

Combined heat and power units up to  $401 \text{ kW}_{el}$  and  $549 \text{ kW}_{th}$





# CHP units for heat and power

Tailor-made energy concepts for the provision of heat and power.

A gas driven combined heat and power unit (CHP) generates heat and power simultaneously. These units are sized to suit both residential complexes and commercial operations. On the heating side, the CHP unit operates in parallel to a boiler. Both the central heating and DHW heating systems are connected to the CHP unit.

The compact appliances from ESS are predominantly decentralised CHP units with a bias towards heating. Comparatively small units generate electric power for consumption on site. Any power not required is fed into the public grid and reimbursed accordingly by the power supply utility. The overall efficiency of the CHP unit can be increased by the use of its own waste heat. The heat generated can be put to use locally, on the building's heating and hot water system.

The overall efficiency of CHP units can reach up to 86% (gross). In the case of the Vitobloc 200 module EM- 18/36 this is delivered from 57% thermal / 29% electrical.

## Heating with biogas benefits the environment

A CHP unit can also deliver additional environmental benefits when using biogas – when its operation is CO<sub>2</sub> neutral. This way, users can make themselves independent of fossil fuels such as natural gas, since biogas is a locally generated fuel.

BIOFerm and Schmack, members of the Viessmann Group, design and build plants for the generation of biogas. The biogas generated in these plants is ideal for the operation of a CHP unit.



At the core of the CHP unit lies the gas engine.



# When and where is the use of CHP beneficial?

The use of energy efficient engines makes CHP a powerful and high efficiency unit.

## CHP unit viability

With the standard manufacture of CHP units powered by natural gas or biogas, Viessmann extends its comprehensive product range for applications requiring a medium output in municipal buildings and industrial and commercial enterprises. To ensure the economic viability of a CHP project operated with natural gas, it is recommended that the output is precisely matched to the heat and power demand. The boiler output should be in excess of 250 kW or the gas consumption in excess of 300,000 kWh/p.a., and the power consumption should be in excess of 80,000 kWh/p.a.

## CHP unit also with condensing technology

The Vitobloc 200, module EM-18/36, used in combination with a peak load boiler is ideal for residential complexes from 30 to 50 units, for medium-sized hotels, care homes and business showrooms, etc. With an overall efficiency of 96.4%, the CHP unit operates highly efficiently thanks to its condensing technology and is recommended both for new build and modernisation projects.

