



# ECOGL : an EGS project for the industry in the Upper Rhine Graben

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**ADEME**

French Environment and Energy Management Agency





## About ADEME

### French environment and energy management agency

ADEME is a **public agency** under the joint authority of the *Ministry for Ecology, Sustainable Development and Energy* and the *Ministry for Higher Education and Research*.



#### Missions:

- ✓ supervising & coordinating the application of **environmental policies** and supporting public authorities for their **design**
- ✓ encouraging and **animating** the sector, providing **expertise** and advice
- ✓ facilitating and undertaking operations of private & public entities  
with the aim of **protecting the environment** and **managing energy**



## ECOIGI:

### Exploitation de la Chaleur d'Origine Géothermale pour l'Industrie (*Exploitation of geothermal heat for industrial applications*)



- ✓ **First geothermal project** at high temperature ( $>150^{\circ}$  C) in France for a heat application (target of  $24\text{MW}_{\text{th}}$ )
- ✓ **Lessons learned from the Soultz-sous-Forêts EGS** successfully applied for enhancing permeability and targeting the second well
- ✓ **15 km** transport loop
- ✓ Development of **expertise** for stimulations, optimized well emplacement and hydraulic testing of deep fractured rocks

## The application

### Roquette Frères bio-refinery in *Beinheim*

- Major player in starch manufacturing (3.1 B€ turnover, >8k employees, 21 sites)
- Products: Polyols (Sugar alcohols), Proteins & Derivatives, Starches
- Markets: Nutrition, pharmacy, green chemistry



- Beinheim site energy needs: ~ 100MWth  
→ Geothermal project: 25% of the energy demand
- Global strategy: reduction of the gas consumption by 70%: geothermal energy, biomass, reduction of the demand



## The project



Joint venture:

- Groupe *Electricité de Strasbourg* (energy provider): 40%
- *Roquette Frères* (bio-refinery): 40%
- *Caisse des dépôts*: 20%



- 55 M€ Total investment
- 18+6 M€ French incentive from the *Renewable Heat Fund* (ADEME)
- Risk insurance mechanism:
  - *Short term guarantee covering 10% to 60%*
  - *Long term guarantee*



## Technical data

<b>2 Wells</b>	2500-3000 m
<b>Operating Hours</b>	8.000 h/year
<b>Temperature</b>	170° C
<b>Transport Loop</b>	15 km
<b>Thermal Power</b>	24 MW <sub>th</sub>
<b>Reduction of GHG emissions</b>	40 kt/y



