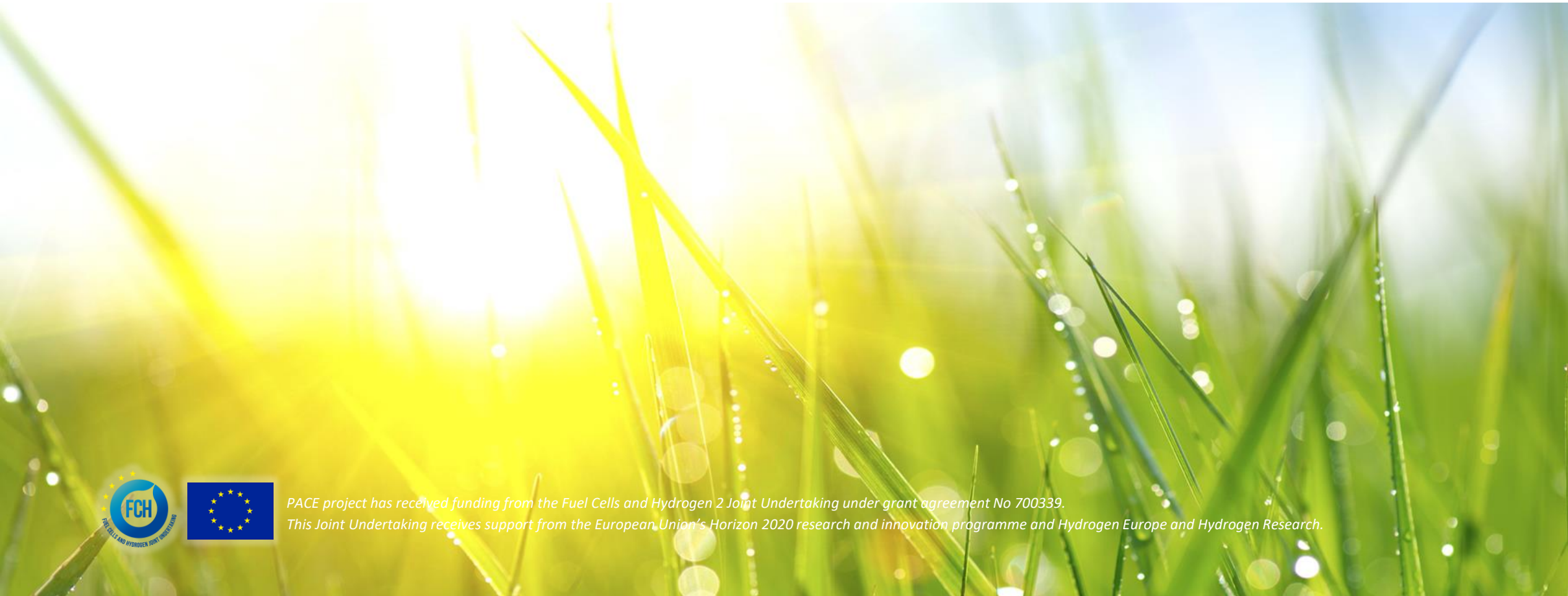
PACE

Pathway to a Competitive European Fuel Cell micro-CHP Market

The bridge to large scale market uptake

European-wide field trials for residential Fuel Cell micro-Cogeneration



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

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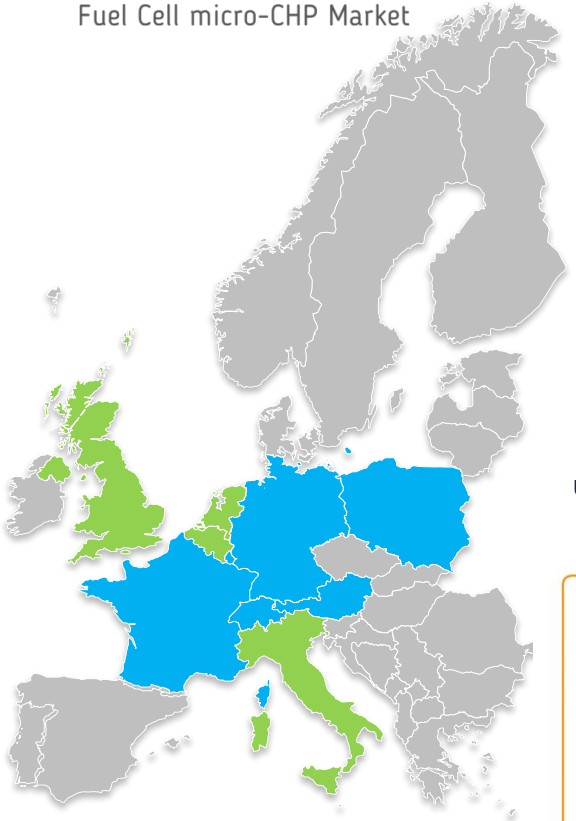
PACE at a glance

Promoting a successful transition to the large-scale uptake of Fuel Cell micro-Cogeneration across Europe



Field trial + installer training + targeted market & policy development activities

Field trial + local installer training

9
Partners
Representing manufacturers, utilities & research community

> 2,800
Fuel Cell micro-Cogeneration units
To be deployed across Europe between 2016-2021

>500
Systems per manufacturer
Established production capacity per manufacturer

10
Countries
Where the units will be installed

4
Countries
Selected for policy & market development (Belgium, Italy, Netherlands and UK)

€90m
Total budget
Including €33.9m Horizon 2020 funding via FCH JU

