Co-funded by the European Union

Project: «Region of CENTRAL MACEDONIA» 2021-2027
Action: «Innovation Investment Projects»

Project title: **"Energy Park Aggistrou Serrwn – Energy Park"**

Short Description of the funding project:

The Centre for Research and Technology Hellas (CERTH) participates in the «**Region of Central Macedonia**» Operational Programme of the NSRF 2021–2027 through the Action «**Innovation Investment Projects**», co-funded by the European Union and National Resources.

The project entitled «Energy Park Aggistrou Serrwn – Energy Park» aims to enable the existing small hydropower plant in Aggistro to achieve energy storage capacity of 1 MWh in the form of hydrogen (H_2), which can be produced through various renewable energy sources (RES), such as photovoltaic systems or biomass gasification. In parallel, the system has been enhanced with technology that enables the optimal charging of lithium-ion batteries, thereby facilitating the direct utilization of RES for the generation of the required electrical energy. Additionally, the company aims to render the biomass gasification unit operational and efficient, with the ultimate and anticipated goal of completing electricity generation from this unit, leveraging the aforementioned energy storage and RES management system. The final objective of the ENER-PARK project is for this unit to operate as a base-load power generation source.

Indicative expected benefits of the project through its proposed interventions include:

- ✓ Significant economic benefits arise for the company, as it already produces electricity and can utilize it to meet the building's energy needs, thereby avoiding the need for connection to the grid. In the event of a grid connection, a separate power line installation would be required, linking to a transformer located 20 km away, since the local transformer is overloaded and cannot support additional lines.
- ✓ The new building will be capable of operating with complete energy autonomy, avoiding the risks associated with frequent outages of the unstable existing grid. Moreover, energy autonomy will be achieved exclusively through Renewable Energy Sources (RES), making the building a comprehensive example of full energy supply coverage via RES.
- ✓ Even during periods without power outages, the energy storage solution using batteries – combined with the energy management system and biomass gasification – offers the ability to regulate frequency and voltage of the load, providing several hours of backup power.
- ✓ The entire system can be monitored and controlled remotely via an integrated energy management system that includes the gasifier and batteries.

- ✓ The project will constitute an innovation for Greece, as there is no comparable existing project in the country. Given the many remote areas facing grid connection issues, this project will offer a model for energy storage and serve as a demonstration case.
- ✓ The possibility of energy exchange will provide valuable experience in the field of energy markets ("energy trading"), a system already implemented in advanced countries and considered a challenge for Greece.

The objective of the project is the completion of an integrated system for the storage and utilization of renewable energy in the form of hydrogen, which includes lithium-ion batteries, a photovoltaic installation, and the integration of continuous power generation from biomass, with the aim of fully covering the energy needs of the company's craft park building. ENER-PARK recognizes bioenergy as a particularly promising solution for energy production within the context of decentralized energy generation and seeks to achieve three key objectives:

1. Identification of the components and processes to be integrated into the autonomous hybrid system, utilizing locally available renewable energy sources, and development of control strategies for sustainable and efficient response to dynamic electrical loads, including heaters and refrigeration units. Within this context, the integration of biomass conversion technologies in combination with photovoltaic (PV) energy generation will be examined. The biomass will be sourced from agricultural processes involving aromatic plant cultivation, which the company owns.
2. Enhancement of the energy valorization of biomass residues through gasification, aiming to achieve this via diversification of feedstocks, identification of techniques to increase energy density, and significant improvement of the flexibility of an already available technology.
3. Development of an integrated power supply and storage system, which will offer "plug-and-play" capabilities.

Total Budget of the project: 319.300,00 €
Budget for CERTH: 143.000,00 €