Grant Agreement: 101251852

Project acronym: GESIIS

Project title: Geothermal Energy Storage and Innovative Integrated System

Type of action: Innovation Fund

Topic: INNOVFUND-2024-NZT-PILOTS

Type of action: INNOVFUND Lump Sum Grants

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GESIIS - Geothermal Energy Storage and Innovative Integrated System

The Concept, Objectives and Participants

GESIIS is a first-of-its-kind geothermal pilot plant that brings together deep geothermal energy, high-temperature aquifer thermal energy storage and a large-scale heat pump to demonstrate a new pathway for the decarbonisation of heat in Europe.

Located in Ostellato, in the province of Ferrara, Italy, the pilot plant will integrate two geothermal doublets at approximately 2,500 metres depth, a high-temperature aquifer thermal energy storage system at around 360 metres depth, and a high-performance heat pump powered by on-site photovoltaic generation.

This innovative configuration will supply around 67,000 MWh of renewable heat per year to a large hydroponic greenhouse facility, almost fully decarbonising its thermal demand. Compared with the reference scenario, GESIIS is expected to achieve a relative reduction in greenhouse gas emissions of more than 99%.

By integrating geothermal heat extraction, seasonal thermal storage, solar power and advanced digital tools, GESIIS will enable real-time optimisation, seasonal energy balancing and predictive maintenance. This integrated approach will improve operational reliability, flexibility and environmental safety, while demonstrating a scalable solution for energy-intensive sectors such as agriculture, district heating and industry.

The project also introduces an innovative business model designed to overcome the high upfront investment and financial risks that have traditionally limited geothermal deployment. This model is based on a dedicated special purpose vehicle and long-term heat purchase agreements with the final heat off-taker, creating a structure that can be replicated in future renewable heat projects.

To manage the implementation and validate an innovative business model, FRI-EL CAPITAL and FRI-EL 4.1 established a dedicated Special Purpose Vehicle (SPV), FRI-EL GEOPOWER, which will be responsible for developing and operating the pilot system.

Over its first ten years of operation, GESIIS is expected to avoid approximately 114,000 tonnes of CO_2 equivalent. In doing so, the project will contribute to the objectives of the European Green Deal, the EU’s climate-neutrality target for 2050 and the renewable energy targets set by the Renewable Energy Directive.

At local level, GESIIS will support regional economic growth, foster high-skilled employment and strengthen value chains in drilling, engineering, digital energy management and environmental monitoring. By engaging SMEs, investors and technology providers, the project will promote knowledge transfer, reskilling and the uptake of advanced geothermal innovation across Europe.

Participants

FRI-EL 4.1 SRL (Coordinator)

FRI-EL GEOPOWER SRL

FRI-EL CAPITAL SRL

Summary of main project Information

LOCATION: Ostellato, Italy

CATEGORY: Renewable Energy (RES)

SECTOR: Geothermal energy

AMOUNT OF INNOVATION FUND GRANT: 31,050,100 EUR

EXPECTED GHG EMISSIONS AVOIDANCE: 114,088 tonnes CO2 equivalent

STARTING DATE 01 April 2026

FINANCIAL CLOSE DATE 28 February 2027

ENTRY INTO OPERATION DATE: 31 August 2028

CALL NAME InnovFund-2024-NZT

LINK to the factsheet

https://ec.europa.eu/assets/cinea/project_fiches/innovation_fund/101251852.pdf

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Contact the GESIIS project

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