

# Member Country Report 2021

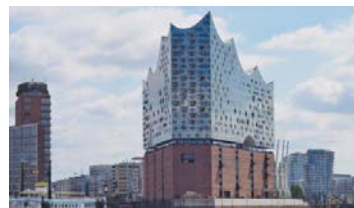
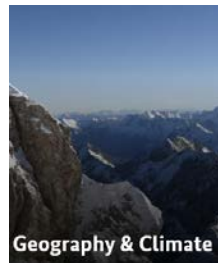
## Germany



The HPT TCP is part of a network of autonomous collaborative partnerships focused on a wide range of energy technologies known as Technology Collaboration Programmes or TCPs. The TCPs are organised under the auspices of the International Energy Agency (IEA), but the TCPs are functionally and legally autonomous. Views, findings and publications of the HPT TCP do not necessarily represent the views or policies of the IEA Secretariat or its individual member countries.

# Agenda

- **General**
- Market
- Policy
- R & D
- Summary



Source: Facts

## General

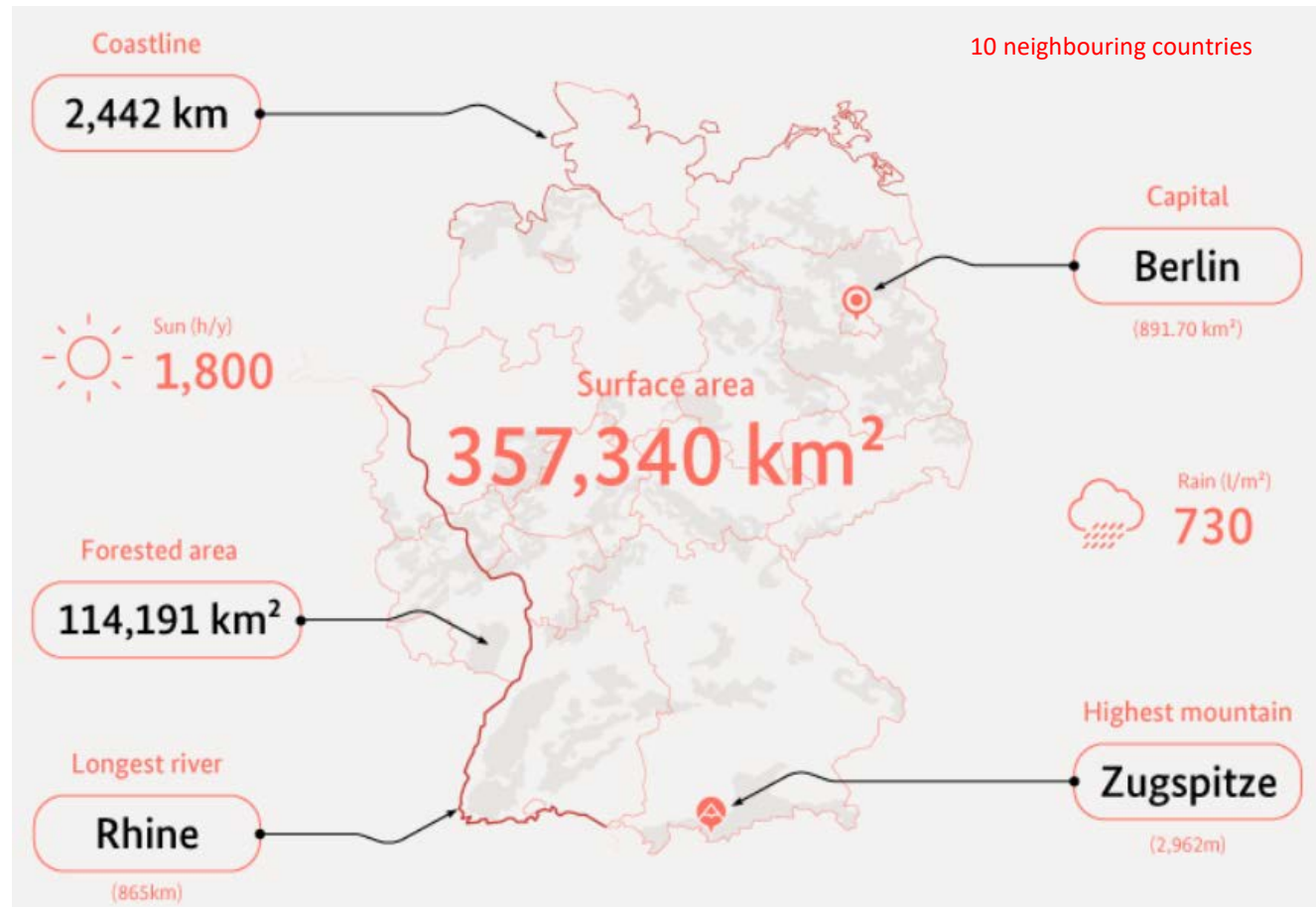
- Germany is a federation. The federation and the 16 Länder (states) each have areas of responsibility of their own.
- 357,340 km<sup>2</sup>
- 83.1 mio. Inhabitants
- 41.506 mio households

**42.3 %** 1-person   **33.2 %** 2-persons   11.9 % 3-persons   9.1 % 4-persons   3.5 % 5+ persons

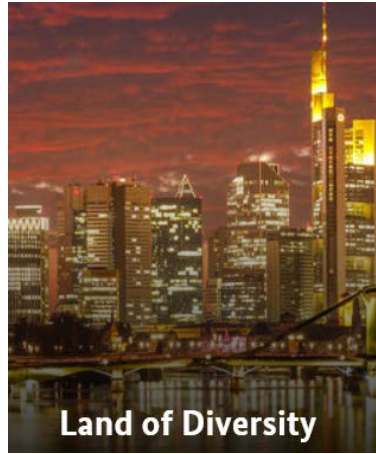
Almost 50 % of people live in rented accommodation, this is the highest level on a EU comparison



Source: Facts



# Germany



Source: Facts



# General

- Germany enjoys a moderate climate. In July, the mean temperature is 16.9 °C, and in January -0.5 °C. The most recent winters in Germany were particularly mild, and the summers particularly hot. With a mean temperature of 10.5 °C, 2018 was the warmest year since records began.
- Germany is the most populous country in the EU and one of the most densely populated; around 77 % of its inhabitants live in densely and highly populated areas. Around 30 % of the population resides in big cities with more than 100,000 inhabitants, of which there are 80 in Germany, four with more than one million inhabitants, Berlin, Hamburg, Munich and Cologne.

