Fit4Micro

Newsletter

Issue 6 | June 2026

A clean way to power homes off the electricity grid

The Fit4Micro consortium is delighted to introduce its sixth newsletter edition.

This newsletter reports the latest news and developments of the project that have occurred up to June 2026 including communication and dissemination actions.

Fit4Micro - Clean and Efficient microCHCP by microturbine based hybrid systems, is a Horizon Europe project aiming at developing a highly efficient microCHCP hybrid system running on sustainable liquid biofuels and able to provide renewable heating, cooling and power production for demand-driven applications such as multi-family houses specially at remote and/or off-grid locations, non-residential buildings and industrial facilities requiring cooling or water as refrigerant in their processes.
Fit4Micro system is based on a double shaft micro gas turbine combined with a humidification unit. A high GHG emission reduction is obtained by our flameless combustor using RED-III compliant biofuels. Its fast response time and fuel-flexible operation make it ideal for a highly efficient hybrid CHP system, resilient to changes in fuel and power markets and empowering the consumers through digital solutions. Fit4Micro can be integrated with a compression heat pump, an adsorption chiller and a solar PV system.

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1. Next Fit4Micro event in Freiburg

Fit4Micro Project workshop and demo plant tour in Freiburg, Germany, will be on Thursday 25 June 2026, 13:00 – 17:00. It will be organised as a hybrid event (online & Fraunhofer Institute for Solar Energy Systems ISE, Heidenhofstr. 2, 79110 Freiburg, Germany)

This workshop will bring together industry representatives, researchers and energy stakeholders to explore innovative approaches to sustainable and efficient heating systems.

Organised by Fit4Micro project in cooperation with Bundesverband Kraft-Wärme-Kopplung (B.KWK) e.V., the event will examine the role of micro-combined heat and power (Micro-CHP) technologies and their integration with heat pumps in supporting Europe's decarbonisation and energy transition objectives.
The workshop will feature expert presentations on developments within the German cogeneration market, emerging Micro-CHP applications, hybrid energy systems, biofuel

production and trigeneration technologies.
Participants will also gain insights into the Fit4Micro project and the latest research undertaken by leading organisations and technology providers in the sector.
Held in a hybrid format at the Fraunhofer Institute for Solar Energy Systems ISE in Freiburg, Germany, the event will conclude with a technical visit and live demonstration of the Fit4Micro hybrid system (starting at 16:00).

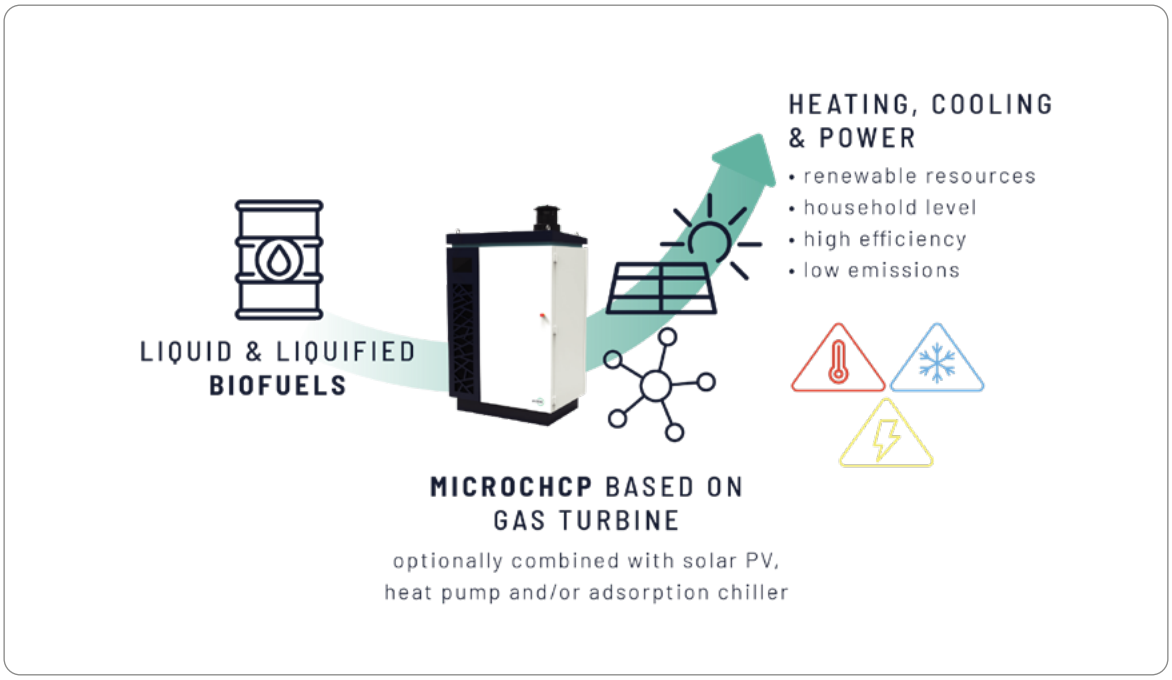
Deadline for registration: 18 June 2026.
Register here

No registration fee is required.

