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# ○ Rittershoffen Geothermal Heat Plant

Enhanced Geothermal System (EGS) for heat generation

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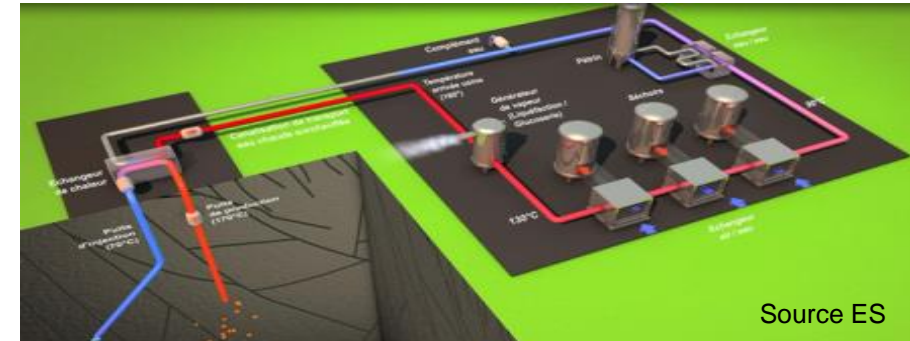
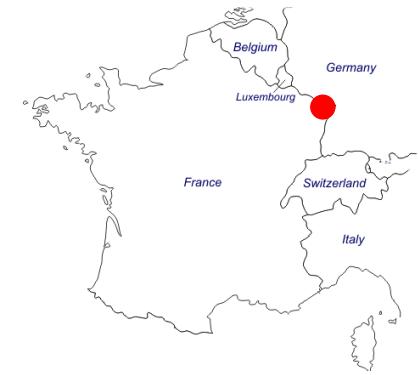
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## ○ PROJET CONTEXT

- Project located in the French Upper Rhine Graben
- Started in 2005
- 3 shareholders (Electricité de Strasbourg, Roquette Frères and Caisse des dépôts)
- 1 heat user: Roquette Frères starch plant at Beinheim, France, on the Rhine river
- 2 000 t of corn and wheat daily transformed
- Total heat demand of the starch plant: 80 MWth
- **Use of local geothermal energy to supply 24 MW of the heat of the Beinheim Starch plant and 180 GWh/year**

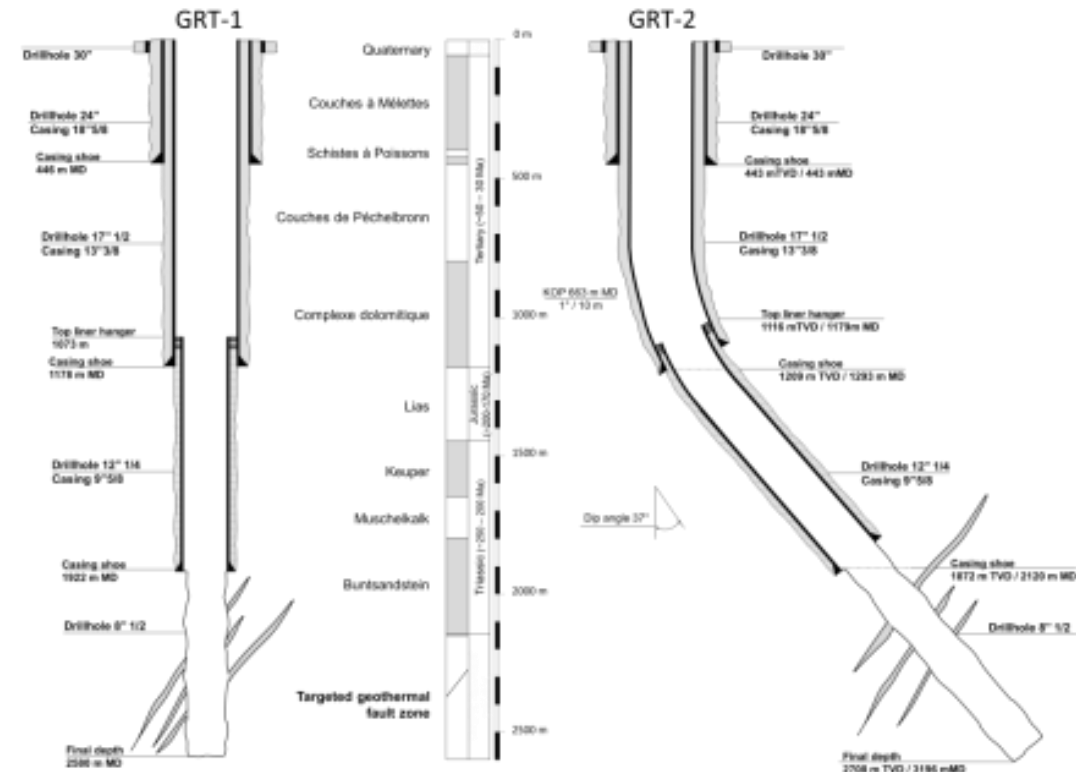


## RESERVOIR CHARACTERISTICS

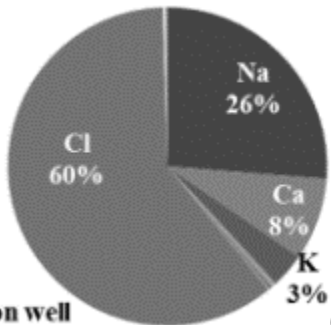
- Reservoir depth: 2500 m
- Fractured sandstone and carboniferous granite
- Bottom hole temperature: 177°C
- **2 wells in operation**
- 1 production well: GRT-2 (drilled in 2014)
- 1 injection well: GRT-1 (drilled in 2012)
- Low productivity index of GRT-1 after drilling
  - Thermal, chemical and hydraulic stimulation (Apr-July 2013)
  - Max pressure of 35 bar during hydraulic stimulation
- **Classified as EGS project**
- Very good productivity index of GRT-2 after drilling
- Na-Ca-K-Cl dominated brine, TDS:100 g/l, NCG: 0.24%mass



Source ES

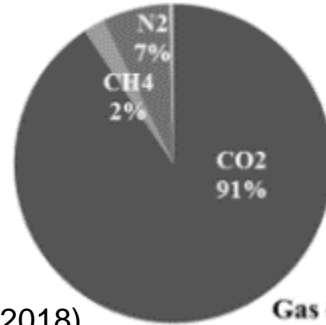


(Baujard et al., 2017)



Production well

(Mouchot et al., 2018)



Gas composition at Production well



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## ○ PLANT DESCRIPTION

- Build in mid 2015 to mid 2016
- In operation since may 2016
- 1 primary loop (brine) and 1 transport loop (fresh water)
- **Pressurized geothermal loop** (25 bar)
- No NCG emission in operation
- 1 Downhole production Line Shaft Pump
- 12 heat exchangers in series
- **Max heat capacity: 27.5 MWth**
- Total plant electrical consumption: 550 kW
- 15 km long transport loop, 1 m deep



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## ○ OPERATIONAL DATA IN 2019

- Well head temperature: 168°C
- Average production flowrate: 280 m<sup>3</sup>/h
- 2 weeks of maintenance
- 8400 h of operation (96% of availability)
- Main failure: external (electrical grid)
- 4°C of losses on 15 km
- 193 GWh of heat produced by the geothermal plant
- **175 GWh of heat supplied to the heat user**
- Average power of the heat user: 21 MWth
- **43 000 tCO<sub>2</sub> saved from natural gas burning**



○ Thank you for your attention

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