Coordination & Dissemination Partner

COGEN EUROPE

Manufacturers

SOLID POWER · BOSCH Invented for life · sunfire · VIESMANN · BDR THERMEA GROUP

Research Partners

elementenergy · DTU · Applied Sciences and Arts HOCHSCHULE LUZERN Engineering and Architecture

>10,000
FC micro-cogeneration units/year post 2020

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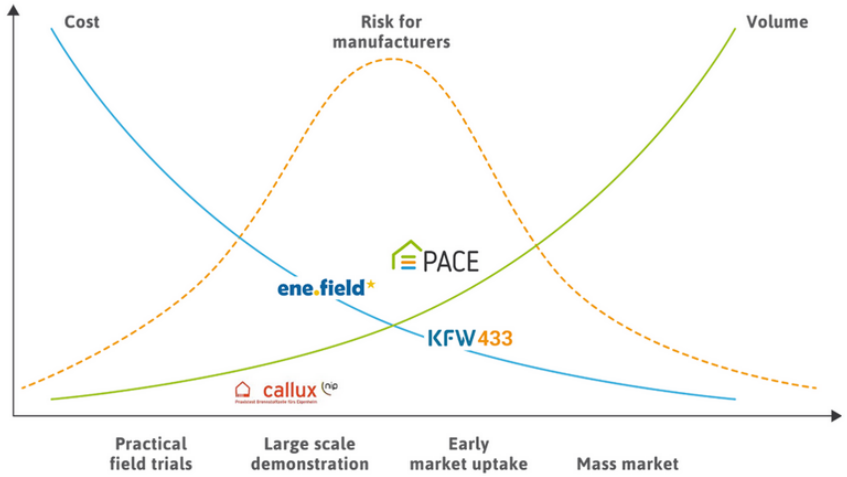
Driving the Fuel Cell micro-Cogeneration sector closer to mass market uptake

How to overcome the point of greatest risk in new product commercialisation?



callux

Callux

- Period: **2008 – 2015**
- Total budget: **€75 million**
- German NIP co-financing: 50%
- **500 systems installed in Germany**
- > 5 million operating hours
- **CO_2 reduction by 30% on average per year**

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- Period: **2012 – 2017**
- Total budget: **€52 million**
- EU co-financing (FCH JU/FP7): 50%
- **> 1,000 systems** installed in **11 European countries**
- > 3 million operating hours so far

