FONDAZIONE BRUNO KESSLER
MAGAZINE

# Energy and Digital Innovation with the European FLEXIndustries Project

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## FBK to host the General Assembly with 30 European Partners; one of six European demonstration sites located in Rovereto at Suanfarma.

Fondazione Bruno Kessler (FBK) recently hosted the General Assembly of the European project **FLEXIndustries**, which brings together over 30 international partners to review the technology solutions being developed to make **energy-intensive industries more sustainable**. Funded by the Horizon Europe programme and launched in 2022, the project features six demonstration sites across Europe. In Italy, the demonstration site is located in **Rovereto**, at the Suanfarma pharmaceutical plant—one of the main industrial facilities in Trentino.

*"FLEXIndustries is a European project that aims to transform how energy-intensive industries produce, consume, and manage energy,"* **Diego Viesi**, a researcher at FBK's Center for Sustainable Energy, explained. *"Our objective has been to develop and test large-scale, practical technology solutions that make industrial processes more efficient, flexible, and compatible with renewable energy use. The core idea is to integrate advanced technologies—such as heat pumps, cogeneration systems, batteries, and solar installations—directly into production sites to reduce environmental impact and enhance industrial competitiveness, with a particular focus on digitization and interaction with energy networks."*

The project includes **six demonstration sites** in various European countries, each representing a different sector: **automotive** in Turkey, **biofuels** in Greece, **fertilizers** in Spain, **steel** in Bulgaria, **polymers** in Poland, and **pharmaceuticals** in Italy.

A Project Bridging Energy and Digital Transition

**FBK** has played a central role in the development and integration of demonstration technologies at the Rovereto site, contributing **cross-disciplinary expertise in energy and digital** technologies. The project is an example of successful collaboration across domains, involving

FBK's **Center for Sustainable Energy** for technology development and energy performance analysis, and its **Center for Cybersecurity**, which developed advanced digital tools for monitoring and managing energy systems through smart control solutions.

*"Our work focused on two main components: thermal and electrical,"* explained **Francesco Ghionda**, a researcher at the Center for Sustainable Energy. *"On the thermal side, we developed a new-generation heat pump, managing the full cycle—from design and modelling to on-site integration and performance analysis. This system provides both cooling for industrial processes and heat, which is fed into Rovereto's district heating network."*

The heat pump installed at the Suanfarma site is a dual-function model supplied by HiRef, capable of simultaneously producing 0.99 MW of cooling for processes and 1.25 MW of heat, which is fed into the district heating network managed by Novareti.

"On the electrical side, Suanfarma made its first investment in renewable energy with a 500 kW photovoltaic system. We then supported the integration of a lithium-ion battery system, with 400 kWh storage and 264 kWp power capacity, supplied by Midac. This system not only stores excess energy but also participates in flexibility markets to optimise costs and support the power grid. It also allows for purchasing electricity at lower rates during off-peak hours, further enhancing overall efficiency."

All of this has been dynamically modelled by FBK to predict system behaviour and optimize performance in response to industrial and energy-related variables.

**Energy Management System**

As energy systems grow more complex due to the integration of technologies such as batteries, heat pumps, and solar panels, an advanced *Energy Management System* (EMS) was needed to **coordinate and optimize the entire energy infrastructure.**

*"The Center for Cybersecurity is involved in researching and developing optimization algorithms for industrial energy systems,"* said **Marcelo Rodas Britez**, a researcher at FBK's Center for Cybersecurity. "Our goal is to integrate renewable sources, enable energy flexibility, and implement decarbonization strategies to support the energy transition."

Developed by Suanfarma in collaboration with Trigenia and supported scientifically by FBK centers, the platform enables real-time monitoring of technology performance, data collection, and the development of optimized management strategies.

## From implementation to reality: the Italian demonstrator enters its final stage

The demonstration site in Rovereto has evolved into a **tangible, scalable model for advancing the energy and digital transition in the industrial sector**. Since the project's launch in summer 2022, the focus has been on the development, integration, and deployment of key technologies—namely a heat pump, battery storage system, and photovoltaic plant. By early 2025, these technologies were fully installed and delivered to the site, marking a critical milestone. Initial operational testing is now underway. Beginning in June, the project enters its final and most pivotal phase: full-scale operation accompanied by a year-long period of monitoring and analysis led by researchers from FLEXIndustries. This final stage will be essential in validating the demonstrator's impact—showcasing measurable improvements in energy efficiency, sustainability, and cost-effectiveness.


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**AUTHORS**

- Editorial Staff