

European International Centre of Excellence on Sustainable Resource Management in Support of the UN Sustainable Development Goals

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The sustainable use of mineral resources essential for energy storage, power generation and the transition to climate neutrality is vital. The United Nations Economic Commission for Europe (UNECE) has set the principles and requirements on sustainable resource management needed to accomplish the 2030 Agenda for Sustainable Development and its goals. To support it, the Horizon Europe's project abbreviated as GSEU is establishing the Geological Service for Europe, of which an integral part will be an EU International Centre of Excellence on Sustainable Resource Management (EU ICE SRM). This capacity building and knowledge centre will operate as a network of partners and experts to assist the decision-makers and key stakeholders in resource management.

L'utilisation durable des ressources minérales essentielles au stockage de l'énergie, à la production d'électricité et à la transition vers la neutralité climatique est vitale. La Commission économique des Nations unies pour l'Europe (CEE-ONU) a défini les principes et les exigences en matière de gestion durable des ressources nécessaires à la réalisation du Programme de développement durable à l'horizon 2030 et de ses objectifs. Pour soutenir cette initiative, le projet Horizon Europe, abrégé GSEU, met en place le Service géologique pour l'Europe, dont fera partie intégrante un Centre d'excellence international de l'UE sur la gestion durable des ressources (EU ICE SRM). Ce centre de renforcement des capacités et de connaissances fonctionnera comme un réseau de partenaires et d'experts afin d'aider les décideurs et les principales parties prenantes dans la gestion des ressources.

El uso sostenible de los recursos minerales esenciales para el almacenamiento de energía, la generación de electricidad y la transición hacia la neutralidad climática es fundamental. La Comisión Económica para Europa de las Naciones Unidas (CEPE) ha establecido los principios y requisitos para la gestión sostenible de los recursos necesarios para cumplir la Agenda 2030 para el Desarrollo Sostenible y sus objetivos. Para respaldarla, el proyecto Horizonte Europa, abreviado como GSEU, está creando el Servicio Geológico para Europa, del que formará parte integrante un Centro Internacional de Excelencia de la UE sobre Gestión Sostenible de los Recursos (EU ICE SRM). Este centro de capacitación y conocimientos funcionará como una red de socios y expertos para ayudar a los responsables de la toma de decisiones y a las principales partes interesadas en la gestión de los recursos.

1. Introduction

Critical raw materials are needed nowadays and will be needed in the future for energy storage, power generation and related developing transport technologies, as well as for the transition to climate neutrality. To increase its sourcing from primary and secondary sources in the EU, Europe's dependence on imports should be decreased and the competitiveness intensified [1]. Europe's vision of a healthy planet, a climate-neutral

economy, and the actions needed for the achievement of the Sustainable Development Goals (SDGs) [2] rely on common understanding and knowledge of raw materials. Such knowledge and the sustainable management of European resources are required to support the European Green Deal [3] and the implementation of the new Regulation of the European Parliament and of the Council of 11 April 2024. The regulation established a framework for ensuring a secure and sustainable supply of critical raw materials (CRM Act) [4] and entered into force in May 2024.

To foster global collaboration and innovation in sustainable resource man-

agement, aligned with the 2030 Agenda for Sustainable Development [2] and the Paris Agreement [5], the United Nations Economic Commission for Europe (UNECE) responded by establishing the International Centres of Excellence on Sustainable Resource Management (ICE-SRM), promoting sustainable practices in all sectors [6].

A direct action to encourage sustainable management of resources, needed for a secure supply of resources to achieve the European initiatives on critical raw materials and the SDGs, is the establishment of an EU International Centre of Excellence on Sustainable Resource Management

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EU International Centre of Excellence on Sustainable Resource Management

