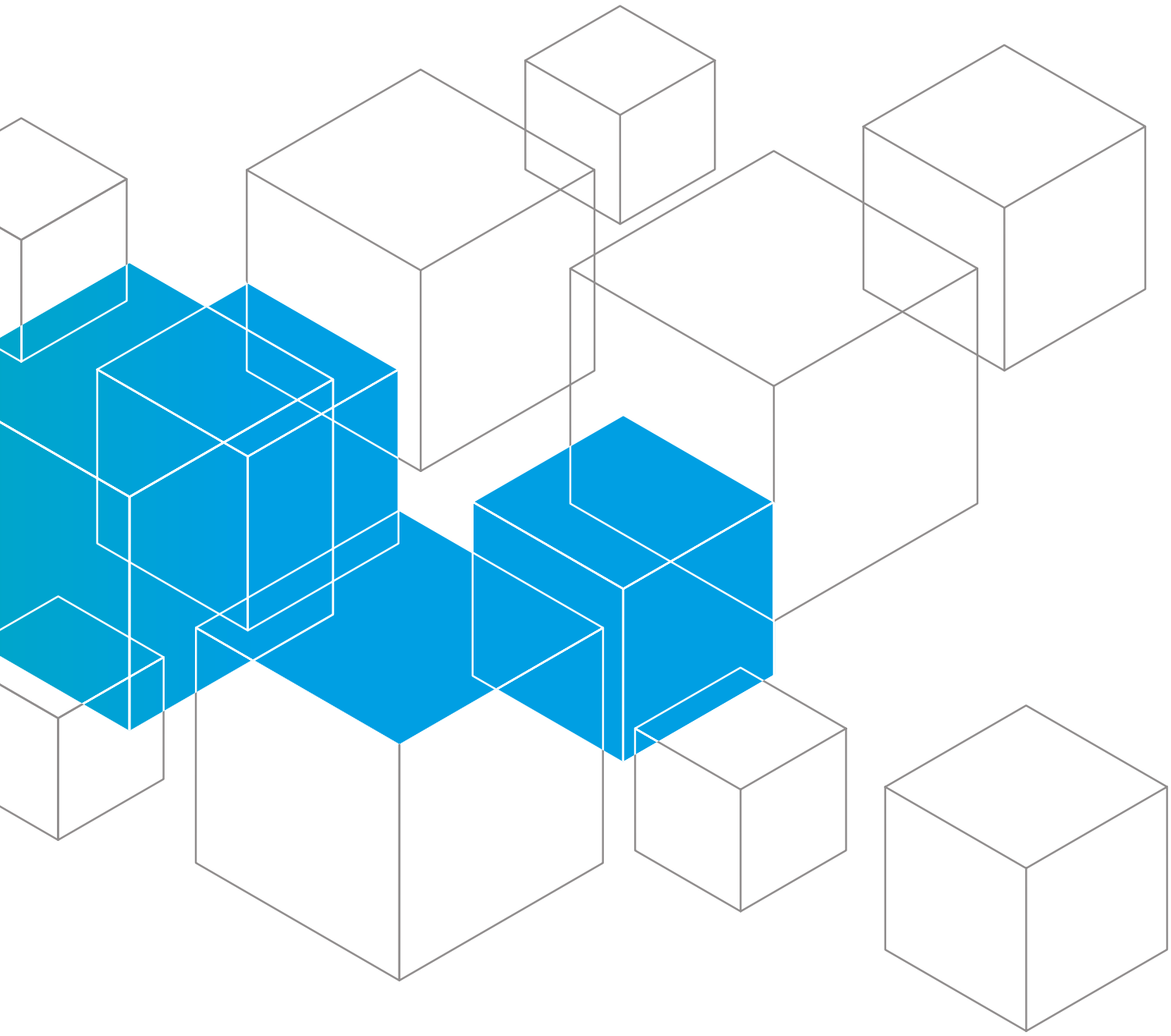
hotspot energy

Efficient systems and renewable energies

Technology and Energy Panel

BDH
Federation of
German Heating Industry

ISH



Foreword

After the ISH was held digitally in 2021 due to the Corona pandemic, this year it will again be held as a face-to-face event. Messe Frankfurt, as well as the BDH and all partner associations, are very pleased that we will be able to offer visitors a broad program on site this year.

Even though the pandemic is largely behind us, the situation in Germany and Europe remains challenging for the people, and also for the heating industry. We are in the midst of a transformation of the energy system against the backdrop of international climate protection goals.

The war in Ukraine is adding new challenges. While in recent years the focus has been primarily on the necessary and possible reductions in CO_2 emissions, over the course of the last year the issues of security of supply and affordability have increasingly become the focus of attention – not only for politicians, but also for the people. These issues are inextricably linked, because the transformation process towards a climate-neutral energy and heating supply can only succeed if achieving climate policy goals goes hand in hand with an affordable and secure energy supply.

For decades, the heating industry has been rising to the challenge of offering a wide range of solutions for every budget and for every application. For us, the focus is on the customer, which is why manufacturers develop their products in line with the needs and wishes of users. At ISH, the wide range of solutions offered by the heating industry can be seen in all its facets. This year there will once again be many innovations on display that prove that manufacturers continue to meet this challenge.

In the “Hotspot ISH Energy” area, ISH 2023 will showcase the technological solutions for implementing the new strategies from Brussels, including the plans for the European ramp-up of renewable energies in the heating market (REPowerEU), as well as the increased target of reducing CO_2 emissions by 55 percent by 2030 (Fit for 55). At the same time, ISH will provide information on the energy sources used in the heating sector and their transformation paths. The energy sources of the future in the heating market are CO_2-free. They include green gases such as hydrogen and biogas, but also liquid renewables, green electricity and solid biomass.

This brochure accompanies the Technology and Energy Panel organised by the Federation of German Heating Industry, Messe Frankfurt and the 16 partner associations. It refers to the above-mentioned topics and, like the Panel, provides information about the transformation process towards a climate-neutral energy and heating supply.

We wish the international visitors to the ISH interesting insights into a dynamic industry in the midst of an exciting transformation process. At the same time, we hope you enjoy reading this issue.

Iris Jeglitza-Moshage
Senior Vice President
Messe Frankfurt
Exhibition GmbH

Markus Staudt
Managing Director
Federation of German
Heating Industry (BDH)

ISH Energy: Solutions for REPowerEU

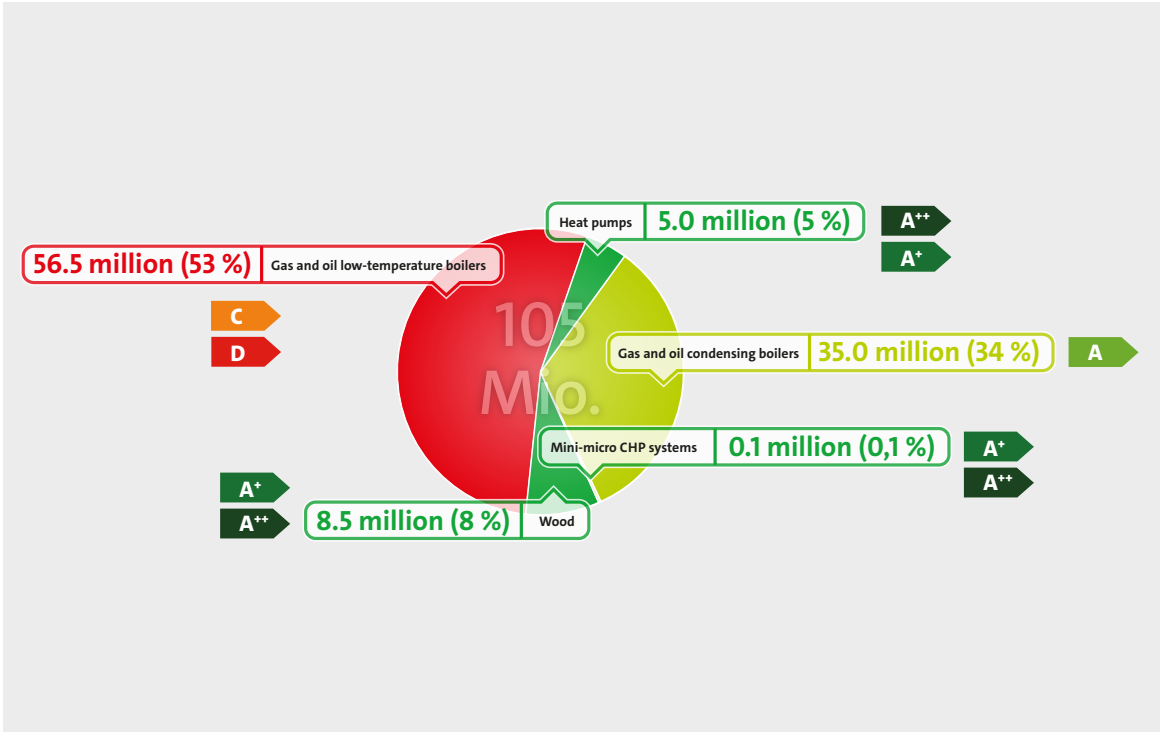
In May 2022, the European Commission presented its strategy for transforming the European energy system with the REpowerEU plan. With this plan, the Commission is pursuing two main goals: to reduce or end the EU's dependence on Russian energy imports and to guarantee the achievement of ambitious climate protection goals. According to the Commission, this plan is also intended as a response to the disruption of global energy markets caused by Russia's invasion of Ukraine.

As one of Europe's largest energy consumption sectors, the heating market naturally plays a key role in the implementation of REPowerEU and the goals of Fit-for-55, a package of directives that will help the EU save at least 55 % CO_2 by 2030, leading to climate neutrality in 2050.

There are 105 million heating systems installed in the EU, of which almost 90% are based on the fossil fuels natural gas and heating oil. More than half of these systems are not state of the art and do not use renewable energies. The BDH and our European umbrella organisation, the Association of the European Heating Industry (EHI), are committed to a technology-neutral strategy for tapping the immense energy-saving and CO_2-reduction potential that arises from the replacement of outdated technology and the integration of renewable energies. The European heating industry welcomes the intention of the European Commission to strive for a stronger electrification of the heating market. In this context, however, EHI and BDH demand not to follow a pure electrification strategy, but to also rely on molecular green energy sources. Corresponding technological innovations enable the increasing use of these CO_2-free and -neutral energy sources. EHI and BDH reject constraints or bans on individual technologies or energy sources.

Part of the European strategy focuses on the rapid energetic improvement of the standards of existing buildings in Europe. This is to be done via "Minimum Energy Performance Standards" (MEPS) within the framework of the EPBD (Energy Performance of Buildings Directive), up to the achievement of "Zero Energy Building" (ZEB) standards by 2050. A socially balanced, technologically coherent and technologically open strategy is needed here if this ambitious project of the Commission is to actually succeed and find acceptance in the member states and their populations.

In the context of the stronger electrification of the building sector and the simultaneously aspired increasing electrification of mobility, a careful assessment of the risks arising for the future energy system and in particular for the European electricity grid is required. EHI and BDH therefore advocate for corresponding precautions in



Source: BDH, Association of the European Heating Industry (EHI)

The European installations in 2019

Technologie- und Energie-Forum
Technology and Energy Panel

The BDH and its partners provide answers to the energy and climate policy questions of the present and future

load management as well as an increase in the production of green electricity in order to be able to balance and cover the demands.

These European initiatives are accompanied by an increasing electrification of the heating market, among others, the more consistent use of renewable energies and the increased use of green gases, green fuels, green electricity and green biomass. During this rapid transformation process, the ISH will in turn present the technical solutions “Made in Germany and Europe” as well as strategies for replacing the various energy sources in the heating market with CO_2-free alternatives. Digitalisation, energy management and sector coupling between heat and mobility in buildings show further potential for making Europe’s energy system future-proof and resilient at the same time.

The Hotspot Energy event and the corresponding Technology and Energy Panel organised by the BDH and Messe Frankfurt, together with 16 strong partner associations from industry, the service sector and the energy industry, address the energy and climate policy issues of the present and the future at European, global and German level.

Energy policy agenda in Germany

Last year was politically very eventful for the heating market. Starting with the coalition agreement after the parliamentary elections and the plan declared in this to introduce a new requirement for newly installed heating systems from the year 2025 to incorporate 65 percent renewable energies. The declaration of intent in the coalition agreement already caused considerable need for discussion. With the onset of the energy crisis in November/December 2021 and Russia's war of aggression against Ukraine, the pace of political initiatives has increased significantly.

Amendment of the Building Energy Act

For example, as part of the so-called second relief package, the coalition committee decided on 23 March 2022 that the agreement from the coalition agreement for the amendment of the Building Energy Act, according to which 65 percent renewable energy should be used in every newly installed heating system as far as possible from 2025, should be moved forward to 2024.

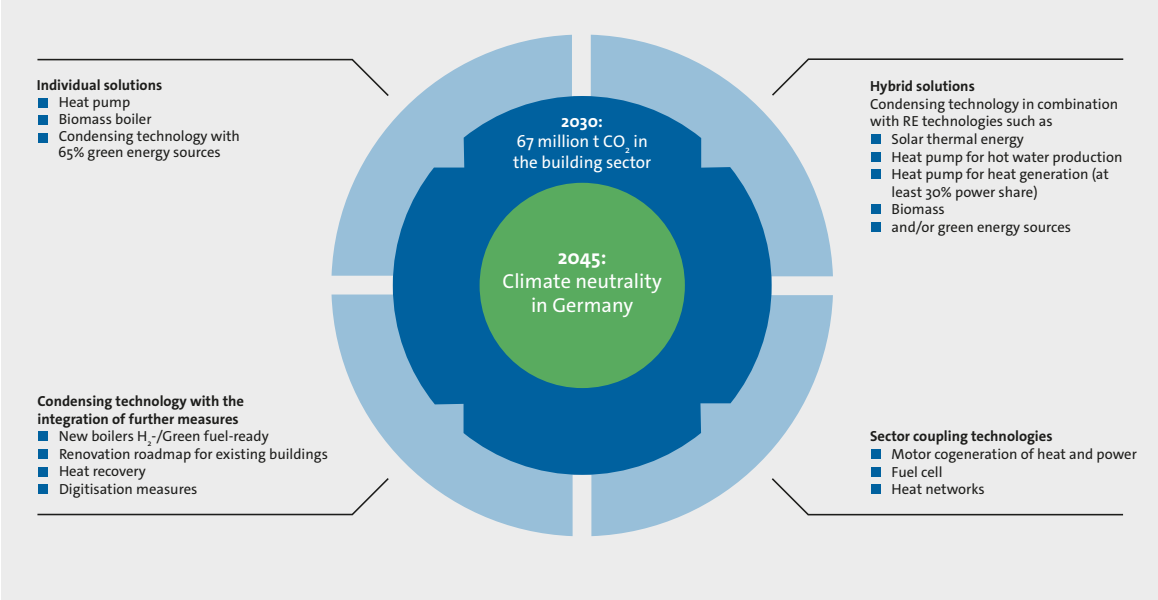
After an initial concept paper was consulted with the associations in the middle of last year, the ministries in charge are currently working on the text of the amendment. Contrary to expectations, no agreement could be reached last year. Currently, the schedule of the Ministry of Economy and Climate envisages bringing a bill to the cabinet in March and reaching the parliament before the summer break.

The bill is of considerable importance not only for the future regulatory requirements for new and existing buildings, but also for the funding under the Federal Funding for Efficient Buildings programme (BEG). The latter is to be adapted accordingly to the new requirement. In the view of the BDH, all technical solutions must be recognised as equally valid for the fulfilment of the obligation to use renewable energies in the definition of the new requirement for the integration of 65 percent renewable energies (see chart). Only with the entire range of technical solutions can the ambitious climate protection targets for the heating market set by the German government be achieved.