Updated version of the event programme here.

This event is hosted under the Sustainable Energy Days umbrella. Sustainable Energy Days are events and activities held globally to increase visibility and promote clean energy and energy efficiency. Featuring a variety of formats - from civil society meetings to educational forums and even artistic interventions - these events provide a platform for individuals, organisations, and communities to inspire behavioural change and accelerate innovation towards achieving the EU's energy and climate goals.

With the current global focus on energy transition and energy independence, the Sustainable Energy Days play a key role in fostering clean energy solutions in the EU and around the world.



The Fit4Micro technology and concept. Source: Fit4Micro project

2.First Fit4Micro project webinars

Six project webinars will be arranged in the period from February to September 2026 to present carried out activities and achieved results for every work package of Fit4Micro, with the main topics as follows: analysis and determination of the environmental sustainability performance of the system; materials for the combustion chamber and new combustors; microturbine coupled to a humidification technique; integrated hybrid trigeneration system; policy regulation and market assessment; production and supply of hydrotreated HPO (biofuel) from woody biomass.

The first two webinars were titled:
"Fit4Micro Tech-development and Sustainability:
1) LCA for better environmental system performance &
2) Making tech-development bridging invisible gender gaps"
and "Fit4Micro: Focus on Performance Enhancement Improving Efficiency and Flexibility in Micro Gas Turbine Systems".



First Fit4Micro webinar. Source: Fit4Micro project.

The first was an engaging webinar exploring the intersection of Life Cycle Assessment (LCA) and gender perspectives in technology development. Drawing on practical experience from work in these two distinct yet interconnected areas, the session highlighted how integrating broader social perspectives can strengthen technological innovation and sustainability assessments. The webinar was organised in two complementary parts, with Sara Bjørn Aaen, Associate professor with the Danish Center for Environmental Assessment at Aalborg university, specialized in social and gendered impacts in technology and planning projects, and Søren Løkke, Associate professor with the Life Cycle Sustainability Group at Aalborg university, specialized in Life Cycle impacts in technology and planning projects, as presenters.

The second webinar explored key technologies developed within the Fit4Micro project to improve micro gas turbine performance. Aggelos Gaitanis, Post-doctoral researcher at UMONS working on the humidification strategy in micro gas turbine, focusing on system efficiency and managing the experimental campaign, in this session presented the Intercooled Regenerative Reheating Gas Turbine concept and examine how humidification enhances efficiency while enabling more flexible operation between heat and electricity production. This webinar combined system-level design with applied research insights, and explained how these approaches contribute to higher efficiency, improved operational flexibility, and better integration in energy systems.

In both webinars, there was time for Q&A which boosted interesting discussion.



Second Fit4Micro webinar. Source: Fit4Micro project.

Next project webinar is planned for the 22nd of June 2026, 13:30-14:45 CEST, on "Advancing Sustainable Biofuels for Microturbine Applications: Fuel Production, Supply Chains and Combusting Testing".
Project partners will present the latest developments in sustainable biofuel production and fuel validation

for microturbine applications. This session will focus on key activities from Biofuel Production and Supply and selected activities from Flameless combustion for Liquid Fuels Development and High-Temperature Material Assessment.
Participants will gain insights into the production and upgrading of sustainable biofuels from biomass, fuel quality standardisation, supply chain considerations, and experimental combustion testing of liquid biofuels in advanced combustion systems.

This is the link to the registration form

Visit the Results webpage fit4micro.eu/results, and the Youtube project channel: youtube.com/channel

3.Fit4Micro at EUBCE 2026

Two Oral presentations about Fit4Micro Project carried out activities were in the conference programme of the EUBCE – European Biomass Conference & Exhibition 2026, World Forum The Hague, The Netherlands.
The first one was titled "Fit4Micro Solution for a microCHCP Hybrid Heating System Running on Biofuels", presented by Michel Delanaye, CEO at MITIS, Belgium, and Fit4Micro coordinator, during the Oral session 3BO.12, Wednesday, 20 May 2026.

