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Raw materials from geothermal fluids: Occurrence, enrichment, extraction



About CRM-geothermal

The energy and digital transitions require a large amount of mineral raw materials, some of which are considered 'critical' by the European Union and are predominantly imported from non-European countries. However, the EU has largely untapped resources at its disposal in geothermal fluids, some of which contain significant amounts of these Critical Raw Materials (CRM).

The combined extraction of heat and minerals from geothermal reservoirs offers a series of advantages:

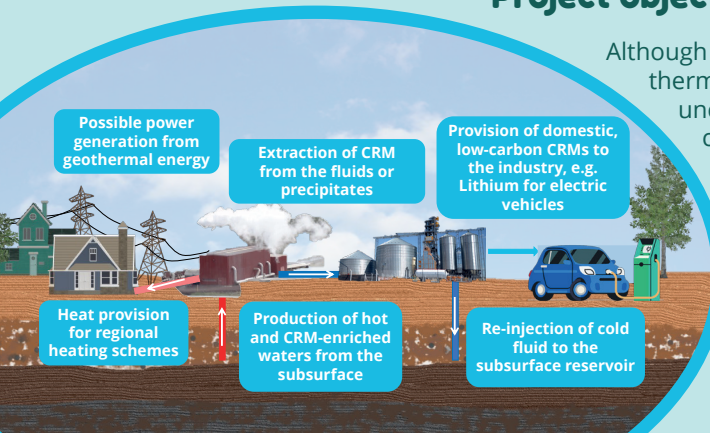
- Maximising returns on investment
- Minimising environmental impact
- Avoiding additional land use
- Leaving no mining legacies
- Near-zero carbon footprint
- Enabling domestic supplies of CRM

The Horizon Europe-funded CRM-geothermal project will thus open up a potentially huge untapped resource and deploy solutions to help Europe fulfil the strategic objectives of the EU Green Deal and the Agenda for Sustainable Development.

Project objectives

Although CRM are known to occur in geothermal fluids, there are still many uncertainties concerning their occurrence in different geological settings and the sustainability of their extraction. The actual extraction process is also a major challenge requiring technology development.

The CRM-geothermal project therefore aims to:



- Establish an overview over the potential for raw materials in geothermal fluids for a large range of CRM elements across the EU and third countries
- Determine the source of selected CRM, their mobility and potential for sustained extraction from geothermal brines
- Develop and optimise innovative extraction technologies for selected CRM from geothermal brines that can form a business case for new EU SMEs
- Assess the environmental-social-economic viability, create transparent and traceable value chains, and foster ethical sourcing of CRM
- Demonstrate at a pilot site the extraction technology for at least one CRM in field at the scale of a miniplant and evaluate the total sustainability of system



Expected impact

- Combined extraction has the potential to cover a significant percentage of current and future needs of certain CRM to the EU at little (extra) CAPEX and OPEX with minimal ESG impacts
- A more resilient and domestic CRM supply chain for the EU by reducing imports exposed to market and political risks
- More trustworthy and ethical supply chains for certain CRM
- Helping to bridge the gap between societal resistance to raw materials extraction and the increasing demand for raw materials by society
- Overseas suppliers will be incentivised to move to more ethically acceptable production methods
- Greater number of viable geothermal projects (with combined extraction) fosters the energy transition