

Sustainable Geothermal Lithium Triangle in the Upper Rhine Graben

Currently, the co-production of lithium from deep geothermal plants is being discussed worldwide and has already been implemented locally on a pilot basis. Especially in the field of electro vehicles (EV), the demand for lithium is increasing rapidly. In Europe, there are well identified exploitable resources for lithium in the Upper Rhine Graben from Alsace in France to Germany near Mannheim where the deep geothermal brines reveal lithium contents up to 200 mg/L.

In particular, the geothermal sites in Landau, Bruchsal, and Soultz-sous-Forêts indicate a sustainable lithium source in the subsurface, as they show constant lithium contents for more than 10 years of plant operation, forming the sustainable geothermal lithium triangle in the Upper Rhine Graben (**Figure 1**). The Insheim and Rittershoffen geothermal sites are also part of this region, with the highest values measured in Rittershoffen at 190 mg lithium per liter geothermal water (**Table 1**).

The aspect of the Upper Rhine Graben comprising considerable potential is indicated by other locations, such as the Cronenbourg drilling well in the northwest of Strasbourg where lithium concentrations up to 210 mg/L have been measured in the past. Thus, geothermal lithium in the Upper Rhine Graben is the focus: based on an average lithium concentration of 200

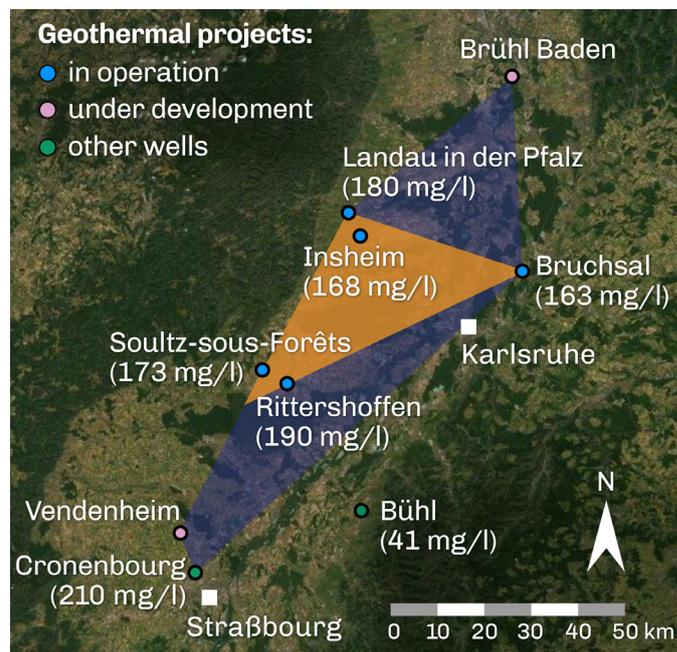


Figure 1: Lithium distribution in the Upper Rhine Graben: the orange marked area shapes the geothermal lithium triangle characterized by sustainable lithium concentrations. The blue area includes all geothermal sites with lithium levels over 150 mg/L.

mg/L, a single project has an estimated annual production capacity of 1,000 tons of lithium carbonate (assuming a production rate of 50 L/s, a lithium recovery rate of 70 % and 8.000 operating hours).

Site	Operator	Reservoir formation	Wells drilled	Operating since	Flow rate (L/s)	Lithium content (mg/L)
Landau (Pfalz)	ecoprime	Granite	2	2007	40	180
Insheim	Natürlich Insheim*	Granite	2.5	2012	70	168
Bruchsal	EnBW	Sedimentary rock	2	2011	28	163
Soultz-sous-Forêts	ÉS	Granite	4	2008	30	173
Rittershoffen	ÉS	Granite	2	2016	80	190

Table 1: Assemblage of the geothermal sites in the Upper Rhine Graben indicating a sustainable lithium production. Lithium concentrations according to Sanjuan et al. (2016)¹.

¹ Sanjuan, B. Millot, R. Innocent, Ch. Dezayes, Ch. Scheiber, J. Brach, M., 2016. Major geochemical characteristics of geothermal brines from the Upper Rhine Graben granitic basement with constraints on temperature and circulation. Chemical Geology 428, 27-47.

* from January 2022; previously Pfalzwerke geofuture