



Pathway to a Competitive European
Fuel Cell micro-CHP Market

D1.7- Summary report on specifications for newest model deployment in PACE (April 2020)

Element Energy



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.

D1.7- Summary report on specifications for newest model deployment in PACE (April 2020)

Introduction and Contents

- The aim of this report is to provide information on the newest models of fuel cell micro-combined heat and power (FC mCHP) units being offered by the 5 manufacturers involved in the PACE project: BDR-Thermea, Bosch, SOLIDpower, Sunfire, and Viessmann.
- The target audience of this report includes industry and consumers alike. As well as the key technical specifications and benefits of the newest models, this report also indicates how further information can be accessed by interested parties.
- In the report you will find the following:
 - An overview of the PACE project
 - Information from each PACE manufacturer on their technology. This includes:
 - A technical overview of the newest models including specifications and comparative differences with previous models;
 - Feedback from existing customers;
 - Resources where additional information can be found (including official marketing material in different languages when available).
- The report was prepared in April 2020. More recent information may be available on the manufacturers' website at the time of reading.

PACE at a glance

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

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

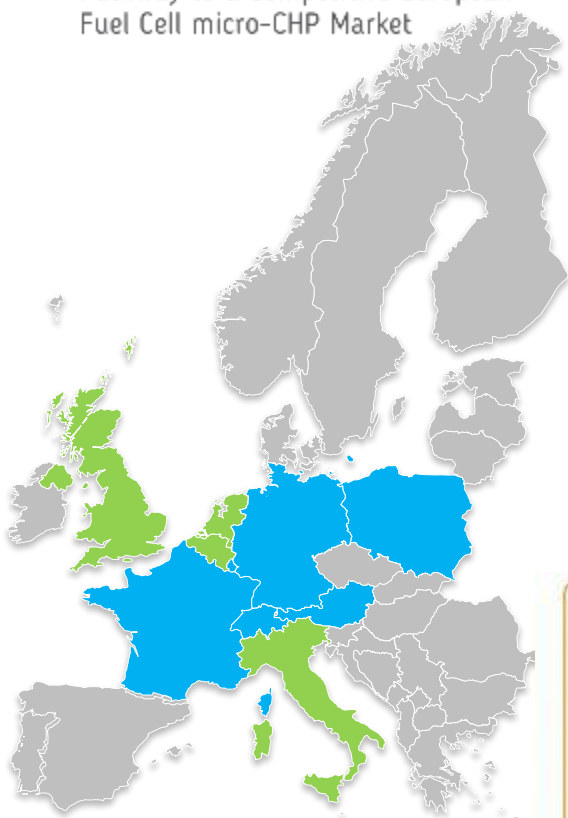
Countries

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

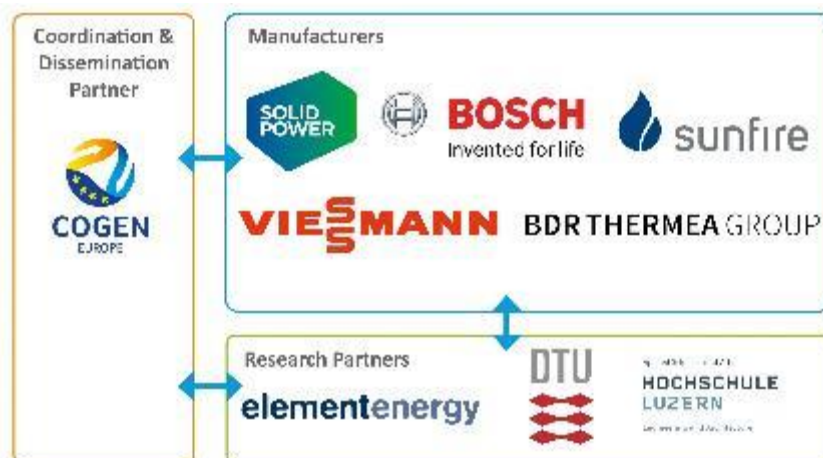
€90m

Total budget

Including €33.9m
Horizon 2020
funding via FCH JU



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



>10,000

FC micro-
cogeneration
units/year post 2020



Pathway to a Competitive European
Fuel Cell micro-CHP Market

BDR THERMEA GROUP

08/04/2020

BDR Thermea

SenerTec Dachs 0.8

Remeha eLecta 300

Technical Specification	SenerTec Dachs 0.8
Fuel cell type	PEM
Operational mode	Heat-led
Electrical output	0,75 kW
Thermal output	1,1 kW + 21,8 kW
Electrical efficiency	38%
Overall efficiency	92%
Fuel flexibility	H Gas, L Gas, H2 ready
On-off cycles	4000 cycles
Stack lifetime	80 000h
System life	20 years

- Increased overall efficiency
- Additional electrical power output
- Increase of maintenance interval for fuel cell stack
- Increase of flexibility for radiator systems
- Higher level of integration of pre-assembled complete FC heating system
- Fits in low basement
- Increase of remote access functionality incl. ability of remotely update functionality

Technical Overview

DACHS 0.8





08/04/2020

Market launch: The first Dachs 0.8 fuel cell runs in Allensbach at Lake Constance

Efficiency at its best

