FinEst Centre
for Smart Cities

SMART CITY CHALLENGE 2025
Solution idea for the city challenges

Max 3 pages

send to smartcity@taltech.ee by Nov 30, 2025

Solution Idea Title (max 5 words, no acronyms) – Mitigating Urban Heat Islands in Europe

Planned pilot project duration – 24 months

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1. Which urban challenge or problem are you planning to provide a solution to?

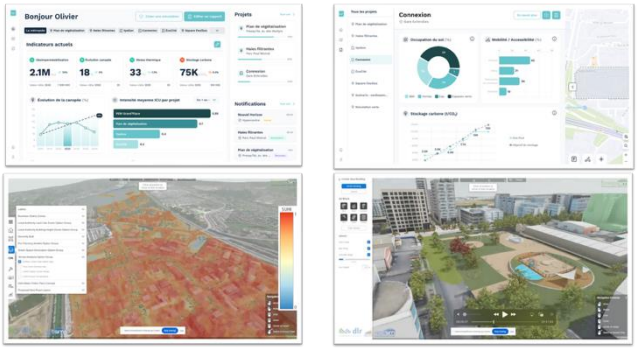
Managing Urban Heat Islands challenge proposed by Warsaw, and important for many other cities as listed.

2. The solution you are proposing

We are proposing a modular digital platform designed to help metropolitan areas, like Warsaw, understand, simulate, and mitigate Urban Heat Islands (UHIs). The solution is user-centric and scientifically robust, supporting urban planners and decision-makers with actionable insights.

The platform integrates several components:

- Dashboards and 2D mapping for project monitoring and indicator visualization.
- 3D simulations and digital twin capabilities for scenario analysis and impact forecasting.
- Advanced environmental indicator calculations and forecasts using remote sensing, terrestrial sensor networks empowered with AI/ML.
- Seamless data integration and synchronization with city's existing IT systems.



The platform can track lifecycle of urban projects to measure the impact of those projects to a variety of indicators such as UHI index, land surface temperature, carbon storage, thermal stress, land cover, canopy density, etc. The solution can do 2D/3D scenario simulations to simulate the impact of those projects to key environmental indicators. The solution is interoperable, lightweight, and adaptable, designed to fit diverse user profiles (by using design thinking methodology, putting the user in the centre of all preoccupations)

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and integrate with existing urban planning workflows. The solution empowers cities to make data-driven decisions for climate resilience and sustainable urban development.

3. Innovation and piloting of your pilot solution.

Existing solutions for Urban Heat Island (UHI) management include tools like ENVI-met (microclimate simulation), UrbanPrint (urban sustainability assessment), and various GIS-based dashboards (e.g., QGIS plugins, local government platforms). These often focus on either detailed 3D simulation or static indicator mapping, but do not combine real-time data integration from satellite images and IoT sensors, and multi-scale scenario analysis. Those are turnkey solutions that are not flexible enough to address needs from a variety of end-users.

Our innovation lies in its modular and interoperable architecture, as well as its combination of real-time and forecasted environmental indicators (IoT devices, satellite images), and participatory workflows within its design thinking development approach, providing tailored user journeys for different city roles (project managers, directors, canopy specialists).

For the pilots, cities need:

- Access to relevant urban data (GIS, project plans, environmental sensors, satellite imagery).
- Engagement from key stakeholders (urban planners, IT, environmental managers).
- Integration points with existing city systems (databases, GIS, project management tools).
- A clear pilot area (e.g., a district or set of projects) and defined evaluation criteria.

The pilot will be organised in 5 key phases:

- Initial workshop to understand user needs and roles, define pilot objectives and data sources.
- Data integration and configuration of the platform for the pilot area.
- Iterative testing to simulate scenarios, monitor indicators, and provide feedback with continuous involvement of end-users.
- Evaluation of outcomes (usability, impact on planning, data quality), followed by refinement and scaling

Our team for the pilot will be composed of 8 members (4 PhDs), with expertise of

- Urban data integration, platform development, user-centric design.
- Remote sensing, environmental indicator modeling, AI/ML for urban analytics.
- 3D simulation, digital twin technology, urban scenario modeling.

From TalTech team (to be identified), we would expect:

- Advanced urban climate modeling and simulation.
- Data science and AI for environmental forecasting.
- Domain expertise in urban sustainability and resilience.

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4. Expected impact of your pilot solution.

The impact of our solution can be summarised as follows:

For City Environments:

- Enables data-driven urban planning to reduce UHIs, leading to cooler, healthier, and more resilient urban spaces.
- Supports evidence-based decision-making for green infrastructure, tree planting, and sustainable land use.
- Facilitates integration of climate adaptation strategies into everyday city management.

For Sustainability:

- Promotes long-term reduction of energy consumption (e.g., less need for air conditioning) and greenhouse gas emissions.
- Enhances biodiversity and ecosystem services by supporting urban greening and water management.
- Provides tools for monitoring and achieving climate and sustainability targets at city scale.

For Citizens:

- Improves thermal comfort and public health, especially for vulnerable populations during heatwaves.
- Increases awareness and engagement through transparent data and participatory tools.
- Contributes to higher quality of life by making cities greener, more livable, and better adapted to climate change.

Disclaimer: by submitting this form you will give the FinEst Centre for Smart Cities the right to share this idea with cities and other researchers, companies through FinEst Centre homepage. If this idea is selected, the FinEst Centre for Smart Cities has the right to implement this idea with offering you an active role in conducting the pilot. If this pilot is selected then the financing is an investment by the FinEst Centre for Smart Cities.