A related paper of this presentation will be included in the full open access conference proceedings database, free of charge for the final users. The Scientific Programme of the EUBCE includes several other presentations and sessions dedicated to biomass feedstocks, conversion processes and technologies for advanced biofuels and bio-based materials production.
The other one was titled "Impact of Hydrotreatment Severity on the Properties of Hydrotreated Pyrolysis Oil (HPO)", presented by Bert van de Beld, Director Technology at BTG Biomass Technology Group BV, The Netherlands, Oral session 5BO.14, Wednesday, 20 May 2026.



Michel Delanaye, MITIS, presentation.
Source: EUBCE 2026/ETA Florence.



Bert van de Beld, BTG, presentation.
Source: EUBCE 2026/ETA Florence.

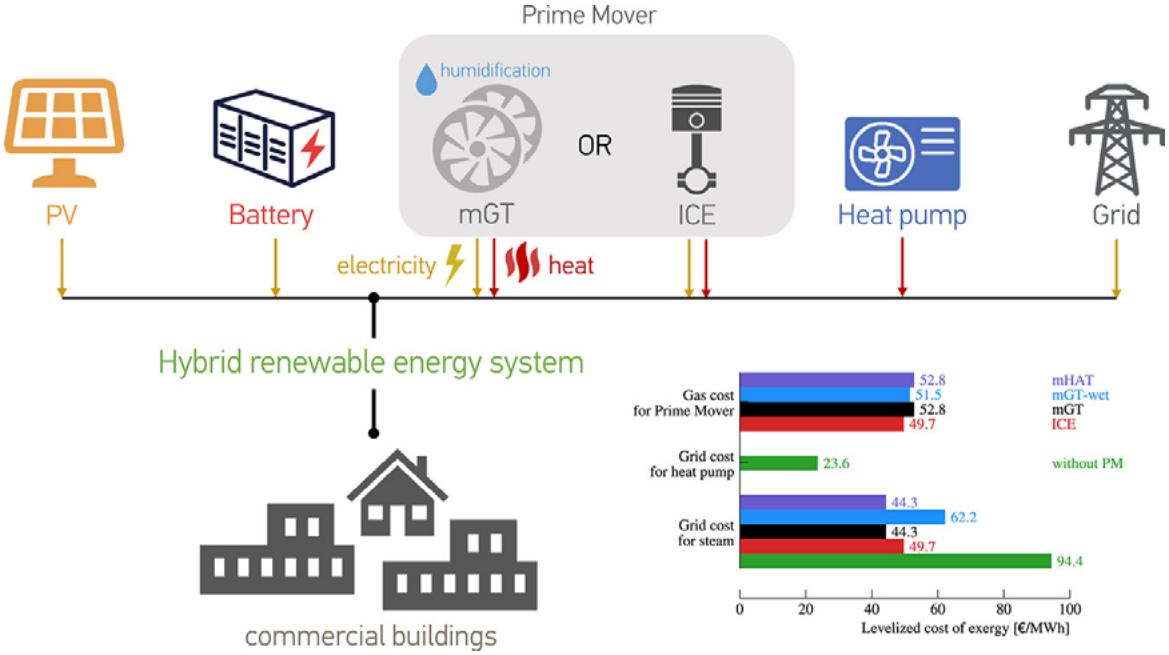
Fit4Micro also organised a parallel project workshop, hosted by EUBCE at the World Forum in The Hague, in the afternoon of the 21st of May 2026. This workshop presented a series of current project activities and results to international attendees, mainly experts in bioenergy and bioeconomy. Presentations focused on an overview on micro-CHP in Europe, microturbines characteristics and system integration, new generation combustor, low emissions with flameless combustion, the production of sustainable biofuel for micro turbines, LCA for sustainability assessments.

For further information, visit the Results page

4. Paper on Techno-economic analysis of mGTs in hybrid renewable energy systems

In this paper, titled "Techno-economic and uncertainty-aware optimization of hybrid renewable systems with small-scale prime movers for commercial buildings" and published in March 2026 (Energy Conversion and Management: X, Volume 30, Elsevier; link to the publication webpage: https://doi.org/10.1016/j.ecmx.2026.101765), University of Mons, Université catholique de Louvain and WEL Research Institute (Belgium) authors presented why and how micro gas turbines (mGTs) can offer a compact and modular option for distributed power generation in microgrids.
The increasing share of renewables forces combustion-driven power generation machines to operate with high adaptability.
Small-scale heat and power units, like micro gas turbines (mGT), could show potential for Hybrid Renewable Energy Systems (HRES) due to their operational and fuel flexibility. However, their economic viability in a variable energy environment remains uncertain.

