FACT SHEET: *Urban Roads, Public Spaces and Sensitive Areas*

This document presents further information in regard to the **PowerUp NetZero OPEN CALL FOR INNOVATION PROJECTS**, specifically the activities expected for Consortia presenting innovation projects to the **Strand B: City of Turin Challenges.**

Catalytic and Photocatalytic Pavements and Functional Materials for the Reduction of Greenhouse Gas Emissions and Urban Pollutants

Type of Area	Urban road, public space, square, sidewalk, public transport stop, school courtyard, school area, pedestrian area, or urban corridor exposed to mobility-related emissions and air pollutants.
Duration	Up to 10 months from the date of signature of the Grant Agreement, with all activities to be completed by 30 November 2027, including baseline monitoring, solution implementation, pilot testing, maintenance, final evaluation, and reporting
Technological Focus Areas	Solutions focused on the valorisation of aquatic plants and algae from the Po River, covering the entire value chain from selective biomass harvesting to long-term carbon storage

Context

Urban roads, public spaces, and sensitive areas located near emission sources are characterized by the presence of greenhouse gas emissions and pollutants generated by urban mobility, vehicle traffic, tyre and brake wear, dust resuspension, microplastics, hydrocarbons, and heavy metals.

Urban surfaces, including roads, sidewalks, squares, school courtyards, curbs, traffic islands, public transport stops, barriers, and street furniture, can become active or passive infrastructure contributing to the reduction, capture, absorption, or transformation of greenhouse gas emissions and pollutants. The pilot testing aims to validate materials, treatments, and integrated solutions capable of improving local environmental quality and contributing to the city's net-zero transition objectives.

Objective of the Pilot Testing

Testing innovative solutions designed to:

- Reduce, capture, absorb, or transform greenhouse gas emissions and pollutants in urban areas
- Contribute to the reduction of emissions associated with urban mobility
- Reduce local concentrations of air pollutants, particularly NOx, SOx and CO and, consequently, PM10, PM2.5 and CO_2, for which the former are precursors
- Limit the deposition and resuspension of road dust
- Promote the degradation, adsorption, or retention of pollutants present in the air, on surfaces, or in runoff water
- Improve the environmental quality of sensitive or highly exposed urban areas
- Reduce the direct exposure of pedestrians, students, cyclists, public transport users, and other vulnerable users

- Integrate, where relevant, digital components or services for monitoring, predictive analysis, simulation, and environmental planning support
- Verify the durability, maintenance requirements, performance degradation, and economic sustainability of the tested solutions
- Define the conditions for future large-scale applications.

Test Area

The test area may consist of an urban road section, a public space, or a sensitive area, preferably characterized by:

- High traffic volumes or proximity to heavily trafficked roads
- A significant presence of pedestrians, students, cyclists, public transport users, or other vulnerable users
- The presence of schools, public transport stops, squares, school courtyards, pedestrian areas, sidewalks, cycling paths, home-to-school routes, or public gathering spaces
- Accumulation of dust and road residues, or surfaces subject to pollutant deposition
- Surfaces suitable for the application of innovative treatments, pavements, or materials
- The possibility of identifying a comparable untreated control area or section
- Accessibility for monitoring, maintenance, and sampling activities.

Solutions Sought

1. Catalytic and Photocatalytic Pavements

- Pavements or surface treatments based on titanium dioxide or equivalent materials
- Asphalt, concrete, paving blocks, or coatings capable of contributing to the reduction of NOx and other air pollutants
- Solutions applicable to roadways, sidewalks, cycle paths, squares, school courtyards, pedestrian areas, or public transport stops
- Materials that can be tested using standardized and comparable methodologies
- Solutions compatible with routine maintenance, safety, accessibility, and urban durability

2. Functional Coatings for Urban Surfaces

- Paints, coatings, or treatments applicable to curbs, barriers, walls, shelters, stops, street furniture, pavements, or vertical surfaces
- Materials capable of adsorbing, degrading, retaining, or transforming emissions and pollutants
- Treatments applicable without complex infrastructure interventions
- Solutions resistant to wear, weather conditions, washing, and street cleaning
- Reversible, regenerable, or easily maintainable solutions

3. Adsorbent, Filtration, and Lower-Impact Materials

- Biochar, activated carbon, zeolites, porous materials, or functionalized minerals
- Modular elements or inserts that can be placed along roadsides, in curbs, planting beds, traffic islands, drains, green areas, courtyards, or public spaces

- Materials capable of retaining dust, microplastics, heavy metals, hydrocarbons, or tyre wear residues
- Solutions made from recycled, regenerated, or low-carbon-footprint materials
- Replaceable or regenerable systems with a defined maintenance plan

4. Permeable and Remediating Surfaces

- Permeable or draining pavements capable of retaining or filtering pollutants
- Systems integrated with drains, inspection chambers, bioretention areas, green infrastructure, or sustainable urban drainage systems
- Solutions for the treatment of road runoff water and first-flush stormwater
- Materials capable of reducing the transport of dust, microplastics, and hydrocarbons into the drainage network
- Systems compatible with urban water management, climate adaptation, and the use of public spaces

