Fit4Micro

Innovative solution for the decarbonisation of the building sector

Clean and efficient microCHCP by micro turbine based hybrid systems

Final publication

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Finding online information about Fit4Micro project

Project website
www.fit4micro.eu

Cordis webpages
https://cordis.europa.eu/project/id/101083536

Disclaimer
This publication is about Fit4Micro project, titled “Clean and efficient microCHCP by micro turbine based hybrid systems”. Fit4Micro is a Horizon Europe-funded project of the European Union and is coordinated by MITIS in Belgium. The project has a total duration of 48 months from October 2022 to September 2026 with a financial volume of 5-million-euro funding. 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.
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Foreword

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 sector, according to European Commission, "A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives", 2020.

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 heat, cooling and power (CHCP) 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.

' The project's main objective is to develop a new generation of combined heat, cooling and power (CHCP) system based on a novel technology of microturbine. '

Acknowledgements

Fit4Micro, "Clean and Efficient microCHCP by microturbine based hybrid systems", is a four-year Horizon Europe Research and Innovation Action 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.
This project started on 1st October 2022, with an overall budget of € 5 Million.
The project consortium has put together 8 partners from 5 European countries with long-term expertise in renewable energy applications, from technology development 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).
In order to implement the Fit4Micro solution, the research started 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."

Acronyms

CHCP: Combined Heat, Cooling and Power.

GHG: Greenhouse Gas.

IRRGT: Intercooled Regenerative Reheating Gas Turbine.

TRL: Technology Readiness Level.

RED: Renewable Energy Directive.

PV: Photovoltaic.

HPO: Hydrotreated Pyrolysis Oil.

FPBO: Fast Pyrolysis Bio-Oil.

DHO: Domestic Heating Oil.

mGT: micro Gas Turbine.

LP: Low Pressure.

HP: High Pressure.

mHAT: micro Humid Air Turbine.

LCA: Life Cycle Assessment.

GWP: Global Warming Potential.

TEM: Techno-Economic Model.

HVAC: Heating, Ventilation and Air Conditioning.

SME: Small and Medium Enterprise.

NPV: Net Present Value.

IRR: Internal Rate of Return.

EUBCE: European Biomass Conference and Exhibition.

ASME: American Society of Mechanical Engineers.

EMGTF: European Micro Gas Turbine Forum.

1.Introduction

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. The micro gas turbine works with flameless combustors that can achieve very low emissions and high fuel flexibility, and has been improved during the project implementation, with the aim of increasing its current design efficiency.
Once implemented with humidification unit, 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.

