Potential for the energetical and material utilization of geothermal brines in the upper Rhine valley Germany – Example Insheim

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BrineMine Webinar

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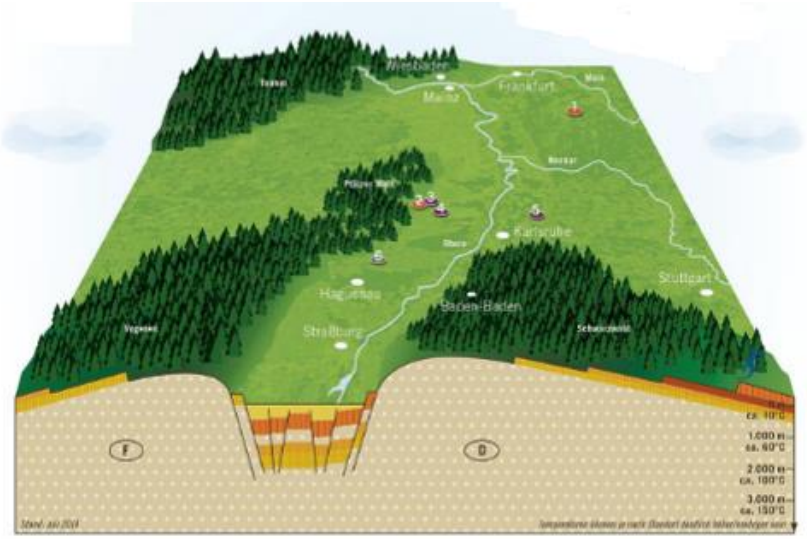
Geothermal sites - a bright future for the Upper Rhine Graben brines



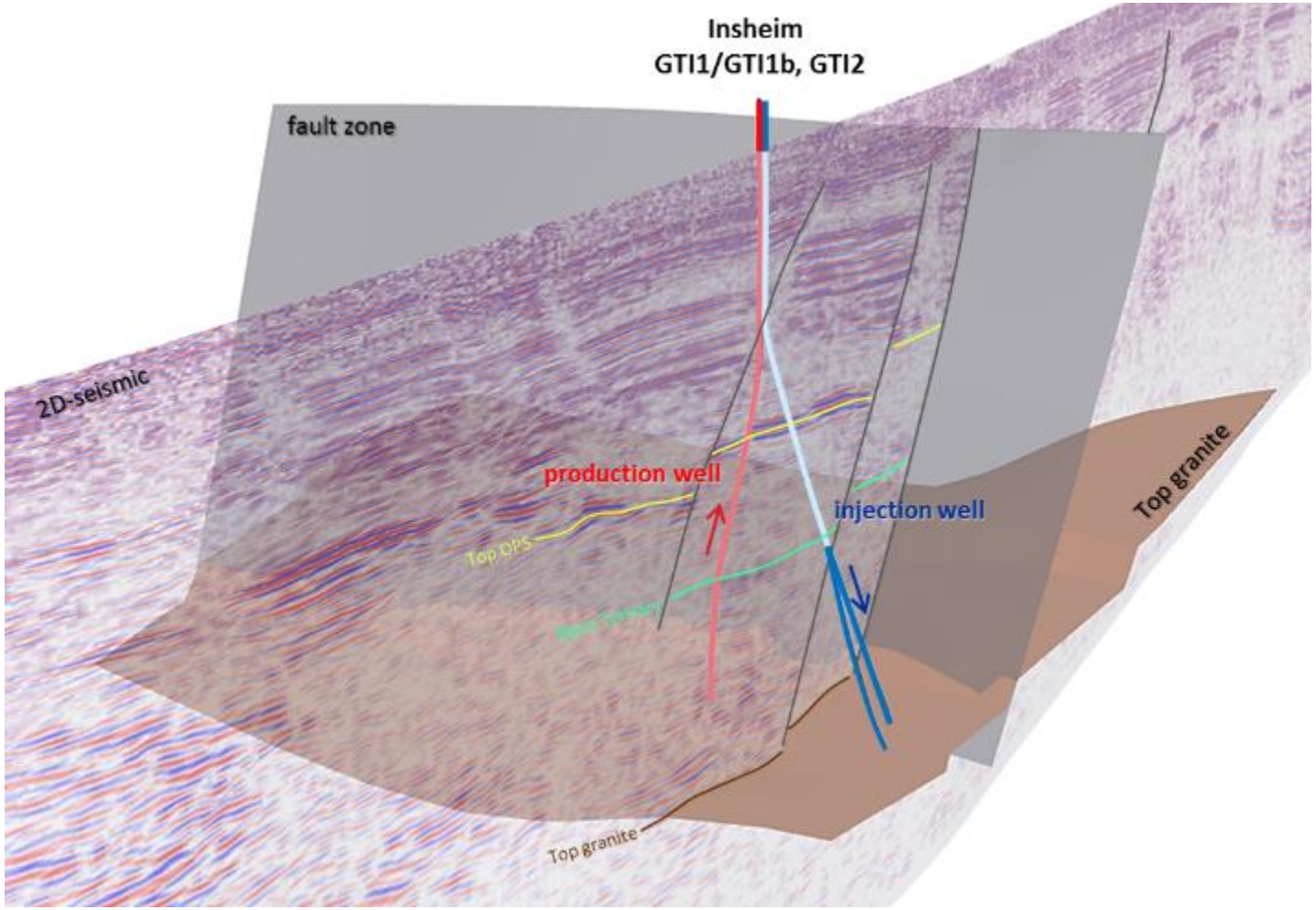
5 projects in operation
16 projects under development