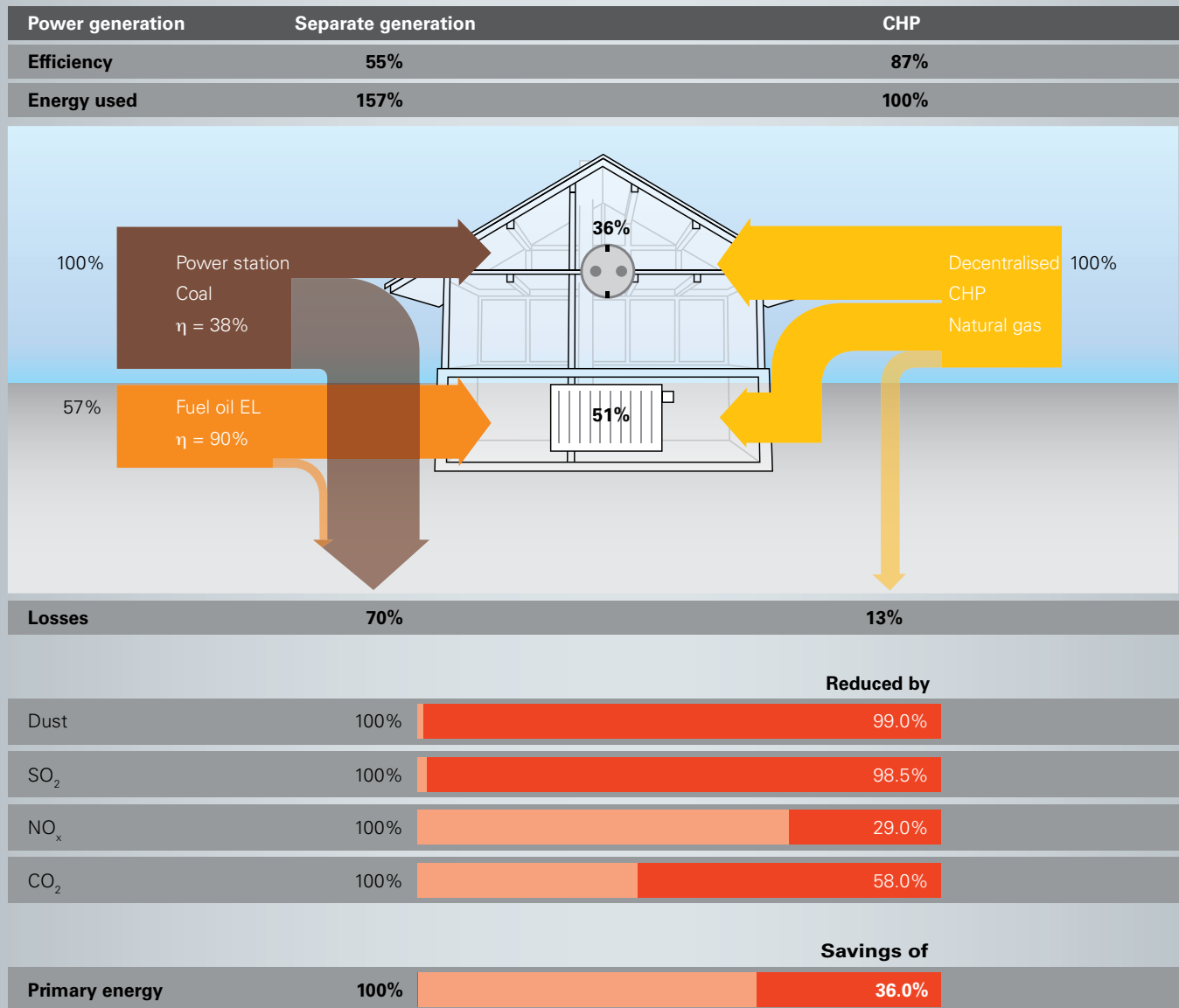
A higher output version of the CHP Vitobloc 200, is EM-50/81, which offers an overall efficiency of 90.3%.

## Operation in parallel mains and emergency power mode

All modules can be operated in parallel mains mode and optionally also in emergency power mode. This means that, in the event of a power grid failure, the Vitobloc 200 can supply the unit with power after a short start-up time.

## Benefits at a glance

- High electrical efficiency through the use of energy efficient engines, resulting in the highest possible power bias for maximum economy
- All Vitobloc 200 units are capable of modulation
- Standard equipment level includes starting batteries and a synchronous generator. As a result, the CHP unit is equipped for mains substitution operation with no increase in the idle current demand
- Also suitable for demanding connection conditions, e.g. the  $\cos \phi$  can be regulated
- Can be operated with natural gas, biogas, sewer and landfill gas
- Time and cost savings during engineering, installation, commissioning and operation through generous standard equipment level
- Longer service intervals through integral lubricating oil supply with optimised tank volume. Operating costs and idle times are reduced, as a result
- Factory tested units ready for installation; therefore minimum installation effort and tested output values
- Proven technology, with more than 750 installed systems
- Proven remote monitoring and automation systems
- Extensive service offer, e.g. different service options – from standard to full service 4/5



Source: ASUE

Combined heat and power units compared with conventional heating technology

**Decentralised power generation**

When power is generated in power stations (centralised power supply), heat is created that is often lost to the environment without being used. The utilisation of this heat, e.g. for heating buildings, reduces heat losses and

lowers emissions that are damaging to the environment. Combined heat and power generation enables up to 36% of primary energy to be saved and is therefore one of the most efficient energy-saving methods available today.

## Attractive benefits to the user and environmentally responsible operation with high levels of efficiency

CHP units operate with great environmental responsibility. In addition to the primary energy savings of approx. 36%, CO<sub>2</sub> emissions are significantly lower compared to a conventional central power station. For this reason CHP technology will qualify for the exemption of the climate change fuel levy. It will also offer tax efficient investment with the Enhanced Capital Allowances (ECA1) scheme, delivering a helpful cashflow boost and a shortened payback period. In future it may reduce the potential cost impact of carbon reduction commitment legislation.

### **Top quality to retain high value**

Only high quality components from well-known manufacturers are used in the manufacture of the CHP units. This guarantees high operational reliability, assured spare parts availability for many years ahead and consequently the system retains a high value.

