Discovery Form

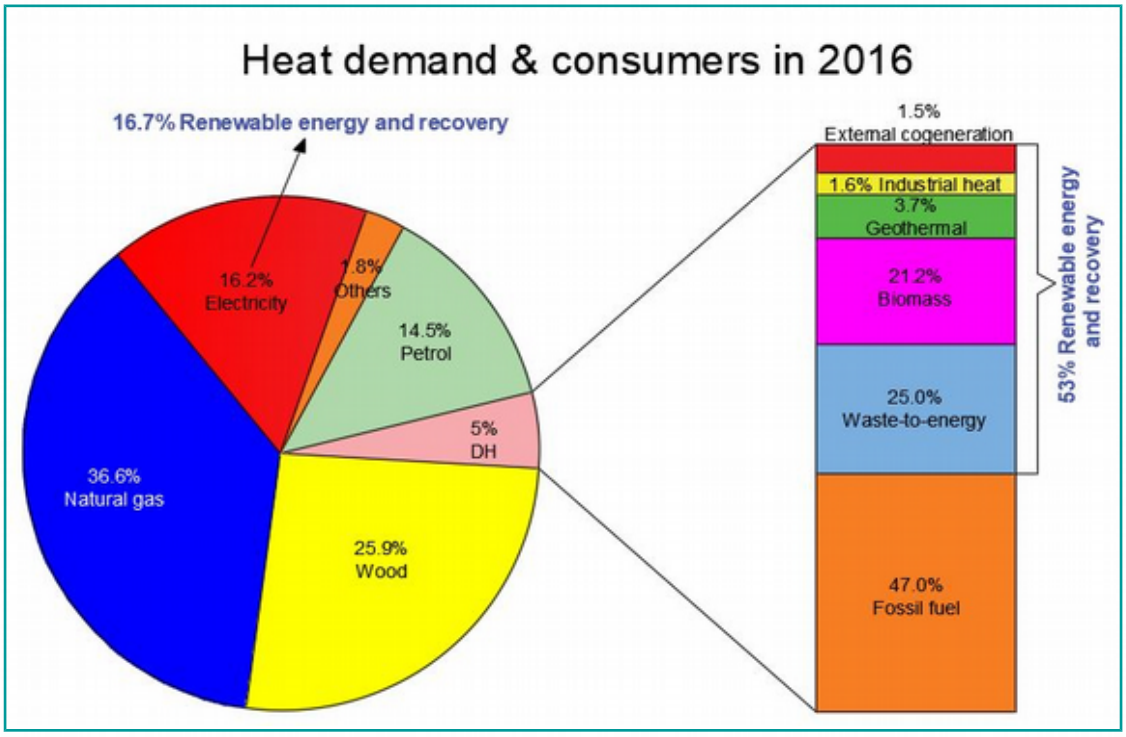
DISTRICT HEATING

Issues of the development of district heating and cooling in France

France aims to reach 23% renewable energies and recovery in final energy consumption in 2020 and 32% in 2030. The Loi de Transition Énergétique pour la Croissance Verte (LTECV)[1] (Energy Transition Law) provides for more specifically, to multiply by 5 the renewable heat delivered by district heating (DH) in 2030 compared to 2012 - a production of 39.5 TWh of renewable energies and recovery compared to 24.6 TWh in 2016. The development of DH is indeed the only way to mobilize massively large deposits of renewable energies such as biomass, geothermal energy, as well as recovery energy from waste treatment or industry.