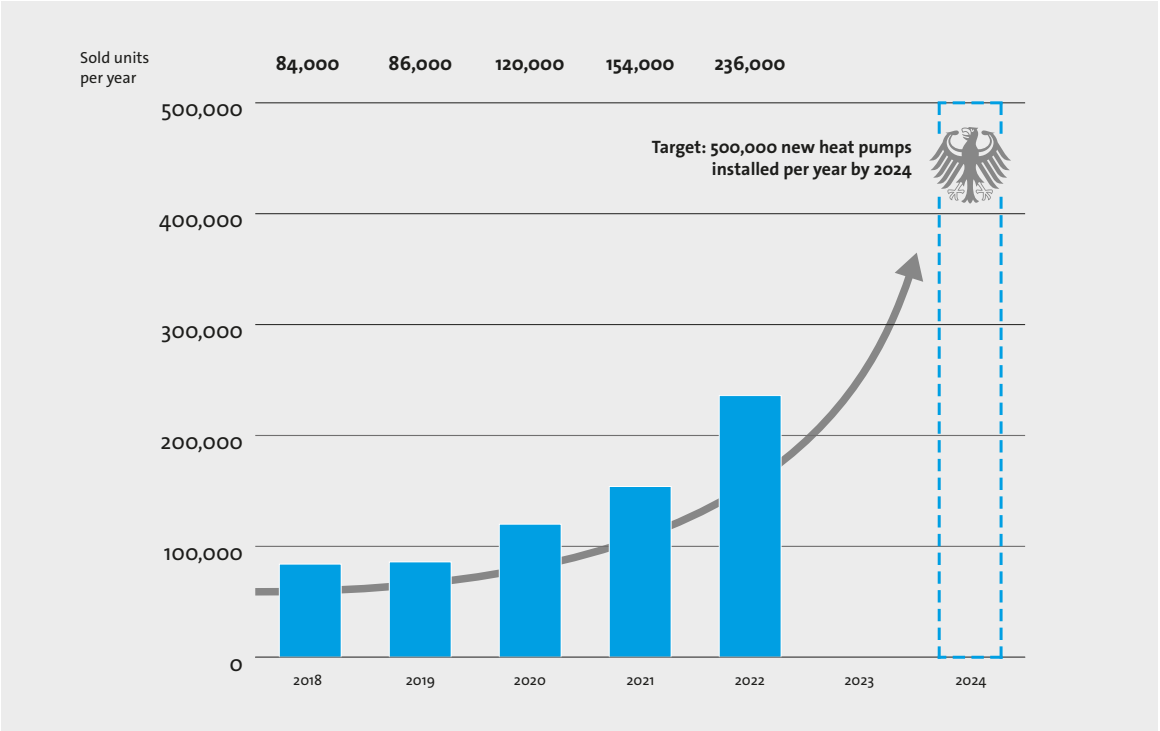
These solutions include individual solutions such as the water-operated Heat pump or hybrid solutions, heat generators for the use of green gaseous, liquid or wood-based energy sources, sector coupling technologies such as the fuel cell and the use of further solutions such as solar thermal energy, domestic ventilation with heat recovery or further digitalisation measures. In the amended law, technical feasibility and social compatibility must also be given due consideration in the new specifications.

Heat pump summit

Also in the wake of the war in Ukraine and against the backdrop of the general discussion about Germany's dependence on Russian natural gas imports, the Ministry for Economic Affairs and the Ministry for Building jointly invited participants to two heat pump summits last year.



Comprehensive toolbox to achieve the climate targets



Source: Federation of German Heating Industry (BDH) / German Heat Pump Association (BWP)

Market development of heat pumps in Germany

At these heat pump summits, the ministries presented, among other things, a joint declaration of intent signed by the summit participants.

The joint declaration sets out the goal of taking all measures and providing support to bring 500,000 heat pumps onto the market annually by 2025. Against the background of the existing capacities in the trade and also the availability of preliminary products due to the strained international supply chains, this target is to be regarded as ambitious. The German heating industry is investing considerable sums in the expansion of production capacities as well as training measures for the specialised trade and is thus living up to its responsibility for achieving the ambitious target.

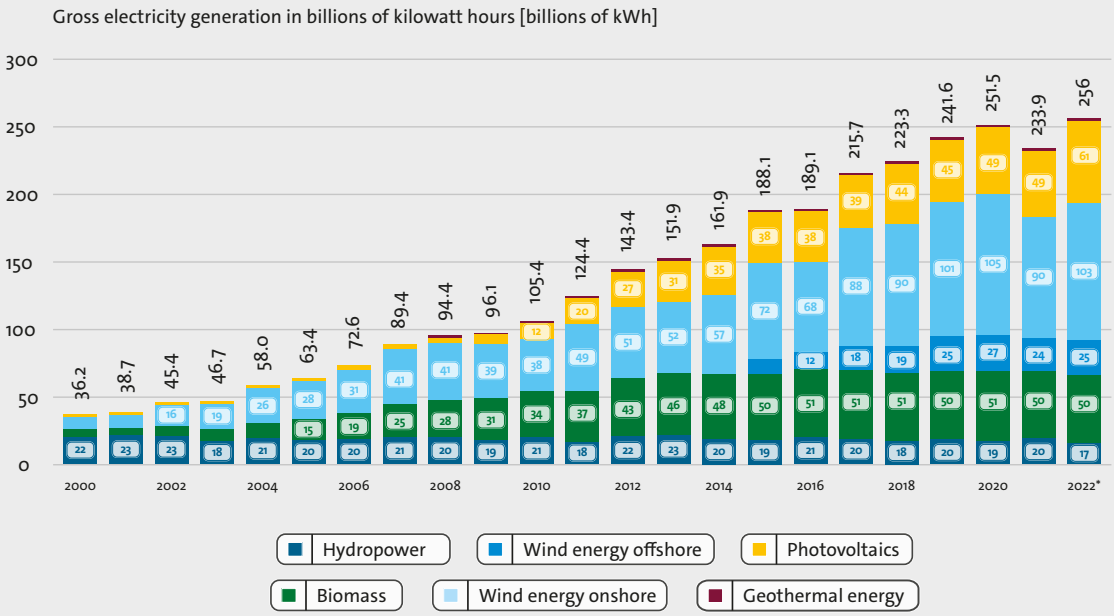
The ministries' initiative is an ongoing process with further planned working meetings of the companies and associations concerned and also plans for further summit meetings this year. Meanwhile, the number of heat pumps sold in Germany in 2022 showed a very dynamic development. With an increase of 53 percent over the previous year to a total of 236,000 units, this heating technology performed much better than in previous years.

The BDH took a clear position in the final declaration of the first heat pump summit. The build-up of necessary production capacities for the installation target of 500,000 heat pumps is being driven forward by the manufacturers. The high investments of the manufacturers require the implementation of the so-called super depreciations announced in the coalition agreement. At the same time, the existing problems of the global supply chains as well as the bottlenecks in the supplier sector must be taken into account. Last but not least, existing distortions of competition due to existing subsidy measures, such as those in the United States, must be addressed and, in addition, existing bottlenecks in the electricity system, such as the overloaded distribution grids, must be solved.

Outlook for 2023

The current year continues to be dominated by Russia's war of aggression in Ukraine and the associated energy policy challenges. The project to fundamentally amend the Building Energy Act – both to introduce the new requirements for integrating renewable energies and the necessary changes based on the new regulations of the European Buildings Directive – will have the greatest significance for the heating market, along with the associated possible changes to the funding landscape. The market for heat generators was also characterised by slight growth last year despite the uncertainties, not least due to the positive influence of the BAFA subsidy. In order to maintain the necessary pace of heating modernisation, the federal government must abandon the principle that only those measures are subsidised that are not required by law. This is the only way to realise the ambitious climate policy goals in the heating market.

Green electricity as an energy source for CO_2 neutrality



Source: Federal Environment Agency on the basis of the Working Group on Renewable Energies (AGEE-Stat).

Gross electricity generation from renewable energies in Germany

Sector coupling brings green electricity into new fields of application

In the future, most of our energy will be generated as green electricity from renewable sources. This also changes a lot for the energy supply of transport and heat generation, because these sectors have so far relied almost exclusively on fossil fuels.

A large part of the electricity will be used directly in electrified applications – such as electric vehicles and heat pumps – without conversion processes. This is what we call “sector coupling”, a growing together of electricity, transport and heat. We see the great importance of electrified applications in the rapidly increasing sales of heat pumps and electric vehicles.

Digitalisation enables integration of renewables

With the increasing share of solar and wind in electricity generation, however, it is becoming more and more difficult to integrate their natural volatility into the electricity system.

This is exacerbated by the fact that renewable electricity generation – in contrast to fossil-based generation – is distributed among a large number of smaller plants. In practice, this means that a large number of volatile generation plants must be coordinated with a consumption side whose electricity demand is increasing significantly due to new electrified applications – such as electric cars and heat pumps. This coordination task did not exist to the same extent in the past; it is only emerging due to the central role of green electricity from renewable sources. This can only be solved through the digital networking of the energy system. Digitalisation creates the possibility to coordinate the multitude of plants with each other and is thus a necessary, central component of the energy transition.

However, the digitalisation of the energy system also enables us to use completely new methods in sector coupling. The electrified applications for heat and transport often have a high degree of flexibility. They do not necessarily have to absorb energy at the time of use. For an electric car, it is often not crucial when it is charged, as long as it is ready to drive when the customer needs it. A heat pump can also be flexible in the timing of electric-

ity consumption by using the thermal storage capacity of the building or a buffer storage tank. The smart use of this flexibility can alleviate bottlenecks in the availability of volatile renewable electricity and also in the transport capability of the electricity grids. This is another necessary tool for the integration of volatile renewable sources.

Molecular energy carriers

New requirements for energy storage also arise from the use of green electricity. Unlike fossil fuels, electricity can only be stored in a complex and expensive way. However, due to the volatility of generation capacities and the seasonal load profile of heat generation, both short-term (day/night) and long-term (summer/winter) storage of green energy is imperative. It is now a consensus that we also need molecular energy sources for storage and transport: for example, green hydrogen generated from electricity and derivatives based on it.

The central importance of green electricity as an energy source for CO_2 neutrality thus leads to three important trends that will determine the development of the next few years: the electrification of applications, the digitalisation of the energy system and the use of hydrogen-based molecular energy carriers.

Electricity from renewable energies can be stored by using it to produce green hydrogen

Digitalisation creates the possibility of coordinating volatile generation plants with the consumption side

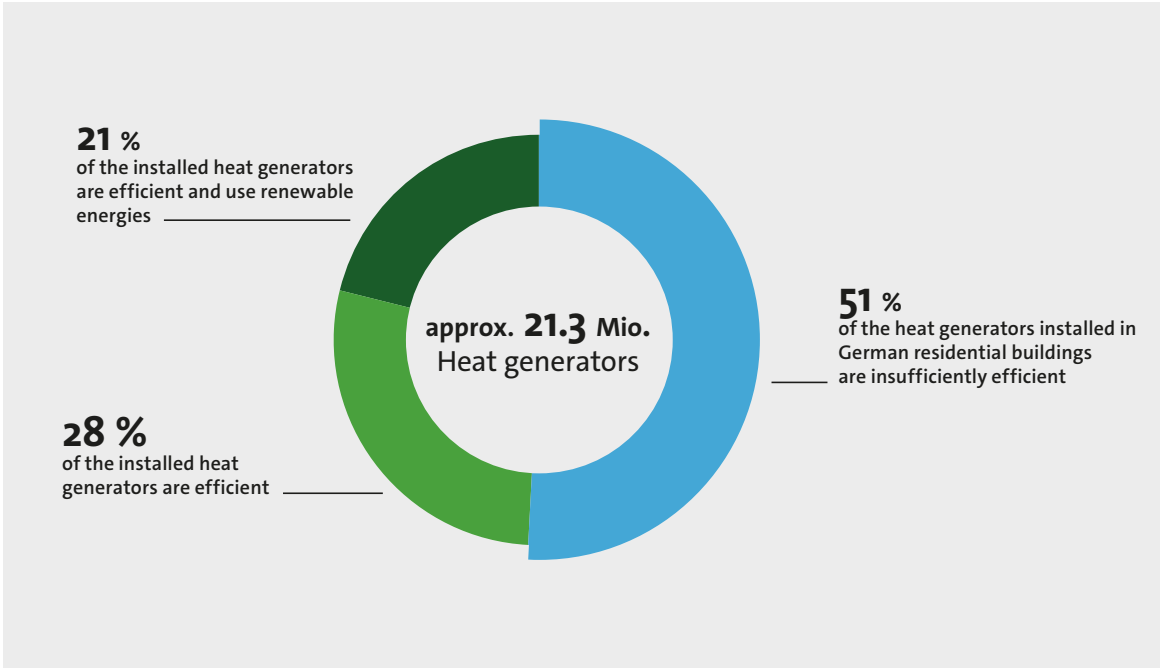
Gas goes green

Gas: Germany's most utilised heat source

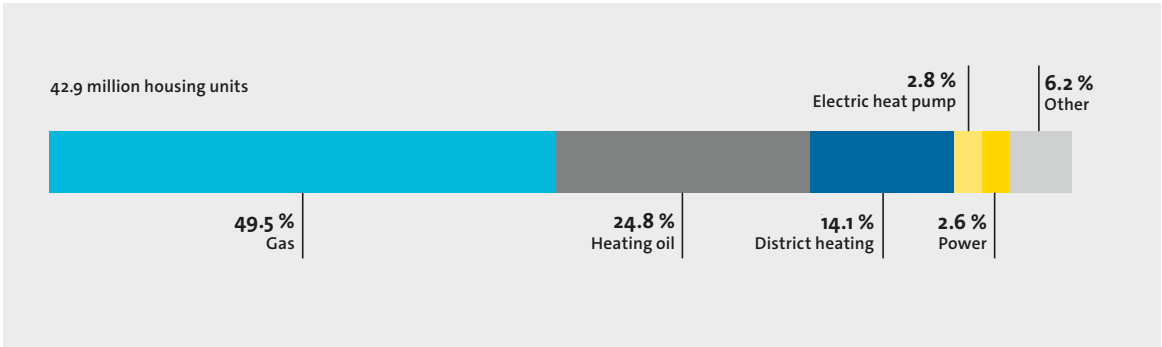
Natural gas is considered the most climate-friendly conventional energy source, because its combustion produces almost no particulate matter and significantly less CO_2 than other conventional energy sources. If methane is produced regeneratively, for example in the form of biogas, it is even largely climate-neutral. Gas can be combined with solar energy, biomass or heat pumps in a variety of applications. This makes the energy source an ideal partner for renewable energies and an integral part of efficient solutions for more climate protection in the heating sector as well. Gas heating systems are the most popular heat generators and are widely used in the German heating stock.

Climate protection thanks to efficient gas technologies

The heat supply in buildings accounts for more than 50 percent of the total energy demand in Germany. For space heating, private households mainly use gas as an energy source, because modern gas heating systems are economical and climate-friendly, especially in existing buildings. For example, a gas heating system emits up to 40 % less CO_2 emissions than an old oil heating system. Since 1990, carbon dioxide emissions in the German heating market have been almost halved – partly because many old heating systems have been converted to modern gas condensing technology.



More than half of the heat generators in Germany are inefficient



Gas makes a significant contribution to heating residential buildings in Germany

Feeding biogas into the grid has a major effect on reducing emissions in the heating market in the short term

A variety of innovative gas technologies, such as gas hybrid heating technology or hydrogen-powered fuel cells, are available on the market. These can be operated with climate-neutral gases and can be combined with renewable energies. Thus, gas heating remains an investment for the future. German heating appliance manufacturers have also committed to equipping all new condensing boilers for hydrogen conversion (H_2-ready) from 2025. This will make it possible to use 100 percent of the climate-neutral energy source with little effort if required at a later date. The German gas grid is also already largely capable of transporting hydrogen.

Goal: climate neutrality in the heating market

The gas industry is committed to the climate goals of the German government and is working together towards the goal of a future nationwide supply of decarbonised and green gas, such as biogas and hydrogen.

Feeding biogas into the gas grid in particular has a major effect on reducing emissions in the heating market in the short term. Around half of the dwellings in Germany were built during reconstruction after 1945 and thus before the introduction of energy efficiency regulations. Many of these dwellings can only be renovated at great expense so that they are suitable for the use of Heat pumps. Here, gaseous energy sources will continue to provide reliable heat for many years to come.

This is because the annual renewal rate of heating systems has also been stagnating at around three percent for a long time. Renewing all heating systems in Germany to the current state of the art would take 33 years at this rate. At the same time, heating systems are considered to be in need of modernisation after 20 years at the latest.