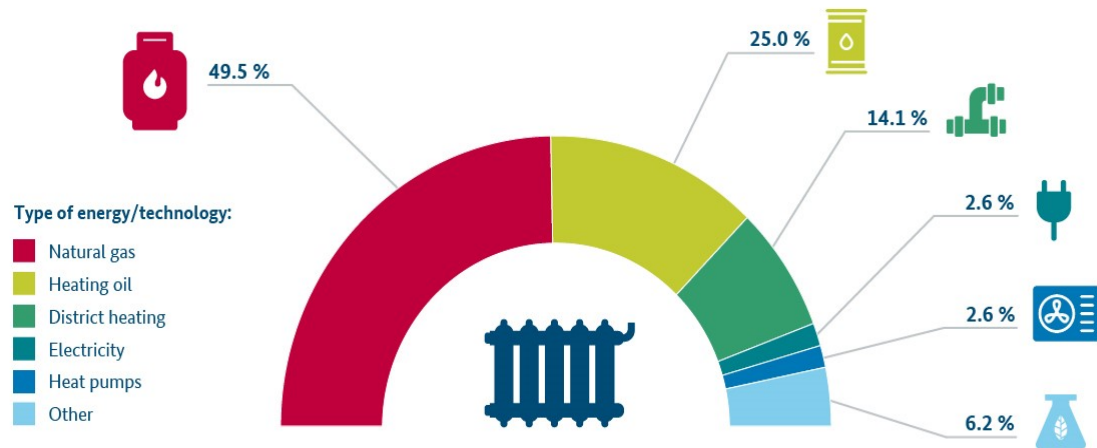
Source: Facts



# General Heating energy for a cosy home

## Gas-powered residential heatings systems still the most common in 2020

Renewables catching up



Heating structure for residential buildings in Germany in 2020  
Respective shares for 2020

© BMWI, BDEW; provisional figures, partly based on estimates (last updated: 12/2020)

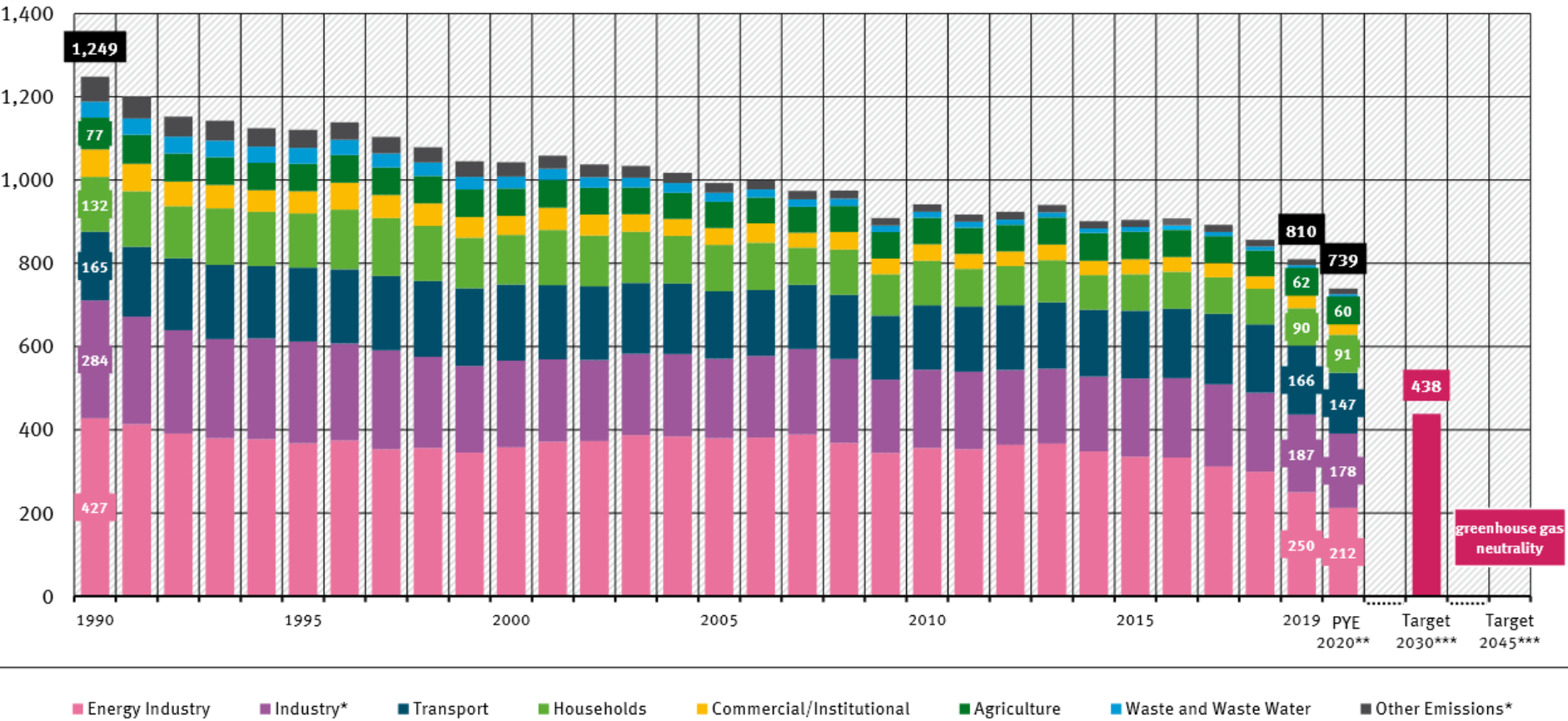
The 10-year overview shows that there is a clear trend towards renewables, with heat pumps and district heating each gaining 10 % and natural gas/biomethane losing roughly 15 % over the last decade.

Source: BDH



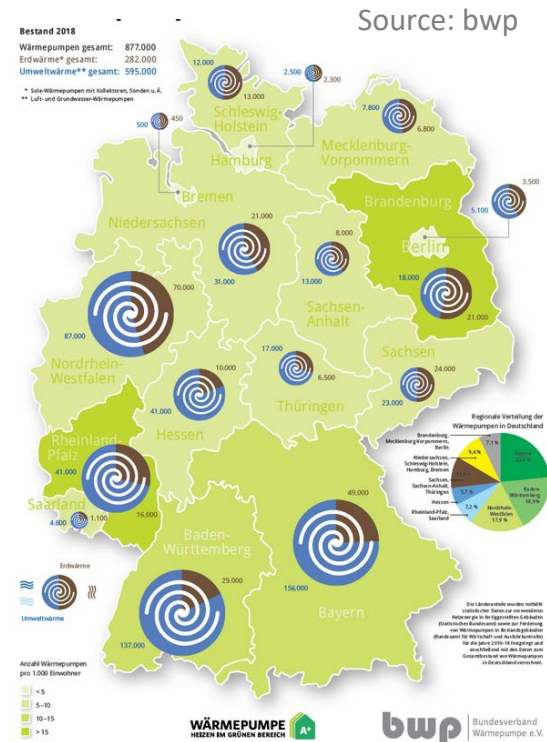
Million tonnes of carbon dioxide equivalents

