

Portuguese SME seeks research and industry partners for Eureka Eurostars project on kinetic energy harvesting technologies for smart city applications

Summary

Profile type

Research & Development Request Portugal

Company's country

POD reference

RDRPT20260330013

Profile status

PUBLISHED

Type of partnership

Research and development cooperation agreement

Targeted countries

• All countries

Contact Person

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Term of validity

30 Mar 2026**30 Mar 2027**

Last update

30 Mar 2026

General Information

Short summary

Portuguese SME active in the space sector developing technologies for smart city applications seeks partners for a Eurostars Programme proposal. The project focuses on a system that harvests, converts and stores kinetic energy, integrating mechanical-to-electrical conversion and battery management. Partners with expertise in energy harvesting, electromechanics or power management systems are sought.

Full description

Energy harvesting refers to the capture of small amounts of energy from environmental sources and their conversion into usable electrical power for low-power electronic systems. Typical sources include solar radiation, thermal gradients, mechanical vibrations, and airflow. Such technologies enable autonomous electronic devices, reducing dependence on conventional batteries, and supporting energy efficiency and sustainability objectives. These solutions are particularly relevant for smart city infrastructure, where distributed sensors and Internet of Things devices require reliable, low-maintenance energy supply.

A Portuguese small and medium-sized enterprise active in the space and advanced engineering sector is preparing a collaborative research project aimed at developing a compact kinetic energy harvesting system capable of converting airflow generated by moving vehicles into electrical power. During vehicle motion, relative airflow is created by the interaction between the vehicle and surrounding air. By integrating micro-turbines or aerodynamic fans into locations where airflow velocity is significant, such as ducts or intake structures, the kinetic energy of the airflow can be converted into mechanical rotation and subsequently into electricity through a generator.

The harvested electrical energy could contribute to powering low-consumption electronic systems or support auxiliary functions, reducing the load on the main vehicle battery or alternator. The concept may also support autonomous sensing systems in urban environments, contributing to improved operational efficiency and reduced maintenance requirements. The project will investigate the technical feasibility, aerodynamic optimization, and electrical integration of such a system while ensuring that the energy gained outweighs possible aerodynamic losses.

The research and development activities will include aerodynamic design and modelling of multi-blade fans, development of ducting and casing structures, optimization of aerodynamic drag and lift, integration of electric generators, design of a battery management system and power electronics, electrical circuit simulation, prototype manufacturing, and experimental testing. System optimization will address aspects such as power output maximization, voltage stabilization, and overall device efficiency.

The consortium is being prepared for submission to the Eurostars Programme, a European funding initiative supporting international research and development projects led by innovative small and medium-sized enterprises. The Programme requires collaboration between partners from at least two participating countries and focuses on market-oriented technological innovation.

The Portuguese small and medium-sized enterprise will lead the project and contribute expertise in system integration, engineering design, and prototype development. Additional partners are sought to complement the consortium with specialized capabilities in areas such as aerodynamic modelling, micro-turbine design, electrical energy conversion, power electronics, battery management systems, and experimental testing of energy harvesting devices. Participation from research organizations, universities, engineering companies, or innovative small and medium-sized enterprises is considered relevant.

The anticipated project duration is approximately 24 to 36 months. The consortium is being assembled ahead of the upcoming Eurostars submission deadline. Expressions of interest are requested from organizations able to contribute technical expertise and participate actively in the research and development activities.

Advantages and innovations

The proposed project explores an innovative approach to kinetic energy harvesting by converting airflow generated by moving vehicles into usable electrical power. This concept can support autonomous electronic systems and improve energy efficiency in mobility and smart city environments. By capturing otherwise unused airflow energy, the technology may reduce reliance on conventional batteries and external power sources for low-power devices. The solution combines aerodynamic optimization, compact mechanical components, and advanced electrical power management. The resulting system is intended to power sensors, communication devices and other low-consumption electronics operating in vehicles or distributed urban infrastructure. The approach is aligned with the increasing electrification of mobility and the growing deployment of Internet of Things technologies in smart cities.

