European Commission
Research Programme of the Research Fund for Coal and Steel

Conservation and promotion of the Coal Mining Heritage as Europe's cultural legacy

Deliverable 3.2

Report on the standards and mechanisms for the management of the heritage sites.

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Grant Agreement number: 101112138-CoalHeritage-RFCS-2023	

Deliverable 3.2	
Deliverable Due Date	31.9.2024
Start - End Date of Project	01.07.2023 – 30.06.2025
Duration	2 years
Deliverable Lead Partner	CERTH
Dissemination Level	Public
Work Package	3
Digital File Name	D3.2 Report on the standards and mechanisms for the management of the heritage sites
Keywords	transition, strategy, heritage, geoheritage, management, system, coal, mine, case study, interview, data analysis, inventory, conservation, resources, legislation

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Summary

Deliverable 3.2 presents a comprehensive report of the existing legal frameworks, measures and policies, standards, resources, and strategies for the management of geoheritage sites for each one of the countries involve in the CoalHeritage project. It also presents existing examples of coal heritage sites from the countries involved and their conservation status, in order to be used as an example for setting an effective management system.

The Deliverable 3.2 reports the existing Mobilizing Resources for Coal Mining Heritage Conservation (section 2.1) and the State of Conservation and Factors affecting the Property of Heritage Sites (section 2.2). The input from each country (France, Germany, Greece, Poland, and Slovenia) is presented as a separate case study.

These sections are used for formulating a comprehensive methodology for the creation of inventory processes and managing the mine's movable and immovable property, that can be applied in all cases of coal mining heritage sites. The methodology is presented in section 2.3 “Inventory processes and management of mine’s movable and immovable property”.

An assessment of the management methods is presented in section 3. “Assessing the Management System”. This section is about the identification of standards and mechanisms for the management of coal heritage assets, in order to inform the expert stakeholders on the topic.

The outputs were the basis for the development of the methodology for the creation of inventory processes and managing the mine's movable and immovable property. The assessment tools used for analyzing the methodology were (a) CAWI In-Depth Interview (CAWI-IDI), and (b) Focus Group Interview (FGI). The justification of the selection of these two methods, the preparation process and the final conduction of the interviews are presented.

In section 4. “Data Analysis and Discussion of Results”, the answers of the interviews are analyzed. Finally, in section 5. “Conclusions and Recommendations” presents the summary of the conclusions from the research, on the basis of the IDI and FGI analysis, and provides recommendations for setting an effective and sustainable plan for the preservation, management, and promotion of coal heritage. These data and recommendations can further be used by the stakeholders in order to incorporate them into broader societal and economic framework aiming to protect valuable mining-related cultural resources.

The research process of the deliverable involved literature investigation, as well as information provided from questionnaires created for this purpose, that will be filled by the project participants and involved stakeholders.

1. Introduction

1.1 Goals & Objectives

The main objectives of WP 3, are on the one hand, the creation of a summarizing list including the information of the available mines considered potential sites for geoheritage reclamation and their assets, and on the other and, the definition of standards and mechanisms for the management of the heritage sites and possible financial support means. The Deliverable 3.2, follows the scope of these objectives by continuing the work achieved in Deliverable 3.1. More specifically, in Deliverable 3.1, a list with the available coal mining heritage sites and their assets at each participant country was constructed by the project partners. The survey was conducted via literature research and a catalogue of coal heritage materials was created, presented and classified according to their particular types of assets as coal mining heritage sites. The classification of the coal mining heritage sites of interest involved two main "supergroups", the "cultural heritage" and "natural heritage", further distinguished to other "groups", "categories", and "subcategories". A record card was developed for each supergroup, which included data about their respective coal heritage assets that were filled accordingly by the project partners regarding the coal mining heritage assets of their countries.

In accordance, Deliverable 3.2 addresses any kind of standards, measures, resources, legislation, and procedures for the management of the heritage sites, in order to formulate comprehensive management plans for the interested stakeholders. The research process of the deliverable involves literature investigation, as well as information provided from questionnaires created for this purpose, that will be filled by the project participants and involved stakeholders.

The importance of geoheritage management, referred to the conservation of geological reserves and former mining areas, and the initiatives to recognize and protect it, lies not only in the scientific and ethical gravity of the heritage site as a historical location, but also includes economical, educational and touristic benefits for the country. The conservation of mining areas is possible to include infrastructure and machinery of historical value, which, along with the mining history of the area, might be of great importance for the history of the country and its industrial and economical evolution through time. The exploitation of these former mining areas as historical monuments and touristic sites, may help preserving the country's history, while also introducing the tourist to the mining history of the country through an interactive way, guiding him to the site itself and presenting mining equipment, machinery and installations of the past, in addition to photographic documents.

The geoheritage sites will also be attracting university students of relevant study areas, as well as school visits and educational trips, therefore providing educational benefits for the country. The geoheritage sites could not only be an attraction to national students, but also to foreign students through international educational trips from universities and schools outside Greece.

Also, the country's economic balance is improving, as an area that no longer generates economic profit becomes an economic resource through tourism activity. As a region that is now part of the country's tourism sector, it can make a significant contribution to the country's GDP if the activities and history it offers attract a significant number of tourists and a corresponding profit per year. Consequently, the designation of such a historic site as a heritage site could potentially increase the international recognition of the country by turning the site into a popular tourist destination. Additionally, the development of touristic geoparks will offer new jobs to the local community and to young people. Especially, it will help former coal miners and people working in the coal industry finding new alternative jobs in the touristic sector. The knowledge and expertise of these people in the operation of the mines, the extraction

methods, historical events that may have occurred in the mining area, and other mining matters of a specific site will be useful information that can be exploited through a touristic scope. This will increase local and national public awareness for promoting the mining heritage sites.

Another important problem that may arise from former mining areas that are not conserved appropriately, may be the pollution of the soil and water horizon with harmful substances, such as acid mine drainage of exposed waste heaps and abandoned reserves. Therefore, the rehabilitation and protection of these sites for heritage purposes, may also mitigate such issues, further contributing to the protection of the environmental heritage.

Developing an effective management system of the coal mining heritage sites is of vital importance, in order to realize the aforementioned assets in a short and viable timeframe, and provide a stability for the operation of geoheritage sites.

2. Developing a heritage management system

2.1 Mobilizing Resources for Coal Mining Heritage Conservation

In order to set up an effective management strategy for coal mining heritage assets, and to mobilize resources for an effective and viable coal mining heritage conservation, it is mandatory to first underline the existing mechanisms and legal frameworks regarding coal mining heritage and related geoheritage assets in general.

The following paragraphs present a comprehensive report of the existing legal framework, organizations, policies, mechanisms and methods used for resource mobilization. It also includes the evaluation of their effectiveness in managing and conserving the regional coal mining, as well as basic principles for planning a more sustainable management system.

The report comprises of different sections, for each Case study of the different countries involved in the project, where the key indicators and data on the aforementioned issues are presented. Input data from the stakeholders of each country (such as museums, companies, etc.) are also included in the study.

2.1.1 Case study – France

Reminder of the French legislative framework
In France, all heritage management systems (including coal heritage) must comply with the law. In this section, we briefly review the legislative aspects concerning cultural and natural (geological) heritage.

Cultural heritage

In France, all aspects of cultural heritage are the responsibility of the Ministry of Culture. The protection and management of cultural heritage in France is governed by the "*Code du patrimoine*" (URL1). This code brings together the provisions of French law concerning heritage and certain cultural services. The code was last updated on 24 May 2021.

Tangible cultural heritage in France

France's industrial heritage is considered to be part of the country's cultural heritage, and is classified as a historical monument (The term "classification" is reserved for designation performed by the French Ministry of Culture for a monument of national-level significance. Monuments of lesser significance may be "inscribed" by various regional entities). Protection as a historical monument is a public utility easement based on the heritage interest of a property, which is assessed by examining a set of historical, artistic, scientific and technical criteria. France's mining heritage is classified as a historic monument.

France's mining heritage (including coal heritage) is also listed as a historic monument.

The notions of rarity, exemplarity, authenticity and integrity of the assets are all taken into account. In order to ensure its conservation, restoration and enhancement, a building or movable object may be protected as a historic monument (with a sufficient artistic or historical interest to warrant classification, which is the highest level of protection).

To get a monument classified or listed, the application for protection may be made by the owner of the property, the person to whom it is assigned or any other person with an interest in it (local authority, heritage protection association, etc.). The initiative for protection can also be taken by government departments. If the cultural asset is a historic monument or is of sufficient historical, artistic, scientific or technical interest to justify its preservation, it may be the subject of an application for classification or registration as a historic monument. This application must follow a specific procedure, involving consultation with the Regional Commission for Heritage and Sites (CRPS) and the National Commission for Historic Monuments (CNMH). Classification or inclusion is decided by order of the regional prefect or by decree of the Prime Minister.

Focus on the geological heritage among natural heritage

In France, the geological heritage takes part of the natural heritage and constitutes the abiotic component. From a general point of view, geological heritage is considered under the Civil Law ("Code civil"). Minerals and fossils belong to the land-owner, but extraction of mineral resources depend on the Mining Code ("Code minier"; especially for metals in mines; URL2) and the Environmental Code ("Code de l'environnement", especially for industrial minerals and rocks in quarries; URL3).

Since the publication of the law on "Local Democracy" on 27 February 2002, the French State has been obliged to carry out an inventory of natural heritage in mainland and overseas territories, covering biodiversity and geodiversity.

Mining heritage - mobilizing resources depends on the type of stakeholders
From La mine en France, 2018/Les patrimoines miniers, P-C Guiollard

Museums and mining heritage preservation projects involve a wide variety of stakeholders, with very uneven technical and financial resources. One can distinguish three types of stakeholder at the origin of coal museum and heritage sites; the success of a heritage management system will depend on the ability of stakeholders to support it over the long term.

- Company projects
  It's understandable that a project born of a company's desire to enhance and safeguard its heritage and know-how is more likely to succeed than an associative or individual projects. After

the mine closes, the museum usually becomes a public institution. While corporate projects are not uncommon in Anglo-Saxon countries, they are less common in France. But there are a few, and not the least; these include the three most important coal museums in France dedicated to coal (Lewarde Mining Historical Center and Parc Explor Wendel, both partners of the BRGM in CoalHeritage, and Couriot Mining Museum in Saint-Etienne).

- Projects supported by the company
  Although other projects were not initiated by Charbonnages de France (the French enterprise created in 1946, as a result of the nationalization of the private mining companies), the company's active partnership was decisive in the realization of more modest but nonetheless interesting projects from the point of view of preserving a technical heritage. These projects, which generally include an extraction or service shaft and its equipment (headframes, machinery, ancillary buildings, etc.), required safety upgrades and renovation, in coordination with local or regional authorities capable of financing over a long-term. The implementation, organization and animation are generally provided by former miners. Examples include the museums at Cagnac (Tarn) and La Machine (Nièvre).

- Association projects
  Associations, often supported by local authorities, sometimes by the Ministries of Tourism or Culture are still in the majority. These museums often owe their origins to associations of former miners, eager to maintain and share the memory of their trade, which they experience, as a passion. They contribute through their know-how, experience, and their networks of contacts and testimonials. Although with more modest means, the achievements are nonetheless remarkable (La Maison du Mineur in La Grand'Combe; Mining Museum Puits Hély d'Oissel in Gréasque). However, in some cases, associations are too small to succeed, and a transition toward a public institution - more likely to succeed - should be seen as essential. In other words, ensuring public ownership therefore makes it possible to safeguard the coal heritage over the long term. Which means finding a willing public body and, for the association's founders, leaving their project in other hands, which can be painful.

Mining heritage - mobilizing resources depends on the legal status of the cultural organization

The legal status of a cultural organization largely determines the way it operates, its cultural policy and its financial resources. In France, there are several types of legal structure for managing public cultural services:

- The "syndicat mixte" is a type of inter-municipal cooperation structure that exists in France, created by the decree-law of October 30, 1935, to enable local authorities to join forces with each other or with public establishments, for example to develop a cultural offer. The term "syndicat mixte" is used because the structure can bring together different types of local authorities, such as communes and a department.
- The "gestion en régie" (local authority control) occurs when the local authority assumes responsibility for managing the cultural public service. The local authority therefore has direct control over the cultural service.
- In French association law, the term "association loi de 1901" refers to a non-profit association governed by the law of July 1, 1901. An association under the law of 1901 must have a purpose

other than profit-sharing. To have legal personality, an association must have its articles of association declared to the prefecture and published in the Official Journal.

- A “groupement d’intérêt public” (GIP - in English public interest group) is a legal entity under public law, with a light operating structure and flexible management rules. It can be set up by a number of public-sector partners, or by at least one public-sector partner and one or more private-sector organizations. The public interest group has a specific objective, which is to fulfil a non-profit mission of general interest, and has an administrative or industrial and commercial mission.
- A “établissement Public de Coopération Culturelle” (EPCC - In English public establishment for cultural cooperation) is a public establishment set up by a local authority to manage a public cultural service. EPCCs make it possible to bring together several local authorities, and possibly the State, to organize and finance major cultural facilities. Created in 2002, they offer an alternative to the above other legal solutions: They provide a flexible yet stable framework for managing permanent institutions.

Managing and conserving the regional coal mining - evaluation and effectiveness

In the case of relatively large heritage sites, it is common to distinguish between the museum sensu stricto and the site as a whole (therefore including the museum, but also for instance a documentary resources center, a restaurant, a convention center, etc.).

Heritage sites

There are no unique rules regarding sites management. Whatever the legal framework of a cultural organization, operating budgets are generally voted for one year, and several years for investment budgets. The financer is usually a public institution (commune, intercommunity, department, region, state, etc.), but could also be private. Regular monitoring of expenses against declared goals is done annually or several times a year.

These financial resources are used for various purposes: they could be related to preservation and management of collections, acquisitions / collection enrichment, cultural initiatives, research…

Museums: basic principles for planning a management system - Musée de France label
(URL4)

Musée de France is a label awarded by the French Ministry of Culture to French museums owned by the State, a public-sector entity or a non-profit private-sector entity, under conditions of conservation and public presentation of their collections in the public interest. It was created by the French law of January 4, 2002, known as the "Museum Law ", now codified in the French Heritage Code. In France, this label provides the main framework for implementing a management system for a museum (through the Projet Scientifique et Culturel, see below).

The museum owning such a collection must also meet specific criteria to obtain this designation:

- Commitment to its missions: to conserve, restore, study and enrich its collections; to make them accessible to the public; to implement educational and dissemination initiatives; to contribute to the progress and dissemination of research (Art. L. 441-2.).
- Must be managed by a scientific staff member from the local or national cultural sector (curator or conservation officer).

- Have its own educational department, or be part of a network with other museums.
- Maintain an up-to-date inventory of its collections.
- Draw up a Projet Scientifique et Culturel (PSC, in English “scientific and cultural project”) setting out its main orientations.

Focus on the PSC
(URL5)

It’s a steering instrument

A PSC is the first operational and strategic document to define the museum's identity and direction. It is a common point of reference for the museum team and the supervisory authority: it commits both parties to the future of the establishment.

While it is a conceptual document that provides a vision of the institution's history and evolution (its collections, its visitor policy, the department's transformation within a broader administrative framework, etc.), it is no less an operational document that must report on the actions to be taken in the short and medium term, as well as the accompanying resources. Moreover, while no museum mission should be neglected, the PSC is selective in its proposals and must identify priorities.

This link between an institution that draws up the PSC (a scientific and administrative team) and a supervisory body that validates and supports the project is the key to its success and implementation.

It's a document that can be shared and appropriated

Because it defines the museum's policy, the PSC is a document designed to be shared with all those involved (museum team, elected representatives, programmer, etc.), so that everyone is fully aware of the issues and perspectives at stake, and can fit their actions into the overall strategy predefined in this key document.

As a governance tool, it is essential that the supervisory authority be involved in the same way, as it constitutes a roadmap for the museum's scientific and cultural actions, determined in coherence with the more global framework of public policies. This shared understanding is the key to getting everyone involved in its implementation.

The museum's management team and its director are the driving force behind this approach.

It's an assessment and a project

While the PSC is a forward-looking document, it is based on an assessment of the current situation and on a history: it cannot ignore the sometimes ancient past of the museum institution, its collection and the way in which this structure has evolved in terms of organization and personnel. It is important to take this long history into account when drafting the first PSC; subsequent versions will build on this initial work.

However, the PSC is not just an exercise in taking stock, but must also open up real perspectives. In the case of programmed changes (renovation, extension, statuary change, donation or major transformation of the collection) this dimension is easy to integrate; it is just as important, even if the moment of its drafting is not dictated by a transformation of the museum.

As a decision-making tool, it should help the supervisory body to plan the future life of the establishment and propose changes.

It's a legal and compulsory document

Article L441-2 of the French Heritage Code makes the PSC compulsory for all French museums, and the granting of a State subsidy for a project to build, extend or redevelop a French museum is subject to prior validation of this document (Art. D. 442-15). It must be renewed at least every 10 years, but this delay may vary depending on the heritage sites (date of creation, size…).

The label provides the main following benefits:

- Mention in communication documents issued by the Ministry of Culture.
- Possibility of obtaining specific road signs bearing the logo.
- Authorization to use the label and its logo on all communication and signage documents;
- Participation in national communication days (European Museum Night, etc.).
- Possibility of State subsidies in the following areas: investment, conservation, restoration, exhibitions and cultural and educational activities, publishing (assistance in creating scientific and cultural jobs in certain regions). For acquisitions, eligibility for the Fonds régional d'acquisition des Musées and the Fonds du Patrimoine. Where applicable, eligibility for the Regional Restoration Fund.
- Inalienability, imprescriptibility and unseizability of collections (guarantee in the event of theft).
- Possibility of transferring ownership of collections to another French museum, or benefiting from the transfer of ownership of collections from another French museum.
- Possibility of benefiting from the advice and expertise of government departments both within the Regional Directorates of Cultural Affairs and within the Service des Musées de France (consulting architects, consulting restorers, curators of the Service des Musées de France, specialists in the public and new technologies).

From mine to museum - background on the three BRGM partners

BRGM's three French partners, through their history, represent valuable case studies of coal heritage sites and museum developments (origin and purpose, political and social-economical support, financial resources); the reader will come across some terms defined above.

Lewarde Historical Mining Center (Hauts-de-France region)

The Mining History Center, created in 1982 at the impetus of the nationalized mining company, opened to the public in 1984. Its aim is to conserve and promote the Nord-Pas de Calais's mining culture. The starting point is always the same: a strong local political commitment.

The center is classified as a historic monument and is one of the remarkable sites of the mining basin listed as a UNESCO World Heritage Site. It belongs to the Nord-Pas de Calais Region and is also subsidized by the French government, Douai Urban Area and the Heart of Ostrevent local towns.

On 21 December 1990, the Nord-Pas de Calais coalfield nationalized mining company closed the last coal mining shaft. At that point, the managers of the Nord-Pas de Calais coalfield nationalized mining company, and Alexis Destruys its Company Secretary in particular, wished to create a mining history center to commemorate three centuries of mining in the area. The project was validated in 1973, and Delloye colliery, which was being dismantled at the time, was chosen as the site. It was selected because it was

representative of the interwar period, and thanks to its location at the center of the coalfield, close to the motorway network.

In 1982 the Mining History Center Association was created, with the involvement of the French government (Ministry of Culture), the Nord-Pas de Calais Regional Council, the Nord Departmental Council and the Nord-Pas de Calais coalfield nationalized mining company. The Center opened to the public in May 1984.

At the beginning of the 21st century, Charbonnages de France marked out the shaft heads and installed firedamp outlets. BRGM carries out annual inspections. All the buildings have been preserved and renovated, with the exception of the dynamiter and a water tower. A hangar was demolished in the early 2000s to make way for a reception area, but the new building retains its original form.

A large part of the site was listed as a historic monument by decree on September 21st 2009, twenty-five years after the museum was opened to the public. The classified items are the revenue and extraction buildings and the headframes of shafts no. 1 and 2; the compressor room; the glazed hall; the fan room; the screening room; the various walkways; the former workshop; the reception building; the administrative building and the documentation center; the building containing the administration offices, the bath/shower room, the lamp room, the infirmary, the bicycle garage and the toilets; the dynamite plant; the former sawmill (now a restaurant); the weighbridge building; and the janitor's house.

The Delloye pit is one of 353 elements spread over 109 sites that were inscribed on June 30, 2012 as a UNESCO World Heritage Site. The Mining History Center is an EPCC, certified Musée de France museum by the French Ministry of Culture.

Parc Explor Wendel (Lorraine region)

Until 1989, part of the site's infrastructure was still used to service the other pits of the Wendel concession that were still in operation. The Wendel 1 pit was closed in 1989, Wendel 2 in 1992 and Wendel 3 in 2001. As for the headframe of the Vuillemin 2 pit, closed from 1884, still visible at the entrance to the site, it is the oldest preserved metal headframe in the former Lorraine coalfield.

In 1985, the "CCSTI" (Centre de culture scientifique et technique du bassin houiller, in English Center for Scientific and Technical Culture in the Coal Basin) was created. In 1988, the "Houillères du bassin de Lorraine" made the Wendel headquarters available to it. In 1998, the "Syndicat mixte pour la Création et la Gestion du Musée de la Mine" (joint association for the creation and management of the Mine Museum), a public body, was created to ensure the long-term preservation and development of this complex as a heritage and tourist attraction. All this was made possible thanks to the unconditional support and commitment of the mayor of the neighbouring town of Forbach.

The site's development continued with the transformation of the Wendel 1-2 washhouse into a 2000 m^2 exhibition space for the 2000 festivities. In 2001, the museographic project and collections were awarded the "Musée de France" label by the French Ministry of Culture.

In 2006, "La Mine Musée du Carreau Wendel" was inaugurated, and in 2012 renamed "La Mine Wendel", a faithful reconstruction of the different types of underground workings in Lorraine (flatworkers, semi-dressers, dressers), carried out by the last active miners, two years after the closure of the last active shaft in France, La Houve, at Creutzwald.

In 2012, the "Musée Les Mineurs Wendel" was inaugurated. Housed in the "miners' building", within the head office shower baths and offices, it completes the historical picture of La Mine Wendel, presenting

the history of the Lorraine coalfield, the daily lives of miners, mining social policies, the geology of coal, and the daytime and underground trades.

Faymoreau Mining Center

Building on its industrial past, the Faymoreau Town Council decided in 1995 to launch a major tourism and cultural project to revive and develop the town. Below are the main steps of this process:

1999 - Renovation of the Hôtel des Mines restaurant.
2000 - Opening of the museum in the former glassmakers' dormitory. Website of the Communauté de Communes Vendée Sèvre Autise.
2001 - Creation of Carmelo Zagari's stained-glass windows in the Chapelle des Mineurs.
2001 - Development of the Etang de la Digue, a 6-hectare fishing lake, with the construction of a communal pontoon.
2002 - Creation of the "chemin de la mine", a 12 km hiking trail, and a cycle path in conjunction with "Vendée Vélo". Establishment of a Zone de Protection du Patrimoine Architectural Urbain et Paysager (now an Aire de Mise en Valeur de l'Architecture et du Patrimoine) to preserve the corons and the hedged farmland.
June 30, 2018 - Opening of the new museum.

The Mining History Center belongs to the community of communes Vendée Sèvre Autise (“gestion en régie”); it is a certified Musée de France museum by the French Ministry of Culture.

Feedback from partners - summary

In this section, we present the main points highlighted by our partners to successfully mobilize resources for mining heritage conservation.

- The beginning of the story most often relies on a single leading and promoting character, motivated to save the coal heritage, and able to involve the right people to succeed
- As in many domains, ongoing success depends on the “human factor”, that is the personality and quality of the people (e.g. management team) involved in heritage conservation and promotion (determination, motivation, dynamism, networking).
- It is essential to start thinking about promoting coal heritage before the end of the closure of the mine.
- Generally speaking, all what is expected to be done at the beginning of the project should be well defined. For example, to carefully define the geographical perimeter of the project, the area of the future museum, the classified buildings (and more generally assets of all kinds).
- Once the museum is running, it is crucial to invest continuously to develop the original project; important to renew the museum's offering (products, programming, etc.).
- Specific to France (?) - The mines closed a long time ago, so there are less and less former miners to provide direct testimonies; heritage sites have to work on digital devices to continue to have a dialogue in the future between these testimonies and their visitors.
- The industrial buildings, particularly in coal mining, were built at a time when heating was not a concern. To face unexpected expenses (rising cost of energy); this is currently a crucial point. A solution could be to increase the number of visitors, but it could be impossible because of logistic and

safety problems (maximum number of visitors already reached). Another solution would be to get more money from financing organizations, which is hardly feasible.

2.1.2 Case study – Germany

The history of coal mining in Germany spans approximately 800 years, reflecting the country's economic and social evolution as well as the challenges and transitions toward more sustainable energy sources. The last black coal mines in Germany were closed at the end of 2018 in the state of North Rhine-Westphalia. For this action, an agreement was celebrated as early as 2007 between the Federal Government, the State Governments of North Rhine-Westphalia and Saarland, the German Hard Coal Corporation (RAG Corporation), and the Trade Union for Mining, Chemical and Energy (IG BCE) to achieve a sustainable phasing out of subsidies for hard coal in Germany. Based on this agreement, the RAG Foundation was established on June 26, 2007, in order to liquidate the German hard coal industry in a socially acceptable way and to finance the perpetual tasks of hard coal mining (RAG-Stiftung, 2024). This closure process is regulated by a corresponding framework agreement concluded on August 14, 2007, between the Federal Government, the coal-mining states, and the RAG Corporation, and by the Hard Coal Funding Act, which came into force in December 2007. The Act amending the Hard Coal Funding Act, which entered into force in July 2011, repealed the original provision for a review by the German Bundestag of the decision to phase out subsidies.

The transition from coal-based energy sources to greener solutions not only implies structural change involving technological and economic transitions but also carries significant cultural and emotional weight. In many coal regions across the globe, mining holds a central place in regional identity. This is particularly true for underground hard coal mining compared to open-pit lignite mining, as the risks of working underground have fostered a strong sense of comradeship in mining communities (Dudău et al., 2019). The long history of coal mining and its impacts on the economy and society have promoted the establishment of a robust framework of resources, legislation, and a management system to conserve its coal mining heritage. This framework encompasses financial resources, human resources, and various other measures.

Legislative measures

On the legislative aspect, cultural heritage laws are governed by both federal and state legislations. The Monument Protection Act (Denkmalschutzgesetz) of each state outlines the responsibilities and processes for preserving cultural heritage, including former coal mining sites. According to the division of competences between the Federation and the Federal States, the Federal States are responsible for the preservation of monuments. For this reason, the structure and forms of the cultural heritage organizations and the authorities in charge of monument preservation differ from one state to another. The current version of the Monument Protection Act in the State of North Rhine-Westphalia (Denkmalschutzgesetz – DSchG NRW) has been in force since April 13, 2022. It deals with the protection, care, and scientific research of objects, collections of objects, and parts of objects whose use and preservation have a public interest. The focus here is particularly on architectural monuments such as former colliery and mining buildings, historical monuments, garden monuments, and ground monuments. These monuments can be placed under temporary and permanent protection, and there are also obligations to provide notification of sale. Suggestions and applications for the registration or cancellation of a monument must be submitted to the competent monument authority. The lower and higher monument authorities make their decisions after consulting the relevant landscape association.

Another important organization in the preservation and maintenance of heritage sites in Germany is UNESCO. In Germany, this responsibility is shared between the federal and state governments. Furthermore, various other stakeholders at different levels are involved in the field of World Heritage, such as federal ministries, local authorities, municipal administrations, educational institutions, and civil society players, as well as the German Commission for UNESCO. Regarding environmental regulations, two important acts influence the management system. On one side, the Federal Nature Conservation Act (Bundesnaturschutzgesetz) includes provisions for the protection of landscapes and ecosystems affected by mining activities. On the other side, the Federal Soil Protection Act (Bundes-Bodenschutzgesetz) regulates soil contamination and mandates the remediation of polluted sites.

Financial resources

In Germany, the federal government set up the Commission for Growth, Structural Change, and Employment (Kommission für Wachstum, Strukturwandel und Beschäftigung) in June 2018 to develop a plan and a date for phasing out coal. On January 26, 2019, the Coal Commission decided to phase out coal by 2038 at the latest. This national policy aims to manage the phase-out, ensuring a balanced approach to economic restructuring and social stability in affected regions.

The financial resources are shared among different stakeholders. Federal and state funding includes grants and subsidies from both federal and state governments for the conservation and repurposing of former mining sites. The specific program "Initiative for Structural Change in Coal Regions" (Strukturstärkungsgesetz Kohleregionen) allocates billions of euros for economic and cultural projects in former coal mining areas. The European Union is also a significant player in funding transition projects. The European Regional Development Fund (ERDF) provides financial support for regional development projects, including those aimed at heritage conservation. Additionally, the Just Transition Fund (JTF), part of the EU's Green Deal, supports regions transitioning from coal, focusing on sustainable development and heritage conservation.

Human resources

The preservation and maintenance of former coal sites in Germany rely on a diverse and skilled workforce, supported by government agencies, educational institutions, local communities, and private sector partners. Key representatives in expert committees and advisory boards include the German Commission for UNESCO, which provides guidance and expertise on the conservation of World Heritage Sites, including industrial heritage. Heritage conservation authorities at the state level employ experts in history, architecture, and conservation to oversee heritage sites. These agencies include the Federal Agency for Nature Conservation (Bundesamt für Naturschutz - BfN), which oversees environmental protection and conservation efforts across Germany, and the Federal Ministry for Economic Affairs and Climate Action (Bundesministerium für Wirtschaft und Klimaschutz - BMWK), which is involved in funding and supporting economic restructuring in former coal regions. State monument protection authorities, such as the Landschaftsverband Westfalen-Lippe (LWL) in North Rhine-Westphalia, are responsible for cultural heritage and monument preservation. The Federal Environment Agency (Umweltbundesamt - UBA) provides guidelines and regulations for environmental remediation of former industrial sites.

Universities and research institutes offer programs and conduct research on heritage conservation, supplying a pipeline of skilled professionals. The German Mining Museum, the Technical University of Dortmund, the Georg Agricola University of Applied Science, and Ruhr University Bochum are notable for their programs related to industrial heritage, environmental engineering, and urban planning.

Foundations and non-profit organizations also play a crucial role. The RAG Foundation (RAG-Stiftung) manages the phase-out of hard coal mining and funds social and environmental projects in former mining

regions. The Foundation for the Preservation of Industrial Monuments and Historical Culture (Stiftung Industriedenkmalpflege und Geschichtskultur) focuses on preserving and repurposing industrial heritage sites, including former coal mines.

In the private sector, RAG Corporation (RAG Aktiengesellschaft), once the primary company involved in coal mining, is now focused on managing the transition and site remediation. The Emscher Genossenschaft engages in environmental remediation and redevelopment projects in the Ruhr area, particularly in water management. Arcadis Germany, a consulting firm, provides expertise in environmental engineering, urban planning, and heritage conservation.

Mechanisms and principles

To evaluate German mechanisms and principles related to heritage administration, it is important to mention that management plans are developed for each heritage site. These plans outline strategies for conservation, sustainable use, and public engagement. The process usually involves multiple stakeholders, including local communities, businesses, and government agencies, in decision-making. Examples include the conversion of mining sites into cultural centers, museums, and tourist attractions through joint investments. Based on sustainability principles, the adaptive reuse approach repurposes former mining infrastructure for new uses while preserving historical elements, ensuring that conservation efforts also promote ecological restoration and sustainability.

Another important mechanism is community engagement, which has been accomplished by developing educational programs that involve the historical and cultural significance of mining heritage. Serving as an economic driver, tourism development promotes heritage tourism to generate economic benefits and raise awareness.

Measures taken

The structural politics began to change in the late 1980s where ecological aspects were integrated for the first time. Additionally, the importance of new technologies and the transfer of those into the economy was emphasized in order to facilitate the founding of new industrial companies and to create jobs in other industrial sectors. In the early 2000's Infrastructure in education and transportation were made out to be key factors in the structural transformation of the Ruhr Region. To be specific eight key markets were the center of investments and development (UBA, 2021).

Extensive environmental remediation efforts have been undertaken to address the legacy of coal mining, including soil and water pollution. Governmental and private investors actively has been part of the measures for soil decontamination, reforestation, and the management of mine water to prevent acid mine drainage and protect groundwater sources.

The structural and environmental concerns have been linked to economic redevelopment significant investments have been made in redeveloping former mining regions to diversify their economies. This includes promoting industries such as logistics, technology, and tourism. The financial support and incentives have been provided for new businesses and startups to stimulate economic growth.

During the last three decades, it has become a common practice incitement of socio- economic transition in the old industrialized locations, in the context of urban renewal, the development of new forms of urban tourism based on culture and events. Additional attempt represents the conversion of closed factories in places of heritage in order to increase the attractiveness of the destination and to create new opportunities for entrepreneurial activities in the field of tourism and services (Hospers, 2004).

To mitigate the social impact on workers and communities, comprehensive social programs have been implemented. New public institutions were set up. A property fund Ruhr and the "State development society" ("Landesentwicklungsgesellschaft"), which bought and restored former industrial sites, led to an end of the so-called "ground lock" (Metropoleruhr, 2010). This was only possible through a high level of engagement of local and regional governments with the private sector. Besides, policies that supported new industries, regional coordination of efforts was crucial to their success.

Another major measure has been retraining and reskilling programs for former coal workers to facilitate their transition to new industries. After the definitive end to hard-coal mining in 2018, the challenge of preventing unemployment in the mining sector was addressed. Between 1998 and 2018, the RAG workforce shrank by about 80000 people, about half going into retirement and half into other jobs. The RAG AG has been the only employer in the hard coal mining industry since then. Finding new employment for former staff was a complex task, as there was no universally applicable approach due to the diverse range of skills possessed by workers of mining sector. The RAG AG helped the staff to find new work, they had a system in place consisting of coaches and people searching for job openings to offer to the workforce. Early retirement schemes and social security measures have been provided to support affected workers.