The fuel cell is available: With the new Dachs 0.8, SenerTec, the manufacturer, presents a highly efficient heating solution for modern one- and two- family houses on the basis of cogeneration of heat and power. The first unit ever in Germany has taken up work in Allensbach at Lake Constance.

The principle is well-known - the technology is new: Like the other members of his family, the Dachs 0.8 produces heat and power at the same time, but uses modern fuel cell technology. Special focus was put on high efficiency in the development. The efficiency standard of the product is A+++. Thus, the Dachs can ensure particularly low heating costs.

Inside the fuel cell a chemical reaction takes place while it is running. Hydrogen and oxygen are united to water molecules. During this process, heat and power are generated. The thermal output of the Dachs 0.8 is 1.100 Watt. The electric maximum output is 750 Watt. This makes the new product perfect for the small heating requirements in one- and two- family homes. If more heat is needed, e.g. in winter, the integrated condensing boiler is switched on automatically. By producing their own power single-handedly, the owners of the building are one step closer to being independent from public power supply.

The Dachs is a highly efficient innovative fuel cell system with intelligent buffer management to reach high operating hours

It offers reduced energy costs and up to 50% CO₂ savings compared to conventional energy production

Additionally, it provides independence from high electricity prices

Key marketing materials

Flyers

- Fuel Cell
- Grants for private users

Brochure

- Dachs Private

Link to
marketing
materials:

<https://www.senertec.de/typo3/de/partnerbereich/vertrieb/dachs-planung-administration/dachs-08-pace-unterlagen.html>

Further Resources



Events and Campaigns (April 2020)

- Trade fairs: E-world Essen, IFH-Intherm Nürnberg
- KWK-Tour for planners and architects <https://derdachs.info/kwk>
- SenerTec Events powered by Heinze (special events for architects)
- Heinze ArchitecTour participant
- Website – product detail page <https://www.senertec.de/dachs-0-8/>
- Website – target group <https://www.senertec.de/dachs-eigenheim/>
- Social media campaign
- Press releases, for example <https://www.hurra-wir-bauen.de/energie-sparen/heizung/brennstoffzellenheizung.html>
- Videos (how to install a fuel cell, functionality of a fuel cell etc.)
- Regional events organized by the SenerTec Centers

Further Resources

Eventlist	City	Date
E-World	Essen	February 2020
IFH Intherm	Nürnberg	To be defined
SenerTec Event	München	12.05.2020
SenerTec Event	Hamburg	14.05.2020
SenerTec Event	Düsseldorf	02.06.2020
ArchitecTour	Dresden	08.06.2020
ArchitecTour	Berlin	10.06.2020
ArchitecTour	Frankfurt	25.06.2020
ArchitecTour Congress	Düsseldorf	19.11.2020

Dachs Info Webinar For Interested Parties



SENERTEC

Dachs-Info-Webinar

Next dates: • 21. April 2020 19:00 – 20:00
• 12. May 2020



Dieses Webinar wird mehrmals angeboten. Wählen Sie einen Termin, der Ihnen am besten passt.

