) State, first category: minerals usable for the extraction of metals, metalloids and their compounds, graphite, phosphates, alkaline and magnesium salts, allunite, micas, feldspar, kaolin and bentonite, porcelain clays, refractory earths; precious stones, garnets, corundum, bauxite, leucite, magnesite, fluorine, barium and strontium minerals, talc, asbestos.; radioactive substances, mineral and thermal waters, gases, fuels, asphaltic and bituminous rocks; 2) Private, second category: peat; building materials; colouring earths, quartz and siliceous sands, stones, other industrially usable materials not included in the first category.
Norway	Two types of ownership: <ol style="list-style-type: none"> 1) State: <ol style="list-style-type: none"> a. All metallic ores/minerals with density $> 5\text{g/cm}^3$, including Cr, Mn, Mo, Nb, V, Fe, Ni, Cu, Zn, Au, Ag, Co, Pb, Pt, Sn, Zr, W, U, Cd, Th b. Ti, As, pyrite and pyrrhotite 2) Private/Landowner: All other minerals (industrial minerals and aggregates), including alluvial gold.
Poland	Two types of ownership: <ol style="list-style-type: none"> 1) Public: Metallic ores, sulphur, rock salt, potash salt, gypsum and anhydrite and gemstones 2) Private: All other
Portugal	Two types of ownership:

	<ol style="list-style-type: none"> 1) Public: All metal minerals and industrial minerals like quartz, feldspar and others 2) Private: Aggregates, construction materials, common clays, ornamental stones etc.
Spain	All mineral resources are state-owned.
Sweden	<p>Ownership of minerals are not defined in Swedish law, but the state grant access to extract deposits of “concession minerals”.</p> <ol style="list-style-type: none"> 1) State/concession minerals: <ol style="list-style-type: none"> a. Sb, As, Be, Pb, Cs, Au, Ir, Fe, Co, Cu, Cr, Hg, La & lanthanides, Li, Mn, Mo, Ni, Nb, Os, Pd, Pt, Rh, Rb, Ru, Ag, Sc, Sr, Ta, Sn, Ti, Th, V, Bi, W, Y b. Andalusite, apatite, barite, brucite, fluorspar, graphite, kyanite, burnt clays, magnesite, pyrrhotite, nepheline syenite, sillimanite, halite or similar rock salts, pyrite and diamond. 2) Private/Landowner: Other minerals
Netherlands	<ol style="list-style-type: none"> 1) private owned -superficial mining (include clay, aggregates, sand...) 2) state owned -mineral occurrences at depths > 100m

Permitting

The survey is focused on the segment of the legislative system which governs the introduction of mineral resources into land use planning, which mostly happens at the stage of permitting. At the same time, permitting varies according to the classification and type of resource.

Permitting procedures and the involved authorities have been mapped through the cases. Findings include:

- In the Irish case, exploration and exploitation require a permit from the Department of Communication, Climate Action and the Environment. Companies conducting exploitation-related activities need to apply for permits from the Local planning authority or the An Bord Pleanála (the national planning appeal board) and from the Environmental Protection Agency.
- The Italian case from Emilia Romagna reveals that a permission for exploration is needed for state owned minerals, whereas exploitation requires a concession given by the region for state owned minerals, or a licence by the municipality for private owned minerals.
- In the Spanish case, the Regional Mining Authority and Regional Environmental Authority must issue a permit if the concession affects an Autonomous Community. If the concession affects more than one Autonomous Community, the National Mining Authority (Ministry of Industry) and the National Environmental authority (Ministry of Environment) handle the permits. The municipal governments may issue an activity permit which allows an area, previously dedicated to other use, to be used for mining.
- In Portugal, exploration and exploitation of state-owned minerals requires a concession from DGEG (the Portuguese mining authority). A concession is issued subsequent to an evaluation of a given case and its

framework; extraction is possible only on land preassigned to mineral extractive activity in the LUP. The extraction of privately-owned minerals also requires a permit (License) issued by the mining authority or by the municipality, depending on the dimension of the quarry. Only the land owners or persons/companies with a lease agreement with the owner can apply for a license.