However, the increased use of biogas and later hydrogen will make it possible to supply the existing stock in an increasingly climate-neutral way via the existing connection. The gas industry thus supports the heat transition without overburdening homeowners and tenants financially with high acquisition costs for a new heating system and the associated renovation costs. The ongoing transformation towards green gas also contributes to the further decarbonisation of heating networks: Gas-fired cogeneration of heat and power and combined heat and power plants already ensure climate-friendly local and district heating and stand for municipal heating planning that is oriented towards climate protection.

The gas industry's goal is the nationwide provision of decarbonised and green gas

Heating with innovative liquid energy sources

Green Fuels: Partners in the heating transition

The building sector plays an important role in climate protection in Germany, as it is responsible for around a quarter of total CO_2 emissions. The German federal government's Climate Protection Emergency Programme stipulates that as early as 1 January 2024, every newly installed heating system is to be powered by 65 percent renewable energies. This requirement is an essential step on the way to a climate-neutral building stock from 2045, by which time the use of fossil fuels in buildings is to have been completely phased out.

This also applies to the approximately 5.2 million oil-fired heating systems in Germany. Most of them are in detached and semi-detached houses in rural regions or on the outskirts of conurbations. Around three million of the oil-heated buildings are located away from the gas and heating networks. For technical or financial reasons, it may make sense or be necessary to choose an efficient heating system with renewable liquid fuels instead of switching to an electric heat pump, for example, when modernising the heating system.

Green Fuels enable the path to a climate-neutral future. This is shown by numerous practical examples where efficient condensing boilers are already being operated with greenhouse gas-reduced heating oil. At the same time, energy savings through building insulation make sense in order to further reduce fuel demand. Condensing boilers are particularly economical in combination with solar systems or electric heat pumps as hybrid solutions. Here, the energy reserve in the tank ensures that peak loads are covered on cold days and provides a reliable CO_2-neutral heat supply. Modern tank systems ensure safe storage and can be adapted to lower consumption in a space-saving way.

The energy stock in the tank ensures a reliable heat supply

Green Fuels can replace fossil fuel oil in the long term

What are Green Fuels?

Green Fuels are alternative liquid fuels that can replace fossil heating oil in the long term. An important criterion in the development of the new fuels was therefore their drop-in capability, so that they can be added to heating oil in increasing proportions of up to 100 percent. Their use is considered CO_2-neutral, since the amount of CO_2 taken out of the atmosphere during their production is later released during their combustion. In the overall balance, therefore, no additional CO_2 is produced. Such closed carbon cycles are created by using bio-based waste and residual materials in their production, for example. Another option are so-called e-fuels. These are produced synthetically from green hydrogen, i.e. hydrogen produced with renewable electricity, and "recycled" CO_2. As storable energy sources, green fuels will also be able to play an important role in the future energy mix in combination with fluctuating wind and solar power.

Green Fuels Ready label brings clarity: heating technology is fit for a future with alternative liquid fuels

The Green Fuels Ready label distinguishes heating systems, tanks and components that can be operated with up to 100 percent greenhouse gas-neutral liquid fuels, i.e. also in mixtures with fossil liquid fuels. The label was created by the BDH in cooperation with en2x – Economic Association for Fuels and Energy. With it, heating appliance manufacturers show that the technology for alternative fuels is ready for use. The label thus offers heating customers valuable orientation when deciding on a sustainable investment. All technical information on the label can be found in the BDH information sheet number 50.

Wood – the great renewable energy

Wood energy makes a large contribution to the decarbonisation of the heating market in some countries of the European Union. These include the core countries Germany and Austria with a share of wood energy in final energy consumption of 6 % and 15 % respectively. Wood energy also plays an important role in Central and Eastern Europe, Scandinavia and parts of France and Italy.

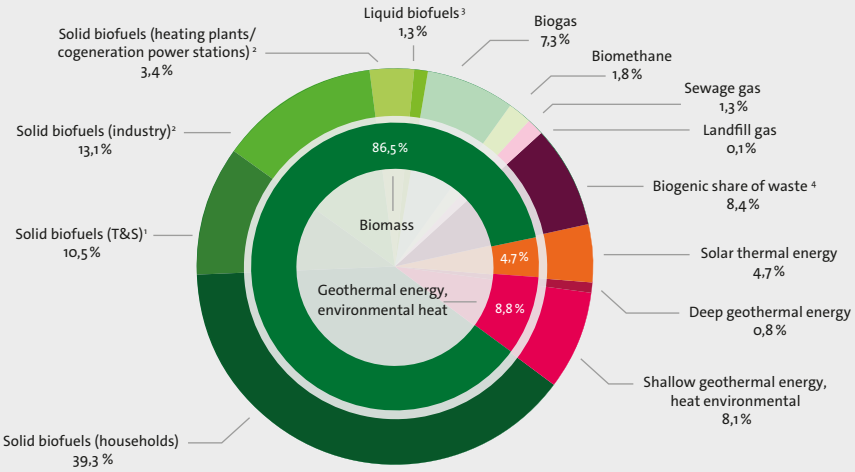
www.holzwaerme.info (website in German)

In Germany and Austria, the resources for thermal utilisation come from local forests. These are so-called residual woods. The sustainable management of forests prescribed by law in both Germany and Austria not only ensures their preservation, but has also led to a net growth of about 3 % per year in recent years. The sensible material use, especially of coniferous wood, and the thermal use, especially for heating buildings, form two sides of the same coin here. The timber industry in both countries has excellent know-how to ensure sustainability.

The example of Germany shows the dimension of wood energy: at 130 TWh, it accounts for a good 6 % of Germany's final energy consumption. 70 TWh of this is accounted for by the building sector, 60 TWh by the industrial and larger capacity sector. In the building sector, wood heat provides more than 70 % of all renewable energy.

About 30 percent of Germany is forested, which corresponds to an area of about 11 million hectares. The wood obtained here substitutes fossil fuels, which usually have to be imported. The resulting CO_2 savings are an important contribution to achieving the climate goals in the building sector.

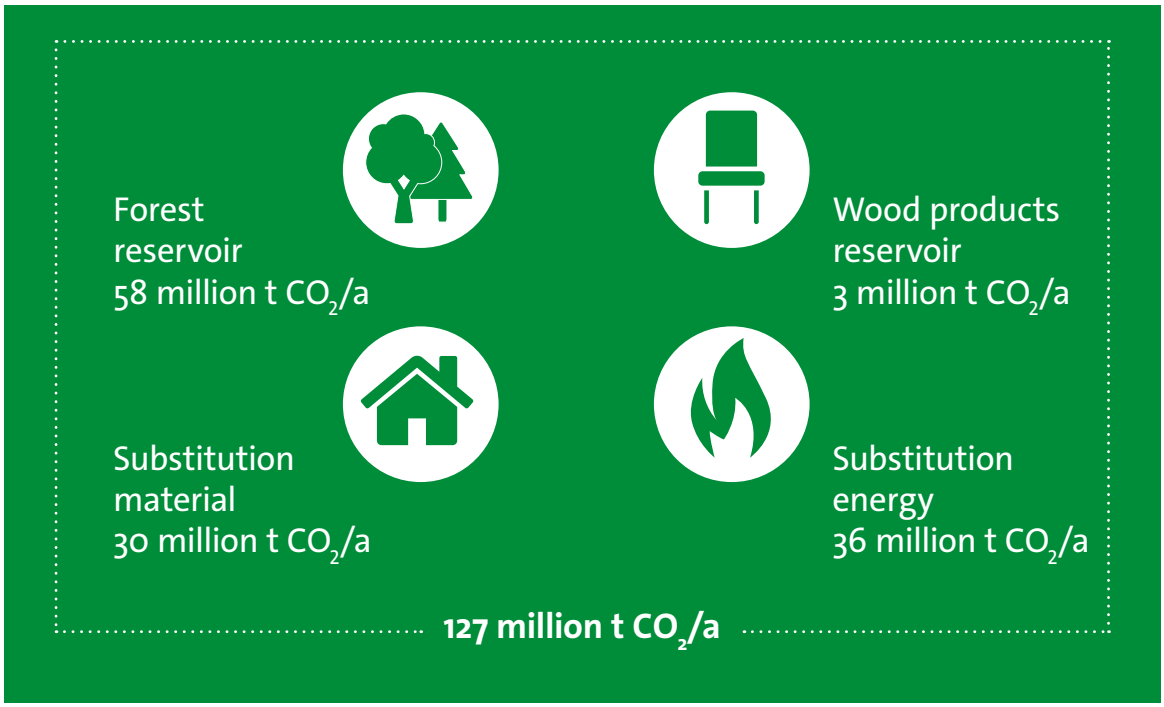
Pellets with a volume of approx. 3 million tonnes per year are available as wood-based energy sources. In addition, there are split logs with approx. 15 million tonnes and wood chips, which are generally used in larger plants. The



[1] T&S = trade and services; [2] incl. sewage sludge and charcoal; [3] incl. biofuel consumption for agriculture, forestry, construction and the military;
[4] Biogenic share of waste in waste incineration plants is set at 50 %

BMWi on the basis of Working Group on Renewable Energies Statistics (AGEE-Stat); as of: December 2020

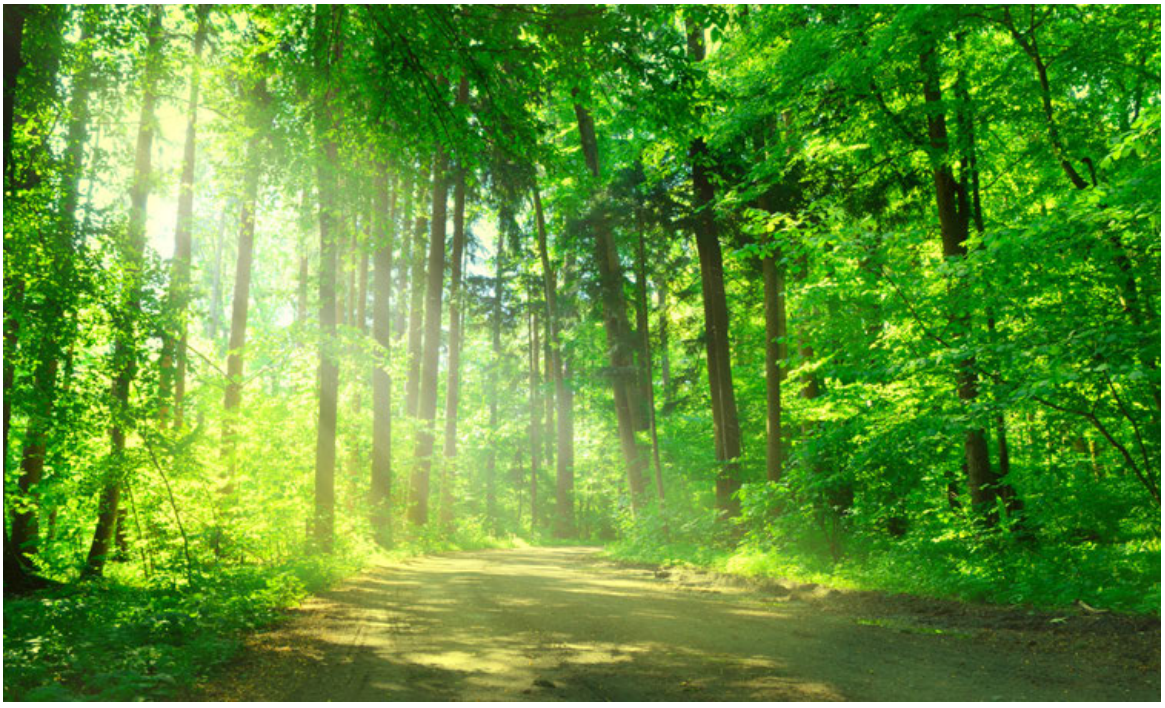
Final energy consumption of renewable energies for heating and cooling in Germany in 2019 (total: 181.7 billion kilowatt hours)



Total carbon effect of forest and wood

thermal use of wood, using the three energy sources mentioned, is fed from residual wood that accumulates in sawmills or is taken from the forest in a sustainable manner during thinning.

In Germany there are a total of 11 million individual fireplaces, of which a good 70 % are outdated. In addition, there are about 1.1 million wood-fired central heating systems, most of which are also obsolete. The BDH and its partners in the Technology and Energy Panel are pursuing the strategy of replacing the obsolete stock as quickly as possible with systems that comply with the second stage of the Federal Immission Control Act (1st BImSchV, stage 2). To this end, the associations call for suitable incentives and an improvement in the enforcement of the 1st BImSchV, stage 2. This rapid replacement of the outdated technology would succeed in significantly further reducing particulate emissions on the one hand and at the same time halving the fuel requirement through efficiency improvements.



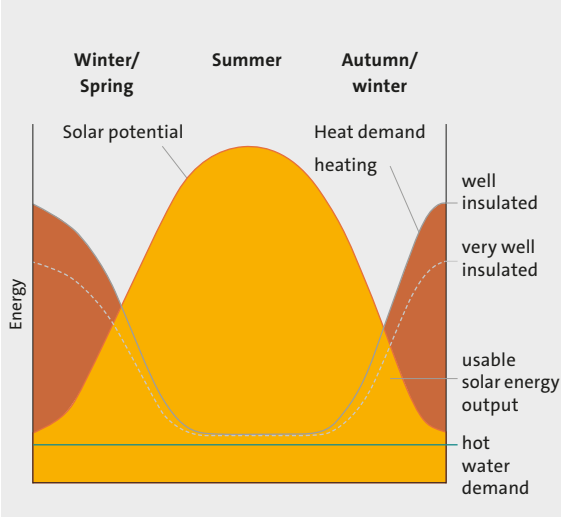
About 30 % of Germany is forested

Solar thermal energy and geothermal/ environmental heat

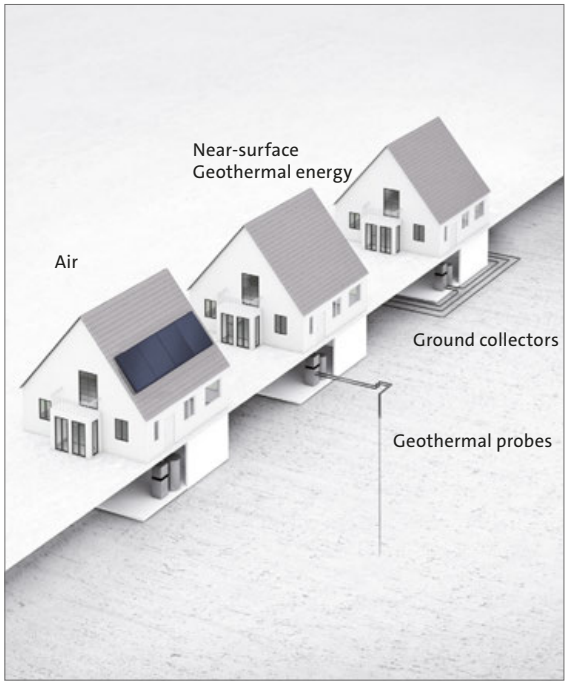
Solar thermal systems are mainly used for domestic hot water heating, backup heating or swimming pool heating. In Germany, approx. 60 % of the annual domestic hot water demand of a single-family house can be heated by solar thermal systems with typical system dimensioning. Depending on the design and insulation of the building, solar systems that support the heating system cover 20 to 30 % of the total heat demand, and in passive houses even up to 100 %.

Especially in the summer months, a modern solar thermal system can cover the entire domestic hot water and heat demand of a house. The heating system remains off during this time. Solar energy for the heating market can optimally support all primary heat generators on the market. In addition to domestic hot water heating and backup heating, other possible applications for solar thermal energy include air conditioning and process heat, as well as the provision of district and local heating.

The use of near-surface geothermal energy and environmental heat is one of the keys to the heating transition. Brine-water, water-water or air-water heat pumps are usually used, which draw up to 80 % of the energy for heating and hot water from the ground or the air and require the remaining 20 % in the form of electrical drive energy. The “greener” the electricity, the more environmentally friendly, i.e. CO_2-free, the heat pump can be operated. In addition to providing the required heating energy for space heating, heat pumps can also be used for domestic hot water heating and for cooling or lowering the room temperature in summer.