The control panel is integrated into the CHP module for optimum space utilisation. The basic design of the CHP unit and control panel is identical in each module, and all components are easily accessible. This results in shorter servicing times and therefore reduced costs for the user.



As standard, the Vitobloc 200 is equipped with a synchronous generator and starting batteries.

# Vitobloc 200

## Natural gas

### Specification

Type		EM-18/36	EM-50/81	EM-70/115	EM-140/207	EM-199/263	EM-199/293	EM-238/363	EM-363/498	EM-401/549
<b>Electrical efficiency</b>	%	32.1	34.5	34.3	36.5	37.0	36.0	35.7	37.8	38.1
<b>Thermal efficiency</b>	%	64.3	55.9	56.4	53.9	52.6	53.0	54.4	51.9	54.6
<b>Total efficiency</b>	%	96.4	90.3	90.7	90.4	89.6	89.0	90.1	89.7	92.7
<b>Power index</b> to AGFW FW308		0.5	0.62	0.61	0.68	0.76	0.68	0.66	0.73	0.73
<b>Primary energy factor</b> ENEC 2007 $f_{PE}$		0.73	0.74	0.74	0.74	0.74	0.73	0.73	0.71	0.71
<b>Primary energy savings</b> PEE acc. to CHP Directive	%	27.5	25.0	25.2	24.6	23.6	25.0	25.5	24.6	26.9
<b>Permiss. heating water flow temperature</b>	°C	80 <sup>*1</sup>	90	90	90	85	85	90	85	85
<b>Permiss. heating water return temperature</b>	°C	65 <sup>*1</sup>	70	70	70	65	65	70	65	65
<b>Engine manufacturer</b>		VW	MAN	MAN	MAN	MAN	MAN	MAN	MAN	MAN
<b>Number/arrangement of cylinders</b>		4/in line	4/in line	6/in line	6/in line	6/in line	6/in line	12/V	12/V	12/V
<b>Process</b>		Lambda =1 <sup>*2</sup>	Lambda =1 <sup>*2</sup>	Lambda =1 <sup>*2</sup>	Lambda =1 <sup>*2</sup>	Lean burn turbo with mix.cool <sup>*3</sup>	Lean burn turbo with mix.cool <sup>*4</sup>	Lambda =1 <sup>*2</sup>	Lean burn turbo with mix.cool <sup>*4</sup>	Lean burn turbo with mix.cool <sup>*3</sup>
<b>Length</b>	mm	1 900	2 800	2 800	3 400	3 580	3 580	4 450	3 980	3 980
<b>Width</b>	mm	850	860	860	900	1 600	1 600	1 600	1 600	1 600
<b>Height</b>	mm	1 200	1 700	1 700	1 700	2 000	2 000	1 985	2 000	2 000
<b>Weight (empty)</b>	kg	900	2 000	2 100	3 420	4 800	4 800	5 300	6 300	6 300
<b>Weight in operation</b>	kg	1 000	2 200	2 300	3 620	5 300	5 300	5 800	6 800	6 800
<b>Flue gas connection<sup>*5</sup></b>	Ø mm	50	80	80	100	150	150	150	200	200
<b>Machine sound pressure level<sup>*6</sup></b>	dB(A)	66	62	72	74	81	81	77	81	81
<b>Extractor fan sound pressure level<sup>*6</sup></b>	dB(A)	63	53	62	71	79	79	78	79	79
<b>Flue gas sound pressure level<sup>*7</sup></b>	dB(A)	46	41	47	57	75	75	72	74	74
<b>Inner room length min.</b>	mm	4 140	5 240	5 240	6 040	6 600	6 600	7 450	7 000	7 000
<b>Inner room width min.</b>	mm	2 490	2 500	2 500	2 540	3 850	3 850	4 650	4 650	4 650
<b>Inner room height min.</b>	mm	2 000	2 800	2 800	2 800	3 500	3 500	3 500	3 500	3 500
<b>Min. space needed for access to control panel</b>	mm	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000
<b>Min. space needed for access to connections</b>	mm	1 200	1 400	1 400	1 600	2 000	2 000	2 000	2 000	2 000
<b>Min. space needed on each side</b>	mm	800	800	800	800	1 100	1 100	1 500	1 500	1 500

\*1 Max. efficiency at flow/return temperatures of 50/35°C (condensing technology); with higher flow/return temperatures, reducing heating output.

\*2 Engines with three-way catalyst and operation with air ratios of Lambda = 1.