- In the Polish case, the license required for prospecting and exploration work and for mining is issued by the Ministry of the Environment for state owned minerals. The District Head can issue permits for open pit mining without explosives of up to 20,000 m³/y within a 2 ha area. The Provincial Marshal issues all other permits relevant for extractive industries.
- Finland also distinguishes between state-owned and privately-owned minerals. For the state-owned minerals, the Mining Authority, Finnish Safety and Chemicals Agency (Tukes) issues the exploration and mining permits for concessions that involves the request for feedback from other authorities and stakeholders. An application affecting the Sami homeland also requires a statement from the Sami parliament. The Centre for Economic Development, Transport and the Environment (authority) plays an important role in the acceptance of the mine's plan.
- Norway requires a permit from the Directorate of Mining and notice to the land owners, the municipalities and county municipality/governor for both exploration for, and exploitation of, state-owned minerals. For land-owner's minerals, the process is easier, requiring an agreement with the land owner. Agreement with land owners and permit from the authority are needed when performing pilot extraction and exploitation of more than 10,000 m³. Special rules apply to the county of Finnmark, where all extractive activity requires the involvement of the Sami Parliament and the district board for reindeer management and the siidas (local Sami communities). An exploration permit in Finnmark requires an EIA, which is not normally required at this stage elsewhere in Norway.
- In Sweden, the state may grant access to "concession minerals", listed in the Swedish Minerals Act (1991:45) and permit the extraction of mineral resources. The Chief Mining Inspector of the Mining Inspectorate of Sweden (a unit of SGU) issues exploration permits and exploitation concessions and shall consult the county administrative board regarding the application of parts of the Environmental Code relevant to Environmental permits. Consultation is sought from all potential stakeholders, agencies and the public. The exploration permits are granted on the basis that exploration is considered as land use that can co-exist with other land uses and will not be granted only if there are severe infringements upon other land uses. The concession is granted upon the stage when a more detailed picture of the deposit has been prospected with an estimated value. At this stage the tool of areas of National Interest is invoked. The final permit the environmental permit results in mining if a positive verdict and that building permits and access to land is being granted. The only areas currently not opened for exploration permits are densely populated areas with detailed land use plan or in national parks.
- Hungary reports that for exploitation activities and for re-cultivation, a permit is required from the Mining Authority. The Mining Authority circulates the exploitation plan to the co-authorities before final permission is given. One can only apply to exploit areas defined as mineral resource areas in the land use plans. Pre-exploration and exploration activities do not depend on land use, but special permits may be needed for certain areas, such as protected areas and agricultural areas.
- In Greece, permits are provided by different authorities depending on the mineral type, as specified by the Mining Code (metallic or quarry minerals) and depending on the phase of the activity (exploration/exploitation), the type of the project/activity, land use particulars of the area of intervention, and the status of the land ownership (private, municipal or public).

- Also, the Austrian case involves different authorities for different commodities; the “free for mining” minerals require permits from the Federal Minister of Science, Research and Economy (now Sustainability and Tourism) acting as the national mining authority (Montanbehörde). Landowner’s minerals require permits from the District Administrative Authority (Bezirkshauptmannschaft) and the provincial governor.
- The Dutch case show that there are different processes for permitting a mining activity to operate (planning and/or permitting policies subjected to EU-defined environmental impact assessments) and locating the site for it. The site selection process refer to a policy favouring to combine extraction with other activities.

The survey has also evaluated the status of “one-stop shop” administration; a specific place, where all the permitting issues can be handled, simplifying the permitting process. One stop shop is adopted in Italy, Portugal, and in Hungary. In Finland the one-stop shop concept is under development but not linked to the mining authority. It is therefore uncertain if a one-stop shop will cover also the extractive industry. In Norway, Ireland and Sweden a one-stop process has not been implemented. The Austrian case shows that a one-stop shop is adopted during the Environmental Impact Assessment process, where the authorities coordinates between them to gather the statement needed.

Relation between land use planning and minerals

Land use planning

In general, land use plans are binding, but for Sweden there are two levels, detailed plans which are legally binding and comprehensive plans which are more a land-use tool and thus indicative. Land use should be reviewed every four years but will be reviewed when need arise, so it is basically a dynamic system, Areas of national Interest are updated continuously. The Swedish process is in principle not very dissimilar e.g., to the Irish where mostly the towns and villages have detailed plans. The remaining land is in the case of mining land-use being appointed as a result of the permitting process similar to some other countries, such as Sweden and Finland. Further analysis into this context in the later parts of the project. Austria have both binding and indicative land use plans as the land use legislation differs from the different federal states within Austria. In Italy, Sweden and Finland, land use plans are reviewed dynamically otherwise periodically, but periods may range between 2 and 25 years. Typical monitoring and reviewing periods are every 4th year, while major land use plans may be reviewed every 10 to 25 years.

