

## The geothermal energy market in France for heating and cooling

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### ABSTRACT

The first market study carried out in France by the French Association of Geothermal Professionals regarding the geothermal domain in France has demonstrated that the installed power for heating and cooling reached 1850 MWth in 2011. One third is related to the exploitation of the Dogger reservoir in the Paris area but the main part is linked to the recent and strong development of shallow geothermal resources in the whole country. The market for single housing using vertical geothermal probes is decreasing since 2009 due to the economic crisis. On the contrary, installations to feed collective housing and residential blocks including offices buildings is growing fast with the installation of very low temperature small district heating. The average power installed for each of these mini geothermal loops is of 2-4 MWth in order to connect 1000 dwelling equivalent in sub-urban areas. Consequently, the number of districts to benefit of geothermal energy is high. The direct uses concentrated mainly Ile de France restarted 4 years ago and more than 15 new deep geothermal doublets are planned in the next 5 years representing additional power of 150 MWth. The oldest plants, tapping the Dogger reservoir, has to be revamped because in exploitation since 40 years and more, consequently the drilling companies has already started to buy new rigs which can be operated in restricted area with no noise and the smallest impact as possible for the public acceptance. The very low temperature installations with doublets using underground waters at depths between 20 and 1000m have been boosted by the Fond Chaleur of ADEME which subsidies the plants to be competitive with natural gas. In the other hand the vertical ground source heat pump dry systems represent now 2/3 of the total installed power for heating and cooling. The main barrier remains administrative constraints and delays to get the permission for drilling in one hand and the calculation rules for new buildings (RT2012) which still encourage gas in the other. In 2020, the market will reach 4000 MWth installed if ecologically driven the target objectives at 6500 could be largely

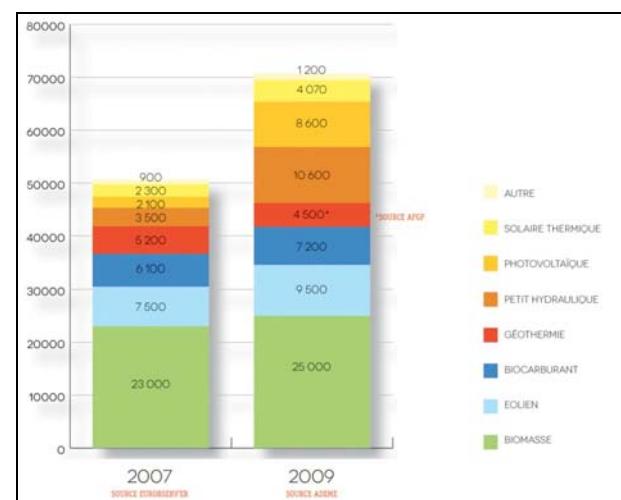
attained. In 2011 the turnover of the domain is around 500 million euros.

The role of the French Geothermal Association is to help the Ministries in charge of ecology, energy and industry to build a policy which will allow boosting the use of geothermal at the same level compared to biomass.

### 1. MAIN RESULTS OF THE MARKET STUDY (2011)

The net energy annual savings are of 410 000 tons of oil equivalent. The shallow geothermal sector represents 82% of the total amount of geothermal heat produced, and 3,4% of heating needs of the country. The contribution to reduce CO2 emissions is of about 1 million tons per year. More than 1 million citizens are heated and sometimes cooled by geothermal energy.

The turnover of the sector amount 500 million € in 2011 and the calculation done by AFPG confirms 4200 direct jobs which represent 6,5% of the total employment in the Renewable Energy sector.



**Figure 1: Jobs in the Renewable Energy sector in France (2009) ADEME**

The position of the country in enlarged EU is not good enough considering that the leading countries in the

northern part of the continent have small populations and relatively poor resources.

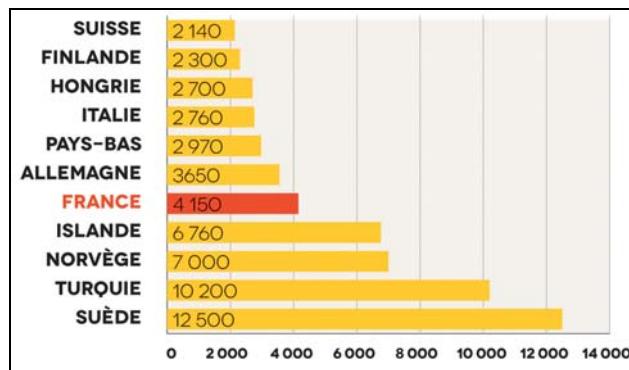


Figure 2: Heating production 2011 in GWh (AFFG)

## 2. WEAK AND STRONG POINTS OF THE GEOTHERMAL SECTOR

### 2.1 The weak points

The administrative delays are too long for operation involving drilling at depth over 100m. As an example, to get the permission for a new doublet to be drilled in Ile de France needs in between 8 and 12 months. These delays are killing a lot of projects of medium size in the private sector.

The average size of the companies acting in the sector is too small and there is no vertical integration of the operation including not only drilling but also surface installations and heat pump furniture.

