

# Boosting Innovation in Geothermal Energy through EU Projects

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# Our Mission

Represent the **professional geoscience associations** of Europe

Promote **excellence in application** of geoscience across the continent

Create **public awareness** of geoscience's importance to European society

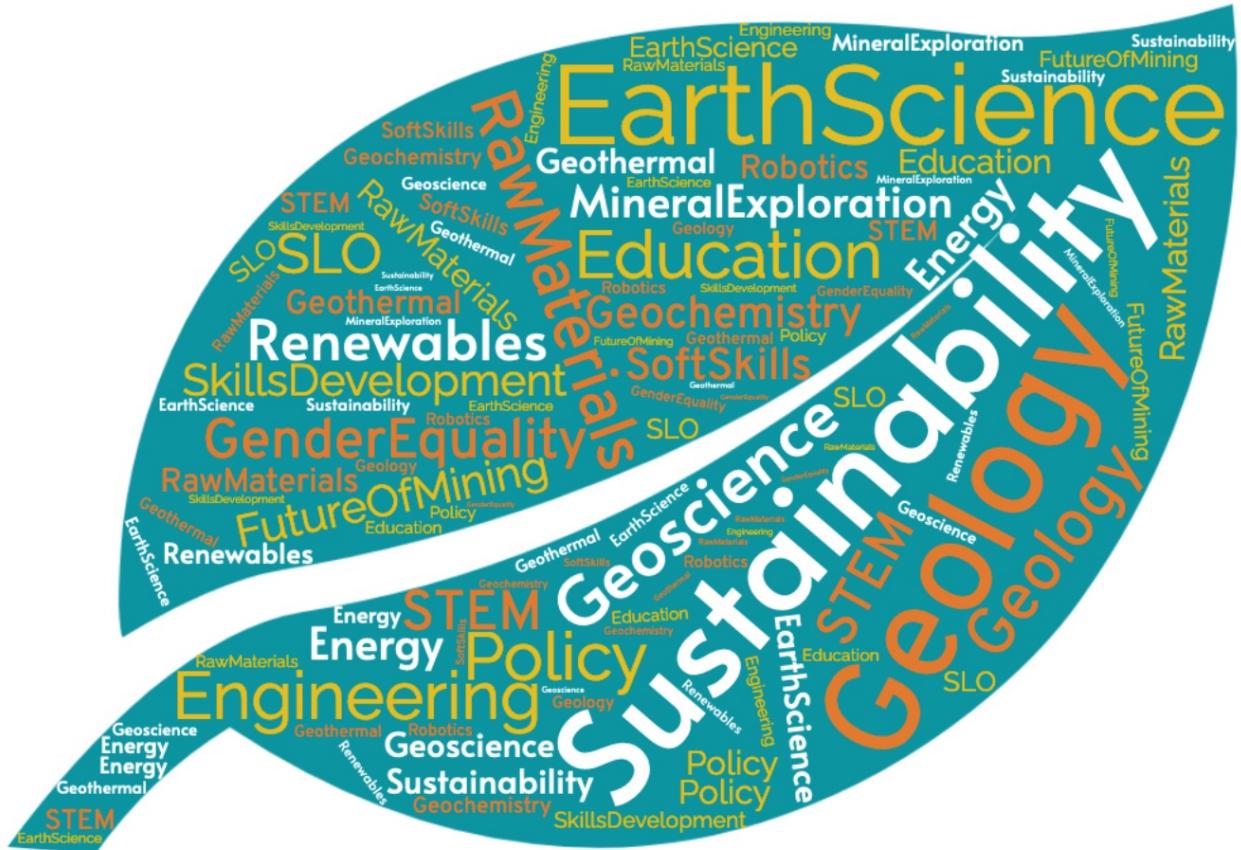


## Why European Union funding?

### EFG's involvement in the Horizon Programme

- EFG has a **40% success rate** (the average is around 5-10%)
- We **understand well the EU's Programmes** having now delivered **20+ projects**
- Provides a **bridge to our advocacy & lobbying activities**:
  - Help **shape EU policy** priorities, technology focus & visibility of geoscience
- Offers **strategic reach** for the Federation:
  - **Collaborate** with range of geographically & technically diverse partners
  - **Demonstrate capability** across spectrum of geoscience & society themes
  - **Opportunities for our member Associations** to actively contribute to projects

