



# **Sensors for Urban Heat Islands monitoring**

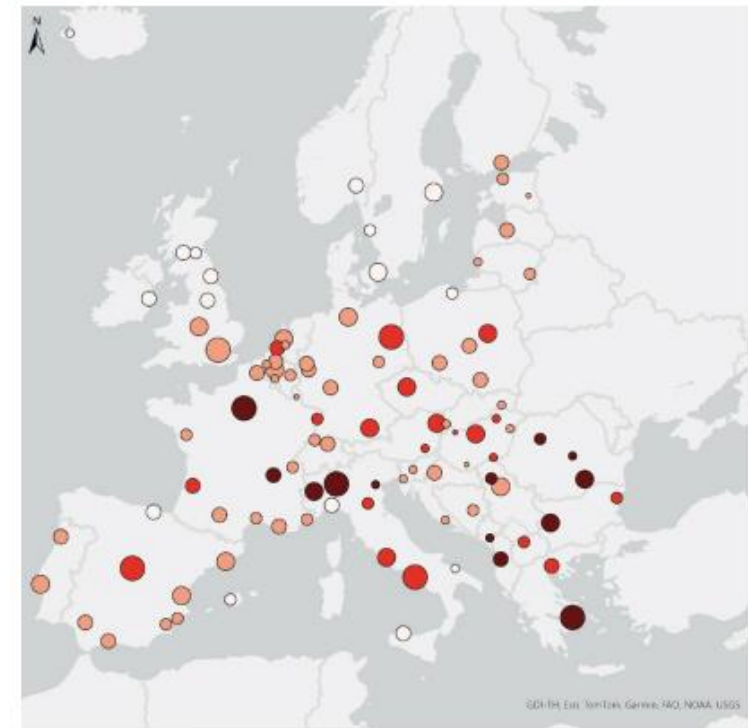
Marta Perucchini, Bosch (BST), 22/09/2025

# Urban Heat Islands (UHI)

The **urban heat island** effect causes cities to be 0.5-4°C warmer during the day and up to 3°C warmer at night compared to surrounding rural areas.



Figure 1 – Urban Heat Island intensity per city



Urban Centre population

- < 100 000
- 100 000 - 250 000
- 250 000 - 500 000
- 500 000 - 1 000 000
- 1 000 000 - 2 500 000
- ≥ 2 500 000

UHI intensity  
in °C (90<sup>th</sup>  
percentile)

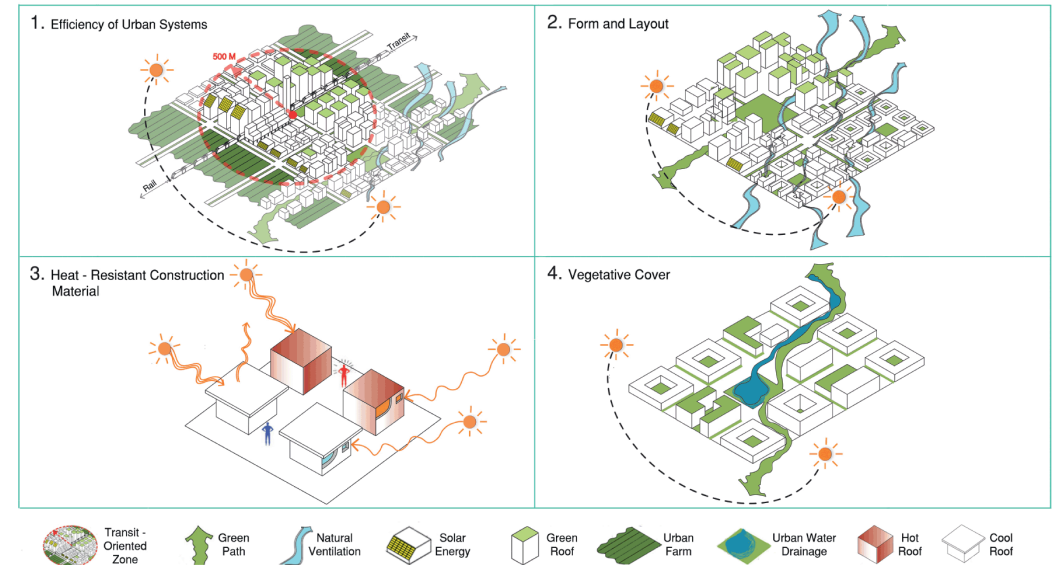
- < 1
- 1 - 1.5
- 1.5 - 2
- > 2

Source: Authors' elaboration on DG REGIO population data and on data by European Environment Agency (2020)

0 300 600 km

# Mitigation strategies

1. Integrate green infrastructure into streets.
2. Retrofit buildings with insulation and reflective materials.
3. Increase trees and drought-resistant plants.
4. Promote green walls and roofs for cooling.
5. Add water features for cooling.