Dienstag, 21. April 2020, 19:00 - 20:00 CEST
Dienstag, 21. April 2020, 19:00 - 20:00 CEST
Dienstag, 12. Mai 2020, 19:00 - 20:00 CEST

Sehr geehrte Damen und Herren,

Sie haben sich bei uns gemeldet und Ihr Interesse an der Kraft-Wärme-Kopplung und an unserem Dachs bekundet. Vielen Dank - darüber freuen wir uns sehr.

Ist die Kraft-Wärme-Kopplung für Ihre Immobilie geeignet? Welchen Beitrag zum Klimaschutz können Sie damit leisten? Wie rechnet sich die Anschaffung für Sie? Antworten auf diese und weitere Fragen erhalten Sie bei uns.

In diesem Jahr haben wir unsere Produktpalette beträchtlich erweitert. Wir bieten jetzt den Dachs für unterschiedliche Gebäude- und Einsatzarten an. Mit entsprechenden Systemkomponenten machen wir ihn fit für die e-Mobilität.

Gerne möchten wir Ihnen unsere Neuheiten in Form eines Webinars vorstellen und mit Ihnen ins Gespräch kommen.

Nutzen Sie die Vorteile dieser effizienten Möglichkeit des Austauschs mit uns als Hersteller und melden Sie sich gleich an. Wir freuen uns auf Ihre Teilnahme.

Datenschutzerklärung:

Eine entsprechende Datenschutzerklärung finden Sie hier: <https://www.senertec.de/datenschutz/>

Pflichtfeld

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Ort*

PLZ/Postleitzahl*

Fragen und Anmerkungen

☐ Hiermit willige ich ein, dass meine personenbezogenen Daten zur Bearbeitung meiner Anfrage durch die SenerTec GmbH genutzt werden dürfen und an das für meinen Wohnort zuständige SenerTec Center zwecks weiterer telefonischer Kontaktaufnahme und persönlicher Beratung übermittelt werden. Ich kann meine Einwilligung jederzeit mit Wirkung für die Zukunft widerrufen.

Anmelden

Link to registrations: <https://register.gotowebinar.com/rt/6978209278538574595?source=PACE>

Technical Specification	Remeha eLecta 300
Fuel cell type	PEM
Operational mode	Heat-led
Electrical output	0,75 kW
Thermal output	1,1 kW + 21,8 kW
Electrical efficiency	38%
Overall efficiency	92%
Fuel flexibility	H Gas, L Gas, H2 ready
On-off cycles	4000 cycles
Stack lifetime	80 000h
System life	20 years

- Increased overall efficiency
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Technical Overview

eLecta 300



Remeha eLecta 300



eLecta 300

Brennstoffzellen-Hybridsystem für
Ein- und Zweifamilienhäuser

Anwendungsbereich

- › Modernisierung und Neubau mit mittlerem Wärmebedarf
- › Hybrid-System mit Brennstoffzelle für Ein- und Zweifamilienhäuser

Vorteile

- › Bis zu 69 % CO₂ Reduktion durch eigene Stromproduktion
- › Hohe staatliche Förderung und einfache EnEV-Erfüllung
- › Hybrid-Systemlösung als vorgefertigtes Plug&Play-Komplettsystem
- › Effizientestes und nachhaltigstes Heizsystem

Technische Details

- › 5-Jahre Wartungsintervall der Brennstoffzelle
- › Hydraulikmodul im Anbaurahmen mit Heizkreislösungen und Systemsteuerung bei einer Aufstellhöhe von nur 1850 mm
- › Neueste Ace Controls Regelungsplattform mit Touchdisplay

Product Highlights



BDR THERMEA GROUP

Susanne Eßlage with their new fuel cell in their home built in 2006



„If the heating of a house cannot be 100% CO₂-neutral, then we would at least like to use the latest technology. With the grant support measures, this modern micro combined heat and power (mCHP) unit comes in the price range of a good heat pump“ Susanne and Jörg Eßlage

