

CRM-geothermal: Raw materials from geothermal fluids

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The energy and digital transitions require a large amount of mineral raw materials, some of which are considered ‘critical’ by the European Union. These Critical Raw Materials (CRM) are predominantly imported from non-European countries where environmental and ethical standards may be less strict than in the EU. However, the EU has largely untapped resources at its disposal in geothermal fluids, some of which contain significant amounts of CRMs.

The EU-funded CRM-geothermal project therefore proposes to combine the extraction of mineral raw materials and geothermal heat, a renewable energy resource from the ground that is available 24 hours per day. The technology solution developed by CRM-geothermal will thus help Europe fulfil the strategic objectives of the EU Green Deal and the Agenda for Sustainable Development while reducing dependency on imported CRM.

Although Critical Raw Materials 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 Horizon Europe-funded CRM-geothermal project therefore aims to:

- establish an overview of the potential for raw materials in geothermal fluids for a large range of 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 European 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 at the scale of a mini-plant and evaluate the system’s sustainability.

The combined extraction technology will support the European Union in developing a more resilient and ethical CRM supply-chain from domestic sources, reducing its dependency on imports, which are exposed to market and political risks. The proposed solution will also help to bridge the gap between societal resistance to domestic raw materials extraction and increasing demand for raw materials that are critical for the Twin Transition. Finally, the combined extraction of minerals and heat will also increase the number of viable geothermal projects, fostering the green transition and diversifying Europe’s energy portfolio.

CRM-geothermal is coordinated by the Helmholtz Zentrum Potsdam Deutsches Geoforschungszentrum (GFZ) based in Potsdam, Germany. The research consortium consists of 20 partners, involving 14 EU-based and 6 associated partners from UK, Switzerland and Kenya, covering academic and industry backgrounds.

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