# EU FUNDED PROJECTS: OUR KEY TOPICS & GEOGRAPHICAL COVERAGE

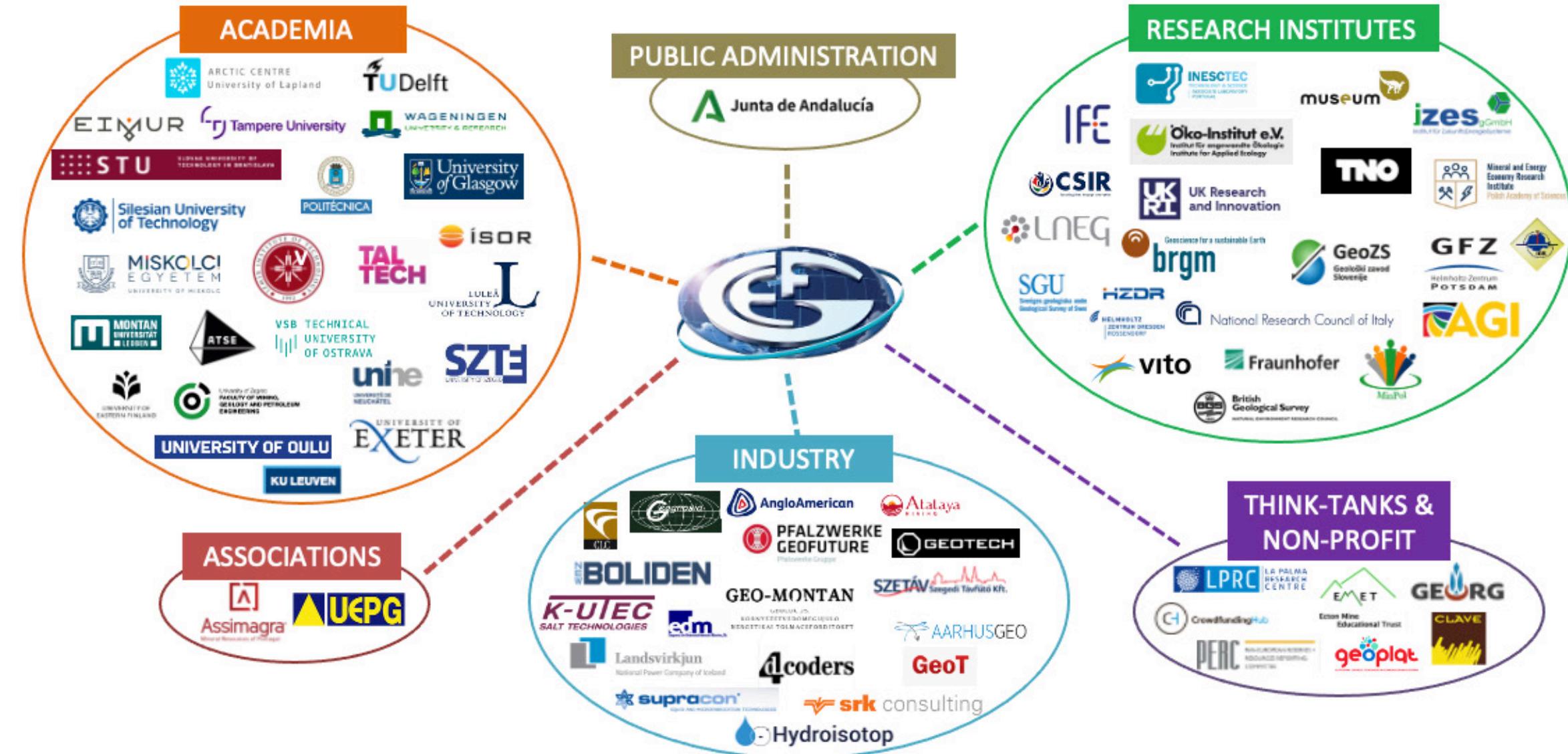


European coverage through EFG's National Associations: 45,000 geoscientists



FÉDÉRATION EUROPÉENNE DES GÉOLOGUES  
EUROPEAN FEDERATION OF GEOLOGISTS  
FEDERACIÓN EUROPEA DE GEÓLOGOS

# EU FUNDED PROJECTS - CREATE A RICH NETWORK



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# Why Geothermal Energy.....?