Key marketing materials and events (April 2020)

- Trade fairs: Berlin, Essen, Nürnberg, Hamburg
- Inhouse exhibitions at wholesalers
- Installation video in progress
- Leaflets and installation manual <https://www.remeha.de/fachpartner/technischer-support/dokumentation/downloads>
- Website – product detail page <https://www.remeha.de/fachpartner/produkte/neubau-modernisierung/hybridsystem-waerme-strom/electa-300>
- Website – energy transition <https://www.remeha.de/fachpartner/jobs-aktuelles/aktuelles/energiewende>
- PR trade media – product info and reference story
- Roadshow and presentations for installers, planners and wholesalers
- Roll Ups for presentations
- Trainings and demonstrations at Remeha training facilities with demo products
- New products overview leaflet

Further Resources



References list	City	Delivery date
Walter	Günzburg	sofort
Frankenhauser	Leutkirchen	
Ausstellung	Großheirath	KW 03/20
Ausstellung	Hof	KW 03/20
Ausstellung	Möglingen	14.01.20 bis 12:00
Ausstellung	Parsdorf	
Ausstellung	Leipzig	KW 03/20
Messe	Emsdetten	KW 03/20
Friedhelm Kösters	Delbrück	
Henk Sundag	Schüttorf	06.02.2020
Heiko Schultz	Bielefeld	18.02.2020
	Leipzig	26.02.2020
Ausstellung	Friedberg	13.02.2020
Ausstellung	Laage	24.02.2020
Ragnar Dam	Schüttorf	02.03.2020
Frank Draber	Grabenstätt	03.03.2020
Ausstellung	Memmingen	03.03.2020
Ausstellung	Markt Schwaben	09.03.2020
Ausstellung	Lauenburg	delivery



Pathway to a Competitive European
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08/04/2020

Bosch

BlueGEN (Buderus GCB and DHW)

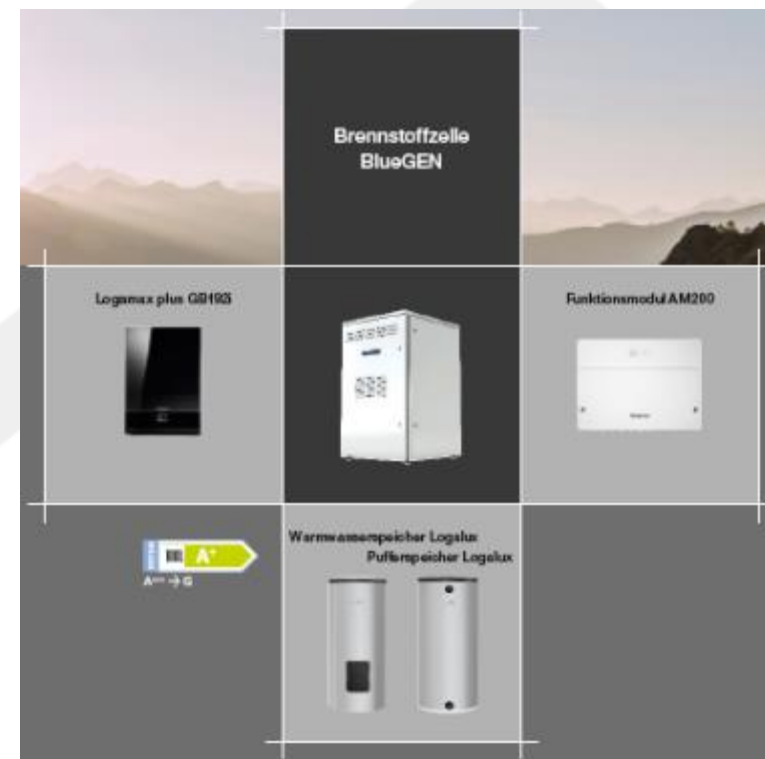
Technical Specification	Buderus GCB and SOLIDpower BlueGEN fuel cell
Fuel cell type	SOFC
Operational mode	electricity-led
Electrical output	1.5 kW
Thermal output	0.6 kW
Electrical efficiency	60%
Overall efficiency	up to 88%
Fuel flexibility	H Gas, L Gas, Bio natural gas
On-off cycles	Continuous operation
Stack lifetime	up to 60 000hrs
System life	15 years

