ENCOURAGING AIR CIRCULATION IN THE NEIGHBOURHOOD

HAZARD

HEAT

IMPLEMENTATION STEP

CONSTRUCTION TERRITORY

AREA OF ACTION

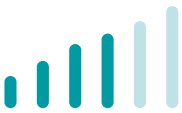
OUTDOORS

COSTS

€ € €

low medium high

LEVEL OF SKILL



medium

In towns and cities, heat produced naturally (sunlight) and by human activity (transport, industry, etc.) tends to be trapped close to the ground because air circulation is impeded by buildings and urban infrastructure. Urban spaces should be designed to avoid narrow streets lined with large, wide buildings, which prevent warm, polluted air from escaping. These "urban canyons" contribute to the intensification of urban heat islands (higher temperatures in urban areas than in the surrounding rural areas).

IMPACTS

At a time when the average temperature in France is rising steadily and heatwaves are intensifying and multiplying, encouraging the circulation of air in towns and cities helps to **combat heat islands**. This approach plays a crucial role in preserving the well-being and health of individuals, while ensuring the viability and attractiveness of urban spaces and buildings. Areas able to provide satisfactory outdoor thermal comfort are likely to become particularly sought-after.

Avoiding " street canyons" also helps **to improve air quality**, because the circular movement of air masses in these streets means that pollution emitted by vehicles is trapped close to the ground.

INSTALLATION GUIDE

To facilitate air circulation, during the planning stages it is important to:

- **Be familiar with climate statistics** on your area and in particular local winds: this information is available from the Météo France website on request for France.
- **Carry out an aeraulic study** (circulation of air flows) for the entire city in order to identify areas of thermal discomfort and integrate this aspect into the design phase of urban development projects to provide corrective solutions.
- Encourage **staggered layouts** for neighbourhoods and position buildings diagonally to the direction of prevailing winds to ensure good external ventilation while promoting natural ventilation systems inside buildings.
- **Provide space between buildings** to make streets more "porous".

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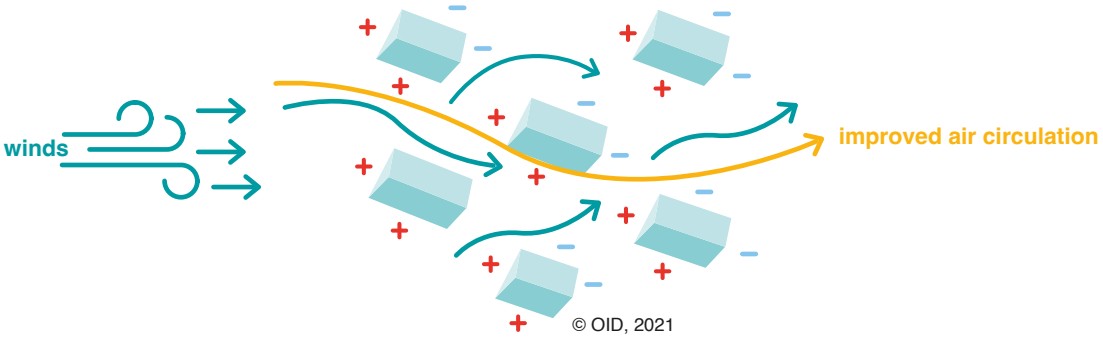
ILLUSTRATION OF A STAGGERED DESIGN FOR A NEIGHBOURHOOD



WEAK POINTS AND STRONG POINTS

⊖ Although effective, this adaptation measure cannot be implemented in all situations, as it requires **major development works**. Highly urbanised areas often have fewer possibilities for ensuring good air circulation.

⊕ Although this action mainly concerns **regional planning**, property developers can also incorporate these issues into the design of buildings and infrastructure.

⊖ Note that an aerological study **can have an impact on** greening strategies. This is because trees, when not placed strategically, can impede air circulation by slowing down currents and the dispersion of atmospheric pollutants. The cooling strategy must take into account the need for ventilation, shading, evapotranspiration, etc. The choice of species fis therefore crucial. In addition, it can be a good idea to use particular types of vegetation, such as spontaneous vegetation or green facades.

MALADAPTATION

Maladaptation can result from the following:

Increased vulnerability to violent winds and storms

Improving air circulation between buildings could transfer vulnerability to the future, especially if anticipated climate changes are overlooked. If planning choices are not adapted to cope with more intense extreme weather events, such as high winds and storms, areas that promote air circulation could become vulnerable and suffer structural damage.

Alteration of local biodiversity

Alterations to air circulation can have an impact on the way biological and chemical elements move through the environment. Plant species often depend on air to transport reproductive elements, such as pollen. If these elements are not distributed efficiently due to changes in air circulation, this could affect the composition of local ecosystems, including interactions between plants and pollinators such as bees.

Accumulation of pollutants

When pollutants (fine particles or toxic gases) are emitted into the air, their movement partly depends on atmospheric circulation patterns. If air circulation between buildings is not carefully considered, this can lead to a build-up of pollutants in certain areas, which in turn can affect human health.

MONITORING INDICATORS

ESSENTIAL RECOMMENDATIONS WORTH THINKING ABOUT

- CONSTRUCT BUILDINGS IN STAGGERED ROWS
- CARRY OUT A CITY-SCALE STUDY OF THE CIRCULATION OF AIR FLOWS
- CREATE SPACE BETWEEN BUILDINGS

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/− : Quantitative indicator ★ : Qualitative indicator

INDICATORS OF MEANS	INTERPRETATION
+/− Ratio of building height (H) to width of adjacent streets (W)	To be minimised to limit the urban canyon effect
+/− Percentage of essential recommendations followed (%)	The maximum number of recommendations must be implemented

INDICATORS OF RESULTS	INTERPRETATION
+/− Concentration of pollutants in the air in the streets adjacent to the building (µg/m³) using cartographic data from an accredited air quality monitoring association	To be minimised

CONCEPT / DEFINITION

- A street is an open space (as opposed to a street canyon) if the height H of the building divided by the width of the street W is less than 1 (*Projet de recherche CLEA*).

TOOL

- In France, air quality monitoring is carried out by independent regional associations (*Association Agréée de Surveillance de la Qualité de l'Air - AASQA*).

FIND OUT MORE

Institut d'aménagement et d'urbanisme d'Île-de-France (2010), *Les îlots de chaleur urbains - Répertoire de fiches connaissances*

Agence de la Transition écologique (2012), *Guide de recommandation pour lutter contre l'effet îlot de chaleur urbain à destination des collectivités territoriales* (Guide to recommendations for local authorities on combating the urban heat island effect).

ADEME (2020), *Mesures pour modifier le trafic routier en ville et qualité de l'air extérieur - Recherches bibliographiques et analyses.*

ADEME (2022), *Pollution de l'air en 10 questions*

Annual review of Environment and resources (2015), Urban Heat Island : Mechanisms, Implications and Possibile Remedies

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