Former mining sites have been transformed into educational and cultural centers, preserving the history and educating the public about the mining heritage. The development and promotion of the Industrial Heritage Trail have involved the cooperation of local municipalities, cultural institutions, heritage preservation agencies, and tourism boards, among others. This collaborative approach underscores the significance of industrial heritage to the identity and cultural landscape of the Ruhr Area. Such touristic approach has allowed the attraction over eight million visitors to the region each year, started in 1999 and is a project of the RVR. To boost the business creation in the region, the RVR established the subsidiary known as Business Metropole Ruhr (BMR). It triggers the business interests of the region's 53 towns and cities, promotes the competitiveness of the region and develops the high-performance and innovative image of the new Ruhr area both nationally and internationally (RVR, 2024).

Germany continues to focus on sustainable development in former coal mining regions. The coal phase-out is part of a broader strategy to transition to a low-carbon economy, emphasizing renewable energy, innovation, and sustainability. Germany's management of its mining heritage, particularly in the context of the coal phase-out, is characterized by a comprehensive approach that balances environmental remediation, economic redevelopment, social support, and cultural preservation. The lessons from Germany's experience can serve as a model for other countries transitioning away from fossil fuels.

2.1.3 Case study – Greece

Greece has a great mining history, especially regarding the coal mining sector. Numerous mining sites have operated either for a short period or for many years, that are now closed or in a closing procedure. The first discussions and starting actions for the conservation of geological heritage sites has been taken by IGME in 1995, during the event "Year of the Conservation of European Nature" where the issues related to conservation and management of geoheritage sites where discussed for the first time in Greece. Conservation and rehabilitation actions of specific geoheritage sites have taken place afterwards (Wibledon & Smith-Meyer, 2012).

Throughout the last years, some of these mining sites have been conserved and rehabilitated in order to be transformed into cultural heritage places for touristic and educational purposes. However, some of the

closed mining sites remain unexploited and have not been appropriately conserved, or have been partially or insufficiently conserved. Therefore, actions still have to be made in order to fully conserve and rehabilitate all the closed mining sites of the country, in order to exploit them for geo-cultural and touristic purposes to the greatest extend.

For this to happen and for the rehabilitated geoheritage sites to operate smoothly and efficiently, it is necessary to set the key elements, factors, and steps for establishing an effective management plan of the geoheritage sites. Concerning the above, it is firstly important to underline the existing mechanisms and methods for geoheritage management in Greece, including the existing legal framework.

It is important to note that the management factors and strategies of a geoheritage site may differentiate due to the type of the geoheritage item and its conservation state. However, in general, the main key elements and factors for management of the geoheritage sites include:

- Legal framework on geoheritage sites
- Organisations and Policy
- Selection and classification of sites
- Registration, inventory and documentation of sites
- Management of geoheritage sites / Funding
- Social participation and Promotion: Educational, scientific and touristic activities

Legal framework on geoheritage sites

The legal framework regarding the management of cultural heritage sites in Greece is formed under specific laws, constitutional articles and legislation measures. According to Article 24 of the Constitution of Greece, the protection of the natural and cultural environment constitutes a duty of the State. Regarding the preservation of monuments, historic areas and related elements, measures and actions that need to be taken shall be taking into account the principles of sustainable development, and are also a duty of the State. The protection of any kind of cultural heritage of Greece is provided and covered by Law 3028/2002 on the Protection of Antiquities and Cultural Heritage in General, as briefly described below. Other laws and legislations consisting the legal framework of heritage sites in Greece are also mentioned in the following paragraphs.

<u>Law 3028/2002 on the Protection of Antiquities and Cultural Heritage in General, Greece</u>

Law 3028/2002 concerns the protection and management of any cultural assets in Greece, including geological and mining heritage. It is mentioned that any actions relevant to the management of a historical site, must be issued to the Minister of Culture. The Ministry of Culture is responsible for listing, registering, and documenting the cultural assets, as well as for providing access to these sites, and approving or disapproving any other decisions taken regarding their management and exploitation.

Law 3028/2002 consists of 75 articles and describes the key indicators that define the protection of cultural heritage asset, the actions and decisions that are allowed concerning its management and protection, as well as the decision procedures and responsible bodies for their characterisation, management and protection. The key indicators mainly refer to:

1. The location, registration, documentation, as well as the study and research of the cultural asset,
2. The preservation of the site and its protection against any destruction, alteration and ay direct or indirect damage on it,
3. The prevention of theft and illegal excavation or export,

4. The restoration and conservation of the site,
5. The facilitation of access and contact with the cultural heritage for the public,
6. The promotion of geological and cultural heritage to raise public awareness
7. The education, and touristic activities for the promotion of the sites.

The access, conservation, exploitation and management of a cultural asset, as well as any rehabilitation and promotion activities necessary, are possible after authorisation granted by the Ministry of Culture. The decision must be issued following the relevant opinion of the Board, while the terms and conditions that accompany the action granted are also a responsibility of the Ministry of Culture.

More specifically, in Article 10, paragraph 2 Law 3028/2002, it is stated that the exploitation of mines/quarries, any kind of mineral exploration activity, as well as the delimitation of mining/quarrying areas must be granted approval of the Ministry of Culture first, where authorisation is given within a three-month timeframe. If the exploitation causes adverse effects to the specific heritage asset due to the distance from the cultural heritage site, the visual contact with it, the morphology of the area, or the type of action requested, approval may be denied.

M.D.12050/2223/2011 (G.G. B'1227), The Regulation on Mining and Quarrying Activities (KMLE)

KMLE is a legal framework involving regulations and specific criteria that should be followed for all types of mining/quarrying activities and mining/quarrying exploitation stages. These include the exploration phase, extraction/exploitation phase, the treatment of extracted materials, and finally, the rehabilitation stage. Apart from the framework and obligations of mining / quarrying studies and operations, health and safety subjects, environmental issues etc., the KMLE also includes legislations and directives regarding cultural heritage.

Law 4685/2020 on Modernisation of Environmental Legislation. Incorporated into Greek legislation of Directives 2018/844 and 2019/692 of the European Parliament and of the Council and other provisions.

Law 4685/2020 presents the latest updates and adjustments of the Greek Environmental Legislation. These amendments are incorporated into the Greek legislation of specific Directives of the European Parliament and of the Council and other provisions comprising the new legal framework. More specifically, the Law consists of 136 articles that are incorporated to Directive 2018/844 of the European Parliament and of the Council, as well as the Directive 2019/692. The first is amending the Directive 2010/31/EU (on the energy performance of buildings) and the Directive 2012/27/EU (on energy efficiency), while the second is amending the Directive 2009/73/EC concerning common rules for the internal market in natural gas.

This Law is mandatory to be taken into account concerning the environmental surroundings of the mine, in case there is need for rehabilitation of the further area due to past mining activity. Especially if phenomena such as acid mine drainage or concerning the mining methods used in older times of exploitation that may have caused pollution of the environmental surroundings, actions under this Law may need to be taken.

Law 4685/2020 includes 4 chapters. The first chapter involves amendments on environmental permitting, management, assessment, as well as environmental impact of any action. The second chapter includes adjustments related to renewable energy sources and electricity generation, such as compliance of installations with a sustainable development framework, spatial planning and zoning restrictions, regulations on installation of photovoltaics, wind farms and similar, waste treatment facilities, and more. The third chapter is about the management of protected areas and includes amendments on raising public awareness for the protected areas, promoting and ensuring their sustainable development, addressing

climate change issues of sectors such as industrial, energy and transport sector, and accordingly indorsing measures to mitigate the climate impact, the role of Protected Areas Management Units, financial management of the Natural Environment and Climate Change Organisation and management of available resources, establishment of the National Policy Governance System for Protected Areas, as well as the Natural Environment and Climate Change Organisation and more. The last chapter includes adjustments on the characterisation and management of specific zones within a protected area. These zones may involve extractive activities, national parks, heritage sites and their characteristics, other special classifications of use and activities (such as agricultural, forestry, livestock, etc.), land improvement projects for rural development, and more.

Organisations and Policy

As mentioned above, the responsibility of the protection and the granting for any actions and decisions of the management, conservation and exploitation of cultural heritage sites is in the hands of the Ministry of Culture (L. 3028/2002).

The conservation, management and any other actions regarding a specific geoheritage site, may also be responsibility of other governmental or non-governmental bodies and institutions, such as PPC or Hellenic Survey of Geology & Mineral Exploration (HSGME), however, upon acceptance decision of the Ministry of Culture. Other non-governmental organizations focusing on the conservation and protection of geoheritage sites are the Greek Society for the Protection of the Environment and the Cultural Heritage and the Geological-Geomorphological Heritage Conservation Committee of the Geological Society of Greece (GSG) (Wibledon et al., 2012; Theodosiou, 2010).

Other institutions and legislations related to geological heritage conservation and protection in Greece are (Theodosiou, 2010):

- Cultural and Natural Heritage Convention of UNESCO, 1972 (ratified by Law 1126/30-1-1981, G. 32/A/10-2-81)
- Environmental Legal Framework 1650/86
- Geological-Geomorphological Heritage Committee of the Geological Society of Greece, (GSG) since 2005.
- Hellenic Ministry of Environment, General Town Planning and Open Town Organization Urban Plans, ratified by Ministerial Decision 27691/14-09-07, G. 1902/B/07.

Selection and classification of sites

The selection of the geoheritage sites and their classification is performed following a specific procedure and according to defined characteristics, qualifications, and assets of each site. Such procedures for Greek heritage sites have been presented in projects and studies before. This topic was studied in a previous research project named “Designation of Geosites-Geoparks, contribution to sustainable development” by HSGME. The project was about systematic registration of Greek geosites, for scientific, education and touristic uses and the selection of areas for potential geoparks studies at a country level (Theodosiou, 2010).

A proposed methodology for CoalHeritage project, regarding mainly geoheritage assets related to coal mining has been presented in previous deliverables, more specifically in Deliverable 3.1 “Catalogue of the collected assets from the partners’ country”, where the international core data standards as well as the

available data for each type of geoheritage asset where identified, in order to form a comprehensive record for the involved countries.

Registration, inventory and documentation of sites

The registration, inventory and documentation of the cultural assets, including the geo-heritage sites such as former coal mines and coal mining infrastructure, is a responsibility of the Ministry of Culture in Greece. As mentioned in Articles 4 "National Archive of Monuments" and 5 "Protection of Intangible Cultural Assets" of the Law 3028/2002 the cultural assets are documented and registered on the National Archive of Monuments, in the Ministry of Culture. The methodology for the collection of data and the registration system, as well as the data protection rights, the access to the Archive and other parameters and regulations regarding the Archive must all be decided by the Ministry and approved by the Minister of Culture. The collection and the listing of all data and the accompanying documents and media (such as audio-visual records), regarding both tangible and intangible cultural assets, are all responsibility of the Ministry of Culture (L. 3028/2002).

Recently, a GIS inventory database has been created by HSGME, including approximately 1200 geoheritage assets, most of them categorized accordingly. However, there is no official system by the government for registration, documentation and listing of the geological heritage assets in Greece, while there are various geological sites that yet remain unregistered. Actions need to be made in order to establish an official registration system including geoheritage sites, such as closed coal mines. Also, all the still unregistered geoheritage sites in Greece need to be included, protected, conserved and rehabilitated accordingly if necessary (Wibledon et al., 2012).

Protection of geoheritage sites

The protection of geoheritage sites and cultural heritage assets in general includes its protection against any destruction, alteration and ay direct or indirect damage on it, as well as the prevention of theft and illegal excavation or export. Protection and conservation measures may also include other actions, according to the specific characteristics of each site, such as the type of the asset, the surroundings and the characteristics of the further area where it is located, geographical and weather conditions and others (Wibledon et al., 2012).

Management of geoheritage sites / Funding

The management of a geoheritage asset depends on its type and specific characteristics. Even though in Greece there is no official methodology/scheme regarding the management of geoheritage sites, a typical procedure most usually followed consists of:

- The initial management steps which include: (a) the initial research and investigation process, (b) the mapping and spatial definition of the site area, (c) the identification, characterization and interpretation of the asset, (d) the rehabilitation where necessary, (e) the conservation and preservation of the site, which include protection measures such as patrols and security, installations against weathering, installations for the tourists such as pathways, stairs, fences etc., (f) and the monitoring process such as cleaning and preserving the protection of the geoheritage site (Pantazopoulou et al., 2024; Theodosiou 2010; Zouros, 2007; Zouros and Valiakos 2010).

- The latter (higher-level) management steps which include: (a) assessment for the importance of the site as a cultural asset, such as evaluation of its scientific, educational or touristic value as a geoheritage element, (b) activities for the effective exhibition of the site, for example building access to the public, such as roads, (c) management activities related to its sustainable exploitation, (d) selection and initiation of different exploitation purposes such as research and/or education, cultural promotion, tourism, promotion of local products etc, (e) and lastly promotion of the geoheritage site for further raising public awareness, a process that can be achieved through social media, communication via organisations, museums, through the educational system, cultural events and relevant activities by municipalities, etc. (Pantazopoulou et al., 2024; Theodosiou 2010; Zouros, 2007; Zouros and Valiakos 2010).

For example, setting an official framework for the management and protection of geoheritage assets should include at least the initial research and characterisation process, the conservation and preservation strategies, the rehabilitation where necessary, the monitoring and management plan, the promotion of the asset, as well as any educational touristic and social participation activities.

The legal conservation and protection status of the geoheritage assets in Greece, related to coal mining activities, are either in the responsibility of the Ministry of Culture, and specifically by the Service of Modern Monuments and Technical Works of Attika, Eastern Stereas Elladas and Cyclades, or of the Ministry of Environment and Energy. Some of the coal-related geoheritage sites are also under the legal protection and management of Public Power Corporation S.A. Some geoheritage sites are overseen by other institutions, such as National and Technical University of Athens, upon recognition by ministerial decisions (usually taken by the Ministry of Culture or the Ministry of Environment and Energy) (L. 3028/2002).

The funding for the conservation of a geoheritage asset is covered by the Ministry of Culture, pending the adoption of the decision for its maintenance and management. The latter may be covered and assigned to either the Ministry of Culture itself, either another institution or organization, or lastly to a company which owns it, such as PPC commonly for coal heritage sites (L. 3028/2002).

There are no other funding schemes or programs for the conservation and management of coal and mining geoheritage sites in Greece formed up to now.

Social participation and Promotion: Educational, scientific and touristic activities

One vital step for the effective management and viable exploitation of the geoheritage coal-related sites over time concerns the educational, scientific and touristic activities related to the specific site. These activities may raise public awareness and furthermore help setting an effective management program for the country. Apart from the social participation and the contribution to education, these actions may also raise awareness in terms of setting a more effective legal framework and funding system regarding the protection and management of such sites.

Regarding the touristic exploitation of the coal geoheritage assets, including educational and scientific activities and visits from educational institutions and schools, any actions, decisions and planning must be approved by the Ministry of Culture (Law 3028/2002, Article 46). More specifically, according to Law 3028/2002, Article 46, the following apply for Greek cultural heritage assets:

The terms and conditions concerning the touristic visits at the heritage sites, as well as any kind of cultural or other events for the public that may take place at such sites, so long as that they are compatible with

the character of the sites as monuments or protected heritage assets, are in the decision of the Ministry of Culture. The decision is taken after being issued to the relevant opinion of the Board (L. 3028/2002).

In order to utilize the heritage assets in such a way, a fee is required to T.A.P.A. (Fund of Archaeological Resources and Expropriations), except from the case of non-profitable events, when upon the decision of the Ministry, there may be no requirement to pay the fee (L. 3028/2002).

Specifications about the entrance fee and other decisions for organized historical places and monuments that belong to the Public Sector and are protected by the Law 3028/2002 are a joint decision of the Minister of Economy and Finance and the Minister of Culture. Special access is provided to scientists for study, publication, photography and documentation of the heritage assets, considering that there is no risk of wear for the monuments and they comply with Article 39 of Law 3028/2002 concerning the publication rights.

For any kind of representations, impressions, or dissemination to the public of movable or immovable monuments belonging to the Public Sector by a natural or legal person, a permission is previously required by the Ministry of Culture. The permission is granted for a fee paid in favor of T.A.P.A. upon decision of the Minister of Culture, and exclusion may be granted for specific occasions upon decision of the Minister. The aforementioned actions may be for direct or indirect economic or commercial purpose, by any means from other institutions or persons apart from the Public Sector, T.A.P.A. and the Hellenic Culture Organization S.A (L. 3028/2002).

2.1.4 Case Study – Poland

The heritage of coal mining in Poland is an extremely important cultural and historical element that requires appropriate mechanisms and management methods. Poland, being one of the countries with a rich mining tradition, has developed a number of strategies aimed at protecting and promoting mining heritage. In the context of the phasing out of mines and the energy transition, the mobilization of resources to protect this heritage has become a key challenge (Mackiewicz & Staszewska, 2023).

The management of mining resources as cultural heritage in Poland is based on various mechanisms and methods, which are rooted in national legal regulations, heritage protection strategies and practical experience resulting from the management of many mining facilities of historical and cultural importance. Key elements of this process include:

1. Legal frameworks
2. Inventory and documentation
3. Management and funding
4. Education and promotion
5. International cooperation
6. Social participation

Legal frameworks

They include legal documents such as:

- The Act on the Protection and Care of Monuments (2003). The main act regulating the protection of cultural heritage in Poland. According to this Act, mining facilities may be entered into the register of monuments, which imposes obligations on owners related to their protection,

conservation and management. The Act defines the rules of entry into the register of monuments and the obligations of monument owners.

- The Mining and Geological Law (2011). It regulates issues related to the exploitation of geological resources, including historic mines and mining facilities. It contains provisions on the protection and protection of historical mining facilities.
- Nature Conservation Act (2004). Some mining facilities, e.g. They may also be protected under nature conservation laws, especially if they are located in protected areas such as national parks or reserves.
- Regulations of the Minister of Culture and National Heritage (2011, 2018), specifying detailed rules for the protection and conservation of monuments.

Inventory and documentation

The scope of the inventory is determined by the National Register of Monuments, kept on the basis of the Act on the Protection and Care of Monuments of 2003 and the Regulation of the Minister of Culture and National Heritage of 2011 on the maintenance of the register of monuments, the national, provincial and municipal register of monuments and the national list of monuments stolen or illegally exported abroad. It is a central, nationwide database containing information on immovable, movable and archaeological monuments, including mining facilities. The entry of a mining facility into the register of monuments provides it with legal protection and allows it to use funds for its conservation and revitalization. An example is the entry of the Guido Mine (NID, 2024) into the register of monuments, which allowed it to be adapted for tourist and educational purposes.

Objects that are not entered in the register of monuments, but are of historical importance, can also be included in the municipal register of monuments, which also provides them with a certain degree of protection and supervision.

For the purposes of documenting resources, it is important to properly map and digitize them. To this end, it is valuable to use GIS technology and 3D scanning to create accurate maps and digital models of mining facilities. The use of modern technologies to monitor the technical condition of historic mining facilities, such as structural or geophysical monitoring systems.

The second important element of this process is archiving documentation. It defines where and how historical documents, plans and photos related to mining facilities are stored and digitized.

The process of inventory and documentation of mining resources in Poland is systematically carried out by various institutions, including conservation offices and museums (Mining Museum, 2024). Creating detailed catalogues and archiving documents and photographs allows you to retain knowledge about mining resources. The effectiveness of these activities is high, because it allows for precise planning of protection and promotional activities. An example is the Coal Mining Museum in Zabrze, which keeps detailed documentation of its resources. Legal protection of mining facilities through entry in the register of monuments provides them with an appropriate level of protection and allows them to apply for funds for their conservation. These mechanisms are effective, but their effectiveness depends on enforcement and the availability of funding.

Management and funding

The main institutions responsible for the protection of mining heritage are: the National Institute of Heritage (NID), the Provincial Offices for the Protection of Monuments (WKZ) and museums specializing in mining, e.g. the Museum of Coal Mining in Zabrze.

These institutions are responsible for developing long-term plans for the maintenance and protection of mining facilities, taking into account maintenance needs, monitoring and preventive measures. They can also try to obtain subsidies from state and EU funds for conservation and revitalization works. The revitalization of post-mining facilities requires large financial outlays. Adapting abandoned mines and mining infrastructure to new functions, such as museums, cultural centers, tourist or recreational facilities, allows them to be reused and increase their attractiveness for residents, but it is expensive. Successful examples are the Guido Mine in Zabrze and the Queen Louise Adit.

The revitalization of mining facilities is another method of mobilizing resources for the protection of the coal mining heritage in Poland, which includes not only their conservation, but also their adaptation to new functions, such as cultural centers, museums or conference spaces. Revitalization projects often benefit from EU funds and support from local communities, which makes it possible to bring these places back to life and give them new utility value. Local zoning plans take into account the protection of monuments and may include detailed provisions for mining facilities, which helps in their protection and management.

Various sources of financial support are available in Poland, such as European funds, national heritage protection programs, as well as funds from local governments. In Poland, there are many cultural institutions that manage mining heritage. These are museums, open-air museums and educational centers that conduct research, educational and promotional activities. An example is the Coal Mining Museum in Zabrze, which manages, m.in the Guido Mine and the Queen Louise Adit, organizing trips, exhibitions and cultural events.

The state and local government units also have the possibility to grant subsidies for conservation, restoration and monument protection works. Examples include the Monument Protection Fund and programs financed by the Ministry of Culture and National Heritage. Regular conservation and restoration work is essential to keep mining facilities in good condition. These works are often carried out under the supervision of monument conservators.

Education and promotion

The key methods of mobilizing resources for the protection of mining heritage in Poland are education and promotion. Educational programs addressed to schools, universities and local communities raise awareness of the importance of mining heritage. Promotion through the media, publications and cultural events attracts the attention of the general public and supports conservation efforts.

Educational programs implemented in post-mining facilities are an important element building local identity based on the history of the region. Organization of workshops, lectures, open days and educational programs for schools, aimed at introducing the history and importance of mining heritage.

Another example of promotional activities are cultural events carried out on the premises of these facilities, such as festivals, exhibitions and other events promoting mining heritage. e.g. Industriada, the Industrial Monuments Route Festival in the Silesian Voivodeship. Industrial Monuments Route of the Silesian Voivodeship, which brings together several dozen objects related to industry, including mines,

steelworks and power plants. The trail is also an excellent example of cross-sectoral cooperation and the effective use of resources to promote and protect heritage.

International cooperation

International cooperation is important from the point of view of educational and promotional activities, but also allows for the exchange of experience in the field of mining heritage management. Cooperation with other countries with mining heritage and the implementation of cross-border projects demonstrate best practices, e.g. projects under the INTERREG programme.

Another example is the efforts to inscribe Polish mining facilities on the UNESCO World Heritage List, e.g. the Wieliczka and Bochnia Salt Mines, or activities within international networks, such as ERIH.

Social participation

The involvement of residents allows for success in the development and use of the potential of mining heritage. Public consultations, joint projects and grassroots initiatives allow for the active involvement of local communities in the processes of protection and promotion of mining heritage. Companies can get involved in heritage protection through sponsorship, donations and co-organizing events. An example is the cooperation of local authorities with mining companies as part of projects to revitalize and adapt mining facilities (Marszowski & Hildebrandt, 2024). A successful example of preserving mining heritage in Poland based on social commitment is Łaźnia Moszczenica: the Institute of Heritage and Dialogue in Jastrzębie Zdrój and the Historic Ignacy Mine in Rybnik.

Another example of social participation is public-private partnerships. Cooperation between the public and private sectors and non-governmental organizations allows for the protection, management and promotion of mining heritage.

Planning a coal mining heritage management system in Poland requires a prudent mobilization of resources, the involvement of local communities and the cooperation of various sectors. Adherence to the principles of sustainable development, education and promotion, as well as ensuring stable funding are crucial for the effective protection and promotion of this unique heritage. Examples of Polish initiatives show that it is possible to effectively manage resources and transform the heritage of coal mining into a valuable cultural and tourist element.

2.1.5 Case Study – Slovenia

The discovery of the main lignite layer in the 19th century forever changed the course of development of the Šaleška Valley, its image, the rhythm of life and its people. In the past, coal from Velenje was an important source for heating homes and industrial buildings in Slovenia. Coal miner Velenje builds its almost 150-year history mainly on tradition and its own knowledge, with technological equipment and technologies that it has developed itself. It is known for its high safety standards, as it constantly adapts to modern safety and technological requirements to ensure a safe working environment for miners. In addition, it uses advanced technology for the most efficient utilization of coal reserves and minimal impact on the environment. Despite the trends after the transition to low- or carbon-neutral society, which is reflected in the world and at home, Premogovnik Velenje today is still an important and indispensable

pillar of the Slovenian energy industry. Together with the Šoštanj Power Plant, it has been working for decades to ensure the most uninterrupted and reliable domestic electricity supply to a third of Slovenia.

Coal mining played a crucial role in the development of Slovenia and Yugoslavia, providing essential energy for economic growth and improving living standards. The Velenje Coal Mine was the center of this industry, supported by education, knowledge transfer, and modern equipment. Traditional mining skills were combined with innovations, enabling efficient and safe mining, which significantly contributed to the region's economic growth. Fossil fuels, including coal, constituted an important part of the energy source. During drought periods, dependence on fossil fuels could increase, reaching up to one-third of all energy needs.

In Slovenia, the methods of cultural heritage protection and the responsibilities for its protection with the aim of enabling the comprehensive preservation of heritage are governed by the Cultural Heritage Protection Act (ZVKD-1), which has been in force since March 2008 and is under the auspices of the Ministry of Culture.

Cultural heritage includes Tangible (immovable and movable) cultural heritage (physical objects such as historic buildings, archaeological sites, monuments, museums and works of art) and Intangible cultural heritage (traditions, customs, languages, folklore, handicrafts, and skills that are passed down from generation to generation).

2.2 State of Conservation and Factors affecting the Property of Heritage Sites

This section presents the conservation and protection status for the coal and other mining heritage assets selected by each partner (Case study – country). The data for each asset is presented in the form of a Table, followed by a brief analysis and suggestions for identifying lessons learned from these sites and propose improvements on the conservation and management status.

2.2.1 Case study – France

Name of the location site, City	*Type of mine*	*Current status*	*Protection*	*Is the site part of any network?*
Lewarde Historical Mining Center	*Coal*	*closed*	*"Musée de France label"*	*Site of the ERIH*
Parc Explor Wendel	*Coal*	*closed*	*"Musée de France label"*	*Site of the ERIH*
Faymoreau Historical Mining Center	*Coal*	*closed*	*"Musée de France label"*	*Site of the ERIH*

As already stated, the questions concerning the necessary resources and provision or purchase of land for future heritage sites have long been settled in France. Since then, the issues have focused more specifically on conservation of sites, particularly buildings. The three BRGM partner sites unanimously consider that that the budgets allocated by the local authorities that fund them are not sufficient to conserve and/or restore the buildings within their perimeters.

The preservation/conservation/restoration of buildings is indeed the most important issue; moreover, most of them are classified as a historical monument, which means they are subject to special legislation (all types of work must be approved by the Ministry of Culture, via the "direction régionale des Affaires culturelles" (DRAC - in English Regional Cultural Affairs Directorate). The industrial buildings that now house the heritage sites were not designed to be used for decades. They were, however, regularly maintained during the life of the mine. The budgets for maintaining and renovating these buildings are very high, and funding bodies are reluctant to release the necessary funds, even though they understand the situation.

One of the partner sites has a very large surface area of industrial buildings of heritage value (on a site that is also very wide); the initial decision to classify this extensive complex, with its many buildings, was well-intentioned; but it is now resulting in real difficulties in finding the funding needed to carry out the work that is now essential.

A very topical issue is also the rising cost of energy: it is of course necessary to heat premises open to the public (and to employees). However, these buildings are often old industrial buildings that have been converted and not designed for public use. They are poorly insulated and the necessary insulation work has not always been carried out; investment budgets to carry out this work will no doubt be necessary in the future in order to reduce heating costs.

2.2.2 Case study – Germany

Name of the location site, City	*Type of mine*	*Current status*	*Protection*	*Is the site part of any network?*
German Mining Museum, Bochum	Museum focused on mining history and technology	Operational as a museum	DMT-Gesellschaft für Lehre und Bildung mbH, and the city of Bochum	▪ Route of Industrial Heritage in the Ruhr Area (Route der Industriekultur) ▪ European Route of Industrial Heritage (ERIH)
Colliery Zollverein, Essen	Former coal mine now a museum and cultural complex	UNESCO World Heritage Site.	Highest level of international recognition for its outstanding universal value	▪ UNESCO World Heritage ▪ European Route of Industrial Heritage (ERIH) ▪ Route of Industrial Heritage in the Ruhr Area (Route der Industriekultur) ▪ Industrial Culture Network of North Rhine-Westphalia (Industrielle Kulturlandschaft Ruhrgebiet)

				▪ European Coal and Steel Community (ECSC) Legacy
Colliery Ewald "Part of Hoheward – Landscape Park", Herten	Former coal mine integrated into a landscape park	Part of the Hoheward Landscape Park	Recognized under the European Route of Industrial Heritage.	▪ European Route of Industrial Heritage (ERIH) ▪ Route of Industrial Heritage in the Ruhr Area (Route der Industriekultur) ▪ Industrial Culture Network of North Rhine-Westphalia (Industrielle Kulturlandschaft Ruhrgebiet)
Hansa Coking Plant (Kokerei Hansa), Dortmund	Former coking plant, now an industrial heritage site.	Preserved as a cultural and historical site.	European Route of Industrial Heritage	▪ European Route of Industrial Heritage (ERIH) ▪ Route of Industrial Heritage in the Ruhr Area (Route der Industriekultur) ▪ Industrial Culture Network of North Rhine-Westphalia (Industrielle Kulturlandschaft Ruhrgebiet)
Workers' Settlement Dahlhauser Heide, Bochum	Historic settlement linked to coal mining	Private properties. Towns and settlements built around coal mines, today place of	Recognized within local heritage networks	▪ Route of Industrial Heritage in the Ruhr Area (Route der Industriekultur) ▪ Industrial Culture Network of North Rhine-Westphalia (Industrielle Kulturlandschaft Ruhrgebiet)
Teutoburgia Colliery Settlement, Herne	Historic settlement linked to coal mining	Private properties. Towns and settlements built around coal mines, today place of	Recognized within local heritage networks	▪ Route of Industrial Heritage in the Ruhr Area (Route der Industriekultur) ▪ Industrial Culture Network of North Rhine-Westphalia (Industrielle

				Kulturlandschaft Ruhrgebiet)
Ems Canal, Dortmund	Coal Transportation mean	Managed by the federal government	Integral part of Germany's transportation network	▪ Route of Industrial Heritage in the Ruhr Area (Route der Industriekultur) ▪ European Route of Industrial Heritage (ERIH)
Ruhr Valley Railway (Ruhr-Sieg-Strecke)	Coal Transportation mean	Operated by Deutsche Bahn	Integral part of Germany's national railway infrastructure	▪ Transportation Infrastructure: As a vital railway line, it is integrated into Germany's national transportation infrastructure. ▪ Industrial Heritage Networks: Sections of the railway may be included in industrial heritage routes or networks that highlight the industrial history of the Ruhr Valley.
Coal Loading Point of the Jupiter Tunnel	Coal mine infrastructure	Exhibition point managed by the regional government	Recognized within regional heritage networks	▪ Route of Industrial Heritage in the Ruhr Area (Route der Industriekultur) ▪ Industrial Culture Network of North Rhine-Westphalia (Industrielle Kulturlandschaft Ruhrgebiet)
Zeche Nachtigall, Witten	Coal Mine	Museum	Regional protection	▪ Route of Industrial Heritage in the Ruhr Area, Industrial Culture Network of North Rhine-Westphalia
Zeche Prosper-Haniel, Bottrop	Coal Mine	Closed (until 2018)	Historical significance	▪ Route of Industrial Heritage in the Ruhr Area, Industrial Culture Network of North Rhine-Westphalia
Zeche Zollern II/IV, Dortmund	Coal Mine	Museum	Regional protection	▪ Route of Industrial Heritage in the Ruhr Area,

				Industrial Culture Network of North Rhine-Westphalia
Zeche Radbod, Hamm	Coal Mine	Historical site	Local heritage protection	▪ Route of Industrial Heritage in the Ruhr Area, Industrial Culture Network of North Rhine-Westphalia
Zeche Carl Funke, Essen	Coal Mine	Museum complex	Regional protection	▪ Route of Industrial Heritage in the Ruhr Area, Industrial Culture Network of North Rhine-Westphalia
LWL-Industrial Museum Zeche Hannover, Bochum	Coal Mine	Museum complex	Regional protection	▪ Route of Industrial Heritage in the Ruhr Area, Industrial Culture Network of North Rhine-Westphalia
LWL-Industrial Museum Zeche Zollern II/IV, Dortmund	Coal Mine	Museum complex	Regional protection	▪ Route of Industrial Heritage in the Ruhr Area, Industrial Culture Network of North Rhine-Westphalia
Henrichshütte, Hattingen	Ironworks/Steel mill	Museum complex	Regional protection	▪ Route of Industrial Heritage in the Ruhr Area, Industrial Culture Network of North Rhine-Westphalia
Landschaftspark Duisburg-Nord, Duisburg	Steelworks/Coal mining	Public park and cultural venue	Regional protection	▪ Route of Industrial Heritage in the Ruhr Area, Industrial Culture Network of North Rhine-Westphalia
Steigerwald Colliery, Dormund	Coal Mine	Museum	Regional protection	▪ Route of Industrial Heritage in the Ruhr Area, Industrial Culture Network of North Rhine-Westphalia

Analysis and suggestions

Overall, these sites collectively demonstrate the adaptive reuse and preservation of industrial heritage, emphasizing cultural, social, and environmental lessons learned from Germany's coal mining history. They

underscore the importance of integrating industrial heritage into contemporary urban and regional planning while preserving cultural identity and promoting sustainable development.

The German Mining Museum serves as an educational hub, preserving mining history, showcasing technological advancements, and promoting cultural heritage. Lessons include the importance of engaging the public in industrial history through interactive exhibits and educational programs. Another significant highlight is the preservation of Colliery Zollverein, which demonstrates the successful transformation of an industrial site into a cultural and economic asset. It emphasizes the importance of sustainable redevelopment and international recognition for industrial heritage.

