MADITRACE

Final Advisory Board recommendations report

Deliverable D6.4

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Summary

The MaDiTraCe project Advisory Board (AB) convened to review progress, assess alignment with objectives, and provide strategic guidance. The AB members—comprising industry experts and stakeholders—evaluated deliverables, risks, and impact, then issued recommendations. The consortium responded with clarifications and commitments to address the feedback.

Keywords

Traceability, critical raw materials, advisory board

Abbreviations and acronyms

Acronym	Description
AB	Advisory Board
MFP	Material fingerprint
VSS	Voluntary sustainable standard
WP	Work Package

1 AB members

The Advisory Board of MaDiTraCe project was composed by several personalities representing organisations with strong background in mining sector, mineral resources, industrials sectors such as battery and magnet manufacture, sustainability.

However, compared to the initial AB expected in the project, due to several reasons (availability, persons moving to other positions), only 3 members of the AB gave clearly relevant recommendations.

Tom van Bellinghen (Lithink)

Tom van Bellinghen is a Belgian expert in the battery and e-mobility industry, currently working as Founder and Owner of Lithink, a strategic commercial advisory firm for the high-tech sector specializing in battery value chains. Based in the Antwerp Metropolitan Area, he established Lithink in mid-2024 after a distinguished 15-year career at Umicore.

Tom van Bellinghen holds a Master'q of Science in Electromechanical Engineering from the Catholic University of Leuven (KU Leuven), complemented by a degree in Business Administration from the Leuven Graduate School for Business Studies.

Prior to joining Umicore, van Bellinghen held business development and management positions. In 2009, he joined Umicore as Marketing & Sales Director for the Rechargeable Battery Materials business. Over his 15-year tenure, he progressively expanded his responsibilities, taking charge of raw material purchasing in 2012 and earning promotion to Vice President of Marketing and Sales in 2018. His work required extensive international travel across Asia, South America, and Africa.

Van Bellinghen departed Umicore in 2024 to launch his own consultancy. At Lithink, van Bellinghen provides strategic advisory services on supply chain management, ESG compliance, cathode materials (pCAM/CAM), battery quality, and commercial negotiations. He also serves on the Stakeholder Advisory Board of BatteReverse, where he advises on battery circularity, recycling, and keeping critical raw materials within the European supply chain to reduce CO2 footprint and enhance supply security.

Recognized as a leading authority on battery materials and electromobility, Tom van Bellinghen is a frequent speaker at major industry conferences.

Trond Watne (Rare Earths Norway - REN)

29 years of experience in the Hustadlitt Group as a geologist and mining engineer. Holds a PhD in Mining Engineering from Norwegian University of Science and Technology.

Rare Earths Norway (REN[1]) is developing Europe's largest rare earth deposit at the Fen Carbonatite Complex in Telemark, Norway. Founded in 2016 and led by CEO Alf Reistad, the company announced in March 2026 a resource estimate of 15.9 million tonnes of rare earth oxides, containing 19% neodymium-praseodymium essential for permanent magnets.

[1] https://rareearthsnorway.com/

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The project uses an innovative "Invisible Mine" concept with underground extraction via a tunnel 4 km from Ulefoss town, minimizing surface disturbance through automated drilling and conveyor systems.

The deposit also contains valuable by-products including niobium and thorium, with existing sale agreements in place. Norway's government supports the project as part of its sustainable minerals strategy, positioning the country as a key contributor to European critical mineral sovereignty during the clean energy transition.

Jérôme Gouin (Pole Avenia)

Jérôme Gouin is an R&D Project Manager at Pôle Avenia, based in Pau. He is an exploration geologist with 14 years of experience, specializing in organic matter-related ore deposits and expertise on deposits in Western and Central Africa, as well as Europe. His work focuses on RDI (Research, Development, Innovation) projects in mines and quarries, hydrogeology, and geotechnics. He holds a PhD in geology.

Pôle Avenia[2] is the only French competitiveness cluster dedicated to subsurface industries. Its headquarters are located in Pau, with additional offices in Paris and Nancy. The organization's mission is to support innovation and the ecological and energy transition through geosciences and subsurface uses.

The cluster brings together approximately 280 members including large corporations, mid-cap companies, SMEs, startups, research labs, universities, and local authorities. Notable members include EDF, TotalEnergies, Orano, BRGM, Storengy, and the University of Pau.

Pôle Avenia operates across multiple areas including mines and quarries, deep geothermal energy, geological storage for CO_2 and hydrogen, oil and gas, hydrogeology and geotechnics, natural risk management, and water resources. The organization funds about 10 projects per year, operates with a budget of 1.5 million euros, and has a team of 8 people.

