OID
ŒUVRER POUR L'IMMOBILIER DURABLE

SETTING UP AN EFFICIENT NETWORK

HAZARD

RAINFALL AND FLOODS

COASTAL DYNAMICS

GEOTECHNICAL DROUGHTS

HEAT

WILDFIRES

STORMS AND STRONG WINDS

IMPLEMENTATION STEP

CONSTRUCTION

RENOVATION

TERRITORY

AREA OF ACTION

OUTDOORS

COST

€ € €

low medium high

LEVEL OF SKILL

high

Network meshing involves interconnections within the same network or between several networks of the same type to ensure greater security of supply for the sector served. The idea is to improve the resilience of networks by creating a diversity of paths, nodes and supply points, and possibly energy sources. Although road networks are the most common example, this system can also be used for sewage, drinking water, electricity and district heating or cooling networks.

IMPACTS

Network meshing ensures **continuity of service in the event of a failure** on one of the network's branches, by redirecting the flow to another branch. This is only effective if the network infrastructures have the capacity to handle a higher flow than normal and to be reversed (particularly for water networks, which can be designed for a predefined direction of flow in the case of gravity networks, for example).

Network meshing is particularly critical for **buildings hosting essential activities**, which can't afford to be cut off from one or more networks, even for a few hours. Efficient networks are all the more necessary because damage to one network can have a **cascade effect** on the others: for example, if there's a power cut, the running water supply stops after just a few hours.

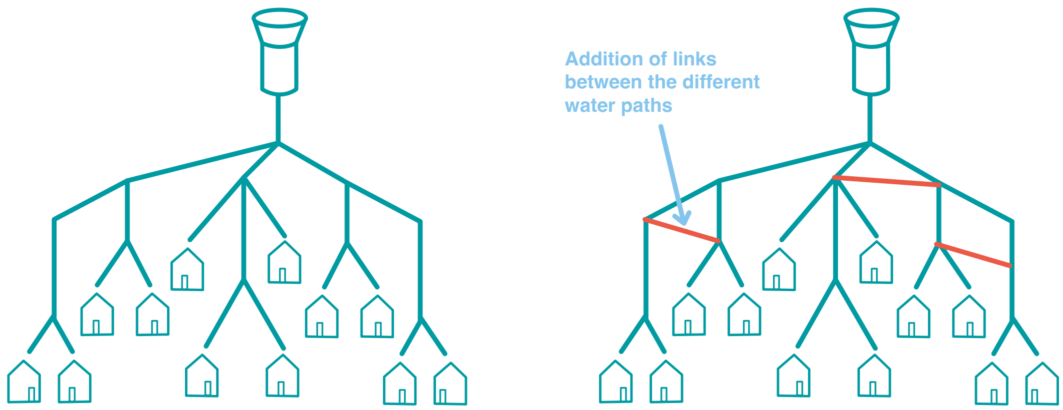
INSTALLATION GUIDE

Network meshing can be set up either by users, by connecting to different parts of the same network or different supply sources, or by the network operator at the request of the local authorities. It must **take account of the specific features of each type of network** and the social and territorial vulnerabilities (poorly served areas, vulnerable populations, strategic infrastructures, etc.). For some networks, additional developments may be required to ensure the reversibility of networks, particularly water networks.

As networks become longer, the likelihood increases of defects in one or more sections of the network. A **network compartmentalisation system** (using valves on pipes, for example) can allow work to be carried out on part of the network without cutting off the supply to all the buildings served. In addition, for water networks in particular, a **system of valves on pipes** reduces the risk of bacteria proliferating on secondary branches and the problems associated with circulation in gravity-fed networks.

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

EXAMPLE OF A DRINKING WATER NETWORK MESH



Examples of network meshing:

Drinking water: these relatively arborescent networks can be made more resilient by installing connections (shown in red here) between the different sections.

Roads: diversions can be set up in consultation with neighbouring municipalities.

WEAK POINTS AND STRONG POINTS

− The **large number of players** involved in the networks, particularly in urban areas, can be an obstacle to implementing a coherent network strategy.

+ In urban environments, a network can be meshed at building level by **multiplying the connection points** to the various supply networks.

− In **rural areas**, where the networks are very extensive, setting up a network can sometimes be **expensive and not cost-effective**. In such cases, electricity self-consumption strategies, changes to the sources of supply for heating networks (geothermal , wood-fired heating, methanisation, etc.) or re-use of rainwater can be envisaged in order to guarantee a degree of autonomy in the event of a crisis.

! MALADAPTATION

The construction of additional infrastructure can lead to **negative environmental externalities**, including the destruction of natural habitats, the disruption of local ecosystems, the emission of greenhouse gases, and water and air pollution. In addition, the construction of new infrastructure networks, particularly roads and public transport, can lead to the **displacement of local populations**. This displacement can have social and economic consequences for displaced populations, exposing them to vulnerabilities such as loss of housing and means of living.

MONITORING INDICATORS

ESSENTIAL RECOMMENDATIONS WORTH THINKING ABOUT

- USE A NETWORK COMPARTMENTALISATION SYSTEM
- TAKE INTO ACCOUNT SOCIAL AND TERRITORIAL VULNERABILITIES
- TAKE INTO ACCOUNT THE SPECIFIC CHARACTERISTICS OF EACH TYPE OF NETWORK

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/– : Quantitative indicator ★ : Qualitative indicator

	INDICATORS OF MEANS	INTERPRETATION
+/–	Number of supply paths in the area	To be maximised
+/–	Number of supply nodes in the area	To be maximised
+/–	Number of supply points in the area	To be maximised
+/–	Number of different energy sources in the area	To be maximised
+/–	Percentage of essential recommendations followed (%)	The maximum number of recommendations must be implemented

	INDICATORS OF RESULTS	INTERPRETATION
★	Ability to ensure continuity of service in the event of a defect on one of the network's branches	Maintaining service

REAL-LIFE EXAMPLE

GROUPE ADP

BUILDING: PARIS-CHARLES DE GAULLE AIRPORT, PARIS REGION.
AREA: MULTIPLE COMMERCIAL SITES OF AROUND 1.5 MILLION M².
USE: OFFICES, LOGISTICS, HOTELS, SHOPS, AIRCRAFT HANGARS.
COST: N/A

Because of the strategic nature of its facilities, the Aéroports de Paris (ADP) Group continually works to ensure that its electrical, refrigeration, thermal, road and hydraulic networks can stand up to potential defects and malicious acts. For the electrical network at Paris-Charles de Gaulle airport, a network of interlocking loops enables electricity to be redirected instantaneously in the event of a failure on one branch, avoiding "dead-end" effects by multiplying the supply paths. This system, which is integrated directly into the infrastructure design phase and coupled with on-site generation plants, ensures that the network is extremely robust. However, the complexity of its implementation requires highly developed in-house skills that are difficult to outsource. A significant additional cost is passed on in electricity subscriptions. This is only a feasible solution for projects that are part of a long-term strategy, and for buildings housing particularly sensitive activities, especially industrial ones, that require a highly secure supply.

FIND OUT MORE

CEPRI (2016), *Le territoire et ses réseaux techniques face au risque d'inondation*

Bardiaux, J-B. (2016), *L'architecture du réseau de distribution*

French Ministry of Ecology and Sustainable Development (2005), *Réduire la vulnérabilité des réseaux urbains aux inondations*