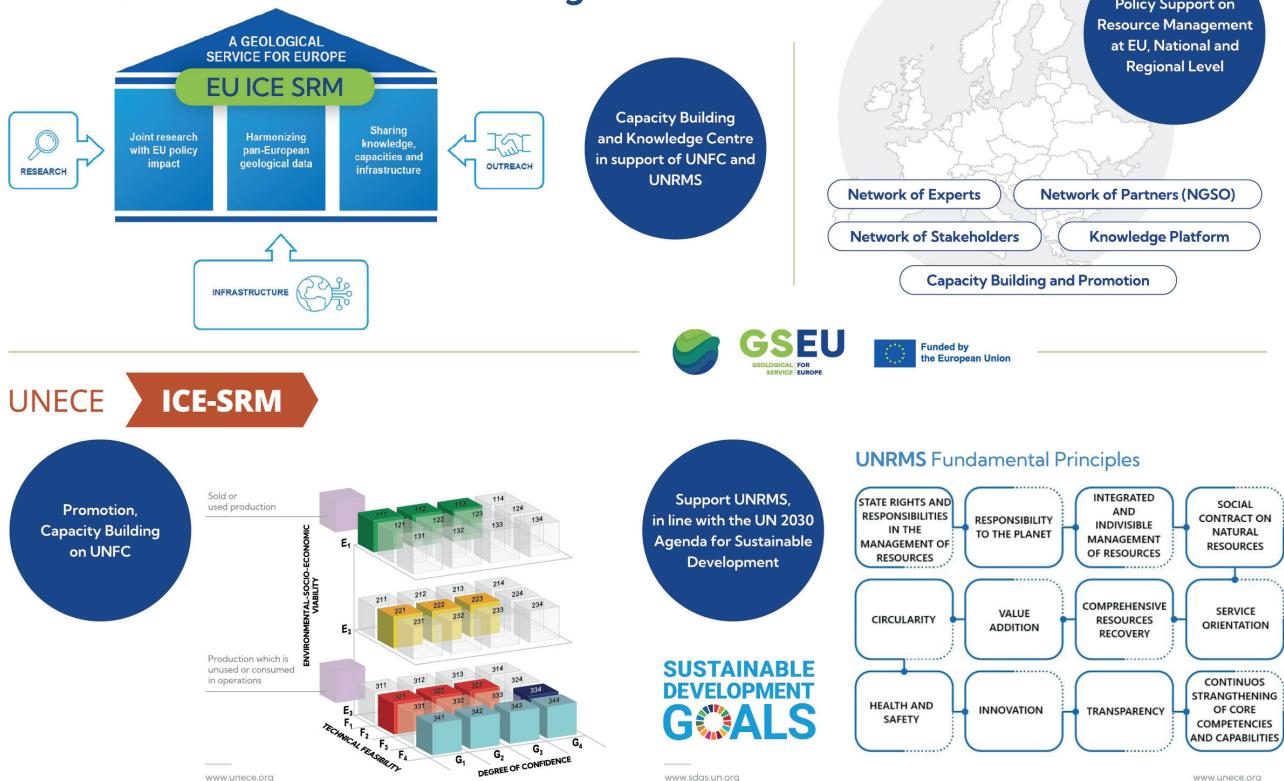


Figure 1: The context of the EU International Centre of Excellence on Sustainable Resource Management (EU ICE SRM) (modified after [1]).

(EU ICE SRM). The EU ICE SRM will be officially established within the Geological Service for Europe in the framework of the European Union's Coordination and Support Action of the Horizon Europe programme, abbreviated as GSEU (2022-2027) [7] (Figure 1). The EU ICE SRM will contribute to the Geological Service for Europe by providing knowledge and services for securing the supply of critical raw materials in the EU [1].

2. Materials and Methods

By following the Terms of Reference and Criteria for Designation [9], set by the UNECE's Expert Group on Resource Management (EGRM), the EU ICE SRM intends to become a part of the UNECE ICE-SRM network. To align with the 2030 Agenda for Sustainable Development and its goals, the EU ICE SRM supports the United Nations Resource Management System (UNRMS) [10], a set of UNECE's principles and requirements on sustainable resource management. To manage the resources sustainably, a uniform classification of resources is needed, including socio-economic, technical, and geological

aspects. For this manner UNECE (Figure 2) developed the United Nations Framework Classification for Resources (UNFC) [11, 12].