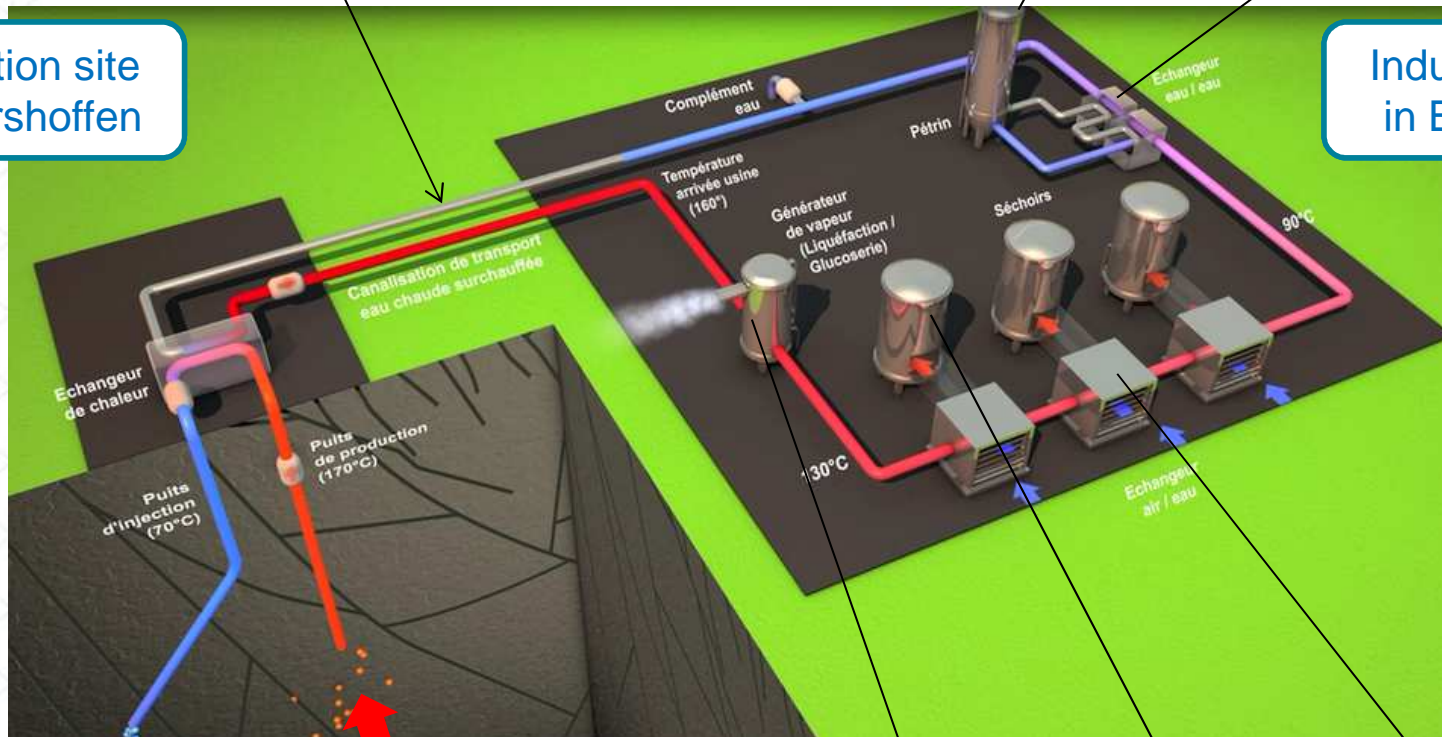
## The ECOGI concept

15 km transport of overheated hot water:  
 double-envelope pipe to lower energy  
 losses (maximum 3° C)

*multiple applications in series:*

Production site  
 in Rittershoffen

Industrial site  
 in Beinheim



**24 MW<sub>th</sub>: 70l/s, 170° C**

steam prod.

Starch dryer

Water/air HH

# Planning

2011	2012	2013	2014	2015	2016
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**ECOGI**

