Discovery Form

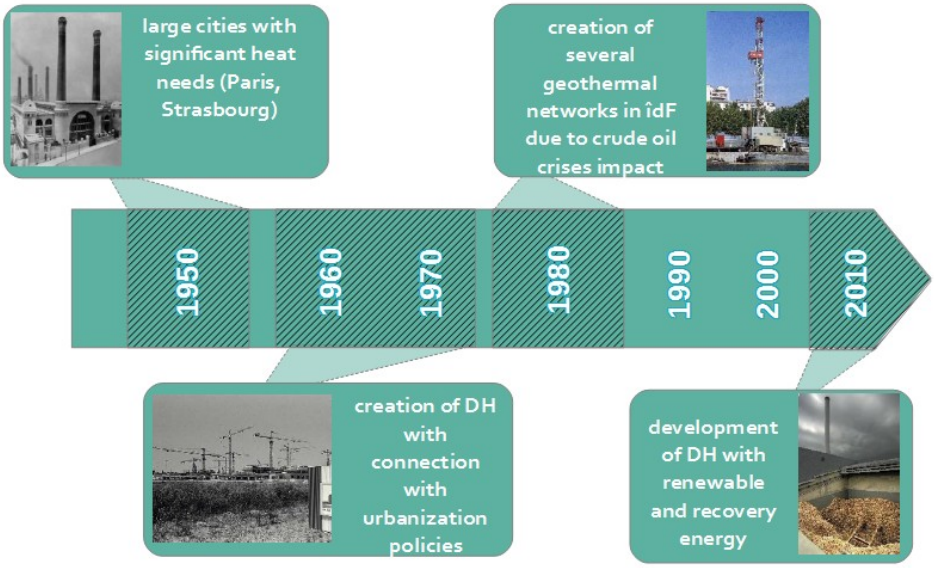
DISTRICT HEATING

District heating and cooling in France

The districts heating (DH) were mainly developed in France after 1950, mostly by the cities as a public service. Today, they appear as a way to use massively renewable energies and recovery such as heat from waste incineration plant (in French : Usine de valorisation énergétique, UVE also known as Usine d'Incinération d'Ordures Ménagères, UIOM)***, biomass, industrial heat, geothermal, solar, etc. Mostly present in dense urban areas, the districts heating and cooling (DHC) are now supplied with 53% of renewable energies and recovery. Despite everything, the districts heating represent only 6% in the national heat sector for domestic heat water and heating system. In order to contribute to the objectives of the law on energy transition for green growth announced in August 2015, DH will have to mobilize in 2030, 39.5 TWh of renewable energy and recovery, compared to 24.6 TWh in 2016.***

How was DH expanded in France ?

Although there is a trace of DH in Europe under the Roman Empire (hot water circuits serving public baths and greenhouses) and the Middle Ages (for example in the 14th century the creation of the geothermal network of Chaudes -Aigues), it is during the last century that urban heating has really increased, through the following 4 main periods :



Do you know ?