Usable solar heat of a solar thermal system in Germany over the course of the year



Different sources of near-surface geothermal energy and environmental heat

The use of near-surface geothermal energy and environmental heat via heat pump systems can also be optimally used for sector coupling and “Power to Heat” applications. In this concept, the amount of electricity generated by wind turbines and photovoltaic systems is used for thermal storage in the form of heat. The consumption of the energy can be adapted to the electricity generation with the smart grid-capable heat pump. As switchable and controllable systems, they can smooth regional power peaks in electricity generation and store environmental energy in the form of heat.

Heat pumps can also be used as part of heat grids to supply entire neighbourhoods. In cold local heating networks, the buildings receive a house connection, similar to classic district heating, which is used to supply heat to the buildings. However, cold heating networks operate at much lower temperatures (below 30 °C). The temperature level required for heating and domestic hot water is raised by a heat pump in the building. The actual heat source (e.g. groundwater, waste heat from sewage or industry, etc.) is located elsewhere.

District and local heating

District and local heating concepts have potentially positive characteristics in terms of climate and resource protection. This is especially true if the generation of district or local heat has a favourable CO_2 balance and the losses during heat transfer are reduced to a minimum through the appropriate design and application of suitable technologies.

However, some district heating networks are operated with fossil fuels, especially coal. Here, the aim must be to switch to low-CO_2 or CO_2-free alternatives in order to achieve the climate protection goals. These include the use of otherwise unusable waste heat from industrial processes and the use of low-CO_2 or CO_2-free fuels.

Local heating concepts usually have lower losses. For this purpose, local heating concepts at the current state of the art can, for example, be supplied with wood chips, i.e. CO_2-neutral solid biomass. Furthermore, solar thermal systems and heat pumps feed heat into local heating systems. Local and district heating concepts in particular play an important role in the municipal heating planning that is envisaged politically.

BDH member companies supply central components for local and district heating networks, such as the heat generators (also cogeneration of heat and power), components of the distribution networks and heat transfer stations, as well as all other hydraulic components downstream of the heat transfer station. Furthermore, the heat transfer stations are also an integral part of the transfer of district heating to the residential property or heat generation in non-residential buildings.

In terms of regulatory policy, the BDH advocates fair competition between centralised supply via local and district heating on the one hand and decentralised supply technology on the other. If district heating and/or local heating is cost-competitive, the BDH sees this as a suitable solution. On the other hand, the BDH rejects compulsory use as well as over-subsidisation of district and local heating.

Source: Allianz Freie Wärme

If the heat is produced in a climate-friendly way, district and local heating networks can make a contribution to climate protection.

Heating as a system

Building planning and system selection

Buildings are to be regarded as integral structures. All components (building envelope, windows and system technology) must be optimally matched to the functions to be fulfilled (heating, cooling, domestic hot water heating as well as ventilation and air conditioning).

The technology can only achieve its maximum efficiency as a system. In addition, the coupling with other sectors as well as digitalisation must be included in the consideration.

To ensure that efficiency is maintained over the technical service life, an annual inspection and needs-based maintenance of the components is recommended. Furthermore, in the case of larger properties, system or building monitoring can also contribute to maintaining efficiency.

The choice of system depends on the general conditions: Legal requirements, heat load, intended use, user behaviour and the preferences of the building owners. If cooling is also to be implemented in summer, the cooling load must be calculated and taken into account accordingly.

Heat generator – distribution – transfer – storage

Heat generation and heat storage

Heat generation is the starting point for the operation of the heating system. Heat pumps, biomass boilers, gas boilers, oil boilers and cogeneration of heat and power are currently used. In addition, solar thermal energy can be coupled into all systems.

Because the energy provided by the heat generator is not used 100 % immediately, the installation of a storage tank is helpful. This tank enables the supply of hot drinking water and heat with a temporal offset between demand and supply.

In addition to individual heat generators, a combination of several heat generators is also considered (so-called “hybrid systems”). In this way, the strengths of the individual product are utilised through optimised interaction for more efficient operation.

Heat distribution

The heat distribution forms the link between the heat generator/storage and the heat transfer. In addition to the pipework, the heat distribution system includes the heating circulation pumps, the flow and return of the hydraulic heating system as well as the fittings and control devices.

For the correct dimensioning of the pipe cross-sections, a pipe network calculation must be carried out as part of the system planning. The result serves as the setting value for the control fittings. In addition, the pipelines must be properly insulated to avoid uncontrollable energy losses. When insulating, thermal and sound bridges must be avoided.

Optimised heat distribution includes hydraulic balancing. The details of hydraulic balancing are laid down in the DIN 94679 series of standards “Hydraulic systems in heating, cooling and ventilation installations”.

Since 2015, only high-efficiency pumps are used as heating circulation pumps. These have a high degree of efficiency and adapt continuously to the performance requirements.

The room temperature is controlled with thermostatic valves or smart, time-controlled regulators. Through digitalisation, control and communication devices can be controlled from outside, e.g. via smartphone, and enable the interaction of all components. This not only enables user-specific control, but can also lead to energy savings.

Heat transfer

The heat transfer is the link between the heat distribution and the user. Surface heating or radiators are available as heat transfer systems. If desired, these can also be combined. Low system temperatures are the prerequisite for achieving high efficiency in heat generation and integrating renewable energies.

Further components for an efficient heating system are, for example, modern flue gas systems, which ensure safe, clean flue gas discharge and allow low flue gas temperatures and condensate removal.

Efficient heating systems

Modern double-walled container systems made of plastic or steel are available for heating oil storage.

Systems for controlled residential ventilation with heat recovery reduce the energy demand and at the same time ensure the required hygienic air conditions.

The optimised use of modern heating systems should always be seen in coordination with the energy quality of the building envelope.

Heat pump: Important cornerstone of the heating transition

Free environmental energy from air, water and earth

The heat pump harnesses the renewable energy stored in the ground, groundwater or air to generate heat in buildings.

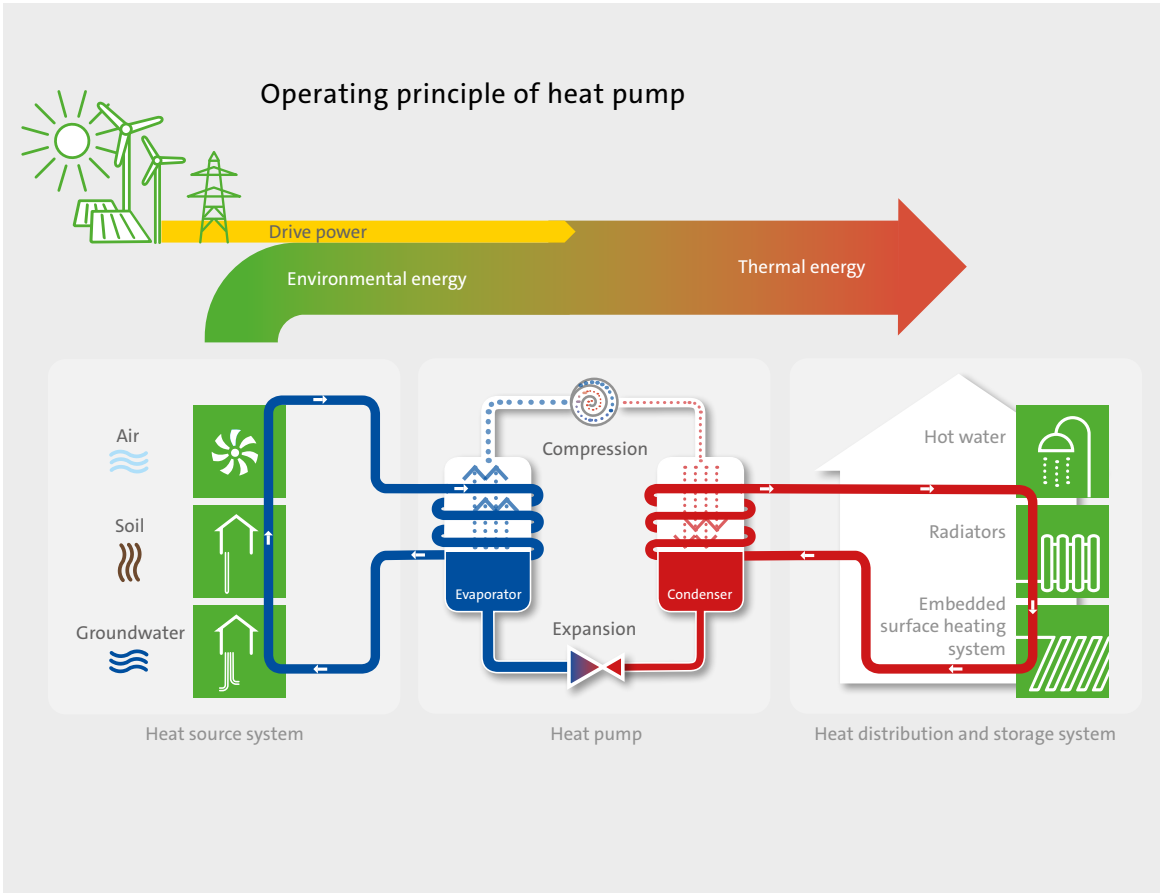
The central element of a heat pump is the cooling circuit. By absorbing environmental heat (e.g. soil, groundwater, air) a refrigerant is evaporated, then the refrigerant vapour is compressed in a compressor. In the process, the pressure and temperature of the refrigerant rise and the heat, brought to a usable temperature level, is transferred to the heating water. This causes the refrigerant to condense, which is then expanded in the expansion valve and the cycle in the refrigeration circuit begins anew. Environmentally friendly natural refrigerants (with low GWP) are increasingly being used in modern heat pumps.

Electric heat pumps require electricity as drive energy and operate very efficiently: a heat pump with a coefficient of performance (COP) of 4.0 generates four kilowatt hours of heat with one kilowatt hour of drive electricity. To ensure that this high efficiency is actually achieved in daily operation, the heat pump must be designed precisely to the individual heat demand and it is recommended to use a heat source with as high and constant a temperature as possible.

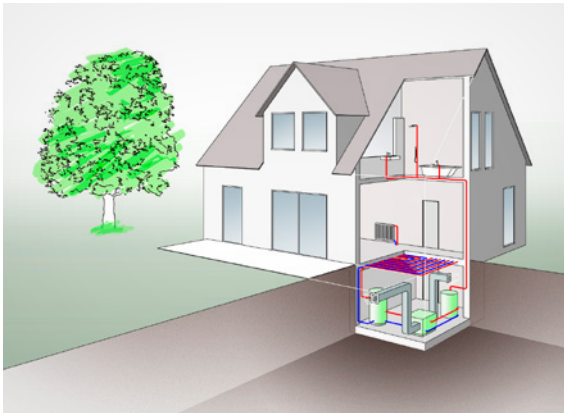
Heating, cooling and ventilation

Heat pumps heat, heat drinking water and can also be used to ventilate and cool a building. Especially in combination with large surfaces for heat transfer and flow temperatures of up to 50 °C, high efficiency and a high level of living comfort are achieved. If heat pumps draw their drive power from renewable sources (e.g. wind power or photovoltaics), they operate emission-free and contribute even more to climate protection.

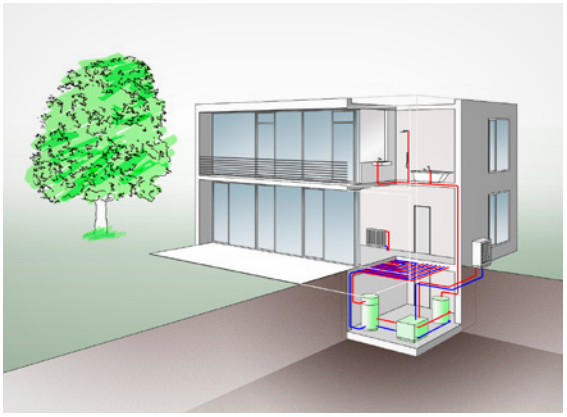
The cooling function of a heat pump can also be used for cooling in summer: The cooling circuit is “passively” or “actively” reversed and the heat extracted from the rooms is released into the ground.



Functional principle of an electrically driven heat pump



Air-water heat pump/monobloc installed indoors



Air-water heat pump installed outside/split system

Brine-water heat pumps

There are two variants of brine heat pumps that use near-surface geothermal energy/geothermal heat: Geothermal probe and ground collector.

Probes use the average ground temperature of approx. 10 °C through boreholes up to 200 m deep. If the free plot size is sufficient, an area collector can also be installed at a depth of approx. 1.5 m. Brine-water heat pumps use “brine”, which circulates in the geothermal probe or in the surface collector, to tap the heat source. Brine-water heat pumps can achieve a COP of up to 5.0.

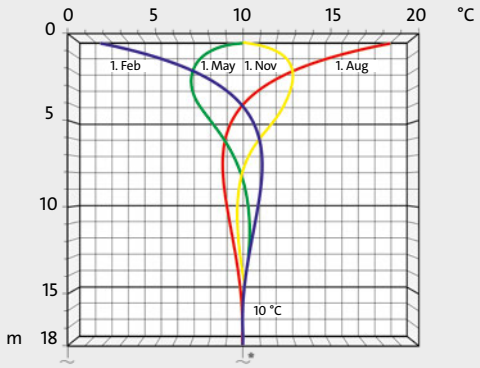
Water-water heat pumps

With the water-water heat pump, heat is extracted from the groundwater or other surface water via a suction well and transferred to the heating system. The cooled water is then returned via an injection well. Water-water heat pumps use the almost uniformly high temperature level of the groundwater of about 10 to 15 °C and achieve coefficients of performance of over 5.0. A permit from the local water authority is required for installation.

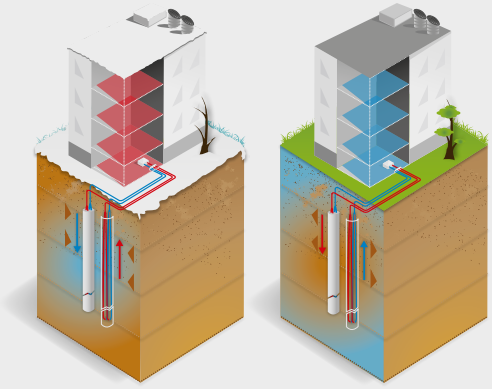
Air-water heat pumps

Air-water heat pumps extract heat from the outdoor air for heating, even at temperatures of -20 °C or lower. The investment in an air-water heat pump is lower because tapping the heat source is not necessary. Installation is possible inside or outside the building, as a monobloc or split system.

However, due to the low outside air temperatures during the heating period, only a COP of 3.0 to 4.0 can be achieved.



Temperature curve for ground-source heat pumps



Heat pump in heating mode (left) and in cooling mode (right)

Condensing technology H_2 and Green Fuels Ready

It is not the technologies that are fossil, but the energy sources. In the discussion about the heating transition, the application technologies are often not defined correctly. For example, they are grouped into fossil and renewable heating systems. Yet it is the respective energy sources used that are either fossil or (proportionately) renewable.

All gas- or liquid-based heating systems can already be operated in a climate-neutral manner today: with biomethane or biofuel oil as the energy source. Ultimately, the CO_2 intensity of the energy carrier – whether gaseous or liquid – is decisive for the CO_2 emissions of the different heating systems.

H_2-ready condensing boilers

In the case of condensing boilers, it would even be possible to achieve completely climate-neutral heat generation by using hydrogen and hydrogen-based fuels. Condensing boilers already available today are often already approved for the use of 20 % hydrogen. The heating industry is currently working on H_2-ready appliances that can be converted to 100 % H_2 and will be available from 2025. In addition, newly installed condensing boilers are again increasingly being used in combination with solar thermal energy. This integrates additional renewable energy.

The "Green Fuels Ready" label identifies systems that can be operated with conventional heating oil and with Green Fuels in any mixing ratio.