Changing designations of land outside the reviewing periods are possible within Sweden, Norway, Finland, Poland, Italy, Ireland, Greece, Austria and Hungary. Other systems are more rigid and do not accept changes within the periods, as is evident from the Portuguese and Spanish case.

In detail:

- Sweden allows changes of land-use as a normal procedure, case by case, since the municipal planning considers both areas of national interest (that are indicative until there is a change in land use) and the municipal development plans. The areas of National Interest are updated continuously.
- in Norway land-use change is possible and conducted through municipal land use plans and zoning plans, but revisions may require between 1 and 4 years. Change of land-use is faster if the land is designated to mining/quarrying utilization before the Directorate of Mining are applied to for extraction permits.

- in Finland, the case demonstrates that companies are in charge of the costs for land use change in the specific area addressed by their activity; the process to change a given land use designation is initiated during exploitation permitting.
- Ireland allows changes to the land use plans specifying that the process would last 14 months, but generally mining activities take place on unzoned lands, so no amendment/variation is required.

Land use plans that are more rigid in renewing time might designate land use to allow for different land use activities. This is the case in Portugal, where land designated for rural activities includes the possibility for extractive activity.

The land use planning processes will be analysed in further detail in D4.2.

Existence or absence of a separate mineral plan

Among the cases investigated, Finland, Poland, Portugal, Spain and Norway do not distinguish between minerals plans and land use plans, and there are no separate mineral plans for mineral resources. Norway, Finland, Sweden and Poland visualize minerals in the land use plans at different stages of knowledge and importance of the deposits. Cases addressing aggregates demonstrate that the potential areas for extraction can be shown on the land use maps. In Spain, the case investigated shows a tool created to coordinate and include information on the extraction of minerals and their effect on the territory, the society and economy into land use maps.

Safeguarding of minerals and co-existence of land use

The survey addresses safeguarding issues in order to observe how and where safeguarding of mineral deposits is performed, and how robust safeguarding is in decisions making in land use planning. The cases show that safeguarding is observed differently in different countries.

Safeguarding has been interpreted differently in the various cases: Safeguarding of known, well documented deposits of defined interest or exploitation activities and mining areas, versus safeguarding as an activity delimitating an area of interest, but not ensuring its protection for mineral utilization.

Safeguarding of minerals in land use planning is mandatory in Sweden¹, Norway², Poland, Italy and Hungary, but not in Finland, Spain, Portugal (but protection of exploitation and exploration permits are mandatory) and Austria (but some federal states have voluntarily implemented safeguarding of mineral deposits in their legislation or policy making). There is no special safeguarding tool for CRM employed in any of the cases.

Only in Poland, Hungary and Italy are designation of areas for minerals equivalent to mineral protection or safeguarding areas. In general, and except for zoned areas in Austria, undocumented minerals or hypothetical resources are not safeguarded.

In the Irish case, even if safeguarding and promotion of the use of minerals is addressed in the land use planning policy, there is no zoning or geographic delimitation that would support safeguarding in practice. The Finnish case shows that in the new land use plan process mineralizations and assessed deposits are visible on the land use

¹ Only areas of National Interest are protected in Sweden.

² Well-documented areas of international, national and regional importance are protected, less documented minerals/prospects are optional in Norway.

plans, but their presence here will not prevent the utilization of the land for other use. In the Norwegian case, as mentioned earlier, shows that well-documented and classified deposits (of regional, national or international significance) are safeguarded. Prospective areas are not safeguarded but are included into land use plans as a reminder, and the details are available for the land use planners.

In Poland, safeguarding is practised for known deposits and safeguarding is addressed in policies advocating the inclusion of known deposits into the land use plans and maps. The situation is similar in Hungary, where mineral resource areas are included into land use plans when they have been recorded in the National Mineral Resource Inventory. This requires the use of land by activities that allow future extraction, but higher priority land uses can hinder the exploitation.

In Portugal, safeguarding is not clearly defined in land use legislation; unknown mineral resources and mineral resources of unknown potential are not included in land use planning, meaning that they are not safeguarded. Work has been done to include minerals into land use planning and to connect the various authorities, and the impact of the activity is visible at municipal level. Generally, areas with ongoing activity, or mining areas under development (exploration prospects, concessions, licensed areas, Reserve and Captive Areas defined by the government for public economic interest), are visible in the land-use plans.

