Event Summary

NAVIGATING THE ENERGY TRANSITION:

AFFORDABLE, RENEWABLE, AND SECURE – BACKING THE CRITICAL RAW MATERIALS ACT TO REINFORCE EU STRATEGIC AUTONOMY

Session at the European Parliament
Brussels, 20 November 2025

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1. Introduction

Europe's transition to a climate-neutral economy depends not only on securing clean energy but also on ensuring reliable access to the critical raw materials (CRMs) needed to build renewable technologies.

The EU-funded [CRM-geothermal project] tackles this challenge through an innovative approach: co-producing geothermal energy and CRMs. The project maps and analyses geothermal fluids across Europe, studies the geological settings that concentrate CRMs in those fluids, and develops methods to extract elements such as lithium, strontium and helium from geothermal brines while producing energy for local use.

Geothermal energy offers a unique advantage: it is a continuous, low-carbon source of heat and power, available around the clock. It can be extracted almost everywhere around the world from deep geological formations and thus represents a regional energy source for many areas in Europe. In certain geological settings, geothermal fluids naturally contain considerable concentrations of CRMs which are critical for clean-energy technologies (for example, lithium for batteries). By collecting CRM data on geothermal fluids and advancing extraction technologies, CRM-geothermal explores a practical pathway to make domestic supplies of essential minerals both technically feasible and economically viable.

The co-production of heat and minerals in a single process offers multiple benefits:

- **Lower environmental footprint:** extracting both heat and minerals from the same borehole reduces surface disturbance compared to separate mining and energy projects.
- **Avoidance of traditional mining legacies:** direct extraction from brines diminishes the need for large open-pit or underground mining operations and the long-term impacts they leave behind.
- **Near-zero operational carbon footprint:** co-production supplies renewable geothermal energy, limiting greenhouse gas emissions associated with extraction.
- **More resilient and ethical supply chains:** domestic CRM recovery strengthens Europe's sourcing options while supporting higher governance and sustainability standards.
- **Reduced import dependence and geopolitical exposure:** diversifying supply within Europe mitigates market and geopolitical risks linked to concentrated global suppliers.
- **Diversification of Europe's renewable mix:** geothermal co-production adds a reliable, dispatchable renewable resource to Europe's energy portfolio.

As Katrin Kieling, CRM-geothermal Project Manager, notes:

"The co-production of critical raw materials and heat from geothermal brines can reduce the EU's dependency on imported critical raw materials by diversifying and securing a domestic and sustainable supply.

While lithium is already recognised in some geothermal fluids, CRM-geothermal widens the research to other elements and develops extraction methods that directly support the aims of the Critical Raw Materials Act and the REPowerEU plan."

This report summarises the key insights from the CRM-geothermal policy event held at the European Parliament on 20 November 2025. It also synthesises recommendations for policymakers to accelerate responsible deployment of co-production technologies, supporting the EU's green and strategic autonomy objectives.

2. Event summary

2.1. Context

Adopted in 2024, the Critical Raw Materials Act (CRMA) is central to Europe's clean energy transition and its goal of reaching climate neutrality by 2050. By fostering the domestic exploration, processing and recycling of strategic raw materials, the CRMA underpins the deployment of renewable energy technologies, energy storage systems, and affordable electrification of households and businesses.

Yes, the implementation of the CRMA faces a mix of institutional, techno-economic and social-environmental constraints. While technical measures to de-risk supply chains and speed up permitting are necessary, they are not sufficient on their own. Two interlinked social realities must be addressed:

- **Public trust and social acceptance:** local communities often perceive extractive projects as threats to landscapes, water resources or livelihoods. This perceived disconnect between EU priorities and local concerns can fuel opposition and delay projects.
- **Energy affordability and distributive fairness:** many European consumers still face energy poverty and high bills. A credible transition must reduce systemic costs through domestic supply and renewable energy generation, while distributing benefits so vulnerable households are not left behind.