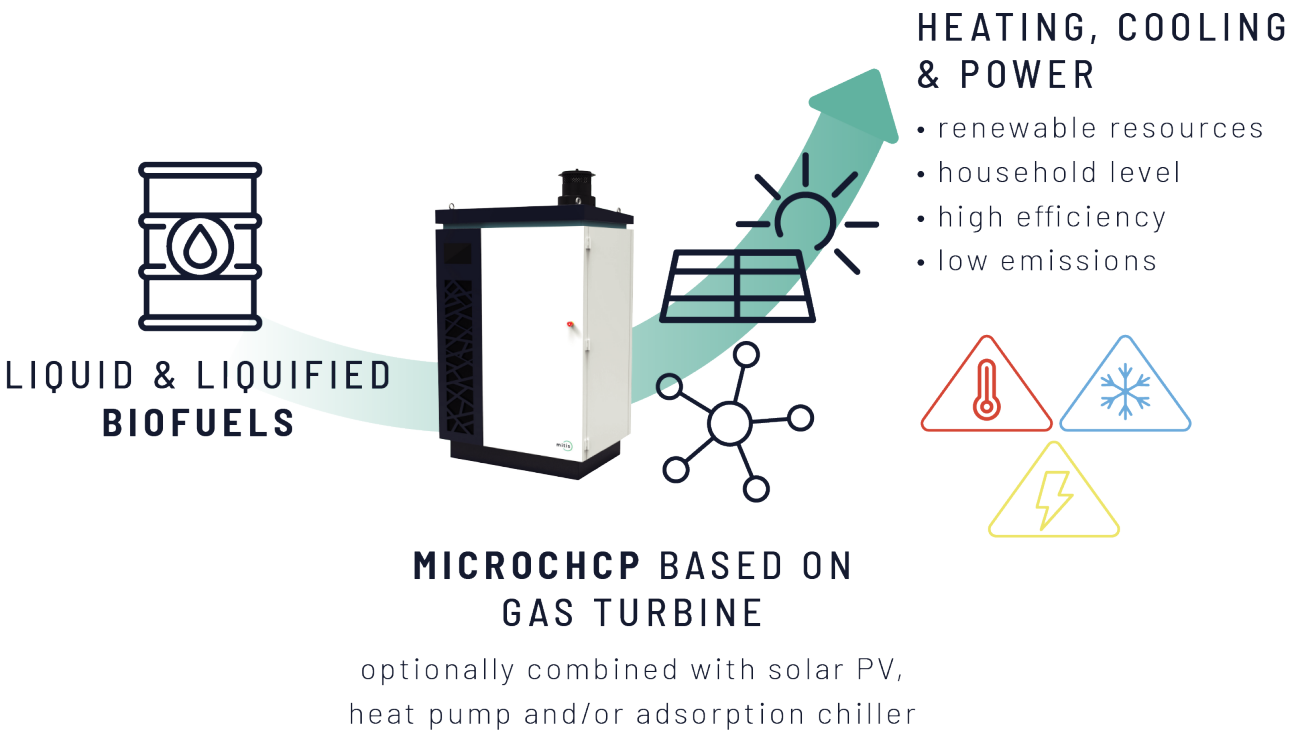

Fig. 1. The Fit4Micro technology and concept.
Source: Fit4Micro project.

2. Biofuel production and supply

In the long run, one of the main expected outcomes is the availability of renewable fuels for domestic usage. Ideally, a renewable fuel should have a high energy density to limit storage volumes and optimize distribution. For flexible operation, either a gaseous or liquid form is preferred to rapidly control the combustion process. In terms of sustainability and availability, it is important that a wide and diverse feedstock base, preferably consisting of residues, can be utilized. In Fit4Micro, the ambition is to produce a liquid biofuel with high energy density from Renewable Energy Directive III (RED-III) compliant resources. These resources have been converted into a liquid biofuel suitable for domestic heating, cooling and power system through processing in two stages: i) fast pyrolysis and ii) hydrotreatment. The final product obtained from processing is referred to as 'Hydrotreated Pyrolysis Oil', abbreviated to HPO.

In the fast pyrolysis process the solid residue is converted into a liquid bioenergy carrier referred to as 'Fast Pyrolysis Bio-Oil' or FPBO in short, and then the goal in this project was to obtain a HPO product with suitable quality for micro gas turbine usage, at the lowest possible operational costs. This is targeted by i) reducing the biomass feedstock costs by targeting residual streams and ii) limiting the hydrogen consumption in the hydrotreatment process. Experimental activities are employed within the project on both approaches. For the Fit4Micro project, three different resources were selected: bark from forest/woody residues, contaminated wood and wheat straw. HPO has been successfully produced from the three feedstocks. It must be noted here that the HPO

Fig. 2. Samples of wood residues and FPBO.
Source: BTG and ETA Florence Renewable Energies.

can also be considered for other applications, and possible by-products could be used as well in the micro gas turbine.
The conversion by fast pyrolysis is self-sustaining and no external energy input is required. Fast pyrolysis of biomass is a thermochemical conversion technology, where the biomass is rapidly heated in the absence of oxygen to form an organic vapour, non-condensable gas and a solid by-product (char). The organic vapour is rapidly quenched to form the FPBO, the non-condensable gas and char are both combusted in the process to generate the heat for the pyrolysis process as well as a surplus for external usage. Excess heat can be used to dry the biomass before the process and/or be sold as renewable heat or power. FPBO is already produced on a commercial scale in Europe.
For small scale heat and power generation, improving the FPBO fuel properties before usage is desirable. Various options to improve fuel properties have been investigated, and one of the most promising ways to improve fuel property is through hydrotreatment.
By hydrotreating the FPBO, oxygen is removed from the fuel, increasing the heating value and ultimately a hydrocarbon fuel chemically similar to conventional fossil fuels can be obtained.