- The **previous generation** (Buderus and Junkers units) sold as Logapower FC10 and Cerapower FC 10 with a fully integrated SOFC, manufactured by the Japanese fuel cell manufacturer Aisin were designed to realize a small footprint and achieve high efficiency. Due to the high integrated system the flexibility for installation was limited
- The **newest model** consisting of a Buderus GCB, the SOLIDpower BlueGEN fuel cell with the highest electrical efficiency and a storage tank to buffer the heat delivered by the fuel cell. This offers the opportunity to realize various system approaches even with a small footprint designed to realize high energy, cost and CO₂-savings

Technical Overview



New system approach with BlueGEN fuel cell, Buderus GCB and DHW – storage



New system approach with BlueGEN fuel cell, Buderus GCB and DHW – storage

- The new generation FC mCHP system offers both, electrical energy produced with the highest electrical efficiency combined with a highly efficient heating technology.
- Due to the modularity, various applications with different GCBs and heat storages are possible.
- Flexible integration and easy installation in addition to existing heating appliances is given as well.
- Key benefits for customers are CO₂-savings of up to 50%, as well as cost and energy savings.

Fair event and training with installers' feed back



Installers' feedback to newest model: High quality and very flexible





Key marketing materials

	Germany
Website Buderus	https://www.buderus.de/de
Product information	https://www.buderus.de/de/produkte/catalogue/alle-produkte/108941_brennstoffzelle-bluegen
Benefits	https://www.buderus.de/de/produkte/catalogue/alle-produkte/108941_brennstoffzelle-bluegen
Product data sheet	https://www.buderus.de/de/produkte/catalogue/alle-produkte/108941_brennstoffzelle-bluegen
Brochure	https://www.buderus.de/de/produkte/catalogue/alle-produkte/108941_brennstoffzelle-bluegen
List price	https://www.buderus.de/de/produkte/catalogue/alle-produkte/108941_brennstoffzelle-bluegen

- Fairs attended: e-world Essen, Bautech Berlin, SHK Essen, IFH Nürnberg, GET Nord Hamburg



Pathway to a Competitive European
Fuel Cell micro-CHP Market

A large, light gray, stylized house graphic that serves as a background for the right side of the slide. It has a simple roofline and a chimney on the left side.

SOLIDpower

BlueGEN

Technical Specification	BlueGEN
Fuel cell type	SOFC
Operational mode	Electricity-led
Electrical output	Up to 1.5 kW
Thermal output	Up to 0.85 kW
Electrical efficiency	Up to 57%
Overall efficiency	Up to 90%
Fuel flexibility	H Gas, L Gas, Green –gas, 20% H2 ready
On-off cycles	6 cycles /year+ modulation
Stack lifetime	40 000h
System life	15 years

BLUEGEN

- Improved stack-design
- Start-stop and modulation
- One touch (reduced) maintenance
- Close cascading
- One service-door (not 2)
- App controlled by customer
- Increased thermal performance
- Higher total efficiency

Technical Overview



SOLIDPower





Pathway to a Competitive European
Fuel Cell micro-CHP Market

BLUEGEN

The BlueGEN provides power from Hydrogen in the most efficient way. It's flexible, robust and gives you the right amount of energy whenever you want!



In addition, the units can be 'cascaded', which provides a single combined solution for small and medium enterprises (SMEs) with higher heat and electricity requirements than standard single family homes.

Product Highlights



SOLIDPower



Fuel Cell Success Story

House Type: Private
Installation Year: 2019

> Renovation of an old listed building



Two BlueGEN for a villa

Here, two BlueGEN BG-15s supply a historic villa with highly efficient energy. Despite the exterior of the house dating from a different time, modern technology in the form of the BlueGEN units ensures a highly efficient energy supply

"I have a green heart, and so I want to use
clean energy for our house."

