Strategies & Policies on Geothermal Energy in France

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About ADEME

ADEME – French Ecological Transition Agency - is a public agency under the join authority of the **Ministry for Ecology** and the **Ministry for Research**.

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AGENCE DE LA TRANSITION ÉCOLOGIQUE

Missions

- Supervising & coordinating the application of **environmental policies** and supporting public authorities for their **design.**
- Encouraging and animating the sector, provides **expertise** and **advices.**
- Facilitating and undertaking operations of private & public entities with the aim of **protecting the environment** and **managing energy.**

About ADEME

French Ecological Transition Agency

Priority areas : renewable energies, energy efficiency, air quality, noise control, transport & mobility, waste & recycling, polluted soil and sites, environmental management.

Staff : ~ 1 000 employees (including ~ 400 engineers and doctors).

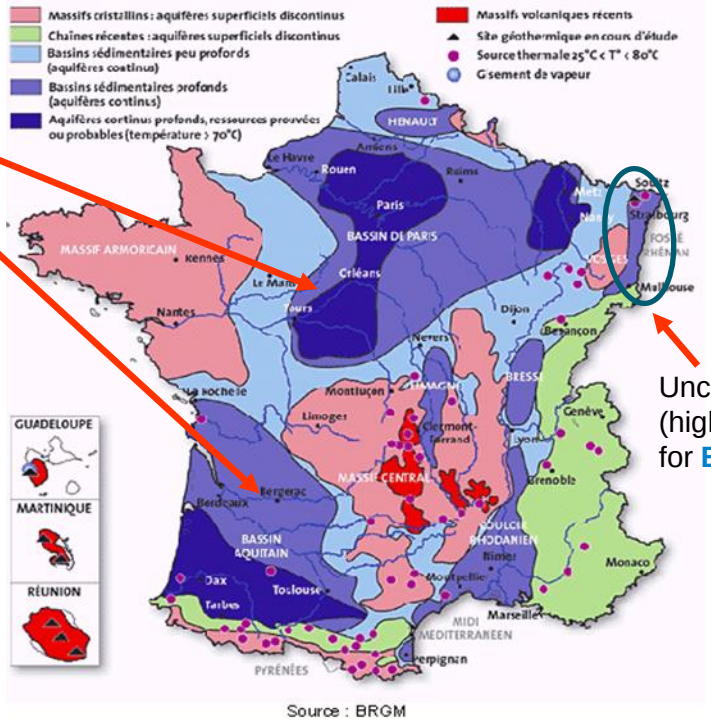
Organisation : 3 central departments, 17 regional branches including France's overseas territories.

2023 budget : 976 M€ action budget (520 M€ to promote renewable heat) + 273 M€ operating budget

Geothermal energy in France : geological context

Two **large sedimentary basins** around Paris and Bordeaux, with deep geothermal aquifers for geothermal direct uses.

Volcanic context in the overseas Departments with high enthalpy geothermal resources potentially existing.



