Turkish SME seeks Eurostars partners for a renewable energy R&D project on thermoelectric generator(TEG) and electrolyser-based green hydrogen production from industrial waste heat

Summary

Profile type	Company's country	POD reference
Research & Development Request	**Türkiye**	**RDRTR20261015016**
Profile status	**Type of partnership**	**Targeted countries**
PUBLISHED	**Research and development cooperation agreement**	**• All countries**
Contact Person	**Term of validity**	**Last update**
Enrico FRANZIN	**15 Oct 2026** **15 Oct 2027**	**15 Oct 2026**

General Information

Short summary

A Turkish deep-tech SME targets a system that converts unused industrial waste heat into electricity through thermoelectric generator(TEG) modules and supplies the energy to electrolyser stacks for green hydrogen production. The SME seeks partners having experience or expertise on TEG, electrolyser, thermal-management, power-electronics and pilot-validation to develop and validate the technology for industrial sites. These partners can have R&D and integration roles in the Eurostars project.

Full description

The initiating SME has deep tech energy innovation experience including electrolyser development and has several working solutions on their customers' sites. The company also holds a patent portfolio on combining electrolysers and thermoelectric generators(TEGs) for different industrial use cases. These patents claim waste heat to energy conversion by thermoelectric generators and electrolysers with thermoelectric generator to electrolyser coupling, and multi point direct current power aggregation. The SME works as a supplier neutral architecture designer rather than as a hardware fabricator.
The SME's aim with this project is to develop working prototypes converting the unused and/or waste heat generated and lost into green hydrogen on the industrial sites. Storing the hydrogen or converting it into green ammonia / e-methanol tasks can be discussed to add to this project or to be the following research titles according to the partners expertises.
The proposed project will develop and validate a site specific architecture that converts industrial waste heat into electricity using solid state thermoelectric generator modules. The recovered direct current(DC) will be conditioned and supplied directly to electrolyser stacks, with grid electricity used only for the remaining power requirement.
The concept targets approximately 73.3 percent of the electrolysis electricity from unpriced waste heat and approximately 26.7 percent from the grid. At scale, the architecture is intended to lower the levelized cost of green hydrogen and enable on site production of green hydrogen, green ammonia, and e-methanol.
Thermoelectric generators are solid-state devices that convert heat directly into electrical energy using the Seebeck effect. Unlike their low energy efficiency (~7.5%), they are capable of generating electricity safely in a wide heat stream from 30 C to 500 C. According to their low energy efficiency, storing energy is a challenge that is generated by TEGs. The approach that combines TEGs and electrolysers enables storing the energy in hydrogen, ammonia and e-methanol forms as well.
Green hydrogen is central to decarbonizing energy intensive industries, but the cost of electricity remains the main barrier to broad adoption. Industrial manufacturing sites produce continuous waste heat, often from flues, kiln shells, hot surfaces, and casting processes. Much of that heat is currently released without productive use.
The company developed and owns a fully operational 40 foot containerized demonstration unit that incorporates power electronics, thermal management, and electrolyser stacks. Accredited inspection bodies have independently witnessed an active power draw of 27.90 kW with production of 30.05 m3 per hour HHO, equivalent to 17.11 Nm3 per hour H2. Gas chromatography analysis recorded hydrogen area purity between 93.4 percent and 97.25 percent.
The SME seeks research-performing SMEs, technology developers and research organisations with expertise in thermoelectric generation, electrolyser integration, thermal management, DC power electronics, automation and pilot-scale validation.

Advantages and innovations

The innovation’s advantages:
- Substantial operating cost reduction through the use of continuous waste heat as a zero fuel cost electricity source for most of the electrolysis load.
- Continuous operation potential because industrial heat streams are available around the clock and are not tied to solar or wind intermittency.
- Solid state modularity because thermoelectric generator modules have no moving parts and can be arranged around distributed low to medium temperature heat pools.
- Direct current coupling that reduces conversion losses by conditioning recovered DC power for multi stack electrolyser inputs.
- Independently witnessed pilot performance from a containerized unit, including 17.11 Nm3 per hour H2 equivalent output and hydrogen purity measurements between 93.4 percent and 97.25 percent.
- Industrial decarbonization value for exporters exposed to EU carbon costs, including CBAM related liabilities, where green hydrogen can substitute fossil fuels or support derivative molecules.

Technical specification or expertise sought

The SME seeks partners with different experiences to decide the final destination and the horizons of the project together with the consortium members. The candidates should be aware that a mini consortium of at least 2 partners from 2 different Eurostars countries and each country has their own Eurostars collaboration rules. Potential partners can check these rules from the Eurostars Call-12 web site.

The company welcomes any potential partners having the expertises below:
- Thermoelectric generator modules
High efficiency thermoelectric materials such as silicide, tetrahedrite, or bismuth telluride variants, optimized for 150 C to 500 C and above, with proven durability under thermal cycling.
- Heat source integration
Capture of waste heat from industrial flues, rotary kiln shells, continuous casting radiant surfaces, and other heat streams from 30 C to 500 C and above.
- Power electronics
High current DC aggregation expertise, custom maximum power point tracking control logic, and DC DC conditioning suitable for up to 700 A per stack line.
- Electrolyser integration
Stack current scaling, gas path backpressure optimization, safety logic, and purification under variable waste heat derived power inputs.
- Scale target
Industrial system design aimed at a base capacity of up to 238 Nm3 per hour H2, equal to approximately 171.3 tonnes of green hydrogen per year.

Stage of development

Under development

Sustainable Development goals

- **Goal 9: Industry, Innovation and Infrastructure**
- **Goal 7: Affordable and Clean Energy**

IPR Status

IPR granted

IPR Notes

Partner Sought

Expected role of the partner

The company welcomes alternative partner types for discussion and deciding projects final targets. These potential partner types with their expected / foreseen roles and contribution in the project are mentioned below:
- TEG and thermal-management SMEs with the high-temperature solid-state TEG modules, heat exchangers and thermal interfaces development role. The contribution of these potential partners is expected as co-developing module form factors and validate durability under representative industrial heat conditions.
- Industrial pilot partners and research organisations that support access to relevant industrial heat streams and pilot-validation facilities. The expected contribution of these potential partners is to provide test conditions, measurement support and validation of the technology's industrial applicability.
- Power-electronics and automation SMEs developing DC-DC conditioning networks, MPPT algorithms and automation or safety controls. The contribution of these potential partners would be to support reliable multi-point DC aggregation and control across variable heat inputs.
- Electrolyser technology SMEs that develop stack integration, gas-path optimisation, current scaling and gas purification solutions. It is expected that these potential partners will contribute to validate electrolyser performance under direct DC supply from recovered industrial heat.
- Engineering and system-integration SMEs supporting balance-of-plant engineering, safety assessment and pilot-system integration.The expected contribution of these potential partners is to implement the pilot and the scale-up pathway after technical validation.

Type of partnership

Research and development cooperation agreement

Type and size of the partner

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

Call Details

Framework program

Eureka

Call title and identifier

Eurostars - Call12

Submission and evaluation scheme

Anticipated project budget

Coordinator required

No

Deadline for EoI

15 Jan 2027

Deadline of the call

4 Mar 2027

Project duration in weeks

104

Web link to the call

Project title and acronym

Dissemination

Technology keywords

- **04005005 - Solar/Thermal energy**

Market keywords

- **06003001 - Solar/thermal energy**

Targeted countries

- **All countries**

Sector groups involved

- **Renewable Energy**