Source: BMWi



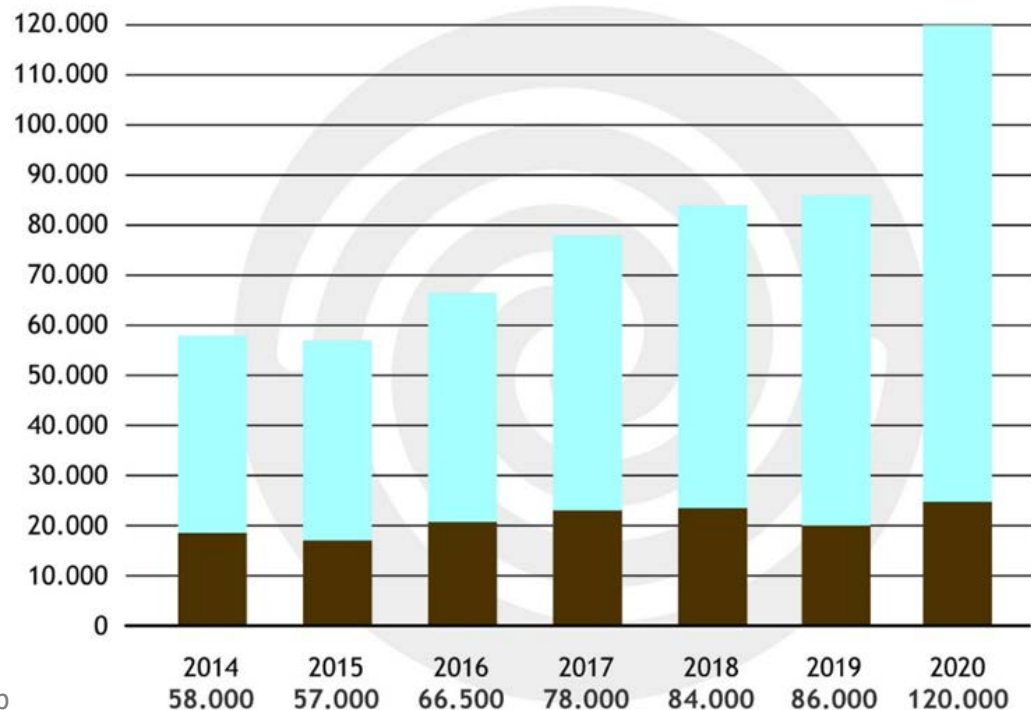
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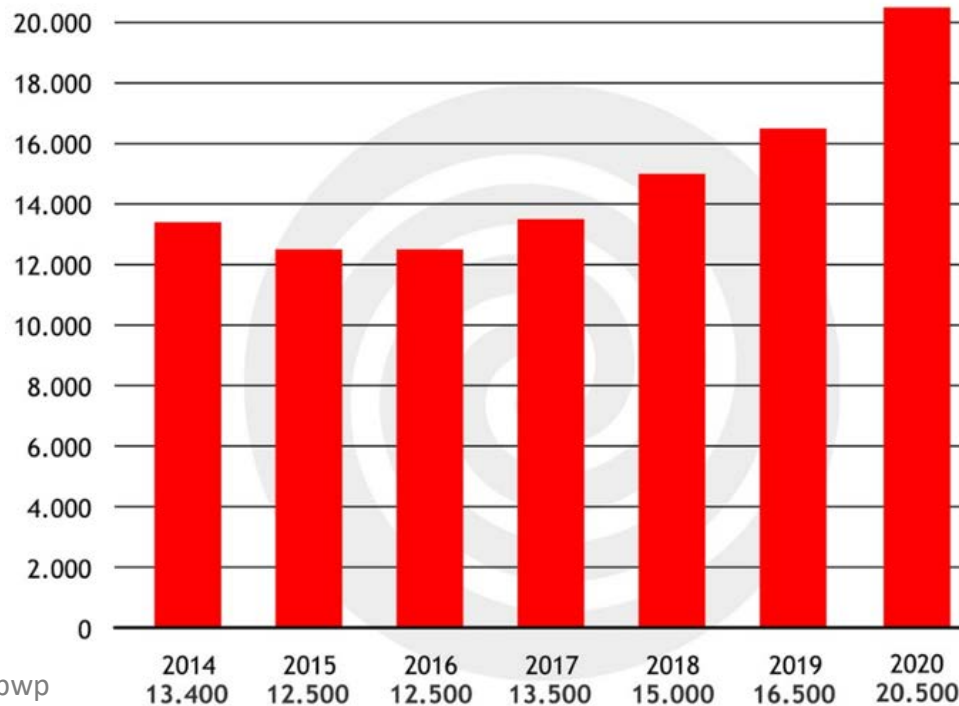


## Sales of heat pumps



Source: bwp

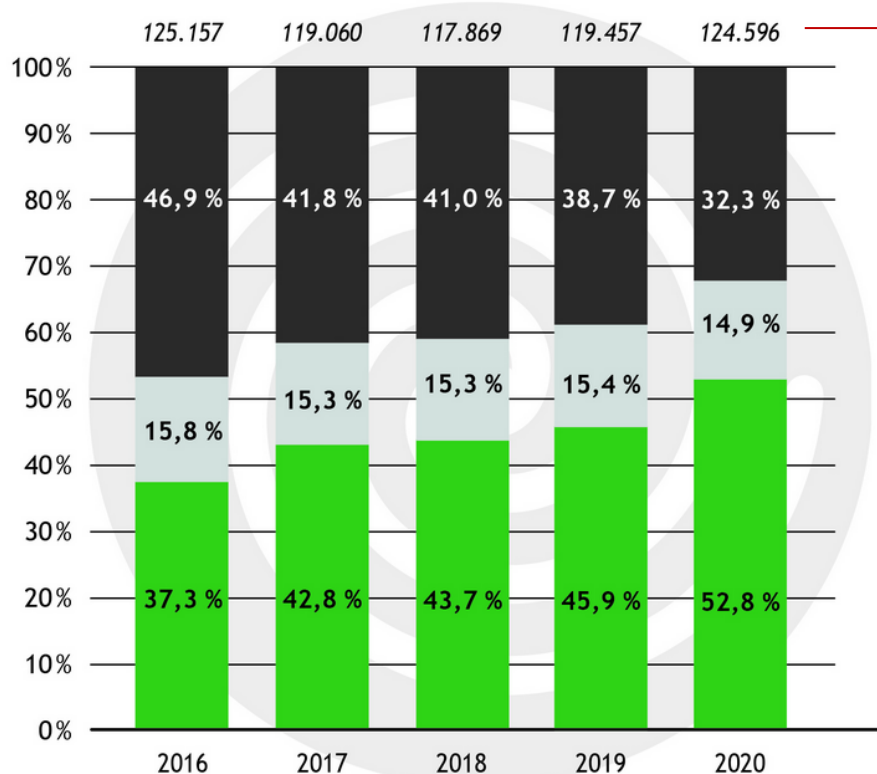
# Sales of domestic hot water heat pumps



Source: bwp



# House-building permission



# authorized new buildings

gas



misc.