Many regions of the Ruhr area have been integrated into landscape parks, illustrating the potential for reclaiming and repurposing industrial sites for recreational and environmental purposes, thereby promoting sustainable land use. Specific aspects of mining infrastructure are also preserved for educational and heritage purposes, ensuring their continued relevance in local and regional narratives.

The preservation of Hansa Coking Plant highlights the significance of industrial processes and their impact on local communities. It underscores the importance of preserving industrial architecture and technological heritage. Similarly, multiple settlement areas serve as reminders of the social and cultural impact of mining on local communities, emphasizing the need for integrated urban planning and the preservation of workers' housing for cultural continuity.

Transportation infrastructure has been pivotal for the economic success of the region, emphasizing the importance of preserving such infrastructure and ensuring its ongoing maintenance for modern use. The preservation of the canal underscores the role of transportation infrastructure in industrial development and the necessity for sustainable management of waterways. Likewise, the railway's significance lies in its historical role in facilitating coal transport and its adaptation for modern transportation needs, highlighting the importance of maintaining and adapting historical infrastructure.

The transition from coal to other sources of energy is a complex way. However, along with a post-mining management framework and multi-stakeholder participation, preservation and maintenance can be associated to new economic development and job creation.

- Comprehensive planning and stakeholder engagement: Develop comprehensive transition plans that involve stakeholders from government, industry, academia, and local communities. Engage in inclusive decision-making processes to ensure broad support and alignment of interests in transitioning away from coal while preserving industrial heritage.
- Adaptive reuse and redevelopment: Emphasize adaptive reuse strategies for former coal mining sites and industrial infrastructure. Use zoning regulations and incentives to encourage sustainable redevelopment projects that integrate environmental, social, and economic considerations.
- Heritage preservation and interpretation: Establish heritage preservation programs that prioritize the conservation and interpretation of industrial heritage sites. Develop interpretive centers, guided tours, and educational programs to showcase the historical significance of mining and industrial processes, fostering appreciation and understanding among visitors and residents alike.
- Economic diversification and innovation: Foster economic diversification by supporting new industries and businesses that align with sustainable development goals. Provide incentives for renewable energy projects, green technologies, and sustainable tourism initiatives to create new employment opportunities and stimulate local economies.
- Environmental remediation and sustainable land use: Implement environmental remediation measures to restore and rehabilitate land affected by coal mining activities. Adopt sustainable

land use practices, such as reforestation, wetland restoration, and ecological corridors, to enhance biodiversity and ecosystem services.

- Skills development and transition support: Invest in skills development programs and vocational training for workers transitioning from coal-related industries to new sectors. Provide career counseling, retraining opportunities, and financial assistance to support workforce adaptation and job placement in emerging fields.
- Monitoring and evaluation: Establish monitoring frameworks to track progress towards transition goals, including economic diversification, heritage preservation, and environmental sustainability. Conduct regular evaluations to assess the effectiveness of policies and initiatives, making adjustments as needed to achieve desired outcomes.
- International collaboration and knowledge exchange: Participate in international networks and partnerships to exchange best practices, innovations, and lessons learned in coal transition strategies. Collaborate with other regions facing similar challenges to leverage collective expertise and resources for successful transition outcomes.
- Policy and regulatory frameworks: Develop clear policy frameworks and regulatory incentives to support coal transition objectives. Include mechanisms for carbon pricing, renewable energy targets, and environmental standards that encourage sustainable development practices and mitigate climate impacts.
- Public awareness and community engagement: Implement public awareness campaigns and community outreach initiatives to build support for coal transition efforts. Foster a sense of ownership and pride in local heritage while promoting a shared vision for a sustainable future that preserves cultural identity and promotes quality of life.

By integrating these management suggestions into coal transition strategies, future regions can effectively navigate the complexities of industrial heritage preservation, economic transformation, and environmental stewardship. This holistic approach ensures that transitions away from coal mining are sustainable, inclusive, and beneficial for present and future generations.

2.2.3 Case study – Greece

Some selected cases of coal and other mining heritage assets in Greece are presented in the table below.

Name of the location site, City	*Type of mine*	*Current status*	*Protection*	*Is the site part of any network?*
Anargyroi open pit mine, Amyntaio mining area, Western Macedonia, Greece	*Lignite open pit mine*	*closed*	*Public Power Corporation S.A*	*No*
The headquarters of the iron mine at Megalo Livadi, Serifos island	*Related to Serifos iron mines*	*closed*	*Ministry of Culture, Service of Modern Monuments and Technical Works of Attika, Eastern Stereas Elladas and Cyclades*	*National Archive of Monuments*

Prininas facilities of the Aliveri mine area	*Related to Aliveri lignite mines*	*closed*	*Public Power Corporation S.A*	*No*
Wagon lifting tower	*Related to Aliveri lignite mines*	*closed*	*Public Power Corporation S.A*	*No*
Kazarma underground gallery in Kymi, Evia, Greece	*Related to Kymi lignite mines*	*closed*	*No*	*No*
Aerial lines of lignite transportation to the port of Kymi, Evia, Greece	*Related to Kymi lignite mines*	*closed*	*No*	*No*
LIPTOL lignite mine facilities and power plant, Ptolemais, Western Macedonia, Greece	*Related to Ptolemaida lignite mines*	*closed*	*Public Power Corporation S.A*	*No*
The Vagoneto Fokis Mining Park	*Museum, related to Fokis bauxite mines (Imerys Bauxites S.A.)*	*closed*	*Ministry of Culture*	*No*
Loading bridge at Milos island	*Manganese open pit mines of Cape Vani, Milos*	*closed*	*No*	*No*
Thiaphes area, Milos Island, Greece	*Sulfur mines*	*closed*	*Ministry of Culture, Service of Modern Monuments and Technical Works of Attica, Eastern Central Greece and Cyclades*	*National Archive of Monuments*
Chemistry laboratory of the French Mining Company of Lavrion, Attica	*Related to galena Lavrion mines*	*closed*	*Ministry of Culture, Service of Modern Monuments and Technical Works of Attika, Eastern Stereas Elladas and Cyclades*	*National Archive of Monuments*

Analysis and suggestions

The conservation status of the majority of the coal and other mining heritage sites listed in the table above, is sufficient. Most of them have been fairly conserved, are mostly under the protection of the Ministry of Culture, and are exploited primarily for touristic purposes and educational activities. Some examples of the most famous touristic sites are the The Vagoneto Fokis Mining Park, the Thiaphes area of the former Sulphur mines at Milos Island, the infrastructure and facilities of the Aliveri former lignite mining area, and the Chemistry laboratory of the French Mining Company of Lavrion, Attica.

The most comprehensive example of effective conservation, management and exploitation for touristic and educational purposes of a geoheritage asset, is the Vagoneto Fokis Mining Park, located within the premises of Imerys Bauxites S.A. (former S&B Industrial Minerals S.A.). The legal protection status belongs to the Ministry of Culture, as it is categorized as one of the museums of the country. The museum includes a tour with the Vagonetto, presenting in the most realistic and on the spot way to educate visitors about the history, the process of the bauxite exploitation and mining procedure step by step. The tour starts

from the operating area of the mines, following with an underground gallery starting with the exhausted Tunnel 850, the old train that transported the bauxite, the Exhibition Area presenting the mining history of the site, and finally the Interactive Digital Technology Wing (URL6).

The Thiaphes area of the former Sulphur mines at Milos Island is also conserved comprehensively and is also exploited for touristic purposes, including educational visits by national and international universities (URL7).

However, there are still some cultural sites that are partly or not at all conserved. For example, there is no legal protection or conservation status for the Kazarma underground gallery in Kymi and the Aerial lines of lignite transportation to the port of Kymi (related to Kymi lignite mines in Evia, Greece). Also, even if the Loading bridge at the former manganese open pit mines of Cape Vani, Milos island, is a well-known mining heritage site visited for scientific and educational purposes, no legal protection status is also mentioned and the legal owner of the site is unknown.

2.2.4 Case study – Poland

Name of the location site, City	*Type of mine*	*Current status*	*Protection*	*Is the site part of any network?*
GUIDO Coal Mine, Zabrze	Underground Blac Coal Mine	Museum, *and an underground tourist route*	Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_ZE.97456, PL.1.9.ZIPOZ.NID_E_24_ZE.26603 **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_ZE.97461, PL.1.9.ZIPOZ.NID_E_24_ZE.26488 Part of: Historical Monument **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_PH.15690	**ERIH** – European Route of Industrial Heritage, The Technical Monuments Trail of the Silesian
"Former Mine" Science and Art Centre in Wałbrzych, Wałbrzych	Blac Coal Mine	Museum, Art center, Cultural place	Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_N_02_ZE.27792, PL.1.9.ZIPOZ.NID_E_02_ZE.15291	**ERIH** – European Route of Industrial Heritage
Historic Silver Mine and Black Trout Adit in Tarnowskie Góry, Tarnowskie Góry	Underground Silver Mine	Museum, *and an underground tourist route*	**UNESCO** - World Heritage Site: **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_UN.1771 Historical Monument: **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_PH.9079 Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_ZE.98902	**ERIH** – European Route of Industrial Heritage The Technical Monuments Trail of the Silesian
Wieliczka Salt Mine, Wieliczka	Underground Salt Mine	Museum, *and an underground tourist route*	**UNESCO** World Cultural and Natural Heritage List: **Inspire id:** PL.1.9.ZIPOZ.NID_N_12_UN.1129 Historical Monument: **Inspire id:** PL.1.9.ZIPOZ.NID_N_12_PH.8572 Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_N_12_BL.52694	**ERIH** – European Route of Industrial Heritage
Queen Louise Adit, Zabrze	Blac Coal Mine	Museum,	Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_BL.75720, PL.1.9.ZIPOZ.NID_E_24_BL.35744	**ERIH** – European Route of Industrial Heritage

		and an underground tourist route	**Inspire id:** PL.1.9.ZIPOZ.NID_N_24_BL.83327, PL.1.9.ZIPOZ.NID_E_24_BL.35573 **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_ZE.29869, PL.1.9.ZIPOZ.NID_E_24_ZE.26500 Part of: Historical Monument **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_PH.15690	The Technical Monuments Trail of the Silesian
Wilson Shaft, Katowice	Blac Coal Mine	Art gallery, cultural place	Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_E_24_ZE.25796	**ERIH** – European Route of Industrial Heritage The Technical Monuments Trail of the Silesian
Tradition Park, Siemianowice Śląskie	Blac Coal Mine	Museum, educational and cultural place		**ERIH** – European Route of Industrial Heritage The Technical Monuments Trail of the Silesian
Hoist Tower of the President Shaft with the Sztygarka Complex, Chorzów	Blac Coal Mine	Museum, educational and cultural place	Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_BL.27256	**ERIH** – European Route of Industrial Heritage The Technical Monuments Trail of the Silesian
"Polska" Mine Hoist Towers, Świętochłowice	Blac Coal Mine	Museum, educational and cultural place	Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_BL.27163, PL.1.9.ZIPOZ.NID_E_24_BL.35591 **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_BL.27162, PL.1.9.ZIPOZ.NID_E_24_BL.35587	**ERIH** – European Route of Industrial Heritage The Technical Monuments Trail of the Silesian
Maciej Shaft, Zabrze	Black Coal Mine	place of public - cultural use	Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_ZE.29723, PL.1.9.ZIPOZ.NID_E_24_ZE.26215)	**ERIH** – European Route of Industrial Heritage The Technical Monuments Trail of the Silesian
Ignacy Historic Mine in Rybnik, Rybnik	Black Coal mine	Museum, place of public-cultural use	Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_ZE.30166	**ERIH** – European Route of Industrial Heritage The Technical Monuments Trail of the Silesian
Former Nowa Ruda Mine, Nowa Ruda	Black Coal mine	Museum and an underground tourist route	Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_E_02_ZE.9657 **Inspire id:** PL.1.9.ZIPOZ.NID_E_02_ZE.9748 **Inspire id:** PL.1.9.ZIPOZ.NID_N_02_BK.81960, PL.1.9.ZIPOZ.NID_E_02_BK.97023	
Krzemionki Opatowskie - Archaeological Museum and	Striped Flint Minie	Museum	**UNESCO** World Cultural and Natural Heritage List: **Inspire id:** PL.1.9.ZIPOZ.NID_N_26_UN.2146 Historical Monument:	

Reserve "Krzemionki", Sudół			**Inspire id:** PL.1.9.ZIPOZ.NID_N_26_PH.8411 Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_A_26_AR.23650, PL.1.9.ZIPOZ.NID_E_26_AR.86434,PL.1.9.ZIPOZ.NID_E_26_AR.86530	
Salt Mine in Bochnia (Kopalnia Soli Bochnia)	Underground salt mine		**UNESCO** World Cultural and Natural Heritage List: **Inspire id:** PL.1.9.ZIPOZ.NID_N_12_UN.1129 Historical Monument: **Inspire id:** PL.1.9.ZIPOZ.NID_N_12_PH.8571 Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_N_12_ZE.58180	
Training Mine of the Sztygarka City Museum in Dąbrowa Górnicza	Underground Blac Coal Mine	museum and an underground tourist route, educational place		The Technical Monuments Trail of the Silesian
The Ficinus workers' colony, Ruda Śląska	Related to black Coal Mine	Private property. The colony complex can only be viewed from the outside	Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_UU.37100, PL.1.9.ZIPOZ.NID_E_24_UU.6726)	The Technical Monuments Trail of the Silesian
Katowice - Nikiszowiec Industrial Quarter, Katowice	Related to black Coal Mine	Museum, place of public - cultural use	Historical Monument: **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_PH.8428 Register of historical monuments: **Inspire id:** PL.1.9.ZIPOZ.NID_N_24_UU.11867	The Technical Monuments Trail of the Silesian

Analysis and suggestions

The conservation status of mining sites in Poland reflects a balance between preserving cultural heritage and adapting to post-mining uses. Poland's rich mining history has led to several sites being protected as cultural monuments under national regulations, such as the Act on the Protection and Care of Monuments. Many former mining facilities have been transformed into museums and cultural centers, like the Guido Mine and the Queen Louise Adit in Zabrze, ensuring their historical and educational preservation. Legal frameworks and national inventories safeguard these sites, while revitalization projects, often supported by EU funds, adapt them for new purposes such as tourism and education. However, the financial and technical challenges of maintaining large industrial complexes present ongoing difficulties. The successful conservation efforts involve cooperation between local communities, government bodies, and international partners.

Examples of well-managed coal heritage sites in Poland showcase successful conservation, revitalization, and adaptive reuse of former coal mines and related infrastructure. These sites, supported by national and local governments, often involve international cooperation and financial backing from the European Union, exemplifying how post-industrial landscapes can be transformed into vibrant cultural and

educational hubs. The examples of effective conservation, management and exploitation of coal heritage in Poland are:

- Guido Mine and Coal Mining Museum, Zabrze
- Queen Louise Adit, Zabrze
- Nikiszowiec, a historic miners' settlement in Katowice,
- Silesian Museum, Katowice.

Poland's coal heritage management illustrates a successful model of combining conservation with economic and social revitalization. Sites like Guido Mine, Queen Louise Adit, Nikiszowiec, and the Silesian Museum represent innovative approaches to heritage management. These projects not only preserve historical and industrial assets but also serve as cultural, educational, and tourism hubs that contribute to regional development, sustainability, and public engagement.

However, the preservation of coal mining heritage faces significant challenges. Many former coal mining sites, particularly in the Upper Silesia region, have not been fully conserved, despite their historical and industrial significance. As the coal industry declines due to environmental concerns and the shift towards renewable energy, many coal mines are being decommissioned without comprehensive plans for heritage preservation. A notable example of under-conservation is the Wałbrzych Coal Mine, which has seen partial preservation through the establishment of the Old Mine Science and Art Centre, but large parts remain neglected. Local and national efforts to turn these sites into heritage museums face financial constraints, lack of political will, and community engagement issues. This uneven approach leaves many coal sites at risk of being lost, undermining Poland's industrial history and cultural heritage. Efforts towards revitalizing these spaces into cultural and educational landmarks remain insufficient.

In addition to the Wałbrzych Coal Mine, several other coal mining sites in Poland have not been fully conserved or recognized as heritage. For instance, the Makoszowy Coal Mine in Zabrze, once one of the oldest coal mines in Upper Silesia, was closed in 2016, and much of its infrastructure now faces neglect. Despite calls for its preservation as a historical site, much of the equipment and buildings remain abandoned, with limited efforts for conservation. The lack of funding and official support has left large sections of this important industrial site at risk of demolition. Another example might be the Krupiński coal mine, closed 2017. These mine site is unused and falling into disrepair despite the potential it represents. These examples prove the broader issue in Poland, where many coal sites are only partially preserved, if at all, leaving significant industrial heritage at risk of being lost permanently.

2.2.5 Case study – Slovenia

Name of the location site, City	*Type of mine*	*Current status*	*Protection*	*Is the site part of any network?*
The Coal Mining Museum of Slovenia, Velenje	Underground Lignite Mine	Museum, underground tourist route, pedagogical work with visitors to museum collections, Gallery, Virtual exhibition	EID: 1-23999	ERIH – European Route of Industrial Heritage

The Zagorje Mining Museum, Zagorje	Underground Brown CoalMine	Museum	EID: 1-13415	ERIH – European Route of Industrial Heritage
The Zasavje Museum Trbovlje, Trbovlje	Underground Brown CoalMine	Museum	EID: 1-22441	ERIH – European Route of Industrial Heritage
The Hrastnik Museum, Hrastnik	Underground Brown CoalMine	Museum, Gallery	EID: 1-30685	
The Mežica lead and zinc mine, Mežica	Lead and zinc mine	Museum	EID: 1-09314	ERIH – European Route of Industrial Heritage
The Idrija Municipal Museum, Idrija	Mercury Mine	Museum	EID: 1-00185	UNESCO World Heritage Site; European Heritage Label; ERIH – European Route of Industrial Heritage
The Urbanščica Black Coal Mine, Vremski Britof Museum	Underground Black Coal Mine	Collection	EID: 1-29890	

Analysis and suggestions

The Slovenian Coal Mining Museum was established in 1957 at the initiative of the Velenje Lignite Mine, today's Premogovnik Velenje, at Velenje Castle as the Museum of Slovenian Coal Miners. In 1999, the collection was relocated to its current authentic environment at Premogovnik Velenje, at the Stari Jašek Škale. The museum thus opened while Premogovnik Velenje was still in operation, enabling a direct connection with the mining industry. Due to the operation of the mine, funds were available to establish and run the museum. This provided a solid foundation for the continued development and preservation of the coal mining heritage. The knowledge and technology available, along with the expertise of professionals from the mine, enriched the museum's content. Early restructuring allowed for timely adaptation and integration of new technologies and knowledge into the museum's exhibits and programs. Among other things, it hosts 5-star experiences – the culinary Velenje Underground and the Submerged Villages, wh

The Slovenian Coal Mining Museum represents an important intersection of history, culture, art, and education. The significance of cultural figures and their impact on local culture is expressed through the poet Anton Aškerc, who guides visitors through the underground world. The museum hosts various permanent and temporary exhibitions that showcase the history and technological development of coal mining. These exhibitions often include artworks depicting the lives of miners and the coal mining industry. The museum collaborates with schools and kindergartens, offering educational programs tailored to different age groups. It also works with the CŠOD (Center for School and Extracurricular Activities), which organizes various educational programs and activities for schools. These collaborations enable students to gain a deeper understanding of coal mining and its impact on society through practical and experiential activities.

The Slovenian Coal Mining Museum, in collaboration with Eurofins, Environment Research Slovenia Ltd., significantly contributes to environmental awareness and education, which is crucial for sustainable development and environmental protection in coal mining regions and beyond. Lectures at the museum cover a wide range of environmental topics, including the impact of coal mining on the environment, reclamation of degraded areas, nature conservation, and sustainable development. As part of its collaboration with ERICO, the museum also offers special programs for schools and kindergartens, where children and young people learn about the importance of environmental protection through practical and

experiential activities. The lectures and exhibitions on this topic illustrate how former mining areas can be revitalized and become important parts of the natural and cultural environment.

The Idrija mercury mine was the second largest mercury mine in the world and one of the oldest preserved mine complexes in Europe. Beneath the city streets lies the priceless wealth of the Idrija mine, which for 500 years drove the development of this mining town. The Idrija mercury heritage management center was established with the aim of ensuring comprehensive and sustainable management and preservation of the cultural heritage and natural values associated with the Idrija mine. It currently manages the following areas and cultural heritage sites of national importance, inscribed on the UNESCO World Heritage List: Hg Smelter, Belčne, Putrihova and Idrijska Klavje, Antonijev Rov Tourist Mine, Frančiškina Jaška area and Kompresorska Station.

Idrija Mercury Mine has been proactive in fostering coordinated cooperation with the municipality, successfully attracting younger generations and employing a strategic approach that includes a representative from the Ministry, facilitating easier collaboration with the government. This strategic partnership has also resulted in increased state funding. The museum holds exceptional importance for the country and is recognized as a UNESCO World Heritage Site.

The City Museum of Idrija is a museum of a general nature, recognized above all for its care for the technical heritage of the Idrija mercury mine, the second largest mercury mine in the world. The central task of the Museum is to care for movable and intangible heritage from the fields of history, ethnology, history of art and technical heritage in the Idrijsko-Cerkljanska region. It emphasizes its role in the educational process, especially in local studies, and with its permanent and occasional exhibitions is a link between textbook history and the real remains of the past in the field. The exhibition activities are complemented by the publication of professional publications and catalogues, various pedagogical programs, lessons and workshops for the youngest and youth, as well as guided tours, with lectures and presentations for adults.

The lead and zinc mine Mežica was one of the last lead and zinc mines in Europe that was still operating at the end of the twentieth century. After the closure of the mine, a rich technical, cultural and natural heritage remained, which is enhanced by other activities such as tourism, crafts and entrepreneurship. **The Underground of Peca** is an important example of how a good public-private partnership can create a sustainable and attractive tourist destination that preserves the region's rich cultural and natural heritage. It combines the rich history of the mine with modern tourism programs and products that are adapted to the various interests and needs of visitors. What stands out the most is the unique experience of riding a bike through the underground tunnels of the old mine, an innovative tourism product where visitors explore the underground waters of the mine by boat, which allows a completely different view of the coal heritage, and teambuilding programs in the unique environment of the underground world.

Mining in the Zagorska Valley has left a mixed legacy - a huge number of degraded areas and a varied mining heritage, which offers an opportunity for development in the economic, cultural and tourist areas. **The Zagorje Mining Museum** was created out of concern for the preservation of the mining heritage and as a memory of 240 years of mining in the Zagorje Valley. The collection of mining heritage in the museum includes a large number of photographs showing the development of mining in the valley, a collection of tools, rocks and mining tools that miners used in their work. A collection of mining heavy machinery (locomotive, mining carts, etc.) shows the rapid progress of coal mining techniques, while a simulated tunnel shows the development of cave support and coal mining techniques. The museum is the first in Slovenia to be designed interactively.

The main challenges in inventorying and managing mining resources as cultural heritage include:

Identification of heritage resources: Many mining sites are abandoned or damaged, making their identification and documentation difficult. Accurate field research and archival sources are needed for effective inventorying. Preservation from decay: Due to age and abandonment, mining structures often face decay and destruction. Ensuring their protection and preservation requires appropriate maintenance and restoration measures. Financial constraints: Inventorying and managing mining heritage require significant financial resources for field research, site restoration, maintenance, and educational programs. Limited funding can hinder effective operations. Involvement of local communities: Successful management of mining heritage relies on the involvement and support of local communities. Engaging residents in decision making processes and project implementation can ensure greater connectivity and sustainability. Legal and administrative challenges: Various regulations and administrative procedures may pose obstacles to inventorying and managing mining resources. Coordination among different authorities and an appropriate legal framework are necessary for operation. Cultural and social context: Mining heritage is often associated with job loss and changes in the social fabric of local communities. Heritage management must also consider cultural and social aspects and promote inclusion and participation. Overcoming these challenges requires a comprehensive approach involving collaboration between different sectors, coordination among institutions, and active engagement of local communities and experts.

The transfer of knowledge is crucial in the preservation of heritage. When knowledge is lost due to the retirement of experienced personnel, it becomes extremely difficult to revive or reconstruct it. The expertise and skills accumulated over years are often unique and irreplaceable, making it essential to document and pass on this knowledge to future generations. Without this continuity, the understanding and effective management of heritage sites can be severely compromised, leading to potential gaps in preservation efforts.

2.3 Inventory processes and management of mine's movable and immovable property

The management of a mine's assets and managing mine property, both movable and immovable requires a systematic and comprehensive methodology. This methodology ensures the effective utilization of resources, legal compliance and the preservation of historical and cultural elements, especially for mines that carry historical significance. The outlined approach integrates the creation of inventory processes and the overall management strategy, which can be applied to mining facilities as a whole.

Methodology for the inventory processes and management of mine property

1. **Establishing the legal framework and regulatory compliance.**
   The creation of inventory processes and management of a mine's assets, whether movable or immovable, begins with understanding and integrating relevant legal frameworks. These frameworks dictate the structure for the protection, management, and inventory of properties, including those of cultural, historical, and industrial significance. This part requires a combination of legal, financial, environmental, and community-focused strategies.

A key starting point is the registration of the mining assets under legal protection frameworks, ensuring compliance with national heritage laws, and leveraging potential funding from government or international bodies

2. Inventory process development

Inventory processes are crucial for maintaining an accurate record of the mine's movable (equipment, machinery) and immovable (buildings, infrastructure) properties. The inventory process should be divided into several key stages:

A. Identification of assets. The first phase involves identifying and categorizing all assets within the mine. This includes:
   - Movable property: machinery, vehicles, tools, safety equipment, and other tangible assets used in mining operations.
   - Immovable property: mining structures such as shafts, tunnels, storage facilities, administrative buildings, and technical infrastructure.

B. Classification and legal documentation. The assets should be classified based on their use, age, condition and relevance. Following the classification, the legal status of each asset must be documented. Immovable assets, particularly historic sites, may require registration under heritage laws. Legal documents ensure the protection and management of these properties, facilitating access to conservation funding.

C. Technological integration for documentation. Using modern technologies such as Geographic Information Systems (GIS) and 3D scanning is critical for creating detailed digital maps and models of immovable assets. This technological approach facilitates accurate record-keeping, which is essential for both operational management and the protection of cultural heritage.

3. Management structures and responsibilities.

The management of both movable and immovable mining properties depends on institutional frameworks and a well-defined chain of responsibility. An essential step in developing a management system involves:

A. Assigning custodial responsibility. Designating specific institutions or management bodies to oversee day-to-day maintenance.

B. Defining the role of local and regional authorities. These bodies ensure long-term oversight, resource allocation, and public engagement in preserving and managing mining assets.

C. Creating a financial strategy. Mobilizing state, local, and international funds to support the restoration, conservation, and adaptive reuse of mining properties

4. Management of movable property.

Movable properties such as machinery, tools, and documents related to mining operations should be systematically catalogued. A comprehensive inventory of such items often involves:

- Tagging each object with a unique identifier,
- Documenting physical attributes, usage and historical value,
- Digitizing records using databases linked to GIS systems to ensure accuracy and easy retrieval.

The management of movable property should focus on operational efficiency, asset tracking, and lifecycle management. Key components should include:

A. Inventory tracking system. Implement a real-time inventory management system that tracks the movement and usage of movable assets:
   - Purchase date and original cost,
   - Usage patterns

- Maintenance schedules
- Depreciation and lifecycle estimations

B. Maintenance and conservation.

C. Regular maintenance schedules need to be implemented to prevent breakdowns. The system should be integrated with predictive maintenance software, ensuring that equipment remains functional and that costly downtime is minimized. Scheduling preventive maintenance is critical for high-use assets such as e.g. drilling machines.

D. Disposal and replacement policy. Establish clear policies for asset disposal and replacement based on depreciation rates and operational necessity. This ensures that the mine is not overstocked with outdated or non-functional equipment and can make room for more advanced technologies.

5. Management of immovable property.

Management of immovable property in a mining context should prioritize both operational functionality and heritage preservation. Regular maintenance and conservation efforts must be implemented to preserve structural integrity and prevent deterioration, often supported by monitoring systems like geophysical sensors. It involves ensuring compliance with regulations, maintaining infrastructure, planning for sustainable land use, and engaging with local communities, while leveraging technology for efficient operations. For immovable assets like buildings, tunnels, and extraction equipment, the documentation should include:

- creating detailed structural maps using 3D scanning technology,
- including historical context, structural integrity, and cultural value in the records,
- regular condition monitoring using geophysical monitoring systems to assess degradation and inform maintenance plans

6. Data archiving and documentation

The effectiveness of any inventory process is supported by meticulous documentation and archival procedures. Mining-related documents, blueprints and photographs should be digitized and stored in a central database accessible to relevant stakeholders. This creates a lasting record for both operational management and historical preservation. Data collection should involve:

- implementation a tagging system for assets (e.g., barcodes, RFID) for unique identification of each asset,
- definition essential data fields for each asset (e.g., ID, description, location, purchase date, value, condition, maintenance records),
- regular audits, schedule regular physical audits to verify the accuracy of inventory records.

7. Maintenance, monitoring and risk management.

Systematic maintenance ensures that mining assets remain in usable condition for future generations. This process involves creating regular maintenance schedules and securing necessary funding. The management framework must also include a system for tracking asset deterioration using modern monitoring tools, such as structural and geophysical assessments, particularly for immovable assets like tunnels or historical buildings.

Structural monitoring systems, such as geophysical or stress-monitoring technology, ensure that buildings are safe and suitable for continued use or renovation. In mining contexts, this is vital to prevent accidents related to subsidence or deteriorating infrastructure. Risk assessment should refers to identification potential risks related to asset management (e.g., theft, damage, obsolescence), as well as mitigation strategies (e.g., insurance, security measures, redundancy).

8. **Funding and resource mobilization.**
   The management of both movable and immovable properties often requires substantial financial investments, particularly for revitalization and conservation. Identifying funding sources is a key part of the management process, including state and regional government funding, EU structural funds, as well as private partnerships and sponsorships.

9. **Education, promotion and social participation.**
   A significant part of managing mining assets includes educating the public about the value of the heritage. It integrates promotional activities, cultural events, and educational programs to foster appreciation for the mining heritage. Educational programs can range from museum exhibitions to school initiatives that teach students about mining history and heritage preservation. Public engagement further extends to consultation processes, allowing communities to participate in decision-making and management practices.

10. **Sustainability and adaptation for reuse.**
    The final element in the methodology involves ensuring sustainability through adaptive reuse of mining sites. Abandoned mining facilities can be transformed into museums, cultural centres, recreational areas, providing them with new utility while preserving their historical essence. Successful adaptive reuse requires interdisciplinary cooperation between architects, historians, and engineers, ensuring that the structural integrity and cultural value of the sites are preserved during transformation.

Conclusions

Creating inventory processes and managing mine property requires the integration of legal frameworks, technology, structured management and strategic funding. Inventory creation forms the backbone of this process, ensuring that assets are properly classified, maintained, and documented. By adhering to these practices, mining sites can ensure operational efficiency while protecting and promoting cultural heritage. Regular monitoring, financial planning, and public engagement are essential components of this methodology, ensuring that mining heritage is protected, promoted, and sustained for future generations. Institutions responsible for this must balance conservation with adaptive reuse, transforming mining heritage into culturally and economically valuable assets.
Taking into account the above elements will allow for the effective development and implementation of a methodology for the inventory and management of movable and immovable assets of the mine as mining heritage, contributing to the protection and promotion of this valuable heritage.

3. Assessing the Management System

Documenting and analyzing information regarding mine-related resources in order to preserve their historical, cultural and scientific value (EU, 2012). This process includes collecting data on physical objects, archival documents, photographs and any other elements related to the history and operation of the mine. In turn, management of mine resources as cultural heritage is an approach that includes planning, protection, promotion and sustainable use of these resources (UNDP, 2018). It also includes taking into account such important areas as local communities, education, as well as activities aimed at maintaining the coherence of heritage with the culture of a given region. The inventory and management of mine resources as cultural heritage aims to protect and preserve unique elements related to the history of mining while ensuring the sustainable use of these resources and the transmission of their knowledge to future generations.

The GIG-PIB research aims to identify standards and mechanisms for the management of heritage sites. The research outputs were the basis for the development of the methodology for the creation of inventory processes and managing the mine's movable and immovable property. Analysis of the methodology was expert assessments containing two methods:

- CAWI In-Depth Interview (CAWI-IDI),
- Focus Group Interview (FGI).

General assumptions of the methodology as an assessment tools

Focus Group Interview FGI

FGI is a research method used in social sciences. It is a form of group discussion involving a small number of people representing the target research group, usually 6 to 12. This method explores participants' opinions, attitudes, feelings and reactions on a specific topic. The characteristic features of a focused group interview (FGI) are:

- Focus on the research topic. The discussion is focused on a specific topic, product, service or issue that is of interest to the researcher,
- Moderation. The meeting is led by a moderator who directs the discussion, tries to maintain the balance of participants' statements, asks questions and stimulates conversation around key issues,
- Interaction between participants. Group participants have the opportunity to exchange their views, experiences and opinions. The interaction between them may lead to the identification of common points of view or differences,
- Analysis of group dynamics. Researchers pay attention not only to participants' individual responses but also to the interactions between them, which can provide additional information.
- Openness to diversity. The group is usually composed of different individuals, which allows for different perspectives on the issue under study,
- Complementary techniques. Sometimes different techniques are used, such as product testing, visual presentations or a concept card, to further stimulate discussion and understand participants' reactions (Morgan & Hoffman 2010).

FGI is an effective method for obtaining a deeper understanding of the target group's opinions and reactions to a research topic.

In-Depth Interview (IDI)

IDI is a research method in which the researcher conducts in-depth interviews with experts in a given field. It~~'s~~ could be run in-person or online, in the form of CAWI (Computer Assisted Web Interview) technique. This type of interview focuses on obtaining detailed information from one respondent who has specialized knowledge about a given study. Distinctive features. Expert of In-depth Interview (IDI) has:

- Specialized knowledge, experience or expertise in a specific field,
- Developing the topic. The researcher has the opportunity to expand on the topic, ask questions as the conversation progresses, and explore deeply different aspects of the issue,
- Elaboration of answers. The respondent has time to carefully consider and elaborate his answers, which allows him to obtain more comprehensive and thoughtful information,
- Individual context. The interview focuses on the expert's individual context and experiences, enabling you to understand his or her unique perspective,
- No group influence. Unlike group discussion (FOCUS), IDI lacks the influence of dynamic group interactions, which allows for more individual and undistorted responses (Boyce & Neale 2006).