JV creation

**Civil works**

Platform construction



**GRT1**

Drilling and well development

**Seismic**

Survey

**GRT2**

Drilling and tracer tests

**Surface loop**

Thermal plant

Thermal loop

Bio-refinery

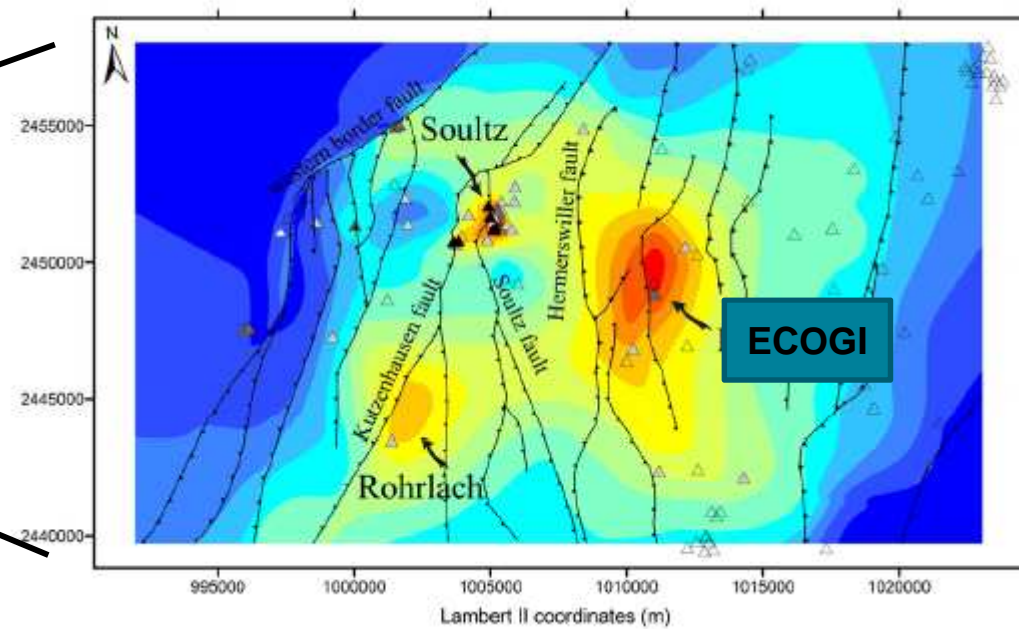
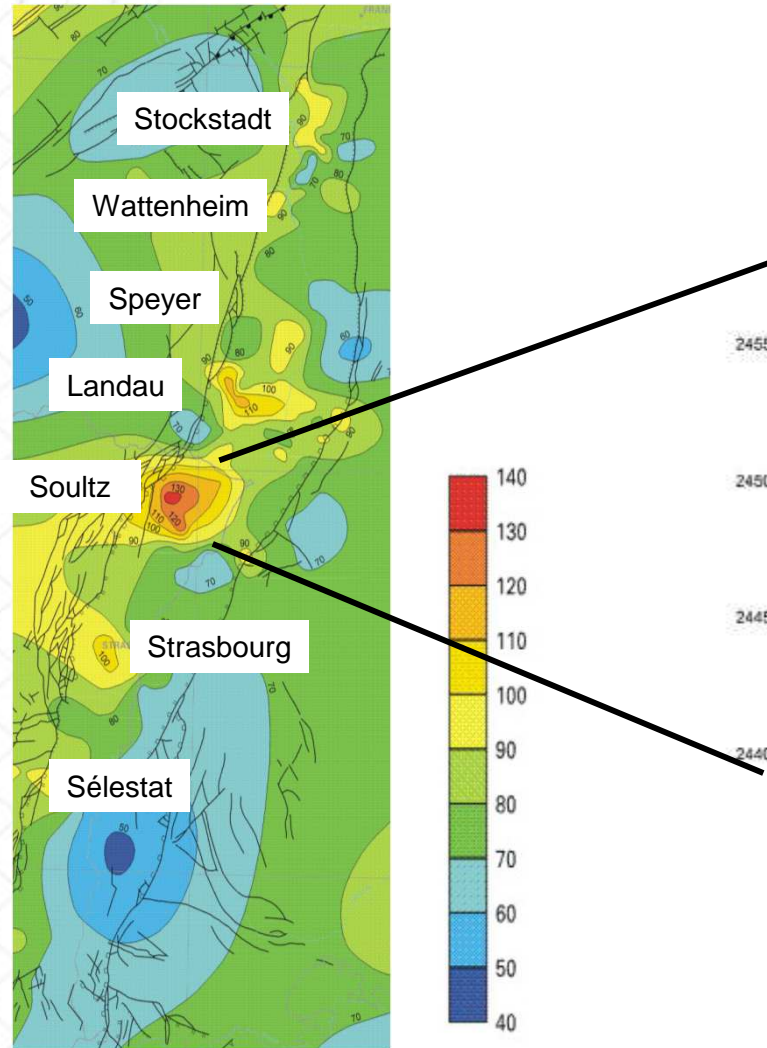


