The Viessmann Group

Family business with head office in Allendorf (Eder)

- **1917** Founded
- **12,100** Employees
- **2.37** Turnover in €/billion
- **23** Manufacturing sites in 11 countries
- **74** Sales companies, 35 sales partners in 58 countries and sales activities in a total of 74 countries
- **120** Sales offices worldwide
- **55** Export share in percent
Strategic goals

Most important goal: To remain an independent family business

- Independent family business
- Sustainable growth
- Technological leadership
- Comprehensive range of efficient systems for heating, industrial energy and refrigeration
- Internationally leading position
Comprehensive range

**Products and systems solutions for all application areas**

- Three divisions: Heating systems, Industrial energy systems, Refrigeration systems
- Comprehensive ranges for specific target groups, for the application areas of residential buildings, commerce, industry and local authorities
Comprehensive range: Heating systems

Efficient technologies for residential buildings and commerce from 1 to 2200 kW

- Gas and oil condensing boilers
- Combined heat and power systems; world’s first fuel cell heating appliance
- Hybrid appliances
- Heat pumps and ice stores
- Wood heating systems (pellets, woodchips, logs)
- Solar thermal systems and photovoltaics, cylinders, system technology and accessories
How do we resolve the Energy supply dilemma for the future?
Energy systems past and present:
centralised, fossil, in-efficient, unflexible

1. Very few large producers

2. Very many distributors

3. The consumers have „no choice“, they have to take it

- Power plants
- Distributor/ public utilities
- Consumers
Energy systems past and present:
centralised, fossil, in-efficient, unflexible

1. There will be many decentralised producing plants and systems

2. Distributors will manage energy supply

3. The consumers are becoming producers. Storing energy becomes more important
Why fuel cell microcombined heat and power?
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 UK/EU energy transition

  Provides greater flexibility for the energy system

  Fosters innovation and high-value jobs
Overall view of mCHP technologies
Pro's and con's – which technology is the best?

<table>
<thead>
<tr>
<th>Operation Principle</th>
<th>Technology</th>
<th>Heat to Power Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHP Technology</td>
<td>Gas Engines</td>
<td>3:1</td>
</tr>
<tr>
<td></td>
<td>Diesel Engines</td>
<td>8:1</td>
</tr>
<tr>
<td></td>
<td>Steam Turbine</td>
<td>1:1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Gasoline Engine</th>
<th>Stirling Engine</th>
<th>Fuel Cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Efficiency</td>
<td>&lt; 90 %</td>
<td>&gt; 95 %</td>
<td>&gt; 90 %</td>
</tr>
<tr>
<td>Electrical Efficiency</td>
<td>&lt; 30 %</td>
<td>&lt; 20 %</td>
<td>&gt; 30 %</td>
</tr>
<tr>
<td>Part Load Behavior</td>
<td>Good</td>
<td>Good</td>
<td>Very Good</td>
</tr>
<tr>
<td>State of Technology</td>
<td>Proven</td>
<td>Series Production</td>
<td>Series Production</td>
</tr>
<tr>
<td>Maintenance Costs</td>
<td>High</td>
<td>Very Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
System comparison of the mCHP-Techn. Stirling, PEM and SOFC:
Technologies are suitable for buildings by energy demand

Building energy demand (heat, hot water, electricity)
Viessmann Vitocalor 300-P

Output:
- 0.75 kW_el
- 20 kW_therm

Ideal for domestic homes

Total efficiency: 91%

33.3% Electricity
57.7% Heat

Efficiency of CHP systems
Traditional power generation

Total efficiency: 38%

38% Electricity
62% Losses (heat)
Fuel cell–heatingboiler Vitovalor 300-P
Supports the 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.
Fuel cell- heatingboiler Vitovvalor 300-P

For static application in single residential homes
Fuel cell technology
mCHP FuelCell System Schematics

Exhaust (CO2)

Natural gas (CH4)

Gas reformer

Exhaust

Hydrogen (H2)

Fuel cell stack

Direct current

240V Grid connection

Inverter

Air (O2)

Air supply

Heat management

Useful heat
Fuel Cell Technology (PEM = "Polymer-Elektrolyt-Membran" or "Proton-Exchange-Membrane")

2 H₂ + O₂ → 2 H₂O & electrical output
Case Study: Liz Marquis, Ayr, UK
Vitovalor300-P 19kW

**Location details**
- Building: built 1900
- Useable floor space: ca. 220m²
- No of occupancies: 1
- Additional heating: no