H_2-ready in three steps: development of H_2-ready system technology in the heating market

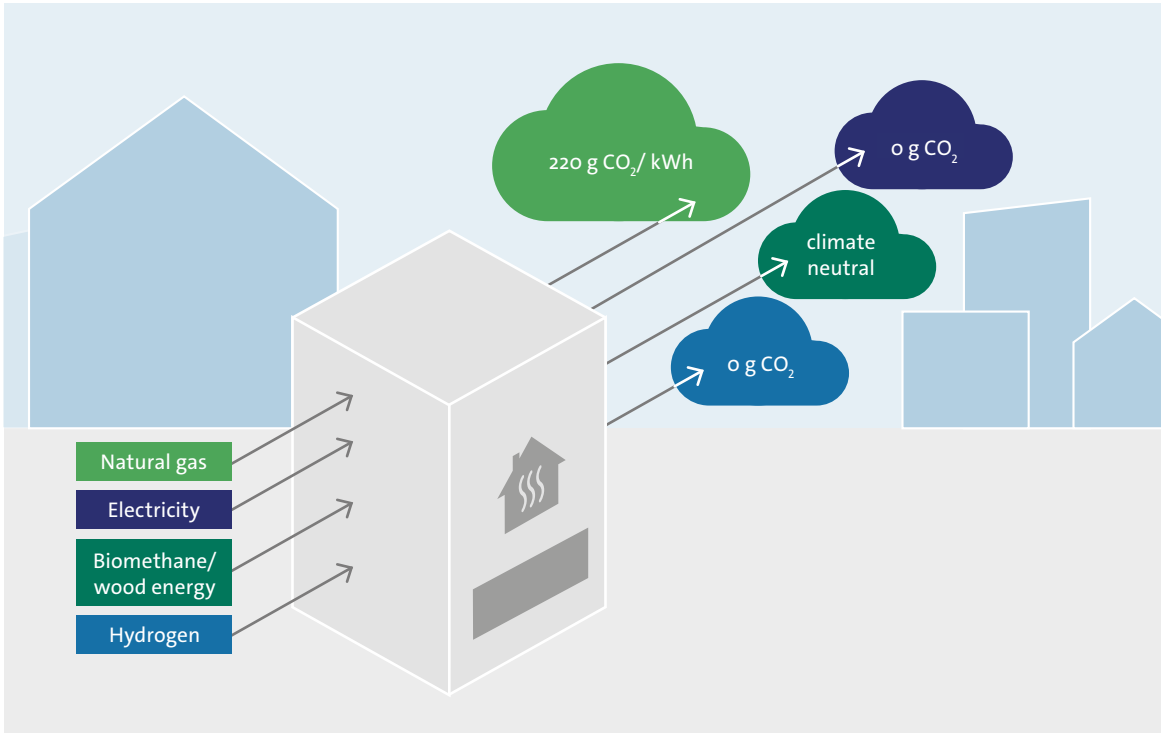
The German heating industry has already developed several options for converting plant technology to the use of hydrogen.

1. Existing appliances built in 1995 or later can easily handle an H_2 admixture of 10 %.
2. All condensing boilers sold since 2020 and provided with a certificate according to DVGW ZP 3100 have a hydrogen compatibility of up to 20 %.
3. From 2025 onwards, new appliances can be converted to 100 % hydrogen at a reasonable expense in terms of time and money. This is ensured by conversion kits, which will be provided by the appliance manufacturers from 2025. The costs for the conversion amount to only a few hundred euros.

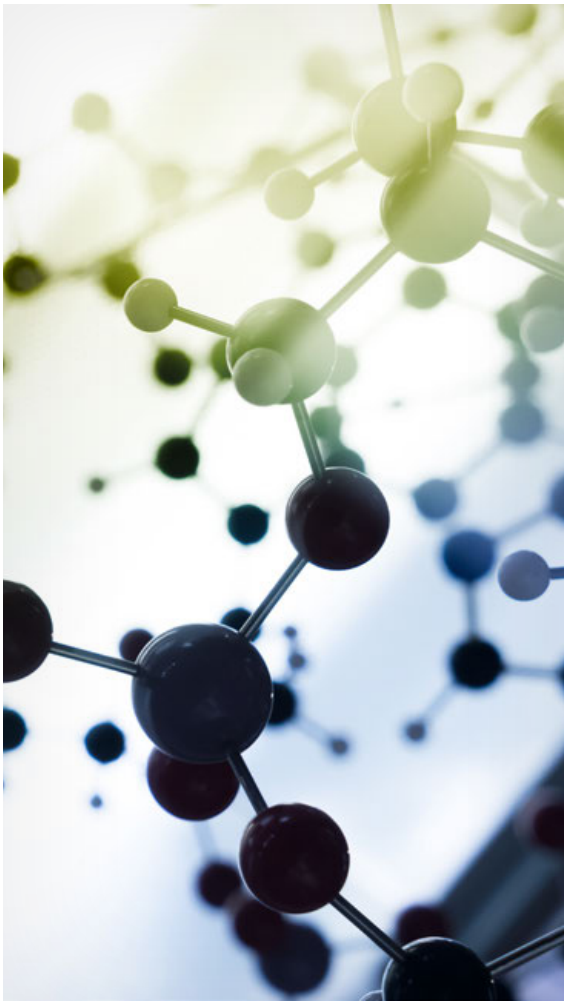
Green Fuels Ready as a signal to customers

In recent years, heating oil has been continuously developed in a targeted manner to meet the increased environmental requirements. To reduce greenhouse gas emissions from the heat supply, liquid fuels can be used that are based on renewable energy (biomass or green electricity) and that are greenhouse gas-reduced or greenhouse gas-neutral due to closed carbon cycles. Depending on the type of energy source and the application technology used, greenhouse gas-reduced/neutral liquid energy sources can be used pure or mixed with mineral heating oil. More precise specifications are given by the respective fuel standards and the manufacturers of the oil heating components.

Alternative fuels can also be used in buildings. Numerous practical examples already show this. Manufacturers of condensing boilers, tanks and other heating components have therefore created a "Green Fuels Ready" product label. The core message behind this is that anyone who buys products such as a heating appliance, a tank and other components of an oil-fired system and makes sure that they bear the new label ensures that these products are suitable for greenhouse gas-neutral liquid fuels (="Green Fuels") and any mixtures with fossil liquid fuels.



An emission value of 0 g CO_2 is also achieved when an oil condensing boiler is converted from heating oil to bio-oil or Green Fuels



Green Fuels enable the storage of renewable energy in chemical form.

Hydrogen produced from renewable sources is one of the decisive building blocks of the heating transition

Modern wood heating technology

In recent years, manufacturers of individual wood-burning stoves, wood-fired central heating systems and heating technology for local heating systems have invested heavily in research and development. As a result, such fireplaces have significantly higher combustion efficiencies than existing systems. At the same time, the particulate emissions of such fireplaces are considerably reduced by new technology and are thus at a much lower level than with the current stock of systems.

Wood-burning and pellet stoves

Around 11 million single room furnaces are in use in Germany. Thanks to combustion technology that has been optimised in recent years and, for example, the room-air-independent air supply via the chimney or the outside wall, modern wood-burning stoves – when operated properly and using suitable fuels – ensure both economical and environmentally sound combustion. Wood-burning and pellet stoves with a collection basin release heat into the heating system for domestic hot water or central heating supplement.

Wood central heating: Pellet, split logs, wood-chip boilers

From detached houses or apartment buildings to commercial properties: Today, modern wood central heating systems flexibly supply buildings of all sizes with heat. In addition to automatic wood central heating systems for wood chips and pellets, there are also manually fed log boilers. What they all have in common is the sophisticated technology and the associated efficient and low-emission combustion. Modern wood central heating boilers feed heat into the heating circuits and buffer/domestic hot water tanks of the central heating system. They achieve high efficiencies. In the case of automatically fed wood central heating systems, the fuel is conveyed from the storage room to the boiler via screw conveyors, pneumatic conveying systems, suction systems or similar technology.

Modern chimney technology

When planning a new or energetically renovated detached house or apartment building, the advantages of using wood heat should not be overlooked, underestimated or sacrificed to cutting corners. In any case, a modern flue gas system is essential in order to be able to use this flexibility and independence.

Ceramic and stainless steel chimneys

Chimneys made of ceramic or stainless steel are suitable for all energy sources such as wood, natural gas, oil and all synthetic or biogenic gas and liquid fuels (biogas, hydrogen, etc.). They offer the necessary quality, durability as well as multifunctional flexibility and they fulfil the different requirements regarding moisture, corrosion, acid and soot fire resistance.

Both materials are suitable across all fuels for use in new buildings as well as for renovation projects, when a new chimney is needed along with a new wood-burning appliance.

www.holzwaerme-technik.de (website in German)

Wood-burning stoves provide sustainable and cost-effective warmth

With wood central heating, even large buildings can be comfortably heated.

Double-walled system (stainless steel)

Ceramic chimney in a detached house

Source: IPS in the BDH

Hybrid heating systems

In addition to the use of climate-neutral gaseous and liquid fuels, the combinability of gas and oil condensing boilers with other renewable technologies is becoming increasingly important in deciding whether they can be used in buildings. Gas and oil condensing boilers can be operated on the one hand in conjunction with electric heat pumps, and on the other hand as well with solar thermal systems. The integration of a single room furnace with collection basin is also a frequently used variant.

Solar thermal energy for heat generation

The solar thermal system supports the heat recovery of the heating system. This heat can be used for the preparation of domestic hot water and also for heating rooms. In a four-person household, the solar thermal system with a collector area of 4 to 6 m² can cover up to 60 % of the energy for the preparation of domestic hot water over the year.

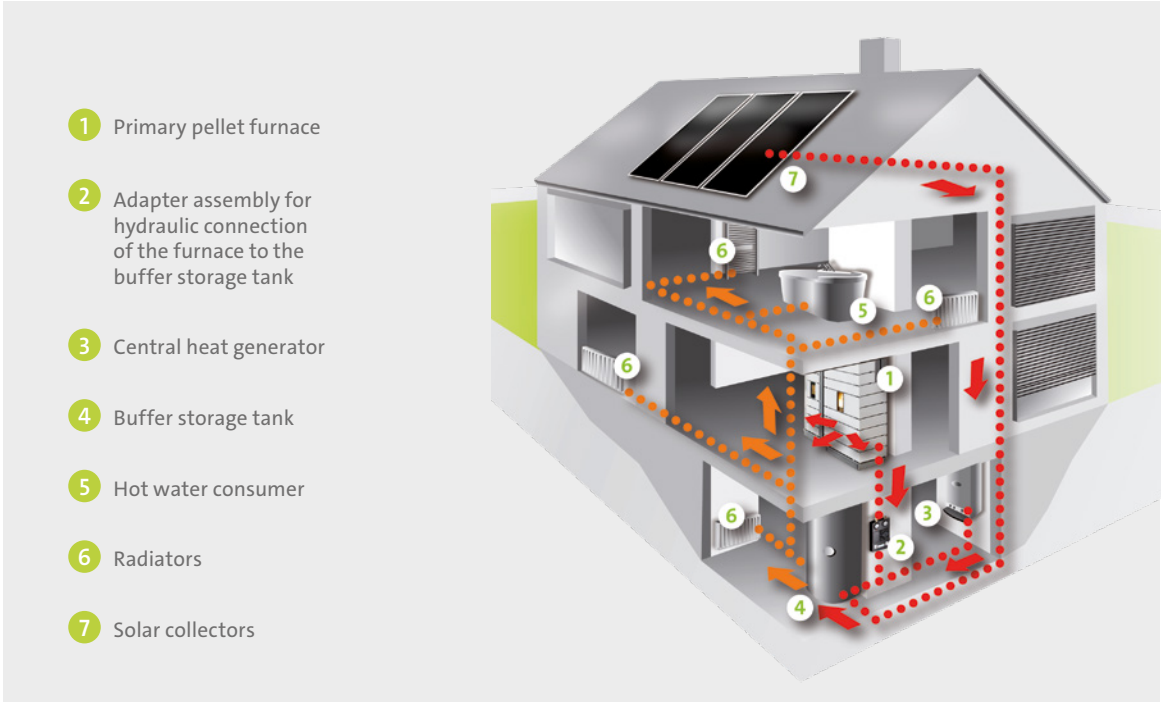
If, in addition to the preparation of domestic hot water, space heating is also to be supported, the collector area must be increased by 2 to 2.5 times. In a single-family house, the heat demand can thus be covered by up to 30 %, depending on the design and insulation standard of the building. In low-energy buildings, even up to 50 % and more can be achieved.

Single room furnace with collection basin

Further savings of gaseous and liquid fuels are possible if a wood-burning stove or a pellet stove with a collection basin is integrated into the heating system in addition to the solar system. Thus, in the summer months, the energy required for domestic hot water can be generated almost exclusively by solar energy. In the transitional period and in winter, the single room furnace makes its contribution to heating the building. Only when the solar system and the single room furnace can no longer cover the heat demand does the gas or oil condensing boiler come into play.

Hybrid heating systems

Specifically when using an air-water heat pump in an existing building with a relatively high heat demand, manufacturers offer hybridisation with a single room furnace, especially one based on pellets. The heat pump takes over significantly more than 70 % of the heat demand (heating circuit and domestic hot water preparation). At peak loads, e.g. during winter temperatures, the single room furnace provides most of the space heating. The heat pump and the single room furnace form a system in which the operation of the respective heat generator is digitally controlled according to demand.



Heating system with central heat generator, solar thermal system and wood single room furnace with collection basin

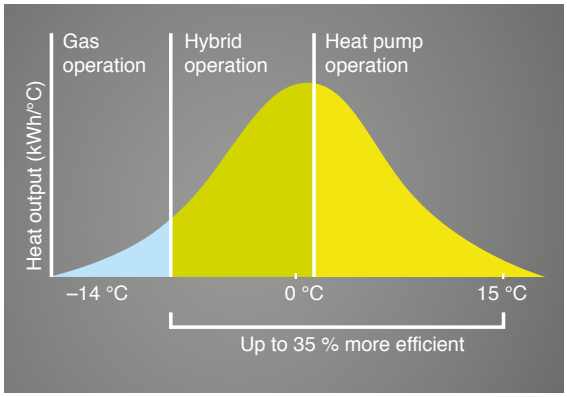
Hybrid heat pump

Optimum combination for optimised heating

A hybrid heat pump is the combination of an electrically driven heat pump, a condensing boiler (gas or wood) and a control system. In hybridisation, an existing fossil-fuelled condensing boiler is “hybridised” by installing a heat pump.

Reasons for a hybrid heat pump

- If the heat pump alone cannot provide the flow temperature required for the heating system all year round, a second heat generator can be activated.
- If the temperature falls below the minimum permissible heat source temperature (e.g. with an air-water heat pump in colder regions), the temperature difference is compensated.
- Depending on the current energy prices, it is decided which heat generator is operated in order to optimise operating costs.
- To minimise environmental impact, the hybrid system independently decides on the operating mode with the lower CO_2 emissions.
- In the case of gradual energy refurbishment (e.g. iSFP), a heat pump is initially added to an existing heating system. At a later stage, the building envelope is insulated, the heat load of the building is reduced and the existing boiler can be taken out of operation.

