Partner Search for Horizon Europe Cluster 5 Project: AI-Driven Circular Bioenergy from Hemp Pellets

Summary

Profile type	Company's country	POD reference
Research & Development Request	**Serbia**	**RDRRS20260204011**

Profile status	Type of partnership	Targeted countries
PUBLISHED	**Research and development cooperation agreement**	

Targeted countries:

- **Finland**
- **Slovakia**
- **Denmark**
- **Spain**
- **Slovenia**
- **Belgium**
- **Czechia**
- **Luxembourg**
- **Romania**
- **Bulgaria**
- **Portugal**
- **Italy**
- **Greece**
- **Hungary**
- **Bosnia and Herzegovina**
- **Switzerland**
- **Austria**
- **Norway**
- **Sweden**
- **Germany**

Contact Person	Term of validity	Last update
Enrico FRANZIN	**4 Feb 2026** **4 Feb 2027**	**4 Feb 2026**

General Information

Short summary

AI-HempLoop aims to demonstrate the technological feasibility (TRL 4–5) of an AI-enabled circular bioenergy concept based on industrial hemp grown on marginal land and the production of hemp pellets as solid bioenergy carriers, complemented by local biogenic waste. The project integrates advanced energy conversion, artificial intelligence and carbon dioxide removal into a single value chain, validated in a rural living lab, supporting scalable and sustainable European bioenergy solutions.

Full description

AI-HempLoop is a Horizon Europe Cluster 5 project concept focused on establishing the technological feasibility (TRL 4–5) of an AI-enabled, circular bioenergy system based on the use of industrial hemp cultivated on marginal land and the production of solid bioenergy carriers in the form of hemp pellets, complemented by locally available biogenic waste streams.

The core idea is to transform underutilised land and low-value biogenic materials into renewable energy and carbon-negative value chains, using advanced technologies and digital optimisation. The project integrates hemp pellet production, advanced energy conversion technologies, artificial intelligence and carbon dioxide removal (CDR) into a single, circular system.

The concept will be validated in a rural living lab in Serbia, enabling real-life testing under operational conditions. This approach allows the assessment of technical performance, environmental impacts and social acceptance at the same time, supporting future replication in different European regions.

AI-HempLoop addresses key European challenges related to energy security, decarbonisation, resource efficiency and social acceptance, while contributing to competitive European renewable energy and bio-based value chains aligned with EU climate neutrality objectives.

Advantages and innovations

The innovation proposed by AI-HempLoop lies in the integration of solid bioenergy production from hemp pellets with artificial intelligence and circular economy principles, targeting low-impact, dispatchable renewable energy solutions.

Unlike conventional bioenergy systems, which often rely on fragmented supply chains and limited digital optimisation, AI-HempLoop embeds AI-based optimisation and a digital twin across the entire value chain — from hemp cultivation and biogenic material management, through pellet production, to energy conversion efficiency and emission control. The concept also incorporates carbon dioxide removal (CDR) by combining biomass-based carbon sequestration with fossil fuel substitution.

The use of industrial hemp grown on marginal land reduces pressure on food systems, enhances biodiversity, and improves land use efficiency, while locally available biogenic waste streams increase circularity and resource security. Validation in a rural living lab enables real-world testing of technical performance, environmental impacts and social acceptance, supporting replication in different European regions.

The proposed solution contributes to EU energy security, climate neutrality and industrial competitiveness, offering a scalable and socially embedded pathway for advanced solid bioenergy systems.

Technical specification or expertise sought

The consortium is seeking EU-based organisations with strong technical, scientific or industrial expertise relevant to TRL 4–5 renewable and decarbonised energy solutions. The following profiles are of particular interest:

-Research & Technology Organisations (RTOs) from EU countries with experience in coordinating Horizon Europe projects and managing multidisciplinary consortia.
-Industrial SMEs or technology providers specialised in solid biomass combustion systems, energy efficiency optimisation and emission reduction technologies compliant with EU standards.
-Research organisations or deep-tech SMEs with advanced expertise in artificial intelligence, digital twins, data-driven optimisation and modelling of energy and resource systems.
-Social Sciences and Humanities (SSH) research organisations or universities with expertise in energy and climate policy, governance, policy mix analysis, socio-economic impact assessment and just transition.
-EU networks, cluster organisations or associations experienced in dissemination, replication and scaling of innovative energy solutions across different European regions.

Stage of development	Sustainable Development goals
Under development	• **Goal 15: Life on Land**
	• **Goal 13: Climate Action**
	• **Goal 9: Industry, Innovation and Infrastructure**
	• **Goal 10: Reduced Inequality**
	• **Goal 4: Quality Education**
	• **Goal 12: Responsible Consumption and Production**
	• **Goal 8: Decent Work and Economic Growth**
	• **Goal 5: Gender Equality**
	• **Goal 7: Affordable and Clean Energy**
	• **Goal 2: Zero Hunger**
	• **Goal 17: Partnerships to achieve the Goal**
	• **Goal 11: Sustainable Cities and Communities**
	• **Goal 1: No Poverty**

IPR Status

IPR Notes

Partner Sought

Expected role of the partner

Partner organisations will contribute to the project according to their expertise through the following roles:

• Project coordination and integration, including scientific, technical and administrative management of the consortium.

• Industrial contribution to energy conversion technologies, supporting the development, optimisation and TRL 5 validation of solid biomass combustion systems in cooperation with Serbian research partners.

• Development of AI-based optimisation tools and a digital twin, enabling performance analysis, scenario modelling and system-level optimisation of the hemp pellet energy value chain.

• Impact assessment and SSH integration, focusing on policy analysis, governance frameworks, social acceptance, just transition and replication strategies, implemented jointly with Serbian SSH partners.

• Replication, dissemination and scaling activities, supporting stakeholder engagement, knowledge transfer and uptake of the AI-HempLoop concept across Europe.

Type of partnership	Type and size of the partner
Research and development cooperation agreement	• **R&D Institution**
	• **SME 11-49**
	• **Big company**
	• **SME 50 - 249**
	• **University**
	• **SME <=10**

Call Details

Framework program

Access to finance

Call title and identifier

Programme:
Horizon Europe – Cluster 5: Climate, Energy and Mobility

Submission and evaluation scheme

HORIZON-CL5-2026-04-Two-Stage

Anticipated project budget	Coordinator required
	Yes

Deadline for EoI	Deadline of the call
10 Mar 2026	**31 Mar 2026**

Project duration in weeks

Web link to the call

https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/HORIZON-CL5-2026-04-Two-Stage-D3-02?isExactMatch=true&status=31094501,31094502&order=DESC&pageNumber=5&pageSize=100&sortBy=startDate

Project title and acronym

AI-enabled circular bioenergy and carbon-negative value chains from hemp and organic waste, AI-HempLoop

Dissemination

Technology keywords

- **04007003 - Process optimisation, waste heat utilisation**
- **04005006 - Solid biomass**
- **04005012 - Waste to energy - other**

Market keywords

- **06003009 - Biomass and Biofuels**
- **06003008 - Other alternative energy**
- **06006003 - Heat recovery**

Targeted countries	Sector groups involved
• **Finland** • **Slovakia** • **Denmark** • **Spain** • **Slovenia** • **Belgium** • **Czechia** • **Luxembourg** • **Romania** • **Bulgaria** • **Portugal** • **Italy** • **Greece** • **Hungary** • **Bosnia and Herzegovina** • **Switzerland** • **Austria** • **Norway** • **Sweden** • **Germany**	