Survey experts

The selection of participants (experts) in the FOCUS and CAWI IDI research on the topic of inventory and management of mine resources as cultural heritage was thoroughly discussed in the GIG-PIB research team and takes into account specific aspects of this research area. In particular, research participants have professional knowledge, show interest and activity in the protection of cultural heritage and are committed and sensitive to topics related to cultural heritage related to mines. GIG-PIB experts ensured their knowledge and experience related to the field of cultural heritage, and conservation of monuments, are representatives of institutions dealing with heritage, in particular related to mining, represent mining companies, mining engineering staff, are people who manage activities related to the extraction of raw materials, they can provide practical information regarding the management of mine resources. Equally important experts were:

- Representatives of industrial heritage organizations at different levels,
- Representatives associated with regional authorities,
- Representatives of local mining communities
- Representatives of other organizations dealing with the protection of cultural heritage and the mining environment.

The principle of gender and age balance is maintained in the selection of experts, which allows for obtaining diverse perspectives and experiences in research.

Research tools construction

The research tools were:

1. CAWI IDI Questionnaire, for ~~t~~online dissemination. CAWI IDI questionnaire form, as well as achieved CAWI IDI questionnaire experts' responses, are attached to this Deliverable. The tool was designed using a combination of single-choice, multiple choice and open-ended questions to capture both quantitative and qualitative data.
2. The FGI Scenario, focuses on the essential aspects of the inventory processes and managing the mine's movable and immovable property. FGI Scenario is an appendix to this Deliverable.

Both research tools have been discussed and revised by all Coal Heritage project partners.

They cover 10 groups with relevant questions:

- Introduction to mine-related cultural heritage
- Inventory of mine assets
- Inventory methods
- Mining heritage management
- Public participation
- Education and Awareness
- Sustainable development
- Cooperation and partnership
- Future perspective
- Demographics

The selection of key terms used in the Questionnaire and Scenario included main topics relating to:

- Mine-related cultural heritage, as it refers to the set of values, traditions, activities and material objects associated with the history of mining that has a significant impact on the culture of the communities and regions where mines have operated or continue to operate. This heritage includes both physical and intangible aspects that shape the identity of a mining community (Czerwińska 2018);
- Inventorying elements related to mines is the process of identifying, documenting and securing various components that constitute mining heritage, in particular: methods effective for inventorying mine resources include a diverse set of techniques and procedures for identifying, assessing and monitoring natural resources, infrastructure and other relevant mine-related elements. (National Heritage Institute 2019);
- Mining heritage management challenges as the difficulties that may arise in the identification, protection and sustainable use of areas (Konior 2021), sites or traditions associated with the mining industry.
- Public participation in mine-related heritage management refers to the involvement and active participation of local communities and stakeholders in decision-making processes related to the planning, protection and use of mine areas and facilities. This process aims to incorporate diverse community perspectives, knowledge and needs into decisions regarding mine heritage (Gutowska & Kobyliński 2011);
- Public awareness of mining heritage is the degree of understanding and knowledge of local communities and the wider community about the historical, cultural, economic and environmental aspects of the mining industry. As part of this social awareness, people realize the value of mining heritage, understand its importance for the region and community, and are aware of the challenges associated with its preservation and sustainable development (National Heritage Institute 2018);
- Sustainable development in the context of mine-related cultural heritage management refers to an approach that balances the protection and promotion of heritage while meeting the contemporary needs of local communities and future generations. This approach assumes that heritage activities should respect cultural, environmental and social values while striving for lasting and sustainable development. In practice, this means that cultural management related to mines should take into account not only the aspects of protecting historical structures or traditions related to mines, but also ensure a balance between the protection of the natural environment, social participation of local communities, and the development of heritage as a cultural and educational resource. The sustainable development approach to heritage management also includes economic aspects, striving to create sustainable economic models that not only maintain heritage but also benefit the local community (Gražulevičiūtė 2006, Linek\ 2016)).

- Collaboration in the management of mining heritage is a process in which various institutions, organizations, local communities and other stakeholders join forces to effectively plan, protect and develop areas related to mining heritage. This cooperation includes coordination of activities, exchange of knowledge, resources and making decisions in common agreement (Gaweł et all. 2021).

Survey design

A survey was designed for 15 IDI experts (international) using the CAWI technique and 2 focused FOCUS expert interviews, in two groups of 6 experts- international and regional (Polish).

CAWI IDI

An in-depth Interview online questionnaire was developed at EUSurvey platform (fig. 1) and available link: https://ec.europa.eu/eusurvey/runner/coalheritagesurvey2024

The link and questionnaire was active from 2024.05.22 till 2024.06.25.

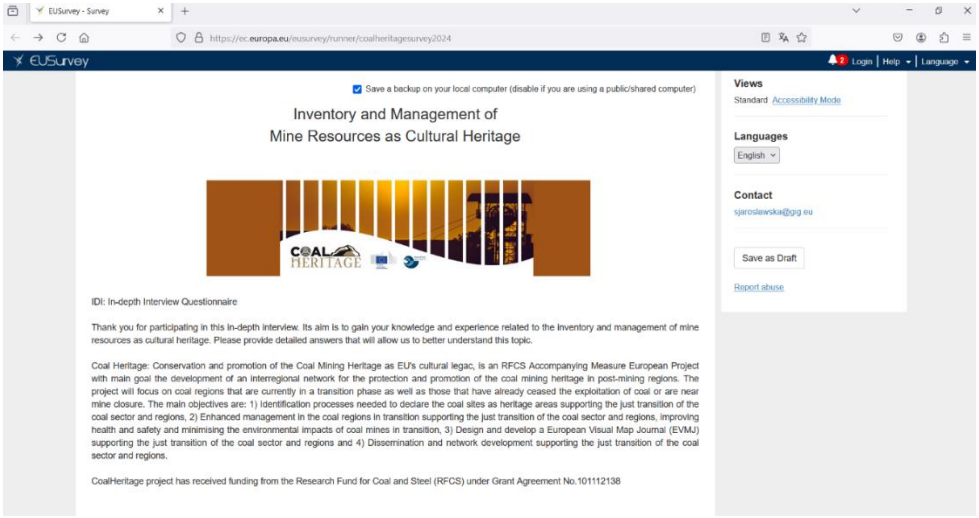


Figure 1 IDI questionnaire at EUsurvey

Questionnaire contained information about the project, RFCS funding of the project and the grant number. Questionnaire also includes a Privacy Statement and information on the General Data Protection Regulation (2016/679 /EU).

Most of the IDI experts had relevant experience in the inventory of mine assets (fig.2).

Most of the experts had medium or little experience in asset inventory – 10 indications. Two experts had long, many years of experience in inventorying mining assets.

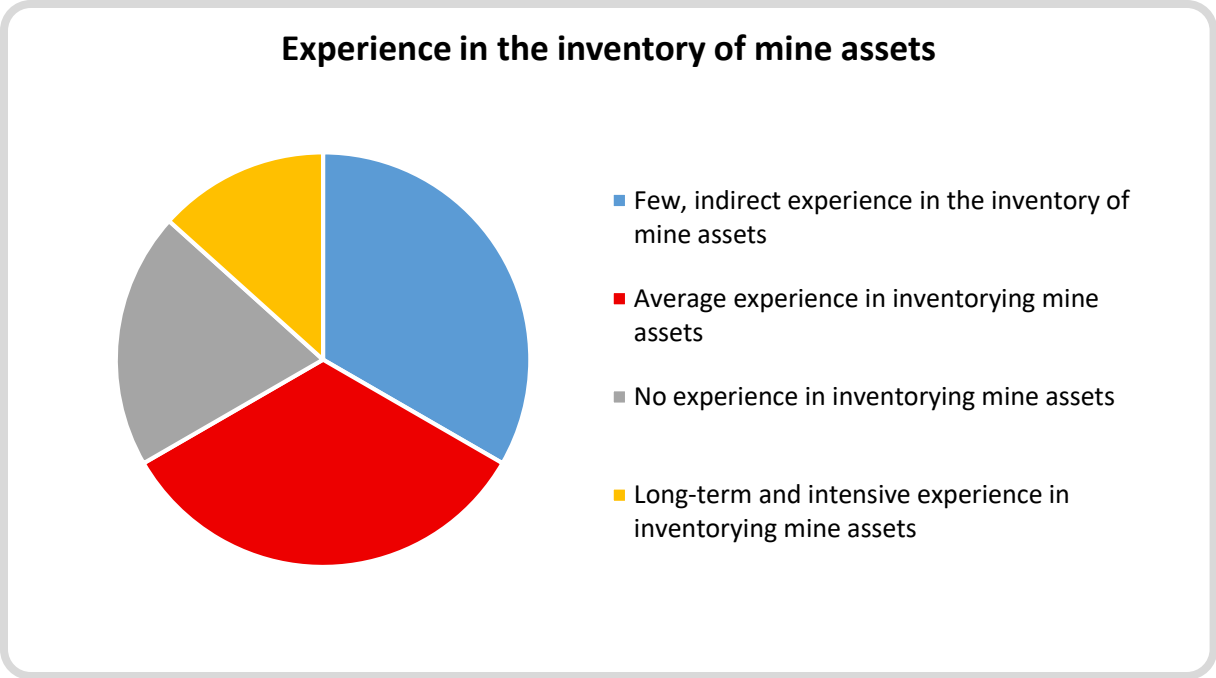


Figure 2 Experts experience in the inventory of mine assets

FGI (Focus group interviews)

A Focus Group Interview has been held in 2 groups of at least 6 experts.

International FGI

21.05.2024 – FGI with international experts, online (fig. 3,4). The meeting gathered 7 outstanding international experts in the field of industrial heritage:

1. Miles Oglethrope, presidents of The International Committee for the Conservation of the Industrial Heritage TICCIH (UK),
2. Catharine Bertram (Peril Bassin Minier Nord Pas de Calais, FR),
3. Jaap Nieweg (European Federation of Museums and Tourist Railways FEDECRAIL, NL),
4. Vasilios Melfos (Aristotle University of Thessaloniki GR),
5. Piotr Gerber (President of the International Committee For The Conservation of The Industrial Heritage TICCIH Polska, PL),
6. Ewa Wojtoń (Coal Mining Museum in Zabrze, PL),
7. Ross Forbes (Durham Miners Association, UK).

Hildebrand de Boer (The Industrial and Engineering Heritage Committee, NL) couldn't attend the FGI but he has sent his FGI scenario response. It has been included in the analysis.

FGI was moderated by Sylwia Jarosławska-Sobór and Piotr Hetmańczyk. Robert Hildebrandt, the Coal Heritage project manager in GIG-PIB, welcomed guests and gave information about the project and financing from RFCS.

The discussion aimed to obtain knowledge on the participants' perspectives and experiences related to the inventory and management of mine resources as cultural heritage.

Figure 3 International FGI

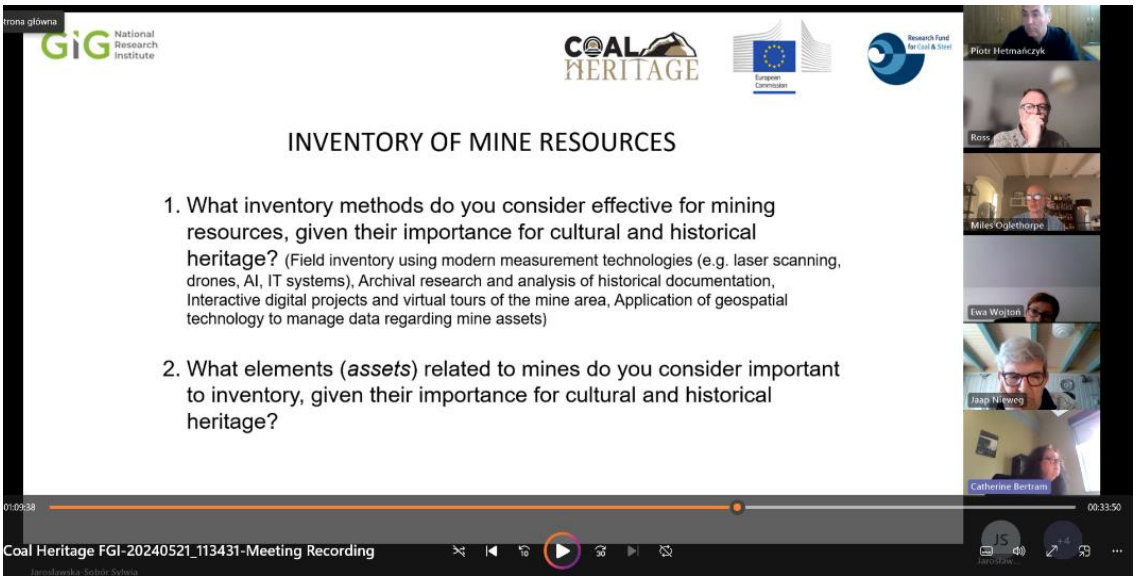


Figure 4 International FGI

Regional FGI

24.05.2024 – regional with regional expert, on the premises of GIG-PIB, Katowice (fig.5,6). The meeting gathered 7 outstanding Polish experts in the field of mining and industrial heritage:

1. Beata Piecha-van Schagen (Department Manager, Muzeum Górnośląski Park Etnograficzny in Chorzów),
   Bartłomiej Szewczyk (Director, Muzeum Górnictwa Węglowego in Zabrze),
2. Marek Gołosz (director of the Ignacy mine in Rybnik),
3. Łukasz Konarzewski (Provincial Conservator of Monuments in Silesia)

4. Piotr Rygus (Department Manager, Muzum Śląskie in Katowice),
5. Adrianna Kordiak-Woryna (director of SGGP),
6. Ewa Caban (Manager, Centrum Dziedzictwa Kulturowego Instytut Korfantego in Katowice),
7. Adam Rostecki (Mobilne Centrum Digitalizacji Instytut Korfantego in Katowice).

FGI was moderated by Ryszard Marszowski. Robert Hildebrandt, the Coal Heritage project manager in GIG-PIB, welcomed guests and gave information about the project and financing from RFCS.
The discussion aimed to obtain knowledge on the participants' perspectives and experiences related to the inventory and management of mine resources as cultural heritage.

Figure 5 Regional FGI

Figure 6 Regional FGI

4. Data Analysis and Discussion of Results

Inventorying in the context of mines as cultural heritage refers to the systematic process of collecting, Data Analysis and Discussion of Results

4.1. CAWI In-Depth Interviews

4.1.1. Experts views of mine-related cultural heritage

In the first open question and introduction to the topic experts have been asked to express their general opinion on the cultural heritage related to mining. The experts' answers were extensive and are included in the survey questionnaires that are attached to Deliverable. Below some selected statements are presented and an analysis of the whole question.

The cultural heritage associated with the mines is an indispensable element building a sense of the history and culture of the region. Most of the stories of families, for generations and those who came to work, have the theme of the mine inscribed as a place, activities, stimulus, situation and relationship, creating a kind of habitus, a family environment that formed dispositions, competences and human attitudes

A very important element of preserving the identity and historical heritage of mining regions. Resource with great social and economic potential.

Mine-related cultural heritage is a crucial part of our collective history and identity.

Preserving this heritage maintains a tangible connection to our past, offering insight into the technological advancements and economic conditions of previous eras. For many communities, mining is more than an economic activity; it is a way of life that shapes their cultural identity.

The cultural heritage associated with mines is an extremely important element of the history and identity of many communities around the world. First of all, mines play a key role in the economic development of many regions. (…) Mines are also a place where unique traditions and customs were formed. Miners formed their own communities with unique rituals, festivals, and folklore. Traditions such as St. Barbara's Day, the miners' holiday celebrated on December 4 in Poland are living proof of the durability of the mining cultural heritage. The mines are also of educational and tourist importance.

Despite many positive aspects, the negative effects of mining activities, such as environmental degradation, accidents and occupational diseases, cannot be forgotten. Therefore, it is important for mining heritage to also take into account these darker aspects, allowing for a more complete understanding of its complexity. The cultural heritage associated with mines is not only a history of raw material extraction, but also a rich array of traditions, values and experiences that have shaped communities over the centuries. Preserving and promoting this heritage is crucial to understanding our past and building the future.

Mine-related cultural heritage is in a narrower sense a branch of industrial heritage. Especially larger mines, including coal mines were not only sites of technical development but also a site of educational, infrastructural, medical, economic, cultural and social prosperity. The latter two, however having been suppressed by growing capitalistic system especially in 19th to mid-20th century, concentrating profits by mine-owners, whereas workers population lived in many cases in a situation just to survive. Occurrences of coal as outcrops on the land surface have been known for centuries, already in the antique times. They were locally also used, mostly for primitive heating, in smithery and ironworks. This connection between coal and accompanying activities comprising mine workings themselves, machinery, buildings, transports may represent, if still exist, a considerably interesting heritage. Mining sites may be of great interest to be visited by people far away from these areas.

As 'industrial heritage' includes the lives of all people in industrialised society, both in terms of their everyday lives and their living and working conditions, 'industrial heritage' primarily combines aspects of technological, cultural and social history. In contrast to 'industrial archaeology', 'industrial heritage' extends the time horizon of the interpretation and evaluation of the 'industrial' age to the present day and thus also directs attention to the current development trends of industrial society and the significant political and cultural phenomena at work within it. The concept of 'industrial heritage' therefore opens up three main perspectives of knowledge: a material perspective with the question of the material/artificial legacy of industrialisation in space and time, a social-societal perspective with the question of working and living conditions in industrial society, an artistic-scientific perspective with the question of the intellectual confrontation with the phenomena of industrialisation and de-industrialisation.

Preserving mine-related heritage also provides valuable data for researchers studying historical mining techniques, materials, and societal impacts, informing modern mining practices and innovations. Overall, mine-related cultural heritage enriches our understanding of history, supports cultural identity, offers educational opportunities, and drives economic and environmental benefits. Its preservation is vital for honoring the legacy of mining communities and learning from the past to inform the future.

Despite many positive aspects, the negative effects of mining activities, such as environmental degradation, accidents and occupational diseases, cannot be forgotten. Therefore, it is important for mining heritage to also take into account these darker aspects, allowing for a more complete understanding of its complexity. The cultural heritage associated with mines is not only a history of raw material extraction, but also a rich array of traditions, values and experiences that have shaped communities over the centuries. Preserving and promoting this heritage is crucial to understanding our past and building the future.

One of the experts drew attention to the fact that cultural heritage associated with mines is of great importance, both from a historical, economic and social perspective. It is important to preserve this heritage while promoting sustainable practices to minimize the negative impacts of mining. This requires an inclusive approach that respects the history and cultural significance while taking into account the needs of today's society.

Cultural heritage in connection with mines is a multifaceted topic that encompasses historical, economic and social dimensions. Historical significance: Mines and mining have a long history in many regions of the world and have contributed significantly to the development of societies. Mining activities have often led to the establishment and growth of towns and communities and have shaped many cultures and traditions. Archaeological heritage: Many historic mines are now archaeological sites that offer insights into past techniques and ways of life. These sites are often important sources for research into the industrial development and social organization of past civilizations. Economic development: Historically, mines have brought economic prosperity to many regions. They have created jobs and contributed to industrial development. In many areas, mining is still an important economic sector today.

Social impact: The social structure and communities around mines have often been strongly influenced by mining. This includes both positive aspects, such as community building and economic advancement opportunities, and negative impacts, such as social inequalities and health risks for workers. Environmental impact: Mining often results in significant environmental impacts, including landscape change, water and soil pollution. These negative effects can threaten the cultural heritage and livelihoods of the local population.

Preservation and protection: The preservation of historic mines and mining sites is a challenge. It requires a balancing act between the preservation of cultural heritage and the economic use of resources. Mines are often important cultural assets and economic resources at the same time, which can lead to conflicts of interest.

The physical remnants of mining, such as machinery, buildings, and tools, are valuable artifacts as part of the industrial heritage. These sites can serve as open-air museums and educational resources, and can offer a large variety of educational activities. For educational purposes, field trips for students of all levels as well as for the broad public and professionals can take place. In addition, old mining areas can attract a large number of researchers working on geology, metallogeny, and mineralogy but also on mining, ore beneficiation, archaeology and archaeometallurgy, as well as economic, political, and social sciences.

The areas where historical mines occur can be considered as part of the geoheritage, a term defined as the array of geological features, dynamics, sites, and landscapes that are not only key-indicators of the Earth's history and functional processes but also reflect the interactions between abiotic and biotic systems, including the anthroposystem. As geo-antroposystems, mining areas are "interactive systems composed of ecosystems and the societies that live in and use them" with an emphasis on the interaction and the co-evolution between natural systems and social systems. They allow the production of cross-knowledge between the disciplines of the natural sciences and those of human and social sciences. For scientists and the public, they provide an almost inexhaustible field of activity and also offer ideal opportunities for educational and geotourism.

Summary of the experts' answers to the first question and their views of mine-related cultural heritage:

1. Mine-related cultural heritage is a rich and diverse aspect of global heritage. It encompasses the historical, social, economic, and technological dimensions of mining activities. The preservation and promotion of this heritage are essential for understanding our past, shaping our cultural identities, and informing future developments. By recognizing and valuing this multifaceted legacy, we honour the contributions of mining communities and ensure that their stories and achievements continue to inspire and educate. It holds immense significance across multiple dimensions—historical, social, economic, and environmental. It is a multifaceted legacy that encapsulates the evolution of societies and technologies while reflecting the complex interplay between human activities and natural resources.
2. Historical significance. The historical importance of mines is evident in the establishment and growth of towns and communities around them. Mines have often been the nucleus around which social and economic structures evolved. In regions such as Silesia, the mining industry has a long history marked by significant achievements in both industrial and scientific domains. This has resulted in a rich tapestry of infrastructure and technological advancements that are of great interest both historically and industrially.
3. Cultural and social impact. Mining has shaped the cultural identity of many communities. It has fostered unique traditions, customs, and social practices that have been passed down through generations. Festivals like St. Barbara's Day, celebrated by miners, are living testimonies of the cultural heritage stemming from mining activities. The sense of community and shared experiences among miners and their families has created a distinct social fabric, often described as a kind of habitus or family environment that instills certain dispositions, competencies, and human attitudes.
4. Economic contributions. Economically, mines have been pivotal in regional development. They have provided employment and stimulated economic growth, thus attracting populations and creating

bustling communities. In Poland, for example, the rich mining tradition in Silesia has significantly shaped the local economy and lifestyle. This economic impact is not limited to active mines; even closed mines continue to contribute by transforming into educational and tourist attractions, thereby preserving and promoting mining heritage.

5. Technological and educational value. From a technological standpoint, mining sites are repositories of historical advancements. The evolution of mining techniques and technologies can be studied through the physical remnants of mining activities. These sites often serve as open-air museums and educational resources, providing invaluable insights into the history of mining, mining technologies, and the working conditions of miners. The transformation of mines into tourist attractions, like the Wieliczka Salt Mine and the Guido Mine in Zabrze, exemplifies how these sites can educate and inspire future generations.
6. Environmental considerations. The environmental impact of mining cannot be overlooked. Historical mining activities have often resulted in significant landscape changes, pollution, and ecological disruption. Preserving mine-related heritage includes acknowledging these environmental effects and promoting sustainable practices to mitigate them. This dual recognition provides a comprehensive understanding of mining's legacy.
7. Preservation and tourism. The preservation of mine-related cultural heritage is crucial for several reasons. It maintains a tangible connection to the past, helps in educating the public, and supports cultural identity. Moreover, heritage sites can attract tourism, providing economic benefits to local communities. This aspect of heritage tourism can create jobs and generate revenue, contributing to the sustainable development of regions transitioning away from mining-centric economies.

4.1.2. Uniqueness of coal mines in the context of cultural heritage

In the second question, experts have been asked to assess to what extent mines in the context of cultural heritage are unique in terms of challenges and opportunities.

Among the various sectors of the specific industry, mining has the richest potential. Of course, I am omitting geological resources here, because as long as they are economically interesting, the mine certainly exists. After the end of operation, however, the typical resources in the form of building infrastructure, land development, but also the mine pit are interesting for the future in terms of development.

The possibilities are created by architectural assumptions that allow the liquidated mines to be used for various purposes, not only exhibition or museum, but also commercial. Large plots of land on which the mine plots are located create an infinite number of adaptation possibilities. The challenge is certainly the need to meet the requirements related to the operation of a mining plant and the restrictions of the conservator. This is followed by significant financial outlays and formal requirements.

One of the main challenges of mining heritage is environmental degradation. The extraction of raw materials often led to the destruction of landscapes, water and air pollution and the generation of mining waste. Heritage protection must therefore include measures to rehabilitate post-mining areas and prevent further environmental destruction. Mines, especially those that are out of service, can pose a threat to safety. Old shafts, tunnels and structures can collapse, requiring careful containment and monitoring. Maintenance and protection of mining monuments is a complicated and expensive undertaking. It requires expertise, materials and technology to maintain the authenticity and integrity of these objects. Mining heritage often includes unique skills and knowledge that can be difficult to pass on to new generations. This is particularly important in the context of rapidly changing technologies and societal changes.

The costs of securing and preparing for new functions are very significant - revitalization, reclamation. Ownership issues are also a challenge. On the other hand, it is a huge spatial, infrastructural, economic, social and cultural potential, which can be a symbol of transformational changes.

Mines often encompass vast industrial complexes, requiring significant resources for preservation. Environmental concerns, like pollution and landscape degradation, must be balanced with preservation efforts. Safety risks from abandoned shafts necessitate careful management. However, well-preserved mining sites can stimulate tourism and economic development in industrial regions. They offer educational resources in geology, engineering, and labor history, fostering learning and engagement. Mining heritage contributes to community cultural identity, while also providing valuable data for research and innovation in modern mining practices. Successfully navigating these challenges and capitalizing on opportunities requires collaboration among stakeholders, including governments, preservation organizations, communities, and the mining industry.

On the plus side, I think that industrial heritage is more popular than more traditional heritage, particularly in highly industrial regions. People are proud of this heritage and they know the importance of the mine in shaping the landscape and the mentality of the area. So it's also an emotional heritage that's not always easy to grasp, because reactions of visitors or donors can sometimes be a little irrational, because there can be so much emotion involved in this relationship with the past. In Northern France, the mines closed at the beginning of the 1990s, leaving us with only a handful of former miners to provide direct testimonies, so we are working on digital devices to continue to have a dialogue in the future between these testimonies and our visitors, whose generational link with the mine is weakening as time goes by. So we're going to have to reinvent ourselves in the coming years to continue to be relevant to visitors whose link with the mine will inevitably be very different.

As far as the threats are concerned, it seems to me that the main one is the fact that the industrial buildings, particularly in coal mining, were built at a time when heating was not a concern, as we were just using whatever we could to heat the place. Today, these buildings are thermal flasks in which it is very difficult to ensure climatic stability. It is therefore a financial challenge for the structures with the rising cost of energy, and we need to work on this while respecting the constraints of protection as historic monuments, which is obviously very costly. But this climatic problem is also a problem for the conservation of the collections housed in the buildings. For any type of heritage, optimum conservation requires the most stable temperature and humidity conditions possible. So the climate problem raises the question of the very durability of the mining heritage as a whole. The issue is all the more important given that the impact of coal on climate change will have to be at the heart of our discourse in the future.

Coal mines are a great challenge as wide objects of coal exploration, both on the surface and underground. Mostly these were wide areas with many industrial objects. Also towns of coal-mining areas hold specific features. Many coal districts in Europe cultivated their land after closure or are in the process doing that. To my opinion also in the frame of cultural heritage these lands must be kept in good condition, as highly as possibly to be used as environments for different public and also modern "low-carbon" industrial activities. Many coal areas will still remain "energy locations" (e.g. installing and producing solar and/or wind electricity, and/or geothermal energy). There are already many cases as good practices in Europe with co-existing multi-activities including a care for industrial/cultural heritage.

Summary of the experts' answers to the uniqueness of coal mines in the context of cultural heritage

Mines, in the context of cultural heritage, are indeed unique in terms of the challenges and opportunities they present. Unique challenges are:

1. Environmental degradation. Mining activities have historically resulted in significant environmental impacts, including landscape alteration, water and air pollution, and the accumulation of hazardous waste. Addressing these issues requires extensive rehabilitation efforts to restore post-mining areas, a process that is both costly and technically challenging. Effective heritage protection must therefore incorporate comprehensive environmental remediation strategies to mitigate these adverse effects.
2. Safety concerns. Abandoned mines pose considerable safety risks due to the potential collapse of old shafts, tunnels, and other structures. Ensuring the safety of these sites involves substantial investment in containment and monitoring, adding to the complexity of preserving mining heritage.

Moreover, the instability of these structures can hinder their transformation into tourist or educational sites without significant intervention.

3. Economic constraints. The preservation and maintenance of mining heritage sites are financially demanding, requiring specialized knowledge, materials, and technology to maintain the authenticity and structural integrity of these sites. Many regions with rich mining histories may lack the necessary financial resources, making it challenging to prioritize and sustain heritage conservation projects.
4. Knowledge transfer and cultural continuity. The unique skills and knowledge associated with historical mining practices are often at risk of being lost with the passing of generations. Rapid technological advancements and social changes further complicate the transmission of this intangible cultural heritage. Initiatives to document and preserve these traditions are crucial but can be resource-intensive and require innovative approaches to remain relevant to modern audiences.
5. Regulatory and legal challenges. The legal frameworks governing the protection of cultural heritage sites can be complex and varied, often imposing strict requirements that necessitate additional administrative and financial burdens. Navigating these regulations to ensure compliance while pursuing heritage conservation can be a formidable challenge for mine operators and heritage organizations.

Unique opportunities are:

1. Tourism and education. Historical mines have significant potential as tourist attractions and educational centers. Successful examples like the Wieliczka Salt Mine in Poland demonstrate how closed mines can be transformed into sites of considerable educational and tourist importance. These projects not only promote cultural heritage but also stimulate local economies by attracting visitors and creating jobs.
2. Community development. Mining heritage sites can play a pivotal role in community development by fostering a sense of identity and continuity. The values of solidarity, hard work, and resilience cultivated in mining communities can inspire and strengthen social cohesion. Projects aimed at preserving and promoting mining heritage can enhance community pride and contribute to social stability.
3. Sustainable development. The redevelopment of former mining sites offers opportunities for sustainable development. For example, converting old mines into renewable energy research centers or other modern facilities can drive innovation and economic growth while respecting and preserving historical significance. Such transformations can serve as models for integrating heritage conservation with contemporary needs and sustainability goals.
4. Innovation and technological advancement. The challenges associated with mining heritage conservation can spur technological innovation. Developing new methods for environmental remediation and the preservation of historical sites not only advances conservation science but also enhances broader environmental management practices.
5. Cultural and artistic projects. The rich industrial history and unique architectural features of mining sites provide fertile ground for cultural and artistic initiatives. These projects can bring new life to old structures, making them relevant to contemporary audiences and ensuring their preservation for future generations.

4.1.3. Inventory of Mine Assets

A. Elements of mine assets that require special attention during the inventory process

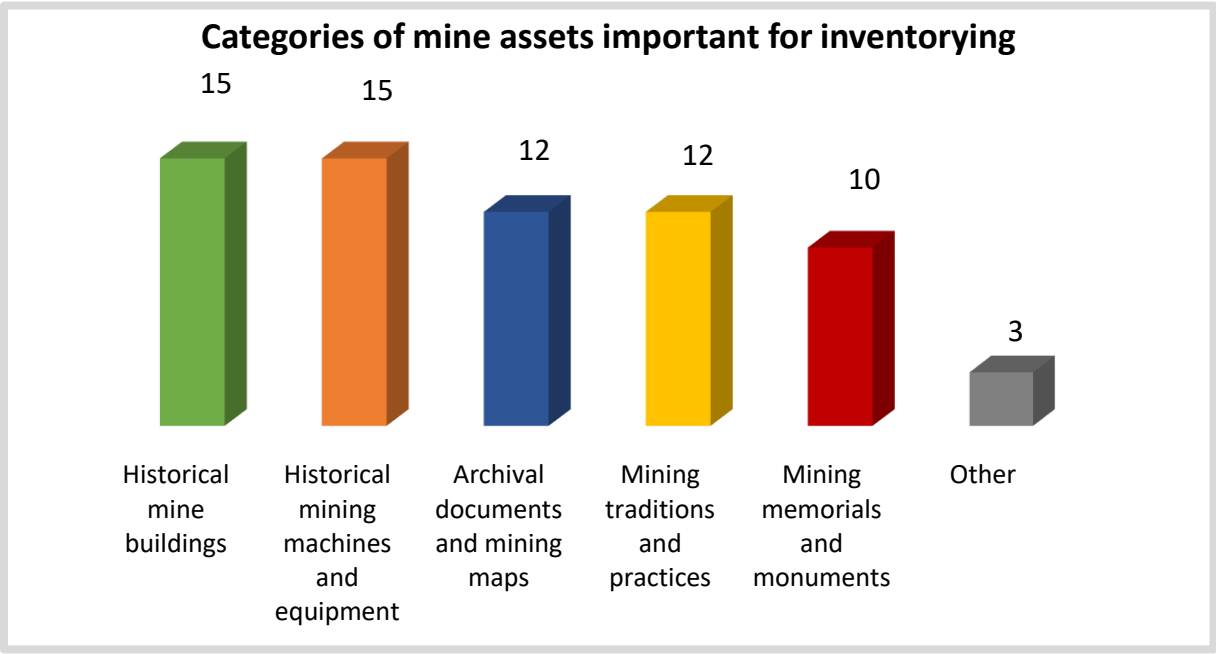


Figure 3 Categories of mine assets important for inventorying

Within the area of inventory of mine assets experts have been asked to specify elements of the mine assets that require special attention during the inventory process. It was a multiple-choice question. Experts indicated almost all categories of mine assets as important for inventorying due to their importance to cultural and historical heritage: historical mine buildings, historical mining machines and equipment, archival documents and mining maps, mining traditions and practices and mining memorials and monuments. As "other" they indicated also:

- Stories of individuals to safeguard the memory of the workers and their families,
- Representative parts of underground mine workings together with a presentation of technology and underground miner's lives,
- Coal mining areas can remain places of modern mining education (e.g. geotechnology, environment, waste materials management etc.),
- Geological features and mineral species,
- Mining infrastructure edits, shafts and tunnels.