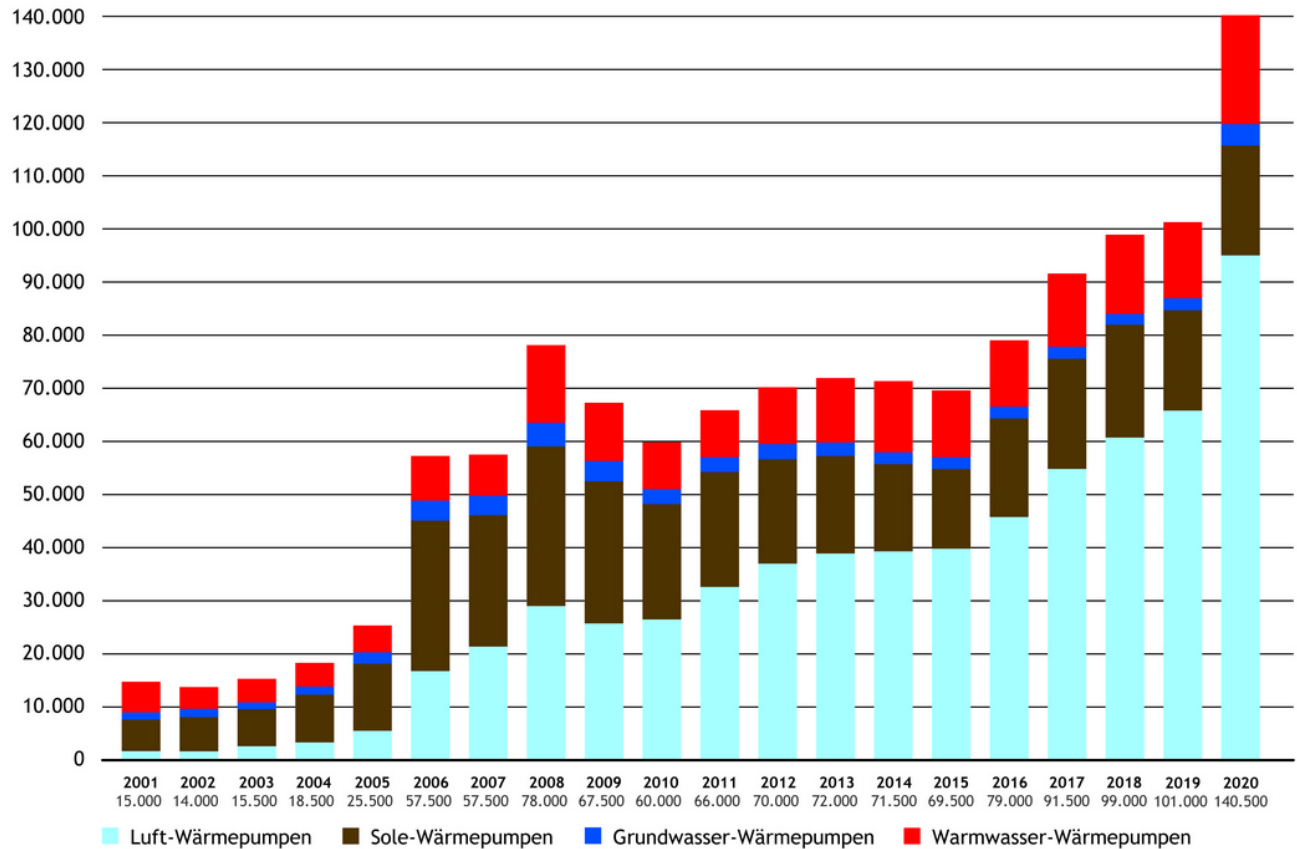


heat pumps



Source: bwp

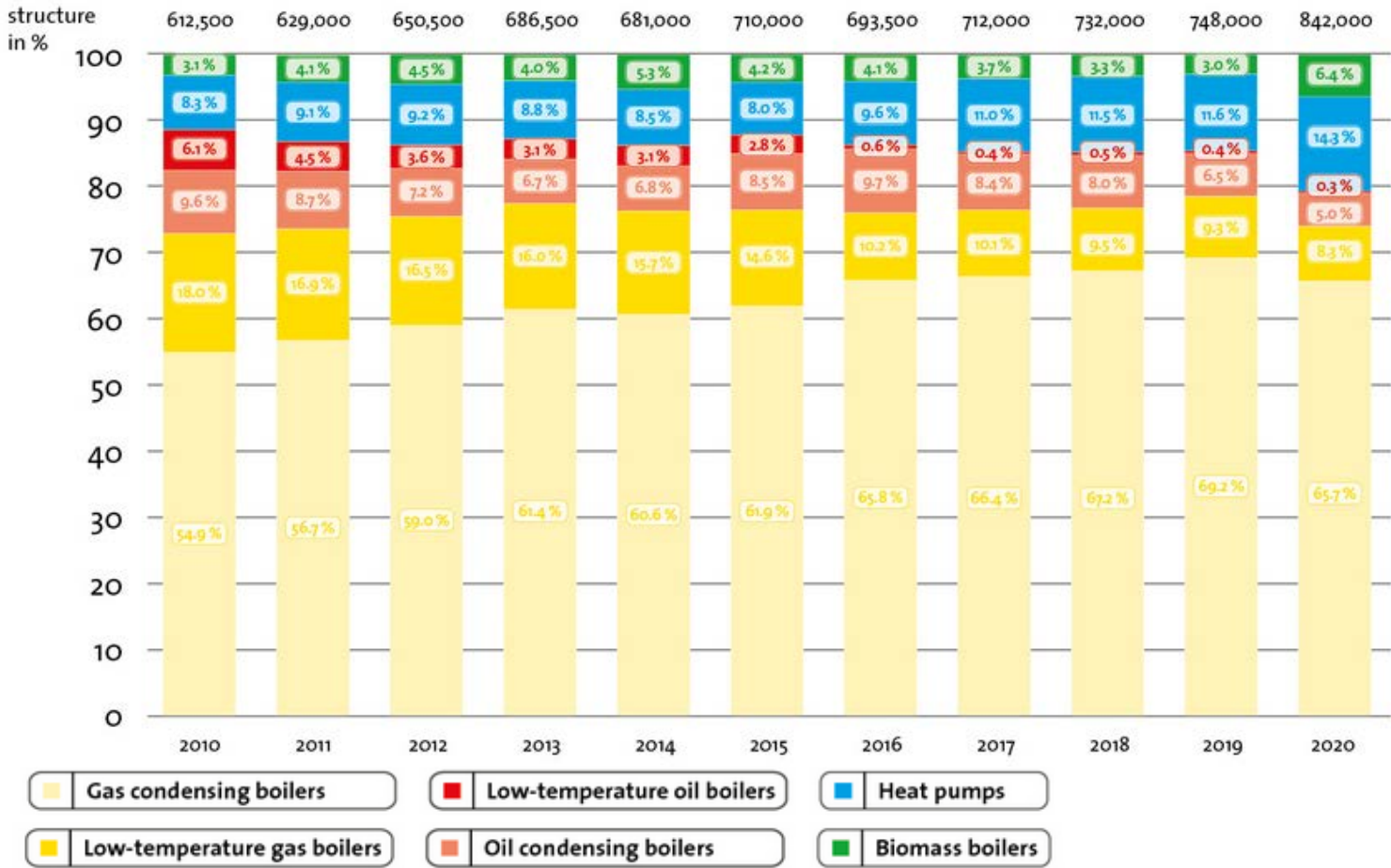
# Total Sales of heat pumps



- Domestic hot water
- Ground water
- Ground coupled
- Air

Source: bwp



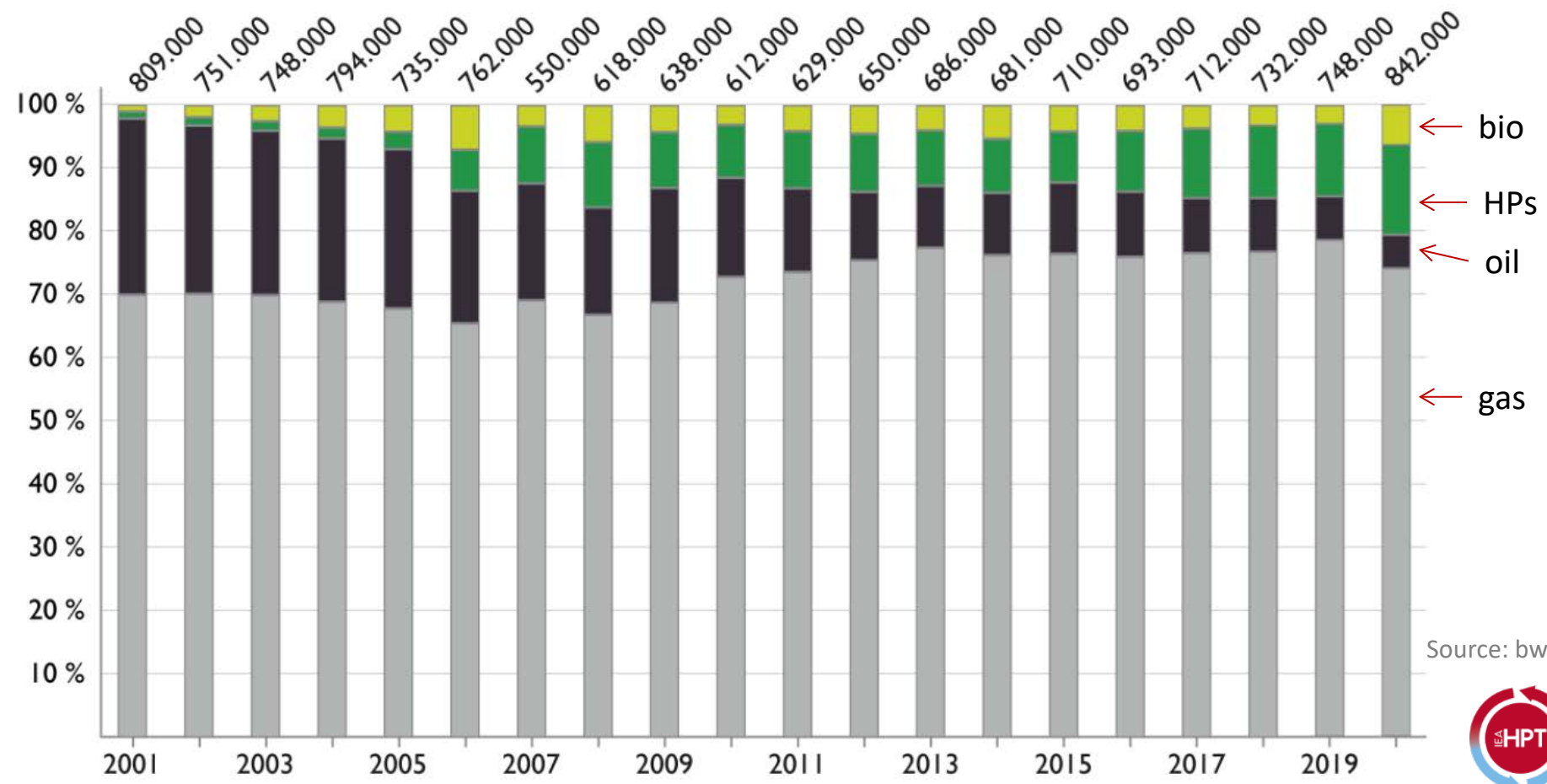


# Heating systems

Source: BDH