To ensure sufficient, reliable, affordable, and environmentally responsible supplies of energy and raw materials for sustainable development, UNFC presents a universal system for classifying and reporting minerals, energy and other resources, and serves as a tool to effectively manage national resource endowments needed to achieve the Sustainable Development Goals (SDGs) [11,13]. The role of the ICE-SRMs is to promote the UNFC worldwide. This classification is closely aligned with many of the 17 SDGs [13]:

SDG 1 No poverty: as it aims to optimise the management of national endowments of energy resources, with positive implications for local economies, employment, royalties, and tax revenues.

SDG 2 Zero hunger: by its use, the management of soil nutrients - as potassium and phosphorous sources - can be done effectively.

SDG 6 Clean water and sanitation: as an interconnected tool with other systems, it is used to manage impacts on

water systems and monitor progress during resource extraction. It contributes to integrated management and monitoring in the case of transboundary sharing of water infrastructure.

SDG 7 Affordable and clean energy: as it is used for effective management of national resource endowments and socio-economically efficient development of the energy resources.

SDG 9 Industry, innovation and infrastructure: it directly contributes to efficient management of resources during extraction by promoting cleaner and environmentally sound technologies and industrial processes.

SDG 10 Reduced inequalities: the fundamental criteria of UNFC for resource development include socio-economic factors, such as gender equality and fruitful employment of disadvantaged, which promote the continued project viability.

SDG 11 Sustainable cities and communities: as an effective tool for local governments to optimise the management of local and sub-regional endowments of energy resources.

SDG 12 Responsible consumption and production: as an international best prac-

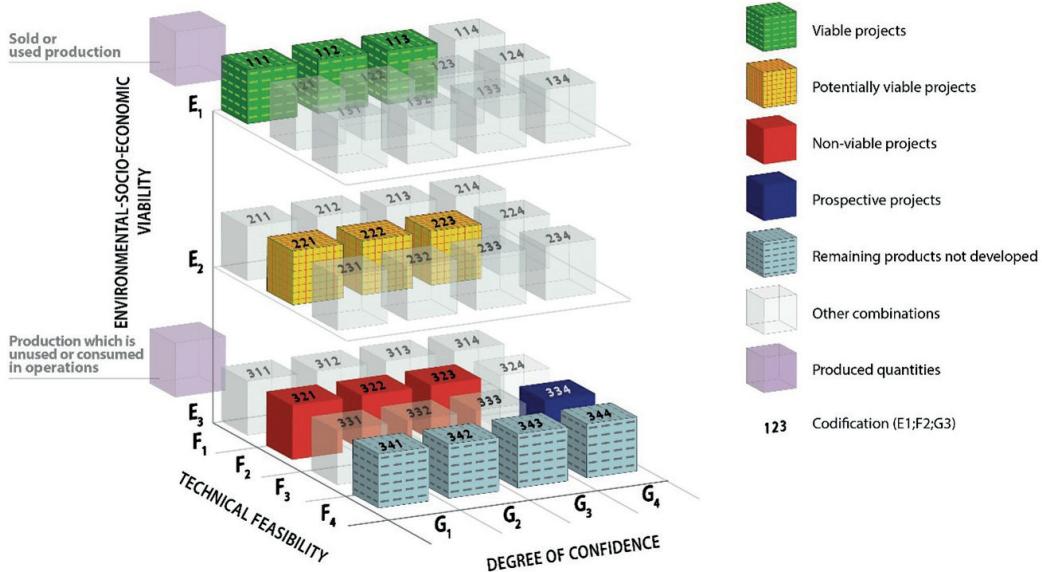


Figure 2: UNFC categories and examples of classes [12].

tice for the sustainable management of mineral resources, petroleum, uranium and renewable energy resources, it provides the tools to consider environmental impact and mitigation and can be part of various sustainability reporting regimes.

SDG 13 Climate action: may be used to manage renewable energy projects such as geothermal energy, bioenergy, solar energy, wind energy and hydro power, as it is applicable to the management of carbon capture and storage projects.

SDG 17 Partnerships for the goals: its

application for the management of various natural resources is very effective in the context of regional and international cooperation and can serve as a global framework of reference for providing data on natural resources.