Main innovative aspects and advantages include:

- Energy autonomy for distributed electronic systems, supporting sensors and communication devices with reduced dependence on external power supply;
- Contribution to sustainability by capturing otherwise unused airflow energy;
- Compact and lightweight architecture facilitating integration into vehicles or infrastructure components;
- Modular and scalable design adaptable to different airflow conditions and applications;
- Optimized aerodynamic components, including multi-blade fans and ducting structures designed to maximize energy capture while limiting drag effects;
- Advanced battery management and power conditioning for improved voltage stability and efficient energy storage;
- Potential cross-sector applications, including smart mobility systems, Internet of Things infrastructure, and selected applications in the wind energy sector.

The technology under development may contribute to more autonomous and energy-efficient electronic systems

Technical specification or expertise sought

This project requires expertise in multiple fields related to energy harvesting technology, namely structural and electrical engineering, aerodynamics, systems and control, firmware and middleware, and battery management systems. The specific background for each contribution is summarized hereunder:

Structures – both modelling and experimental resources and skills for vibration, fatigue, and corrosion analysis; manufacturing capabilities would also be useful;

Aerodynamics – fan and casing design for drag and lift optimization; computational fluid dynamics resources would be necessary;

Software – development of firmware for signal processing, control, and communications onboard microcontrollers and FPGAs;

Battery management system – power delivery stabilization and monitoring capabilities for energy storage; development of design and control solutions applicable to battery management system and power conditioning electronics, and electrical circuit simulation.

Stage of development

Under development

Sustainable Development goals

- **Goal 12: Responsible Consumption and Production**
- **Goal 7: Affordable and Clean Energy**
- **Goal 9: Industry, Innovation and Infrastructure**
- **Goal 11: Sustainable Cities and Communities**

IPR Status

No IPR applied

IPR Notes

Partner Sought

Expected role of the partner

The consortium is seeking partners to contribute specialized expertise to the development and validation of an energy harvesting system designed to convert airflow generated by moving vehicles into electrical power. The project integrates several stages, including energy harvesting, mechanical-to-electrical conversion, and electrical energy storage.

The Portuguese small and medium-sized enterprise leading the project will coordinate the system integration, prototype development, and overall project management. Additional partners are sought to complement the consortium with technical expertise required across the different technological components of the system.

Relevant partners may include research organizations, universities, engineering companies, or innovative small and medium-sized enterprises with experience in one or more of the following domains:

- Aerodynamics and fluid dynamics, including modelling and optimization of airflow conditions and aerodynamic efficiency;
- Mechanical design of micro-turbines or aerodynamic fan systems, including optimization of blade geometry, blade number, and structural integration into compact devices;
- Mechanical testing and validation, including vibration testing, fatigue analysis, and aerodynamic performance assessment under laboratory conditions;
- Electrical energy conversion systems, including evaluation and integration of generators, rectification circuits, and voltage stabilization components;
- Power electronics and circuit design, including development, manufacturing and assembly of electronic components and power conditioning systems;
- Battery management systems, including hardware design and firmware development for monitoring, control, and optimization of energy storage performance.
- Software and embedded systems, particularly for device monitoring, performance optimization, and integration of power management functions.

Partners are expected to actively participate in research and development activities such as system modelling, component design, prototype development, laboratory testing, and performance optimization. Participation in experimental validation campaigns and contribution to technical documentation and dissemination activities is also foreseen. Organizations able to contribute to one or several of these technological areas are encouraged to participate.

Type of partnership

Type and size of the partner

Research and development cooperation agreement

- **University**
- **SME 50 - 249**
- **R&D Institution**
- **SME 11-49**
- **SME <=10**

Call Details

Framework program

Eureka

Call title and identifier

Eurostars 3 Call 11

Submission and evaluation scheme

Eureka Eurostars submission and evaluation scheme - 2 stage application, one international and one national if successful in first stage and received Eureka label.

Anticipated project budget

2 500 000 euros

Coordinator required

No

Deadline for EoI

15 Jun 2026

Deadline of the call

10 Sep 2026

Project duration in weeks

140

Web link to the call

<https://www.eurekanetwork.org/programmes-and-calls/eurostars/eurostars-call-for-projects-september-2026/>

Project title and acronym

Renewable Energy Aerodynamic Capture and Harvesting (REACH)

Dissemination

Technology keywords

- **04005010 - Integrated waste-energy processes**

Targeted countries

- **All countries**

Market keywords

- **03002 - Batteries**
- **06008 - Energy Storage**
- **03003 - Power Supplies**
- **02006004 - Data processing, analysis and input services**

Sector groups involved