Overview of renewable heat in France

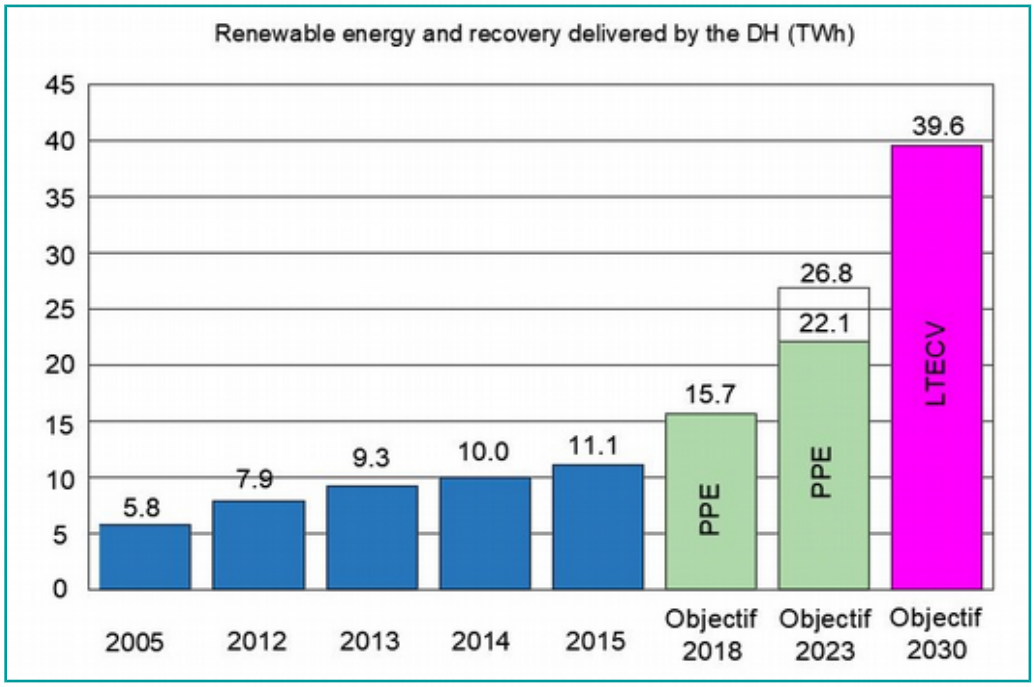
Indeed, the heat is the first post of national energy consumption. It is currently produced about three quarters from non-renewable energies. At the national level, the building sector accounts for nearly 45% of final energy consumption, mainly in the form of heat, and 25% of greenhouse gas emissions.



Source : CEREN – Ministry of Energy for the left graphic and SNCU's report 2017[2] for the right graphic, RTE-France for the 16.7% renewable energy and recovery used for electricity[3]

The following graph shows that DH use more and more renewable energies and recovery, but the evolution needs to accelerate to reach the objectives (PPE = National plan about energies on 2018-2023 and LTECV).

Cerema



Actually, it's feasible because important sources of renewable energies and recovery, usable for the production of heat, are today under-exploited. Just with unused recovery heat from industry – 16,6 TWh heat > 60°C are available near DH in France according to an ADEME's study in 2017[4] – the high fork of 2023 PPE target – 26,8 TWh – can be achieved.

Why develop the district heating and cooling ?

An action inscribed in an overall strategy

The necessary reduction of heat needs in buildings, which passes through the "low consumption" level in all new buildings from 2013 and the energy renovation of 500,000 homes per year until 2020[5],will not just meet the objectives. Indeed, some buildings can not be renovated (technical or economic constraints) and, in 2010, the city of 2050 was already built more than 70% ... It is estimated that it will remain in 2050 between 30% and 40% of dwellings prior to 1975.

We must find solutions to meet the needs of buildings that will continue to consume significant amounts of energy for heating, cooling and hot water for sanitary use. In addition, with climate change, the cooling demand in buildings will increase.

The generalization of decentralized systems (one per dwelling or per building) of renewable heat production (geothermal, wood boiler, solar water heater, heat pump ...) is an interesting solution in the individual residential sector. But these systems become more difficult to implement in the collective (where shelters 43% of the population) or the tertiary in dense zone, because they are consumers of surface on the ground or on buildings (geothermal, solar, heat pumps) or require large storage spaces for fuel (wood).

The DH makes it possible to "centralize" these needs in order to treat them better, to pool investment costs, and finally to access energy deposits that could not be exploited by individual systems.

Unique access to certain energies

Geothermal energy: coordinating the investment

The realization of a deep geothermal capture (water drawn at 1500-2000m) costs from 8 to 10 million euros. This solution is economically viable only if it is implemented for many users; it is estimated that at least 5,000 homes connected to a deep geothermal power plant are needed to ensure the economic

equilibrium of an operation.

Deep geothermal energy has mainly developed in Île-de-France, which accounts for 80% of national production, thanks to an abundant resource and a high population density. DH in the region Ile-de-France produced almost 12,4 TWh of heat in 2016[5], which 7% comes from geothermal energy.

Illustration 1: Geyser - Source : Hans, Pixabay

Fatal heat: transporting from the place of production to the place of consumption

The heat released by industrial sites or waste incineration plants also known as waste-to-energy (WtE) must be sent from its place of production (factory/ power plant) to the places of consumption (residential and office areas) and delivered at the foot of each building.