\*3 Engines with lean mixture combustion, mixture heating and external mixture cooling.

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\*5 Use approved flue system type. Connection withstands ulsation pressure up to 5 000 Pa.

\*6 Sound pressure level at 1 m distance in the open to DIN 45 635, measured with silencer hood and fan, exhaust air noise 1 m downstream of duct.

\*7 Sound pressure level at 1 m distance in the open to DIN 45 635, measured with the silencer (accessory).

## Comprehensive service for every system – from engineering to maintenance

From control panel to maintenance contracts, ESS offers a comprehensive range of services for all CHP units.

### **Tailor-made control panels with established software**

Since 1983, ESS has been offering tailor-made control panels and matching software for PLC, automation, network coupling, auxiliary drives, control units and power units. The company can draw on extensive experience to deliver bespoke solutions, especially when it comes to modernising existing CHP systems. Smaller domestic control systems with optional remote monitoring can also be supplied.

### **Commissioning and handover**

Prior to despatch, each individual CHP unit is subjected to extensive tests on the in-house test bed. As part of these tests, specified output values for the unit are documented, keeping the effort when commissioning the system at the customer's premises to a minimum. ESS hands over these units fully tested and ready for use.

Each customer can assemble their own individual service package from several options according to their individual demands and requirements. This includes everything from commissioning and training, to complete operational management.

### **Maintenance contracts**

Different maintenance contracts offer many options, allowing a flexible personalised contract to be found. A number of contract options are specifically tailored to public bodies.



Intensive test runs prior to delivery are, naturally, a must.

## Efficient heat and power supply with compact combined heat and power units

Vitobloc 200 CHP units are supplied with an electrical output from 18 to 401 kW<sub>el</sub> and a thermal output from 36 to 549 kW<sub>th</sub>.

	<b>VITOBLOC 200</b>	<b>Module EM-18/36</b> Output: 18 kW <sub>el</sub> , 36 kW <sub>th</sub> Fuel: Natural gas (biogas on request) 4-cylinder gas engine, efficiency: 96.4% (H <sub>2</sub> ) – High efficiency through condensing technology
	<b>VITOBLOC 200</b>	<b>Module EM-50/81</b> Output: 50 kW <sub>el</sub> , 81 kW <sub>th</sub> Fuel: Natural gas (biogas on request) 4-cylinder gas engine, efficiency: 90.3% (H <sub>2</sub> )  <b>Module EM-70/115</b> Output: 70 kW <sub>el</sub> , 115 kW <sub>th</sub> Fuel: Natural gas (biogas on request) 6-cylinder gas engine, efficiency: 90.7% (H <sub>2</sub> )
	<b>VITOBLOC 200</b>	<b>Module EM-140/207</b> Output: 140 kW <sub>el</sub> , 207 kW <sub>th</sub> Fuel: Natural gas (biogas on request) 6-cylinder gas engine, efficiency: 90.4% (H <sub>2</sub> )  <b>Module EM-199/263</b> Output: 199 kW <sub>el</sub> , 263 kW <sub>th</sub> Fuel: Natural gas (biogas on request), 6-cylinder turbo-charged gas engine, efficiency: 89.6% (H <sub>2</sub> ) – High electrical efficiency through external mixture cooling  <b>Module EM-199/293</b> Output: 199 kW <sub>el</sub> , 293 kW <sub>th</sub> Fuel: Natural gas (biogas on request) 6-cylinder turbo-charged gas engine, efficiency: 89% (H <sub>2</sub> )
	<b>VITOBLOC 200</b>	<b>Module EM-238/363</b> Output: 238 kW <sub>el</sub> , 363 kW <sub>th</sub> Fuel: Natural gas (biogas on request) 12-cylinder gas engine, efficiency: 90.1% (H <sub>2</sub> )  <b>Module EM-363/498</b> Output: 363 kW <sub>el</sub> , 498 kW <sub>th</sub> Fuel: Natural gas (biogas on request) 12-cylinder turbo-charged gas engine, efficiency: 89.7% (H <sub>2</sub> )  <b>Module EM-401/549</b> Output: 401 kW <sub>el</sub> , 549 kW <sub>th</sub> Fuel: Natural gas (biogas on request) 12-cylinder turbo-charged gas engine, efficiency: 92.7% (H <sub>2</sub> ) – High electrical efficiency through external mixture cooling

## Reliability and economy: CHP units offer many advantages

ESS is a leader in the development and manufacture of CHP units with over 750 systems already installed.