The code and laws applicable don't take into account the recent technology of vertical geothermal probes and we are still waiting a new text encouraging small geothermal plants of 500 KWth maximum geothermal power which could be drilled down to 200m depth using a simple declaration to be constructed.

The size of the whole sector is still too small in order to benefit from scale effects.

### 2.2 The strong points

The technology is mature and the expertise both in GSHP and deep doublet is excellent. The tool box, to cover geological risk for the first well, the long term insurance for deep wells and AQUAPAC for shallow wells are in place since more than 25 year and have proved their efficiency to boost the development. Since 2009 ADEME put in place the Fond Chaleur which has been also an accelerator by means of subsidies to compete with gas. The situation is OK to the end of 2013 with a total yearly budget of about 200 million € but even the French minister of Environment seems to be favourable for continuing this effort nothing is yet secured for 2014.

The recent development plans for each region energy strategy has taken also geothermal in consideration.

The economic activity in geothermal is strongly performed at local level with regional companies and this advantage is of paramount importance for the sector in this difficult period for employment.

## 3. BOTTLENECKS AND BARRIERS

### 3.1 Direct uses

For deep geothermal energy using water over 50%, the main point is to maintain a reduced VAT at 5% as it is already in place for DH network utilizing more than 50% of renewables.

The continuation of Fond Chaleur is still of paramount importance for 2014. The delay regarding administrative permits has to be reduced.

The geological survey must help to open new province for geothermal promoting and financing wild cats in zones which has never been explored.

The effort put in research and adaptation of new techniques in drilling and pumping is also a key element.

### 3.2 Shallow geothermal

The adaptation of the law concerning the small geothermal plants has to be adopted now very soon in order to simplify the administrative constraints for individual GSHP installations (less than 30 kWth).

An adaptation of the new thermal regulation for buildings (RT 2012) needs to be amended in order to encourage geothermal heat pumps development and not to encourage the gas consumption.

## 4. CONCLUSIONS

The evolution of the market is well oriented for deep doublet and operation over 150 kWth shown on the figure below, on the opposite the small heat pump market for individual housing is catastrophic

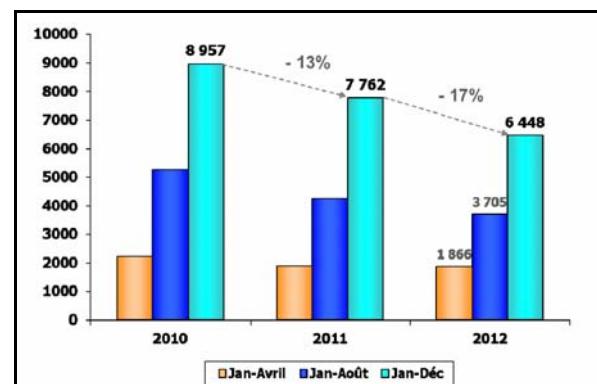
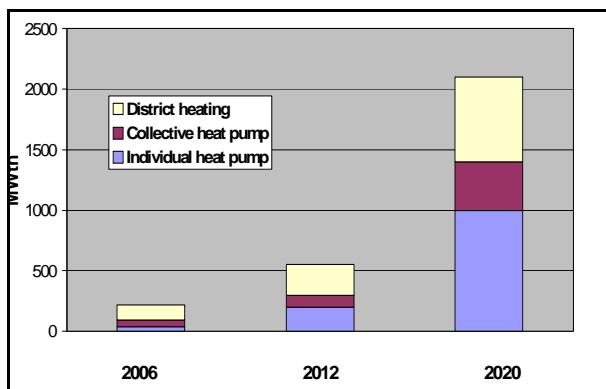


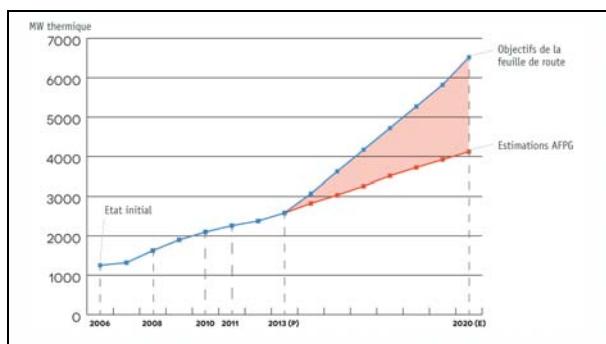
Figure 3: Geothermal HP from 0 to 15 kW sales (UNICLIMA-AFPAC)

The French road for geothermal energy was very ambitious and the target was to multiply the installed power for heating and cooling by 4 between 2012 and 2020.



**Figure 4: French road map (Grenelle)**

The individual housing represented half of the power and consequently without a change in the taxes policy this target will be never attained in 2012.



**Figure 5: Estimation of installed power by AFPG**

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The economic crisis is a strong negative factor which has reduced drastically the ambition of the sector, nevertheless the number of installations of plants with power comprised of 0,5 to 1 MW are numerous.

A special effort has to be done in direction of the house revamping sector because the application of geothermal at the moment is limited to new buildings which represent per year less than one per cent of the total building of the country.

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