The CRM-geothermal approach sits at the intersection of these challenges. Co-production of energy and critical minerals from geothermal brines offers a technical pathway to reduce environmental footprints and avoid conventional mining legacies, while also generating local, dispatchable renewable energy that can lower costs for consumers.

The panel discussion held at the European Parliament on 20 November 2025 examined how such innovations can strengthen the EU's strategic autonomy, reduce household energy costs, and safeguard Europe's natural capital. The discussion also explored business models and social contracts that could equitably distribute benefits, enhance transparency, and build long-term public acceptance, complementing the CRMA's supply-side measures.

2.2. CRM-geothermal results up to now

In her keynote speech, the scientific coordinator of CRM-geothermal, Prof. Dr. Simona Regenspurg, provided an overview of the current status of the project which is now entering into its final stage. CRM-geothermal has already produced a robust evidence base, as well as experimental results that support the technical feasibility and policy relevance of geothermal co-production:

Data & mapping

- The CRM-geothermal database now contains geochemical data from over 4,500 geothermal fluid samples collected across Europe, providing a continent-wide picture of CRM occurrences in geothermal brines.
- These data allow for regional assessments of element concentrations and can help prioritise sites for further investigation.

Tools and digital innovation

- Project partner INLECOM has developed an AI-powered lithium estimation tool, which is publicly available at: https://crm.inlecom.eu.
- To improve transparency and user trust, the tool integrates Explainable AI (XAI) methods, including Shapley-value analyses, so stakeholders can interpret which input factors drive predicted lithium concentrations and thus better understand model outputs for decision-making.

Extraction technologies (laboratory scale)

- To enhance the understanding of the geological controls for CRM enrichment and sustainability, four different geological settings were investigated in detail:
    - High enthalpy geothermal areas of Iceland and Turkey
    - Alcaline brine of the East African Rift
    - Sedimenatry Basisn with highly saline fluids
    - Cystalline rocks with low salinity fluids
- Six extraction approaches have been tested in the laboratory:
    - Four laboratory trials focused on lithium recovery, including adsorption, ion-exchange methods, and an electrochemical approach
    - One trial targeted helium recovery
    - One trial addressed recovery of earth alkaline metals and germanium
- In addition to established physico-chemical methods, the project is pioneering biotechnology-based approaches of biosorption and bioprecipitation.

Resource classification and reporting

- The project developed guidelines to apply the United Nations Framework Classification (UNFC) to combined geothermal energy and CRM resources. Applying UNFC for co-production projects will provide a consistent, internationally recognised framework to assess technical feasibility, economic viability and socio-environmental considerations.

Pilot testing: Cornwall (United Kingdom)

- Fieldwork at the Cornish Lithium site (United Downs) in 2023 included hydraulic and geochemical monitoring. Key findings showed that the reservoir demonstrates very high permeability, indicating strong productivity potential for geothermal extraction. In addition, fluid chemistry resembles seawater but is enriched in lithium, confirming the site as a promising candidate for co-production.
- The next technical step is a miniplant demonstration of one selected CRM extraction technology to validate lab findings under near-field conditions.
- Social research and stakeholder engagement in Cornwall have informed guidelines for obtaining a social licence to operate for combined extraction projects. These guidelines are now being implemented on the ground.

2.3. Session highlights

Opening remarks – MEP Nicolás González Casares (S&D)

Member of the European Parliament (MEP) González Casares opened the session by recalling that the Critical Raw Materials Act (CRMA), adopted in 2024, is essential for Europe's green energy transition, as technologies such as wind turbines, solar panels and grid infrastructure depend on secure access to strategic raw materials. Yet he stressed that legislation alone is not sufficient: implementation must deliver visible benefits for European citizens.

He highlighted the opportunities offered by combined solutions such as CRM–geothermal, which can strengthen strategic autonomy while reducing energy costs for households. He also underlined the broader potential of geothermal energy, referencing the 2024 Own Initiative Report in which the European Parliament called for a dedicated EU Geothermal Strategy, including resource mapping, streamlined permitting and new financing mechanisms.