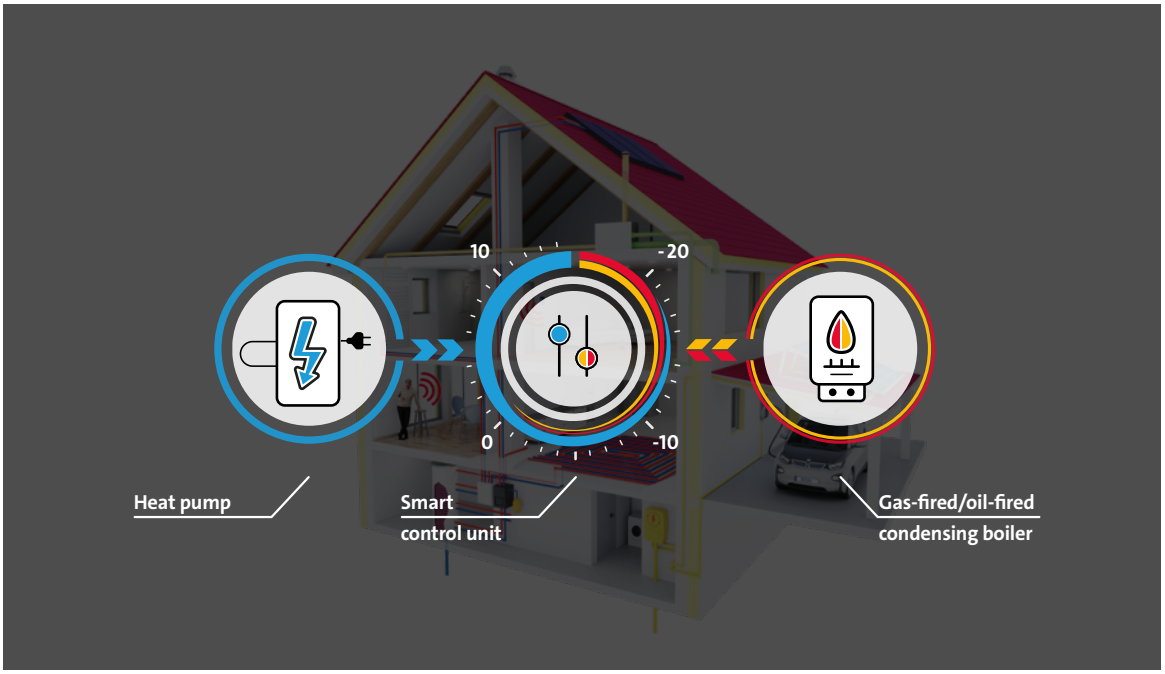


The hybrid heat pump system automatically selects the most efficient operating mode

One variable system – many possible applications

Hybrid heat pumps are available as compact units for use in detached and semi-detached houses or as bivalent systems consisting of individual components for apartment buildings.

Hybrid heat pumps are equally suitable for new and existing buildings. They ensure that the building is always heated with the preferred heat generator and, in modernisation, offer an entry into the transition to renewable heat generation.



The hybrid heat pump combines different energy sources via an intelligent control system.

Home ventilation systems with heat recovery

Ventilation systems save heating costs and at the same time offer a high level of indoor air comfort. Fresh and hygienic air quality is crucial for well-being indoors. Ventilation systems with heat recovery guarantee high air quality, ensure the required minimum air exchange and reduce the energy demand for heating.

Everyday use produces carbon dioxide, pollutants (VOC) and water vapour. Ventilation is required to remove them and regulate the supply of fresh air. Ventilation systems with heat recovery take care of this independently and help to save valuable heating energy thanks to the heat recovery.

Normal window ventilation is associated with a high thermal loss because the indoor air heated by the heating system flows outside and cold fresh air from outside flows uncontrolled into the building. Only automatically operating ventilation systems can ensure an optimal balance between the required supply of fresh air and minimal thermal loss.

A building's energy losses are made up of transmission heat losses (through walls, ceilings and floors) and ventilation heat losses. Increasing energy requirements for the building envelope reduce the transmission heat losses more and more, so that the ventilation heat losses dominate. In modern buildings, up to 50 % of the heating demand is already required for heating the necessary fresh air supply.

Maximum energy savings are achieved when the energy of the warm extract air is used to preheat the cooler outdoor air through HRS. Modern systems are able to recover up to 90 % of the heat in the extract air.

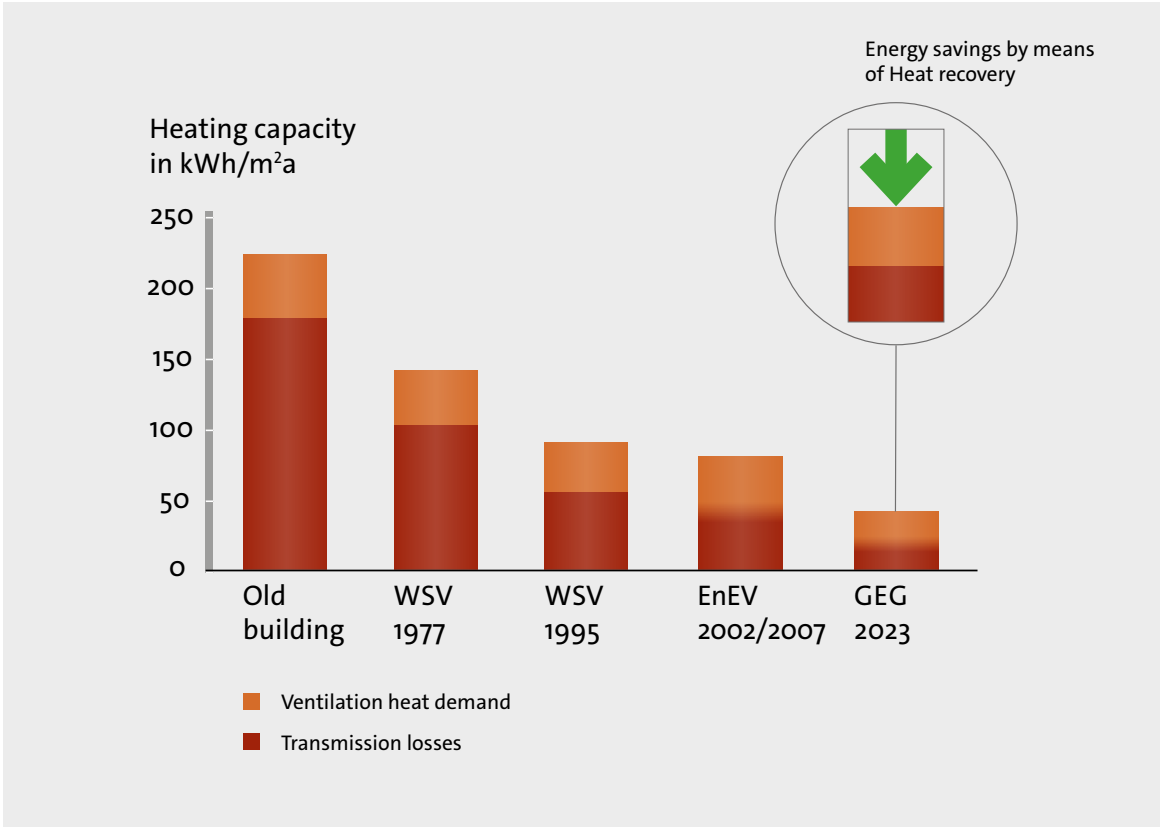
Room-by-room/decentralised ventilation systems with HRS

In the supply and extract air rooms, individual units per room are installed directly in the outside wall. This means that no air distribution system is required.

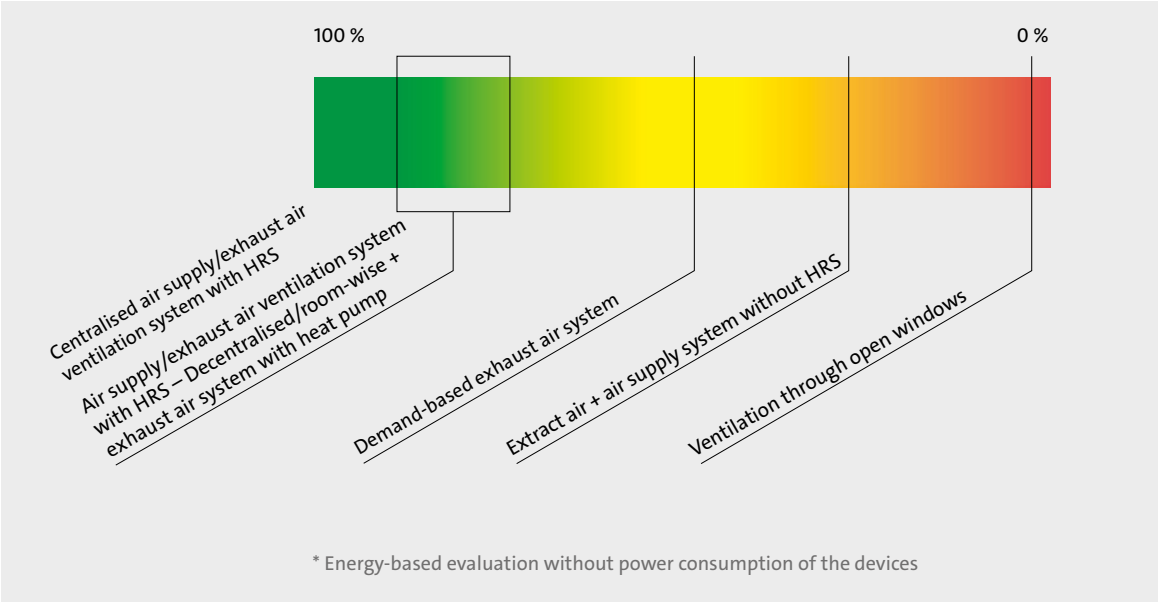
Two operating modes are available:

- Permanent supply and extract air.
- Alternating supply or extract air (push-pull principle)

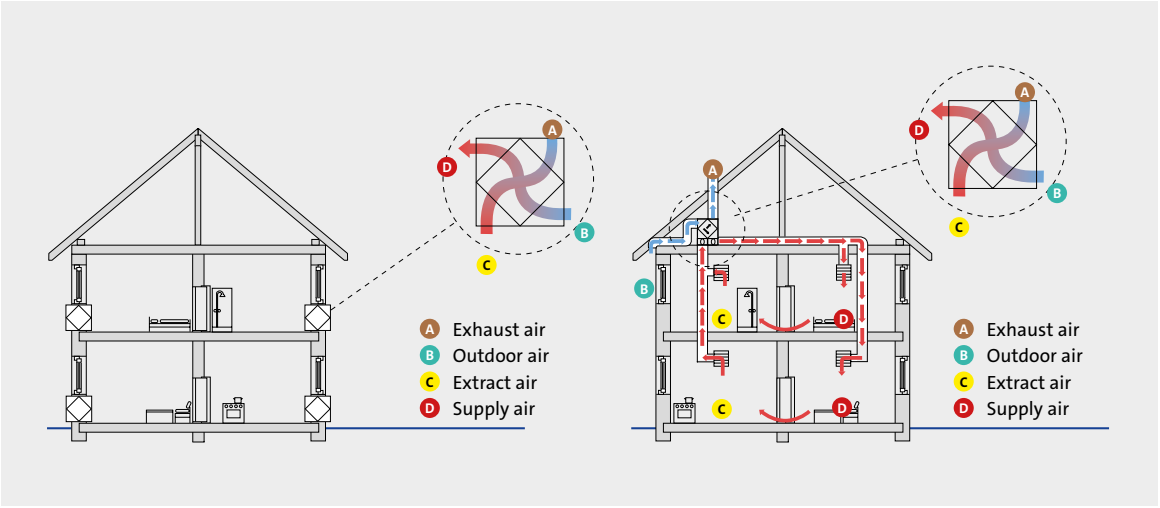
Both operating modes are equipped with a heat recovery of up to 90 %.



Relative share of ventilation in total heat demand



Reduction of ventilation heat losses



Left: Decentralised supply and exhaust air system per room with HRS / right: Centralised supply and exhaust air system with HRS per residential unit

Due to the fact that they are installed in the outside wall and without an air distribution system, decentralised ventilation units are particularly suitable for use in modernisation projects.

Centralised ventilation system with HRS

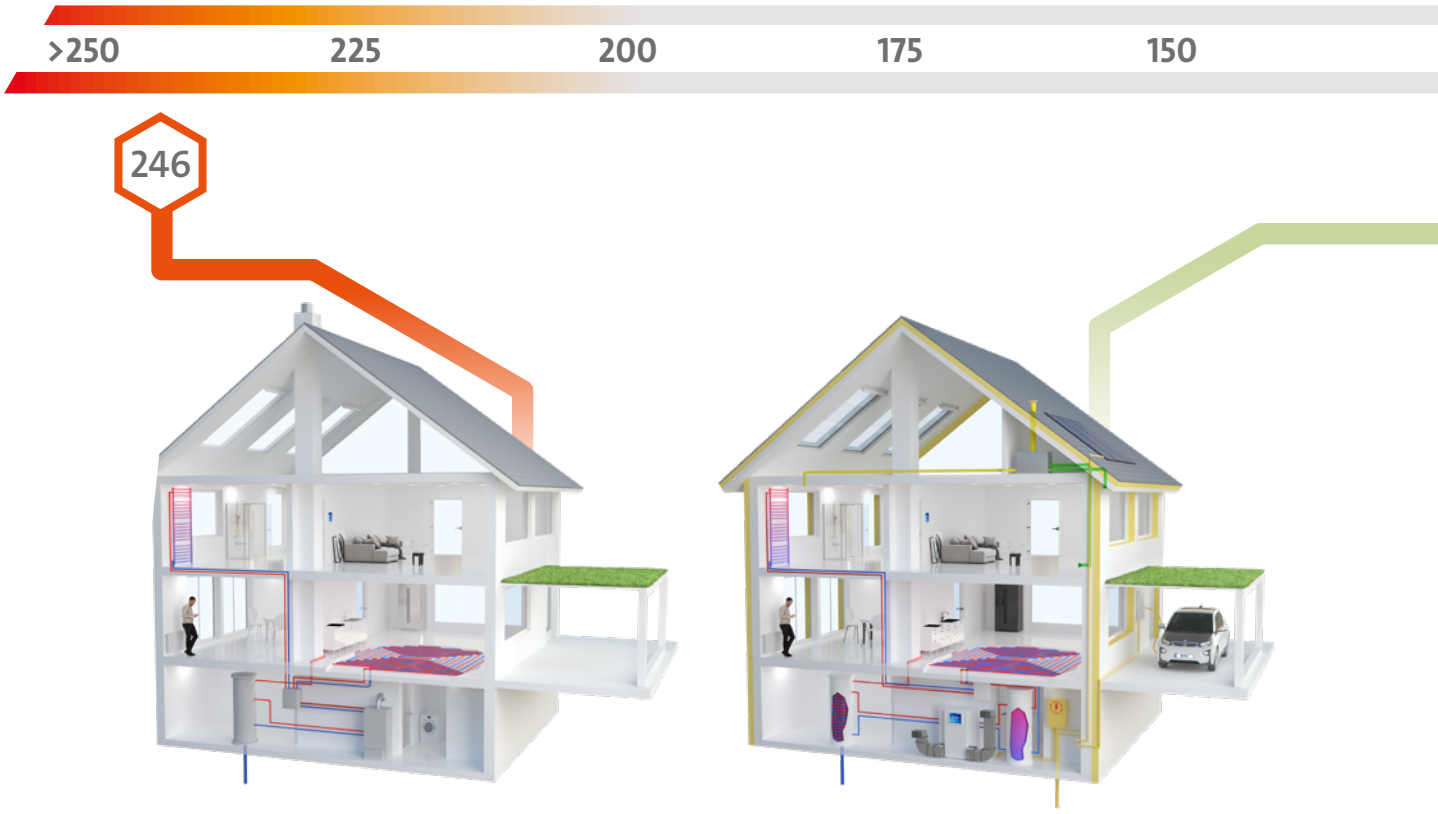
Central ventilation units transport the air via an air distribution system: a fan introduces the outdoor air into the building, another fan discharges the warm extract air from the rooms. A heat exchanger ensures that the heat from the extract air is transferred to the incoming outdoor air. In this way, up to 90 % of the heat is recovered and used to heat the outdoor air. The effect: up to 50 % of the heating energy can be saved.

In addition to high energy and cost savings, ventilation systems also offer greater comfort. Modern systems ensure optimum air quality and a comfortable indoor climate, while at the same time providing excellent sound insulation. Further plus points are comprehensive hygiene, pollutant reduction and protection against pollen, mites and mould growth.

If the ventilation system is planned at an early stage, the energy-saving potential can be optimally exploited and costs minimised. A ventilation concept must be drawn up in advance to check whether a ventilation measure is necessary.

The market for domestic ventilation systems offers the right solution for every need and every application.