Various quantities of HPO of different qualities have been produced in the bench-scale systems during the project to select the most convenient 'reference-HPO' to be successfully used as Fit4Micro fuel in the microturbine. Bark and wheat straw have been successfully pyrolyzed and upgraded to a good quality HPO.
The analytical data of HPO are also evaluated with respect to existing fuel quality standards for domestic heating oil (DHO) and related middle-distillate fuels. The objective is to assess the compatibility of HPO with established specifications and to identify potential deviations relevant for transport, storage, handling, and end-use in micro gas turbine-based CHCP systems.
The results show that HPO exhibits a fuel quality broadly comparable to domestic heating oil in terms of energy content, density, viscosity, and overall elemental composition. This indicates a strong potential for HPO as an alternative hydrocarbon fuel.
Based on the assessment of fuel properties, logistics, infrastructure compatibility, and regulatory constraints, several key recommendations are derived to support the further development and implementation of HPO in decentralized energy systems.

'In Fit4Micro, the ambition is to produce a liquid biofuel with high energy density from Renewable Energy Directive III (RED-III) compliant resources.'

3. Flameless combustion

This paragraph refers to flameless combustion for liquid fuels development and high temperature material assessment.
Fit4Micro aimed to develop a flexible hybrid energy system, able to provide renewable heating, cooling and power production for demand-driven domestic (multifamily) usage. The core of the microCHCP (Combined Heating, Cooling and Power) unit is a novel, high-efficiency micro gas turbine (mGT).
This novel mGT cycle is exploiting the Intercooled Regenerative Reheat Gas Turbine Cycle (IRRGT). Through the double shaft layout, combined with the intercooling in the compressor, and the reheat in the expansion, allows achieving higher electrical efficiencies than standard mGTs. Moreover, by implementing a cycle humidification option, waste heat can be recovered increasing the electric efficiency while providing a flexible heat and power output. Flameless combustion further ensures minimum pollutant emissions and high fuel flexibility to allow the use of various liquid biofuels.
Combustors have been designed to operate using renewable fuels (HPO in this case) and for two pressure levels, 3 bar (LP) and 5 – 6 bar (HP). Both in the case of HP and LP combustion chambers, the gas supply will be air.

Regarding the material resistance of combustor and turbine components, the design and development of a mGT system, including its heat exchanger and combustion chamber, for operation with biomass-derived liquid fuels necessitates careful consideration of material degradation phenomena.
The operational lifespan of metallic components in such environments is often influenced by a complex interplay of corrosion, creep, and fatigue mechanisms.
Moreover, the chemical composition of biomass-based fuels can result in corrosive flue gas atmospheres, and cycle humidification may further intensify corrosion processes under high-temperature conditions.
Based on a preselection of promising material candidates, a comprehensive test campaign was conducted to evaluate their performance under conditions representative of actual mGT operation - including high temperatures, corrosive combustion gases, and mechanical loads.
The objective of these investigations was to identify materials capable of ensuring long-term durability and minimizing the risk of premature failure or rapid degradation.

‘ Flameless combustion further ensures minimum pollutant emissions and high fuel flexibility to allow the use of various liquid biofuels. ‘

