EU cities and heat extremes

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Ways to tackle extreme heat in cities

- Strategic recommendations
- Analytical approaches
- Best practices
Heatwaves and their local manifestations are some of the most severe consequences of climate change.

Extreme weather and climate-related events:

- Around half a trillion euros over the past 40 years
- Between 85,000 and 145,000 human fatalities. 85% for heatwaves
- Potential exposure to extreme heat exceeded 1.7 billion people

Extreme heat is particularly alarming in cities, where it leads to the Urban Heat Island effect.
Heatwaves refer to prolonged, extremely high temperatures that can cause the microclimatic phenomenon known as **Urban Heat Island (UHI)**.

By altering the nature of the city’s surface, and generating large amounts of anthropogenic heat, cities modify the microclimate and air quality, **increasing their ecological footprint**.
Cities become hotter than surrounding suburban regions and rural areas due to:

- More sealed surfaces
- High people density
- Low ventilation
- Fewer green areas
- High heat emitting infrastructures density

Peak temperatures may be up to 10°C higher than in surrounding rural areas with an average between 4 and 6°C.
The intensity of an UHI is usually quantified through the Land Surface Temperature (LST) and is referred to as Surface Urban Heat Island.
Measuring and identifying **thermal hotspots** at different spatial granularities could support policy interventions.

When addressing the issue of extreme urban heat, the **energy sector** is an important perspective to consider.
Notwithstanding the unique characteristics of each city, due to a combination of climate, geography, morphology, and structure, some **common patterns** also emerge.

Urban hotspots tend to concentrate in:
- Industrial areas
- Areas with unregulated urbanisation

Cooler conditions in correspondence of:
- Green zones
- Water bodies
- Drier climate and desert areas

Distribution of warm-season extreme SUHI in megacities. Source: Mentaschi et al., 2022.
Which strategic recommendations?

- To exploit the **existing data** as well as monitoring and modelling systems
- To target **high exposure areas** and **vulnerable neighbourhoods**
- To map the wide availability of **underused** portions of urban territories
- To design urban adaptation plans sensitive to the **spatial dimension**
- To ensure a balanced combination between **buildings, green spaces,** and **pavement**
- To implement **behavioural change**
- To enhance **citizens’ participation**
- To look at different **spatial scales**
- To establish **heat action plans** and **heat officers**

To ensure the **combination** of several **strategies** adapted to the local circumstances in a holistic way
What can we do?

Some effective responses have already been identified

Mitigation is essential to limit the impact of climate change by reducing emissions.

At the same time, we should adapt by diminishing exposure and vulnerability and increasing the overall resilience and adaptive capacity of cities.
Which best practices?

Climate shelters in Barcelona

Barcelona spatial vulnerability to heatwaves

Development of a network of cooling centres, transforming pilot schools through:

- One public school per district
- 75 schools transformed so far
- Plan to transform all schools by 2030

© Barcelona climate plan 2018 - 2030
Greening Torino and replication of Nature-based solutions

The city of Turin took concrete action to adapt to the increasing effects of climate change in one of the most vulnerable areas, the neighbourhood of Mirafiori Sud.

Torino has joined a replication process – led by ICLEI Europe – to recreate proGIreg solutions within and beyond the metropolitan area.
Which indicators?

Measurable indicators and evaluation tools are valid ingredients when it comes to monitoring progress, enhancing the knowledge base of a specific urban context, and the assessment of future scenarios.

SDG 11 includes targets and indicators related to urban planning, green spaces, and disaster risk management.

Population with access to green urban areas within 400 m walking. Source: Poelman, 2018
In a study carried out in more than 600 European cities, the role of urban green spaces in reducing air temperature was analysed.

Given the capacity of trees to cool the air, the deployment of green spaces in cities is regarded as one of the most effective measures to counteract the UHI effect.

Urban trees reduce the air temperature by 0.8 °C on average, with peaks up to 7°C.

Areas where the cooling effect is more pronounced are those where large parks are situated.

Close up of the cooling effect (a) and main land cover classes (b) in the city of Paris.

Sources: Marando et al. (2022) (a), Urban Atlas (b)
Which indicators?

**Measurable indicators** and **evaluation tools** are valid ingredients when it comes to monitoring progress, enhancing the knowledge base of a specific urban context, and the assessment of future scenarios.

- **Spatial indicators** through the use of maps.
- More layers in one single map at different granularities.
- Granular visualisations to uncover hidden dynamics.

Urban Heat Island Intensity and hospitals, Athens (EL)
The consultation of dedicated dashboards for the monitoring of climate-related achievements.

The European Environment Agency (EEA) monitors **tree cover** and **urban green spaces**.

Cities can report on adaptation and mitigation measures results through the **ICLEI/CDP Track** and **MyCovenant**.
The way forward:
How to let cities remain livable and sustainable while becoming more resilient and fit for climate-related events

Heat extremes and the consequent UHI phenomenon will persist and as predicted by climate models, are even expected to worsen in the future.

- Need for equity-oriented policies
- Integrate in the urban policy agenda diversified and place-based solutions
- Exploit the already available knowledge, tools, and measurement techniques
- Adopt an integrated perspective and formulate science-based policies sensitive to the spatial dimension

Look granularly at the urban scale with finer data, without losing touch with the European-wide perspective

Adopt common strategies and mutual learning practices between urban areas with similar characteristics
Keep in touch

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Thank you