One of the expert also points out the problem of environmental pollutants, such as groundwater or air contamination. Their inventory and monitoring are important for assessing the impact of mining on the environment and planning reclamation activities. It is also needed to ensure that personnel are adequately protected against potential hazards associated with mining sites, such as collapses or gas poisoning.

4.1.4. Inventory methods

A. Inventory methods consider as the most effective in the case of mine assets.

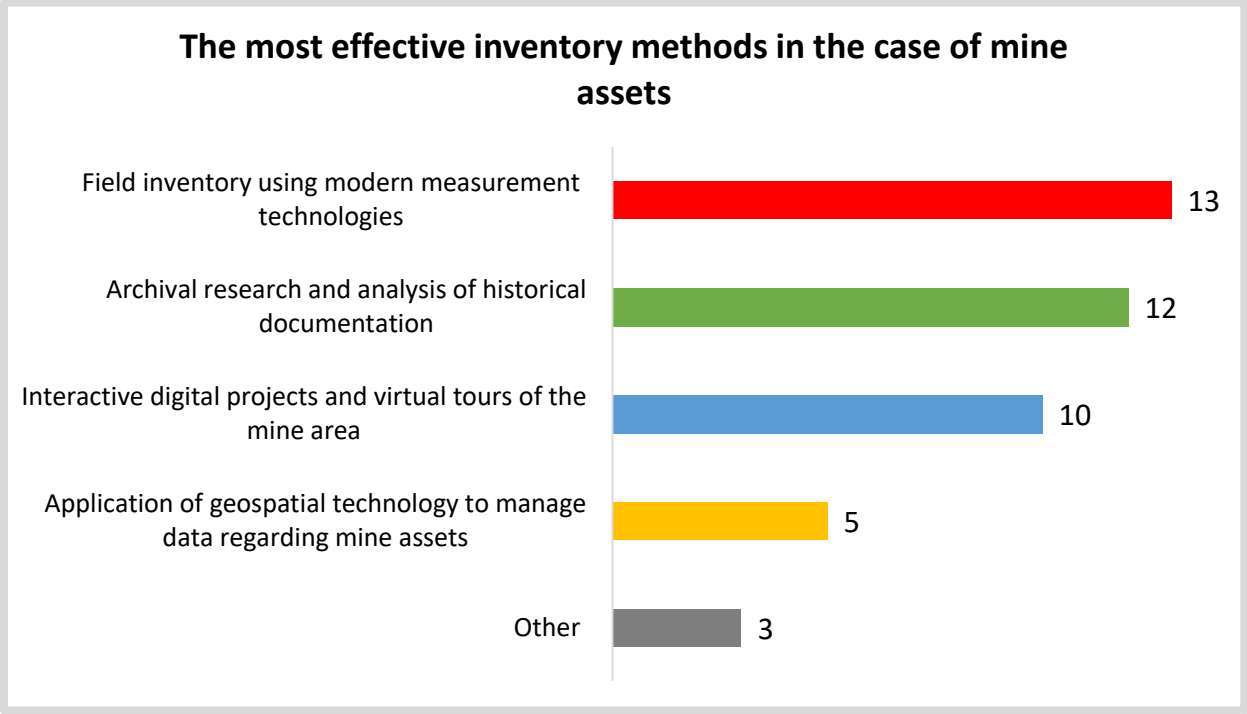


Figure 4 The most effective inventory methods in the case of mine assets

Within the area of inventory methods experts have been asked the assume efficiency of the inventory methods in the case of mine assets. It was a multiple-choice question. Experts indicated 3 categories of inventory methods that they consider most effective:

- field inventory using modern measurement technologies (e.g. laser scanning, drones),
- archival research and analysis of historical documentation,
- interactive digital projects and virtual tours of the mine area.

As "other" they indicated also:

- Oral collection through testimonies,
- public consultation. It is important to take into account the opinions and knowledge of local communities in the inventory process, especially if they have experience related to mining activities. Public consultations can help to identify important elements of cultural heritage and to define the priorities and objectives of the inventory.

B. Modern technologies that can be effectively used in the inventory process.

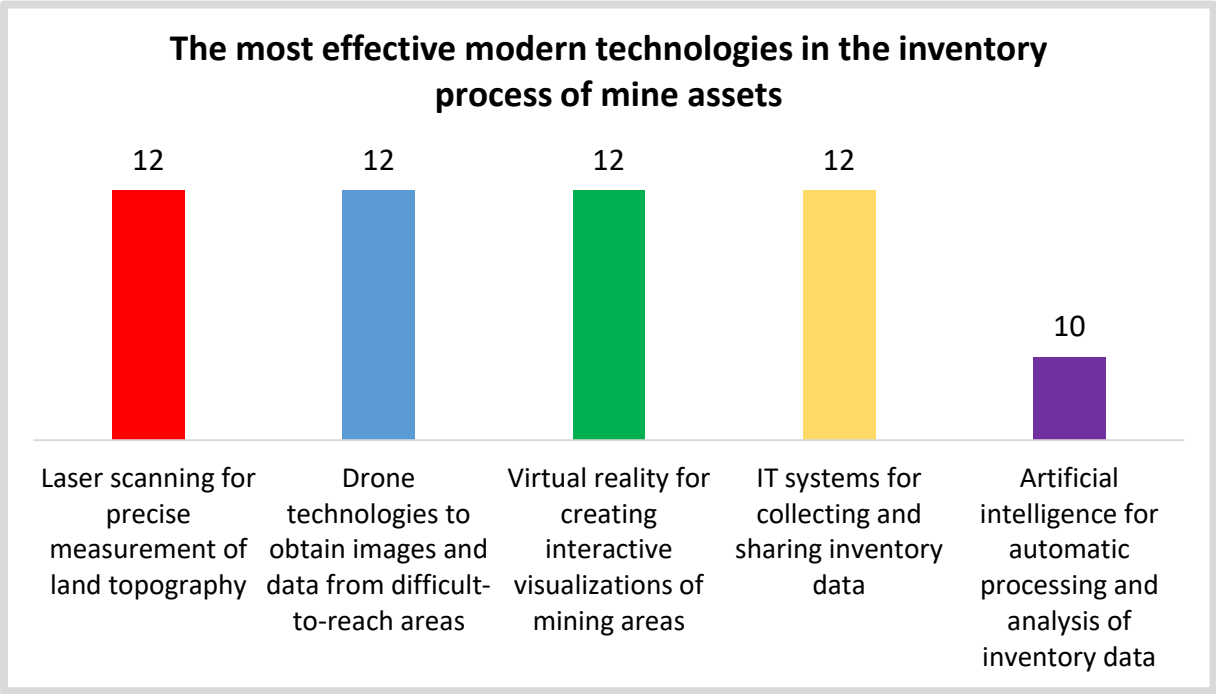


Figure 5 The most effective modern technologies in the inventory process of mine assets

In the next question concerned modern technologies that can be effectively used in the inventory process. It was a multiple-choice question. Experts indicated 4 categories of up-to-date inventory methods that they consider most effective:

- Laser scanning for precise measurement of land topography,
- Drone technologies to obtain images and data from difficult-to-reach areas,
- Virtual reality for creating interactive visualizations of mining areas,
- IT systems for collecting and sharing inventory data.

4.1.5. Mining heritage management

A. Key challenges in managing mining heritage

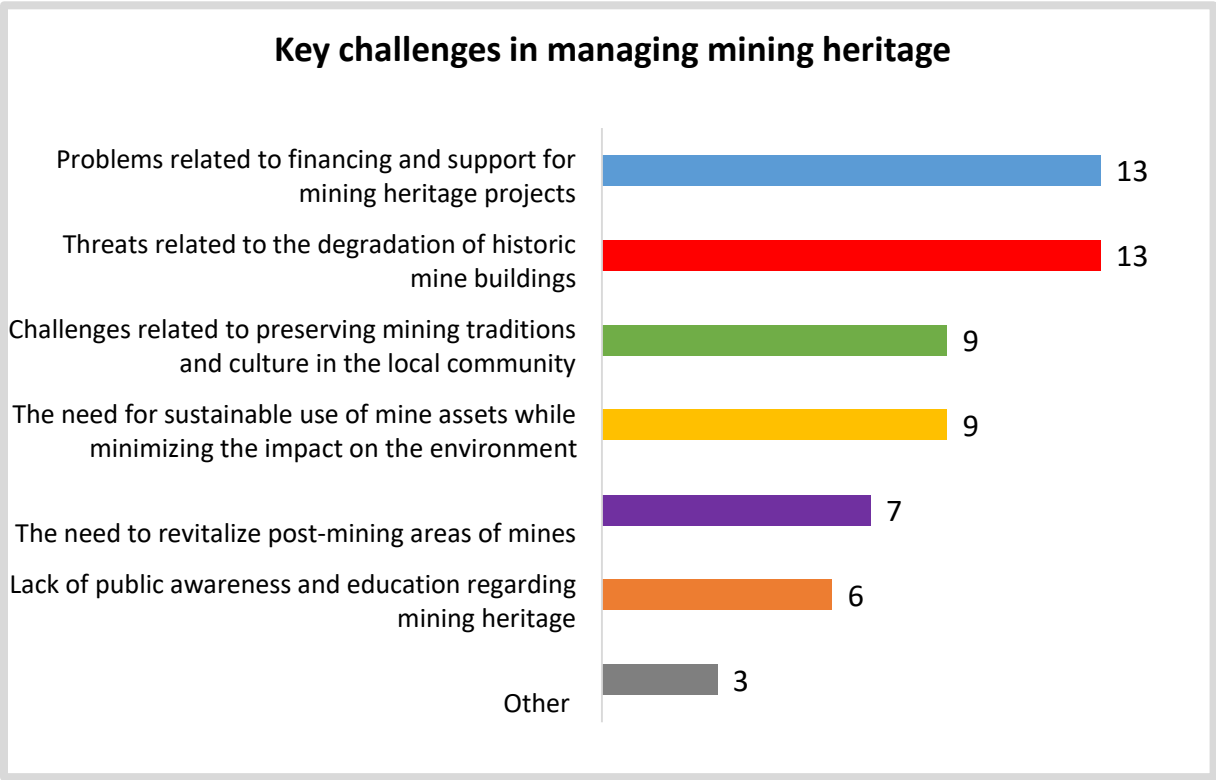


Figure 6 Key challenges in managing mining heritage

As key challenges in managing mining heritage, experts indicated:

- Problems related to financing and support for mining heritage projects,
- Threats related to the degradation of historic mine buildings.

It was a multiple-choice question. As "other" they indicated also:

- Cataloguing objects and collecting memories,
- Difficulties of the private sites of mining buildings,
- Value of post-mining areas for development activities,
- Financing.

B. The optimal models for maintaining industrial heritage facilities

All experts confirmed that there is no single model of maintenance and financing of mining heritage that should apply to mining heritage facilities. In each case, the situation should be considered individually, depending on the state of resources, the situation of the region, but also on the social attitude.
Below are some selected statements by experts on this topic.

Local government and social with an indispensable element of state financing programs, I emphasize: financing, not planning and management.

I am of the opinion that there should not be a single model here, but it should function in the form of many solutions, both when it comes to activities at the level of local governments, the state, as well as typically private individuals and companies, as well as non-governmental organizations. Of course, what I am talking about does not prove that it has to be diverse, but each mining area, each place where a mine operated, has its own specificity and this should be decisive, as well as the attitude of local communities and, as a result, the local government to apply a specific solution.

Optimal models for maintaining industrial heritage are those carrying out as good as possible cooperation between the state, local government of municipalities, social stakeholders (population), and public-private participation. Very welcome is support by outstanding companies, firms, financial organizations (banks) etc. Very important is cooperation between mining professionals "at the site", surveys and museums of different kinds, and academia. In Slovenia such very good practices already exist for decades in areas of abandoned metal (Idrija, Mežica, Litija) and also coal mines (Velenje, Trbovlje-Hrastnik-Zagorje and some smaller). Coal areas which ended their production or those planning a finish of it are under permanent processes of recultivation (as they already have been during their active era). In Slovenia, such processes concerning to preserve industrial and cultural heritage are for sure expected to be continued.

Management models depend very much on the national structure of heritage protection in general. In this respect, I feel it is important for mining heritage to remain within common law protection systems and not be part of a specific protection system that could ultimately make it a second-class heritage. In France, culture and heritage are considered to be missions of general interest and therefore public service. Therefore, even if the mining heritage was initially safeguarded by former miners' associations, there is always a problem in the long term because there is no generation renewal. Ensuring public ownership therefore makes it possible to safeguard the heritage over the long term. However, we are in a period of scarcity of funds, so it is important not to multiply the structures (as in France) but perhaps to have a single operator for all the country's mining heritage.

Maintaining industrial heritage facilities requires a thoughtful approach, with various models available depending on the circumstances. State ownership and management, for instance, involve national agencies or governments overseeing these sites, ensuring proper funding and professional care, especially for significant national assets. Meanwhile, local government ownership allows for tailored preservation efforts, tapping into local knowledge and funding sources, and fostering community pride and involvement.

Optimal models of maintaining industrial heritage sites depend on the specificity of a given site and local conditions, but hybrid approaches, combining various forms of involvement, are most often effective. For example, PPP is one of the most effective models that allows you to combine the financial and organizational resources of the private sector with the mission and support of the public sector. Examples of success include the transformation of the mine in Wieliczka or the Guido museum in Zabrze. Self-government models, local administration often has a better understanding of the specific needs and capabilities of the region. It can effectively manage facilities while providing support to the local community. The social model, the involvement of NGOs and local associations can bring good results, especially when the community feels a strong attachment to heritage, and governance models, although less frequent, can be effective if private owners have the right vision and resources to maintain the facilities. It is often optimal to combine these models to take advantage of their various advantages.

Maintaining industrial heritage facilities requires a thoughtful approach, with various models available depending on the circumstances. State ownership and management, for instance, involve national agencies or governments overseeing these sites, ensuring proper funding and professional care, especially for significant national assets. Meanwhile, local government ownership allows for tailored preservation efforts, tapping into local knowledge and funding sources, and fostering community pride and involvement.

Social ownership models, where community-based organizations take charge, emphasize grassroots support and innovative preservation methods. Private ownership offers flexibility and potential for entrepreneurial initiatives but raises concerns about conflicting interests and accessibility. Public-private partnerships combine resources and expertise from both sectors, making them effective for large-scale projects or sustainable tourism initiatives.

Summary of the experts' answers to the question on optimal models for maintaining industrial heritage facilities:

Maintaining industrial heritage facilities is a multifaceted challenge that requires a tailored approach, taking into account the specific context of each site. Various models: state, local government, social, private, and PPs offer different advantages and face unique challenges. An optimal approach often involves a hybrid model that combines elements from multiple strategies.
Table 1 presents the advantages and challenges of all types of models for maintaining industrial heritage facilities

Table 1 Optimal models for maintaining industrial heritage facilities

	Advantages	Challenges
State ownership	Stability and funding: state-managed models benefit from consistent funding and long-term planning. Governments can allocate public funds, ensuring that resources are available for ongoing maintenance and preservation. Legal protection: government entities have access to legal frameworks that can enforce the protection and conservation of heritage sites, providing a robust safeguard against neglect or misuse.	Bureaucracy: administrative processes can be slow and cumbersome, delaying necessary actions and adaptations. Limited flexibility: state management can lack the flexibility to respond to local needs and innovative approaches, often adhering to rigid protocols.
Local government management	Local control: local governments are intimately familiar with the heritage and significance of industrial sites within their jurisdiction. This local control can lead to more context-sensitive and effective management. Community engagement: local authorities can foster greater community involvement, leveraging local knowledge and promoting a sense of ownership and pride among residents.	Resource Constraints: local governments may struggle with limited financial and technical resources, hindering their ability to maintain and develop heritage sites effectively. Capacity issues: smaller municipalities might lack the necessary expertise and capacity to manage complex heritage projects.
Social and community-based models	Commitment and expertise: community organizations and NGOs often bring a high level of dedication and specialized knowledge to heritage preservation efforts. Flexibility and innovation: these groups can adopt more flexible and innovative approaches tailored to specific site needs and challenges.	Funding difficulties: reliance on donations and voluntary contributions can lead to financial instability, limiting the scope and sustainability of projects. Limited influence: community-based organizations may lack the political clout or resources to implement large-scale or long-term conservation measures.

Private Sector Involvement	Efficiency and resources: private sector actors can operate more efficiently and often bring significant financial resources to heritage projects. Entrepreneurial approaches: private management can introduce innovative and entrepreneurial solutions, potentially enhancing the site's commercial viability and visitor experience.	Profit motive: the primary focus on profitability can sometimes overshadow the preservation of cultural and historical values. Access restrictions: privatization might lead to restricted public access, undermining the community's connection to the heritage site
Public-Private Partnerships (PPPs)	Combined resources: PPPs harness the strengths and resources of both public and private entities, making it possible to tackle large-scale projects with a balanced approach. Risk sharing: these partnerships distribute the financial and operational risks between the public and private sectors, reducing the burden on any single party.	Coordination and management: effective PPPs require careful coordination and alignment of goals between the partners, which can be complex and time-consuming. Potential conflicts: differences in priorities and objectives between public and private partners can lead to conflicts, requiring robust negotiation and conflict resolution mechanisms.

The optimal model for maintaining industrial heritage facilities is often a hybrid approach that integrates elements from various models to leverage their respective strengths. For instance, Public-Private Partnerships (PPPs) can effectively combine the public sector's commitment to heritage preservation with the private sector's efficiency and innovation. State and local government involvement can ensure legal protection and community engagement, while social organizations can bring dedicated expertise and flexibility to the table.

The choice of model should be guided by the specific needs and conditions of each heritage site, ensuring a balanced approach that promotes both conservation and sustainable development. Collaborative efforts that engage various stakeholders, like government entities, private companies, local communities, and NGOs, are key to achieving long-term preservation and economic viability for industrial heritage facilities.

C. Financial maintenance of industrial heritage sites

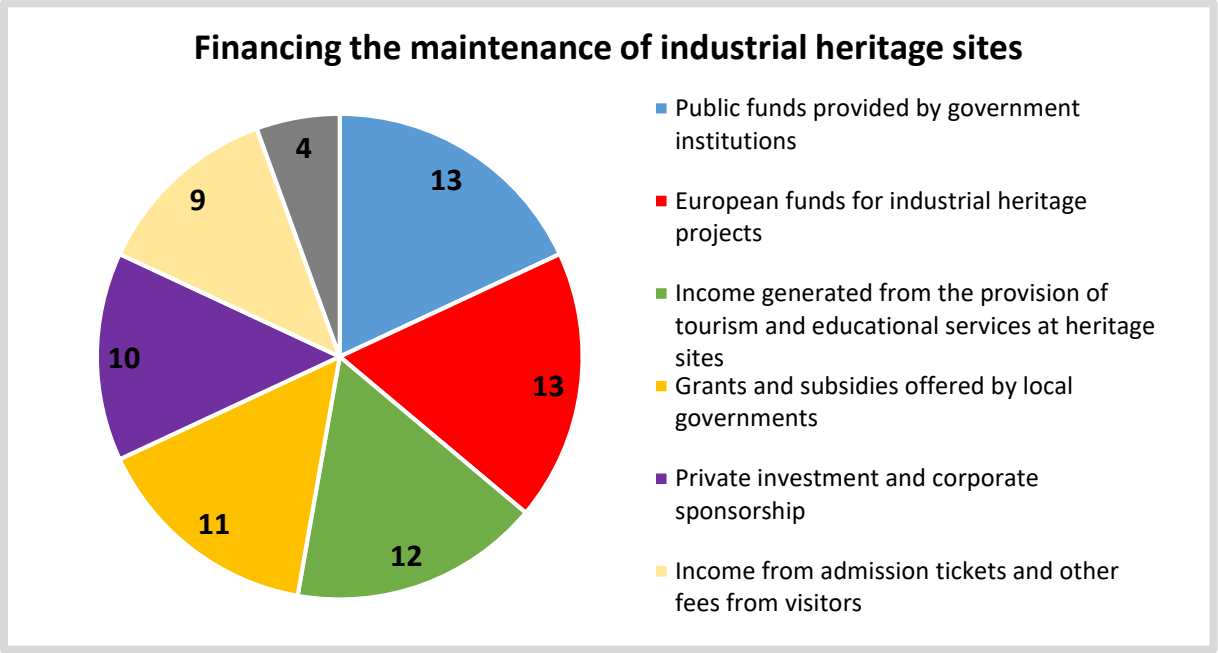


Figure 7 Financing the maintenance of industrial heritage sites

Within the scope of financial maintenance of mining heritage sites, experts indicated the following funds that they consider likely and appropriate to finance the maintenance of industrial heritage sites:

- Public funds provided by government institutions,
- European funds for industrial heritage projects,
- Income generated from the provision of tourism and educational services at heritage sites,
- Grants and subsidies offered by local governments,
- Private investment and corporate sponsorship.

It was a multiple-choice question. As "other" they indicated also:

- Mining companies, sponsors, commercial companies,
- Non-profit foundations.

Some experts consider that ticket revenue will never be able to cover the cost of restoring our heritage.

4.1.6. Public participation

A. Involvement of local communities in decision-making processes regarding mining heritage

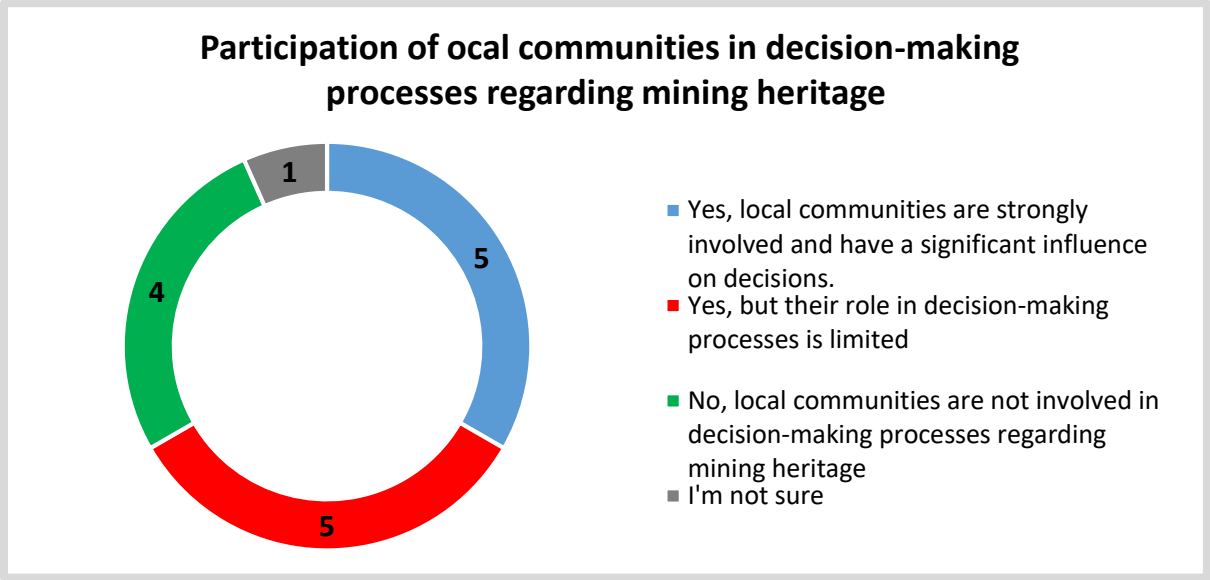


Figure 8 Participation of ocal communities in decision-making processes regarding mining heritage

Within the area of public participation experts have been asked to assume do local communities are actively involved in decision-making processes regarding mining heritage. The answers were almost evenly distributed: 5 experts believe that local communities are strongly involved and have a significant influence on decisions. 5 believe that they are involved but their role in decision-making processes is limited. 4 responses were negative: local communities are not involved in decision-making processes regarding mining heritage.

Some experts said that direct user participation processes are relatively limited in France, but one of them gives the example of Faymoreau Mining Centre initiated by the Commune of Faymoreau and managed by the Communauté de Communes Vendée Sèvre Autise.

B. Public consultations on the management of mining heritage

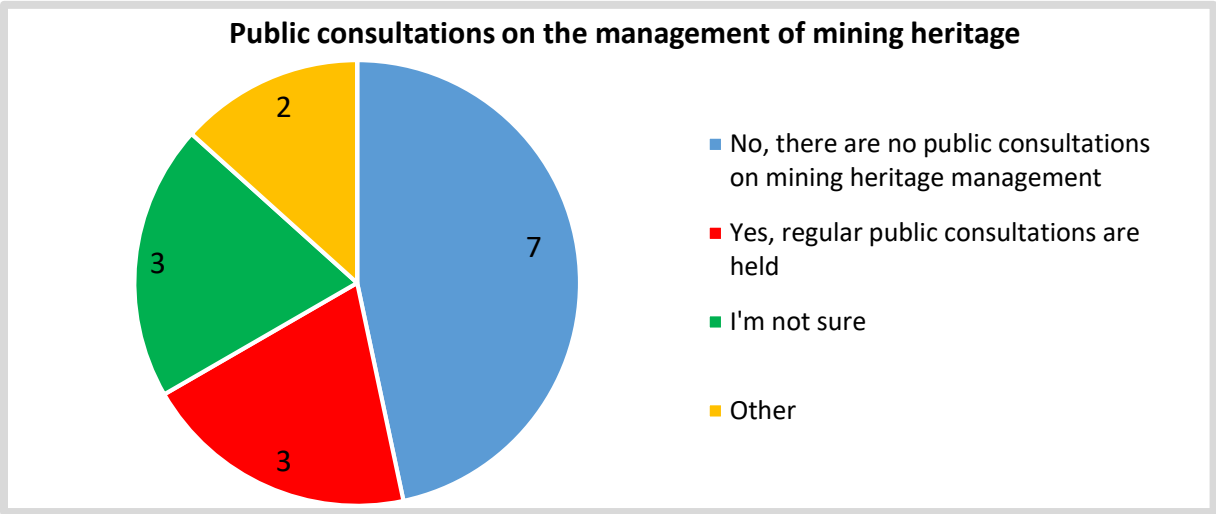


Figure 9 Public consultations on the management of mining heritage

In response to a question on the public consultation on the governance of the mining heritage experts said that there is no such activity.
As "other" they indicated also that public discussions and consultations, are taking place do take place, but they focus more on the just transition rather than on cultural heritage.

C. Benefits or challenges of public participation in mining heritage management

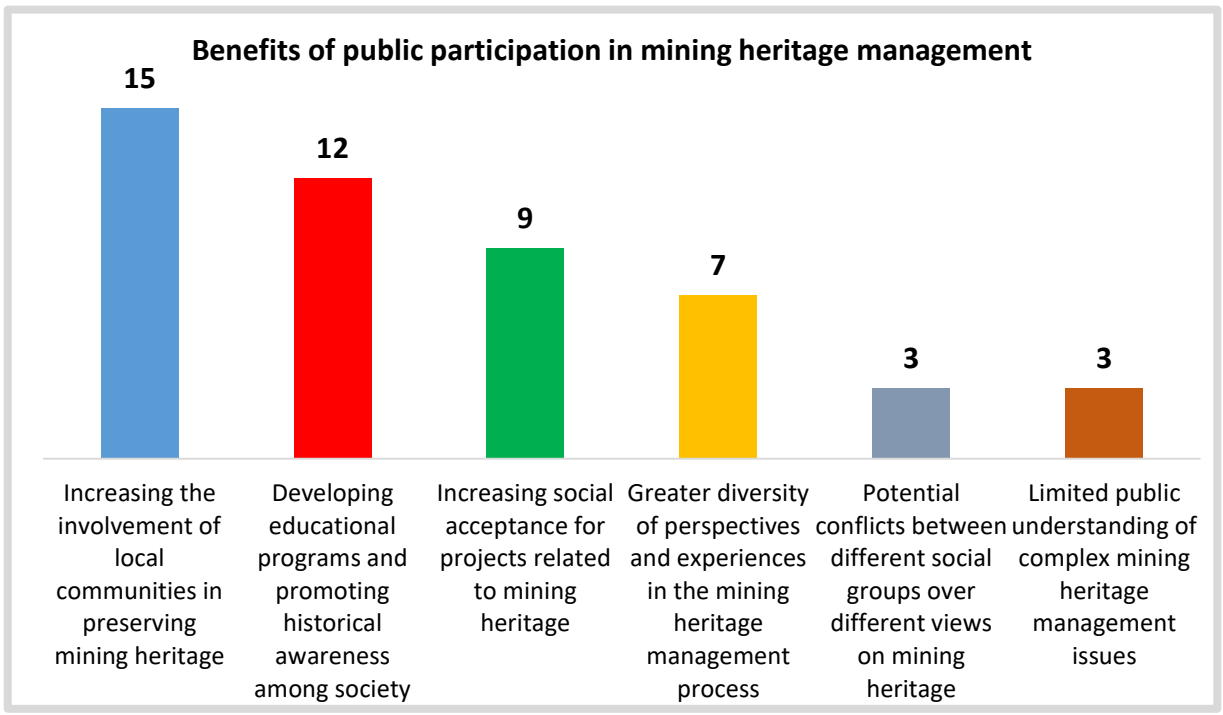


Figure 10 Benefits of public participation in mining heritage management

Experts participating in the survey see the benefits of public participation in mining heritage management. It is mainly increasing the involvement of local communities in preserving mining heritage and developing educational programs and promoting historical awareness among society. It was a multiple-choice question.

4.1.7. Education and awareness

A. Educational programs affection mining-related cultural heritage

I am afraid not. Such educational programs would be necessary to raise awareness about the importance of mining-related cultural heritage. They could help foster a deeper understanding of the historical significance of mining activities and their impact on local communities. Additionally, these programs could promote the preservation and conservation of mining heritage sites, ensuring that future generations appreciate and respect this aspect of their cultural heritage.

In fact, I don't know of educational programs as such, so that they would be published as programs. However, there is no doubt that the activity of, for example, the Zabrze museum is such a classic example of multi-threaded activities in this area.

Yes. First one: Šolski center Velenje (School centre Velenje), high school, Mining programme. Second one: Faculty of Ljubljana, NTF, Geotechnology and mining programme. Also wider local primary and secondary schools visits of mining museums, regularly, each generation, e.g. museum of Slovenia or even operating coal mine.

I am afraid not. Such educational programs would be necessary to raise awareness about the importance of mining-related cultural heritage. They could help foster a deeper understanding of the historical significance of mining activities and their impact on local communities. Additionally, these programs could promote the preservation and conservation of mining heritage sites, ensuring that future generations appreciate and respect this aspect of their cultural heritage.

No, there are not specific educational programs in Greece that may affect mining-related cultural heritage. However, for educational purposes, teaching the geology, mineralogy, and ore deposit formation in old mining sites is among the most favored subjects for students at several Greek Universities. Several field trips take place every year in various districts as part of undergraduate and postgraduate courses. Moreover, through the supervision of several Bachelor, Master, and PhD theses, research on the mineral deposits has greatly improved our knowledge of the geological and the archaeological constraints that have affected the mining districts. Over the last three decades, the Greek Universities, organized several workshops and field trips for students and academics from all over the world at these districts and provided education content to students at the various levels (undergraduate, postgraduate, etc.) as well as for the broad public and professionals. Through collaboration with several international Universities and research institutions from all over the world, our scientific knowledge in the field of mineralogy, geology, mining, mineralizing, as well as in environmental and pollution processes has greatly improved. All these activities are beneficial for a positive effect to mining-related cultural heritage.

In North Rhine-Westphalia in particular, a wide range of training structures have now developed in the field of post-mining and industrial heritage. One example is the post-mining research centre at the Georg Agricola University of Applied Sciences in Bochum. The German Mining Museum Bochum, Leibniz Research Museum for Georesources, also regularly offers programmes and exhibitions for a wide audience. Within the German Mining Museum Bochum, there is the Mining History Document Centre (montan.dok), which not only collects and documents the material heritage of mining, but also researches the industrial heritage of the mining industry in university contexts and represents it in teaching.

Greece has a rich history of mining, dating back thousands of years, with significant archaeological sites and historical records documenting mining activities. Educational programs in fields such as history, archaeology, geology, and cultural studies likely include content related to mining heritage. Archaeological studies in Greece may focus on excavations and research related to ancient mining sites, such as the silver mines of Lavrion or the gold mines of Thrace. These studies contribute to our understanding of ancient mining practices and their cultural significance. Geology and mining engineering programs at Greek universities may include courses on the history and technology of mining in Greece. Students may learn about ancient mining techniques as well as modern mining practices and their impact on the environment and society.

Additionally, programs focusing on cultural heritage and tourism management may explore the role of mining heritage in Greece's cultural landscape. This could include topics such as heritage conservation, interpretation, and the development of sustainable tourism initiatives around mining sites. Educational programs related to museum studies and heritage management may cover the preservation and presentation of mining-related artifacts and sites. Students may learn about museum exhibition design, conservation techniques, and community engagement strategies (…) By incorporating mining heritage into various academic disciplines and community initiatives, these programs contribute to the appreciation and preservation of Greece's rich mining history.

Summary of the experts' answers to the question on the educational programs affection mining-related cultural heritage

The educational programs can have a significant impact on mining-related cultural heritage. These programs, which range from formal school curricula to informal community-based initiatives, play a crucial role in preserving, promoting, and raising awareness about the historical and cultural significance of mining. It might be:

- Diversity of educational programs, like school-based educational programs, specialized degree programs or research projects,
- Vocational training and continuing education,
- Informal education programs, run by museums and centers or community-based initiatives.

The goals are: raising awareness, highlight the importance of conserving mining sites and boost community engagement.

Educational programs are indispensable for the preservation and promotion of mining-related cultural heritage. By integrating mining heritage into formal and informal education, these programs raise awareness, foster community engagement, and ensure the protection of mining sites and artifacts. The examples from various countries underscore the global recognition of the importance of mining heritage and the diverse strategies employed to educate and involve the public in its preservation. As these programs continue to evolve and expand, they will play a crucial role in sustaining the cultural legacy of mining for future generations.