"Adoption is only the first step — implementation is the real challenge. We must show that raw materials policy and green energy policy are two sides of the same European project: a project that delivers lower costs, stronger autonomy and a healthier planet."

He concluded by stressing fairness: access to strategic materials is not enough and benefits must be widely shared, including jobs, lower energy bills and new industrial opportunities.

Christine Banken – European Commission, DG ENER

Ms Banken addressed Europe's dependence on critical raw material supply chains and the strategic importance of boosting sustainable domestic production. She emphasised that while European supply alone cannot close the gap, coupling domestic extraction with recycling, circularity and strong trade agreements can strengthen resilience.

She described how integrated projects such as CRM–geothermal align with the CRMA's objectives and can be supported through EU instruments such as Horizon Europe.

"If we produce in Europe, we produce under very high environmental, social and governance standards — traceable and transparent. That is not a cost but a competitive advantage, and exactly the kind of technologies we want to support and scale up."

She also highlighted the need for efficient permitting and improved waste management, noting that extractive waste should remain within Europe to maximise recovery value.

Mark Harris – Cornish Lithium

Mr Harris explained the technical pathway for lithium extraction from geothermal brines in Cornwall, where unusually clean brines make ion-exchange the most suitable process. Purification and further concentration remain necessary steps to produce battery-grade material, but the technological route is clear and increasingly feasible. He also pointed out the advantages of focusing on Lithium-Iron-Phosphate (LFP) batteries with regard to making Europe fully independent from any critical metal imports.

"From my perspective, if Europe wants to rely less on external suppliers, LFP batteries offer a simple, stable route — and geothermal brine projects, with their small footprint and real community benefits, are far easier for people to support than traditional mining projects."

Dr Simona Regenspurg – GFZ Helmholtz Centre for Geosciences

Dr Regenspurg described the scientific and technological progress of the CRM-geothermal project. Each site presents unique extraction challenges, from purity constraints, to scaling issues or process-specific bottlenecks. Lithium is the closest to deployment, while other elemental extraction remain at laboratory scale and require stepwise demonstration.

"If we look beyond lithium, everything is still at lab scale. We need small demonstrators, like the one in Cornwall, and then we scale up — and with each step, new challenges will emerge."

She stressed the need for robust safeguards to ensure that CRM–geothermal systems remain both environmentally sustainable and publicly trusted.

Kęstutis Kupsys – European Economic and Social Committee (EESC)

Mr Kupsys framed the transition as a multi-layer challenge, spanning geopolitics, affordability and social acceptance. Combining geothermal energy with CRM extraction, circularity and recycling can strengthen European autonomy, but only if communities become genuine partners. Benefit-sharing mechanisms—cheaper heat, local jobs, co-ownership, transparent participation—are essential to shift from Not-In-My-Back-Yard (NIMBY) to what he called "Preferably-IMBY".

He also emphasised the crucial role of civil society and the EESC in building technical literacy, improving oversight and ensuring workers' and consumers' voices remain central.

"Communities must be partners, not bystanders. Cheaper heat, jobs, co-ownership and transparent participation — that's how we move from NIMBY to OK-IMBY, and eventually to Preferably-IMBY."

He called for stronger ESG legislation (CSDDD, CSRD, SFDR), updated mining-waste rules, better enforcement of the Batteries Regulation, and the redirection of capital from harmful overseas mining toward clean, high-standard EU projects.

Emily Ritchey – Transport & Environment (T&E)

Ms Ritchey underlined that the energy transition requires a massive increase in critical materials and that balance must guide EU policy: environmental protection, social justice and industrial competitiveness must progress together. She stressed that the CRMA provides a strong framework but must be complemented by ambitious implementation of existing legislation.

She highlighted two urgent areas:

- preventing any weakening of the EU Batteries Regulation, whose timelines have already slipped,
- modernising the Extractive Waste Directive, which is no longer adequate for today's materials landscape.