The Spanish case shows that minerals are not safeguarded. Land-use planning classifies the land in three general categories: Urban land, Land for urban development and Land protected from urban development. The Spanish system identifies two categories of land protected from urban development: for protection (including environmental, agricultural and cultural heritage sites) and for preservation (valued areas recovering after loss to fire or other hazards). In the Spanish case, it is evident that the Spanish mining law, which considers reserves of interest for the state, has no influence on the land use planning tools.

Sweden safeguards mineral resources, including the deposits of National Interest in the national GIS layer for planning purposes; these are included into the municipal plans. Their presence as areas of National Interest requires that any application for change of land use must consider if the activity will endanger/preclude the exploitation of the mineral resource in the future. Areas of different national interest can overlap, and the areas are indicative for land-use planning until a permit application will address the area and final weighting is performed.

With regards to the possibility for co-existence of different land uses in the same area, the cases show differences for sites classified for use by extractive activity. Until the extraction phase, coexistence between minerals and other land use is considered possible even if legislations or policies does not state this specifically. If the other land use does not jeopardize exploitation, minerals do not preclude other land use. The Dutch case show even that extraction of private minerals can happen only in combination with other activities according to a policy.

No countries have tried to protect unexplored mineral areas. In Norway and Finland, the prospective areas are shown in the land use maps reminding the reader of the mineral potential, but prospective areas are not safeguarded *per se*. Cases from Italy, Finland, Hungary, Spain show that an area attributed to mining activity is dedicated to that activity only.

- In Sweden, co-existence is not possible when a concession has been issued, but in a phase of exploration, overlapping claims to areas for different types of land-use may exist.
- In the Italian case, in Emilia Romagna; if the land use plan has designated an area for mineral extraction and not usable for other activities, complementary activities, such as a crushing plant, is still possible.

- In Finland; when the land use plan includes areas related to mineral exploitation (belonging to the *kaivospiiri*) and a licence/concession to operate exists, it is still possible to apply for complementary activities. Under extractive activities, only the extraction of aggregates can occur under permits in the latter areas.

Cases from Poland, Portugal, Norway and Ireland are examples of jurisdictions where permitted extractive activities do not preclude parallel land requiring activities.

- Portugal allows the co-existence of different land uses within the rural activities, unless specifically denied at the municipal level. Mineral extraction is valued on equal terms with other rural activities, but municipal rules might penalize mineral resources compared to nature conservation, environmental protection, or recreation and tourism as shown in the report on LUP.
- In Poland the case also addresses co-existence, as it includes exploitation of mineral deposits in areas with natural and recreational functions.
- The Norwegian case mentions the possibility for co-existence of mineral extraction with for example Wind turbines and reindeer herding.
- Ireland shows that underground mining can coexist with other surface activities, and an area already equipped with infrastructure could serve also other activities. In addition, the Irish case also points out that the rehabilitation includes designing an area for alternative use after the exploitation ends.
- In Netherlands extraction of private minerals occurs in combination with other activities.

Data on mineral resources

In most cases, national datasets on mineral resources are available for land use planners, both on national, federal, regional and municipality levels, but the use of the data varies from none or little, to fully integrated in land use planning tools.

Both Portugal, Spain and Austria have developed methodologies and procedures to increase the use of data on mineral resources in land use planning.

Much of the data are Inspire compliant, such as in the Finnish, Portuguese, Italian, Polish, Hungarian, Irish, Austrian and Norwegian (to certain extent) cases. Not every country has good integration of the geological surveys, the mining licencing authority, and the land use planning authorities. In some cases, the geological survey possesses public data supporting the activity (cases by Norway, Finland, Poland). The Spanish case shows that the geological survey has public information available, but the data are not updated and not used by the other authorities. The Swedish case shows that the geological survey, besides maintaining and generating data, has a role as authority denominating deposits of National Importance. This is also the case for Norway.

From the questionnaire, it is evident that the land use planning authorities and those involved in the permitting process use external geological experts if they do not employ their own geo-scientific personnel; these are mainly geologists as defined in the case reports.

The questionnaire also shows that there is a continuous need for gaining more geological information.

Value of equal footing and stakeholder involvement

In the cases analysed, the interactions of different interests, the evaluation of the impacts, and the requirement for public hearing, are generally addressed in the Strategic Environmental Assessment (SEA). The SEA is conducted during the formulation of spatial land use plans, whereas an Environmental Impact assessment (EIA) is required at project level during the phase of permitting. The EIA covers exploitation and rehabilitation measures (see relevant cases from Finland, Portugal and Spain), but also exploration activities in the Polish case. The Austrian case shows that even if an EIA is needed only for certain volumes of extraction (which is typical also the case for other countries), projects which involve small volumes in an area affected by more than one projects, may need an EIA to assess the cumulative impact (this is also in other countries).