To accomplish the aforementioned, the EU ICE SRM defined specific goals of capacity building on UNFC, promotion of UNFC and creation of the EU ICE SRM IT Knowledge Platform and developed the appropriate objectives [14] (Table 1).

3. Results

As part of its initial establishment phase, the EU ICE SRM started to work as a capacity-building and promotion centre to support knowledge and deployment of UNFC in European countries, and to support the implementation of the CRM Act. The EU ICE SRM is building its expertise using networks of partners, experts, and stakeholders to support decision-makers in the field of resource management at national, regional and European

Table 1: Goals and objectives of the EU ICE SRM [14].

Goal	Objective
Capacity building on UNFC	<p><i>Educate and train practitioners and stakeholders in the collection, use, and visualisation of data using UNFC.</i></p> <p><i>Establish a common understanding of practical UNFC reporting of national resource inventories, existing information, and a system of continuous updating when new information becomes available.</i></p> <p><i>Expand and maintain a European network for UNFC experts on mineral resources covering all commodities (e.g., metals, industrial minerals, construction raw materials) in terrestrial and marine environments from primary and secondary sources.</i></p> <p><i>Identify and manage a network of experts for capacity building and expertise and support the expertise in the EC in the field of resource management and UNRMS.</i></p> <p><i>Identify and manage a network of partners to supply relevant data.</i></p>
Promotion of UNFC	<p><i>Identification of data gaps within Europe in critical raw materials data classified under the UNFC and address those falling under the responsibility of network partners.</i></p> <p><i>Support for UNFC and UNRMS related data and information on technical (information technology) and expert level.</i></p> <p><i>Expand the use of UNFC concepts from mineral raw materials to other domains such as energy (geothermal), groundwater, anthropogenic waste, and e-waste.</i></p> <p><i>Identification and inclusion of key actors to build a strong, reliable network.</i></p> <p><i>Promotion of UNFC at relevant events at the EU, regional, and national level.</i></p> <p><i>Translation of UNFC-2019 to the EU's official and partner's national languages.</i></p> <p><i>Extension of activities to EU neighbouring countries and raw materials partnership countries.</i></p> <p><i>Networking with other ICE-SRMs.</i></p>
IT Knowledge Platform	<i>Creation and maintenance of a knowledge-based platform to support the EU ICE SRM activities.</i>

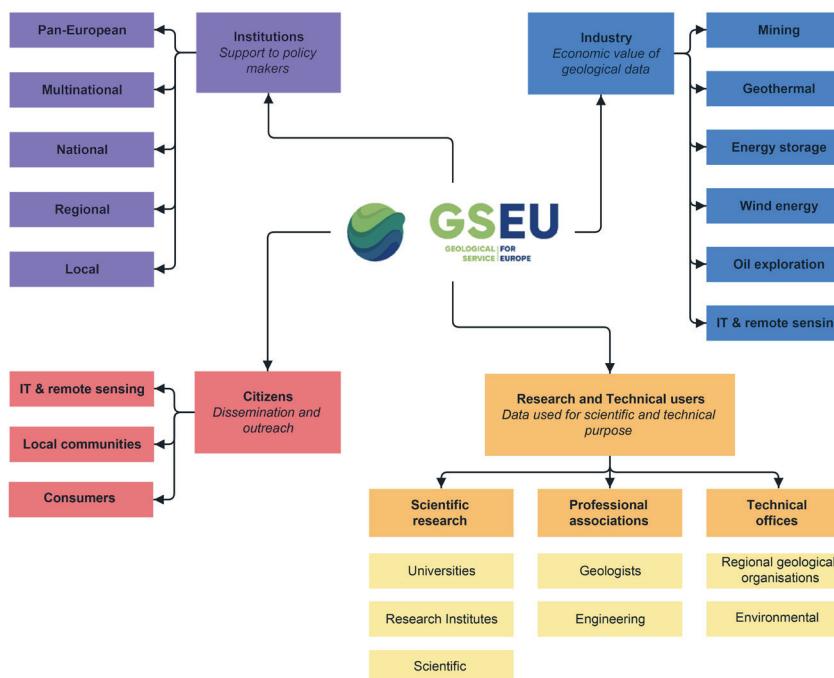


Figure 3: Chart of relevant experts, partners, and stakeholders with whom the EU ICE SRM may engage [14].

levels (Figure 3). The work of the Centre will be facilitated by the EU ICE SRM IT platform, which is currently under development. The activities are aligned with a working plan, drafted in the EU ICE SRM project report [14].