4. IRRGT Humidified micro gas turbine

The Intercooled Regenerative Reheat Gas Turbine (IRRGT) Cycle is characterized by two stages of compression separated by intercooling and two stages of turbines with a reheat (second combustor) between the LP (low pressure) and HP (high pressure) stages, see Fig. 3.
The classical issue within such microCHP systems, like the Mitis micro 40 is the fixed heat-to-power ratio, limiting the operating range of microCHP. This often leads to system shutdown in the absence of a heat demand, despite significant electrical power demand, given the lower electrical efficiency.
Cycle humidification, allowing to reintroduce waste heat in the cycle, and by doing so, improving the electrical efficiency in periods with low demand, is an interesting route for enhanced operating flexibility, as it allows to partially decouple heat and power production.
This option for cycle humidification is investigated within Fit4Micro.
Cycle humidification can be performed under different forms, ranging from steam or heated liquid water injection, down to the introduction of a saturation tower for evaporative humidification.
At this stage, the main developed technology further consists in the development of the mHAT, micro Humid Air Turbine cycle, for IRRGT, and more specifically the saturation tower. Using and in-house developed 2nd law analysis tool, the mHAT cycle was found to have the highest performance combined with ease of implementation and reduced number of cycle alterations as well as the optimal use of original components.
A new saturation tower was developed, constructed, and tested.
Besides the mHAT concept, cycle humidification by simple water injection was also studied and tested. Although only limited performance improvement can be expected, this technology requires the lowest amount of cycle modification, while it leaves a significant amount of thermal power available in the flue gases to be valorised for heat and cooling and allowing to tune this heat flow. By doing so, it responds to the demand for increased flexibility.

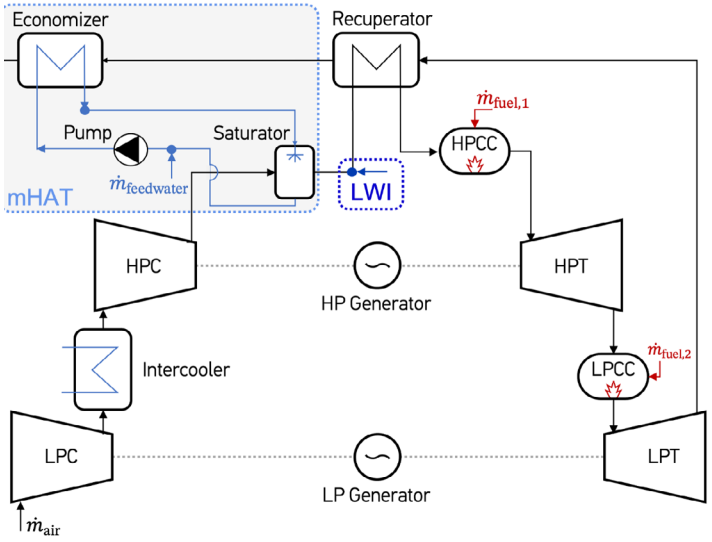

Fig. 3. Advanced humidified cycle configuration.
Source: University of Mons.

5. Integrated hybrid trigeneration system development and evaluation

One important work under the project is the identification of heating and cooling applications for the micro gas turbine (mGT) systems under development in the Fit4Micro Project. For this reason, project partners have defined and evaluated the use cases that can be suitable for the Fit4Micro technology, and these were used to assess the techno-economic performance of the hybrid combined mGT system.

Simulated load profiles of different building applications have been evaluated in terms of achievable full load hours, since a high utilization factor is crucial for the economic feasibility of such a system. The focus was on buildings with high and constant hot water demand over the year, such as hospitals or retirement homes, and buildings with high heating and/or cooling demand, such as offices or multi-family homes in central and northern Europe.

Here, the main aim is to identify promising use cases for the implementation of a micro gas turbine (mGT), possibly in combination with an electric heat pump, a thermally driven chiller and/or a photovoltaic system. The picture, Fig. 4, below geographically shows the use cases that have been defined and analysed for the project.

For what concerns office and residential buildings, this evaluation has pointed out that only sufficiently large existing buildings can have a number of full load hours able to support a CHP technology, similar to the one developed by Fit4Micro.

The main result is that the Fit4Micro technology can be adapted in all the analysed use cases, but with some differences for what concerns its application:

- For residential buildings, only large ones can be considered suitable for the heat supply;
- For non-residential buildings, the feasibility of an mGT system can be suitable if there is a high demand of hot domestic water (or heat for other processes).

After the evaluation and definition of the use cases suitable for the Fit4Micro technology, the next steps in the project were focus on the development of robust and efficient control strategies. To that aim the consortium has built an integrated system demonstrator, already available at Fraunhofer ISE, to validate the technology and full system for the two most promising use cases.