Valorisation of minerals and other land use and value on equal footing

The priority given to the extractive industry in the cases analysed varies at policy level, but to certain extent mineral resources are addressed in the policies (cases from Italy, Finland, Ireland, Portugal, Poland, Norway, Sweden). From the case survey it is also quite clear that in certain cases extractive activity is considered less relevant than other land uses.

Only Sweden and Norway have currently implemented a system of valorising known/documentated mineral resources (deposits). Sweden have areas of National Interest, whereas Norway have deposits of international, national, regional or local significance (or not assessed) as well as non-valorised prospective areas and occurrences reflecting the level of knowledge of different areas. A similar valorisation is used for other land uses, such as suggestions for protected areas, thus ensuring a value assessment on similar footing. In Sweden, the weighing is performed during the permitting process, whereas in Norway, the weighing is performed during the land use planning process. Finland is following the same approach in the new land use planning activities, weighing the land use during both stages.

However, Sweden and Norway are not the only countries where different land uses are compared when deciding final land use. Various land use interests are also weighed and balanced toward other interests, such as environmental protection, in Austria and Italy, and in Hungary, a set of “limiting factors” are employed in land use planning. In Netherlands the weighting is done during permitting process, when searching a site proper for surface mining. Special sectoral plans are employed in Greece. Currently, only special sectoral plans for industry, tourism, renewable energy resources and aquaculture exist and affect the extractive mineral industry in Greece, but a new Special Spatial Plan for Mineral Raw Materials is under development. Sectoral plans also exist in Austria. Spain has developed a tool for weighing the mineral/aggregate extraction activity for the benefit of society.

- The Irish case shows that minerals are addressed at policy level but are not safeguarded in land use plans. When developing a mineral target into exploitation phase, the main concerns relate to the effects on the environment, humans and the ecosystem. Mineral resources are valued by the companies, and their exploitation is assessed case by case, also here depending on the competing land use. The case shows that different areas/ different authorities will base their evaluation on different aspects: landscape, habitat, nature areas, and ground water etc.

- In Emilia Romagna (Italy) the mineral plan is present and coherent through different levels of land use planning (Regional and Local), but mineral resources are considered less relevant than other land uses. Land uses are dedicated to the extractive industry only in areas where other strategic land use (houses, infrastructures etc.) are not foreseen. During the drafting of land use plans in Italy, the need to designate areas for extractive activities, such as aggregate production, is evaluated based on downstream need for aggregates only. The economic valuation of mineral resources is performed during permitting, when a company applies for permits to initiate exploitation activities (including also the costs for remediation). When creating the land use plan and applying the SEA, the weights are politically, economically and socially dependent.
- In the Portuguese case it is not possible to evaluate the mineral resources against other resources.
- At policy level, Finland promotes the development of the mineral extractive industry, but Finland does not have established methods for giving mineral production value against other land use. Any assessment should include Sami homeland and environmental issues. The regional land use planning described in the two cases reported, evaluates land use dedicated to mineral resources against tourism and other specific local interests.
- Interestingly, the Polish case, in which the authority explains that the value attributed to the utilization of the mining product, enhancing pollution control of emissions, has overcome the ban of mining near the natural protection zone. However, the operation conditions require several obligations by the mine. Otherwise, the region values environmental and recreational aspects higher than mineral extraction.
- Norway safeguards, and evaluates, quantified mineral deposits as of regional, national or international significance and competing land use may be classified in a similar way. Mineral resources are safeguarded through the local land use plans and the possibility for objections from the Directorate of Mining. The value of nature protection and conservation are always very strong.
- In Sweden protection happens at municipal level, it is however steered by the areas of National Interest. Otherwise it is a result of the permitting process where it comes into play at the stage when the deposit becomes better described in terms of value, which will be at the stage of the concession. The concession is thought of as the stage in permitting to give the company sufficient protection so that the prospecting can be finalised towards an application for the environmental permit and if positive verdict commencement of mining. Regarding the areas of National Interest, the geological survey is responsible for decisions.
- The Spanish case shows that mining is not valued in land use planning, and other land use have priority. Protected areas and environmental aspects have priority in the specification of land use.
- In Hungary there is no tool to define the value in land use planning, and environmental and heritage protection aspects have priority against mining activities.
- In Greece the minerals are considered for their economic importance, and if the activity contributes to the economic development of local communities it is possible to operate, also within natural parks and in areas of wildlife refuges subsequent to environmental permitting. In order to operate in Natura sites an Appropriate Environmental Assessment is required with the EIA Study. Nature, water, forest, cultural assets are valued and in order to initiate mining or quarrying a permit from different relevant authorities is needed.
- The Austrian case shows that at a constitutional level the secure supply of raw materials is firmly addressed, and the individual provinces voluntarily implement the national policy in their own legislation or policies. The case also shows that at national level it is not possible to make a mere economic evaluation of the deposits, whereas at a federal/regional level it is possible to value mineral resources against other