Customer's wish

- A sustainable overall energy concept for the new heat and power supply
- A reduction in electricity costs

Technical requirements

- Challenge: Monument protection
- Installations: wall heating, brine water heat pump, sauna & oven with 9 kW electr. Power and an electric car

The efficient villa of the Wintzen family

Since 2012 Patricia and Bernd Wintzen have lived in the Villa Höges in Viersen. The red brick and the white frames of the windows immediately catch the eye. But although the villa is more than 100 years old, it is by no means from another time. On the contrary: two innovative BlueGEN BG-15 fuel cells provide the Wintzen family with clean, efficient and low-cost electricity.

Built in 1908, the villa with 350 square metres of residential space has been a listed building since 1989. And this was a particular challenge in the refurbishment, not least because insulation of the exterior facade is only possible on the back of the house due to the monument protection and was implemented in 2017. Due to the lack of insulation and the single glazing, the entire house requires heating throughout the winter months in order to avoid cooling, even individual rooms. From the central stairwell, the heat is redistributed into the adjoining rooms, even when the landlords are travelling.



Product Highlights

Fuel Cell Success Story

House Type: Private
Installation Year: 2019

> Renovation of an old listed building



The entire stairwell was equipped over three floors with wall heating, which is embedded in a clay plaster. Bernd Wintzen knew that only one BlueGEN would not be enough. The micro-CHP uses fuel cell technology to generate up to 13,000 kWh of electricity per year and prepares up to 250 litres of hot water per day. For the villa, however, this would not have been enough because of the heat pump. In order to bring the water into the wall heating, the heat pump has to use a lot of electricity, meaning high electricity costs. The heat pump accounted for 63 percent of the electricity consumed in the household.

Fulfilling customer requirements / Technical implementation

The house of the Wintzen family has been gradually renovated in recent years, in the course of which the heating and power supply has also been reorganised. As part of the entire refurbishment, two BlueGEN, a brine water heat pump, a 500 litre buffer tank and a 300 litre hot water tank were installed. In order to enable the heat pump and the two micro-power plants to be integrated even more efficiently in a functioning energy concept, oecotact eG created an individually tuned hydraulic control concept. "For example, we have installed the two BlueGEN BG-15 micro-CHPs with the existing heating system," says Björn Uhlir, km. Managing Director of oecotact eG.



The BlueGEN BG-15 offers the perfect way to operate a heat pump in a way that conserves resources and is as efficient as possible. This is illustrated by a look at the peak consumption of the heat pump: "Based on the load behaviour of the heat pump at 6 kW, I have found that in winter the generation of electricity from one BlueGEN and a connected PV power generation is far from sufficient. With two BlueGEN in combination with the existing battery storage, we come close to independence from large power products," explains Wintzen.

Electric cars and KfW funding

The Wintzen family already owns an electric car, and a second one is to follow. In addition, the Wintzen family benefited from KfW funding 433 when purchasing the BlueGEN BG-15, which significantly reduced the acquisition costs: the builders receive up to 12,450 euros back from KfW per BlueGEN.

Key marketing materials

	English	German	Italian
Website	Website ENG	Website GER	Website ITA
Brochure	Brochure ENG	Brochure GER	only offline
Booth	Yes	Yes	Yes
Rollups	Yes	Yes	Yes
Other	Yes	Yes	Yes

Key actions

Shows, PR Activities, Newspaper Ads, Online Ads (Google, Facebook, Xing, LinkedIn),
Offline Mailings, Lead Campaigning, Customer Marketing Support

Further Resources



SOLIDPower





Pathway to a Competitive European
Fuel Cell micro-CHP Market



08/04/2020

A large, light grey outline of a house, serving as a background for the Sunfire logo and product name.