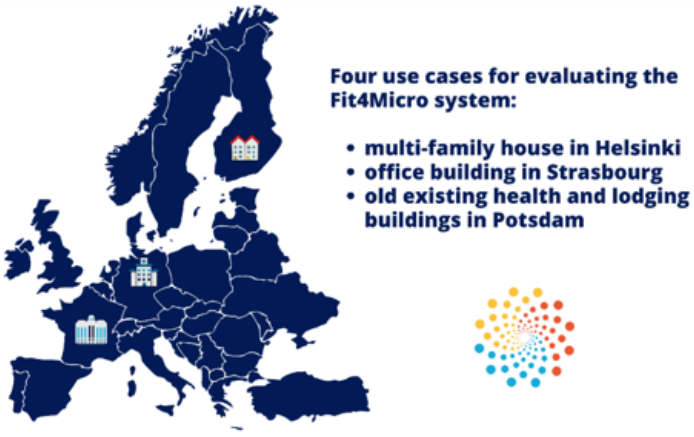

Fig. 4. Geographically distribution of use cases for evaluating the Fit4Micro system.
Source: Fraunhofer ISE.

6. LCA, socio-economic impact and public perceptance

In Fit4Micro a first Life Cycle Assessment (LCA) has been conducted with the aim of facilitating decision support in technology development and support sustainable implementation of the technology. The primary objective of this study is to assess the environmental impact of the mGT system when fuelled with HPO in various use case scenarios and with different feedstock sources for the biofuel production process. Scenario development encompasses 18 different potential applications of the mGT, spanning various building types, locations, and building standards.

The preliminary LCA results demonstrate that the environmental performance of the mGT system is highly dependent on the choice and treatment of biofuel feedstock. Using a consequential modelling approach, the study shows that climate impact is influenced not only by emissions from combustion and operation, but also by the alternative use of the feedstock and the substitution effects when it is diverted from conventional applications. For example, forest residues (Scenario A1) and contaminated wood (Scenario A2) yield net negative GWP100 (Global warming potential) values, though via different mechanisms—biogenic carbon uptake in A1 and avoided incineration emissions in A2. In contrast, wheat straw (Scenario A3), when sourced from regions with fossil-intensive heat substitution, results in net positive GWP100, underscoring the importance of regional energy contexts.

According to the carried out LCA, the variation across building types, standards, and geographic locations confirms that use-case-specific modelling is essential. The mGT system's performance depends not only on feedstock but also on the local energy grid and heating supply, reinforcing the need for nuanced scenario development. This furthermore implies that the mGT system if implemented in an off-grid context likely will perform better if alternatives are based on more emission heavy technologies, which often are seen in off grid applications.

These findings emphasize that biofuel production must be evaluated within its broader system context—considering regional energy mixes, building energy demands, and substitution technologies. The model is improved and in the following final versions, the scope is expanded to include a full range of use scenarios, each linked to specific future business-as-usual alternatives for heating, cooling, and hot water.

‘ The preliminary LCA results demonstrate that the environmental performance of the mGT system is highly dependent on the choice and treatment of biofuel feedstock. ‘

7. Policy, Market assessment, TEA & Business development

EU buildings are responsible for 40% of energy demand, of which 80% is represented by heating, cooling and hot water. Most energy consumed in buildings is produced by inefficient stand-alone boilers running on fossil fuels. Rural and remote communities, home to more than 130 million EU citizens residing in approximately 50 million households, experience further challenges related to poor grids connectivity and an ageing building stock. Moreover, buildings are at the intersection of energy infrastructure – electricity, gas, district heating – which must also evolve as energy sources diversify and decarbonise. Responding to these challenges, EU and national policies are prioritising building renovations, including higher shares of electrification, increase integration of renewable electricity, the uptake of renewable fuels and boosting energy efficiency.

Against the background of the ambitious buildings policies across the EU, a range of clean buildings solutions are available to improve the energy performance of buildings, increase renewable energy use and mitigate increasing energy costs to European households and businesses.