B. Good practices in mining heritage educational programs

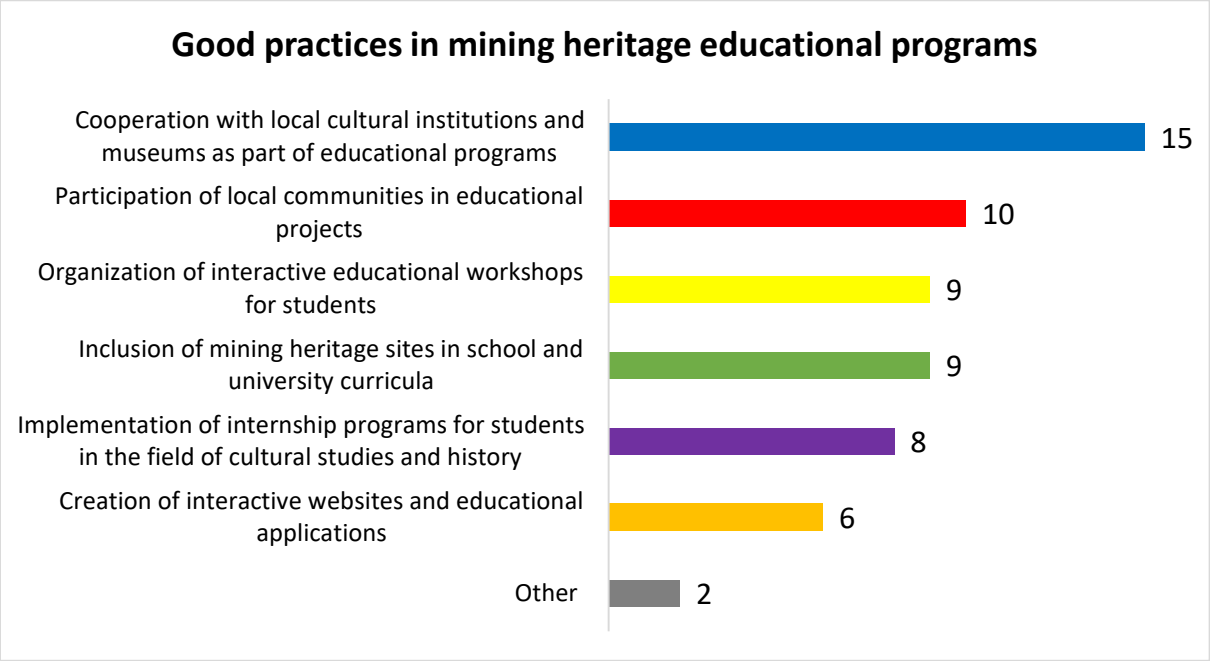


Figure 11 Good practices in mining heritage educational programs

When asked about good practices in mining heritage educational programs, all experts indicated cooperation with local cultural institutions and museums as part of educational programs. It was a multiple-choice question. As "other" they indicated also local schools and all programs related to mining, geology and similar and organization of other regional and local events in post-mining spaces.

C. Increasing public awareness of mining heritage

Figure 12 Increasing public awareness of mining heritage

On the question of what actions can be taken to increase public awareness of mining heritage experts indicated almost all actions as valuable:
Promotional campaigns in social media

- Creation of interactive mining exhibitions and museums,
- Educational school and university projects on the history of mining,
- Organization of festivals and cultural events related to mining,
- Educational workshops and seminars for local communities,
- Educational publications, press articles and information materials on the topic mining heritage.

It was a multiple-choice question. Additionally, it was added that all kinds of actions must be implemented.

4.1.8. Sustainable development

A. The most important aspects of development in the context of mining heritage

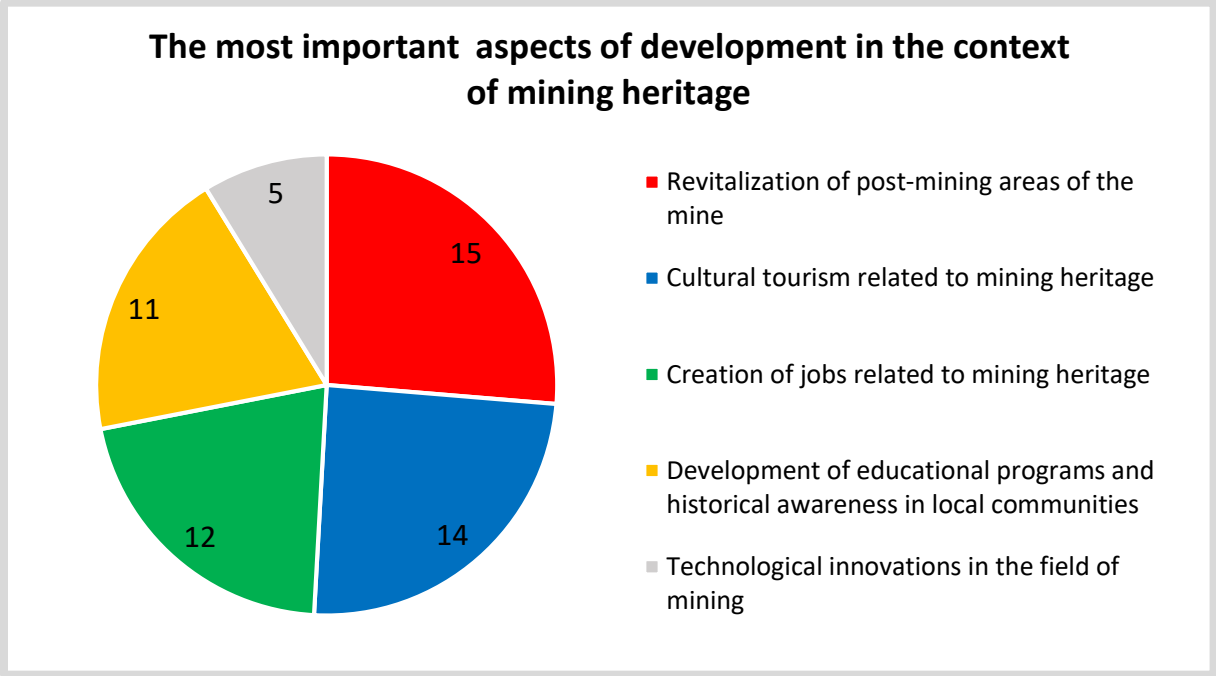


Figure 13 The most important aspects of development in the context of mining heritage

Within the area of sustainable development experts have been asked to assume the importance of the development aspects in the context of mining heritage. Experts indicated 4 categories:

- Revitalization of post-mining areas of the mine
- Cultural tourism related to mining heritage
- Creation of jobs related to mining heritage
- Development of educational programs and historical awareness in local communities

It was a multiple-choice question.

B. Examples of successful sustainable development practices in the field of cultural heritage

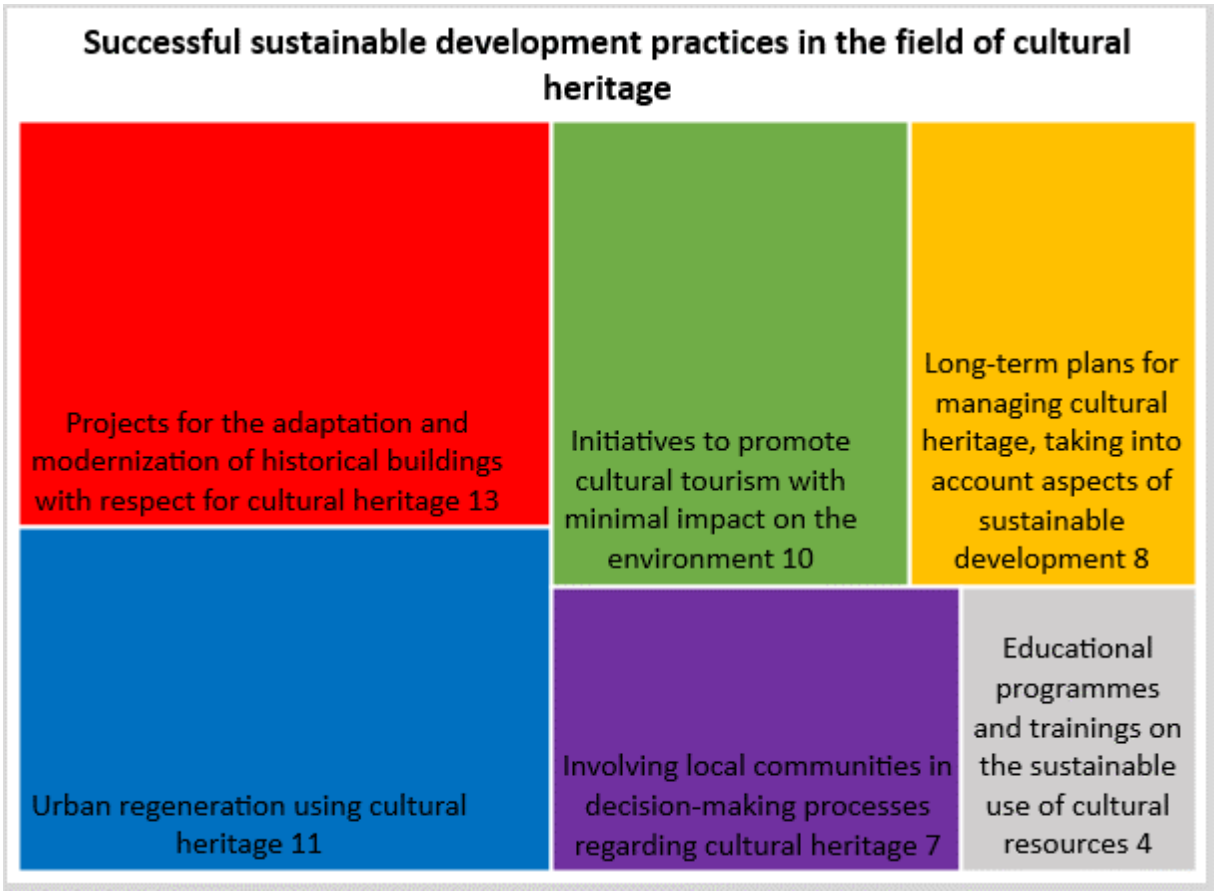


Figure 14 Successful sustainable development practices in the field of cultural heritage

As examples of successful sustainable development practices experts indicated the following aspects as most important:

- Projects for the adaptation and modernization of historical buildings with respect for cultural heritage,
- Urban regeneration using cultural heritage,
- Initiatives to promote cultural tourism with minimal impact on the environment.

4.1.9. Cooperation and partnership

A. Institutional cooperation in mining heritage management

Figure 15 Institutional cooperation in managing mining heritage

Within the area of cooperation and partnership experts have been asked to assume which institutions or organizations should cooperate in managing mining heritage. It was a multiple-choice question. Experts indicated almost all categories, but the most important are:

- Local governments and regional authorities,
- Museums and cultural institutions,
- Government institutions responsible for the protection of cultural heritage,
- Educational institutions, schools and universities.

As "other" they indicated also long-term work to encourage visitors to use public transport rather than private cars.

B. Benefits of cross-sector cooperation in the context of mining heritage

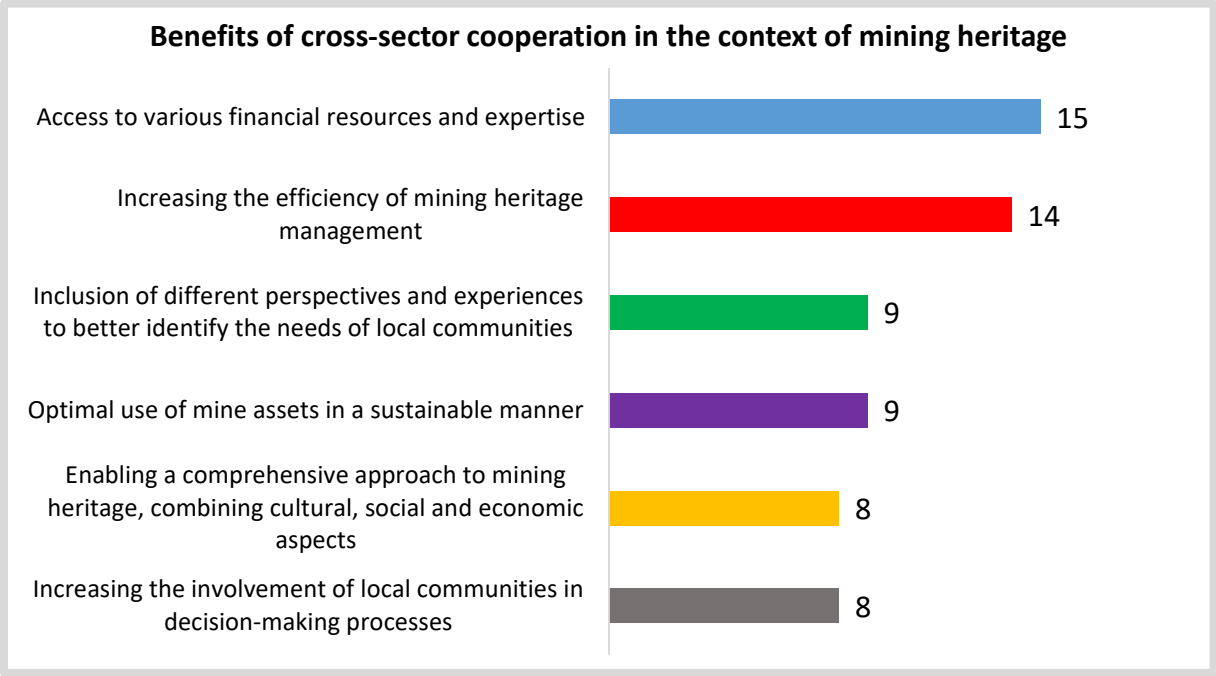


Figure 16 Benefits of cross-sector cooperation in the context of mining heritage

On the question of the benefits of cross-sector cooperation in the context of mining heritage experts indicated almost all categories. It was a multiple-choice question.

4.1.10. Future perspective - main challenges in the inventory and management of the mine's resources as cultural heritage

In this part of the survey, experts had the opportunity to indicate the most important challenges they see in the process of inventory and management of coal mine resources as cultural heritage. Below some selected statements are presented and an analysis of the whole question.

The main challenges in inventorying and managing mining resources include identification of heritage resources (…) preservation from decay (…) financial constraints. Successful management of mining heritage relies on the involvement and support of local communities (…) Overcoming these challenges requires a comprehensive approach involving collaboration between different sectors, coordination among institutions, and active engagement of local communities and experts.

We should be able to afford, as a state, as a society, to make a reliable inventory of mining resources. In order to give up certain resources, because it is impossible to manage everything. For financial reasons, it is impossible to maintain it. Besides, I don't think it's all that attractive. However, there is no doubt that even after the development process is launched, it will also consume costs. Abroad, there are also often problems with maintaining this type of facilities. So the first thing is the inventory, the next is the plan of this development and determining the way of functioning. I also mean the separation of those elements that can constitute industrial, administrative or museum value.

Main challenge is usually in lack of funding for the preservation and management of mine-related heritage which can be limited, especially in areas with economic difficulties or competing priorities. In that case challenge is also to have proper motivated initiator with good e.g. business plan and whole idea.

Abandoned mines and structures are often exposed to the elements, leading to deterioration over time. So proper due time action is necessary.
Where can also be a problem of lack of documentation if one is not preserved/archived properly. It is similar for oral histories that can be problematic due to the passage of time, fading memories etc.

Raising awareness and fostering appreciation of mining heritage within local communities can be difficult, especially if the community has negative associations with the mining industry.

The question of the cost of restoration work and climate adaptation is really crucial. These factors are rarely taken into account when setting up structures to manage and protect heritage sites.

Summary of the experts' answers to the question on main challenges in the inventory and management of the mine's resources as cultural heritage:

The experts outline numerous challenges associated with the inventory and management of mining resources as cultural heritage. Some of them are:

- Financial and resource constraints, the process of inventorying and managing mining heritage requires significant financial resources for research, documentation, maintenance, restoration, and safety measures. Limited funding often hampers these efforts,
- Difficulty in identification, some mining sites are abandoned or damaged, making their identification and documentation challenging. Accurate field research and archival sources are crucial but often difficult to access or incomplete,
- Large and diverse areas, mines often encompass extensive and varied areas, including underground galleries, above-ground facilities, machinery, tools, and associated infrastructure. Fully documenting these elements can be time-consuming and requires specialized knowledge in history, archaeology, geology, and engineering. Also, historical cataloguing of mining activities may be incomplete or scattered, adding complexity to the task of cataloging mining heritage accurately. The preservation of oral histories is also challenging due to fading memories,
- State of preservation, many historic mines are in poor condition due to disuse, natural deterioration, and lack of maintenance. Rapid decay necessitates immediate protective measures to prevent further deterioration,
- Legal and administrative challenges, obtaining necessary permits for conservation and restoration measures can be time-consuming and complicated, delaying crucial preservation work,
- Environmental degradation and safety concerns,
- Modern technologies and data management, accurate and comprehensive inventory often require the use of advanced technologies like 3D scanning, GIS and drones. Managing the large amounts of data collected during the inventory requires efficient database systems and appropriate IT infrastructure. These technologies are costly and require specialized expertise,
- Local communities' engagement with and raising awareness, engaging residents in decision-making processes and project implementation is essential for sustainability but can be difficult to achieve, especially if the community has negative associations with the mining industry.

Inventorying and managing mining resources as cultural heritage is a multifaceted challenge requiring comprehensive strategies. These strategies must address technical, social, economic, and environmental aspects while fostering collaboration among various stakeholders, including local communities, cultural institutions, local authorities, and experts in related fields. Effective management hinges on overcoming these numerous challenges through coordinated efforts, adequate funding, technological innovation, and community engagement, ensuring that the rich cultural heritage of mining is preserved for future generations.

4.2. Focus Group Interview analysis

This analysis covers two Focus Group Interview (FGI) discussions: online FGI with the participation of international experts on May 21 2024, and face-to-face FGI with regional experts on May 24 2024, in the Central Mining Institute-National Research Institute. The FGIs involved experts who were asked identical questions. The Focus Group Interviews (FGIs) conducted with both international and regional experts

revealed a comprehensive and consistent perspective on the significance, challenges, and management of mining heritage. The results from both online and face-to-face FGIs confirmed the homogeneity of assessments and statements in the cognitive areas explored, indicating minimal impact from the differing formats of the discussions.

Moderators started the discussions by presenting its purpose. In the first question, the key goal was to determine the term "mining heritage" for each of the study participants and aspects related to this term the study participants consider as the most important. The moderators asked the experts for a short introduction and to share their first thoughts on the subject. The FGI experts emphasized the historical importance of mining for developing of the regions they represented. They pointed out that mining had a key impact on the formation of societies and economies. *"Mining heritage is primarily about material resources - historic mines, machines, infrastructure. These are also archives and documents that testify to the history of this industry - said one of the discussion participants representing the Polish partner - also emphasizing that mining influenced the development of cities, education and culture in his region."*

The most complete reflections related to the first question focused on social awareness and its role in preserving mining heritage. According to experts, social awareness plays a key role in preserving mining heritage, both in historical and cultural contexts. Mining heritage includes not only physical artifacts such as mines, tools and infrastructure, but also intangible aspects such as the traditions, stories, skills and communities associated with mining. Maintaining this heritage requires an active role of society, which must be aware of its value and importance. Social awareness is the degree to which a community is aware of important issues related to its environment and heritage. In the context of mining, public awareness includes understanding mining history, recognizing the contribution of miners to regional development, and recognizing the value of mining heritage as part of cultural identity. As one of the Polish experts noticed*: "We must first define what heritage is. It is the past from which we draw in the present, which is important to us, from our point of view. The key challenge, from my point of view, is that people who live in the present and will live in the future are able to interpret it and treat it as their own. And here there is a lot of scope when it comes to intangible heritage, transferring this knowledge to the recipient, giving the possibility of its interpretation. Without this key mechanism, tool, this legacy will be lost because people will not feel that it is important to them."*

Without proper public awareness, mining heritage may be neglected or destroyed. A society that does not appreciate its mining past may not engage in activities to protect it. Culture is also a carrier of social awareness. Local festivals and other cultural events can keep the memory of the mining past alive and pass it on to future generations. These activities also help build a sense of community and local identity. The voice of an expert from Great Britain fits very strongly into the space described above, describing his own experiences and pointing out that: *"the Durham Miners gala, it started in 1871 and is probably the largest event of this type in Europe. More than 100,000 people carrying banners represent over 200 years of industrial mining in the region and in many ways it is the only remaining piece of cultural heritage. Almost all industrial architecture has disappeared, so it's a people thing. Now what are the challenges. We finance it exclusively from trade union contributions, individual contributions and some so-called benefits in kind. These are services provided by local authorities such as police services, road closures and cleaning. But if you add it all up, it costs almost half a million pounds every year. Some of it is the voluntary efforts of people, which does not burden us, but we have 60 so-called banner groups and these are community groups that raise their own money throughout the year to bring their banners and banners to the parade. Each one costs about £3,000, but they make it, so in euros it's 4,000, let's say 4,000 euros. They incurred this cost, they come on the second Saturday in July and everyone goes. Why are they doing this? This is crazy. These are coal mines that were closed down 40 years ago. And that's the determination among*

people to say, you may have taken away our industry, but you won't take away our sense of belonging and our culture, and we will continue to do so."

Experts participating in the discussion paid particular attention to the social dimension of heritage, the intangible aspect of mining heritage. It was emphasized that mining heritage is not only buildings and machine, but above all people - their traditions, customs, stories and everyday life. Experts spoke of strong social bonds among miners and their families that have survived for generations. She drew attention to the unique cultural identity of her regions, which is inextricably linked with mining. Once again, it is worth recalling the statement of an expert from Great Britain who says directly that:
"the main challenge is that many of us are getting older. I will be 67 in July and I am known as one of the young ones. So our intention is to pass this on to the next generation, the generation that comes after us. And part of it works. We see people gathering the energy to make this a reality and that is our goal. We do not receive any direct state subsidies for this purpose. This is because its source is in people. Money is always a challenge when you have to raise this amount essentially voluntarily. Which it seems to be working because over the last 10 years we've built the infrastructure for people to donate and if you look online, we call friends of the Durham Miners gala. So yes, it's always a challenge. I guess I would say the biggest challenge for us is maintaining the legacy and the sense of wanting to do this. And so we have to adapt. We need to make the event more family oriented, so we continue to do that and work on it, and actually more and more people come every year. So really, as long as people keep coming and want to come because it means something to them, why do we need experts telling us what we probably already know? So yes, I think the key thing for us is continuity, how to sustain it and how to get people enthusiastic about supporting it.

Equally important were the experts' views on the economic importance of mining. It was emphasized that despite the closure of mines, their heritage still influences the regions' economies - mining heritage is not only the past, but also the future. The challenge is how to effectively use the remaining resources and post-industrial areas. In this perspective, another expert from Poland, continuing the topic of mining heritage, notes that: *"problems with places where the mine is a heritage and, for example, in our case, where mining still operates, so on the one hand we have a lot more work, on the other hand, we have a better situation, but we can still save something, which can actually be said, but it is the hard coal mining industry complex. So the situation in Poland requires quick work to preserve, still over 10 different types of coal. The mining industry is working on creating a good inventory station and deciding what we should keep (…), because we, the people of the Museum of Industry, need not only the coal heritage, but we actually need coal to run our museum and we say goodbye to coal, for example (…). Coming back to Poland, we need hard work to save them. So our Minister of Culture declares that he would like to work more intensively to preserve the mining heritage, and I think there will be some voices also from Zabrze, but they are among the groups that will play an important role in preserving still operating coal mines. Finally, it must be said that in the case of Poland, we have, on the one hand, a lot of work, but on the other hand, a great opportunity to preserve the mining heritage - as best as possible, using the experience of other countries."*

On the other hand how to use mining heritage for the development of infrastructure and education as well as the tourism potential related to heritage, this thread can be found in the statement of an expert from France, who noted that: *"in fact, when it comes to a living, evolving cultural landscape, this is the category in which we include as a former coal mining area, Nord Pas de Calais has been listed since 2012, and the challenges are so many, but I will highlight some, are at the core of our management plan, which is a strategic framework to preserve the integrity and authenticity of the listed sites , natural features and listed buildings and the preservation, but also development, challenges are tailored to them. This is a goal*

that is really complex because we obviously have problems with preserving monuments and buildings. So we have to join forces. Many tools to combine legal and regulatory measures and tools, of course, listed monuments with French law, because we don't have, you don't have international law coming from UNESCO, World Heritage, but also combining these legal and regulatory measures with planning documents, and also with a whole range of tools that ultimately, and this is also the point, is to make them available to residents, not just tourists, which is also a challenge for me. Having a world heritage label and tourism, it's not just about slow tourism or tourism management, you know, respecting natural places and so on, in the face of the pressure of too many visitors, which is not our case, but more about the fact of sharing with the locals also the value, the universal value of their very, very everyday houses, churches, natural objects, and heaps. In our landscape of 353 sites, this is a large landscape. So the challenge is of course to preserve and develop, as well as find new uses for the buildings, to combine the functional functions of the former railway tracks for pedestrians, but also biodiversity. It is a challenge to combine the sometimes very narrow terminological goals we have.

From this perspective, the thread related to innovations raised by the discussion participants is interesting. Experts drew attention to technical innovations and technological progress resulting from mining, emphasizing that mining is not only the extraction of mineral resources, but also the development of technologies that can be used in other areas of life and the global development of technology.
An expert representing representatives of local communities from Poland shared his personal experiences related to mining. He spoke about the pride residents feel for the region's mining past, but also about the challenges they face today. In one of his statements he noted that " *For me, Rybnik and the Ignacy mine are such a great example of good practices. There, the mining community was the initiator of the preservation of this facility and activities aimed at it almost from the very beginning. Now we have an example in Pszów, it concerns the buildings of the Anna mine, where the local community also took the initiative to preserve the complex, a historical building."* In his opinion, mining heritage is our identity, our roots. We also need to think about the future and adapt to new realities. The voice of museum representatives was very strong in the discussion, emphasizing the huge role of cultural institutions in preserving mining heritage. According to experts' museums and educational centers play a key role in preserving and promoting mining heritage. These are not only places where we store artifacts, but also educational spaces, where young generations can learn about the history and culture of the region. The above regularities were significantly emphasized by an expert from the Netherlands in his statement, pointing out that:
"we need to build an educational part to learn how everything worked. The intentional part is also writing processes and from those people who have done the work or are still doing the work to try to shape younger people to take over. And I think that's one of the things that's very, very important to me. The other issue is that other types of industrial heritage, which I always broaden, not specifically to coal, but to fossil fuels, and they use those fossil fuels. I think it's important that we come up with some ways that we want to keep things in good condition and presentation and present it to the world really as a place where you can smell, smell gold in a locomotive fire or on a steamboat or something like that. I think it's very important that such things acquire appropriate value. I think that a museum is an important part of the local, national or European economy. If we look at the change in museums, such as the European roots of industrial heritage and things like that. So I think something is an important part of the economy, because if it's not, you won't exist. On the other hand, value, balance, preservation and being part of the economy is a difficult, but very important and necessary matter. Also, they should be at the back of your mind at all times, which is the essence of the values, and we may need to talk about validating these things. We did this in the Netherlands and confirmed their essential role in industrial and mobile heritage."
"At least one or two active coalmines should be preserved in Europe as a working fuel producing demonstration Museum. The organizations as such, should also become the learning/training facility for

people to learn to maintain the technical installations to keep closed coalmines throughout as a safe part of their environment. This will help to promote the mining history in areas after closure of the coalmines."

Experts recognized that mining heritage is a complex and multi-faceted topic, including both tangible and intangible elements. Experts agreed that it is important to continue the dialogue on this topic and take action to preserve and promote mining heritage for future generations. All discussion participants emphasized that mining heritage is not only the past, but also an important element of the region's identity and future. This conclusion is very consistently echoed by another voice of an expert from Great Britain, who, summarizing her participation in the first part of the discussion, states: *"we see ourselves as simply guardians of heritage and it is up to people what their expectations will be in this matter. I think we understand how important it is in the UK and I'm sure it's true elsewhere too because it's people's heritage. Secondly, we have been actively inviting people and seeking different views on what they want, in terms of the assets we have and how they can best be involved in community regeneration. I think the way we did it allowed us to demonstrate to the UK authorities that the project really represents what people want and therefore will. If it is loved and valued by them, and not just seen as a tourist destination, it will live and breathe the culture and heritage of the people and places it represents.*

Another area in the discussion was opened by the question about mining heritage management. Experts participating in the discussion in the first assessment stated that in their regions it involves many challenges that require a balanced approach and close cooperation between various stakeholders. In the opinion of one of the Polish experts *"there are no elements in the legal regulations, guidelines or internal documents of the mining industry that would in any way bind people making decisions to take care of these elements of particular value. This means that we do not have systemic solutions or legal protection for these objects, even if, I think that the conservator will say more, the issue of protecting individual elements is becoming secondary."* Following this statement, the discussion focused on five main areas: physical protection of heritage, financing, education and public awareness, tourism and sustainable development. In this cognitive space, the voice of an expert from France is interesting: *"we have areas that are still active and areas where activity ceased a long time ago. This is our case, it stopped in 1990. So these are not exactly the same errors. There's only so much we can share in terms of the lessons we've learned from experience and of course from your experience. You know, the problem is that we have 124 local mining towns that are part of the oblast, the inscribed oblast and the buffer zone. But the historic area of mining, coal mining is broader than this construction, because what heritage is, is a construction, so the idea is that there are no heritage citizens as such and no heritage citizens, which is really a very sensitive issue. We also need to share and communicate with a wider group than ourselves, which is really important, and also show that investments and money can also be transferred to what is not in the perimeter and the buffer zone, because we do not have money flooding the perimeter and the buffer zone. One way or another, we have of course had some money for several decades, from the EU, from the state and intercity local communities. This is something that needs to be done because we do not currently have groups of former miners who can be the only unique transmitters, or actors responsible for transmitting history and values and so on. Our former miners are 80 years old today. They were, of course, replaced by young teams of very dynamic museum guides. And you also need to work on the message, not just memory, because it's not about writing down one unique story. This must, of course, be done from the point of view of history, scientific research and inventory. We also need to find local people who can transmit it, because here the former miner's discourse evolves over the years. The environment sometimes juxtaposes bad things, so you need to know it to take control. Our local cities and the entire French administrative management level are involved in the management plan and system. So they are deeply involved in it, but the idea is very difficult because our heritage is an everyday heritage. It's a house, it's a church, it's a public space. It's not something you only know from iconic monuments, we obviously have some very, very monumental places. Not only. We have investments in 124 local mining towns. Urban*

planning, urban structure, urban buildings that are part of the oblast. That is, how to talk to people who have family roots in this history, but also with people who come and live in the local mining towns and have no connection with this history. We need to talk to them. We need to engage them so that they share that their lives are not just trivial. Now it is a house of everyday life, but it is also a house that has local but also universal value in terms of industrial heritage. And of course we have developed not very original tools in terms of signage, of course in terms of the broadcast by so-called heritage ambassadors of many festivals of many local cultural projects, the use of tourism tools in terms of welcoming people, not only in four-star hotels, which we do not have, but also in local mining, mining, which is also preferred by people who want to explore the area in a different way. And we do not want to do this to become such data and we will not be like that, but to develop slow tourism, develop another way of discovering history, special territory, and also make natural visits and discover heritage with the public, with schools, and we are very, very lucky because we have developed the tools to do this."

According to experts, one of the most important challenges is the physical protection of mining facilities, which are often in poor technical condition. The study participants drew attention to the need to carry out comprehensive conservation and restoration works. A significant problem is the lack of appropriate financial resources and specialist knowledge. The need to introduce systematic technical reviews and develop long-term conservation plans was also emphasized. Closely related to this challenge is the issue of financing the management of mining heritage - it was one of the main topics of discussion. It was noted that there was a strong need for funds at both national, regional and local levels. Experts related to activities related to local communities pointed out the need to obtain funds from various sources, including EU funds, government programs and private investors. In turn, the environment close to the entrepreneur emphasized the need to create attractive business models that could attract investors, as well as to increase inter-sector cooperation. Another challenge is to increase public awareness of the value of mining heritage. Heritage experts pointed out the need to develop educational programs that would include both formal and informal forms of education. The importance of engaging young people and children was emphasized, which may contribute to shaping pro-social attitudes and protecting heritage. It was also proposed to organize workshops, exhibitions and cultural events that could promote mining heritage among the mass audience.

Tourism turned out to be a very sensitive topic, which, according to experts, constitutes both an opportunity and a challenge for the mining heritage. The study participants agreed that the development of tourism can contribute to the economic revival of the region, but it requires proper management. The need to create attractive and diversified tourist offers that will be able to attract diverse groups of visitors was pointed out. One of the Polish experts clearly emphasized the role of tourism in this space, stating that *"the best example of good practice is the Coal Heritage Museum in Zabrze, because you can go down there, ladies and gentlemen. To get to know the mining heritage, you have to go down, but in Rybnik you will never be able to do that again. In this whole puzzle of tangible and intangible heritage, this descent is fundamental from my point of view."* On the other hand, the need to control the intensity of tourist traffic was emphasized to avoid excessive exploitation and degradation of mining facilities. Last but not least, the sustainable development of the region is a challenge. In this context, the integration of activities to protect mining heritage with broader development plans was discussed. Participants drew attention to the need for inter-sectoral cooperation and the inclusion of mining heritage in regional development strategies. The importance of scientific research was also emphasized, which could provide valuable information on the impact of various activities on heritage and effective methods of its protection.
To conclude, in the area of mining heritage management in the regions represented by experts, a multi-faceted approach and the involvement of various stakeholders are expected. Key challenges such as physical protection of facilities, financing, education, tourism development and sustainable development

can only be effectively addressed through close cooperation and integrated actions. The conclusions from the FGI indicate the need to continue the dialogue and take concrete steps to protect and promote mining heritage, which is not only part of our history, but also a key element of the European Union's cultural identity.