3.1. EU ICE SRM Capacity Building Programme

In 2024, an EU ICE SRM Train-the-Trainer capacity-building programme was designed with the aim of forming a network of UNFC trainers at national geological survey organisations, which will be able to share knowledge further, through training at the national level. The objectives and outcomes of the Train-the-Trainer programme on UNFC are presented in Table 2.

Training was designed by 12 trainers, consisting of GSEU project partners and UNFC experts, actively involved also in the UNECE Expert Group for Resource Management, the Network of Practitioners Europe, and the UNFC Adoption Group.

The training programme was structured as a three-level course, increasing and deepening the knowledge from level 1 to level 3. Each level was composed of two-day workshops. The theoretical content of the training was based on the following main UNFC documents: the UNFC update 2019 [15], the Supplementary

Specifications for the Application of the UNFC for Minerals [16], the UNFC Guidance for Europe [12] and the CRIRSCO-UNFC bridging document [17]. In the level 1 training, the background and basic knowledge of UNFC was presented, and this training course was tailored to be understandable to all interested in UNFC. The level 2 training course built on level 1, provided practical exercises on case study examples from different countries, enabling participants to learn how to use the UNFC classification. The training programme was concluded with the level 3 training course, providing deeper insights into the use and teaching of UNFC [18].

The training was conducted in the first half of 2024, from April to June. 44 participants from 20 European countries, representing various geological surveys and mining authorities across Europe, were trained in the capacity-building programme. Their prior knowledge varied and was not required for participation in the first level. However, most were well informed about the UNFC concept before the training. The programme gradually brought them to a level of knowledge where they could train other stakeholders in their respective countries.

The trained participants of the Train-the-Trainer programme joined the EU ICE SRM Network of experts. These experts are now further spreading knowledge of UNFC implementation at the

national level. The training materials, prepared by the experts, are uploaded to the GSEU website [1] and are freely available to all interested stakeholders, including EU, national and regional governments, decision-makers, national geological survey organisations, and industry.

3.2. Promotion of UNFC

Promotion of UNFC through the EU ICE SRM focuses on awareness-raising and fostering acceptance of its application by building on identified bottlenecks and by using the recommendations for promotion provided by the UNFC experts. The key activities are translating key documents into official EU working languages, presenting at relevant events, and scientific meetings and networking with other ICE SRMs [14].

For further awareness and acceptance of UNFC, knowledge and understanding are essential [14]. The EU ICE SRM experts are aware that the most important information may come through the translation of relevant UNFC documents, such as the UNFC - update 2019 [15] and Guidance for Europe [12], into the official EU working languages. Translated documents will be made publicly available on the UNECE website or on the website of the respective EU ICE SRM expert's institutions.

Within the GSEU project, the EU ICE SRM is promoting UNFC at relevant national and international events in Europe, such as GeoBerlin, Minex Forum, GeoSaxonia and the International Round Table on Materials Criticality (IRTC). Every year the work of the EU ICE SRM is presented at traditional high-level events: the Resource Management Week in Geneva, organised each spring by the UNECE, and the Raw Materials Week in Brussels, organised annually by the European Commission. The EU ICE SRM has also been presented at traditional conferences across the world such as the convention of the Prospectors & Developers Association of Canada (PDAC) in Toronto and the International Geological Congress (IGC) in Busan, South Korea.

Since the EU ICE SRM intends to become a part of the UNECE ICE-SRM network by following the terms of reference and criteria for designation [9], connections, intensified communication and exchange of experiences with other ICE-SRMs – existing ones and those under establishment – are of great importance. Networking with these centres, such as ICE SRM for Latin America and UK ICE

Table 2: The objectives and outcomes of the EU ICE SRM Train-the-Trainer programme on UNFC (modified after [14]).

