

Accelerating the Heating and Cooling Transition



Joint Call 2021
Kick-off meeting of granted projects

Project presentation pitch

17 November 2021



Real-time control and tuning of borehole heat exchanger fields for optimal integration in heating and cooling systems

The innovation to gain best out of the ground

RECOIN

Who We Are

- **International Coordination**

- Coordinator: Prof. Dr. Peter Bayer
- Applied Geology research group
- Geothermal energy, groundwater science, environmental engineering

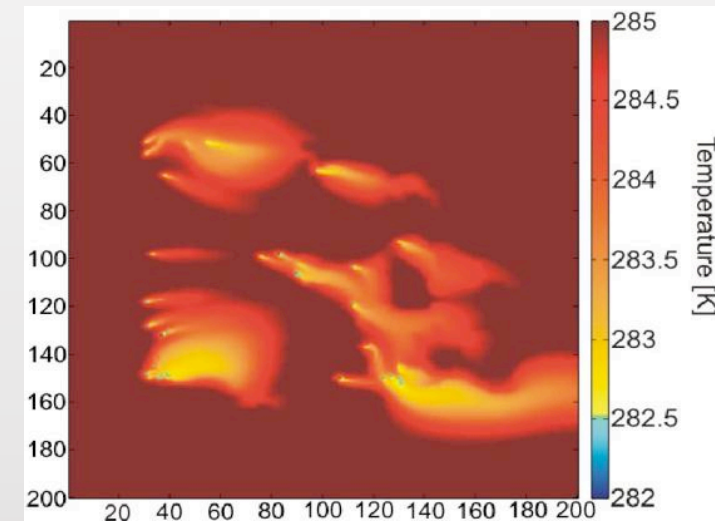
- **The Consortium**

- 10 partners: 2 universities, 4 R&D companies + 4 stakeholders
- Applied geologists, energy engineers, high-tech developer, real estate owners
- 3 national subprojects (GER, SUI, SWE)
- 3 demo sites (*Lausen, Berlin, Stockholm*)



Our Challenge

- Descriptive & predictive uncertainties in operating **borehole heat exchanger (BHE) fields**;
In practice, it is nearly **impossible to forecast** optimal BHE operations.
- **Heating/cooling demands** rarely balanced and often differ from projections, while subsurface conditions face large unknowns.
- May cause a **long-term performance degradation** in any of the ca. 100,000 (i.e. 1.5 GW) operating BHE fields in the world.
- **Compromises economic & environmental benefits**, in extreme case even causes **failures**. Thus, the reputation as reliable, robust renewable energy source may be hampered



Beck et al. 2010 (modified)

Our Solution – RECOIN Innovation

- A **new type of control system** is being developed to monitor, regulate and adapt BHE fields in a smart way to achieve **optimal overall system efficiency**.
- A flexible **modeling, prediction and control** procedure will be integrated into a **new device** for model predicted control.
- Based on in-situ operational **data**, physical **modeling**, and **machine learning**, the ground-load will be dynamically adapted.
- Focus of research work on **setup, construction and calibration** of the novel real-time controller device and its **experimental testing**.
- The system will be applied as **prototypes**.

