

### AFPG Geothermal energy, tomorrow's energy starting today!

The French Geothermal Association of Professionals was created in June 15, 2010 in Paris. Beginning 2020, AFPG gathers around 100 members representing the different geothermal professions in France and overseas: drillers, heat pump manufacturers and installers, district heating operators, consulting engineers, ...

It is organised into 2 sectors:

- · Shallow geothermal energy
- Deep geothermal energy

AFPG objectives are to promote the use of geothermal energy, as a renewable energy that allows the production of electricity, heat and cooling. These tasks are divided into four major areas:

- Representing and federating French professionals of the sector (mainland and overseas),
- Informing communities, manufacturers and individuals of geothermal resources and the diversity of the geothermal offer and advantages,
- Supporting the public authorities to adapt regulations, legislation and certifications,
- Contributing to the emergence of new technologies such as temperate geothermal water closed-loop.



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AFPG also federates **GEODEEP**, a multidisciplinary cluster for geothermal heat and power that brings together French companies involved in deep geothermal energy with export activities. Specialized in resource exploration, engineering, construction of high-energy geothermal power plants, and district heating. GEODEEP covers the entire value chain and offers turnkey solutions.





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# GEOTHERMAL ENERGY IN FRANCE

## 2021 Sector Study

#### **OVERVIEW**





#### Shallow geothermal



#### Deep geothermal Heat production



By exploiting geothermal resources at temperatures higher than 120°C, it is possible to produce electricity and heat (co-production). France has developed a significant know-how since 2011 with 2 power plants: Bouillante (Guadeloupe) and Soultz-sous-Forêts (Alsace). This development has been accomplished in June 2016 with the inauguration in Alsace of the third French power plant, ECOGI producing only high temperature heat.

The achievement of numerous ongoing projects would enable to reach an installed capacity of 160 MWe in France by 2028.

Zone	Number of projects	Power capacity (MWe)	
Installed operations in 2020	2	17	
Mainland permits	11	59	
Research permits overseas	3	90	
Total France (2028)	16	166	

Shallow geothermal energy can provide individual housings, but also collective and tertiary buildings (hospital, long term care houses) with heating, sanitary hot water, cooling and cold production.



The individual geothermal heat pump market has stabilised for few years, but at a very low rate: around 3000 geothermal heat pumps sold in 2020 (Observ'ER).

This rate is very low compared to 10 years ago and represents a small percentage of a market dominated by air/air heat pumps and thermodynamics water-heaters (around 100 000 unities sold a year each) whereas geothermal energy has numerous advantages: discretion (visual and sound), no heating island effect, very high performances,...



In the shallow geothermal energy sector, the situation is contrasted: if the private market felt-down in recent years, the collective one shows a permanent growth (+10% per year). Several innovative technologies have shown a strong dynamism. like the geothermal temperate water closed-loop also known as "thermal smart-grid" or geothermal spiral heat exchanger

According to this market study, around 3,6 TWh of shallow geothermal energy have been produced in 2020 in the individual market and 1,17 TWh in the collective and tertiary sectors.

> If the ongoing dynamics is in line with the 2016 PPE objectives, it is essential to support his development to be able to reach the new ambitious objectives set at the horizon 2028, and even to exceed them!

Operating geothermal resources at temperature between 30°C and 90°C, can deliver large amount of heat. It supplies urban districts heating, agricultural installations or thermal baths.

It is a dynamic sector with already 80 operations in France and a dozen planed by 2023. In France, more than one million inhabitants are heated by geothermal district heating operations.

Location	Number of operations	Equivalent residential units	Total géothermal production (MWh/year)
TOTAL Paris bassin (incl. Moselle, Indre departements)	49	167 670	1 676 700
TOTAL Aquitaine bassin	17	11 230	112 300
TOTAL Other regions	6	21 090	210 900
TOTAL	72	approx. 200 000 E.R.U. → 1 inhabitants heated by deep geothermal energy in France	2 078 700 → 2 TWh

Overview on the French deep geothermal market in 2020 (AFPG)



The deep geothermal heat in France in 2020 represents about 2 TWh. among which 87% is delivered by districts heating networks.

#### Deep geothermal Power generation

Optimum expected geothermal power capacity

