Korea-EU Horizon Europe Researchers Networking Forum

on Energy & Advanced Mobility

- **Nicola Colaninno**

- **Assistant Professor**
- **Politecnico di Milano**
  Dept. Architecture and Urban Studies (DAStU)
- **Urban Planning**
- **Urban Climate**
- **GIScience**

1. Short Introduction of your Organization

Politecnico di Milano is a public, scientific-technological university founded in 1863, dedicated to the education and research in engineering, architecture, and design. It is Italy's largest technical university in its domain. The university operates across seven campuses (in Milan, Lecco, Cremona, Mantova, Piacenza) to host its varied programmes.

It enrolls approximately 49,000 students, including undergraduates, masters, and doctoral candidates. Among these, about 8,800 are international students (distributed across levels). The staff comprises around 1,800 full faculty and 1,300 technical and administrative personnel. The university supports a network of laboratories, experimental infrastructures, and organized research structures.

Politecnico has a strong lab ecosystem: well-equipped, cross-disciplinary laboratories are used for experimentation, technology transfer, and collaborative innovation. Politecnico's 12 departments cover engineering, architecture, and design fields. Its **research agenda emphasizes sustainability, digitalization, climate resilience, built environment technologies, mobility and infrastructure, spatial planning, and design innovation**.

The **Research Office** centralizes support for project funding, proposals (especially Horizon Europe/Horizon 2020), and strategic research management.

According to the **QS World University Rankings**, Politecnico di Milano ranks 98th worldwide, becoming the first Italian university ever to enter the global top 100. In the QS World University Rankings by Subject 2025, it is positioned 7th globally in Architecture & Built Environment and 21st in Engineering & Technology.

2. Expertise

Expertise of the Institution

DAStU at Politecnico di Milano is a pivotal Italian department specializing in the integration of urban planning, policy, design, and advanced geospatial technology. We bridge the gap between abstract technical data and actionable urban policy. Our core strength lies in analyzing complex urban challenges and translating those findings into site-specific design interventions for public spaces and mobility networks that promote resilience and equity in cities.

Potential contribution to a consortium

1. **Urban Planning, Policy and Design Leadership**: Ensuring that technical results are transformed into concrete design standards and policy frameworks that municipalities can adopt.
2. **Decision Support Tool Development**: Utilizing our expertise in GIScience to design the user-facing, intuitive front-end of any planning tool, maximizing its practical utility for city planners and minimizing the barrier between research findings and real-world application.
3. **Holistic Climate-Resilience Modeling**: Beyond specific project data, we provide the foundational expertise to assess how multi-scalar climate impacts (from regional flood risk to micro-level heat stress) intersect with social vulnerability. This ensures the project's solutions are anti-fragile—meaning they address climate risks comprehensively and contribute to long-term systemic adaptation, not just single-issue mitigation.

Keywords

Urban Planning, GIScience, Urban Climate Adaptation, Urban Heat Island (UHI), Active Mobility (Walking, Cycling), Public Space Design, Equitable Cities

3. Your Project Idea

Targeted call

Calls addressing the **need for smart, climate-resilient urban mobility systems and the integration of AI-driven solutions for urban planning**. It ensures the equity and accessibility of sustainable transport modes (walking, cycling) in the face of climate change impacts, particularly urban heat.

Main objectives

Create **novel, spatially dynamic Thermal Resilience approaches that quantifies the actual mobility disruption** (observed route changes, speed, and abandonment) caused by localized Urban Heat Island (UHI) effects along active transport pathways.

Idea briefly explained

- **Problem**: The 15-minute city relies on active mobility, but urban heat (a key climate impact) makes walking and cycling intolerable or dangerous, especially for vulnerable populations, effectively collapsing the accessible radius.
- **Solution**: Use multi-source data fusion (microclimate simulations, crowd-sourced mobility data and sentiment data, and physical street characteristics) combined with Machine Learning

4. Profile You are Seeking and Why

Partner Profile	Role in the Project	Type of Organization
URBAN CLIMATOLOGY & THERMAL SCIENCE	Core Data Provider & Modeling. Leads high-resolution microclimate simulations (UTCI, PMV, UHI effects) and thermal data validation. Provides expertise in environmental physics for input to the index.	University Research Group (e.g., Atmospheric Science, Environmental Engineering) or Specia lized Climate Tech SME.
AI, DATA SCIENCE & GEOSPATIAL ENGINEERING (GIS)	Technical Engine. Develops the Machine Learning model. Builds and manages the GIS-based Decision Support Tool and data infrastructure for processing mobility data.	Computer Science/Data Science Institute, or a specialized Geo-Informatics/AI SME.
URBAN PLANNING, DESIGN & POLICY	Intervention & Policy Translation. Translates project scores into concrete, site-specific design interventions (e.g., strategic tree planting, cool pavement standards). Develops policy recommendations for city-wide adoption and budgeting.	School of Architecture/Urban Design, or a Planning Consultancy with a focus on public space and climate adaptation.
ACTIVE MOBILITY & TRANSPORT PLANNING	Network & Behavioral Analysis. Provides expertise in transport network modeling, accessibility assessments and behavioral analysis of walking/cycling patterns. Ensures the project is integrated into existing mobility models.	University Transport Department, or a specialized Transport Planning Firm.
SOCIAL SCIENCE & CITIZEN ENGAGEMENT	Equity & Usability. Focuses on ethical data handling, validating the index for vulnerable populations (e.g., elderly, children, low-income groups), and managing the feedback loop to ensure the solution is inclusive and accepted by users.	Social Science Faculty, or an NGO specializing in Urban Equity and Public Space.
MUNICIPALITY/CITY AUTHORITY	End-User & Validation. Provides real-world testing grounds, access to city data, and ensures the Decision Support Tool meets the needs of city staff for budget allocation and planning implementation.	Cities (e.g., Planning or Sustainability Department).

4. Profile You are Seeking and Why

Key Expertise Offered	Possible Role/Contribution	Link to DAStU-PoliMi Expertise
URBAN PLANNING & DESIGN	Physical Intervention Strategy: translating the technical project scores into concrete, scalable design guidelines (e.g., standardizing shade solutions, specifying tree species for cooling, optimizing water features) that city administrations can budget for and implement.	Core expertise in designing public spaces and active mobility networks.
GIScience	Decision Support Tool Implementation: essential for the application of the data science. Bridge the gap between the ML-derived models and the final visualization, building the user-friendly, GIS-based front-end that planners will use to analyze "Mobility Heat Stress Hotspots" and allocate resources.	Expertise in spatial analysis, mapping, and GIS implementation.
URBAN CLIMATE	Validation and Policy: Ensure the project's findings on UHI effects are contextually relevant to the urban morphology and policy environment, facilitating the integration of climate adaptation policies within existing planning frameworks.	Expertise in climate change adaptation and UHI mitigation in urban settings.

5. Contact Details

Nicola Colaninno

Politecnico di Milano

Department of Architetture and Urban Studies – DAStU

nicola.colaninno@polimi.it