5. Solutions for Sensitive Areas and Public Spaces

- Applications in schools, school courtyards, squares, public transport stops, pedestrian crossings, pedestrian areas, home-to-school routes, and waiting areas
- Solutions aimed at reducing the direct exposure of vulnerable users
- Integration with tactical urbanism, street furniture, greening, shading, or public space regeneration interventions
- Solutions compatible with accessibility, safety, play, social interaction, maintenance, and everyday use of spaces
- Possibility to involve citizens, schools, or users in the perceived assessment of environmental quality

6. Integrated Digital Solutions for Monitoring and Planning

- Fixed or mobile environmental monitoring systems associated with treated surfaces
- Sensors for air quality, deposited dust, surface temperature, humidity, and runoff water
- Dashboards for comparing environmental, traffic, weather, and material performance data
- Predictive models or simulation tools for estimating effectiveness, performance degradation, and replicability
- Systems powered, where possible, by renewable energy sources or integrated with micro-storage systems.

Minimum Proposal Requirements

Proposals shall be submitted by an SME consortium in accordance with the rules of the call and shall clearly indicate:

- The proposed technology and its level of maturity
- The connection with the City of Torino Challenge and with at least one net-zero technology relevant to the call
- The surfaces or urban elements on which the solution will be applied
- The expected duration of the environmental performance
- The conditions leading to performance degradation
- Regeneration, maintenance, or replacement procedures
- Compatibility with washing, street sweeping, rain, freeze-thaw cycles, traffic, wear, and the everyday use of public spaces
- Any constraints related to safety, accessibility, usability, and maintenance

- The unit cost of the solution, expressed where possible in €/m², €/road section, or €/treated urban element
- Result and impact indicators
- The conditions for future large-scale application.

Pilot Testing Methodology

The proposal shall include:

1. Initial analysis of the test area and available surfaces
2. Baseline environmental characterization, including measurement of air quality, deposited dust, weather conditions, and, where relevant, runoff water
3. Identification, where technically feasible, of an untreated control area or section comparable in terms of traffic, exposure, urban geometry, use of space, and environmental conditions
4. Application of the pavement, coating, or functional material
5. Monitoring during the pilot testing under real operating conditions
6. Periodic sampling of surfaces and, where applicable, filtration materials
7. Assessment of environmental performance before and after implementation and in comparison with the control area
8. Verification of durability, safety, maintainability, and operational impacts
9. Economic analysis and scalability assessment
10. Definition of technical requirements for potential future procurement procedures or larger-scale application

The measurement protocol shall enable the effect of the tested solution to be distinguished from normal variations due to weather, traffic, seasonality, and routine cleaning or maintenance activities.

Expected Results

- Measurable reduction, capture, absorption, or transformation of greenhouse gas emissions and urban pollutants
- Contribution to the reduction of emissions associated with urban mobility
- Measurable reduction of NOx, PM10, PM2.5, or other target pollutants
- Reduction of deposited dust and dust with the potential to be resuspended
- Improvement of local environmental quality
- Reduced exposure of vulnerable users in sensitive areas
- Evidence of the adsorptive, filtration, catalytic, or photocatalytic capacity of the materials
- Verification of the durability of performance over time
- Compatibility with street maintenance, safety, accessibility, and the ordinary use of public spaces
- Reduction of pollutant loads in runoff water, where relevant
- Availability of reliable data on actual performance
- Economic and operational assessment of the solution
- Demonstration of replicability in other urban contexts.

Indicative KPIs

#	KPIs
01	Reduction in Nitrogen oxide (Nox) levels before and after treatment
02	Estimated or measured reduction of emissions associated with urban mobility
03	PM10 and PM2.5 levels in the treated area and in the control area
04	Quantity of dust deposited on surfaces
05	Quantity of pollutants adsorbed, retained, degraded, or transformed
06	Catalytic, photocatalytic, adsorptive, or filtration performance over time
07	Durability of the treatment or material
08	Performance degradation over time
09	Frequency and cost of maintenance
10	Compatibility with street washing, traffic, freezing conditions, rain, wear, and everyday use
11	Effects on safety, skid resistance, accessibility, and urban comfort
12	Quality of runoff water, where relevant
13	Installation cost per m² or per treated urban element
14	Operating and maintenance costs
15	Measured difference between the treated area and the control area
16	Specific benefits in sensitive areas, schools, public transport stops, squares, or public spaces
17	Potential for technical and economic replicability at the urban scale
18	Potential integration with digital solutions, renewable energy sources, or storage systems

Indicative Duration

Up to 10 months from the signing of the Agreement with Fondazione Piemonte Innova, as explained in the Open Call Guidelines, with completion by 30 November 2027, including baseline monitoring, solution implementation, pilot testing, maintenance, final evaluation, and reporting.

Final Outputs

- Report on technical and environmental performance
- Environmental and operational monitoring dataset
- Ex ante / ex post measurement protocol
- Comparison between the treated area and the control area
- Assessment of durability and performance degradation
- Economic analysis and cost estimate for larger-scale deployment
- Maintenance and life-cycle management plan.

- Guidance for integration into technical specifications, procurement procedures, or innovation procurement processes
- Urban scale-up and replicability model
- Minimum technical requirements for future procurement procedures.

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