The goal of GO-Forward is to develop and advance a novel methodological approach to assess geothermal reservoir properties and uncertainties, making more accurate pre-drilling predictions of geothermal reservoir properties and thus reduce the exploration risk.

Project Objectives:

- Improve the reliability of pre-drilling geothermal reservoir assessments by combining innovative process-based modelling with geological analysis
- Create dedicated tools for predicting fracture development and reactivation within a forward geological modelling framework
- Augment machine-learning approaches with spatial uncertainty quantification to better detect and interpret subsurface features
- Assess and enhance societal readiness for dedicated case studies as a core element of geothermal exploration planning

Consortium Members

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GO FORWARD

GEOTHERMAL EXPLORATION AND OPTIMIZATION THROUGH FORWARD MODELLING AND RESOURCE DEVELOPMENT

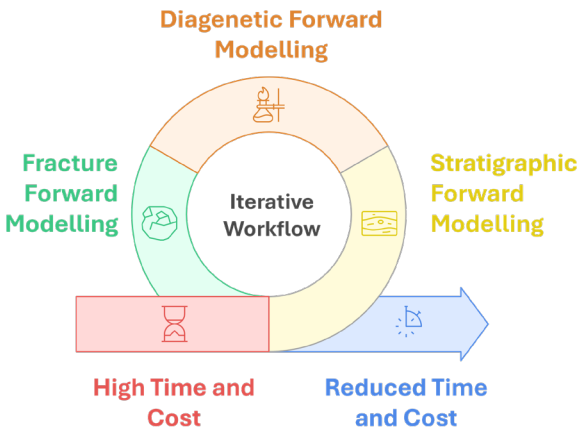
Grant no. 101147618

Project duration:
September 2024 – August 2028

Existing geothermal exploration workflows rely on geostatistical extrapolation of exploration data. The acquisition of reliable data is expensive and time consuming, which results in high initial investment costs.

GO-Forward develops a novel methodological framework that integrates advanced forward modelling techniques with a process-based understanding of the formation of geothermal reservoirs.

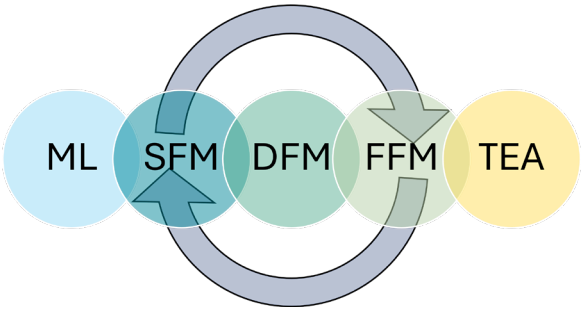
This approach not only promises to reduce exploration costs and risks but also aims to increase the exploratory success rate by providing a comprehensive understanding of subsurface characteristics.



Once the model workflow has been calibrated and validated in “data-rich” areas it will be transferred to “data-poor” areas with comparable geological setting. This will ensure the roll-out of geothermal exploration in regions of high relevance to Europe.

Modelling Approach

By integrating different forward modelling techniques, GO-Forward aims to develop accurate reservoir models even in regions with limited direct subsurface information.



ML: applying machine learning approaches for geological data interpretation and parameter derivation to reduce time and cost effort for reservoir characterization.

SFM: stratigraphic forward modelling is used to predict the reservoir heterogeneity through simulation of sedimentary processes (in siliciclastic and carbonate systems).

DFM: diagenetic forward modelling is used to simulate physico-chemical processes like compaction, cementation, and dissolution that alter the rock during burial.

FFM: forward fracture modelling is used to predict fracture network architecture, fracture porosity and connectivity, in fractured basement rocks.

TEA: techno-economical assessment utilizes integrated forward models for estimating geothermal potential at the regional scale.

Project Structure

Developing Enabling Methods
Development and evaluation of ML-aided approaches to derive key parameters for the subsequent modelling steps

Stratigraphic Forward Modelling
Modelling sedimentary processes for siliciclastic and carbonate reservoirs

Fracture Forward Modelling
Modelling nucleation and propagation of fractures, and the generation of faults

Diagenetic Forward Modelling
Modelling diagenetic processes, such as compaction, cementation, dissolution

Techno-Economical Analysis
Combining integrated reservoir models with economical requirements, yielding a tool for geothermal potential analysis

Societal Readiness Level
In study areas, GO-Forward assesses the societal readiness level and engages with stakeholders and the public

Study Areas