#	Site	Country	Project holder/ Operator	Power Production	Heat supply	Lithium Extraction	Operational since	Planned operation
1	Landau	GER	geo-x	X	X		2007	
2	**Insheim**		**PW geofuture**	**X**		**X**	**2012**	
3	Bruchsal		EnBW	X	X	X	2009	
4	Soultz-sous-Forêts	France	ÉS-Géothermie	X			2008	
5	Rittershoffen				X		2016	
6	Illkirch	France	ÉS-Géothermie	X	X			2024
7	3 Projects under development		Fonroche Géothermie	X	X	X		2022
-								-
9								2026
10	Bruehl	GER	EnBW/MVV		X			2024
11	Schifferstadt		Public untilities Speyer/Schifferstadt	X	X	If possible		2025
12	Woerth		Public untility Woerth	X	X	If possible		2026
13	Freiburg		Public untility Freiburg		X			
14	4 Projects under development		Deutsche Erdwaerme	X	X	If possible		2022
-								-
17								2026
18	4 Projects under development		Vulcan Energy	X	If possible	X		2024
-								-
21								2026

Project history

Since February 2007	Project-planning and preparation HotRock Engineering GmbH
November 2007	Start of drilling operations
June to September 2008	Successful drilling of first well GTI 1
November 2008	Acquisition of project from the geothermal project leader HotRock Engineering GmbH by Pfalzwerke AG
January to April 2009	Successful drilling of second well GTI 2
April and November 2009 March and April 2010	Production tests: examination of flow-rate and temperature of the thermal water
August to October 2010	Sidetrack – drilling in reinjection well GTI 1
13 November 2012	Start of power plant operation

Exploitation of the geothermal reservoir



Technical data

• Brine temperature	165°C
• Flow rate (max.)	70 l/s
	~ 2.500.000 m³/a
• Electric output	
• Power (max.)	4,0 MW_{el}
• Energy (year)	35.000 MWh_{el}
• High availability	8.500 h/a
• Thermal energy (option)	
• Energy (max.)	10 MW_{th}
• On site power demand	25%
• Remuneration under the EEG (German Renewable Energy Law)	25 ct/kWh_{el}
• Total cost	50 Mio.€

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Mitigation induced seismicity

Response profile

Perceptual range

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Measurement values	Ground velocity (mm/s) 0,2 < v < 0,5	Ground velocity (mm/s) 0,5 < v < 1,0 or 5 events level 1 in 12h	Ground velocity (mm/s) 1,0 < v < 3,0	Ground velocity (mm/s) 3,0 < v < 5,0	Ground velocity (mm/s) 5,0 < v < 10,0 or 3 events level 4 in 12h	Ground velocity (mm/s) v > 10,0 or 5 events level 5 in 12h
Action	Notification, Documentation of all Vibrations	Notificatioin, temporary reduction of flow rate	Notification; Evaluation of events temporary stepwise reduction of flow rate	Notification; Evaluation of events further reduction of flow rate	Notification, Operation with minimized flow rate over a longer period and in consul-tation with the mining authority	Notification, controlled shutdown of the power plant

