FUEL CELL MICRO-CHP

Energy Efficiency at Your Fingertips

#SettingthePACE

PACE

PACE – Pathway to a Competitive European Fuel Cell Micro-CHP Market

Aim of the project: To demonstrate the potential of Fuel Cell micro-CHP as an efficient and reliable energy solution for homes and businesses and establish a market for this technology in Europe.

2016-2023
Project Duration

€90m
Total Budget

€34m
EU Funding

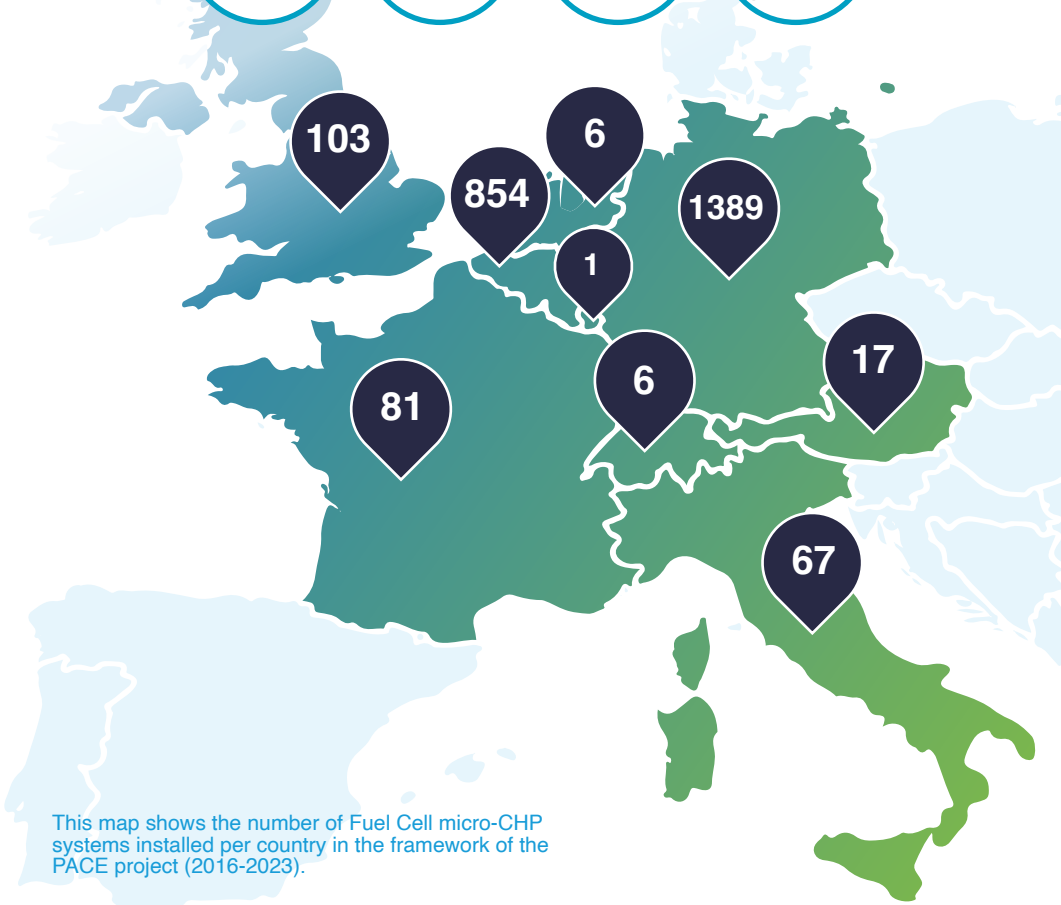
€56m
Industry Investment

2600
Fuel Cell Micro-CHP Units Installed

3400
Installers Trained

23m
hours of operation

24m
kWh of electricity produced

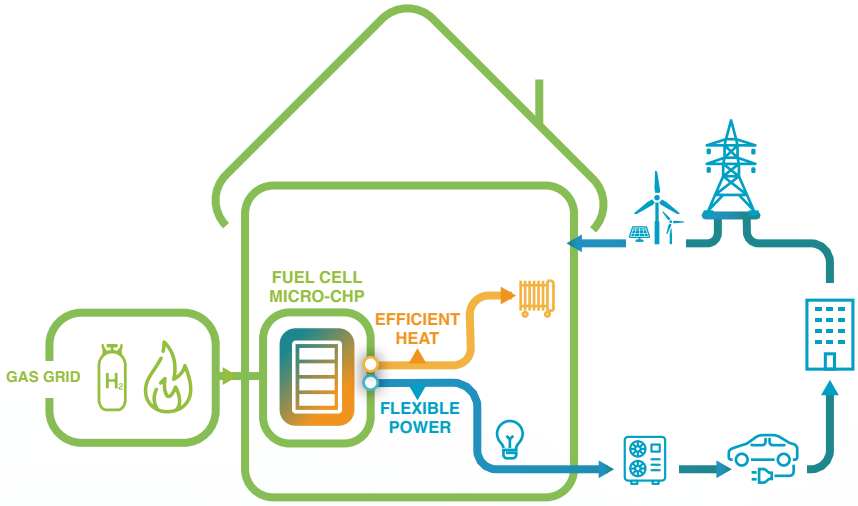


This map shows the number of Fuel Cell micro-CHP systems installed per country in the framework of the PACE project (2016-2023).

What is Fuel cell micro-CHP?