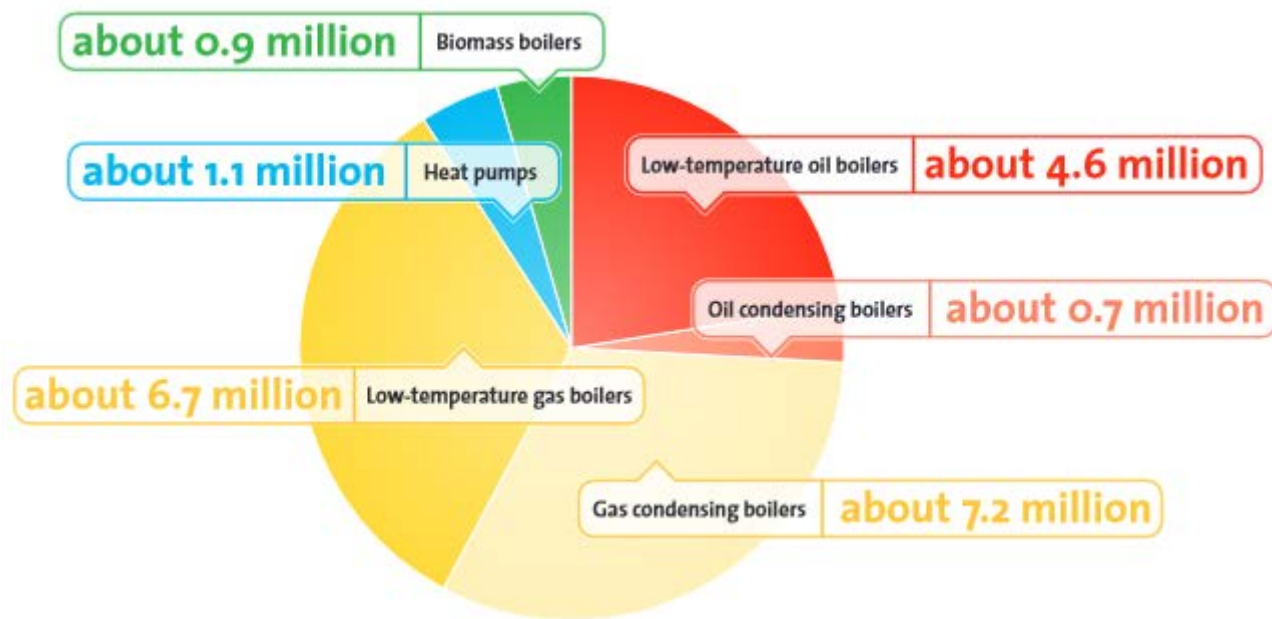




Source: bwp



# Total amount of central heat generators 2020

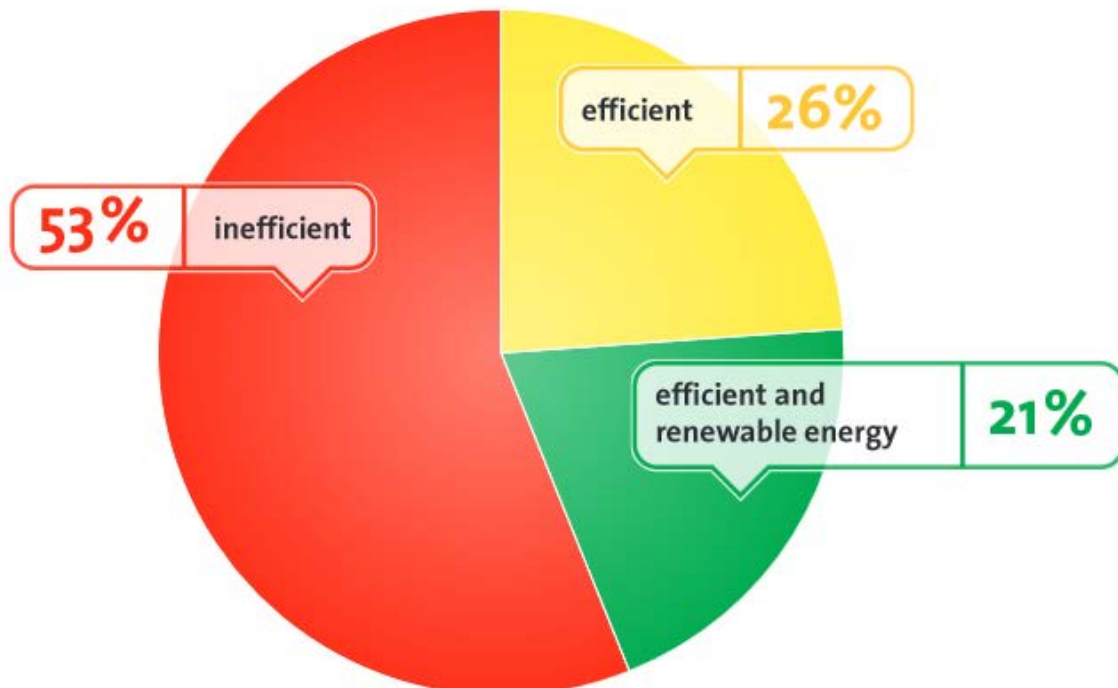


~ 21.2 million heat  
generators in stock

Installed collector surface  
solar thermal systems  
Approx. 21.3 million m<sup>2</sup>  
~ 2.5 million systems

Source: BDH

