

Heat Transition

November 2023

Theme pipeline



PV



Onshore



Offshore



Heat



Smart networks



**Grid
expansion**



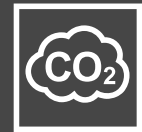
Mobility



Hydrogen



Gas/LNG



CCUS

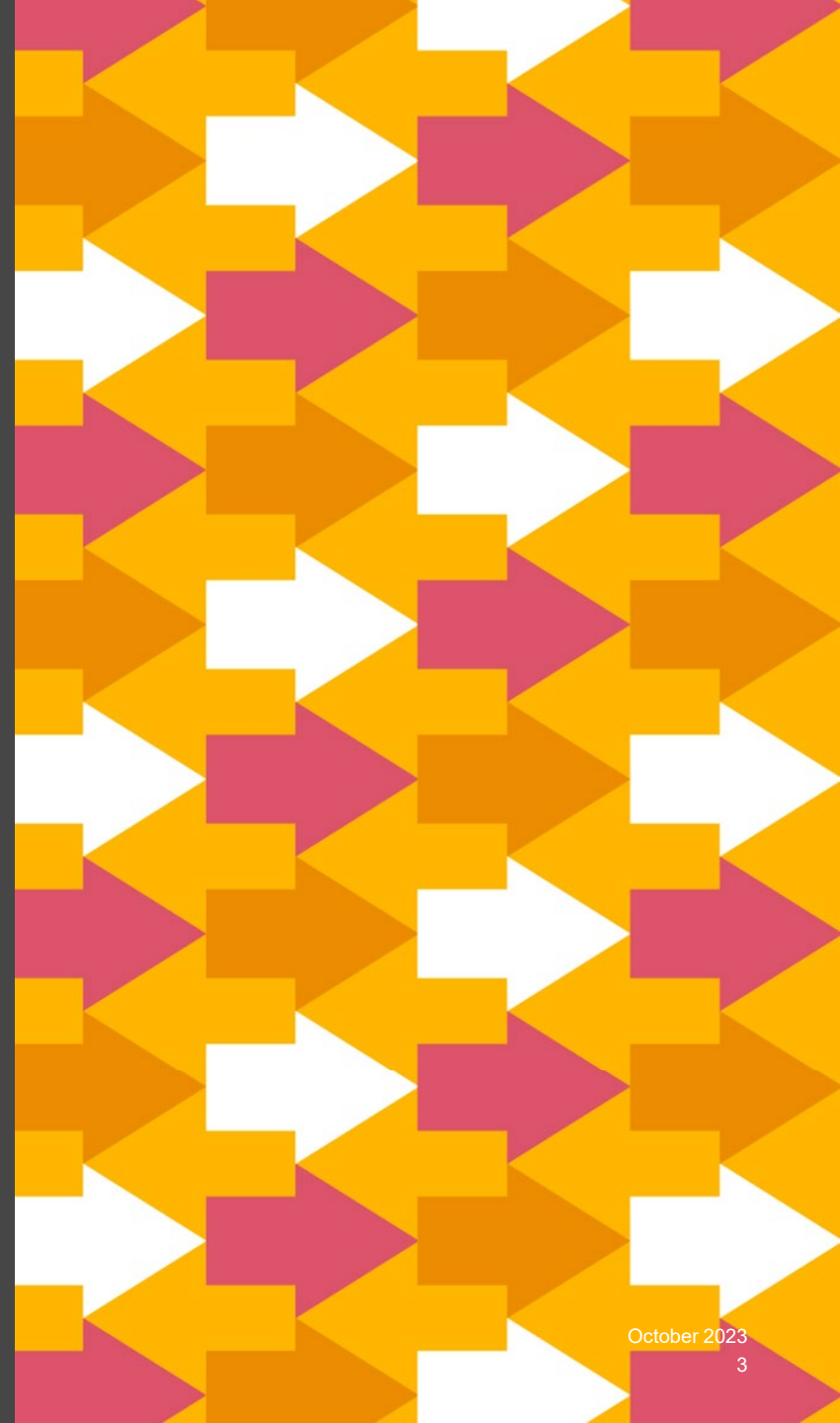
“

It is a generational task to completely decarbonise the heat supply.
That's why we have to start now.