Illustration 2: Nebula - Source : Pixabay

The main source of energy recovery currently used is the energy released by waste incineration plant (25% of all energy delivered by DH in 2016). There are also some examples of industrial heat recovery, such as the Dunkerque network (16,000 housing equivalents), 60% of which is supplied by heat from a steel plant.

ADEME, the french public agency for energy management, estimated the heat loss by industry in France[6] : 109,5 TWh, whose 52,9 TWh are above 100°C. This is a third of the heat consumption in 2016.

Biomass: convey, store, control

Biomass can be used at the scale of a house or building (closed chimney, wood boiler), but fuel wood transportation and storage can sometimes be problematic, especially in dense areas. On the other hand, it is quite possible to create collective wood heating systems, for example on the outskirts of cities, and to distribute by a DH the heat produced. This also preserves the quality of the air, these facilities are equipped with powerful smoke treatment devices, unlike individual systems.

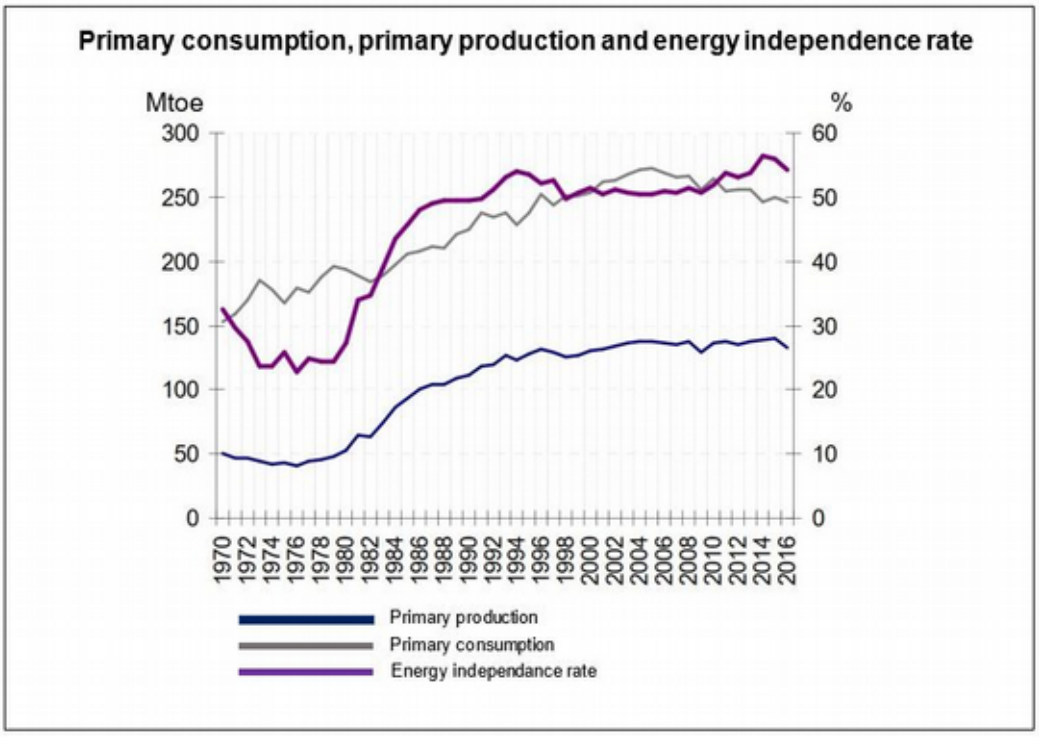
Do you know ?

Fruit cores, heat of a crematorium, heat of data centers can be the sources of energy to be exploited by a DH. For example :

Fruit cores, DH in Cransac, Aveyron region, France
Crematorium → Halmstad, Sweden and Aalbourg, Danemark
Data-center, → DH of Val d'Europe, Marne-la-Vallée, France
Straw→, DH of Pécs, Hungary

Local energy production

France produces only half the energy it consumes. Indeed, in 2016 the independent energy rate was to 54%, as we can see on the graph below.



Source : Report, from ministry in charge of energy, on the energy balance of France in 2016[7]

Note: primary production and consumption are read on the left scale, the energy independence rate on the right scale.

In addition to be renewable and with low greenhouse gas emissions, these energies have the advantage of being able to be produced locally. At the national level, this means that they contribute to reducing energy dependence compared with countries that hold fossil fuels. At the territorial level, renewable DH contribute to the development of a local economic activity of energy production.

Reference

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