## Our Position

- It's a truly regenerative, weather-independent energy source

Solar and wind behave like a racehorse, geothermal is the packhorse of the renewable sector
- Offers a full spectrum of very low carbon, high reliability energy generation

From back-gardens to city districts and lower lifecycle environment footprint than many renewables
- In metal-bearing geology, we can combine extraction of energy and metals

This new technology can significantly reduce import dependence on both critical metallic minerals
- As well as an energy source, provides huge capacity for energy storage

Opens up possibility of large-scale deployment in association with other renewables
- Prime candidate for diversifying our energy and heat supply

Can be integrated into the energy mix at the macro-scale

# EFG – OUR EU-FUNDED GEOTHERMAL PROJECTS

## COMPLETED



## ONGOING



## STARTING SHORTLY

CRM-Geothermal

The CHPM2030 project aimed to develop **novel technology** to combine deep geothermal **energy production with metals extraction** in a single interlinked process



CHPM2030 was a project funded under the Horizon 2020 programme for Research and Innovation under grant agreement n° 654100. The three-year project has officially closed in June 2019.

**CHPM = Combined Heat Power Metals**

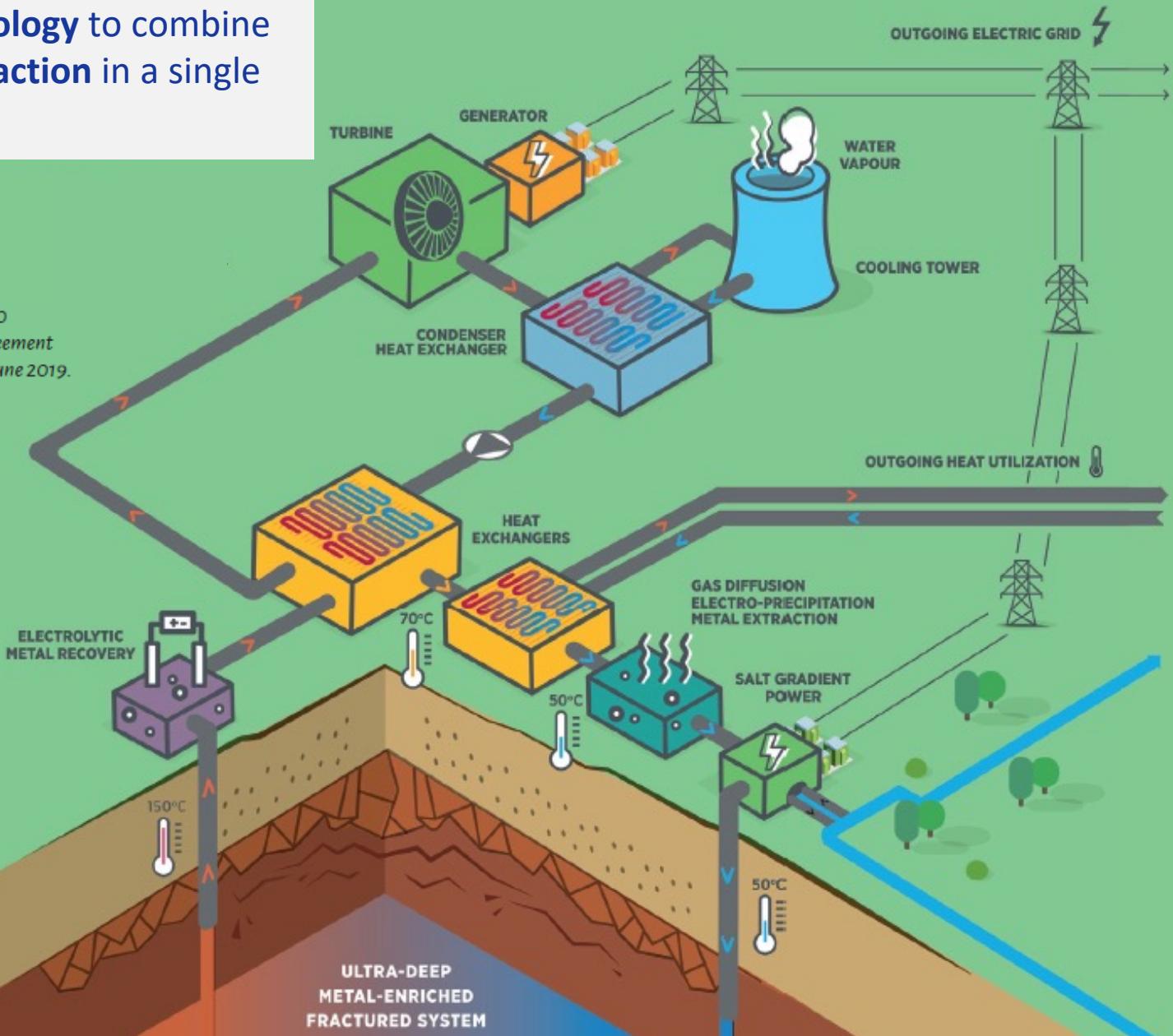
Cover photo: Vigdís Harðardóttir, Iceland Geological Survey