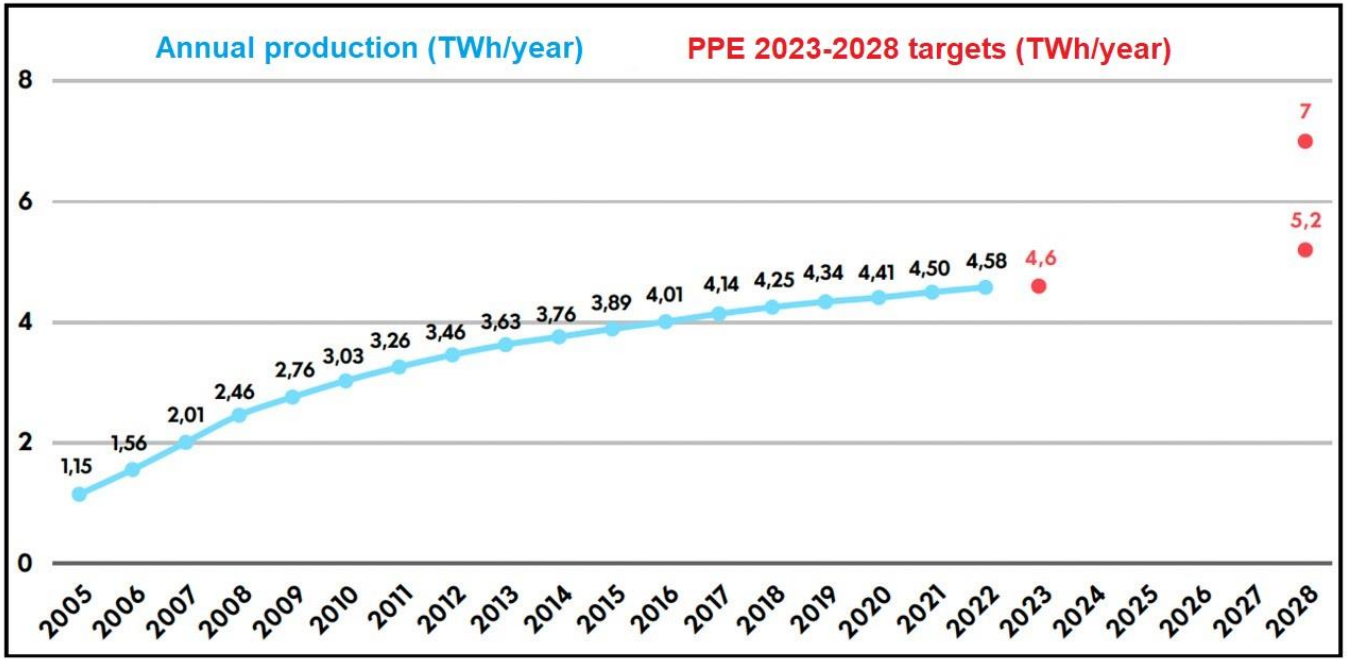
Source : BRGM

Unconventional geothermal resources (high-depth hot rock formations) suitable for **EGS** applications

Almost everywhere existing **shallow aquifers** for thermal uses with ground source heat pumps and almost everywhere possibilities for **geothermal closed loops**.

Shallow Geothermal Energy

Annual production (TWh/year) of shallow geothermal energy in mainland France since 2005 and PPE* 2023-2028 targets

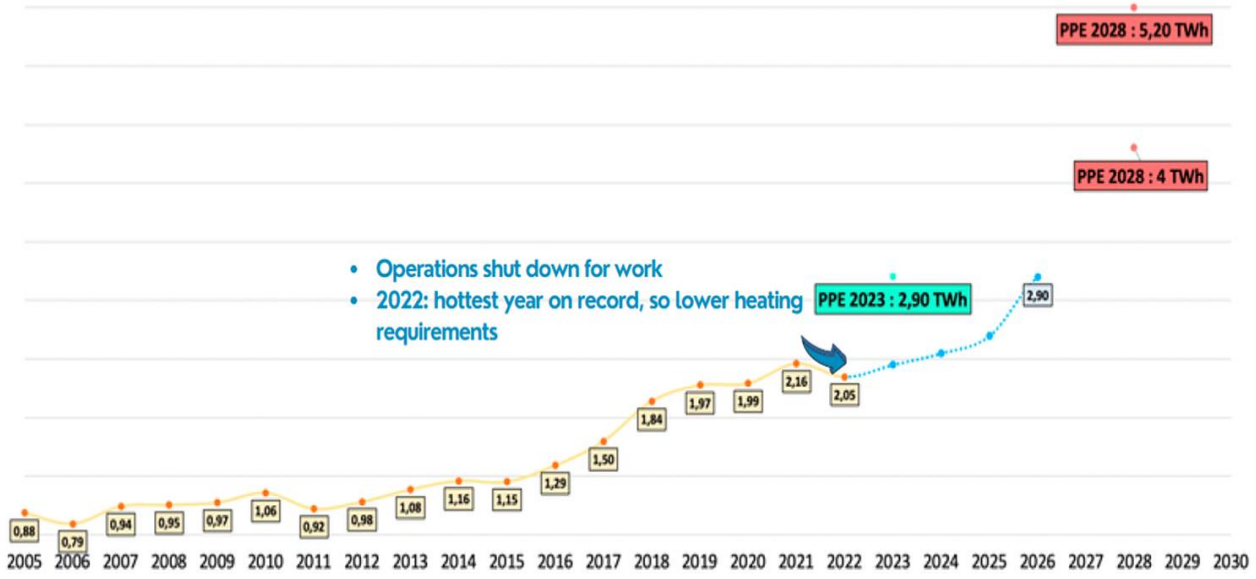


*PPE : Programmation Pluri-annuelle de l'Énergie (multi-annual energy programming)

- **205 300** installations in 2022.
- Mainly **(98%) for individual houses.**
- **Collective housing and tertiary building installations** (2% of the total) **produce almost 20%** of the energy produced with geothermal shallow energy in France in 2022.
- With the changing energy context and the global warming problem, the use of shallow geothermal energy **is expected to strongly increase** in the coming years, especially for collective housing and tertiary buildings.