Another area discussed during the FGIs focused on assessing the participation of local communities in decision-making processes regarding mining heritage. Much valuable information collected from study participants revealed both challenges and good practices in this area. The consensus among study participants was that communities are not always fully involved in decision-making processes regarding mining heritage. It often happens that decisions are made at higher levels of government without sufficient consultation with local residents. Lack of transparency and insufficient communication between decision-makers and local communities were recurring elements of the discussion. This emphasis was particularly strong in one of the opinions, in which the Polish expert notes that: *"there are a number of these barriers and we will systematize them. I would say, from the point of view of my experiences, that today all these barriers can be overcome with great determination and will to preserve what we have. I would go back to what he said (...), I think it is primarily about decision-makers' awareness of industrial heritage, including coal heritage. Our experience is that mining is very industry-specific and today it is the Ministry of Industry, these are coal companies, this is the State Mining Office, and none of these entities has anything that could be called heritage in their main tasks. A few years ago, at the Ministry of State Assets (hereinafter MAP), we tried to talk about the fact that it would be good to try to implement some systemic solutions when it comes to the protection of the most important objects of post-industrial and post-mining heritage, and we talked with officials and it was a bit like a conversation between the blind and the deaf. I'm not even surprised that MAP officials look at it this way, because no one expects anything like that from them, they have other tasks. And the entire mining industry that comes out of there also has other tasks."*

Experts agreed that the active participation of local communities is crucial for the effective protection and management of mining heritage. Local communities have unique knowledge and perspectives that can enrich decision-making processes. Their involvement not only increases the sense of responsibility for heritage, but also promotes the creation of more sustainable and socially acceptable solutions. During the discussion, several examples of good practices were identified that can serve as models for other mining regions, including: public consultations and workshops, the creation of advisory teams, public-private partnerships, education and information campaigns. The voice of an expert from Great Britain resonated very strongly in this cognitive space, pointing out that: *"the first thing I would like to say is that the nature of hard coal mining and mining communities means that there is incredible potential for volunteering, perhaps greater than in other communities and different countries, that there are various programs that help organizations and groups take advantage of people's willingness to volunteer. We should therefore never underestimate those who devote their time to mining heritage projects and these may include oral video history projects as well as cultural heritage trails, for example. We have just launched a new so-called coal bunker and I will distribute the website. This is a really exciting project that encourages people to take healthy walks and discover their heritage. This is reminiscent of the entire occupational health and safety culture that surrounds mining, and mine rescue in particular, which will be a major force where mining continues. I would use the legacy and work of the mind savers to work for you in the community. The last thing I would say is that you are looking for guidance and examples, although world heritage is only a small part of mining heritage, although it is very important. One of the greatest things that they do is that they may need to develop management plans that outline how they manage what they do with and between their heritage. On the other side there are several mining world heritage sites. You should be able to find very useful resources about working, especially with the local community."*

FGI participants agreed that local communities should be more actively involved in decision-making processes regarding mining heritage. Examples of good practice such as public consultations, advisory teams, public-private partnerships and education can inspire other regions. The value that the local community brings and create mechanisms that enable their active participation in decision-making processes. According to experts, only through joint actions can we effectively protect and promote our mining heritage. Ways to increase public awareness of mining heritage are the subject of further assessments and expert opinions. One of the Polish participants in the discussion even said that *"I like the director's statement about treating the heritage as your own. It is our consciousness that is crucial to its preservation."*

The discussion in this cognitive area brought many valuable ideas and recommendations that may contribute to a better understanding and protection of mining heritage. The first of these is the integration of mining heritage into the curriculum. Experts emphasized the importance of including topics related to mining heritage in school curricula. It was proposed to organize educational trips to mining museums, mines and other places related to mining. Creating special teaching materials such as textbooks, documentaries and multimedia presentations can also help educate young people. Workshops and courses for adults correspond to this recommendation. The study participants suggested organizing workshops and courses for adult residents, which could cover the history of mining, mining techniques and the impact of mining on the development of the region. Such initiatives can be implemented by local non-governmental organizations and educational institutions. Campaigns in regional and local media are equally important. Using local media such as newspapers, radio and television to conduct information campaigns about mining heritage. Regular articles, reports and interviews with experts can increase public awareness and interest in the topic. In this area, according to experts, we cannot ignore the importance of social media, as Facebook, Instagram and Twitter in promoting mining heritage. Creating engaging content, including photos, videos, quizzes and competitions, can capture the attention of younger audiences and encourage them to learn about the region's history. The initiatives, regularities and directions of actions described above were confirmed by an expert from France in his statement, saying: *"time flies, but time is an important factor if you work a lot, if you finance many, many things to repair, all the huge consequences of the consequences on the territory, I'm talking about brownfields and so on, but changing the image, the way the media or social media looks at you and changes the discourse, the speech, actually in my experience it takes time. And now the new gap, the new barrier to be crossed must be shown to everyone, I mean, from local and regional government to the parliament. This is heritage, mining and industrial heritage is part of the transformation process. There is a French saying that we are not the icing on the cake. We are the expensive icing on the cake. We are part of the recipe and it is very important to convince that the materials, milestones, etc. are sometimes good, sometimes very good. If you treat them well, to preserve all the thermal quality of the house, and it's not that expensive to preserve the heritage, if you treat them well, you are innovating in the local mining environment and that is something that we are really fighting for within a very large program. A national program called the carbon recovery. This is EUR 200 million earmarked for the renovation of local mining houses. We have at least 23,000 local mining houses that will engage in this program over 10 years and we really need to be successful in showing that insulating houses can protect heritage in terms of materials, but also in terms of architecture, because it really is a specific step that we have to go through. There are also many other great plans and guidelines that we are implementing today, which are intended to show that all the local mining, former railway tracks, and all former post-industrial areas. Now those that are green, because they have been renovated and turned green, can be chained together into so-called green networks, called park networks, which will really allow people to cycle at least 100 kilometers and discover what landscapes we have (…). We have a very, very famous mining museum, but trying to turn every site into a museum might appease your local councilor. You actually need to have a few tools in your kit to deal with it and be successful. It will take about 10, 30 years to show something and that's the best. This is a goal we must share."*

According to experts, festivals and thematic events provide significant support for these activities. Organizing festivals, open days in mines, historical reconstructions and other cultural events that can attract both residents and tourists. Such events may include exhibitions, shows, workshops and concerts that celebrate mining heritage. These activities may be accompanied by the inclusion of art in the promotion of mining heritage by organizing exhibitions, art competitions, street theaters and other artistic forms that can engage the local community and emphasize the importance of heritage. The above-mentioned regularities were discussed in a broader context by an expert from Great Britain, stating that: *"in terms of world heritage, we are talking about what is intangible. What people have created over 200 years of trade union, industrial, health and safety organizing is truly the key thing because it can shape the present and the future as much as the past. So, in terms of raising public awareness, we really want to emphasize and we do emphasize the importance of history in how it shapes the present and the future, because there is more mining in the world than ever before, and deaths and injuries are the same. On a much larger scale, and indeed we find that people are interested not only in their own heritage, but also in what it means for the future, especially in the context of climate change, in the context of a just transition, and in particular in terms of global inequality in mining, thanks to which your cell phone and everything we do today works. So what I want to say is that we have managed to prove that historical heritage is as important to people now as it always has been because, in a sense, we have refreshed the narrative. And I'll kind of leave it at that. And people reacted. Really, really positive."*
"We should produce a scientific paper, like the paper "The value of historic houses in Europe", ordered by the EU parliament in 2018 and executed by the EU commission in 2019, and carried out by Creative Europe."

It is worth mentioning tourism once again here. Creating tourist trails and educational paths that lead through historical mining sites. Equipping these routes with information boards, mobile applications and audio guides can make the tour more attractive and educational. To sum up, increasing public awareness of mining heritage requires diversified educational, information, cultural and tourist activities. The involvement of various stakeholder groups and the use of modern communication tools are crucial. Good practices identified during the FGI may serve as inspiration for other regions seeking to protect and promote their mining heritage.

During the FGI, another goal was to discuss existing guidelines and strategic plans, taking into account both the preservation of the heritage associated with the mines and the stimulation of the sustainable development of local communities. The discussion undertaken by experts revealed several key conclusions and identified good practices that can serve as models for other areas. First of all, the study participants pointed out that in many of their regions, there are already guidelines and strategic plans that combine the protection of mining heritage with sustainable development. Such examples include, but are not limited to: local development plans. Many mining communes include in their spatial development plans the protection of mining heritage sites and their adaptation the needs of tourism and education. These plans often include the revitalization of old mines, the creation of cultural parks and the development of tourist infrastructure. In this light, it is worth recalling one of the expert statements from Poland, which states that: " *ladies and gentlemen, the local community is one thing, and the community associated with mining, the history of the mine and the industry, is another thing. It is often the case that these two groups have divergent interests. I am glad that the Ignacy mine is perceived so well from the outside, but it is not as rosy as it may seem. A large part of the restructuring process was a fight with residents who do not necessarily have connections with mining, making them aware that part of their budget goes to the revitalization of a mine at the end of Rybnik in Niewiedzie, outside the city center, which they could still use. That is, outside the center, on the outskirts and even outside their heritage area."*

Experts noted that there are regions where regional (local) development strategies (plans) have been developed that integrate mining heritage with broader sustainable development goals. These strategies focus on promoting heritage tourism, supporting local businesses and developing sustainable economic practices. There are also examples of funding and grant programs that support mining heritage protection and sustainable development projects. According to the study participants - which has already been noticed several times - EU, national and local funds can be used to implement revitalization, educational and tourist projects. The above-described context includes the voice of an expert from the Netherlands, who notes that: *"scientific research should be carried out on historic values in Europe, and I think we need something like what was commissioned by the Parliament of the European Commission. I'm talking about value, awareness and possibilities for the future. I think we all need to work together to achieve this. So, in a sense, I will echo Parliament's decision to the new Commission after the elections to get a report on this so that we can all continue to learn about the importance of fuel for the historical heritage, but also in the current world that we find ourselves in and I think that this is what people want to know before making a positive decision about industrial and mobile heritage. I think it has so much to do with what European identity is. I think the European Union has arranged it quite well, this position, mobility and industry. Heritage is a central part of European identity. So that's what I think we should do again with things like this."*

Experts attached particular importance to the revitalization of mines as centers of culture and education, the promotion of ecotourism and heritage tourism as a way to preserve mining heritage and stimulate sustainable development, and the creation of inter-sectoral partnerships that involve local authorities, non-governmental organizations, enterprises and local communities in projects related to heritage protection and sustainable development. The above-described expert voice fits into the space and gives the example of including the traditional mining festival "Barbórka" on the UNESCO list of intangible heritage. In this case, the Polish expert notes that: *"I will also refer to the inclusion of St. Mary's Eve celebrations on the list of intangible heritage in 2018. For people who have no knowledge about the term cultural heritage created by UNESCO in 2003, it may seem niche, but in retrospect, this entry caused, first of all, a huge increase in awareness that St. Barbara's Day is of great importance to people and –to local communities. Publicity of the holiday itself, having both a religious and secular dimension. On the other hand, the entry gave wings to smaller groups that met somewhere in parishes, rented rooms from parish priests, and the prestige and support from the state meant that these people began to cooperate with each other, contact each other, call each other, and become active in other various activities. fields, not only those related to Barbórka. This had a very positive impact, especially for small groups, which I call post-mining districts, cities and communes, which were closed down in the 1990s. There is no strategy as such, but it is about maintaining vitality. This is where the match is made to a specific group or community. You can design some actions that will last. The problem is that we cannot decide from above what this group should do. The only problem of these groups is the difficult generational transfer, these are older men and women nowadays, and the second problem is the lack of finances. Whether in Pszów or Zabrze, the gentlemen organize themselves. These are deeply grassroots initiatives."*

According to FGI participants, such cooperation may lead to better coordination of activities and more effective use of resources. This was echoed again in the voice of another expert from Poland, who, speaking about St. Barbara's Day - similarly to the previous expert, states that: *"in our museum are the coordinator of two intangible heritage entries related to the mining culture of mines and the culture of miners, i.e. Barbara's Day and mining orchestras wind instruments, which are very important to us and very important for the intangible heritage - the heritage of coal mining and the coal area - and we are, as I mentioned, this is the time when here in Poland we need to think about how to preserve, how to capture and survive for the next generations. I imagine these are big words, but this is a unique moment in which*

we must seize the opportunity to digitize oral history as well. Memory, memory and identity of coal mining from a human perspective (…). Almost two years ago, we opened what was probably our last exhibition, a permanent exhibition called Carboneum. It is located in our water tower, which is also part of the Coal Mining Museum and is dedicated to coal. So what purposes is coal used for and where can we find it in everyday life? This is my opinion, and when we think about society, especially local society, especially here in Poland, it is worth thinking about it."

Despite existing measures and good practices, survey participants identified several challenges that require further attention. In particular, they noted the lack of uniform standards and guidelines that would be applied in all regions. Standardization can help better manage mining heritage and integrate it with sustainable development. This thread of discussion was developed by an expert from Poland, emphasizing that: *"we have to do a lot of very fundamental work. First of all, we must clarify that carbon heritage is not the same as church heritage or palace heritage. Remember that a few years ago we were preparing for the criteria of our Minister of Culture on how to deal with industrial heritage, including the coal mine. So I think this will help the process. I can build a list of the most important objects that need to be saved. So, first of all, in the case of Poland, we need a very strong connection of people with knowledge about heritage with people making decisions not only in the Minister of Culture, but also in the Ministry of Development, so that we have time to save as much as we can and save in good ways, so let's not only save buildings or what is underground, but we have to save the entire structure. We need to talk about buildings, of course about machines and the whole process. Now we don't have one place where we can digitize carbon and observe, so on the pollution side, it's a huge job for you, requiring very basic work. More complicated and very expensive, like preserving some of the facilities that are still in operation. So research is very important now to know what we have and how, what we should do and how to save."*

Despite the available financing programs - according to experts - there are insufficient funds for the implementation of long-term projects. Participants suggested increasing financial support and facilitating access to funds. As has already been noted, there is still a need to increase public awareness and involve local communities in decision-making processes. Another expert opinion from Poland confirms the above-mentioned regularities, emphasizing that: *"I agree that these are bottom-up initiatives. There are no regulations here. However, for several years now there has been a change in the treatment of cultural heritage. We are talking about cooperation with the local community, looking at the problem, landscape, buildings and material heritage more holistically. There is talk of protecting the landscape created by this mine. The perception of heritage is changing a lot, expanding, as if integrating in various fields, that's how I would describe it. I tried to look at world documents covering this and only from 2014 in the promotion of industrial heritage I found these records of cooperation with communities. There has been a lot of interest in post-industrial monuments for a long time, e.g. Industriada. People like to visit something different, they like to see original monuments. It is interesting for different people, whether they like taking photos or are interested in history, like the friend next to me. How to increase this awareness? We need to take advantage of this interest and, point two, patiently inform and convey this information. Popularize knowledge as much as possible. I also wanted to say that perhaps Mr. Conservator will confirm that currently most applications for renovation are submitted by local communities and associations, and not by the owners of the facilities. This is my observation. You have to use it."*

Education and awareness campaigns can play a key role in this regard. Experts recognized that there are numerous guidelines and strategic plans that combine the protection of mining heritage with the sustainable development of local communities. Good practices such as mine revitalization, promoting heritage tourism and cross-sector cooperation can serve as models for other regions. As one of the Polish experts participating in the study emphasized, *"I have three examples of such a process related to the preservation of mining heritage. I will try to mention them quickly, because they also provide conclusions. The first is the creation of a mining museum complex in Zabrze, and this is due to the fact that mining*

began quickly here, and there are no mines here at the moment. Since 1981, the Coal Mining Museum in Zabrze has been the only mining museum in Poland, a society of mining friends, there were several societies that tried to save something, even with success. The battle to restore the Guido mine to tourist traffic lasted several years, was led by the social side, and forced decision-makers to reopen the mine. These environments were strong and dynamic, but they could not carry out this process on their own. The key was for the city to get involved at some point and take over the entire process. It was treated as a political approach, phantasmagoria to focus on the coal heritage. We strongly focus on partnership. There was a coal mining museum, the Guido mine, the Pro Futuro institution, the city of Zabrze, the Silesian Voivodeship and the Silesian University of Technology. Therefore, it was a large consortium interested in carrying out this process, with the favorable attitude of the provincial conservator of monuments, without whom it would not have been possible. This showed that this process can be done, this path can be followed. The second action was the process already mentioned, entering Barbórka on the list of intangible heritage, the national list. It was then that a partnership was created, a group of entities that were interested in this entry, from the State Mining Authority, representatives of mining companies, trade unions, orchestras, associations, churches –and even individuals. We, as the Coal Mining Museum, took it upon ourselves to organize this process, and thanks to the fact that there was such a wide participation, which was visible, there was great dynamics in it all, we managed to make this entry quickly. The first entry in Silesia related to mining and was followed by the second entry. Last year, we included mining orchestras on the national list of intangible heritage. And this is also thanks to the fact that all the orchestras that are currently operating were involved in this process, and we, as a museum, brought it together. What is the conclusion? In my opinion, several things result from this, the most important of which is that without this strong social participation it is very difficult to carry out such a process. Everyone who is interested in this, these depositors, must get involved, that is one thing. The second is that there must be someone who is a leader in such an undertaking. It must also be someone who has a strong institutional background that allows them to obtain funds, go through the bureaucratic process and carry it all out. In the first case, it was the then mayor of Zabrze, Małgorzata Mańka-Szulik, the city was the driving force behind these activities. The second one was the Coal Mining Museum, which cooperated with interested knowledge groups. For this process to be successful, two things must be reconciled: the interest of the depositaries, the social side and the institutional and formal potential that will carry it all out. Money is really secondary in all this. They appear when these first two things are present." Similarly to the expert from Poland, the expert from the Netherlands views the issue of protection of mining heritage, noting that: *"I think that an interesting element is the construction of such a coal mine. Also the educational and scientific part to learn these things for the whole of Europe to continue all these things, how to think about holes, pumps, how to maintain, how to make the right decisions to keep things in their existing condition and be preserved give if possible. I think this could be an interesting complement to the idea of keeping a coal mine open for a long time as a working museum. It should be a school where people can learn it, even if they were so young in 100 years, I have no idea what it was like in the past, in mining areas. So I think that's what I would add. I like to add the idea of an active museum, a combine."* To achieve full success, it is necessary to further develop standards, increase financing and involve local communities in decision-making processes. The FGI showed that there are numerous guidelines and strategic plans that link the protection of mining heritage with the sustainable development of local communities. Good practices such as mine revitalization, promoting heritage tourism and cross-sector cooperation can serve as models for other regions. However, to achieve full success, it is necessary to further develop standards, increase funding and involve local communities in decision-making processes.

The question of what inventory methods are considered effective in the case of mining resources, taking into account their importance for cultural and historical heritage, was the content of the next expert discussion. The discussion aimed to determine the most effective inventory methods, taking into account

the importance of mining resources for cultural and historical heritage. Here are some sample statements by Polish experts on this topic:

“new technologies, this is where I would lean, and secondly, going in a completely different direction on this scale, I would lean towards obtaining all this information from humans ",

"we create a wide range of materials study. we create a historical description of this mine and document it physically. In detail, we have inventory sheets that are useful and can be consulted at any time. Get to know the most important elements of a given facility in a short time. From the list displayed, I would choose research and scanning", "research, analysis of historical heritage", definitely yes. In the case of intangible heritage, it is field research with a voice recorder and camera", "…first, it would be necessary to determine what the purpose of this inventory is. Is it only the description of the object in historical terms, or a deeper one with drawings and descriptions? Because what is displayed in this small print is, for me, putting different things into one bag. I would mention the conservation documentation here, we realize that we are not able to preserve everything",

"for me it's laser scanning, 3D, virtual tours, so that we can show future generations, as well as the current ones, what it looked like. And scanning old documents",

"for me it is a field inventory using laser technologies and necessarily related to the analysis of documentation ",

"I think that we can of course agree that we could not stop all buildings, all mines, all facilities related to mines to protect them and ensure their survival for future generations. Scanning documents, scanning buildings, underground corridors is something we should take care of and I would add that at the KWK in Zabrze we are doing just that, because we are scanning the building, mine facilities that will be closed and, of course, once again talking about people, minors and their families. We need to think about it, or maybe not, but let's just do an oral history to document the memories. What they remember from work is something we could and should have done. From my point of view, this is very important and should be pursued.”

Similarly, the problem of inventory is noted by an expert from Great Britain, pointing out that: *"part of what we do with the mine hall in Durham is documentation covering over 150 years, which requires archiving. We do all this, but we involve people in the process. So we choose articles that will be interesting and post them on social media to engage people on this issue, which is 72 cubic meters of paper that needs to be archived and made available to people. And we keep saying that this is your history and it belongs to you, so we try to instill in it a very strong sense of ownership, because we have nothing left of this industrial architecture, which is almost nothing left. Everything was removed, including the huge piles of slag. In this perspective we will recreate Redhills, a virtual coal mine. The virtual mine will tell a story about shared human values. It does not serve as a museum, it is a reminder of how people collectively cared for each other and built their communities and society around it. So if we are in a museum of anything, it is a museum of collective effort and how people achieve things together. I know it sounds like a bit of a utopian concept, but that's actually what people did. So we're not making anything up. We're just reinterpreting what people have done and finding that it's a bit more difficult than doing it if you like the design of the Technology Museum, but it really works and engages people, also in terms of resources. Our advantage is the history of people, the history of social organization and social reforms.”*

“At least one or two active coalmines should be preserved in Europe as a working fuel producing demonstration Museum. The organizations as such, should also become the learning/training facility for people to learn to maintain the technical installations to keep closed coalmines throughout as a safe part of their environment. This will help to promote the mining history in areas after closure of the coalmines.”

To sum up, to the most important inventory methods, experts included photographic and video documentation, 3D scanning technologies, geographic information systems (GIS), databases and digital archives. During the discussion, participants identified several key challenges related to the inventory of

mining resources and proposed several important recommendations directly and indirectly, including the need to develop uniform standards and guidelines for the inventory of mining resources. These standards should be applied across all regions to ensure data consistency and comparability. It is necessary to organize training and workshops for inventory specialists. This training should include the use of modern technologies such as 3D scanning and GIS, as well as documentation and data management methods. Inventory of mining resources requires appropriate financial and human resources. Participants pointed out the need to obtain funds from various sources, including EU programs, government grants and support from the private sector. Effective inventory requires close cooperation between various institutions, such as local authorities, museums, universities and non-governmental organizations. These partnerships can contribute to better coordination of activities and exchange of knowledge and experiences. In conclusion, it can be stated that an effective inventory of mining resources requires the use of advanced technologies, such as 3D scanning and GIS, as well as detailed photographic and video documentation. Creating digital databases and archives is crucial to preserving mining heritage information. The introduction of uniform standards, training of specialists, appropriate financing and interinstitutional cooperation are necessary to make the inventory process effective and lasting.

During the FGI experts focused on identifying key mine resources for the inventory from the point of view of cultural and historical heritage, the first voice in the discussion - it was the result of the opinion of experts from Poland, indicated that all tangible and intangible resources related to mining should be recognized as cultural heritage, is confirmed by the following conclusion, agreed by all discussion participants: "*actually everything. If we look at mines and mining, half of them are material resources, because in addition to mines, there are entire workers' settlements, communication links, engineering facilities, hospitals, clinics, health centers, sports clubs. All this is waiting for some research and systematization, because these are elements of the history of mining that should be taken into account. Today, Silesia without mining would be a completely different place. It's hard to choose what to keep here*."

More specifically, the discussion allowed us to distinguish, among others: several key resource categories that are particularly important for preserving and promoting mining heritage. According to experts, the key resources of mines for inventory purposes are, first of all, surface and underground structures, including buildings and above-ground infrastructure. Next, corridors and underground workings, mining machines and equipment, mining and transport machines, hand tools and personal equipment, maps and mine plans, accounting books, reports and correspondence, places of worship and memorials, residential buildings, schools, shops and other structures creating a mining community, which illustrate everyday life and the organization of the community around the mine.

Experts' opinions also indicated the possibility of identifying several key challenges related to the inventory of mining resources. First of all, the fact that many resources, especially underground ones, are difficult to access and may be in poor technical condition. Specialized conservation and protection measures are necessary. Collecting and integrating data from various sources (e.g. technical documentation, artifacts, oral histories) requires a well-planned information management system. The inventory process is expensive and time-consuming. It requires adequate financing and qualified personnel, including archaeologists, historians, engineers and conservators. The above-described perspective related to the inventory of mining heritage is reflected in the statement of an expert from France, who states that: *"we started with this small inventory, and after collecting all archival inventories regarding slag heaps, residential buildings housing urban buildings, etc., we have also created our inventory of world cultural heritage. In fact, two approaches define the universal and unique value of these cultural heritage sites and we make a selection. Therefore, it urged our French state and French experts to select a list of these elements. That's why we only have 20% of the world heritage inside my region. That's*

why it was a selection. That's why I said that any legacy is, among other things, a construction, but it is one thing, it is a choice. So for six years we were involved in major inventories of natural sites or buildings, etc., to learn about the history, to see the archives, which was a really serious task. But I would say that if you come up with, if you create an inventory, you need to determine who will manage it. Because it's something alive. It's a living thing. This is not a static photo of what you have. Things are sticking. Some things need to be demolished. The situation needs to change to welcome new users, such as economic or housing projects. So you need to connect at the same time. If you don't do this, people usually accuse you of freezing the territory and blaming it on the legacy. We are becoming expensive. It becomes black, gray and modern. Modern architecture is beautiful and inexpensive to replace its heritage. So heritage is obviously a living thing. This needs to be adjusted, but if you want to give a weapon to a legacy opponent, you can very easily give them something to erase or leave it at that. So this is something that needs to be put into, I mean from the beginning of the project, very much involvement from the very beginning in making choices. It's true that sometimes you have to make choices, but don't bow down to going against things because the legacy will be lost."

It is worth noting here that the FGI showed that the inventory of mine resources requires a multi-aspect approach, including documentation of surface and underground structures, mining machines and equipment, historical documentation and cultural and social objects. It is crucial to overcome challenges related to availability, data comprehensiveness and financing. Modern technologies, inter-sectoral cooperation and active involvement of local communities can significantly contribute to the effective inventory and protection of mining heritage.

At the end of the discussion, the participants made several additional comments. Experts from Poland note that: " *I would like this entire technological process to be shown in our voivodeship. So that you can see everything, so that there is a sorting office somewhere. We are talking about random protection here, and my dream is to be able to see everything somewhere - –the hoisting towers, sorting rooms, and how it was transported. We don't have anything like that and it would be nice. Maybe it's still possible to save something somewhere."*

Assessing the condition of preserving post-industrial monuments, especially mining, another participant in the FGI emphasized that: *"It depends on immigrant and indigenous social groups. If they are indigenous, they are very connected with mining, because it provided them with an existence, earning money, establishing workers' settlements in this mining landscape. In Silesia, this awareness condition is at a high level. The situation is worse where there is an immigrant population, e.g. Jastrzębie. But I bow my head anyway, because there is a desire to preserve this heritage. I don't know if it's different outside Silesia."*

Two subsequent discussion participants assessed this issue from a different perspective, stating with conviction that: *" if we are talking about popularizing post-industrial and mining heritage, we must change the way we see mining. First of all, our children do not know the world we are talking about, for them it was not the mythical world that we know from research or autopsy, or the messages of our grandparents. For them it is absolute fiction, possibly neglected districts, poverty, an open-air museum. Second thing, mining is crap, it's not cool. Our generation has destroyed their world; we have climate change caused by fossil fuels. They think this way, we are actually a mutual admiration society, we have similar experiences, with the same vision of the future, that heritage is cool. With all due respect to these groups of miners, these are gentlemen, people older than me, there are no young people. If we do not learn to create projects about post-industrial heritage, the heritage must be cool for generations of our children. If it's not "cool" we'll be running an open-air museum."*

"we can't change everything in a museum. Because who will go sightseeing later? All ways of adaptation and usefulness are good, valuable and worth considering to preserve this heritage. However, it is very

difficult for conservators. For material heritage, great importance is attached to its authenticity. And what is this authenticity? It is a historic element, but also a historic experience. As part of the conference, we now had a study trip to the Plato gallery in Ostrava. It is a contemporary art gallery created in the modernized buildings of an old slaughterhouse. The bricks were not cleaned; they even went the other way to dirty them. The building is dirty, but it is perceived in a completely different way than those pimped out, clean buildings where the facade is so bright. Where does this border end, where we stop perceiving an object as authentic, and it becomes a model, fantasy, decoration. We will leave, for example, one wall and who will understand that there was a well-known industrial facility there. This is a very difficult topic, both for property owners and designers, how to show it so that a certain amount of authenticity remains. We cannot escape this. That's why it's important to make these conservation records. If we are unable to retain the object, we must retain the knowledge. These may be digital records, because they are rather permanent, or, as the conservator said, drawings."
"The long term availability of sufficient people to take care of this heritage, like enough young people willing to learn theoretical and practical to preserve, maintain and present this heritage as living history and enough older people with enough theoretical and practical knowledge and experience to preserve, maintain and present, who are well willing to transmit this knowledge to the next generation."

The expert from Great Britain focused, among others, on history and safety, saying that: *"The north-east England was really where industrial mining really started. So 1,000 years ago, some people say that the Romans came to the north of England for lead, but they used coal to smelt it, so it goes back a long way, and the aquifers and hydrology of that region are quite extraordinary. So yes, it has to constantly pump water in the south of the region. Something like half a million liters of water per hour. If they don't, the pressure builds and a plume of water shoots out. If you know where we are, in a town called South Shields , which is on the North Sea coast, up to the height of the roundabout, I try to do this over a distance of about 100 meters and the water will be full of heavy metals and almost overnight it will poison the entire flood plain of the River Tyne , making it uninhabitable and no one really knows about it. So the coal authorities must remain as long as we work on the right solution, but I don't think it will be reached. The reason I say this is because it's about this whole issue of relating our coal mining heritage to modern times and, I guess, the point is that all of Europe was built on this magical black mass that had thermal properties, which gave Europe an advantage over the rest of the world, and especially Britain."*

In his final statement, the expert from the Netherlands focused on the topic related to the spatial database, noting that: *"a lot depends on defining the purpose of the spatial database, because it must be so. We have to be very careful about what happens with this, and for me it has to be as simple as possible, and the more you add to it, we will have to take into account management issues, because one of the things that is really happening is important consistency of terms used, thesaurus, and so on. So that you can find yourself. Search and find information reliably, and you have to work hard to determine exactly what date should be included in the database and what it should be used for, otherwise a monster will be created that will be useful."* An expert from Great Britain agreed with the above statement, adding that: " *I really agree with the above assessment, it has to be something simple and understandable to people, while he wants something very, very technical. I don't know, I won't make any further statements, I will just make the conclusive statement that once again Britain is connected to the continent in terms of history, in terms of, as you know, so maybe there was no Brexit, but it is connected to the continent. So that's the lesson. And I'm very, very happy with it."*

In the topic of the Coal Heritage geospatial database, FGI experts noticed that mining heritage, especially coal mining, plays a key role in the history of many regions around the world. A geospatial database like Coal Heritage can be an essential and unique tool for managing and protecting these resources. Experts

concluded that to be effective, it must include a wide range of descriptive attributes that enable a comprehensive understanding and management of mining heritage. Location and geographical coordinates, operational history, mining types and structures, mining technology, geological data, environmental impact, sociocultural aspects, documentation and archives, state of preservation and accessibility and tourism are the key categories of attributes that should be considered as priorities in the database. Therefore, the database will not only be a management tool, but also an educational and promotional platform supporting the protection and popularization of mining heritage.

Key FGI findings

The key findings from both FGIs are presented in table 2.

Table 2 Key findings from FGIs

Regional FGI	International FGI
The importance of financial support: the implementation of revitalization projects often depends on obtaining external funds. Without adequate financial support, both from local governments and other institutions, the implementation of ambitious revitalization projects is difficult to achieve. An example is the Ignacy mine, which needs external funds for revitalization to continue its educational and cultural mission.	Financial challenges: mining heritage management faces numerous financial challenges, including a lack of sufficient resources to maintain and promote mining-related cultural heritage. The Durham Miners gala, which is the largest event of its kind in Europe, is financed mainly by trade union contributions and individual contributions.
The importance of bottom-up initiatives in the protection of cultural heritage: bottom-up initiatives, especially those undertaken by local communities and associations, play a key role in the protection and restoration of post-industrial heritage. Local communities often submit more applications for renovations than property owners.	Identification of needs: Identification processes are essential for the recognition of coal areas as heritage areas, which supports a just transition of the coal sector and coal regions.
Cross-sectoral partnerships: effective management of mining heritage requires cooperation between various actors, including cities, cultural institutions, monument conservators, as well as universities. An example is the consortium in Zabrze, which involved many institutions in the process of revitalization of the Guido mine or the inscription of St. Barbara's Day in Poland on the list of intangible heritage.	Better governance in coal regions: managing coal regions in transition is key to support a just transition, improve health and safety, and minimize the environmental impact of coal mines.
Awareness and educational challenges: a key challenge is to increase awareness among younger generations about mining heritage. Young people	The role of local communities: it is crucial to involve local communities, which can be transmitters of the history and values

often view mining negatively because of its impact on the environment, so it is necessary to change the way heritage is presented to make it attractive and understandable to younger audiences.	associated with mining heritage. Young teams of dynamic museum guides are replacing older generations of former miners.
The role of modern technologies in heritage documentation: modern technologies, such as laser scanning, are invaluable in the process of inventory and documentation of post-industrial facilities. Thanks to them, it is possible to accurately preserve and record the technical and historical condition of these buildings.	Volunteer potential: mining communities have a high potential for volunteering, which can be used to implement various programs to support mining heritage.
The need for a change in the perception of heritage by younger generations: there is a need to change the narrative and methods of popularizing post-industrial heritage among younger generations so that it is perceived as something valuable and interesting. The current generation of young people may not understand the importance of mining heritage, which poses a challenge to its protection and popularization.	The role of education and festivals: education, university and school activities and festivals play an important role in raising public awareness of mining heritage.