In 2016, Avenia inaugurated GEOSTART, the first startup incubator dedicated to geosciences and subsurface energy in France. The cluster is supported by the French government, the New Aquitaine Region, the Pau Metropolitan Area, and the Pau Béarn Pyrénées Chamber of Commerce and Industry.

Other external opinions

During the final event of the MaDiTraCe project celebrated in Espoo (Finland) in June 2026, other external opinions were collected. In particular, we include in the present document the recommendations from Susanne Guth-Orlowski (expert on DPP, 4theRecord company), who gave a kick-off conference during this final event.

[2] https://www.pole-avenia.com/

2 Comments and recommendations from AB members

This section synthesizes AB feedback on the current state of the MaDiTraCe project based on draft version of several deliverables of the project, including D4.5 MaDiTraCe roadmap and final event presentations.

2.1 Traceability challenges and core difficulties

Ensuring traceability remains particularly challenging when one or more actors in the supply chain lack transparency. Key problem areas would include:

- Upstream activities: Mining, concentrate production, and pyrometallurgy operations.
- Recycling processes: Mixed input streams from various sources. How can traceability tools developed in the project address it?
- Material heterogeneity: Variations within mineral deposits themselves
- Mixed raw materials: Commingling of materials from different sources
- Countries with very different data transparency policies
- Coexistence in a limited space or the same region of mining companies operating legally and illegally, following VSS and not
- Integration of artisanal and small-scale mining
- Interoperability between different systems of traceability, between countries with different data sharing policies
- Comparability between different VSS systems.

Special attention is required when an end-user or OEM relies on a single supplier for a given commodity. If that supplier receives a "red flag" designation, alternative sourcing options must be identified and evaluated.

2.2 ESG Criteria and certification standards

The project and in particular CERA4in1 should encompass with other existing responsible mining standards. Upstream sector (mining) certification seems to be quite well covered whereas midstream and downstream are less covered by certification frameworks. The AB founds particularly interesting the action of CERA4in1 Similar certification frameworks for refining operations, processing facilities and manufacturing activities across the entire value chain.

It would be interesting to have more clear examples of the concrete implementation of those certification schemes.

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2.3 European Production and domestic production labelling

"Mined in Europe" Label

Strong support exists for developing a "Mined in Europe" certification covering:

- Primary ores extracted in Europe
- Materials recovered from mining residues (with site remediation requirements)

This approach offers the most efficient traceability procedure when feasible, as production occurs within a regulated jurisdiction.

Caution on "Made in Europe"

Some AB expressed scepticism toward "Made in Europe" or equivalent labels, as these often indicate only final assembly of components rather than genuine supply chain security or metal traceability. Experience shows such labels have not successfully secured raw material supply chains nor guaranteed metal traceability.

2.4 Strategic and Geopolitical Context

The relevance of traceability initiatives has intensified due to evolving geopolitical dynamics. While responsible sourcing and ESG compliance remain fundamental objectives, the broader context has shifted to encompass:

- Strategic autonomy: Reducing dependency on external suppliers
- Industrial competitiveness: Securing access to critical materials
- Defense preparedness: Ensuring supply chains for strategic industries
- Geopolitical risk management: Mitigating vulnerabilities exposed by recent crises.

The energy crisis following the invasion of Ukraine demonstrated that strategic dependencies can become major vulnerabilities. Control over the entire value chain—mining, refining, separation, processing capacity, recycling, and downstream industrial use—is increasingly critical for national and European security.

2.5 Implementation Questions

Key questions requiring clarification for industry adoption:

Question	Focus Area
Technology suitability	Which tracing methodologies are best suited for specific industrial circumstances?
Step-by-step recommendations	What is the conclusive recommendation for each supply chain segment (e.g., cobalt: technology X from mine to refiner, procedure Y in refinery, etc.)?
Adoption pathway	How will industry adoption occur in practice?
Cost-benefit analysis	What are the economic implications of different approaches?
Knowledge gaps	What remaining barriers could prevent deployment?
Technology mapping	Can a matrix be produced showing technology performance at each supply chain step (mine to OEM)?

Table 1: main implementation questions raised by AB members.

3 Integration of recommendations and MaDiTraCe project answers

The next table lists the main comments, questions and recommendations made by AB members and gives a collective answer from MaDiTraCe project perspective. In some cases the answer and recommendations were included in other ones that would require new implementations in a sequel project.

Comments from AB	MaDiTraCe answers
Material mixes challenges	Material mixes constitute a challenge for several developed solutions. In certain cases, MFP should be able to detect anomalies and risks of mixes of materials from different origins. Material mixes should be easier to detect in upstream than midstream. Mass flows accountability in the framework of CERA4in1 or audit should be another mechanism of control. Mass balance CoC model would be realistic for several products.
Heterogeneities in MFP within the same deposit	This challenge has been identified since the beginning of the project. Heterogeneities in MFP (trace elements, isotopes, etc.) constitute a big limitation that the project tried to solve. With current datasets, based in some deposits with a very limited numbers of samples, heterogeneities inside the deposit are completely missed.