"Balance is key. The CRMA is strong, but only if we ensure full implementation, whilst upholding the Batteries Regulation and modernising outdated mining-waste rules. That's how we support the responsible European projects we heard about today."

Audience Reactions: Industry perspectives stressed urgency, scale, and the need for fast-tracked innovation

A **representative from Equinor** challenged the idea that a "preferably in my backyard" approach would suffice, warning that Europe is moving too slowly. While Europe continues to debate incentives, China has already secured significant market share, with more than a dozen major investments in place. If Europe waits until 2027 or 2030 to deploy large-scale innovation support, supply chains risk becoming structurally locked in by foreign players. The question raised was clear: How can EU industrial and innovation policy move fast enough to avoid replacing fossil-fuel dependency with reliance on foreign-controlled clean-tech ecosystems?

The speaker urged the EU to establish mechanisms that dramatically accelerate innovation, ensure cross-sector orchestration, and foster integrated value-chain development—especially for CRM–geothermal—before the window of strategic opportunity closes.

The **European Commission representative** acknowledged this urgency. Time, she stressed, is now the critical factor. She highlighted the fast adoption of the CRMA and the NZIA, as well as ongoing efforts to identify and support new strategic projects. She also underlined that innovation must be accelerated, while being embedded within strong international partnerships.

For scaling domestic production, the Commission representative pointed to tools already in motion:

- NZIA-designated projects
- The upcoming Industrial Accelerator Act
- The new CRM Centre
- The joint purchasing platform, announced during the EU Raw Materials Week 2025

These initiatives, taken together, aim to shorten permitting, reinforce investment certainty, and bring value-chain actors together. On the question of avoiding value-chain fragmentation, the Commission representative underlined that the EU follows a "whole-of-economy" approach, where multiple Acts and Directives converge. She expressed confidence that CRM-geothermal projects can achieve successful scale-up.

Representatives from ERAMET and Vulcan Energy emphasised the persistent funding gap as a critical barrier. The ERAMET representative described the capital-intensive nature of deep geothermal lithium projects in Alsace, noting they remain on the Innovation Fund waiting list and depend on upcoming calls to close their financing gap. The Vulcan Energy representative questioned how companies are expected to use the "strategic project" label in practice, arguing that despite political support, industry still lacks the financial instruments and certainty needed to move at the required pace.

Civil-society and project developers echoed this call for urgency. **Emily Ritchey from Transport & Environment** stressed that "We need real financing and immediate actions." Meanwhile, **Mark Harris of Cornish Lithium** highlighted the challenge of making CRM extraction commercially viable without decisive European backing.

Closing Words — MEP Nicolás González Casares

MEP González Casares concluded by emphasising the strategic and societal dimensions of Europe's emerging raw materials agenda. Europe must learn to manage new mining and extraction projects, ensuring that technological progress is matched with robust efforts to build public acceptance.

He noted that a major barrier remains the risk profile of early-stage projects: exploration is costly, uncertain, and often misunderstood by investors. Current financing tools, he argued, do not sufficiently address this gap. Co-extraction models, such as CRM-geothermal, offer a promising way forward by creating multiple value streams, reducing project risk, and delivering clean energy alongside strategic materials.

González closed with a call for political and industrial unity: Europe must strike the right balance between resource extraction, environmental protection, and community trust, ensuring that the continent builds a resilient, competitive, and fair foundation for its green industrial transition.