**ECOGI**

Commissioning

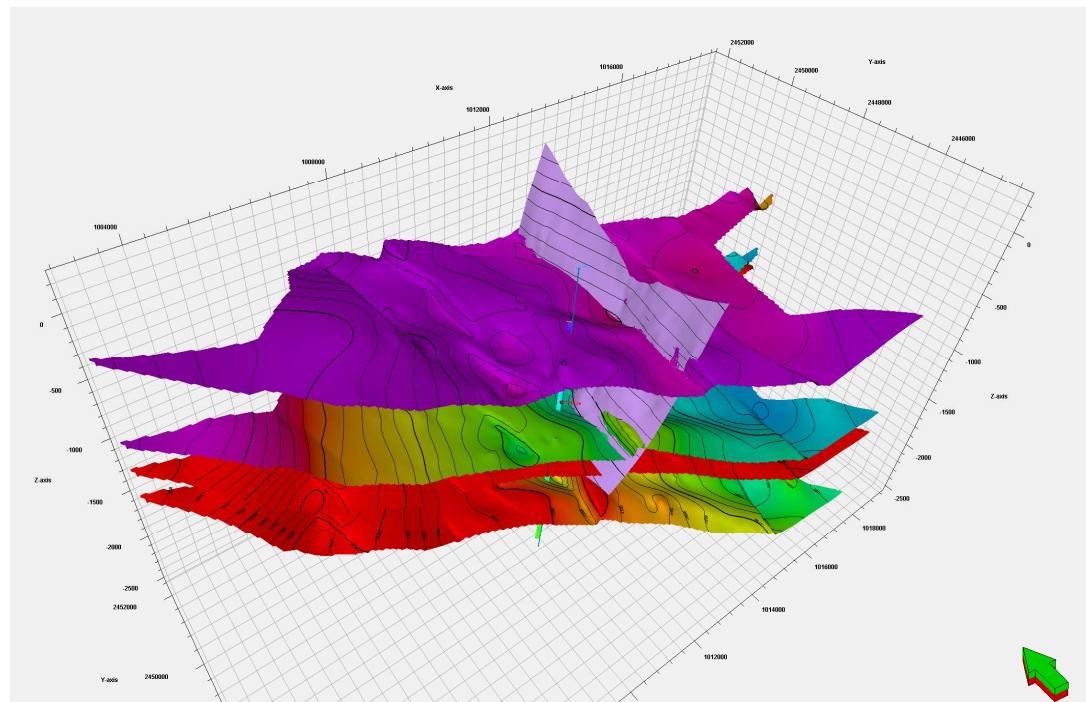


## Background: a series of geothermal anomalies in the Upper Rhine Graben (URG)



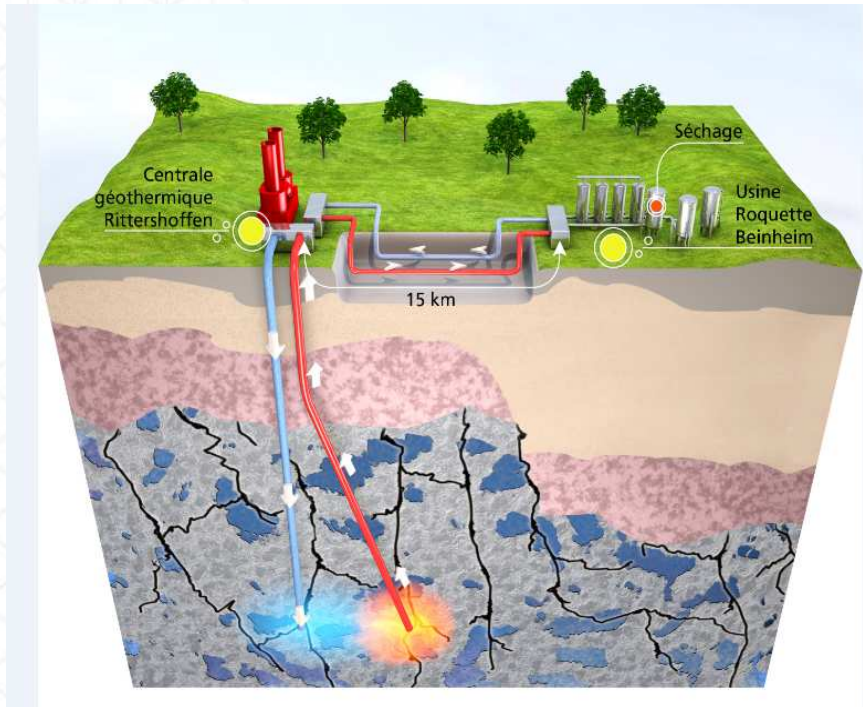
Baillieux, 2012

- ✓ Seismic acquisition
  - ✓ Acoustic imaging
  - ✓ Elaboration of data from existing oil wells
  - ✓ ...
- New skills and expertise developed by ES-Group





