OID
ŒUVRER POUR L'IMMOBILIER DURABLE

CONNECTING TO THE DISTRICT COOLING NETWORK

HAZARD

HEAT

IMPLEMENTATION STEP

CONSTRUCTION

RENOVATION

AREA OF ACTION

COOLING

COST

€ € €

low **medium** high

LEVEL OF SKILL

medium

Although urban cooling networks are underdeveloped in France, they offer a sustainable solution to the growing cooling needs of the population. These systems can operate on a district, town or regional level to supply all types of building: residential, commercial and industrial. They operate in much the same way as district heating networks: a refrigeration plant supplies the buildings with cold via a network of pipes carrying a chilled transfer fluid (often water).

IMPACTS

At a time when temperatures are rising steadily and heatwaves are multiplying and intensifying, district cooling networks make it possible to **maintain the thermal comfort** of building occupants while making significant savings. Producing large quantities of cold **generates economies of scale** and ensures a degree of **price and supply stability**. The costs of maintaining the network are borne by the operator, who then connects the buildings to the network so that they can benefit from this source of cooling.

Using a district cooling network also helps to **reduce the building's impact on the environment**, as the industrial installations that produce cooling are much more efficient (around 30-50% more) than individual systems.

INSTALLATION GUIDE

To connect to a district cooling network, you need to:

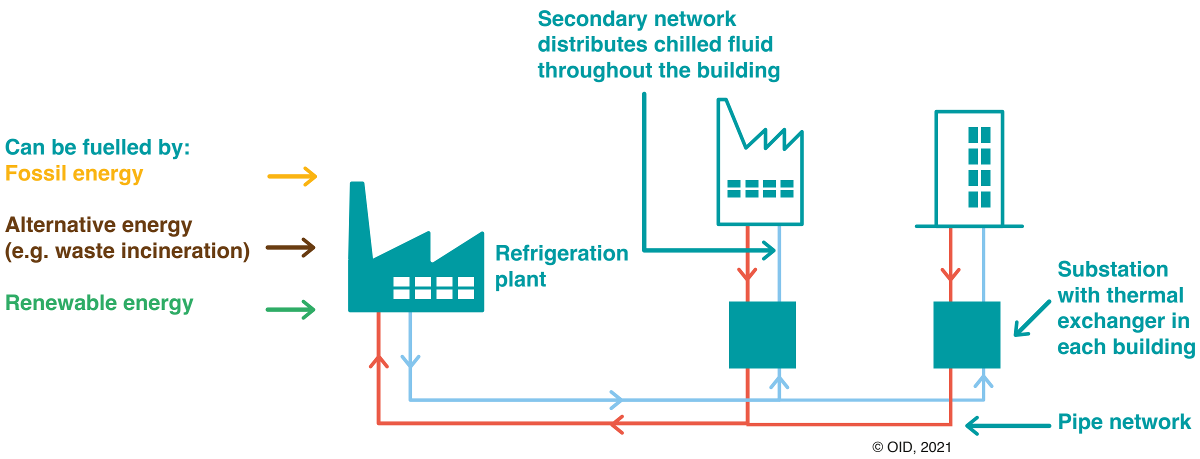
(1) find out if there is a district cooling network nearby (several tools are available, such as the France Chaleur Urbaine map or the Via Sèva directory);

(2) submit a **connection request** to the network operator, which may be public or private;

(3) carry out **works to install a substation** and, if necessary, a secondary network. The cost and difficulty of connecting to the district cooling network vary from one local authority to another.

If an area has water resources (river, lake, etc.), you may be able to take advantage of them by installing a **free cooling** system: the coolness of the water bodies is used to chill the transfer fluid transported by pipes (when the temperature of the water is equal to or less than 5°C), thereby cooling the buildings with limited energy consumption.

HOW A DISTRICT COOLING SYSTEM OPERATES



WEAK POINTS AND STRONG POINTS

- ⊖ Connecting to the district cooling or heating network can be **costly for buildings powered by electricity**, as a secondary network (radiators, hot water pipes) needs to be installed to distribute the heat throughout the building.
- ⊕ Buildings supplied by a collective gas or oil boiler can be connected simply by replacing the boiler with a substation.
- ⊕ Connection to the heating and/or cooling network **can be made compulsory** for new buildings by a local authority through a network classification process.
- ⊕ In order to ensure that a building is adapted in the most appropriate way, the emphasis should be on **energy sufficiency**, starting by limiting cooling requirements through insulation, building orientation and reduced solar gain. **Passive or semi-passive cooling strategies**, such as ventilation or adiabatic cooling can also be interesting alternatives.