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- Period: **2016 – 2021**
- Total budget: **€90 million**
- EU co-financing (FCH JU/Horizon 2020): 37%
- **> 2,500 systems** to be installed in **11 European countries**
- **500 units/manufacturer**

KFW433

KFW433

- Period: **started in 2016**
- **German NOW NIP grant scheme** administered by KfW bank
- Beneficiaries: **End customers**
- Eligible size: 0.25 kWe – 5 kWe
- Grant value per system: **€5,700 – €28,000**

Fuel Cell micro-Cogeneration units have demonstrated initial technology readiness in previous European and national demonstration projects

Reduce costs and improve competitiveness

Improve products' performance

Establish Fuel-Cell micro-Cogeneration as a standard technology

Raise awareness on Fuel-Cell micro-Cogeneration

Demonstrate product readiness as a key component in the delivery of EU's energy goals

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Why Fuel Cell micro-Cogeneration?

Heating and Powering your home

Fuel Cell micro-Cogeneration is a highly efficient home energy system that simultaneously produces heat and electricity

- **Empowers consumers**
- **Supports the European energy transition**
- **Provides greater flexibility for the energy system**
- **Fosters innovation and high-value jobs**

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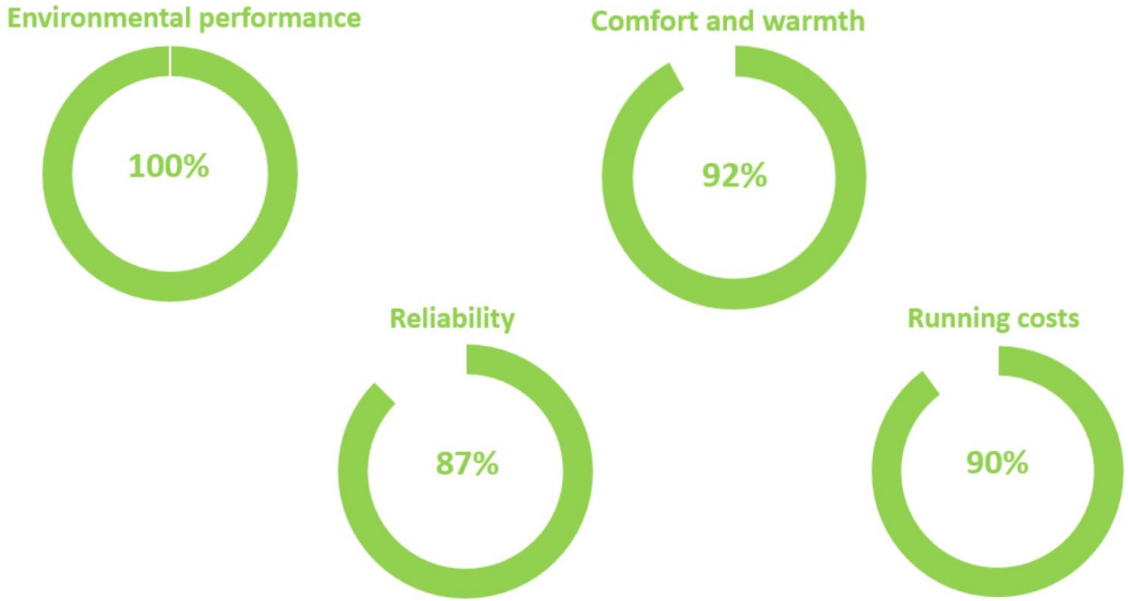
Pathway to a Competitive European Fuel Cell micro-CHP Market

Why Fuel Cell micro-Cogeneration?