The Fit4Micro solution, combining energy efficient microCHCP with renewable fuels, PV and electrification, provides multiple benefits aligned with EU's objectives on energy, climate and competitiveness, see Fig. 5.

As a highly efficient hybrid system, the Fit4Micro package can deliver an all-year round zero-emissions energy for buildings with limited access to energy grids, at lowest possible cost for the consumer and the energy system as a whole. Depending on the local circumstances, consumer needs and regulatory environment,

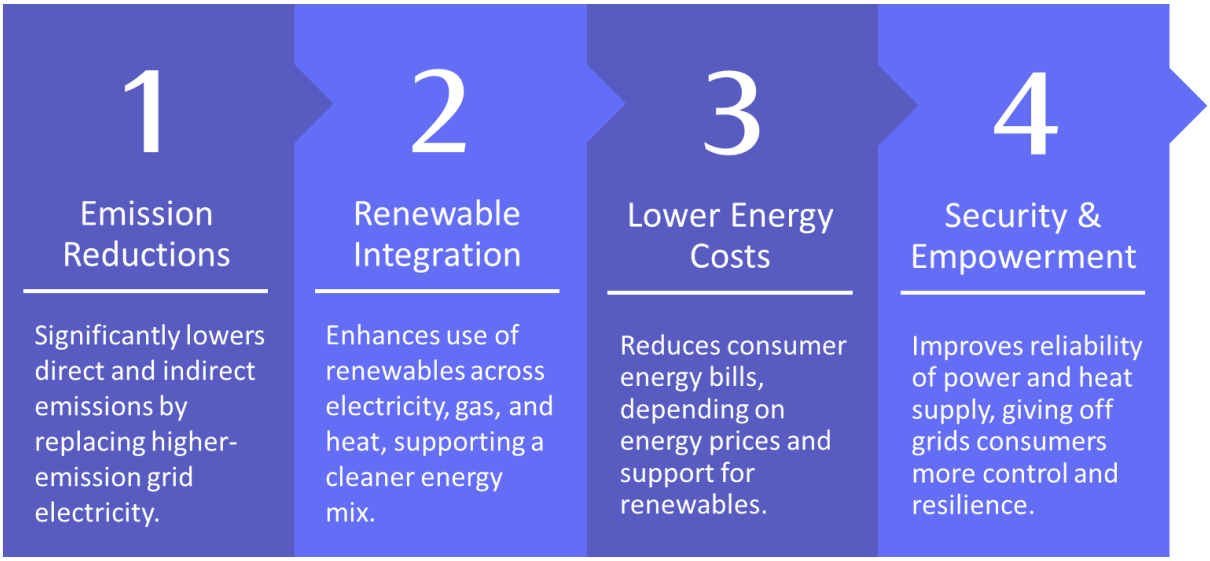

Fig. 5. Benefits of highly efficient hybrid buildings.
Source: COGEN Europe.

different configurations can be achieved to optimise and smartly combine an innovative micro-CHP with heat pumps, storage and PV, as well the integration of a range of sustainable biofuels.

The Fit4Micro solution responds to major challenges identified for EU's building stock, with a special focus on ensuring affordable supply of clean energy in remote and off-grids buildings. Combining microCHP with different renewable technologies helps meet both the high-level objectives and targets set at EU and national levels. Yet certain policy measures and regulatory provisions fall short of fully capturing the benefits of the Fit4Micro solution.

The market assessment shows that the commercial potential of the Fit4Micro hybrid microCHP system lies in targeted European niches where full electrification is constrained by grid limitations, retrofit complexity, affordability challenges, or the availability of renewable and waste-derived fuels.

The most promising opportunities are in rural and off-gas-grid buildings, thermally intensive commercial and industrial facilities, and sites with continuous heat and power demand, where decentralised energy generation can improve cost-effectiveness, resilience, flexibility, and support staged decarbonisation pathways.