## Efficiency structure of installed heating systems 2020

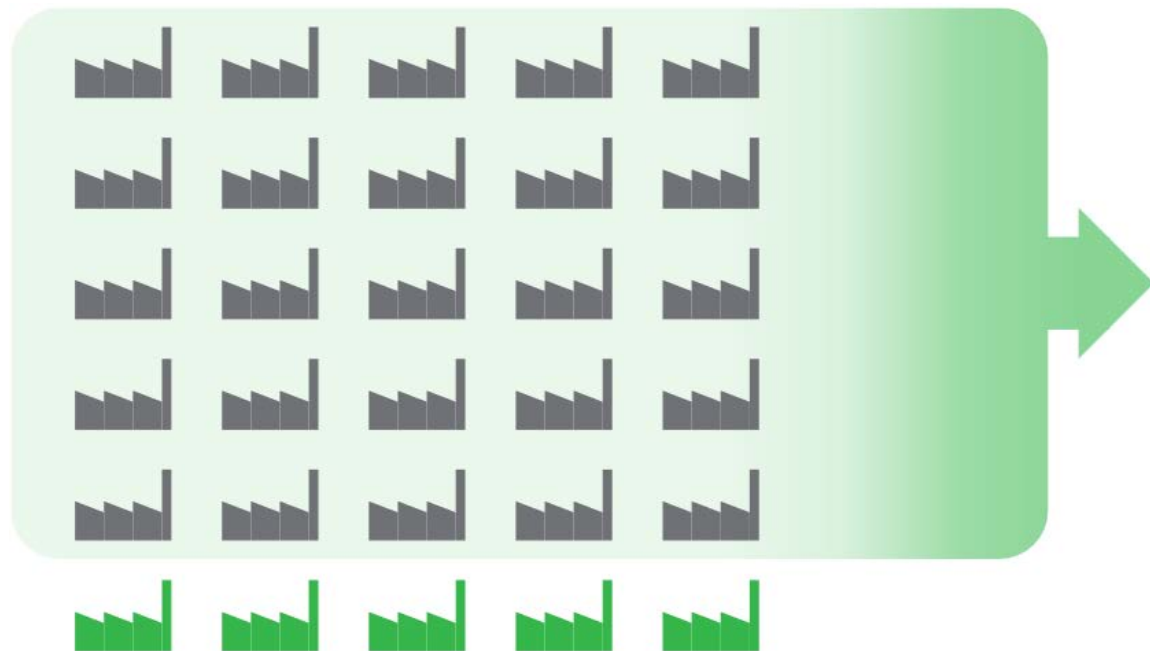


**Only 21 % of the 21.2 million heat generators are efficient and use renewable energy**

Source: BDH

## Industrial heat

300,000 systems with outputs ranging from 100 kW and 36,000 kW in the commercial sector in Germany