MALADAPTATION

Maladaptation can result from the following:

Increase in greenhouse gas emissions

District cooling networks require a significant amount of energy to operate. When this energy comes mainly from fossil fuels, it generates harmful greenhouse gas emissions. To minimise this impact, the priority should be to develop renewable energy sources in the vicinity of refrigeration plants. Renewable energies produce electricity and heat with a much smaller carbon footprint than fossil fuels (see the emissions factors in ADEME's Base Empreinte).

Risk of load shedding during periods of high demand

Cooling networks may be subject to load shedding, which consists in deliberately reducing electricity consumption in an electrical system or network to maintain the balance of the network and avoid overloads during periods of high demand. This can compromise the thermal comfort of occupants. To cope with such periods, cooling networks can be combined with refrigeration energy storage systems.

Negative impact on biodiversity and soil

The construction of underground networks, including cooling networks, can have a negative impact on biodiversity and soil, including loss of habitat, pollution risks, etc.

Inadequate cooling capacity

If the cooling network is designed solely to meet current cooling requirements, without anticipating future needs resulting from rising temperatures, it may become inadequate in the face of increasingly frequent and intense heat waves.

CLICK HERE TO CONSULT THE GUIDE TO ACTION FOR CLIMATE CHANGE ADAPTATION

MONITORING INDICATORS

ESSENTIAL RECOMMENDATIONS WORTH THINKING ABOUT

- IMPLEMENT MEASURES TO REDUCE COOLING REQUIREMENTS

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/– : Quantitative indicator ★ : Qualitative indicator

INDICATORS OF MEANS		INTERPRETATION
+/–	Percentage of cooling requirements covered by the district cooling network (%)	To be maximised

INDICATORS OF RESULTS		INTERPRETATION
+/–	Comparison between energy consumption linked to use of the district cooling network and that of a control situation* (kWh)	To be minimised
+/–	Comparison between greenhouse gas emissions linked to use of the district cooling network and a control situation* (tCO_2e)	To be minimised

**The control situation is defined by the parameters set to isolate the influence of the adaptive action (similar conditions: weather, time of measurement, space, etc.).*

FIND OUT MORE

ADEME (2020), Collectivités: le pari gagnant des réseaux de chaleur et de froid renouvelables

AdaptaVille (2023), Réseaux de froid urbains: rafraîchir les bâtiments en consommant moins d'énergie. L'exemple de Paris

Calderoni M, Babu Sreekumar B, Dourlens-Quaranta S, Lennard Z, Rämä M, Klobut K, Wang Z, Duan X, Zhang Y, Nilsson J, and Hargo L (2019), Sustainable District Cooling Guidelines.

FEDENE (2022), Enquête annuelle des réseaux de chaleur & froid 2024

France Chaleur Urbaine (2023), Le guide France chaleur urbaine pour les collectivités

Credits: Agence Impact Communication & Architecte Moatti-Rivière

REAL-LIFE EXAMPLE

BNP PARIBAS REAL ESTATE

BNP PARIBAS REAL ESTATE

BUILDING: 53 BOULEVARD HAUSSMANN - PARIS
SURFACE AREA: 3,526 M²
USE: MIXED (OFFICES AND RETAIL)
COST : 60,000 €

In 2023, BNP Paribas REIM carried out a complete overhaul of a late 19th-century Haussmann building, involving a number of sustainable initiatives: wood flooring, low-carbon concrete, reuse, etc. One of the actions was to renew the urban cooling network connection already in place in the building, managed by Fraîcheur de Paris, and to completely take over the technical installations. This network uses water from the Seine via the free cooling method. The water is used either directly in winter when its temperature is low, or cooled by refrigeration units powered by renewable electricity. The building benefited from the facilities already in place for the nearby department stores to keep the existing connection to the network while carrying out work to bring the installations up to standard, with the technical room being relocated, for example. The work involved in this connection and the associated costs amounted to €60,000, over a period of 2 to 3 months. The contract with Fraîcheur de Paris is for 10 years. Participating in this urban network avoids the need to duplicate individual cooling systems and reduces the associated emissions. This building is part of this approach for sustainable cooling, being powered by electricity guaranteed to be 100% renewable. This solution, combined with a complete thermal renovation of the building using insulation from the inside out, ensures summer comfort. As a result of all the measures taken, the building has an energy consumption rating of B (primary energy consumption of 79.06 kWhep/m².an).

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