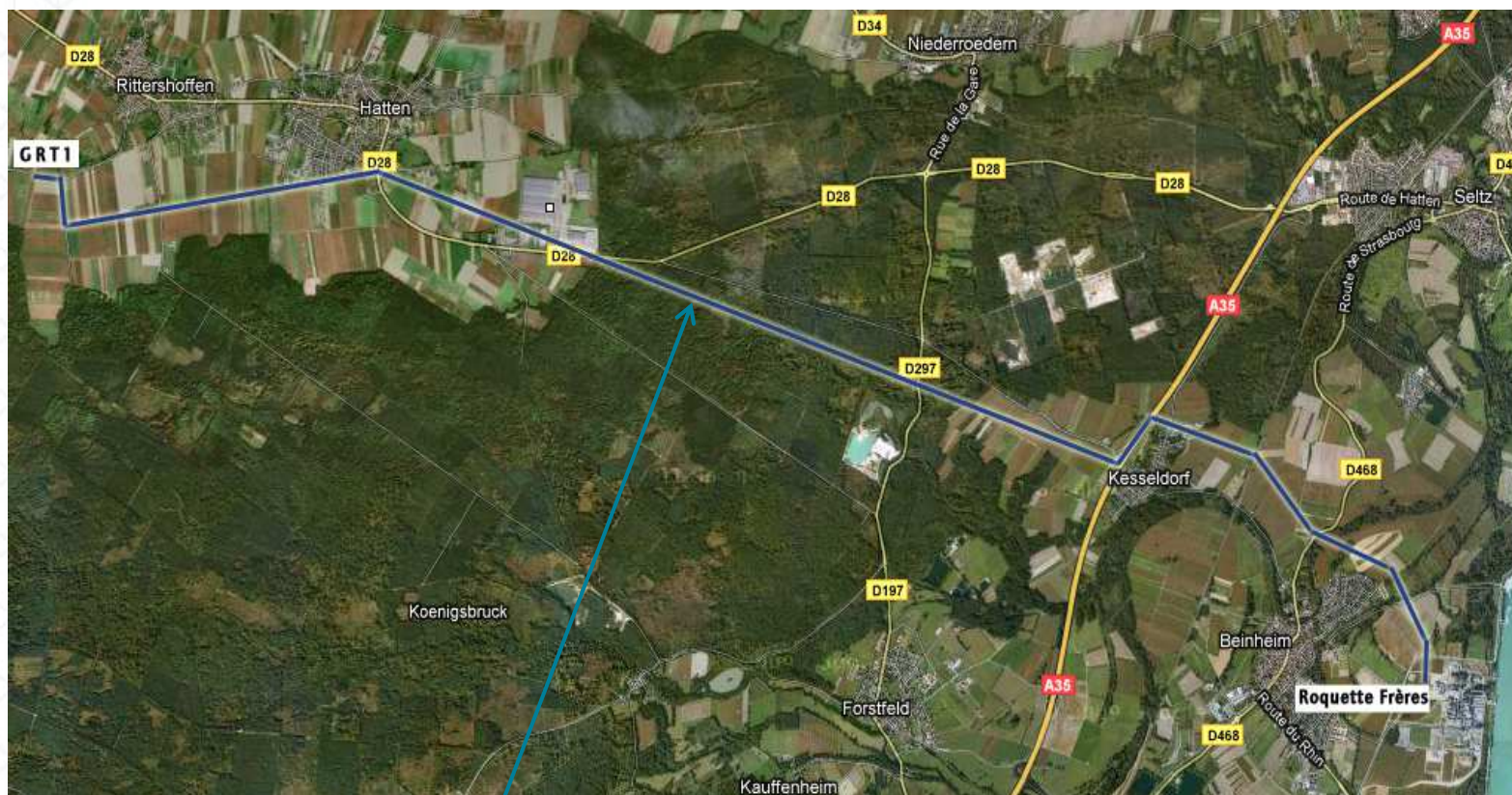
## Geothermal doublet : GRT-1 + GRT-2



- **GRT-1** : vertical well, 2600 m (600 m open section)
- **GRT-2** : deviated well, 3200 m (1000 m open section)
- Distance at the bottom: 1200 m
- Target: a faulted structure
- All wells achieved in 2014



## Over-heated pipeline from Rittershoffen and Beinheim



15 km transport loop between Rittershoffen and Beinheim

## Over-heated pipeline from Rittershoffen and Beinheim



**High temperature pipe :**  
 steel cased pipe-in-pipe  
 with vacuum, preloaded  
 ID : 250 mm  
 OD : 450 mm  
 thermal losses:  
 4° C/15km



**Return pipe :**  
 insulated pipe  
 ID : 250 mm  
 OD : 450 mm  
 Thermal losses:  
 3° C/15 km



## ECOGL: Well development and testing

### GRT-1 Well development

- Cold fluid reinjection (4200 m<sup>3</sup>, < 25 l/s, < 35 bars)
- Chemical cleaning with biodegradable products
- Hydraulic improvement of the well (3150 m<sup>3</sup>, < 80 l/s, < 35 bars)  
⇒ **Injectivity x 5**