Thanks to the comprehensive standard equipment level of its products, ESS can be proud of many satisfied customers.

The Egerner Höfe Park Hotel heating centre was completely renovated at the end of 2009. The anticipated 6000 hours of operation per annum have already been exceeded. The CHP unit covers approximately 68% of the total electricity demand. The entire system is financed and operated by a contracting company.



"Wohnoase" residential park in Regensburg

The overall heating system is operated internally as a local heating network.

- CHP:
  - ESS Viessmann Vitobloc 200 EM-140/207
- Boiler:
  - 2 x Vitocrossal 200, type CT2
- Heating water buffer cylinder:
  - 4 x 2200 litres
- CHP control unit:
  - The system is equipped with TeleControl remote monitoring and a Vitocom 300. This registers the temperature of the heating water buffer cylinder, the Wilo Strator pumps for heating and discharging the heating water buffer cylinder via Wilo-Digicon, and the heat meters, to name but a few.



Centerparc Tossens







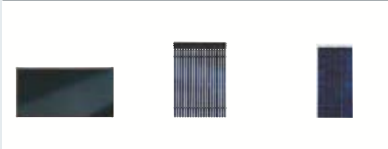












CHP units are not only the right choice for property developers of residential homes and housing estates; their efficiency and economy also make them equally attractive in many other applications. For example:

- **Commerce and industry**
  - Food processing, pharmaceutical and chemical industries, etc.
- **Tourism**
  - Pubs, hotels, etc.
- **Local and district heating associations**
  - Municipal authorities, contractors, etc



Inselbad Landsberg

# The comprehensive Viessmann product range

	 Oil low temperature and condensing technology 13 – 20,000 kW	 Gas low temperature and condensing technology 4 – 20,000 kW	 Solar thermal and photovoltaics
 Detached houses			
 Apartment buildings			
 Commerce / Industry			
 Local heating networks			

## Individual solutions with efficient systems

Futureproof heating systems for all energy sources and applications

### The comprehensive Viessmann product range

The comprehensive product range from Viessmann offers individual solutions with efficient systems for all applications and all energy sources. As environmental pioneers, the company has, for decades, been supplying efficient and clean heating systems for oil and gas, solar thermal and photovoltaic systems and heat generators for sustainable fuels and heat pumps.

The comprehensive product range from Viessmann also offers superior technology and sets new benchmarks. With its high energy efficiency, our range helps to save heating costs and is always the right choice where the environment is concerned.

At Viessmann, protecting the environment and natural resources has already been enshrined in the company's principles.

Viessmann develops and produces innovative heating systems, which demonstrate top quality, energy efficiency and a long service life. Many of these products have become milestones of heating technology.

### Individual and efficient

Viessmann offers the right heating system for any demand – wall mounted or floorstanding, in individual combinations – all are futureproof and economical. And whether for detached or semi-detached homes, large residential buildings, commercial/industrial use or for local heating networks; for modernising existing properties or new build – they are always the right choice.

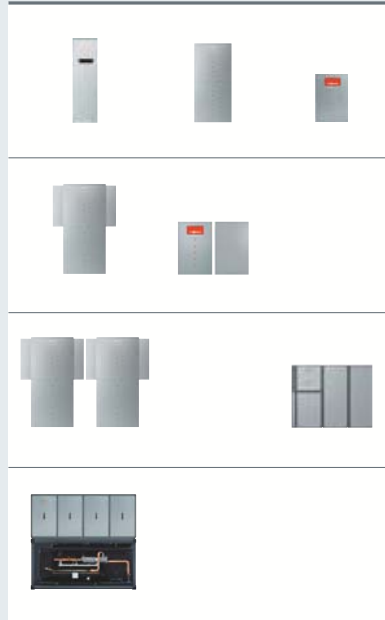
Wood combustion technology,  
CHP and biogas production

4 – 13,000 kW

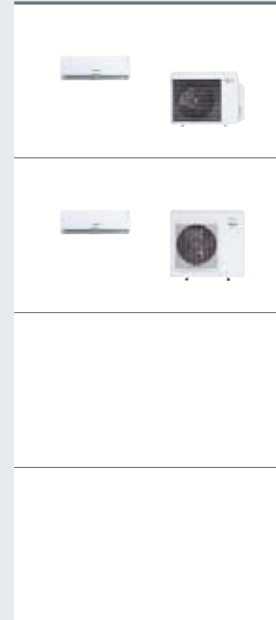


Heat pumps for  
brine, water and air

1.5 – 1500 kW



Air conditioning technology



System components



The comprehensive product range from Viessmann:  
Individual solutions with efficient systems for all energy  
sources and applications

**Key performers**

The Viessmann Group sets the technological pace for the heating industry. This is what the Viessmann name represents, and also what the names of the subsidiaries in the Group represent, as they are founded on the same pioneering spirit and power of innovation.