# How is UHI effect measured?

## Satellite data

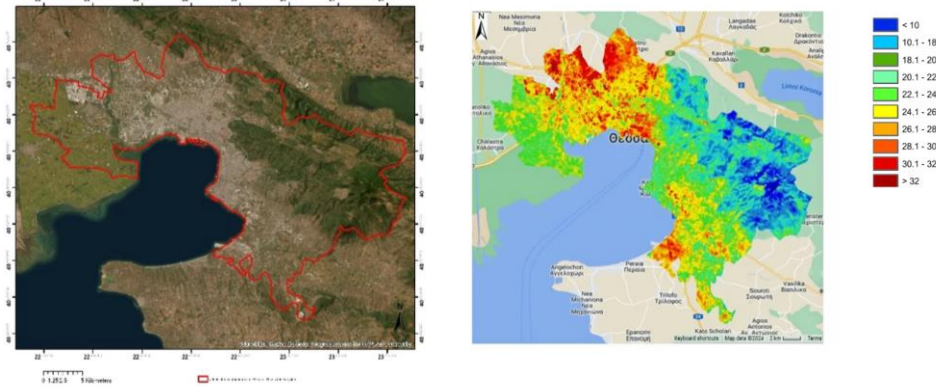


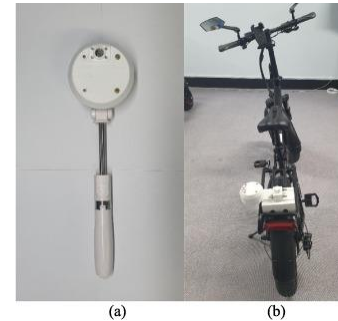
Image of Thessaloniki and the derived LST images in GEE in 2021 (Stamou, A. et al., 2024)

## Meteorological stations

## Portable devices



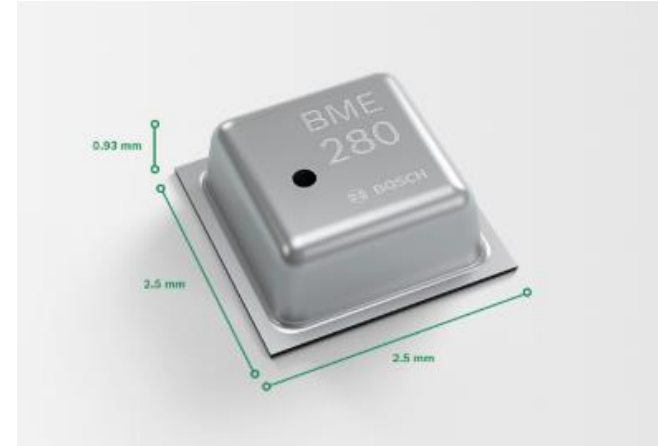
Wearable system developed for monitoring outdoor environments (Cureau, R. et al., 2022)



Mobile Urban Heat Monitoring (MUHM) system for pedestrians and motorbikes (Yonghun, C. et al., 2024)

# What could wearable sensors do for UHI?

- Measure and identify thermal hotspots at fine granularities enabling local policy interventions
- Real-time measure of the effectiveness of various strategies.
- Enable citizen participation (via gamification)
- Create a diffuse network than can be integrated with sensors applied on coatings/buildings



## BME280

Humidity sensor measuring relative humidity, barometric pressure and ambient temperature

# Call for contribution: join us in making cities cooler!

- **Goal:** Provide municipalities with actionable insights to develop urban plans that reduce UHI effects by leveraging wearable sensors
- **Target Audience:** Municipal administrations and urban planners
- **Requirement:** Utilize advanced wearable sensor technology to collect real-time data on temperature, humidity, and other environmental factors. Analyze collected data to understand UHI patterns and identify hotspots.
- **Type of Proposal:** Wide range of innovative contributions, including but not limited to:
  - **Technical Solutions** (i.e. strategies for deploying networks of sensors effectively, recommendations on optimal sensor placement for accurate mapping of UHI)
  - **Community Engagement** (i.e. development of applications to involve citizens in data collection and awareness)
  - **Integration Ideas** (i.e. incorporating sensors into existing urban infrastructure, such as e-bikes or public transport)
  - **Data Analysis Tools** (i.e. proposals for software or algorithms to analyze and visualize UHI data)

# Bibliography

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
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