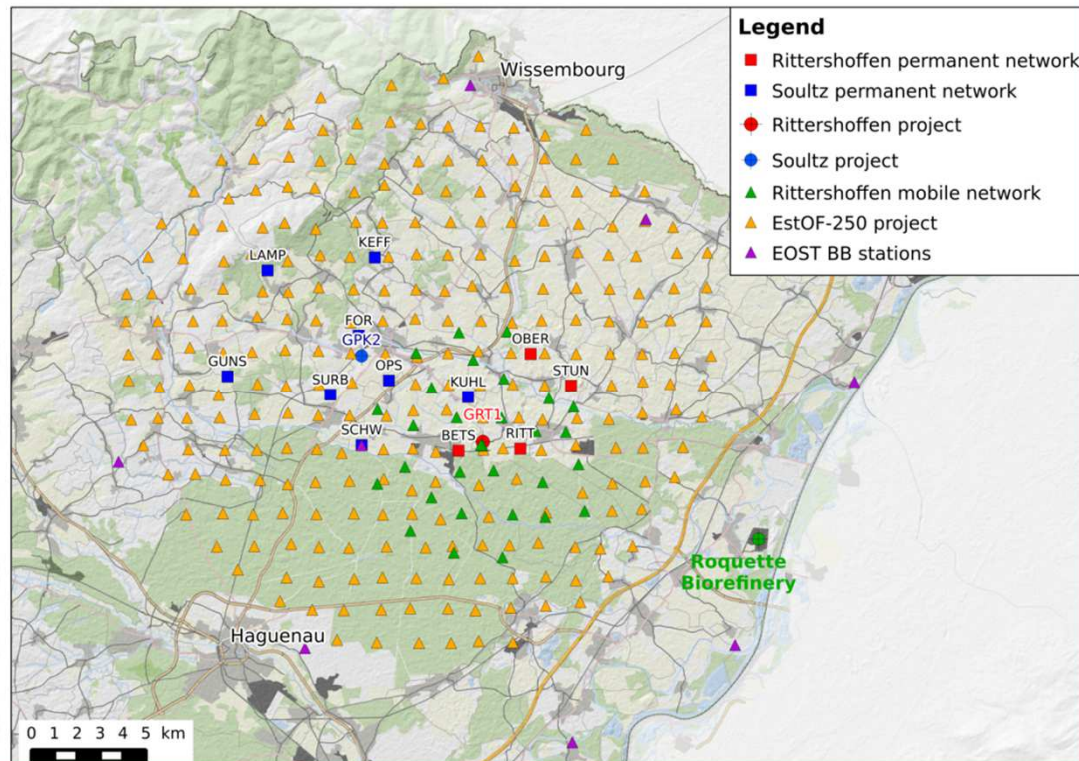
### GRT-2 Well testing

- Good production well
- No need for stimulation
- Tracer test between GRT-1 (injection well) and GRT-2 (production well)

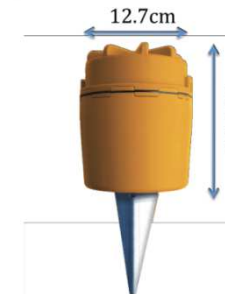




## Seismic monitoring



- More than 300 stations installed
- More than 500 micro-EQ automatically detected between 2012 and 2015
- $M_{lv}$  max : 1.5
- No micro-EQ felt by population



## An example of collaboration: an Upper Rhine Valley alliance

- ÉCOGI benefits from the know-how of the German-French pilote project of Soultz-sous-Forêts
- ÉCOGI contributes to the development of industry in Northern Alsace
- For drilling activities, different French actors are involved: drilling operations, borehole supervision and prime contractor, well testing, cementing, geological & fluid data
- Project owner delegate: ÉS Géothermie, a daughter company from Groupe ÉS, is specialized in the technical supervision of geothermal energy project
- German expertise is involved through the reservoir development program
- Local support from academic research for seismic monitoring from Strasbourg university (EOST-LABEX in Deep Geothermal energy) and Karlsruhe with KIT





## Conclusions

- ✓ First industrial EGS in France
- ✓ Valorization of the lessons learned from the pilot EGS in Soultz
- ✓ Development of expertise for stimulations, optimized well emplacement and hydraulic testing of deep fractured rocks
- ✓ Enhancement of the energy mix of the Beinheim site of RF
- ✓ Local energy for local industry
- ✓ Further developments: ongoing exploration phase in Illkirch...



## More information

Baujard et al., 2014, “The ECOGI EGS project in Rittershoffen, France”, GRC, Portland, Oregon

Baujard et al., 2015, “ECOGI, a new deep EGS project in Alsace, Rhine Graben, France”, WGC, Melbourne, Australia

Maurer et al., 2015, “Seismic monitoring of the Rittershoffen EGS project (Alsace, France)”, WGC, Melbourne, Australia

Gaucher et al., 2015, “Migration based detection and location of the seismicity induced at Rittershoffen EGS (France)”, WGC, Melbourne, Australia

## Contacts



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ROQUETTE

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# Thank you



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## Questions?