The company offers the following:

- Condensing technology for oil and gas
- Solar thermal and photovoltaic systems
- Heat pumps
- Wood combustion systems
- CHP modules
- Biogas plants
- Services

Viessmann is extremely specialised in all these market segments, yet at the same time the company has a crucial advantage over specialist suppliers: Viessmann understands heating technology as a systematic whole and offers unbiased advice on technology and fuel type. This guarantees the best solution for every application.

Viessmann Group

**VIESSMANN**

**KWT**

**KOB**

**MAWERA**

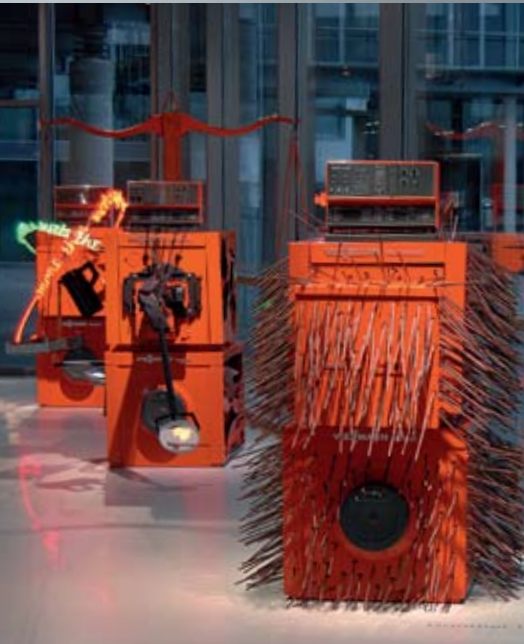
**ESS**

**BIOFERM**

**Schmack**

**Carbotech**

The company



# The Viessmann Group

For three generations, the Viessmann family business has been committed to generating heat conveniently and economically, with environmental responsibility in mind and in alignment with your needs.

With a number of outstanding product developments and problem-solving solutions, Viessmann innovations have frequently made it the trailblazer and trendsetter for the entire industry.

Viessmann's orientation is decidedly international. It maintains 17 factories in Germany, France, Canada, Poland, Hungary, Austria, Switzerland and China, sales organisations in 37 countries and 120 branch sales offices worldwide.

## Members of the Viessmann Group

Viessmann is a family business that has financed its growth almost exclusively with its own resources. In more recent times, company takeovers have also contributed to its growth. Today, members of the Viessmann Group include the wood combustion specialists KÖB and MAWERA, the heat pump manufacturer, KWT, the manufacturer of combined heat and power units ESS, as well as BIOFERM and Schmack the market leaders in biogas systems.

## Skilful workforce

Training is becoming ever more important. As long ago as the 1960s, the company set itself the task of offering a programme of continuous training to its skilled customers.

Today Viessmann maintains at its company head office in Allendorf (Eder), a modern information centre that is second to none. Every year at the Viessmann academy, more than 70,000 customers bring their knowledge right up to date.

## The "Efficiency Plus" Model

As part of our model, Viessmann has implemented a sustainability concept that links economic actions with ecological and social responsibility. It encompasses the generation and consumption of energy and resource-efficient production in the Allendorf (Eder) factory. As a result, the amount of fossil fuel consumed at the factory has been cut by 40 percent, and CO<sub>2</sub> emissions have been reduced by a third.

## Responsibility

Viessmann is committed to fulfilling its environmental and social responsibilities. The company employees form a team acting on a global footing. This team is defined by the loyalty, reliability and the responsible actions of each individual. We ensure all our processes are environmentally compatible and encourage the use of renewable forms of energy. Furthermore we take an interest in economics, art and culture and have for many years successfully engaged in international sport sponsorship.



For its commitment to climate protection and efficient use of resources, Viessmann won the German Sustainability Award 2009.

# Viessmann Group



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9443 666 GB 02/2011

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