Examples of modernisation (renovation according to KfW Efficiency House 55 standard)



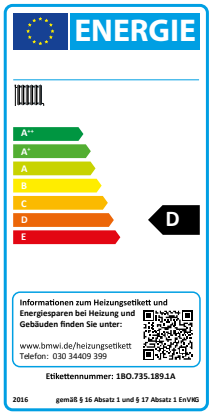
House before the renovation

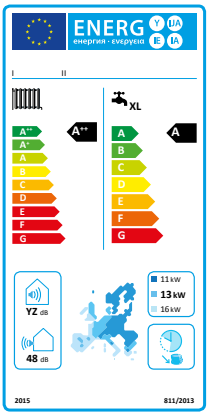
Partially renovated, detached single-family house, built in 1970, usable floor space 150 m², solid/plastered construction, standard oil/gas boiler with indirectly heated domestic hot water tank, uncontrolled circulation pump.

Renovation variant – Air-water heat pump, controlled residential ventilation

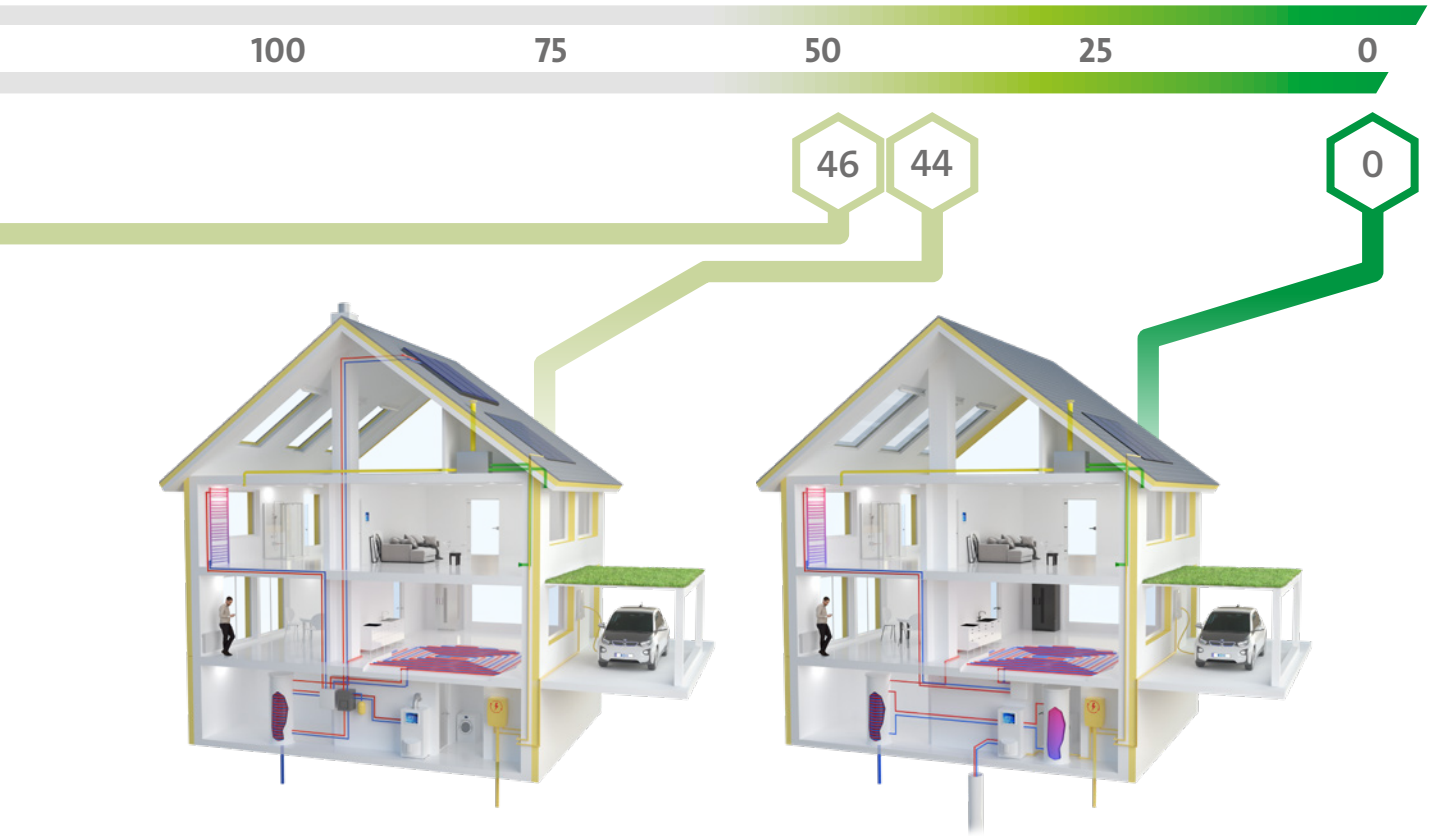
Air-water heat pump, buffer and domestic hot water storage tank, adaptation of the heating surfaces, high-efficiency pumps, new thermostatic valves, insulation of the distribution pipes, hydraulic balancing, additional controlled residential ventilation with heat recovery and renovation of the building envelope.

Annual oil consumption	3.251 litres		–
Annual gas consumption	3.251 m³		–
Annual electricity demand	–		3.627 kWh
Annual pellet/split logs demand	–		–
Electricity produced annually	–		–
Annual saving of oil	–		–
Annual saving of gas	–		–
Primary energy saving	–		200 kWh/(m²a)
Energy efficiency class for space heating	D		A++
Energy efficiency class for domestic hot water heating	–		A





Primary energy demand in kWh/(m²a)



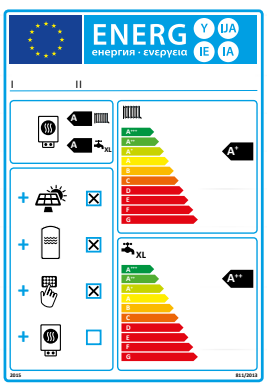
Renovation variant – gas/oil condensing technology (20 % bio-methane) with solar thermal system, controlled residential ventilation

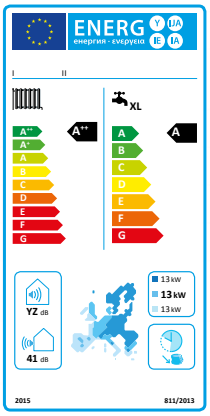
Modern condensing boiler (gas), solar domestic hot water heating and auxiliary heating, adaptation of the heating surfaces, high-efficiency pumps, new thermostatic valves, insulation of the distribution pipes, hydraulic balancing, modern flue gas system, additional controlled residential ventilation with heat recovery and renovation of the building envelope.

Renovation variant – Brine-water heat pump and PV system with electric storage, controlled residential ventilation

Brine-water heat pump, buffer and domestic hot water tank, adaptation of the heating surfaces, high-efficiency pumps, new thermostatic valves, insulation of the distribution lines, hydraulic balancing. PV system with 7.3 KW_{el}, additional controlled residential ventilation with heat recovery and renovation of the building envelope.

–	–
536 m³	–
–	2.840 kWh
–	–
–	5.521 kWh
–	–
2.715 m³	–
202 kWh/(m²a)	246 kWh/(m²a)
A+	A++
A++	A





Digitalisation in the heating sector

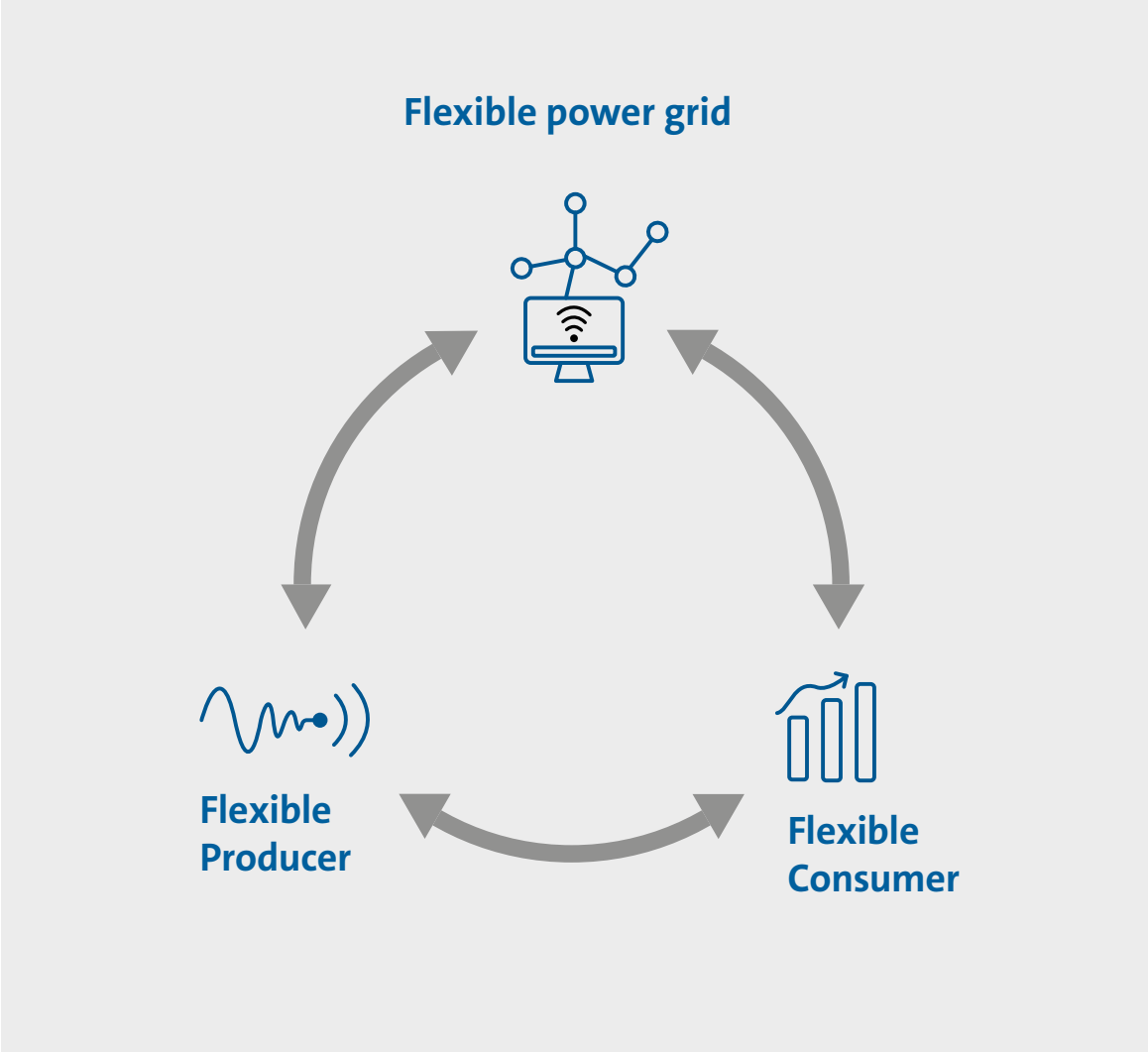
Paradigm shift in the energy system

In the course of the energy transition, the energy system must be enabled to accommodate a large number of new decentralised and volatile generation plants in a coordinated manner and at the same time feed the increasing electrification of heat generation and transport. However, security of supply must not be compromised in the process.

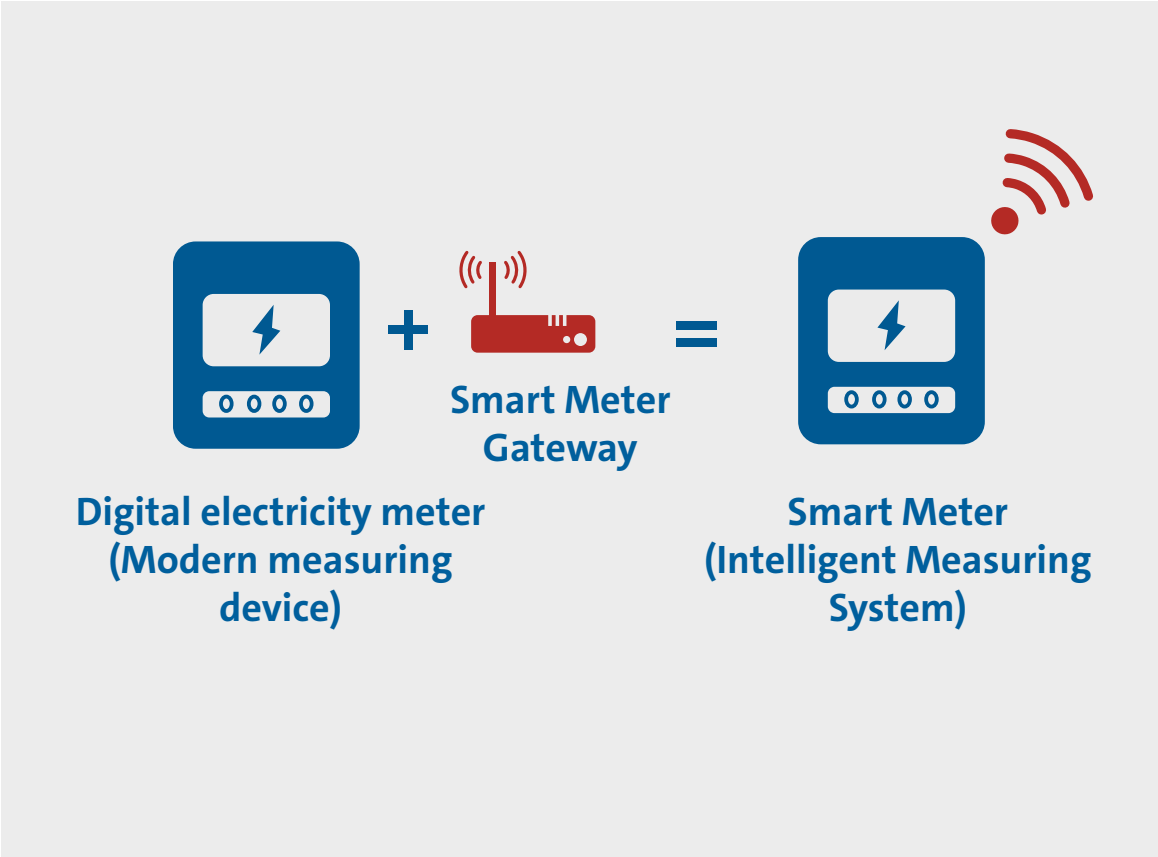
This requires a paradigm shift: Efficiency in energy consumption remains indispensable, but flexibility is also gaining a new, previously unknown importance. This applies not only to energy consumption – i.e. load management – but also to controllable power generation. The provision and use of flexibility will be crucial for the success of the energy transition.

To make this possible, we need the digitalisation of the energy system. This is because it creates the basis for coordination between decentralised generation plants, the electricity grid and flexible consumers. It is imperative in order to reconcile the increasingly volatile nature of renewable electricity generation with the rising demand for electricity through the electrification of transport and heat.

This is also an interesting development from the point of view of the individual citizen, as their flexibility in electricity consumption in this way gains an economic value.



The digitalisation of the energy system creates the basis for coordination between decentralised generation plants, the electricity grid and flexible consumers.



The smart meter serves as a central, highly secure communication link between the electricity system and the building.

The communication centre of the energy transition – the smart meter

Generators, storage facilities and consumers are being networked in the energy system – this also affects a large number of systems located in citizens' buildings. They must be able to receive and respond to incentives for system-serving behaviour: for example, by deferring flexible consumption when the power grid reaches its capacity limit. This regulatory requirement is currently being defined by the Federal Network Agency and is expected to come into force as early as the beginning of 2024.

The smart meter serves as a central, highly secure communication anchor between the electricity system and the building. Regulatory requirements – such as temporary power restrictions at the grid connection point – as well as market incentives from the electricity system – such as variable electricity prices – are transmitted to the building via this.

