

Fit4Micro: an innovative solution for the decarbonisation of the building sector

A new European project is working to develop a micro-CHP unit that runs on sustainable liquid biofuels

Florence, 30 November 2022.

While the European Union is committed to reducing carbon dioxide emissions and achieving carbon neutrality (or 'net zero' emissions) by 2050, buildings represent a hard-to-decarbonise sector.

In the framework of the European Green Deal, the European Commission has developed the Renovation Wave Strategy and Action Plan. It concerns the renovation of buildings, which is essential for both decarbonisation and energy efficiency.

The current renovation rate of existing buildings is low, risking substantial delays to achieving the EU's CO₂ emissions reduction targets. Moreover, the energy demand in Europe's building sector is very diverse, and the differences in seasonal demand and local energy infrastructure mean that a multi-technology approach will be needed to provide all buildings with electricity, heating and cooling that is generated from renewable and sustainable energy sources.

Currently, 75% of Europe's buildings rely on fossil fuels for heating, and 36% of GHG emissions are due to this sector¹.

The Fit4Micro project, which is funded by the EU's Horizon Europe research & innovation framework programme, aims to make a positive and unique contribution to the challenge of making buildings more environmentally sustainable. The project's main objective is to develop a new generation of combined cooling, heat and power (CCHP) system based on a novel technology of microturbine, running on sustainable biofuels. The system would be suitable for multi-family residential buildings and at remote or off-grid locations, for multi-office or multi-apartment buildings, hotels, hospitals and so on.

The technology developed for the project is based on a hybrid heating system, which has several advantages compared to pure electrically-driven ones, and hence is particularly attractive in the retrofit market for existing buildings.

¹ European Commission, 2020. [A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives.](#)



In order to implement the Fit4Micro solution, the research will start from the innovative Intercooled Regenerative Reheating Gas Turbine (IRRGT) prototype made by MITIS, the project coordinator.

As explained by Dr Michel Delanaye, founder and CEO at MITIS:

“The main objective of Fit4Micro is to develop a new generation of combined heat, power and cooling system, based on a novel technology of microturbine. The aim is to rely on renewable energy as much as possible by using liquid biofuels, which will be injected into the microturbine to produce power and heat.

The system will generate electricity in an efficient way, and the heat can also be used in order to produce cooling by means of adsorption chillers. By the end of the project, our aim is to build an integrated TRL-5 demonstrator.”

The turbine will work with flameless combustors that can achieve very low emissions and high fuel flexibility, and will be improved during the project implementation, with the aim of increasing its current design efficiency up to 40%, a very ambitious target for microturbines.

Once implemented, this technology will lead to very high electrical efficiencies and a flexible heat/power ratio.

Moreover, the development of this hybrid heating system will significantly increase environmental sustainability in the building sector, through intelligent replacement of fossil fuels with biofuels.

In line with the European Green Deal’s objectives, the Fit4Micro solution will contribute to making Europe the first circular, climate-neutral and sustainable economy in the world.

PARTNERS

Fit4Micro project is a Horizon Europe Research and Innovation Action, launched in October 2022. The Project Kick-Off meeting took place in Brussels, hosted by COGEN Europe, on 22-23 November.

The consortium is coordinated by MITIS (Belgium). Other partners are: COGEN Europe, University of Mons (Belgium), BTG (The Netherlands), OWI, Fraunhofer ISE, Fahrenheit (Germany), Aalborg University (Denmark) and ETA Florence Renewable Energies (Italy).



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Contacts: info@fit4micro.eu

LinkedIn: <https://www.linkedin.com/company/fit4micro/>



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