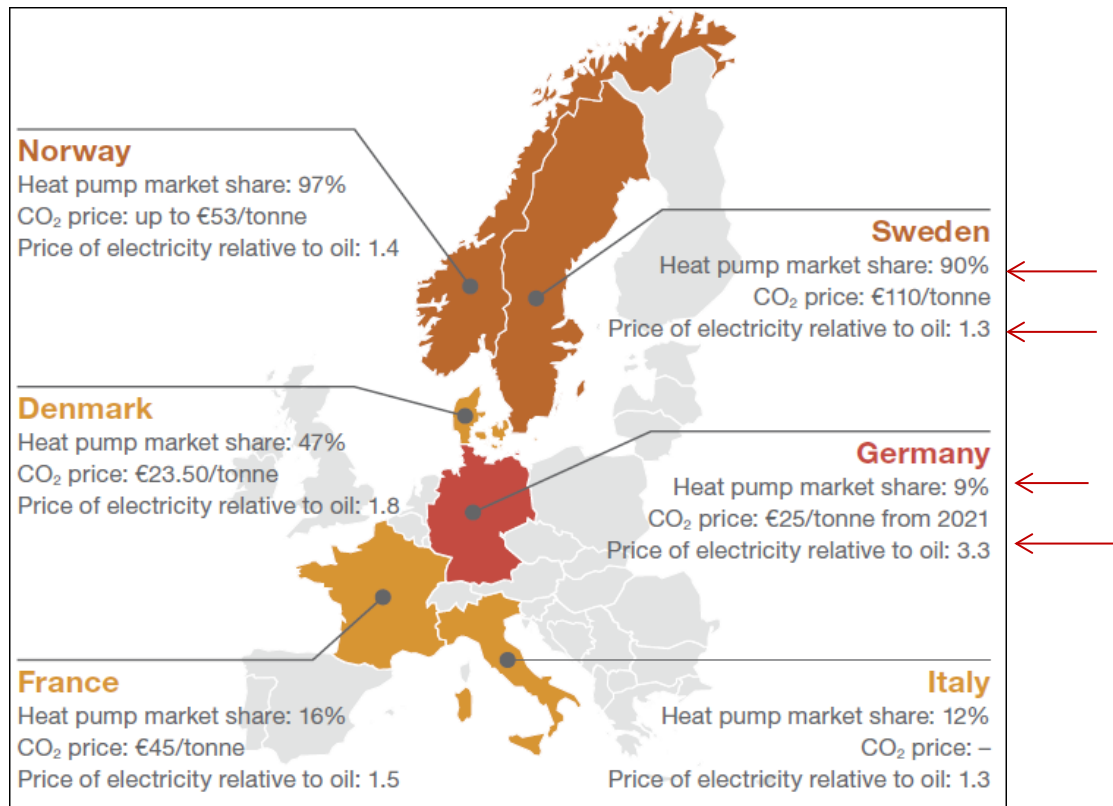


Saving  
**2 %**  
of the total German  
final energy con-  
sumption

Only 17 % of the systems are state of the art

Source: BDH

# Comparison for heat pumps in selected European countries



Source: bwp





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Roadmap Dekarbonisierung

Strategies

Leitpapier

Climate change act

Bundesförderung

Green Deal

Impulse paper

Förderprogramm

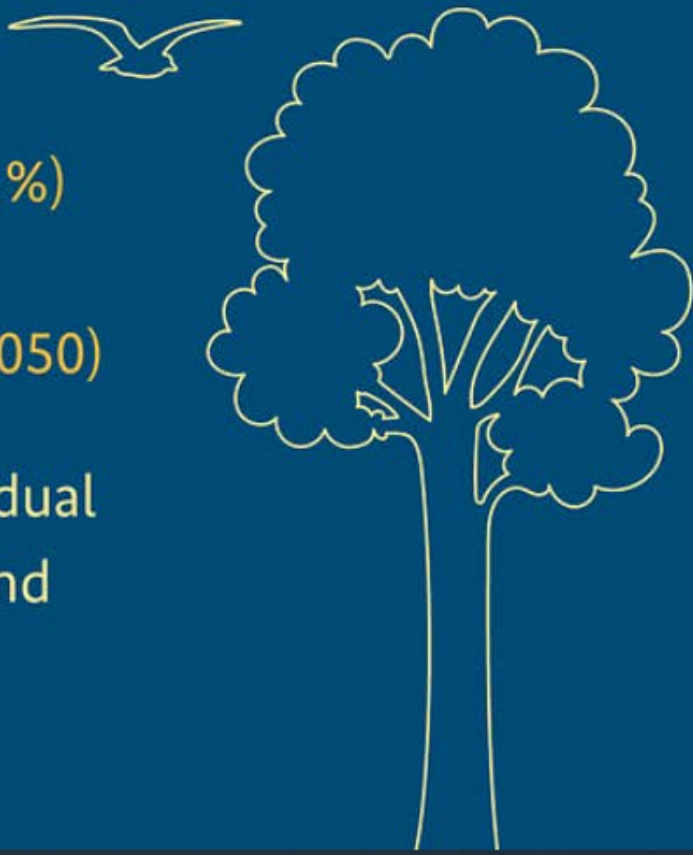
Climate protection act

Energiepreisreform



# Germany to achieve climate neutrality earlier

- Greenhouse gas emissions
  - By 2030: 65% less CO<sub>2</sub> (current target 55 %)
  - By 2040: 88% less CO<sub>2</sub>
  - 2045: Climate neutrality (current target 2050)
- Permissible annual CO<sub>2</sub> emissions for individual sectors such as energy, industry, transport and buildings to be reduced.



# Policy

- Climate Change Act 2020 2021 (amendment)
- Film: The German government's Climate Action Programme [Link](#)
- Germany is to cut its greenhouse gas emissions by 65 % of the 1990 levels by 2030.
- Since the start of 2020, a government scheme has rewarded property owners replacing older oil-fired central heating.



# Grants for "Heating with Renewable Energy"

Heating system	Building Stock		New Build
	Subsidy rate	Subsidy rate/bonus Replacement oil heating	Subsidy rate
1. Biomass- or Heat pump system	35%	45%	35%
2. Solar collector system	30%	-	30%
3. Renewable energy hybrid heating (combination of 1. + 2.)	35%	45%	35%
4. Gas hybrid heating, (combination gas-condensing boiler with 1. or 2.)	30%	40%	
5. Gas hybrid heating (combination gas- condensing boiler with subsequent addition of 1. or 2. within 2 years)	20%	-	

# Policy

Business associations:

**BDH**, BDEW, BWP, BVF, B.KWK, Geothermie, FGK, BTGA, VDMA,  
ZVEI, ZVSHK ...

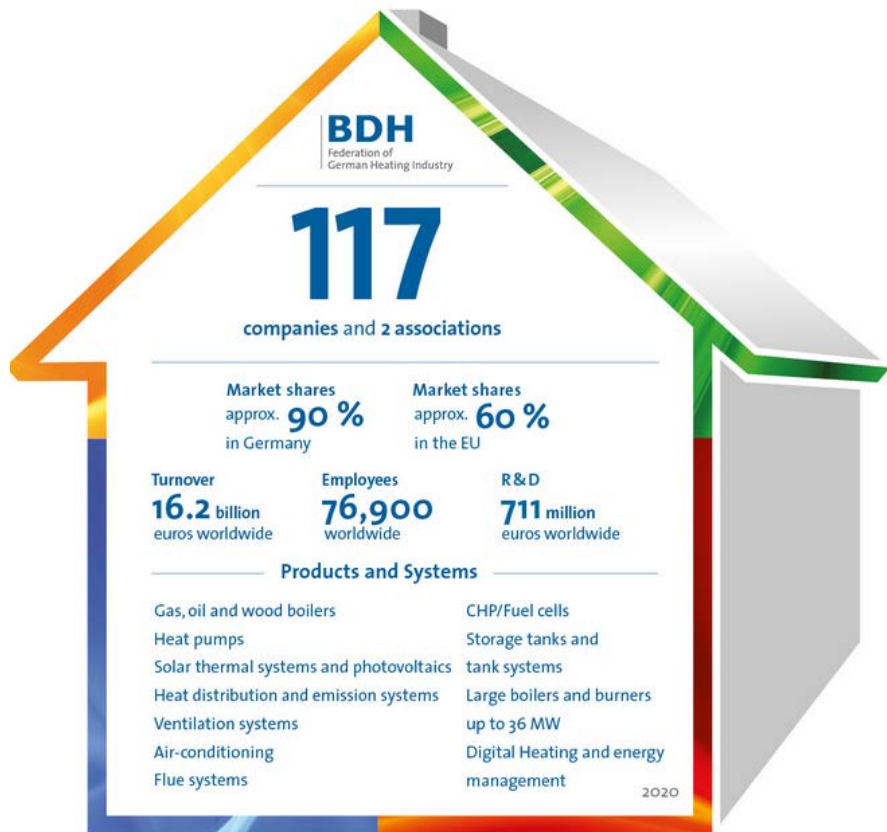
Technical societies:

DKV, FKT, IZW, VDI, VDE ...

This paper is not intended  
to be complete or definitive.



# BDH Federation of German Heating Industry



The German heating industry occupies a world-leading technological position

Source: BDH

[www.heatpumpingtechnologies.org](http://www.heatpumpingtechnologies.org)



# BDH Heat Generators

Source: BDH

**Gas condensing technology:** Modern gas condensing boilers are highly efficient and can make a decisive contribution to reducing your private energy consumption. [Read more](#)

**Oil condensing technology:** Modern oil fired condensing boilers make heating more environmentally friendly and efficient. [Read more](#)

**Heat pumps:** With a heat pump you can use the environmental heat that is present in the soil, in the ground-water and in the air for heating or cooling. [Read more](#)

**Hybrid Heat Pumps:** Hybrid HPs are suitable for use in new buildings as well as in existing buildings. [Read more](#)

**Solar thermal energy:** With a solar thermal system, sunlight is converted into heat. This can be used for heating and DHW heating. [Read more](#)

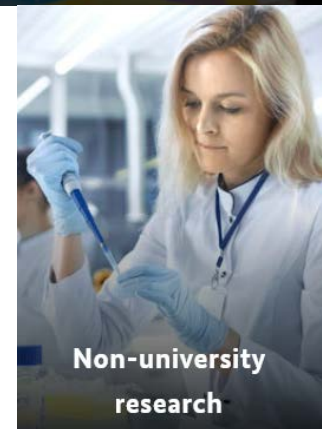
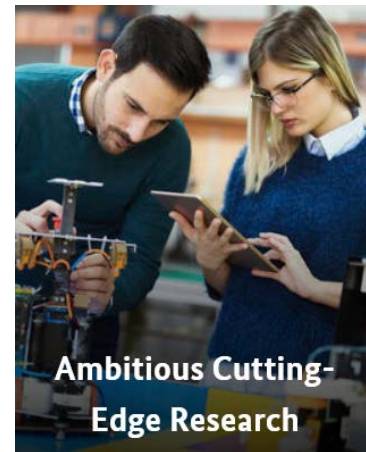
**Heat from wood:** Wood is a renewable resource that absorbs about as much CO<sub>2</sub> as it releases when burning. [Read more](#)

**Cogeneration of heat and power (CHP):** Heating which generates electricity, also known as decentralised CHP (cogeneration of heat and power), on the other hand, generates both electricity and heat at the same time. [Read more](#)



# Agenda

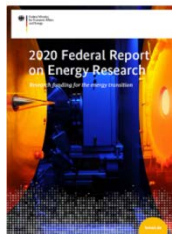
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Source: Facts

# Research

- The German government is aiming for a climate-neutral building stock by 2045. In order to achieve this goal, it is necessary to reduce the heat demand on the one hand and to achieve a climate-neutral heat supply on the other.
- The German government is therefore funding projects in the areas of research, development and demonstration as a part e.g. of the 7<sup>th</sup> Energy Research Program. ([Link](#)) [Report 2020](#) [Report 2019](#) [Report 2018](#)



Source: BMWi

## Research

- Since 2010, research projects in the fields of heat pump and refrigeration technology have been funded with more than **71 million €**.
- In the past few years, development has focused mainly on HPs for buildings (single-family houses, multi-family houses, non-residential buildings) and the main areas of development are refrigerants, components, integration and demonstration. There are also some projects addressing HPs for industry.
- Currently, another main topic is the generation of cold at temperatures below 0 °C by water-based absorption and adsorption processes.

Source: BMWi





## Research

- In addition, a major project on the topic of heat pumps in district heating networks "Reallabor GWP" has been started as of 01.04.2021. The Federal Ministry of Economic Affairs and Energy is funding this project with **21 million €**. [Link 1](#) [Link2](#) (only in German)

Source: BMWi



## R & D

- A large number of universities, research institutes and industrial companies are working on heat pump technologies in Germany.
- In particular, the Fraunhofer Institute for Solar Energy Systems ISE, the Technical University of Dresden and the E.ON Energy Research Center at RWTH Aachen University on the research side and Vaillant, Viessmann, Stiebel Eltron and Bosch-Thermotechnik on the industry side are to be mentioned.
- New Institutes for large energy systems:  
German Aerospace Center's (DLR) Institute of Low-Carbon Industrial Processes  
Fraunhofer Research Institution for Energy Infrastructures and Geothermal Systems (IEG)

This paper is not intended  
to be complete or definitive.

[www.heatpumpingtechnologies.org](http://www.heatpumpingtechnologies.org)



# Summary

- Heat pumps as heating systems are dominant in new build.
- There is further a great potential in the building stock.
- A government scheme rewards property owners replacing older oil-fired central heating.
- Air to water heat pumps have ~80 % market share.
- Great potential also in commercial + industrial applications
- High electricity prices in comparison to gas and oil are a strong barrier for HPs.



# Sources

- Facts about Germany <https://www.tatsachen-ueber-deutschland.de/en>
- BDH <https://www.bdh-industrie.de/en/>
- bwp <https://www.waermepumpe.de/>
- Bafa <https://www.bafa.de/EN/Energy/energy.html>
- Federal Government <https://www.bundesregierung.de/breg-en/issues/climate-action>
- BMWi [7<sup>th</sup> Energy Research Programme](https://www.bmwi.de/Redaktion/EN/Dossier/energy-transition.html)
- BMWi <https://www.bmwi.de/Redaktion/EN/Dossier/energy-transition.html>