The levelized cost of exergy (LCOX) in HRES with combined heat and power (CHP) units, should be calculated under uncertainties to support decision-making. This paper applies design optimization to a photovoltaic/battery/heat pump system with two prime movers (PM) to investigate the required economic relevance of small-scale CHP units in HRES. The considered prime movers are internal combustion engines (ICE) and mGTs, including advanced mGT configurations such as humidified cycles (mGT-wet, mHAT).
Test cases include a hospital, office and hotel in Brussels with distinct demand profiles. Uncertainty quantification on optimized system capacities is performed using Polynomial Chaos Expansions (PCE), ensuring computational efficiency. The hospital shows that adding an mGT improves LCOX (227 €/MWh compared to 244 €/MWh of non-PM HRES), while in the hotel case, non-PM systems are more cost-effective due to low electricity demand.



Graphical abstract. Source: sciencedirect.com.

Dry mGTs and ICEs enhance flexibility in HRES for suitable applications, but their economic viability depends strongly on energy prices and demand.
Humidified mGTs improve self-sufficiency but with higher fuel cost, making their cost-effectiveness questionable if excess electricity is not sold to the grid.

This paper employs design optimization and uncertainty quantification on a system that integrates photovoltaic arrays, battery storage,

heat pumps, and two distinct prime movers, ICE and mGT. Targeting a hospital, an office and a hotel located in Brussels, this investigation handles their unique demand profiles.
The optimization utilizes two objectives: minimizing the LCOX and increasing the system's SSR.
The study's main focus is to compare the optimized designs without PM with those that incorporate PM regarding their calculated LCOX. Also, the economic results of the prime mover cases are compared in an uncertain techno-economic operating environment.

The conclusions drawn in this study are specific to the investigated demand profiles, climatic conditions, and design constraints.
The case study is limited to buildings located in Brussels, and the photovoltaic capacity is constrained to the available roof area in order to represent a realistic retrofit scenario.

Future work will extend the present framework toward robust design formulations, in which system sizing decisions are optimized directly under uncertainty.
Such an approach would enable the identification of designs that remain robust across a wide range of economic, climatic, and technical conditions.
Also, the integration of broader socio-economic indicators could further enhance the assessment of system performance.
Lastly, the integration of load scheduling in a weak-grid systems could be explored in future extensions of the framework.

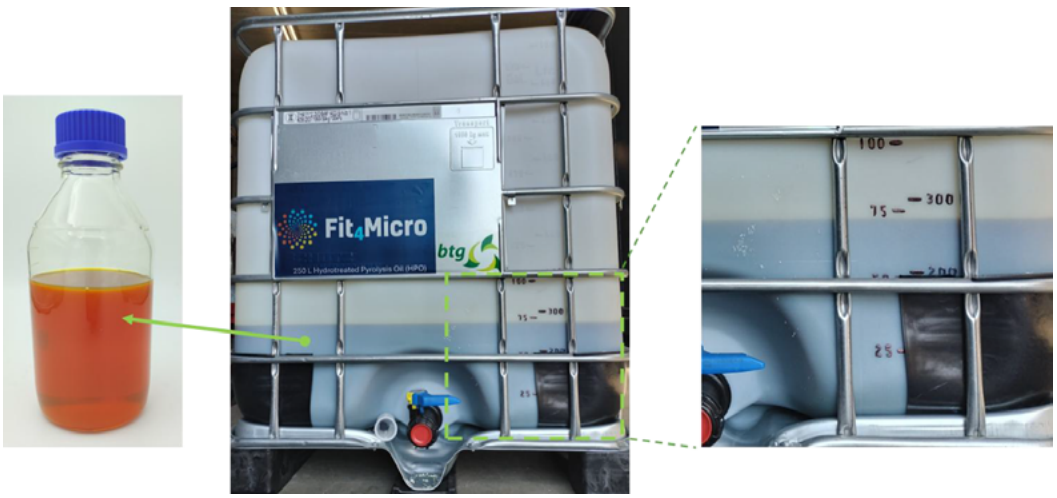
5. New project deliverables

In the public deliverable D2.4 HPO produced for the hybrid micro CHCP system an introduction on the conversion of fast pyrolysis oil (FPBO) to hydrotreated pyrolysis oil (HPO) was provided.
The aim of Fit4Micro with respect to hydrotreatment of FPBO is threefold:

- Minimize the hydrogen consumption to produce the HPO
- Produce HPO with a net heat of combustion of at least 40 MJ/kg (LHV)
- Produce HPO with Nitrogen content below 100 ppm.