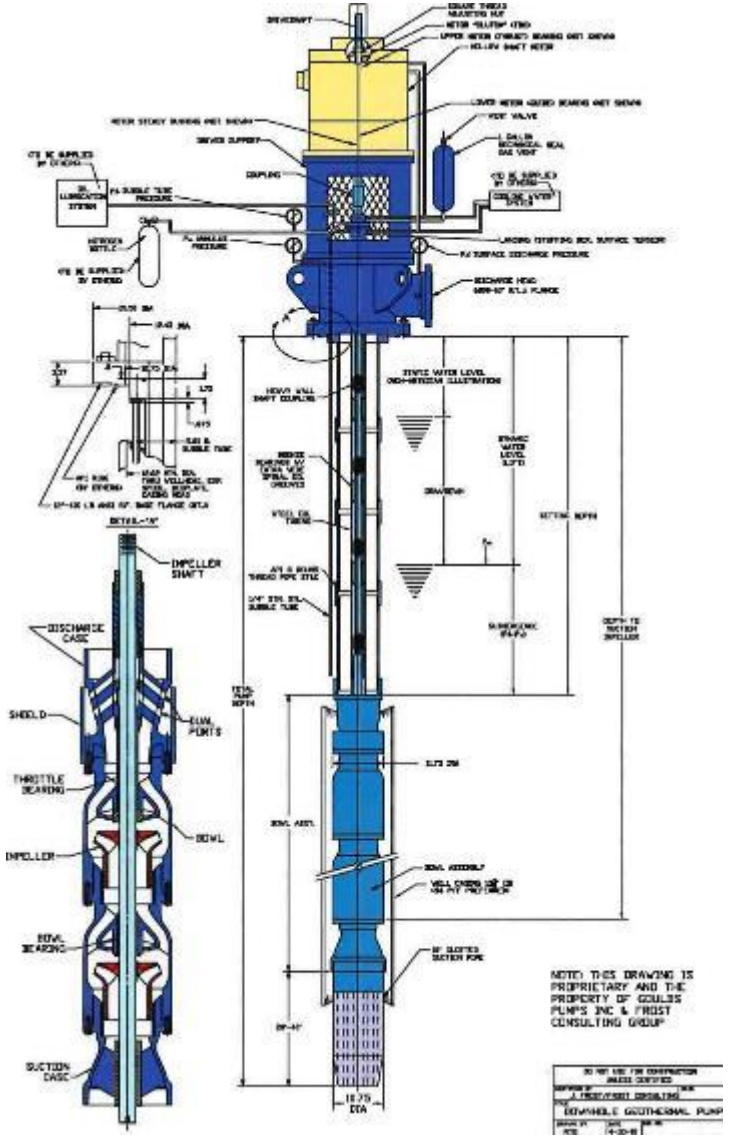
Operating range

Reference value **v** of DIN 4150

Line shaft pump

Due to the relatively high water temperature only line shaft pumps (LSP) are available:

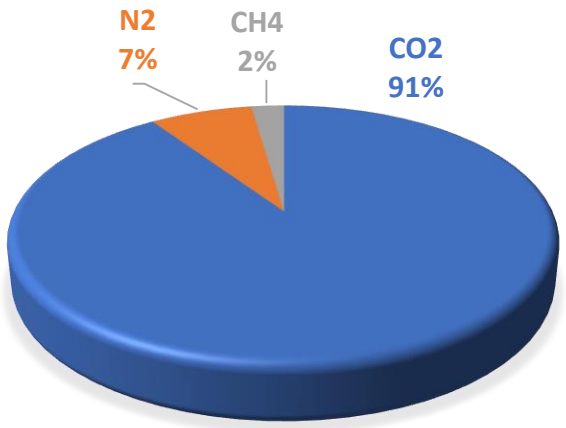
- More reliable than ESPs
- But complex and difficult to change



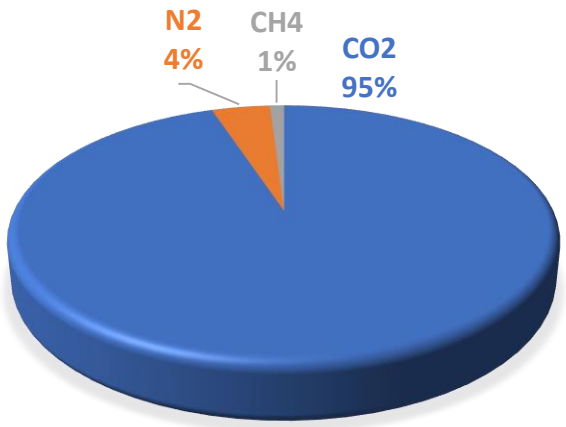
Brines in the Upper Rhine Graben

dissolved gases in brines of the Upper Rhine Graben			
	Insheim	Soultz	Bruchsal
Gas content per L brine in standard litres	1,18	1,0	1,6
Degassing pressure in bar	~19 (163°C)	-	-

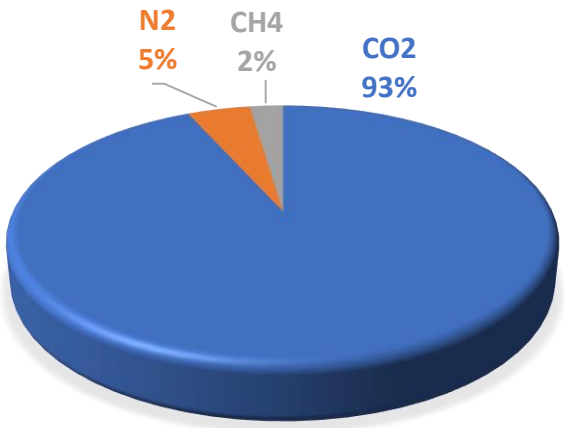
degassing pressure = water vapour pressure + partial pressures non condensable gases



Insheim



Soultz



Bruchsal

Lithium in the Upper Rhine Graben (URG)

- URG belongs to the most potentially viable Lithium-deposits in Europe
- Lithium contents in the thermal brines are between 150 and 200 mg/l
- Additional added value at existing and future geothermal projects
- Establishment of a domestic supply chain for the strategic raw material lithium
- The brine is provided by the geothermal plant, therefore no additional facilities are required for raw material supply
- Thus a sustainable and environmentally friendly production is expected

Geothermal Power Plant Insheim

Thank you for your attention!

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