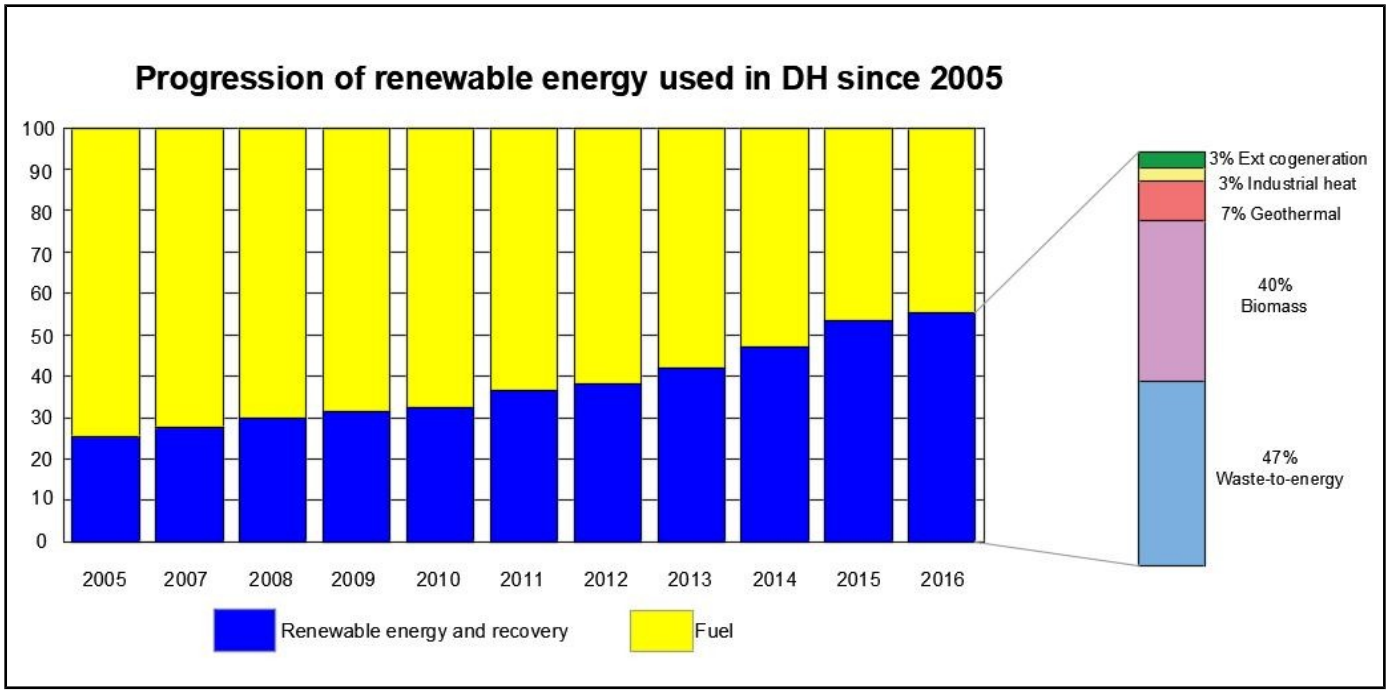
Do you know that DH facilitated skyscraper development? By centralizing the combustion necessary for the production of heat, it has been possible to eliminate the need for chimneys on the roofs of buildings, and thus to concentrate more occupants on a small surface on the ground.

Illustration 1: View of the roofs of Paris and Montparnasse © Laurent Mignaux - Terra

Cerema

French district heating in numbers (2017 DHC french survey based on data in 2016)

A national survey is conducted each year on the DHC by the ***Syndicat National du Chauffage Urbain, SNCU*** (in English: National Union of Urban Heating) – a union regrouping the public and private managers of DHC - on behalf of the ***Service de la donnée et des études statistiques, SDES*** (in English : Service of the data and the statistical studies) of the Ministry of Ecological and Solidarity Transition, in partnership with AMORCE - association of communities and professionals on energy climate policy and waste management. Source of technical and economic information, unique in France, this survey is based on data collected from all managers of DHC identified in France.



The survey based on the data in 2016 lists 664 DH and 20 districts cooling (DC), whose total installations cover 5,015 km. The use of renewable and recovery energies continues to grow. For the first time in 2015, the threshold exceeded 50% ; in 2016, it is close to 53%.

Heat from waste incineration plant also known as waste-to-energy (WtE) and energy-from-waste (EfW) is mobilized primarily by renewable energy sources supplying DH (47% in 2016 compared to 19% in 2005). With 21%, the share of biomass has increased with a stronger progression since 2009 (3%). Natural gas has tendency to replace other fossil fuels and remains the main resource used for DH (39% in 2016). Since 2005, the average CO_2 content of the DH continues to decrease to reach 0.126 kg/kWh in 2016 (gas= 0.243 kg/kWh).

District heating currently serve 2.32 million housing units (ie 24.6 TWh of heat delivered in 2016), mostly in urban areas dense. The residential sector consumes 57% of the heat delivered, while the tertiary sector (including utilities) consumes 35%.