The energy transition needs the involvement of the citizen

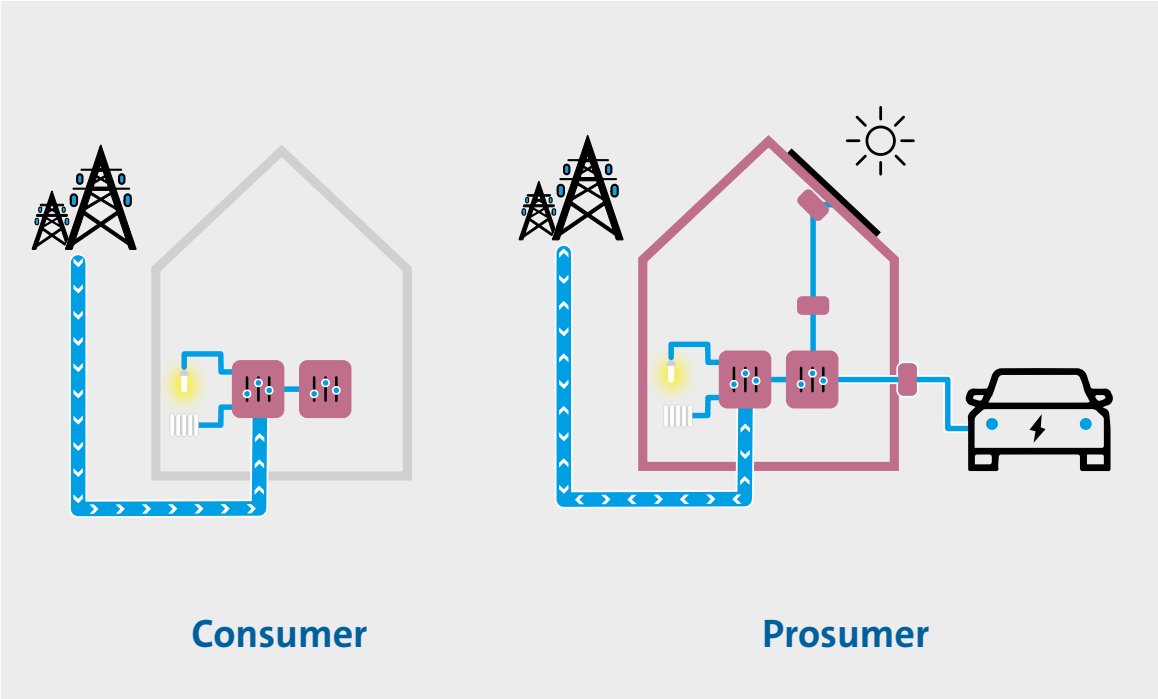
Far more than before, the mechanisms in the energy system – and thus the success of the energy transition – will therefore depend on the involvement of individual citizens, because many of the decentralised generation plants and flexible consumers are owned by them and the necessary methods require their – voluntary – contribution. It is therefore crucial to include the customer in the digitalisation of the energy transition and to create suitable financial incentives to motivate him to provide flexibilities. In the process, bureaucratic obstacles must be dismantled, concepts simplified and made suitable for mass use. The German government has recognised this and is pursuing this goal in various initiatives, but there is still a way to go.

Sector coupling in buildings – the energy management system (EMS)

In order to use the energy in the building efficiently, cost-effectively and at the same time in a way that is as beneficial to the system as possible, a cross-sector interaction of all energy-relevant products – such as the PV system, the e-car and of course the heating system – must be organised. This task is taken over by the energy management system.

The energy management system thus has several functions at once: on the one hand, it enables the optimal use of energy in the building – for example, taking variable electricity prices into account – and thus saves costs for the consumer. Secondly, it makes it easier for the customer to deal with energy networking in the building by automating tasks such as maximising own power consumption in the interaction of PV and heat pump, and by pro-

Networking of energy-relevant products with an intelligent energy management system (EMS)



The decentralisation of the energy system turns the consumer into a prosumer.

viding the customer with a simple and easy-to-use interface to the building's energy management system. And thirdly, it enables the customer-friendly realisation of intelligent, automated methods that organise system-serving and grid-serving behaviour tailored to the individual customer.

The customer decides on optimisation priorities – the network operator or electricity supplier cannot judge whether it is more important for the customer to charge their electric car or heat up their hot water tank. An energy management system understands the customer's needs, can evaluate them and, for example, coordinate them in the event of a power limitation at the grid connection point.

Such use cases can often already be realised today, as the essential building blocks are already available. In order to exploit the potential for the energy transition, however, they still have to be transferred to the mass market. Therefore, it is important to establish cross-industry standards that ensure smooth interoperability of systems from different manufacturers. This is what the BDH's specialist department for energy management systems is working towards, for example in cooperation with the EEBUS initiative.

Photovoltaics as a door opener

The drivers for this development are the economic advantages for individual citizens. The use of self-generated electricity from photovoltaic systems or fuel cells is often the door opener for citizen participation in the energy transition. It is becoming increasingly profitable not to feed as much electricity as possible into the grid – with today's very low feed-in tariffs – but instead to increase the share of self-consumed electricity. If heat pumps and e-mobility, with their high electricity demand, are largely fed by the PV system, the economic efficiency increases significantly.

From consumer to prosumer

The decentralisation of the energy system is turning the consumer into a prosumer. Increasingly, the focus is no longer only on supplying one's own building, but also on playing an active role in the networked energy system.

Surplus electricity can no longer just be fed into the grid, but can also be marketed. Neighbourhood concepts or energy communities are already available for this purpose. This can also result in considerable economic advantages for the end customer.

Variable electricity prices encourage citizens through financial incentives to make the energy flexibility of the building – i.e. the time and amount of electricity consumption and feed-in – available in a way that serves the system and thus realise cost savings: for example, through load shifting during bottlenecks or through increased feed-in of surplus electricity when demand in the grid is high.

Partners of the Technology and Energy Panel

bdew
Energie. Wasser. Leben.

BDEW German Association of the Energy and Water Industry (Bundesverband der Energie- und Wasserwirtschaft e. V.)

As the umbrella organisation of the energy and water industry, BDEW has more than 1,900 municipal and private member companies, whose interests it represents in Berlin and Brussels as well as through its regional organisations. At the same time, BDEW is the only trade association that unites all sectors and stages of the value chain of the energy and water industry without exception, brings the member companies together at one table and also represents transport, digitalisation and new business fields through its member companies. BDEW takes a holistic view of the energy and water industry and its role in the economy across all sectors and stages of the value chain. At the same time, BDEW is a complexity manager for the ever accelerating developments.

www.bdew.de

bwp Bundesverband Wärmepumpe e.V.

German Heat Pump Association (Bundesverband Wärmepumpe e. V.)

The German Heat Pump Association (BWP) e. V. is an industry association based in Berlin that covers the entire heat pump value chain. Around 700 tradesmen, planners, architects, drilling companies, the heating industry and energy suppliers are organised in the BWP and are committed to the increased use of efficient heat pumps.

The German heat pump industry employs around 27,000 people (excluding craftsmen and installation) and generates an annual turnover of around 2.8 billion euros. Currently, more than 1.4 million customers in Germany use heat pumps. Approximately 230,000 new systems are installed each year, 95 percent of which are manufactured by BWP member companies.

www.waermepumpe.de

Energieeffiziente Gebäude
BDI initiativ

Federation of German Industries (Bundesverband der Deutschen Industrie e. V.)

The BDI initiative advocates a strengthening of the topic of building energy efficiency and calls for attractive state framework conditions for energy-efficient refurbishment and energy-efficient construction in Germany. It is a cross-sector and cross-trade alliance of associations, companies and research institutions. The members of the BDI initiative want to contribute to Germany's position as a pioneer in the field of climate protection and make it clear that Germany is the world market leader in the field of climate-protecting technologies. The BDI Initiative currently has around 30 members representing all elements of the building sector – envelope, technology and operation.

www.initiative-energieeffiziente-gebaeude.de

DEPV Deutscher Energieholz- und Pellet-Verband e.V.

German Energy Wood and Pellet Association (Deutscher Energieholz- und Pellet-Verband e. V.)

The German Energy Wood and Pellet Association (DEPV) is the federal association representing the German pellet and wood energy sector. As a trade association, it represents the political interests of companies involved in heating with wood pellets and modern wood energy at federal and state level. Its member companies cover the entire value chain: from fuel production and logistics to the manufacture and sale of combustion technology as well as pellet storage accessories and service providers.

www.depv.de

DIN Standards Committee Heating and Ventilation Technology and their Safety (DIN-Normenausschuss Heiz- und Raumlufttechnik sowie deren Sicherheit)

The DIN Standards Committee Heating and Ventilation Technology and their Safety (NHRS) deals with the following topics: Heating technology (generation, transfer and distribution of usable heat or cold in buildings), ventilation technology (planning, design, execution, acceptance, inspection and testing of systems and components for the ventilation and air-conditioning of buildings), measurement, control and regulation technology for heating and ventilation technology and thermotechnical systems (measuring, consumption, protection and safety devices as well as building automation and communication systems of meters), facility management (support processes within companies or administrations) and overall energy efficiency of buildings – system standardisation (energy evaluation of technical building equipment for heating, cooling and ventilation as well as for domestic hot water heating and lighting).

For standardisation projects in which the work areas of other standards committees are affected, e.g. the DIN standards committees for construction (NABau), gas technology (NAGas), mechanical engineering (NAM), heating, cooking and thermal equipment (FNH), lighting technology (FNL), refrigeration technology (FNKä) or fittings (NAA), or which have thematic overlaps with the NHRS, agreement is reached in good time before the work begins as to which of the standards committees will assume the lead and sponsorship.

www.din.de

German Association for Gas and Water e. V. (Deutscher Verein des Gas- und Wasserfaches e. V.)

The DVGW German Technical and Scientific Association for Gas and Water (DVGW Deutscher Verein des Gas- und Wasserfaches e. V.) is a recognised standard-setter, technical-scientific know-how provider and promoter of technical innovations and is the competence network for all issues relating to the supply of gas and drinking water.

The DVGW is also the institution designated in the Energy Industry Act for hydrogen infrastructures. Since January 2023, the DVGW's central role on the path to a hydrogen economy has been supported by the official commissioning of an H_2 standardisation roadmap for a rapid, targeted expansion and adaptation of the technical regulations in the field of hydrogen technologies.

www.dvgw.de

EEBus Initiative e. V.

The EEBus Initiative is a non-profit organisation based in Cologne with international members from the automotive, heating, air conditioning, ventilation, household appliances, PV, energy storage and energy management sectors. On behalf of the industry, EEBus describes the communication interface (= use cases, data model, transport protocol) for networking between energy management-relevant devices and corresponding control systems. Both legal and market-oriented mechanisms are consistently specified and standardised: this allows the creation of a manufacturer-independent eco-system of interoperable devices from the different sectors.

www.eebus.org

The Association of the European Heating Industry

The Association of the European Heating Industry (EHI) represents 90 % of the EU market for heat and hot water generation. Directly employing over 125,000 people and investing more than € 1 billion annually, our industry is critical in the EU's transition to a climate-neutral economy by 2050. EHI brings together 41 market-leading companies and 12 national associations in the European thermal comfort sector; producing efficient and renewables-based heating systems and innovative hybrid and digital solutions.

www.ehi.eu

en2x – Fuels and Energy Industry Association (Wirtschaftsverband Fuels und Energie e.V.)

Climate protection is one of the greatest challenges of our time. That is why we at en2x – Fuels and Energy Industry Association are working together with our members to achieve the Paris climate goals.

Our member companies from the current petroleum industry secure a large part of Germany's current energy supply for mobility and heat and supply considerable quantities of basic chemical products. A comprehensive transformation process is now necessary for a greenhouse gas-neutral future. With a variety of renewable energies, alternative fuels and raw materials, technologies and innovations, our industry can make key contributions to this transformation. We want to accompany, drive and help shape this process in an open dialogue.

www.en2x.de

Association of Building Air Conditioning (Fachverband Gebäude-Klima e.V.)

As the leading trade association of the German air conditioning and ventilation industry, the Association of Building Air Conditioning (FGK) represents the interests of its members in dialogue with market partners, politics, industry, standardisation institutions and science. In the areas of ventilation technology, controlled residential ventilation, VRF air-conditioning systems, air ducts and other important specialist areas of the industry, the FGK speaks for more than 80 % of the market. With intensive political communication, it influences regulatory requirements and standards from the relevant area of technical building equipment. The realisation of market-ready measures and certification opportunities as well as activities in the field of communicating research results are further facets of the FGK's work.

www.fgk.de

Alliance for Building Energy Efficiency (Allianz für Gebäude-Energie-Effizienz)

The Alliance for Building Energy Efficiency (geea) is a cross-sectoral association of leading representatives from industry, research, trade, commerce and energy supply. The aim of the geea is to improve energy efficiency in buildings in Germany through recommendations for politicians and concrete measures on the part of industry.

One of geea's central tasks is to give the various industry players – for example, systems engineering, the trades, the insulation and window industry, etc. – a unified voice vis-à-vis policymakers. After all, the success of a holistic energy transition depends to a large extent on setting the right course in regulatory law and funding for efficiency measures.

www.geea.info

Association of Companies for Gas and Water Technologies (Bundesvereinigung der Firmen im Gas- und Wasserfach e.V.)

Under the banner of figawa – Association of Companies for Gas and Water Technologies, we currently represent 280 member companies from the gas and water industry, ranging from service providers and plant manufacturers to equipment and component manufacturers. As a technical-scientific association, we promote uniform and ambitious standardisation and are involved in legislative procedures – both nationally and at the European level. In this way, we create the basis for approval, testing and certification and provide legal certainty for all market players. We stand for technological openness in heat and water supply and for the transformation from fossil to climate-neutral energy sources.

www.figawa.de

HEA – Association for Efficient Energy Application (Fachgemeinschaft für effiziente Energieanwendung e. V.)

The HEA – Association for Efficient Energy Application is unique as a network for the exchange of experience and in the orientation of its tasks and projects: For more than 70 years, it has been bringing together market players from industry, the energy sector and the installing trades at eye level.

The focus is on the market success of innovative application technology and increasing energy efficiency in residential buildings. Whether it is smart home applications, heat pumps, ventilation systems, household appliances or charging infrastructure for electromobility, the HEA supports the technological and normative framework. The HEA develops wide-ranging communication measures to address end customers and multipliers..

www.hea.de

Federal Association of the Chimney Sweeping Trade (Bundesverband des Schornsteinfegerhandwerks)

The Federal Association of the Chimney Sweeping Trade represents the interests of the chimney sweeping trade in Germany. Its members include 16 regional guild associations and their affiliated guilds with around 7,500 guild companies, more than 21,000 employees and over 11,000 energy consultants. It thus represents 97 percent of all companies involved in the market. As a direct contact for authorities, ministries, associations and market partners, the Federal Association participates in technical and professional policy coordination processes, committees and working groups. It communicates craft trade issues to the public and advises members, citizens and market partners.

www.schornsteinfeger.de

Industrial Association of House, Heating and Kitchen Technology (Industrieverband Haus-, Heiz- und Küchentechnik e. V.)

HKI Industrial Association of House, Heating and Kitchen Technology represents the interests of manufacturers of catering equipment and domestic heating and cooking appliances – nationally, in Europe and worldwide. Our 230 members employ about 65,000 people and generate an annual turnover of about 12.4 billion euros. The association is actively involved in international standardisation work and is a member of numerous national and international committees, initiatives and working groups. In addition, the association cooperates with numerous organisations, partner associations and institutions.

www.hki-online.de

Future Gas (Zukunft Gas)

Future Gas is the industry association of the German gas industry. It unites the interests of its members and represents them vis-à-vis the public, politicians and consumers. Together with its member companies, the association works to ensure that the potential of the energy carrier and the existing gas infrastructure is utilised, and provides information about the opportunities and possibilities that natural gas and green gas such as hydrogen and biogas offer for our society. The association is supported by leading companies in the gas industry. Other industry associations and the heating appliance industry support Future Gas as partners.

www.gas.info

www.bdh-industrie.de

Issue March 2023

Issued by: Interessengemeinschaft Energie Umwelt
Feuerungen GmbH, Frankfurter Straße 720–726, 51145 Köln

Organisation

BDH
Federation of
German Heating Industry

messe frankfurt

bdew
Energie. Wasser. Leben.

Energieeffiziente
Gebäude
BDI initiativ

bwp Bundesverband
Wärmepumpe e.V.

DEPV Deutscher Energieholz-
und Pellet-Verband e.V.

DIN
NHRS

DVGW

EEBUS

ehi
association of the
European Heating Industry

en2x
Wirtschaftsverband Fuels
und Energie e.V.

geea
Die Allianz für
Gebäude-Energie-Effizienz

Fachverband
Gebäude-Klima e.V.

figawa

HEA

HKI

Bundesverband des
Schornsteinfegerhandwerks

ZUKUNFT
GAS