Sunfire

Sunfire-Home 750

Technical Overview

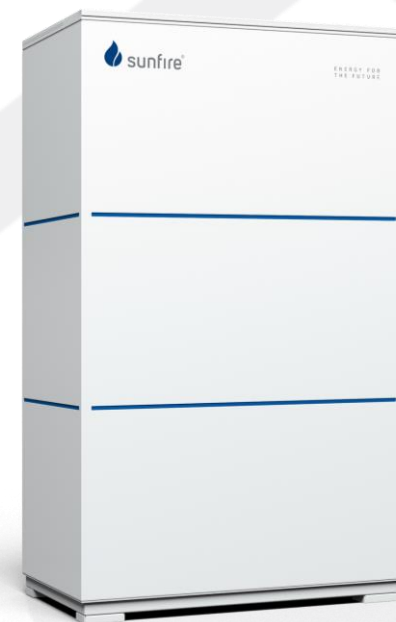
Sunfire

Technical Specification	Sunfire-Home 750
Fuel cell type	SOFC
Operational mode	Heat-led
Electrical output	0.75 kW
Thermal output	1.25 kW [+ peak boiler]
Electrical efficiency	38 % _{H_i}
Overall efficiency	88 % _{H_i}
Fuel flexibility	LPG, H Gas, L Gas, H ₂ ready
On-off cycles	1 cycle/ 1,000 h
Stack lifetime	40 000 h
System life	15 years

- Higher power density stack with improved materials, new design and increased lifetime
- Full stack integration leading to cost reduction and a more compact design
- New materials/ components for insulation, blowers and burners for higher efficiencies and lower cost
- Casing with fewer interfaces and integrated controls for easy installation



Sunfire-Home 750



The Sunfire logo, consisting of a blue flame icon followed by the word "sunfire" in a lowercase, sans-serif font.

Sunfire-Home 750

- Operation with liquid gas (propane/butane) and therefore a clean alternative to fuel oil.
- Heat extraction also possible at high return temperatures (up to max. 65 °C). Ideal for existing buildings.
- Continuous operation possible, as no regeneration times are required.
- "Made in Germany" - from development to the finished product

Sunfire-Home in Action



Key marketing materials

	Language 1	Language 2
Website www.sunfire-home.de	German	English (planned)
Factsheet	German	English
Application Sheet	German	English (planned)
Warranty Sheet	German	English (planned)
Video	German	English (planned)

Key marketing events

- [Launch event](#) (Jan 2020), [Haus 2020](#) (Mar 2020)
- [LinkedIn](#) / [Facebook](#) channels



Pathway to a Competitive European
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A large, light gray, stylized house graphic that serves as a background for the right side of the slide. It has a simple roofline and a chimney on the left side.

Viessmann

Vitocalor PT2

Technical Specification	Vitovalor PT2
Fuel cell type	PEM
Operational mode	Heat-led
Electrical output	0,75 kW
Thermal output	1,1kW [11/19/26/32]
Electrical efficiency	37 %
Overall efficiency	92 %
Fuel flexibility	H Gas, L Gas, H2 ready up to 5%
On-off cycles	4000 cycles
Stack lifetime	80 000 h
System life	12 years

- Enlargement of Stack lifetime from 10 to 12 years
- Enlargement of Stack lifetime from 70.000 to 80.000 hours
- Decrease of maintenance effort from 2 to 5 years
- Increase of overall efficiency by 2% points to 92%
- Max. continuous operation until regeneration stop increased from 22 to 45 h

Technical Overview



Vitovalor PT2



Vitovvalor PT2

- First fuel cell mCHP on fuel cell base for single and double family houses in Europe
- Producing your own energy at home
- Get independent from rising electricity prices
- Up to 50% CO2 savings

[Video](#)

(Embedded link)





Key marketing materials

	Germany	United Kingdom	Belgium	France
Website	Vitovalor PT2 Vitovalor PA2	Vitovalor	Vitovalor PT2 Vitovalor PA2	Vitovalor PT2
Link to marketing materials e.g brochure	ViBooksDE/de Media database	Vibooks/GB/en	Vibooks/BE/nl Vibooks/BE/fr	Vibooks/FR/fr

(Embedded links)



Pathway to a Competitive European
Fuel Cell micro-CHP Market

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