Conclusions of the FGI analysis

1. Historical and cultural significance. Mining heritage is recognized for its historical importance in shaping societies and economies. Experts emphasized that it includes both tangible elements (such as historic mines, machines, and infrastructure) and intangible elements (such as traditions, stories, and skills). Social awareness is critical in preserving mining heritage. This awareness encompasses understanding mining history, recognizing miners' contributions to regional development, and valuing mining heritage as part of cultural identity. Active societal engagement is necessary to prevent neglect or destruction of this heritage.
2. Social dimensions of mining heritage. Experts highlighted the strong social bonds and unique cultural identities that have developed in mining communities. Traditions, customs, and everyday life in these communities are integral to the heritage. Public events, like the Durham Miners Gala in the UK, play a crucial role in maintaining these social dimensions by bringing communities together and reinforcing a shared sense of belonging and cultural continuity.
3. Economic impact. Despite the closure of many mines, mining heritage continues to influence regional economies. Experts discussed the importance of leveraging remaining resources and post-industrial areas for economic development. The heritage also offers potential for tourism development, which can contribute to economic revival if managed properly. This includes creating diversified tourist offers that respect and promote mining heritage.
4. Management challenges: Effective management of mining heritage involves addressing several challenges like physical protection and financing. Many mining facilities are in poor condition and require comprehensive conservation and restoration efforts. This necessitates systematic technical

reviews and long-term conservation plans. There is a critical need for financial resources from various sources, including national, regional, and local levels, EU funds, government programs, and private investors. Attractive business models and inter-sector cooperation are essential to attract investment.

5. Public awareness and education. Increasing public awareness through educational programs is vital. Engaging young people and children can help instill pro-social attitudes towards heritage protection. Workshops, exhibitions, and cultural events can further promote mining heritage. Also important is tourism management. While tourism can boost regional economies, it requires careful management to ensure it contributes positively to heritage preservation. This involves creating sustainable and attractive tourism offers.
6. Community and institutional roles. Museums and cultural institutions are pivotal in preserving and promoting mining heritage. These institutions serve as educational spaces and help transmit knowledge to younger generations. Local communities play a crucial role in heritage preservation. Initiatives led by these communities, such as those in Rybnik and Pszów, Poland, demonstrate successful grassroots efforts in preserving mining heritage.
7. Technological development. Mining has historically driven technological innovation, and experts emphasized the importance of continuing this trend. Technologies developed in the mining sector can be applied to other areas, contributing to broader technological advancement.

The FGIs concluded with a consensus on the multifaceted nature of mining heritage, recognizing its importance for both the past and future. The discussions underscored the need for continued dialogue and action to preserve and promote mining heritage. The heritage is seen as an integral part of regional identity and a crucial element for future development. Experts called for a balanced approach to manage this heritage, involving cooperation among various stakeholders, comprehensive conservation efforts, adequate financing, public engagement, and sustainable tourism development.

5. Conclusions and Recommendations

CONCLUSIONS

From the first part of the Deliverable, concerning the collection of data and reporting on the existing "Mobilizing Resources for Coal Mining Heritage Conservation" (section 2.1) for the countries of interest (France, Germany, Greece, Poland, and Slovenia), it can be concluded that:

1. All the reporting countries have developed a legal framework to a specific extend, regarding the conservation and protection of the geological heritage assets. The legislations and policies are included in specific laws for each country, and are under the supervision of specific Ministries and legal entities.
2. Organizations and policies responsible for managing geoheritage and cultural heritage assets in general are mentioned where present.
3. An important role in the formulation of these frameworks have played respective EU directives and laws regarding the cultural heritage (including geological heritage sites), as well as UNESCO.
4. The methodologies for the selection and classification processes of the geoheritage and cultural heritage sites in general, as well as the registration, inventory and documentation of sites for most of the countries of interest are also mentioned. These methodologies and strategies are either officially set up buy legal entities, or unofficially by the scientific community or other entities.
5. Mobilizing resources such as funding schemes and management strategies also exist in the case countries studied, however developments still need to be made in order to promote effective and viable coal mining heritage conservation and exploitation.
6. The social participation and promotion measures and initiatives for the geoheritage sites are also mentioned, involving mainly educational, scientific and touristic activities. However, these measures are also at a primal stage and need developments in order to raise public awareness and participation on the importance and legacy of the geological heritage monuments.
7. The effective management, conservation, preservation, rehabilitation where necessary, and exploitation for touristic or other purposes is still at an early stage and in need of improvements.

The "State of Conservation and Factors affecting the Property of Heritage Sites" in section 2.2, presented input from each country (France, Germany, Greece, Poland, and Slovenia) as a separate case study. Examples selected from each participant on specific geoheritage assets, where presented in the form of a table, along with a brief analysis on the conservation status of the assets and suggestions on improvements.

The existing legal frameworks, measures and policies, standards, resources, and strategies for the management of geoheritage sites for each one of the countries of interest, along with examples of existing coal heritage monuments from each county and their conservation status, where used for setting an effective management methodology in section 2.3 "Inventory processes and management of mine's movable and immovable property".

The overall process was effective and the goals of sections 2.1 to 2.3 were achieved. The proposed methodology for the creation of inventory processes, preserving and managing the mine's movable and immovable property that was proposed, can be applied in all cases of coal mining heritage sites.

The two following sections, i.e., section 3. "Assessing the Management System" and section 4. "Data Analysis and Discussion of Results", present an assessment and analysis of the standards and mechanisms for the management of coal heritage assets, in order to inform the expert stakeholders on the topic. The outputs were the basis for setting a methodology for the creation of inventory processes and managing

the mine's movable and immovable property. Two assessment tools were used for analyzing the methodology, namely (a) CAWI In-Depth Interviews (CAWI-IDI) and (b) Focus Group Interviews (FGI).

On the basis of the IDI and FGI analysis, the following final conclusions were developed:

1. Historical and cultural significance of mining heritage. Mining heritage holds immense historical importance, encompassing both tangible (historic mines, machinery) and intangible elements (traditions, oral stories). This heritage is vital in understanding the evolution of societies and economies.
2. Social awareness. Preserving mining heritage necessitates broad social awareness. This includes recognizing miners' contributions to regional development and valuing mining heritage as an integral part of cultural identity. Building public awareness of the importance of mining heritage within the identity of local communities is crucial process.
3. Community identity. Mining communities possess unique cultural identities formed through strong social bonds and traditions. Events like the Durham Miners Gala are crucial in maintaining these identities, fostering a sense of belonging and cultural continuity.
4. Educational outreach. Engaging the public, especially younger generations, through targeted educational programs can foster a long-term commitment to long-term heritage preservation. Especially strengthening the promotion of mining heritage with the use of modern tools addressed to young people and strengthening the awareness and involvement of decision-makers.
5. Economic impact. Even post-closure, mining heritage continues to influence regional economies. Properly leveraged, it can aid economic development through tourism and other heritage-related activities.
6. Public engagement and education. Increasing public awareness through educational programs is essential. Engaging youth through workshops, exhibitions, and cultural events can promote a deeper appreciation for mining heritage.
7. Community initiatives: Local community involvement is crucial. Grassroots efforts and community-based models show the potential for successful heritage preservation through local initiatives.
8. Cooperation among stakeholders. A balanced approach involving various stakeholders, government, local communities, and private investors is essential for effective heritage management.
9. Public Participation. Active involvement of local communities in decision-making processes enhances the management of mining heritage. Public consultations and inclusive strategies are beneficial.
10. Technological innovation. Mining has historically driven technological advancements. Continuing this tradition, modern technologies can play a significant role in heritage preservation and broader technological progress.
11. Comprehensive conservation efforts. Systematic and well-planned conservation efforts are needed to address the deterioration of historic mining facilities. This includes technical assessments and restoration initiatives.
12. Sustainable development. Integrating mining heritage into sustainable development plans can enhance its value. This includes balancing heritage conservation with modern economic activities.
13. Innovative inventory methods. Modern technologies, such as laser scanning, drones, and virtual reality, enhance the inventory and preservation processes, making them more efficient and comprehensive.
14. Hybrid models. Hybrid models are optimal for maintaining industrial heritage facilities is often a hybrid approach that integrates elements from various models to leverage their respective strengths. The choice of model should be guided by the specific needs and conditions of each heritage site, ensuring a balanced approach that promotes both conservation and sustainable development.

Key challenges are:

- Management. Effective management of mining heritage faces several challenges, including physical protection, conservation, and financing. Many facilities require significant restoration efforts, demanding comprehensive technical reviews and long-term conservation plans.
- Financing. Adequate financial resources are critical. The conservation of historic mines and mining sites requires extensive resources and expertise. It is often difficult to manage the balancing act between the conservation of cultural heritage and the continuation of mining activities. Diverse funding sources, including national, regional, EU funds, and private investments, are necessary to support conservation and heritage projects.
- Future development. Mining heritage is seen as a crucial element for future development, emphasizing the need for continuous dialogue, action, and balanced management approaches to integrate heritage conservation with contemporary needs. it is necessary to valorise resources (mine assets) in order to optimally choose the way of their management. It is important to inventory mining resources and individually estimate them as potential for further use.
- Environmental impacts. Mines can cause significant environmental impacts that jeopardize cultural heritage. Landscape changes, water and soil pollution and the destruction of habitats can affect both historical sites and the quality of life of the local population.
- Legal and regulatory framework. The legal requirements for the protection of heritage sites can be complex and varied. Mine operators often have to meet strict requirements to ensure the protection of cultural heritage, which entails additional costs and bureaucracy.

These conclusions highlight the multifaceted nature of mining heritage and the necessity of comprehensive, cooperative, and innovative strategies to preserve and promote this invaluable cultural resource.

RECOMMENDATIONS

Based on the reporting of the existing mobilizing resources for coal mining heritage conservation, rehabilitation, management and exploitation for the countries of interest, the presentation of specific cases of heritage sites and their conservation state, a recommended management strategy has been presented. The management strategy aims to the effective protection and promotion of movable and immovable assets of the mine as mining heritage.

The recomendations for the creation of inventory processes and an effective management system for mine property as a cultural heritage asset include mainly the following:

1. The integration of legal frameworks and policies, and their development and enhancement to be more inclusive and detailed for ta more effective protection and management framework of mining heritage assets.
2. The incorporation of technology for the conservation, preservation and rehabilitation of the mine's tangible, intangible, movable and immovable assets.
3. Setting a more structured management plan, including regular monitoring, financial planning, and public engagement in the form of social activities (cultural, educational). This will ensure the more effective protection, promotion, and sustainability of mining heritage for the future generations.

4. Institutions responsible for the management of the mining heritage need to balance the conservation of the sites with effective exploitation. This will make the coal mining heritage assets more culturally and economically valuable.
5. The promoting and development of strategic funding schemes is also suggested, in order to make the conservation process more attractive and viable.
6. The creation of inventory creation forms is also necessary, in order to ensure the appropriate classification, maintenance, and documentation of the mining heritage assets.

Based on the IDI and FGI analysis, a set of recommendations is also provided. These recommendations aim to enhance the preservation, management, and promotion of mining heritage, ensuring its sustainability and continued relevance for future generations. By implementing these strategies, stakeholders can work collaboratively to protect valuable cultural resources and integrate them into broader societal and economic frameworks. They include the following:

1. Inventory guidelines. Develop standardized guidelines for the inventory process to ensure consistency and accuracy in documenting mine assets. This should include both movable and immovable property. Comprehensive database, centralized, geospatial for all mine-related assets, including historical buildings, equipment, documents, and cultural practices. This database should be accessible to researchers, local authorities, and the public.
2. Inventory methods. Develop and adopt standardized methods for inventorying mine assets to ensure consistency and accuracy across different regions and projects. Implement modern technologies such as laser scanning, drone imagery, and geospatial tools to enhance the precision and efficiency of inventory processes. These technologies can provide detailed and comprehensive data for better management. Establish digital archives that house historical documents, photographs, and other relevant materials. These archives should be easily accessible to researchers and the public.
3. Intangible heritage. Document and preserve intangible aspects of mining heritage, such as traditions, oral histories, and cultural practices, to provide a comprehensive understanding of the mining community's heritage.
4. Training programs: Provide specialized training for personnel involved in the inventory and management of mining heritage. This training should cover both technical skills and heritage conservation principles.
5. Adequate funding. Identify and secure funding from diverse sources, including government grants, private investments, and international heritage funds, to support conservation and management efforts.
6. Interdisciplinary collaboration. Encourage collaboration between different groups of professions, historians, archaeologists, engineers, and other relevant professionals to ensure a holistic approach to managing mining heritage. Foster partnerships. Promote international cooperation and knowledge exchange among heritage professionals and institutions to share best practices and innovative solutions. Partner with universities and educational institutions to incorporate mining heritage into academic curricula and research programs. This will help cultivate a new generation of heritage professionals.
7. Public engagement. Strengthen the role of local communities in managing mining heritage by involving them in decision-making processes and providing platforms for their voices to be heard. Increase public awareness and involvement in heritage projects through educational programs, workshops, and interactive platforms. This will foster a greater appreciation and support for mining heritage. Local communities' involvement in decision-making processes regarding the management and conservation of mining heritage ensures that local knowledge and values.

8. Environmental concerns. Integrate environmental sustainability into heritage management practices to mitigate the impact of conservation activities on the surrounding ecosystems. Promote cultural heritage in urban planning.

6. References

Boyce C., Neale P. (2006). Conducting In-Depth Interviews. A Guide for Designing and Conducting In-Depth Interviews for Evaluation Input. Pathfinder International, USA 2006.

Constitution of Greece, 2008 revision, Hellenic Parliament. ISBN: 960-560-073-0

Czerwińska K. (2018). Repacking heritage. The past as a projection of reality - Silesian cases. University of Silesia Publishing House Katowice 2018.

Dudău, R., Ghinea, G., Krynytskyi, K., Kryzhanivskyi, V., Oei, P.-Y., Schön-Chanishvili, M., Sutlovičová, K., Vondrová, Z., Wehnert, T., Krynytskyi, M. S.-C. (2019). Transformation Experiences of Coal Regions: Recommendations for Ukraine and other European countries.

Đukičin, S., Đorđević, J., Milanković, J. (2014). Spa¬tial and social changes caused by the continuous exploitation of lignite in the Kolubara lignite ba¬sin, Serbia. Acta geographica Slovenica, 54, 1, DOI: 10.3986/AGS54102, article in press

Gankhuyag U., Gregoire F. (2018). Managing mining for sustainable development and sourcebook. United Nations Development Program 2018.

Gaweł L., Pokojska W., Pudełko A. (2021). Heritage management: problems, areas, definitions. Cultural Management Library, volume XX, Institute of Culture of the Jagiellonian University, Kraków, 2021.

Gražulevičiūtė I. (2006). Cultural Heritage in the Context of Sustainable Development. Environmental research, engineering and management, 3, 37, pp74-79.

Guidelines on cultural heritage technical tools for heritage conservation and management, Jp - Eu/Coe Support The Promotion Of Cultural Diversity (PCDK). European Union 2012.

Guiollard P.-C. (2018) Les patrimoines miniers in La mine en France, S. Domini Editeur, ISBN 2354751311

Gutowska K., Kobyliński Z. (2011). Cultural heritage management - a new field of academic teaching and scientific research, MAZOWSZE Studia Regionalne No. 6/2011.

Heritage next to me - a guide to heritage management in municipalities. National Heritage Institute, Warsaw 2019.

Hospers, G. (2004). Industrial heritage tourism and regional restructuring in the European Union. European Planning Studies, 10, 3, 398-404.

Konior A. (2021). Cultural heritage management in the context of the process of revitalization of post-industrial areas. Cultural Management Library, volume XXI, Kraków 2021.

Law no. 3028 of 2002. Title: On the Protection of Antiquities and Cultural Heritage in General.

Law no. 4685 of 2020. Title: Modernisation of Environmental Legislation, incorporation into Greek legislation of Directives 2018/844 and 2019/692 of the European Parliament and of the Council and other provisions.

Łaźnia Moszczenica: Instytut Dziedzictwa i Dialogu, https://lazniamoszczenica.pl/

Legal status of cultural organizations
https://fr.wikipedia.org/wiki/%C3%89tablissement_public_de_coop%C3%A9ration_culturelle

Linek B. (ed.) 2016. Mining narratives from the Zabrze area, Coal Mining Museum in Zabrze. Zabrze, 2016.

Mackiewicz, E., Staszewska, A. (2023). Zarządzanie dziedzictwem kulturowym na przykładach obiektów Górnośląsko -Zagłębiowskiej Metropolii. Akademia Górnośląska im. Wojciecha Korfantego w Katowicach, Katowice 2023.

Marszowski, R., Hildebrandt, R. (2024). Protection of post-industrial cultural heritage. A task for smart societies. Scientific Papers of Silesian University of Technology 2024, Organization and Management Series no. 194.

MINLEX - Greece Country Report. MinPol and partners, 2017, Updated by Diamantoula Lampou and Georgios Tsifoutidis, Department of Development and Policy Analysis for Mineral Resources, Ministry of Environment and Energy, in 2019.

Morgan D. L., Hoffman K. (2010). Focus Groups, in International Encyclopedia of Education (Third Edition).

Muzeum Górnictwa Węglowego w Zabrzu. https://muzeumgornictwa.pl/

Narodowy Instytut Dziedzictwa https://nid.pl/

Pantazopoulou, Z., Mouratidis, A., Alexakis, D. D., Tsioukas, V., Perivolioti, T.-M., Terzopoulos, D., Kalaitzis, P. (2024): An open geospatial database as a tool for geoheritage management at national scale: The case study of Greece. AUC Geographica 59(1), 60–76. https://doi.org/10.14712/23361980.2024.4

Poles towards heritage Social research report, 2017.National Heritage Institute, Jagiellonian University, Warsaw – Kraków 2017.

Premogovnik Velenje coal mine web page https://www.rlv.si/

RAG-Stiftung, 2024. Meilensteine. Available online: Meilensteine (rag-stiftung.de) (accessed on 28 June 2024).

Rejestr zabytków nieruchomych – województwo śląskie [online], Narodowy Instytut Dziedzictwa, 31 marca 2024. https://nid.pl/wp-content/uploads/2024/05/SLS-rej_31.03.2024.pdf (- dostęp, 09.07.2024 r.).

Rozporządzenia Ministra Kultury i Dziedzictwa Na¬rodowego z 2011 roku w sprawie prowadzenia rejestru zabytków, krajowej, wojewódzkiej i gminnej ewidencji zabytków oraz krajowego wykazu zabytków skra¬dzionych lub wywiezionych za granicę niezgodnie z prawem, Dz. U. z 2011 r. nr 113, poz. 661.

Rozporządzenie Ministra Kultury i Dziedzictwa Narodowego z dnia 2 sierpnia 2018 r. w sprawie prowadzenia prac konserwatorskich, prac restauratorskich i badań konserwatorskich przy zabytku wpisanym do rejestru zabytków albo na Listę Skarbów Dziedzictwa oraz robót budowlanych, badań architektonicznych i innych działań przy zabytku wpisanym do rejestru zabytków, a także badań archeologicznych i poszukiwań zabytków, Dz.U. 2018 poz. 1609.

Rules for documenting geological and engineering conditions for the purposes of mine closure. Ministry of the Environment, Warsaw 2009.

RVR 2024. Economy & Structural Change. Available online https://www.rvr.ruhr/en/topics/economy-structural-change/ (accessed on 28 June 2024)

Scientific and cultural project ducument https://www.culture.gouv.fr/Thematiques/Musees/Pour-les-professionnels/Construire-un-musee/Creer-un-musee/Le-projet-scientifique-et-culturel-d-un-musee-de-France

Slovenian Registry of cultural heritage https://www.gov.si/teme/register-kulturne-dediscine/

The Coal Mining Museum of Slovenia http://muzej.rlv.si/si/zanimivosti

Theodosiou, I. (2010). Designation of geosites- proposals for geoparks in Greece, Bulletin of the G.S.G. Proceedings of the 12th International Congress. Patras, May, 2010

TZDO (2019): Über uns - TZDO - TechnologieZentrumDortmund GmbH. [online] Available at: https://www.tzdo.de/de/tzdo/ueber-uns.htm.

UBA (Umwelt Bundesamt), Analyse des Historischen Strukturwandels im Ruhrgebiet, p.52-53, available online, accessed 19.09.2023: https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2021-12-28_cc_29-2021_fallstudie_analyse_historischer_strukturwandel_ruhrgebiet_0.pdf

Ustawa z dnia 16 kwietnia 2004 r. o ochronie przyrody, Dz.U. 2004 nr 92 poz. 880

Ustawa z dnia 23 lipca 2003 r. o ochronie zabytków i opiece nad zabytkami, Dz.U. 2003 nr 162 poz. 1568

Ustawa z dnia 9 czerwca 2011 r. - Prawo geologiczne i górnicze, Dz.U. 2011 nr 163 poz. 981

Wibledon, W.A.P., Smith-Meyer, S. (eds.). (2012). Geoheritage in Europe and its conservation. ProGEO. 405 pp.

Wojewódzkie Urzędy Ochrony Zabytków (WKZ) http://wkz.katowice.pl/

Zabytkowa Kopalnia Ignacy w Rybniku https://www.kopalniaignacy.pl/

Zouros, N. C. (2007). Geomorphosite assessment and management in protected areas of Greece Case study of the Lesvos island – coastal geomorphosites, Geogr. Helv., 62, 169–180, https://doi.org/10.5194/gh-62-169-2007

Zouros, N., Valiakos, I. (2010): Geoparks Management And Assessment. Bulletin of the Geological Society of Greece 43(2), 965–977, https://doi.org/10.12681/bgsg.11262

URL Links

1. https://www.legifrance.gouv.fr/codes/texte_lc/LEGITEXT000006074236/2021-05-24 (Code du patrimoine)
2. www.legifrance.gouv.fr/codes/texte_lc/LEGITEXT000023501962 (Code minier)
3. www.legifrance.gouv.fr/codes/texte_lc/LEGITEXT000006074220 (Code de l'environnement)
4. https://www.culture.gouv.fr/Aides-demarches/Protections-labels-et-appellations/Appellation-Musee-de-France
5. https://www.culture.gouv.fr/Thematiques/Musees/Pour-les-professionnels/Construire-un-musee/Creer-un-musee/Le-projet-scientifique-et-culturel-d-un-musee-de-France (Musée de France label)
6. http://www.vagonetto.gr (accessed on 4 September 2024)
7. https://www.arxaiologikoktimatologio.gov.gr (accessed on 29 August 2024)

Appendix

1. CAWI IDI Questionnaire form

Inventory and Management of Mine Resources as Cultural Heritage

IDI: In-depth Interview Questionnaire

Thank you for participating in this in-depth interview. Its aim is to gain your knowledge and experience related to the inventory and management of mine resources as cultural heritage. Please provide detailed answers that will allow us to better understand this topic.

Coal Heritage: Conservation and promotion of the Coal Mining Heritage as EU's cultural legac, is an RFCS Accompanying Measure European Project with main goal the development of an interregional network for the protection and promotion of the coal mining heritage in post-mining regions. The project will focus on coal regions that are currently in a transition phase as well as those that have already ceased the exploitation of coal or are near mine closure. The main objectives are: 1) Identification processes needed to declare the coal sites as heritage areas supporting the just transition of the coal sector and regions, 2) Enhanced management in the coal regions in transition supporting the just transition of the coal sector and regions, improving health and safety and minimising the environmental impacts of coal mines in transition, 3) Design and develop a European Visual Map Journal (EVMJ) supporting the just transition of the coal sector and regions and 4) Dissemination and network development supporting the just transition of the coal sector and regions.

CoalHeritage project has received funding from the Research Fund for Coal and Steel (RFCS)

under Grant Agreement No.101112138

Privacy Statement

Participation in this survey is voluntary.

If you decide to participate in the survey, you consent to the collection and processing of your personal data. The data are collected and processed only for research purposes in the context of the implementation of

the project CoalHeritage and under the provisions of the General Data Protection Regulation (2016/679 /EU).

We use the EUsurvey to conduct the survey. We will not disclose your data to another third party unless disclosure is required by law or is necessary for the fulfillment of the above processing purposes.

The collected data will be kept for a maximum period of 12 months after the closure of the survey unless a longer retention period is required by law or for the establishment, exercise, or defense of legal claims.

As a data subject, you have the right to access, rectification, restriction of processing, erasure, object to processing, portability, as well as withdraw your consent at any time.

Data Controller: Główny Instytut Górnictwa (GIG), Plac Gwarków 1, 40-166 Katowice, Poland

If you have questions regarding the data processing or the survey details, please contact us by sending an e-mail to gig@gig.eu

I declare that I have read this Privacy Statement, understand the processing of my personal data and I consent to it.

Yes

1.What is your view of mine-related cultural heritage? *3000 character(s) maximum*

2. In your experience, are mines in the context of cultural heritage unique in terms of challenges and opportunities?

3000 character(s) maximum

3. What are your experiences with inventorying mine assets? Please select one of the following options No experience in inventorying mine assets

Few, indirect experiences in the inventory of mine assets Average experience in inventorying mine assets

Long-term and intensive experience in inventorying mine assets

4. Are there specific elements of the mine assets that require special attention during the inventory process? Please select one or more of the following categories of mine assets that you consider important for inventorying due to their importance to cultural and historical heritage

Historical mine buildings

Historical mining machines and equipment Archival documents and mining maps Mining traditions and practices

Mining memorials and monuments Other (please specify)

Other.....

5. What inventory methods do you consider the most effective in the case of mine assets? Please select one or more of the following inventory methods that you consider most effective.

Field inventory using modern measurement technologies (e.g. laser scanning, drones) Archival research and analysis of historical documentation

Interactive digital projects and virtual tours of the mine area

Application of geospatial technology to manage data regarding mine assets Other (please specify)

Other.....

6. Are there modern technologies that can be effectively used in the inventory process? Please select one or more of the following modern technologies that you consider effective.

Laser scanning for precise measurement of land topography

Drone technologies to obtain images and data from difficult-to-reach areas Artificial intelligence for automatic processing and analysis of inventory data Virtual reality for creating interactive visualizations of mining areas

IT systems for collecting and sharing inventory data Other (please specify)

Other.....

7. What do you consider to be the key challenges in managing mining heritage in your region? Please select one or more of the options below.

Threats related to the degradation of historic mine buildings

The need for sustainable use of mine assets while minimizing the impact on the environment Challenges related to preserving mining traditions and culture in the local community Problems related to financing and support for mining heritage projects

Lack of public awareness and education regarding mining heritage The need to revitalize post-mining areas of mines

Other (please specify)

8. What are the optimal models for maintaining industrial heritage facilities (state, local government, social, private, Public Private Participation) ?

3000 character(s) maximum

9. Where can/should the funds for maintaining these facilities come from? Please select one or more of the following sources of funds that you consider likely and appropriate to finance the maintenance of industrial heritage sites.

Public funds provided by government institutions Grants and subsidies offered by local governments

Income generated from the provision of tourism and educational services at heritage sites Private investment and corporate sponsorship

Income from admission tickets and other fees from visitors European funds for industrial heritage projects

Other (please specify)

Other.....

10. Do you believe that local communities are actively involved in decision-making processes regarding mining heritage in your region?

Yes, local communities are strongly involved and have a significant influence on decisions

Yes, but their role in decision-making processes is limite I'm not sur

No, local communities are not involved in decision-making processes regarding mining heritag Other (please specify)

Other.....

11. Do you know whether there are public consultations on the management of mining heritage in your region?

Yes, regular public consultations are held

Yes, but public consultations are carried out rarely I'm not sure

No, there are no public consultations on mining heritage management Other (please specify)

Other.....

12. What are the benefits or challenges of public participation in mining heritage management? Please select one or more of the options below.

Increasing the involvement of local communities in preserving mining heritage

Developing educational programs and promoting historical awareness among society Increasing social acceptance for projects related to mining heritage

Greater diversity of perspectives and experiences in the mining heritage management process Potential conflicts between different social groups over different views on mining heritage Limited public understanding of complex mining heritage management issues

Other (please specify)

13. Do you think there are educational programs in your country that may affect mining-related cultural heritage?

3000 character(s) maximum

14. Can you mention good practices in mining heritage educational programs in your region? Please select one or more of the items below.

Inclusion of mining heritage sites in school and university curricula

Organization of interactive educational workshops for students Participation of local communities in educational projects Creation of interactive websites and educational applications

Cooperation with local cultural institutions and museums as part of educational

programs Implementation of internship programs for students in the field of cultural studies and history Other (please specify)

Other.....

15. What actions do you think can be taken to increase public awareness of mining heritage? Please select one or more of the following actions.

Organization of festivals and cultural events related to mining

Educational school and university projects on the history of mining Creation of interactive mining exhibitions and museums

Educational publications, press articles and information materials on the topic mining heritage Promotional campaigns in social media

Educational workshops and seminars for local communities Other (please specify)

Other.....

16. What aspects of development are important in the context of mining heritage? Please select one or more of the options.

Development of educational programs and historical awareness in local communities

Cultural tourism related to mining heritage Revitalization of post-mining areas of the mine Creation of jobs related to mining heritage Technological innovations in the field of mining Other (please specify)

17. What examples of successful sustainable development practices in the field of cultural heritage do you consider to be particularly successful? Please select one or more of the following examples.

Urban regeneration using cultural heritage

Educational programs and training on the sustainable use of cultural resources Initiatives to promote cultural tourism with minimal impact on the environment

Projects for the adaptation and modernization of historical buildings with respect for cultural heritage Long-term plans for managing cultural heritage, taking into account aspects of sustainable development Involving local communities in decision-making processes regarding cultural heritage

Other (please specify)

18. Which institutions or organizations should cooperate in managing mining heritage? Please select one or more of the following

Government institutions responsible for the protection of cultural heritage

Local governments and regional authorities

Non-governmental organizations dealing with environmental protection Private enterprises related to mining

Educational institutions, schools and universities Museums and cultural institutions

Local communities and social organizations Other (please specify)

19. What are the benefits of cross-sector cooperation in the context of mining heritage? Please select one or more of the following.

Increasing the efficiency of mining heritage management

Access to various financial resources and expertise Optimal use of mine assets in a sustainable manner

Inclusion of different perspectives and experiences to better identify the needs of local communities Increasing the involvement of local communities in decision-making processes

Enabling a comprehensive approach to mining heritage, combining cultural, social and economic aspects Other (please specify)

20. What do you see as the main challenges the inventory and management of the mine's resources as cultural heritage?

3000 character(s) maximum

Demographics

Name and surname

Sex

Male, Female, Non Binary

Occupation

Experience, I have experience in the area of .....

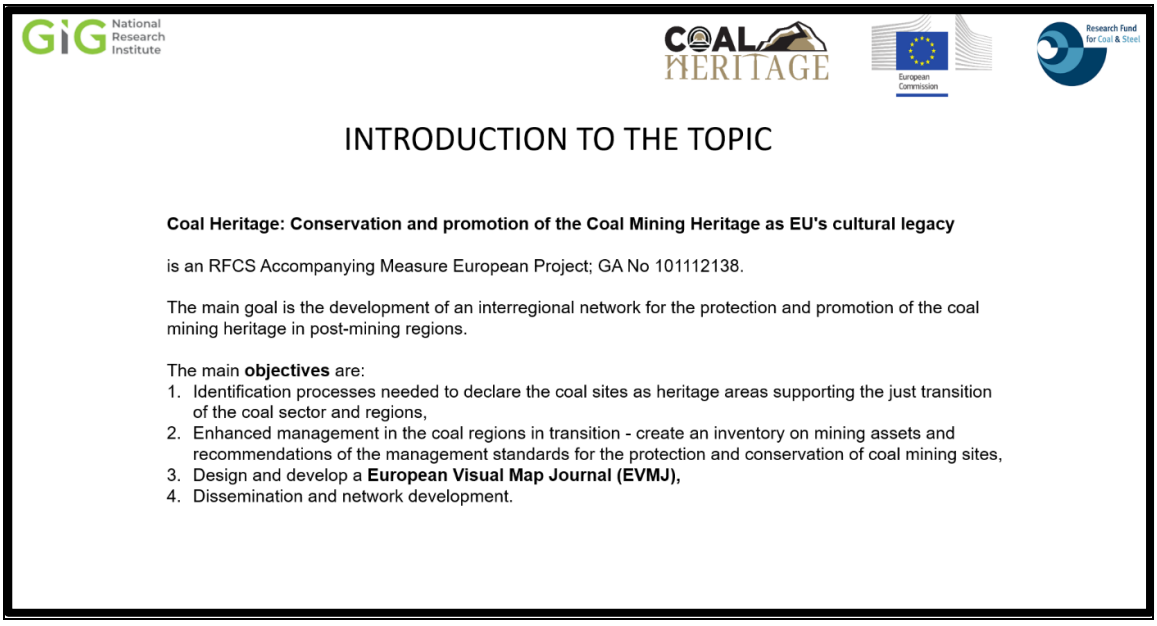
Education: degree.....

Academic/professional
degree in field…….
Specialization…...

Thank you for taking the time to share your knowledge and experience in the field of inventorying and managing mine resources as cultural heritage. Your opinion is precious to further understanding and preserving this important heritage.

Contact sjaroslawska@gig.eu

2. FGI Scenario



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Thank you for participating in this Focus Group Interview.

MANAGEMENT

What challenges do you perceive as crucial for managing mining heritage in your region?

INVENTORY OF MINE RESOURCES

1. What inventory methods do you consider effective for mining resources, given their importance for cultural and historical heritage? (Field inventory using modern measurement technologies (e.g. laser scanning, drones, AI, IT systems), Archival research and analysis of historical documentation, Interactive digital projects and virtual tours of the mine area, Application of geospatial technology to manage data regarding mine assets)

2. What elements (*assets*) related to mines do you consider important to inventory, given their importance for cultural and historical heritage?

PUBLIC PARTICIPATION

1. Are local communities actively involved in decision-making processes regarding mine-related heritage? (*or should it be*). Can you list a good practice in this scope?

2. What kind of actions do you think can be taken to increase public awareness of the mining heritage?

3. Are there any guidelines or strategic plans that take into account the simultaneous pursuit of preserving the heritage associated with the mines and stimulating the sustainable development of local communities?

CONCLUSIONS

1. Do you have any additional comments or suggestions regarding the inventory and management of mine resources as cultural heritage?

2. What descriptive attributes (fields) could be included in the Coal Heritage geospatial database?
   (e.g. location & coordinates, operational history, site risks like postmining problems: sinkholes, post-exploitation overflow lands, subsidence…)