A description on the production of a reference quality HPO was presented in D2.1. The current deliverable D2.4 only concerns the production of 250L of HPO with a quality sufficient for the Fit4Micro application and complying with the KPI's mentioned above. More detailed information on the production run, mass-& energy balances will be reported in a separate deliverable (D2.8, due May 2026).

The following figure illustrates the final HPO batch. Total product quantity is around 280 L.



The final Fit4Micro HPO batch. Source: BTG and Fit4Micro project.

The heating value of the HPO product is 42 MJ/kg complying with the required minimum value of 40 MJ/kg. The nitrogen content is 49 ppm well below the maximum value of 100 ppm. For comparison also the properties of the HPO reference are given as reported in D2.1.
The objective of producing 250L of a HPO fuel with a minimum heating value of 40 MJ/kg and a maximum Nitrogen content of 100 ppm has been successfully achieved.
Details on the production of the HPO fuel (including mass & energy balances) will be reported in due course.

For further information, Deliverable 2.4 "HPO produced for the hybrid micro CHCP system".
Visit the Results webpage fit4micro.eu/results

The aim of the report Deliverable 6.4 **Report on Gender Dimensions** is to identify attention points relevant to prevent the MicroCHCP-technology from prompting gender bias and perpetuating existing social inequalities. The analysis provides input to the specific development of the MicroCHCP-technology.
The gender dimension analysis consists of two parts:

1. firstly, gender aspects related to small scale heating systems or in this respect comparable technologies are reviewed, where upon, (and building on the general review)
2. the technology development process is screened to identify potential aspects that may need to be ad-dressed to prevent gender-bias.

The method for the review is accounted for in the methods section (section 3). The gender screening, however, is based on a framework derived from already existing gender assessment frameworks.
It should be noted that the report is not a gender impact assessment, in the sense that it reveals the positive and negative impacts from the MicroCHCP-technology.
Rather it focusses on the potential for improvement and thus skips the positive impacts from implementing the technology.
The methodology for the report consists of three elements: a literature review, an internal project workshop and interviews with experts and stakeholders in the intersection between gender and energy technology.
The report identifies several attention points and loosely formulated actions that would make the design of energy technologies in general and the MicroCHCP-technology in particular more gender+ sensitive.
The conclusions from the analysis should, however, be understood from a system perspective.
Some actions are manageable within a design team e.g. related to function and form or experiences and services, whereas more systemic rooted issues can only be addressed in the policy-sphere.
As discussed in this report, there are several barriers on all levels that range from systemic to organizational which underscores the need for initiatives on all system levels. However, awareness is the first step.

For further information, Deliverable 6.4 "Report on Gender Dimensions".
Visit the Results webpage fit4micro.eu/results

ABOUT THE PROJECT

The core activity of FIT4MICRO is to design a technology that will guarantee an improvement in energy efficiency rates of existing buildings, through the reduction of energy consumption and the replacement of fossil fuels with biofuels.
The project has a total duration of 48 months from October 2022 to September 2026 and is funded by the European Union under the Horizon Europe programme.



The project Consortium during the meeting and visit at BTG in Enschede, The Netherlands.
Source: Fit4Micro project.

- FIT4MICRO is coordinated by MITIS, a clean-tech startup developing flameless combustion microturbine working with air foil bearings, with the main aim of providing immediate and drastic emission reductions during primary energy conversion. The project consortium has put together 8 partners from 5 countries with long-term expertise in renewable energy applications, from technology developments to the market implementation, including:
- two research institutions: Fraunhofer ISE and OWI Aachen (Germany);
- one industry partner: MITIS (Belgium);
- two SMEs: ETA Florence Renewable Energies (Italy) and BTG Biomass Technology Group (The Netherlands);
- two universities: University of Mons (Belgium) and Aalborg University (Denmark);
- one European association: COGEN Europe (Belgium).

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PARTNERS

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UMONS University of Mons · Fraunhofer ISE · btg biomass technology group · AALBORG UNIVERSITY

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