The Micro Gas Turbine Techno-Economic Model (TEM), developed under the Fit4Micro project, is an Excel-based and web-accessible decision-support tool that evaluates the technical, economic and environmental performance of biomass micro-CHP/micro-CHCP systems across different applications, fuels and climatic zones, while considering a range of sensitivity scenarios. The Fit4Micro TEM tool enables users such as HVAC professionals, building experts, energy managers and SMEs to assess energy performance, costs, emissions, financial indicators (e.g. NPV and IRR) and lifecycle carbon impacts to support their clean energy investment decisions.

This tool is available in the project website: fit4micro.eu/tem-online-app

‘ The market assessment shows that the commercial potential of the Fit4Micro hybrid microCHP system lies in targeted European niches where full electrification is constrained by grid limitations, retrofit complexity, affordability challenges, or the availability of renewable and waste-derived fuels. ‘

8. Dissemination and stakeholders engagement

Since the beginning of the project in 2022, the consortium has identified target audiences and specific stakeholders as in the list below:

- Heating sector, energy professionals and intermediaries;
- Renewable energy sector;
- Academia and research institutions;
- EU and national policymakers;
- nternational organizations, civil society and end consumers association.

and ensured the participation of partners as speakers at leading events at both international and national level in order to address a broad range of audiences.
Different mediums and means to reach out have been used. The project website was launched by January 2023 (four months after the start of the project) and together with the social media (specially LinkedIn and YouTube) it has been the central point to disseminate all the activity of the consortium.
Open deliverables are available in the section results of our web page. Project publications, factsheets, newsletters and videos generated during the project can be found in the same section.
The consortium has done an important effort to communicate and disseminate the technology and advances in the project.
The partners have participated in different events, both national and international and not only research oriented but market oriented, trying to reach all kind of stakeholders. Section updates of our website show all the events that the consortium has organized and events where Fit4Micro has been presented.
This section is an overview of Fit4Micro contributions and participation at various events other than primary workshops, notably: EUBCE editions, ASME Turbo Expo conferences, other projects' workshops, symposiums, international conferences on energy and renewable fuels, etc.
In person events and virtual events on project activities performed and results carried out were organized by the consortium partners.
Fit4Micro project attended EUBCE, the European Biomass Conference and Exhibition, editions from 2023, held in Bologna, Italy, to 2026, in The Hague, the Netherlands.
Here, Fit4Micro had a booth in the Exhibition area for the whole duration of the event, where project partners had the occasion of disseminating the most important information about Fit4Micro to visitors and attendees.
The project was also presented during different oral and poster sessions mainly focused on biomass integration in energy systems.
In the same period, the project activities were presented in another important international context: ASME Turbo Expo Conference, as for example in London, UK, 2024 and Milan, Italy, 2026, the Turbomachinery Technical Conference and Exposition where global experts and turbomachinery engineering leaders from industry, academia, and government gathered to actively address the 2050 goals for a sustainable future. Here, project activities were orally presented in session on micro gas turbines development.
The project was presented in dedicated sessions of the European Micro Gas Turbine Forum (EMGTF), held in Brussels, Belgium,

15 and 16 of October 2025, a biannual event designed to bring together all key stakeholders in the micro gas turbine (mGT) ecosystem, as well as at COGEN Europe's Annual Conferences in Brussels.

Five project events were organised in four different European countries: Belgium, Germany, Italy and The Netherlands, considered to be very promising markets for CHCP systems. These events constituted an important and direct dissemination channel between the project and industrial stakeholders. In conjunction with the final project consortium meeting in Freiburg, Germany, at the end of June 2026, last thematic project event was organised to examine the role of micro-combined heat and power technologies and their integration with heat pumps in supporting Europe's decarbonisation and energy transition objectives, and it introduced a technical visit and live demonstration of the Fit4Micro hybrid system plant in Freiburg.

Five project webinars were arranged in the period from April to September 2026 to present carried out activities and achieved results for every work package of Fit4Micro.

Webinars, project videos and consortium partners interviews recorded during Fit4Micro monitoring meetings are available in the project YouTube channel and to this link of the project website, Results webpage fit4micro.eu/results.