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Comments from AB	MaDiTraCe answers
	We think it is a matter of data; with more data more robust models of anomaly detection would be put in place. Deliverable D2.5 address this particular aspect. Further projects would require the acquisition of more data if possible of the same deposit. MaDiTraCe established sample sharing protocols with some companies, but it was in a voluntary way. The nonparticipation directly as partners in the project of mining companies was here a clear limitation. In addition, lithium and rare earths projects in Europe are an exploration or pre-feasibility phases, that means that we were not in real production scale. With the creation of a MFP for certain commodities and with the participation of companies operating in Europe, this challenge should be solved.
Recycling challenges	The MaDiTraCe project was not initially a project about the recycling of materials, but recycling was addressed in several technical tasks. In terms of MFP it represents a clear challenge. However, main promising results of the project in MFP refers to upstream and first transportation vector (mine to trader, mine to refiner) as associated to a combination of trace elements and isotopes. Trace elements are less relevant in midstream and downstream. For recycling, plant audit (control of waste inflows mass, waste traceability systems mandatory by regulation in certain countries, mass balance approaches) must constitute the toolkit for recycling content verification and traceability.
Technology mapping	WP2 did an assessment of different technologies, for different commodities and for different battery supply chain stages. More synthetic output in this direction should be produced
Cost of traceability	The MaDiTraCe project technical developments (MFP, artificial tagging, passport, certifications) induces a cost. For some cases, like artificial tagging, the over cost has been evaluated very preliminarily. This over cost would be optimized if those solutions were largely deployed. According to a recent International Energy Agency (IEA) report, mining companies declare to apply premium prices for responsible sourced and traced materials. This premium should cover this over cost. The idea of standard based market and price floor would be also in the same direction.
Mined in Europe label vs Made in Europe	We agree that the hypothesis of a Mined in Europe (such as Mined in Canada initiative) would require to put in place a verified credential system and a validation system. From MaDiTraCe perspective this possibility is heavily interesting. However, a Mined in Europe label would require a global industrialisation and to have a battery and magnet value chain mostly European.

Comments from AB	MaDiTraCe answers
	Indeed, a very oriented downstream industry criteria, with less importance to the origin of materials, would lead to a lower importance of material traceability and MaDiTraCe work in general. The MaDiTraCe roadmap explores more in detail those scenarios and the possibilities
Strategical and geopolitical dimension	We observe that ESG and environmental concerns are diluted due to the international context and the expectations in terms of simplification (cf. Ommibus debate about CSDDD regulation). Other documents (IEA, OECD) identify that traceability have a double perception and objective, traceability as a tool for supply chain diversification and traceability with responsible business conduct aligned with responsible due diligence and ESG in general. The conceptual framework of MaDiTraCe (WP1 work, Fernandez et al 2026) have ESG, climate change and responsible practices as main drivers for all the development in the project. This represented the fundaments of the project
Integration of MaDiTraCe project results in WP3 (digital passport) into UN CEFACT UNTP	For a larger visibility of the project results and share it with a larger community, WP3 work must be put into this GitHub. To be done.
Lack of transparency and lack of data exchange	One of the biggest challenges of MaDiTraCe project is to tackle non-EU policies in countries where transparency of supply chains and due diligence From a technical point of view (IT), interoperability is the tool to solve data exchange issues. Cases studies in MaDiTraCe are mostly based on commodities, mines and parts of supply chains where this transparency could work. MaDiTraCe project cannot solve the degree of supply chain dominance of China.
Industry adoption in practice of MaDiTraCe results	Battery passport will become a reality in 2027. CERA4in1 was testes in several real cases studies. Several MFP tests and analysis. As it is already the case by several private laboratories. MFP would require a standardisation, as laboratory techniques recognition must be required for accreditations.
Experience about certification coverage along supply chain	CERA4in1 has been piloted across different stages of the mineral value chain, including CRS (Exploration), CPS-II (downstream manufacturing), and CCS (Chain of Custody) standards. Pilots, including the CRS at an exploration project, the CPS-II assessment at a cable manufacturing facility in Georgia and CCS both at a cable manufacturer and at an ASM, demonstrated that the framework can be applied along the mineral value chain maintaining traceability and ESG assurance.

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Comments from AB	MaDiTraCe answers
Alignment between CERA4in1 and other sustainable mining standards	CERA4in1 was designed with reference to existing due diligence and responsible sourcing frameworks (the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals) and also regulations such as CSRD and CSDDD. Also, it considered other schemes such as IRMA, the Copper Mark, RMI, ASI, Responsible Steel etc., best practices of each of the different stages of the mineral value chain.

Table 2: answers to AB recommendations and comments.

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