3. Policy recommendations

To fully unlock the potential of CRM-geothermal co-production and align it with the EU's strategic autonomy and green transition objectives, the following policy measures are recommended:

a. Facilitate and accelerate permitting for combined technologies

Permitting remains a major bottleneck for co-production projects, where geothermal energy and critical raw material extraction intersect. Policymakers should streamline regulatory procedures by:

- Implementing dedicated "fast-track" permitting schemes for co-production projects, including more and better trained experts in permitting authorities.
- Promoting one-stop guidance and support services to reduce administrative delays and increase investor confidence.

b. Support diversification beyond battery materials

While lithium is currently the most prominent CRM in geothermal brines, Europe's long-term strategic autonomy requires attention to other critical materials such as helium, strontium, and boron. Policies should:

- Incentivise research, development, and pilot projects targeting a broader range of CRMs.
- Encourage mapping and resource assessment initiatives to identify potential deposits across Europe.
- Link funding and innovation support to materials critical for emerging technologies beyond energy storage, such as electronics, aerospace, and green hydrogen.

c. Expand field demonstration and research funding

Technical feasibility has been demonstrated at the laboratory scale, but larger-scale deployment requires robust field testing. To bridge this gap, the EU should:

- Increase targeted R&I funding for pilot plants and demonstrators, building on successes such as Cornwall and the Upper Rhine Valley.
- Foster public-private partnerships to share risks and accelerate learning curves.
- Support data collection, digital tools, and resource classification systems to provide transparent and reproducible evidence for regulators, investors, and communities.

d. Build public acceptance and equitable benefit-sharing

Policy frameworks should ensure that local communities perceive tangible benefits from co-production projects, fostering a social licence to operate. Recommended measures include:

- Embedding local benefit-sharing mechanisms, such as reduced energy costs, job creation, and co-ownership models.
- Strengthening transparency through participatory planning, stakeholder consultations, and explainable digital tools.
- Integrating social and environmental safeguards in project funding and licensing requirements to maintain public trust.

e. Integrate CRM-geothermal into broader EU strategies

To maximise strategic impact, co-production technologies should be embedded within the EU's overarching energy, industrial, and raw materials policies:

- Include CRM-geothermal technologies in the forthcoming Geothermal Action Plan, the Heating & Cooling Strategy and Industrial Accelerator frameworks.
- Leverage multi-Act coordination (CRMA, Batteries Regulation, Extractive Waste Directive, Innovation Fund) to reduce value-chain fragmentation.
- Encourage cross-sector collaboration to combine renewable energy, circularity, and domestic mineral production efficiently.

4. Conclusions

The co-production of energy and minerals from geothermal fluids represents a compelling pathway to strengthen Europe's green industrial transition while reducing dependency on imported critical raw materials. By combining renewable energy generation with strategic mineral extraction, CRM-geothermal offers a low-carbon, low-footprint, and socially responsible solution that aligns with the objectives of the Critical Raw Materials Act and the REPowerEU plan.

Accelerated permitting, expanded research and demonstration, diversified material focus, and proactive community engagement are essential to move the CRM-geothermal technology from promising pilot projects to scalable, commercially viable deployments. With coordinated policy support, transparent governance, and adequate funding, Europe can secure domestic supplies of critical materials, enhance energy affordability, and build public trust—laying a resilient foundation for its green and strategic autonomy ambitions.

5. Annexes

5.1. Session outline

12:00 – 12:10
Welcome by **MEP Nicolás González Casares** (S&D)

Introduction by event moderator and CRM-geothermal coordinator **Katrin Kieling,** GFZ Helmholtz-Centre for Geosciences

12:10 – 12:25
Keynote: *"Critical Raw Materials and Renewable Energy: Building the Foundations for Affordable Clean Power in Europe"* (presentation of CRM-geothermal project results and impacts) – **Simona Regenspurg**, GFZ Helmholtz-Centre for Geosciences

12:25 – 13:10
Panel Discussion: Harnessing Innovation to Secure Raw Materials and Power the Energy Transition
This panel explores how innovative solutions that integrate critical raw material extraction with renewable energy production can strengthen Europe's clean energy capacity, reduce costs, and enhance security of supply. At the same time, it will address the social dimension of the Critical Raw Materials Act (CRMA): ensuring that implementation supports vulnerable consumers, reduces inequalities, and builds long-term trust and benefits for local communities.