Heating and Powering your home

Empower consumers

It transforms Europeans into active energy 'prosumers' (producer-consumers), creating a decentralised energy system with a reduced carbon footprint and lower energy bills. Surveys show that more than 90% of end users are pleased with the environmental performance, the comfort and warmth, reliability and running costs of their fuel cell micro-cogeneration unit



"With the fuel cell micro-CHP system, I was able to cover 72% of my electricity use by producing power myself. Compared to before, I save around €1,000 a year", Mr Boel, Hamburg

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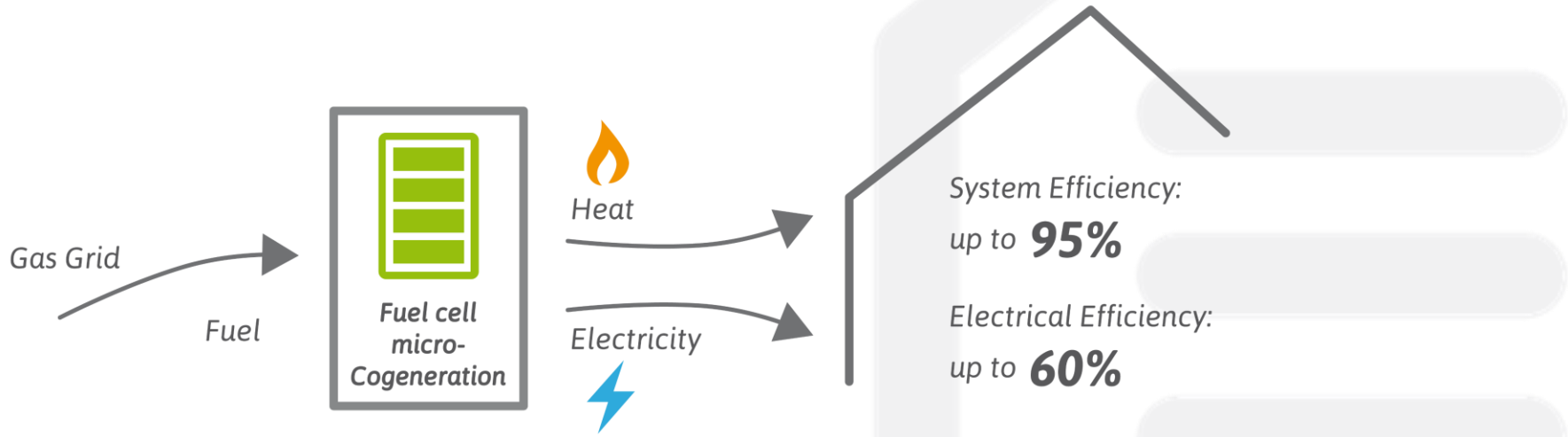
Why Fuel Cell micro-Cogeneration?

Heating and Powering your home

Supports the European energy transition

With total efficiencies of more than 90%, including electrical efficiencies of up to 60%, this technology can achieve significant energy savings and CO2 emission reductions. On average in Europe it would save around 1 tonne of CO2/kW every year, thus delivering more than 32 million tonnes of CO2 emission reductions across Europe in 2030.

This "fuel flexible" technology will be progressively fuelled by renewable energy sources, such as hydrogen and renewable gas.



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Why Fuel Cell micro-Cogeneration?

Heating and Powering your home

Provides greater flexibility for the energy system

By generating heat and electricity near the point of consumption and stepping in when the output of renewables is low, Fuel Cell micro-Cogeneration relieves the stress on the electricity grid during peak demand (e.g. for powering heat pumps and charging electric vehicles).

For our transition to a complex energy system, with increasing penetration of intermittent renewables, Fuel Cell micro-Cogeneration:

- Is a valuable demand-side measure for managing grid stability
- Overcomes the challenge of increasing penetration of electric heating
- Is low-carbon and renewable when utilising bio-gas and H2
- …in an existing, extensive natural gas network
- Contributes towards a cleaner, healthier environment

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Why Fuel Cell micro-Cogeneration?

Heating and Powering your home

Fosters innovation and high-value jobs

Provides new and highly skilled green jobs in Europe, while building on the existing expertise of the heating industry.

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Pathway to a Competitive European
Fuel Cell micro-CHP Market

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