The Fit4Micro Final Dissemination Event takes place in Brussels. In this event the Horizon Europe Fit4Micro consortium presents the project's final results and demonstrate how innovative micro combined heat, cooling and power (microCHCP) systems fuelled by sustainable liquid biofuels can contribute to a cleaner, more efficient and resilient energy system.

The event brings together European policymakers, industry representatives, researchers and technology experts to explore the project's technical achievements, lessons learned and policy recommendations.

9. Conclusions

Fit4Micro has developed a hybrid microCHP unit running on sustainable liquid biofuels. Application is foreseen at multi-family houses, and more specifically at remote and/or off-grid locations. The innovative system is based on a double shaft micro gas turbine (mGT) combined with a novel humidification unit.

This unique combination leads to increase the electrical efficiencies as well as to obtain a very flexible heat:power ratio. Low emissions are achieved by the application of flameless combustion, and a high GHG emission reduction is obtained by using advanced biofuel.

The integrated hybrid system demonstrator plant was built for the evaluation of a microCHCP trigeneration system based on a humidified microturbine cycle, with also a smart control system developed to enable optimal performance at all times.

Many of the project deliverables are designated as "Public", and those already finalised are available in dedicated sections of the project website, demonstrating the commitment of the consortium on open science practices.

Project publications, papers and articles form partners are stored in the Zenodo related community.

In addition, Fit4Micro project in cooperation with other European partners organised events that examined the role of micro-combined heat cooling and power (microCHCP) technologies and their integration with heat pumps in supporting Europe's decarbonisation and energy transition objectives.

Stakeholder engagement is a key aspect of this approach, thus a database of target stakeholders related to the topics of the project has been defined, currently managed, and regularly updated.

Single or grouped stakeholders from any sector being linked to industry, research and innovation in the field of the clean energy and sustainable and efficient heating systems, and who are interested in sharing and receiving information about Fit4Micro, best practices regarding market implementation, commercialization and deployment of new technologies and processes, are therefore invited to register themselves to the dedicated platforms, media and events.

10. References

A selection of reports from Fit4Micro project as reference and for further reading:

WP2 - Biofuel production and supply
D2.1 Production report of 200 L reference-quality HPO
D2.4 HPO produced for the hybrid micro CHCP system
D2.6 Report on the standardization requirements and fuel logistics for HPO as heating fuel
D2.7 Final mass, energy and elemental balance input for value chain assessments 1
D2.8 Final mass, energy and elemental balance input for value chain assessments 2

WP3 - Flameless combustion for liquid fuels development and high temperature material assessment
D3.1 Operating parameters combustor
D3.2 Material resistance of combustor and turbine components, report on testing

WP4 - IRRGT humidified micro gas turbine
D4.3 Analysis of Humidification techniques for the IRRGT cycle
D4.4 Report on experimental testing of the new saturator

WP5 - Integrated hybrid trigeneration system development and evaluation
D5.1 Report on 4 use case definitions for system development and evaluations
D5.3 Report on HiL tests for the advanced mGT system
D5.4 Report on heating and cooling test results with the hybrid system
D5.5 Report on the overall system evaluation and results achieved with the two hybrid system cases

WP6 - LCA, socio-economic impact and public perceptance
D6.1 Technical report on LCA assessment 1
D6.2 Technical report on ESA
D6.3 Report on public risk perception
D6.4 Report on gender dimension
D6.5 Technical report on LCA assessment 2

WP7 - Policy, market assessment, tea & business development
D7.1 Paper on Policy and Regulatory Framework and Recommendation
D7.2 Market Assessment Report
D7.3 Techno-economic model

WP8 - Dissemination, communication & exploitation
D8.1 Dissemination, Exploitation and Communication plan 1
D8.2 Dissemination, Exploitation and Communication plan 2
D8.3 Dissemination, Exploitation and Communication plan 3
D8.4 Dissemination, Exploitation and Communication plan 4
D8.5 Report on events and stakeholder engagement 1
D8.6 Report on events and stakeholder engagement 2
D8.10 Final project publication
D8.11 Data Management Plan (DMP)

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.

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).

PARTNERS

mitis · COGEN · Science4Fuels OWI an der RWTH Aachen · etaflorence renewable energies

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

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