Panel moderator: **Pavlos Tyrologou**, European Federation of Geologists

Panellists:

- **Christine Banken**, European Commission
- **Mark Harris**, Cornish Lithium
- **Simona Regenspurg**, GFZ Helmholtz-Centre for Geosciences
- **Kestutis Kupsys**, Member of the European Economic and Social Committee (2020-25), consumer rights activist
- **Emily Ritchey**, T&E

13:10-13:20
Q&A session

13:20– 13:30
Closing remarks by **MEP Nicolás González Casares:** *"Making the Energy Transition Affordable and Inclusive for All Europeans"*

5.2. Speaker bios

Christine Banken, Team Leader for Energy Security and Electricity, Directorate-General for Energy, Unit F.4 Energy security and safety
Christine Banken is Team Leader for Energy Security and Electricity in the European Commission's Directorate-General for Energy (DG Energy), where she oversees work on security of electricity supply, protection of critical energy infrastructure, climate adaptation, and cybersecurity in energy installations. Her team also assesses foreign direct investment cases in the energy sector and works on ensuring the secure and sustainable supply of critical minerals for the energy transition. Before joining the European Commission, she worked as a consultant supporting Japanese clients across the energy, automotive and agriculture sectors in developing policy strategies and business approaches. She holds a Master's degree in Global Politics and Societal Change.

Mark Harris, Cornish Lithium
Mark Harris is a Lead Process Engineer at Cornish Lithium with more than 25 years of experience in the water industry and over a decade specialising in wastewater process design. He brings a strong track record of developing innovative process solutions for both water authorities and industrial clients, working nationally and internationally. At Cornish Lithium, he plays a central role in multidisciplinary collaborations with research partners and Direct Lithium Extraction (DLE) technology providers. Mark has led audits and assessments for several on-site DLE pilot plants in the UK and supported test work programmes abroad, while also mentoring PhD students and contributing to DLE consortium efforts. He manages a team of process scientists and technicians and has presented his work at major industry conferences.

Simona Regenspurg, Scientist at GFZ Helmholtz Centre for Geosciences, CRM-geothermal project scientific coordinator
Simona Regenspurg is a senior scientist at the GFZ Helmholtz Centre for Geosciences and scientific coordinator of the EU-funded CRM-geothermal project. Trained in geology and hydrogeology at Ludwig Maximilian University Munich, she earned her PhD in Environmental Sciences from the University of Bayreuth in 2002. She has held postdoctoral research positions in the United States, Germany, Sweden and Switzerland, working across chemistry, geochemistry and industrial ecology. Since joining GFZ in 2009, she leads the "Geothermal Fluids" research group and teaches hydrogeology at Freie Universität Berlin since 2013. Simona previously coordinated the EU-funded project REFLECT.

Kestutis Kupsys, Member of the European Economic and Social Committee (2020-25), consumer rights activist
Kęstutis Kupšys is a leading consumer rights advocate and Vice-President of the Lithuanian Consumers Alliance, representing Lithuania within the European BEUC network. During his 2020–2025 mandate at the European Economic and Social Committee, he played an active role in shaping opinions on critical raw materials, industrial policy, sustainable finance, renewable energy and the Capital Markets Union. He chaired several study groups and served as Rapporteur on key legislative and own-

initiative files. Kęstutis holds a diploma in systemic economic analysis from Vilnius University and pursued additional studies in business administration and financial markets at the Katholische Universität Eichstätt-Ingolstadt in Germany.

Emily Ritchey, Policy Manager, Supply Chains, Transport & Environment (T&E)
Emily Ritchey is Policy Manager for Supply Chains at Transport & Environment, where she focuses on responsible battery and mineral supply chain legislation. She joined T&E in 2024 after working at the Confederation of British Industry (CBI) in Brussels, where she led the organisation's work on EU and international trade policy. Emily previously held roles in both EU and UK public policy. She studied French and History at King's College London and holds a Master's degree in Political Science from the Université Libre de Bruxelles.

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