interests. Land-owner materials were addressed from a demand oriented perspective, free-to mine and state-owned from a supply oriented perspective.

Based on the cases in the case study, the strongest “competition” for mineral resources in land use planning are nature conservation and environmental protection, urban development, infrastructure and cultural heritage. In the Nordic countries there are also some conflicts with reindeer herding. However, there are also solutions with co-existence of mining with reindeer herding.

Inclusion of infrastructure

From the results, it is evident that infrastructure is addressed at local land use levels at function close to a mine or extraction site. The local plans generally delineate the road and transportation axes. The Irish case shows that even if mining is recognized to provide benefits to the local communities in terms of employment, the community and other local enterprises were concerned about the load of heavy traffic.

At the same time, existing infrastructure, as observed in the interviews, are considered a positive boosting factor for starting exploitation, and it also provides better conditions for the coexistence of different activities.

The Swedish case of Fäbodlidsjärn shows that the inclusion of infrastructure may raise questions among the local stakeholders even though it has so far not shown to be a problem in the permitting process. In the Austrian case infrastructure is evaluated at project level. Even small projects might be required to evaluate its cumulative impact with similar operative projects in the area.

Stakeholder engagement in land use planning

In all countries, stakeholders take part by making comments that may influence decisions on both local and regional scales. Usually stakeholder engagement happens at an early stage in the developing land use or zoning plans but may also take place during the permitting processes.

The Italian, Irish, Finnish, Polish, Spanish, Hungarian, Swedish, Greek, Dutch and Austrian case studies show that hearing is performed during applications for the development of exploitation activities. The documents are public, and objections can be stated and recorded in the process. Public comments are taken into consideration when implementing changes or updating land use plans.

Ireland is an interesting case as there is no legal framework governing land use conflict management procedures; these are handled during land-use plan development.

The Italian case (Emilia Romagna Region) also shows that the community is involved for consultation, information, partnership and in a form of community control. According to the case analysed not all the objections are implemented but the result of public hearing or consultation is publicly available. In the Polish case the affected parties have not been informed specifically of the results. In the Greek case it is stated that during permitting processes, and after permission is granted, third parties may appeal to the Council of State. The Dutch case show that appeals might slow down permit applications even of 10s years and might also end with negative decisions. The Irish case shows, moreover, that transparency is a strong value for supporting the developing of extractive activity, and any secrecy during the exploration phase might jeopardize public acceptance later. This effect is also supported by other mining cases.

Conclusions

The application of mineral resources in land use planning is highly dependent on both the policy and the legislative framework in each country. In those countries where mineral extraction is a value at a higher policy level, this has been brought down to land use planning level, as many systems have a vertical implementation of the objectives from the government downwards. These top-down dynamics are evident in many of the cases addressed.

The system and extent of implementation of mineral resources on land use maps varies. Practically all the countries have spatial resource data available in the exploitation phase. Some countries use spatial data on mineral resources also in “low knowledge phases” (Nordic countries), even if valuation is not performed until a given resource is under study for exploitation.

Some systems that do not consider mineral resources explicitly in land use adopted strategies, such as Portugal, show that zoning under rural definition might allow mineral extraction anyway. Others, such as Ireland, do not attribute zoning to all land, so the land might be assessed case by case when a mining operation should start. In certain cases, mineral resources have not been visualized on purpose in order to, according to the reports, avoid speculation for possession of land (Austria), or for avoiding unnecessary conflicts/difficulties when weighing different interests and impacts in early stage (Greece). The Finnish case shows that presence of a zone attributed to mineral extraction, facilitated mineral resource extraction, even in areas close to Natura2000 and reindeer herding.

Values given to nature, culture, tourism are strong even for mining-oriented countries, and the values are endorsed both at governmental and regional/local levels. Better understanding of inter-authority dynamics, duties and land use planning will be analysed and assessed in WP4.