Training Level	Objective	Outcomes
1	<i>To introduce the UNFC framework and provide a foundational understanding of its concepts.</i>	<i>Participants gain basic knowledge of UNFC for mineral resources, including theoretical background on resource estimates and related uncertainties.</i>
	<i>To build a common understanding of how to classify projects according to UNFC in the European context.</i>	<i>Participants develop a shared approach to classifying projects in line with UNFC across Europe.</i>
	<i>To demonstrate classification challenges using case studies.</i>	<i>Participants analyse problematic cases and challenges through real-world examples.</i>
2	<i>To review essential UNFC concepts through recap lectures and Q&A.</i>	<i>Participants strengthen their understanding of UNFC and enhance their training skills.</i>
	<i>To apply UNFC in practice through regionally tailored exercises.</i>	<i>Participants complete practical exercises and begin preparing a country-level training plan.</i>
3	<i>To review pre-course assignments and refine country-specific training plans and materials.</i>	<i>Participants update and deepen their understanding of UNFC applications.</i>
	<i>To explore training methods and present national training plans.</i>	<i>Participants align their national training approach with EU-level consistency goals.</i>

SRM for Circular Economy, is developing during the international events related to resource management and raw materials, and by communication through in-person and online bilateral meetings.

3.3. IT Knowledge Platform

An EU ICE SRM IT Knowledge Platform is already being developed as a one-stop shop for stakeholders with all available information about the activities of the Centre, and an exchange platform on UNFC training with a Q&A section and a dedicated helpdesk for fast-track support [14].

The platform will present the link to the UNFC inventory of mineral resources at the EU level, give access to training materials and provide UNECE updates on UNFC and UNRMS, with the latest research outcomes. It will present a communication platform to serve interested stakeholders with online Q&A sessions, tailor-made training opportunities, best practice exchange and capacity building and promotion events. Through the calendar of activities, EU ICE SRM will announce upcoming events and advertise past and future training. The IT Platform will be kept operational and updated on a regular basis [14].

4. Discussion and Conclusion

Within the EU ICE SRM Train-the-Trainer capacity building programme experts from different European national geological surveys were trained, so that they can further support UNFC in their countries and spread their knowledge at the national level. All the 44 trained experts from 20 European countries were invited to join the Network of Practitio-

ners Europe within the EGRM, which is co-led by the EU ICE SRM and UNECE. The newly formed EU ICE SRM Network of experts and the new rounds of UNFC courses at the national level, held by the EU ICE SRM experts, are intensively building capacity on the UNFC implementation and widely promote its use in sustainable resource management within UNRMS. By adopting UNRMS, stakeholders are ensuring the use of resources contributes to economic growth, environmental protection, and social well-being, fostering a balanced and sustainable future [10].

The high interest in participation on UNFC training had been expressed by different partners and stakeholders. The feedback from the training participants, acquired during and after the training, confirmed the Train-the-Trainer capacity building programme is well structured, providing them with a background and a wide range of case studies for practical exercises. Thus, the Roadmap for the organisation of UNFC training according to the scheme of the EU ICE SRM Train-the-Trainer capacity building programme is under preparation by the EU ICE SRM trainers. It is expected to be published in the coming months, to be used as a manual which supports further sharing of knowledge on UNFC. The challenges in the organisation of such training are financial support, needed for the work of experts, materials and the logistics, as well as possible legal constraints at the national level.

UNFC is a tool for effective management of national resource endowments necessary to realise the SDGs [13]. It aims to provide necessary specifications and guidelines for optimising the management and development of resources, with

positive impacts on society, environment, local economies and employment. These target the delivery of the SDGs such as SDG 7 on providing affordable and clean energy for all, SDG 12 on responsible consumption and production, and SDG 13 on climate action [13].

With capacity building on UNFC and promotion of sustainable management of resources, critically needed for future development, the EU ICE SRM actively contributes to achieving the Sustainable Development Goals.

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