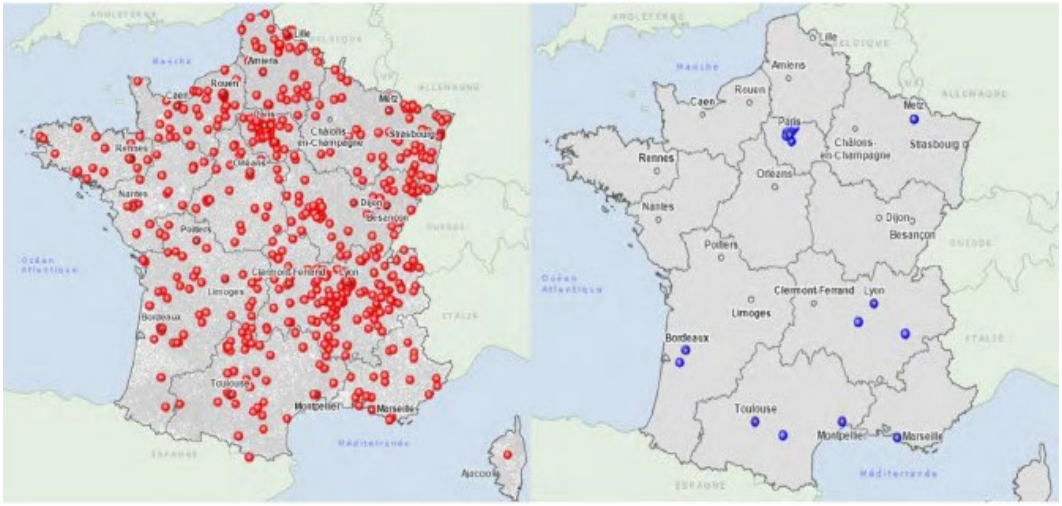


Illustration 2: Map of DH (left) and DC (right) in France in 2016 - SNCU

There is no regulated price for DHC, each DHC has its own price. In 2015, for residential, the DH solution is on average the most competitive after collective natural gas condensing boiler. But "virtuous" DH (with more than 50% renewable energy and recovery) have an average overall cost of € 1158, almost identical to that of collective natural gas condensing boiler. As for the individual and/or collective electric heating system, they are far the most expensive. In 2015, the average selling price of energy delivered by the DH is 68.3 € ex-tax / MWh.

Tools, policy and regulation to develop DHC

The national target for DH is to reach at least 22.1 TWh of renewable energy and recovery by 2023 and 39.5 TWh by 2030 (compared to 24.6 TWh in 2016). In order to converge towards this ambitious objective, several actions must be carried out such as :

- ➔ creation of new DH when it is feasible technically and economically ;
- ➔ extension of existing DH, for example during urban development projects ;
- ➔ the development of renewable energy and recovery to replace fossil fuels within existing DH.

The principal financial support, obligations and devices to achieve these objectives are listed below.

Financial support

- Financial support for projects through a fund called the *fonds chaleur (*in English *:* heat fund), allotted of 250 million euros per year. The feasibility studies for DH are also financed.
- Reduced VAT (from 20% to 5.5%) for the consumers (direct impact on the energy bill) for DH with more than 50% renewable energy and recovery.
- The energy suppliers have to mobilize energy savings certificates (CEE) and give an aid to some heating renovations.

Discovery Form

DISTRICT HEATING

The integration of DHC in urban planning

- There is a procedure, called *classement*[2] (in English : classification), that allows DHC owner (local community for example) to make the connection to reliable DHC (more than 50% renewables and sustainable) mandatory for new building or refurbished one in an area. But there is no obligation for existing building.
- There is a requirement for each big new urban projects (since 2010) to study the feasibility of integrated a district heating (creation or extension) along with other renewable energy technologies.[3]
- Each region has to make a DHC inventory and has also to plan the biomass development on their territories.
- DHC owners have to fulfill a ten years master plan outlining the DHC evolution and how to integrate more renewable energy[4] if the DHC was built before 2009 (=most of existing DHC).
- ***Réglementation thermique, RT2012***[5] (in English : Thermal regulation for new buildings) takes DH more than 50% renewable energy into account as a potential source of renewable energy for housing. And if the carbon content of a district heating is particularly low, the maximal consumption goal of the building is increased. The next thermal regulation (2020) will also take into account the DH percentage of renewable energy and recovery.
- As mandatory due to the article 14 of the ***Directive Européenne relative à l'efficacité énergétique***[6] (in English : European directive on energy efficiency), for every new major district heating or every new major plant built in France, there must be a costs-benefits analysis[7] regarding the use of industrial waste heat in the district heating.

There is also a research and development fund distributed by ADEME, the national energy agency, to finance thesis and research centers for innovations in DHC, technology assessment (tests in lab), market deployment (trainings, call for projects, studies, guidebook, etc.).

References :

1. https://files.acrobat.com/a/preview/7dd79a22-ca52-445e-957c-b7acca8a5c6b
2. http://reseaux-chaleur.cerema.fr/classer-un-reseau-de-chaleur-ou-de-froid
3. http://reseaux-chaleur.cerema.fr/guide-les-etudes-denergies-renouvelables-dans-les-operations-damenagement
4. http://reseaux-chaleur.cerema.fr/realiser-un-schema-directeur-de-reseau-de-chaleur
5. http://reseaux-chaleur.cerema.fr/reseaux-de-chaleur-et-rt2012
6. http://reseaux-chaleur.cerema.fr/lanalyse-couts-avantages-pour-la-valorisation-de-la-chaleur-fatale-sur-reseau-de-chaleur
7. http://reseaux-chaleur.cerema.fr/lanalyse-couts-avantages-pour-la-valorisation-de-la-chaleur-fatale-sur-reseau-de-chaleur

April 2018

Cerema