Fuel Cell micro-Cogeneration (also called Fuel Cell micro-CHP, where CHP stands for Combined Heat and Power) is a highly efficient and reliable energy solution that can be installed in buildings of various sizes and uses. It empowers households and businesses (including SMEs) by enabling them to meet their own electricity and heat needs.

At the heart of the system is a Fuel Cell, where hydrogen is combined with oxygen in a clean and very efficient process that generates both electricity and heat. The only by-product of this electrochemical process is water (H_2O). No chemical pollutants or particles are produced.



Fuel Cell micro-CHP is a mature technology that is already available and in operation globally. It is highly efficient, as both electricity and heat are produced in the same building where they are being used, thereby minimising losses. It reduces the strain on electricity grids at times of peak demand by generating power locally, and it can complement intermittent renewable energy sources such as wind turbines and solar panels.

European Industrial Net-Zero Leadership

The development, design and manufacture of Fuel Cell micro-CHP systems and their components provides an important source of high-quality jobs and contributes to Europe's economic prosperity.

200m

private investments by European industry in stationary fuel cells (2015 - 2020)

500%

increase in Fuel Cell manufacturing capacity in Europe

OVER 3400

installers received training under the PACE project (2016 - 2023)

OVER 2800

jobs created in Germany under the KfW433 funding programme for fuel cell micro-CHP (2016 - 2020)

Accelerating the EU Energy Transition

1 BOOSTING EFFICIENCY

With an overall system efficiency of up to 95%, Fuel Cell micro-CHP can deliver significant energy savings compared to other technologies.

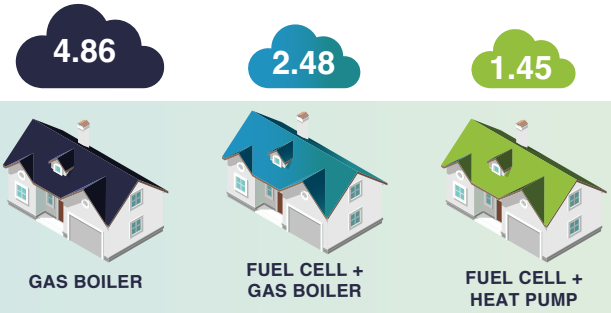
MINIMISING AIR POLLUTION 2

A Fuel Cell can generate electricity and heat without burning any fuel, virtually eliminating local air pollution, such as NOx, SOx and particulate matter.

3 REDUCING CO_2 EMISSIONS

Fuel cells can deliver lower CO_2 emissions compared to the alternative of having a stand-alone boiler (running on natural gas) and using electricity from the grid. As energy grids decarbonise, a combination of heat pumps and fuel cells offers highest benefits in terms of emission reductions and energy cost.

AVERAGE CO_2 EMISSIONS (TONNES/YEAR) FOR A 5-PERSON HOUSE IN GERMANY BETWEEN 2019-2022



The reason why I purchased it is out of ecological conviction. The biggest advantage of the fuel cell for me is to work towards being CO_2 neutral.

This data is produced assuming optimal use of heating systems to lower total emissions. Source: PACE project (HSLU), 2023

4 ENABLING A RENEWABLE-DRIVEN ENERGY SYSTEM

Fuel cell micro-CHP are renewables-ready. As renewable gases such as biomethane and hydrogen become more widely available and cost-effective, fuel cell micro-CHP will maximise the efficient use of these net-zero emissions fuels.

5 ENHANCING SYSTEM RESILIENCE

Fuel cell micro-CHP is a key enabler of an integrated and resilient energy system. By efficiently producing electricity locally, it complements intermittent renewable generation and electrification, as well as demand-side flexibility.

Empowering European Consumers

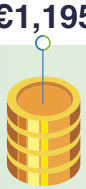
Fuel cell micro-CHP transforms Europeans into active energy 'prosumers' (producer-consumers), contributing to a decentralised energy system with a reduced carbon footprint and lower energy bills.

Everything is compactly gathered in one system. Hot water, electricity, heating... Everything is contained in one device.

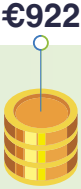
AVERAGE ANNUAL ENERGY COSTS FOR A 5-PERSON HOUSE IN GERMANY BETWEEN 2019-2022

The electricity bill is day and night compared to before the installation. We produce the electricity we need with the Vitovalor, which means that we don't have to pay for electricity anymore.

GAS BOILER



FUEL CELL + GAS BOILER



FUEL CELL + HEAT PUMP

This data is produced assuming optimal use of heating systems to lower total emissions. Source: PACE project (HSLU), 2023

A survey of more than 1700 Fuel Cell micro-CHP system owners carried out in the framework of the PACE project found that there was a high level of satisfaction with the technology.

75%
consumers were satisfied with their fuel cell micro-CHP's environmental performance, comfort and warmth, power generation, as well as the design of the system.

70%
of customers experienced a reduction in their electricity bills following the installation of their FC mCHP

€900
(or more) of electricity bill savings reported by 50% of respondents.

PACE

Pathway to a Competitive European Fuel Cell micro-CHP Market

Email: info@pace-energy.eu
Website: www.pace-energy.eu

PROJECT COORDINATION

COGEN EUROPE

MANUFACTURERS

VIESMANN

BDR THERMEA GROUP

SolydEra

BOSCH
Invented for life

sunfire

RESEARCH PARTNERS

elementenergy
an ERM Group company

DTU

HSLU Hochschule Luzern

Clean Hydrogen Partnership

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking (now Clean Hydrogen Partnership) under grant agreement No 700339. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe Research.