Deep Geothermal Energy

Annual production (TWh/year) of deep geothermal energy in France since 2005 and PPE* 2023-2028 targets



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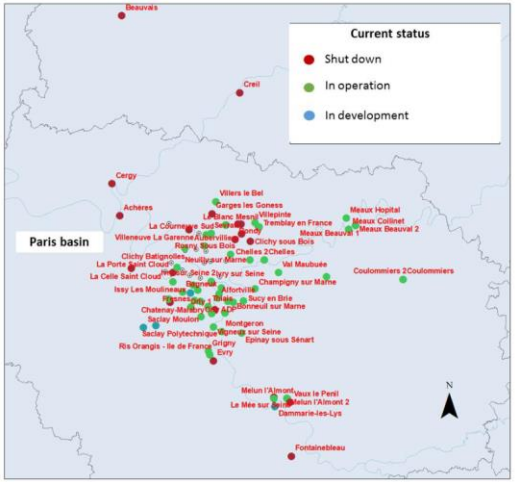
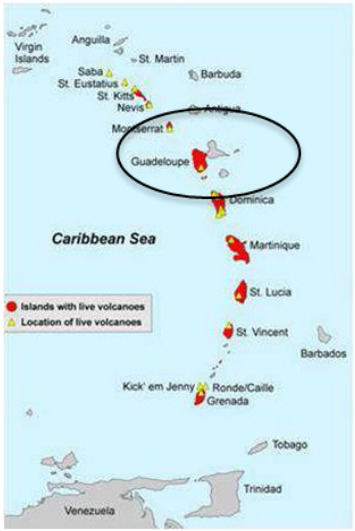
Deep geothermal heat production mainly dedicated to district heating

Basin	Numbers of plants	Number of dwelling-equivalents	Geothermal production in 2022 (MWh/year)
Paris Basin	55	315 229	1 697 376
Aquitain Basin	22	36 146	155 713
Others	2	19 940	193 576
Total	**79**	**371 315**	**2 046 665**

- **79 plants in operation in 2022** producing 2.05 TWh.
- High concentration in Paris area (83% of the heat produced).



Geothermal power production



Location of Guadeloupe in Caribbean area

Soultz geothermal power plant

Only 2 plants in operation:

- **15 MW** in Bouillante in Guadeloupe with an extension of 10 MW in progress.
- **1 MW** Soultz EGS plant in mainland France (Alsace – Rhein Graben).

Perspectives:

- **7 exploration licenses** in the overseas territories (Guadeloupe, Martinique, Réunion, Mayotte);
- Possibilities of a total of 57 MW for new EGS power (total power authorized by the administration).

A plan for geothermal energy

Energy situation in France vs Geothermal

In mainland France

- **45%** of the energy needs is for heat (**670 TWh**),
- **60%** of heat is produced with fossil fuel or gas (**400 TWh**),
- **25%** of the heat is produced by renewable energies (**170 TWh**),
- Less than **4%** of renewables energies is from geothermal (**6,5 TWh**) – i.e **1%** of the total amount of heat production in France).

In France overseas departments

- The majority of electricity produced comes from fossils fuels with high costs of production **(~ 300 €/MWh**).
- Most overseas territories are volcanic islands where high energy geothermal resources are potentially existing. These resources (if they exist) could be developed at a low cost (**~100-150 €/MWh**), with low CO_2 emissions (**~ 40 kg of CO_2/MWh vs 600-700 kg of CO_2/MWh with fossils fuels)** and as a base.

With the changing energy context and the problem of global warming, there is an urgent need to further promote geothermal energy.

February 2023 : Launch of a French national geothermal plan

2030 Geothermal annual production objectives:

From 4.5 to 7 TWh from shallow geothermal
From 2.05 to 7 TWh from deep geothermal

2050 Geothermal annual production objectives:

30 TWh from shallow geothermal
20 TWh from deep geothermal

Geothermal annual production capacities estimation:

100 TWh from shallow geothermal
50 TWh from deep geothermal

French national geothermal plan : main actions

- Strengthening drilling capacity (education / investment in rigs).
- Simplifying regulations (mining rules).
- Promotion of installations of geo HP (regulation, Cluster dedicated to urban geothermal energy).
- Improving knowledge of the subsoil (3D seismic with public funds).
- Reinforce specific existing tools for deep geothermal energy - Renewable Heat fund, Risk mitigation funds. Creation of a specific geothermal risk fund for the overseas territories.
- Encourage new financial arrangements (leasing, third investor, …).

A plan with a total of 50 actions which will be piloted by ADEME in relation with the Ministry of Energy Transition and professionals.

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