Infographic: CHPM2030 consortium



Stay tuned:

[www.chpm2030.eu](http://www.chpm2030.eu)  
@chpm2030



## Results

- ✧ **Proof-of-concept for technology of combined minerals and energy at lab-scale for high performance geothermal systems, including study of potential pilot sites**
- ✧ **Developing innovative pathways for leaching strategic metals from the geological formation and corresponding electrochemical methods for metal removal and recovery on the surface**
- ✧ **Developing conceptual design & economic feasibility models for future facilities designed from the very start as a CHPM systems**
- ✧ **Leveraging presence of high dissolved metal % and very high temp of these resources to advantage through design of new types of geothermal facility**
- ✧ **A roadmap for development for 2030 and 2050: <https://prezi.com/view/ZMa90y7KRIMfP3NATk8s/>**

The CROWDTHERMAL project aims to **empower the European public to directly participate in the development of geothermal projects** with the help of alternative financing schemes, crowdfunding and social engagement tools



## Expected Results

- **Analysis of three case studies in Spain, Hungary and Iceland**

In-depth understanding on social engagement, alternative finance and risk mitigation

- **Core services**

To facilitate post-project efficient market uptake and sustainability of results:

- \* Decision Tree
- \* Toolbox for Risk-Evaluation & Mitigation

- \* Information Catalogue for Self-Learning

- \* An interactive Guide to Integrated Finance

- \* Meta-Database of Geothermal Projects for Alternative Finance

- **European Deployment Campaign**

Final year: Raising visibility for financial tools and services developed by CROWD THERMAL



# REFLECT

## Redefining geothermal fluid properties at extreme conditions

**Geothermal energy** depends on the behaviour of the fluids that transfer heat between the geosphere and the engineered components of a power plant. This project aims to **prevent problems related to fluid chemistry** rather than treat them.

Photo: Simona Regenspurg



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 850626.

## Expected Results

- **European Geothermal Fluid Atlas** (Data from 21 European countries)  
Layers will provide point feature information on a base-map, including geography, geology and depth range, as well as physical, chemical and microbial properties of fluids
- **Predictive models**  
Will provide recommendations on how to operate geothermal systems sustainably

## Desired Impact

- Significantly increased technology performance and reduced maintenance costs
- Reducing life-cycle environmental impact
- Facilitating the exploitation of high-temperature geothermal resources
- Reducing the environmental impact of geothermal energy production
- Transfer of project results to the operators



*Scales in a geothermal pipeline,  
Larderello Museum, Italy*



# CRM-Geothermal

CRM-Geothermal project aims to advance the potential for **co-generation of geothermal energy and critical raw materials** in Europe and East Africa through pioneering both technological and environmental excellence

Image: Idaho National Laboratory



This project has received funding from the European Union's Horizon Europe research and innovation programme under Call HORIZON-CL4-2021-RESILIENCE-01

### Expected Results

#### To assess large-scale supply potential of Critical Raw Materials via geothermal co-production

- Enlarge on current geothermal fluid atlas via new data & well-sampling in Europe & East Africa
- Potential of varied geological settings for combined extraction & contribution to EU Green Deal objectives

#### Development of existing mineral extraction/separation techniques

- Novel solutions for specific challenges of CRM-generating geothermal systems (high T, P, salinities)
- Lab-scale material vs flow-scheme assessment: Optimise systems for different geothermal & CRM settings

#### Deployment of a modular, mobile pilot plant at existing geothermal sites

- Studies will investigate upscaling, system integration & establish reference for stakeholder engagement
- Showcase minimal environmental impact, no additional need for land, near-zero carbon footprint

#### Creation of new business opportunities

- Development of UNRMS-compliant reporting template to create trust among investors, regulators & public
- Investigate likely future economic models with view to proposing suitable business models



### Why EU-funded geothermal projects are important to EFG

- ✓ Be at heart of geothermal innovation in project viability & economics and viability, operational efficiency, social acceptance and environmental footprint
- ✓ Ability for EFG and its member associations to contribute to opening up this potentially huge resource bringing this critically important solution to market
- ✓ Sharing of knowledge and development of expertise within the Federation and a wider audience
- ✓ Access to the European Commission's own teams working directly on the growth of geothermal energy as part of the EU's Green Deal and Agenda for Sustainable Development.

### Why EU-funded geothermal projects might be important to YOU

- ❖ The research institutions of Denmark, Sweden and Finland, as EU nations can all participate automatically
- ❖ Norway and Iceland are very present in EU geoscience projects with same benefits as EU member countries through an association agreement