

Freitag, 25. Juni 2021  
Kongress 1 - Tiefe Geothermie  
15.10-15.40 Uhr

## **GEOCLAD: An Advanced Tool for Geothermal Energy Exploitation** **Vittorio Faluomi, Lacopo Borsi, TEA Sistemi S.P.A, STEAM s.r.l, Gis3W s.r.l**

The flow of a multiphase stream is a complex phenomenon and applies to process components and to transport systems as well, with several order of magnitude difference in scale. Several computational models of multiphase flow for piping networks and process plants are reported in the technical literature. Some of them are developed only in stationary conditions, others are transient computational models, capable to simulate all operative conditions of a plant. The latter have an appropriate computational capability but are designed for fields not applicable to geothermal power exploitation. Despite IEA foresees in 2030 a tripling of current geothermal generation (the installed geothermal capacity in the European Union to 28 states currently amounts to 1850 MWe and generates an annual output of electricity over 12 TWh), this lack of modelling and software tools entails that geothermal plant and networks design is still approached mostly by in house tools, seldom qualified by third parties, with low calculation power, no distributed access for team working, and no capability of forecasting the plant behavior, towards design optimization and safety analyses. To answer these needs, the project GEOCLAD has been proposed and funded by European Union under EUREKA/EUROSTARS financing program. The main innovative feature of GEOCLAD is the integration of a tool for geothermal energy exploitation suitable for design purposes (for engineers), for planning activities (managers) and for informative actions (decision makers), sharing input data, assumptions, and methodologies. The final goal is to achieve results aligned with economical resources availability, social requirements, and environmental and safety regulations. GEOCLAD can provide engineers with:

- A massive parallel calculation engine to design, monitor and optimize geothermal plants and network distribution system, based on an advanced flow simulator model.
- A cloud-based infrastructure to store, manage and distribute model calculation results.
- A web-based application for design phase and forecast representation of system behavior and performances.

GEOCLAD is an innovative tool for geothermal engineering applications, being:

- Tailored, since it is specifically designed for power plants and urban districts geothermal energy design.
- Integrated, since it includes in the same tool three crucial capabilities: design, optimization, and management.
- Predictive, since the network/geothermal plant behavior is simulated on a medium/longtime scale.
- Reliable, being based on well-known technologies, and developed by a consortium with demonstrated high level of knowhow on required project fields.
- Simple and User-friendly: in a single application are available design control and prediction capabilities, making consistency among project data, design methods and obtained results. This allows to minimize implementation or analysis errors and to increase design accuracy.