**Technical details**
- Product: Vitovalor 300-P
- Output: 19 kW
- Hot water: Vitovalor
- Heating circuit: 1 x mixed HC
Site: Collings, Presteigne, UK
Vitovalor300-P 26kW with DHWComfort set

Location details
Building: built 1700
Useable floor space: ca. 410m²
No of occupancies: 6
Additional heating: 2 large AGA’s

Technical details
Product: Vitovalor300-P
Output: 26kW
Hot water: Vitocell 100-V 300L
Heating circuit: 1 x mixedHC
Fuel Cell technology in the heating market

- The Viessmann Group
- Changes in the heating market
- Introduction of the Viessmann fuel cell, Vitovalor
- Economic requirements and efficiencies
Fuel cell technology
Additional new consumers – EV\& hybrids
Fuel cell technology
Incentives and financial support

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

9 Partners
> 2,800 Fuel Cell micro-Cogeneration units
> 500 Systems per manufacturer
10 Countries
4 Countries
€90m Total budget

Representing manufacturers, utilities & research community
To be deployed across Europe between 2016-2021
Established production capacity per manufacturer
Where the units will be installed
Selected for policy & market development (Belgium, Italy, Netherlands and UK)
Including €33.9m Horizon 2020 funding via FCH JU

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

Coordination & Dissemination Partner:
Manufacturers:
- Viessmann
- BDR Thermea Group
- Sunfire
- Solid Power
- Bosch
- CogenSafe

Research Partners:
- DTU
- Element Energy
- EWE

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

PACE
Pathway to a competitive European Fuel Cell micro-CHP Market
**Vitovalor 300-P**

The new heating revolution

**Micro CHP**

🔍 Back to technology types

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**Search**

<table>
<thead>
<tr>
<th>Product type</th>
<th>Manufacturer</th>
<th>Keywords</th>
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<tr>
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🔍 Search  Clear

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10 per page  

<table>
<thead>
<tr>
<th>Product</th>
<th>Type</th>
<th>Manufacturer</th>
<th>Models</th>
<th>Certification number</th>
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</thead>
<tbody>
<tr>
<td>Vitovalor</td>
<td>Heat Led Microgeneration Package</td>
<td>Viessmann Ltd.</td>
<td>Vitovalor 300-P</td>
<td>KM 680752/1</td>
</tr>
</tbody>
</table>

More info.
Vitovalor 300-P
EPC rating for existing homes

Full marks for heating and hot water

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**Summary of this home’s energy performance related features**

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Energy Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td>Solid brick, as built, no insulation (assumed)</td>
<td>★★★★★</td>
</tr>
<tr>
<td></td>
<td>Cavity wall, as built, insulated (assumed)</td>
<td>★★★★★</td>
</tr>
<tr>
<td>Roof</td>
<td>Pitched, 100 mm loft insulation</td>
<td>★★★★☆</td>
</tr>
<tr>
<td></td>
<td>Pitched, 300 mm loft insulation</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>Floor</td>
<td>Suspended, no insulation (assumed)</td>
<td>★★★★★</td>
</tr>
<tr>
<td></td>
<td>Solid, insulated (assumed)</td>
<td></td>
</tr>
<tr>
<td>Windows</td>
<td>Fully double glazed</td>
<td>★★★★☆</td>
</tr>
<tr>
<td>Main heating</td>
<td>Micro-cogeneration, mains gas</td>
<td>★★★★★</td>
</tr>
<tr>
<td>Main heating controls</td>
<td>Programmer, room thermostat and TRVs</td>
<td>★★★★★☆</td>
</tr>
<tr>
<td>Secondary heating</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Hot water</td>
<td>From main system</td>
<td>★★★★★</td>
</tr>
<tr>
<td>Lighting</td>
<td>Low energy lighting in 88% of fixed outlets</td>
<td>★★★★★</td>
</tr>
</tbody>
</table>
Fuel cell technology

Benefits to home owners

- Independent of rising electricity prices
  - £1000 saving/ year

- Benefit for the environment due to CO2-saving
  - Up to 40% CO₂ reduction

- Aesthetics of the house is not effected
  - Fuel Cell performance equivalent to 5-6kWp PV

- Remote control and display via Smartphone