Klara Geywitz

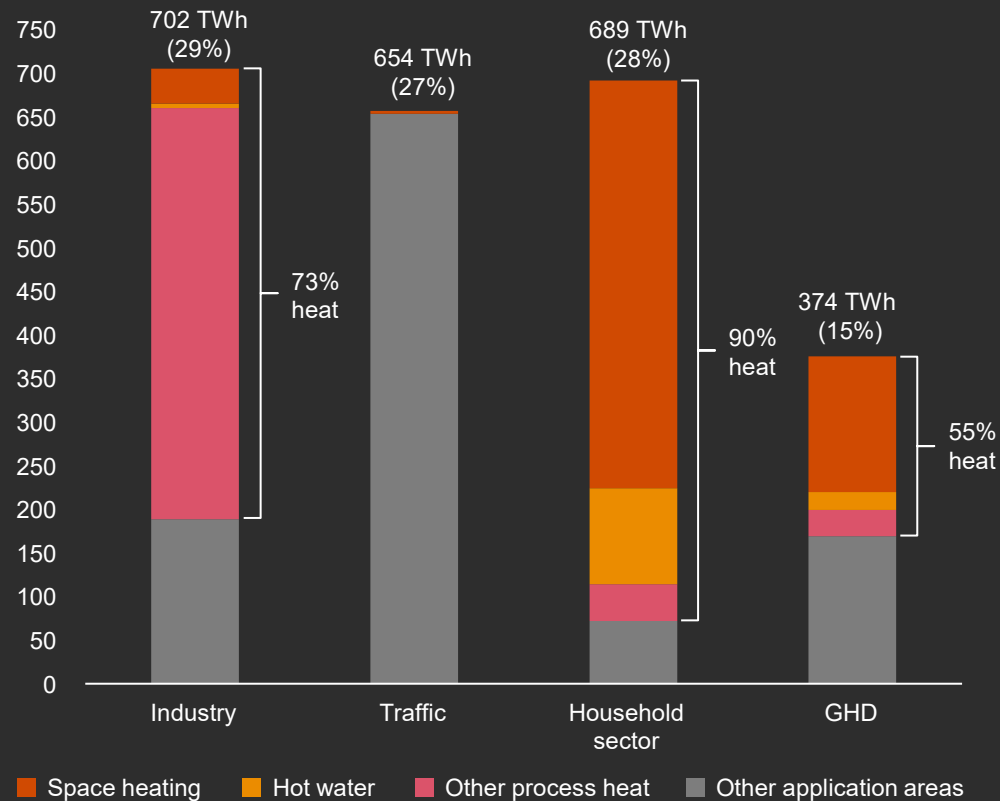
Federal Minister for Housing, Urban Development and Construction

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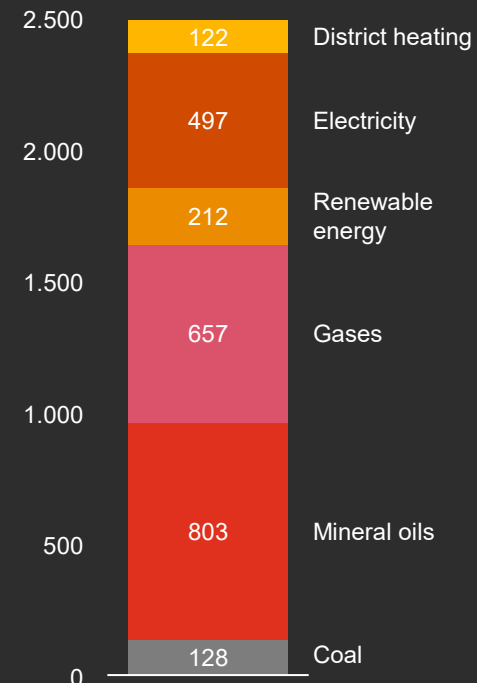


Heat accounts for a significant portion of final energy consumption in Germany

Final energy consumption per sector and application area



Final energy consumption per energy source in TWh

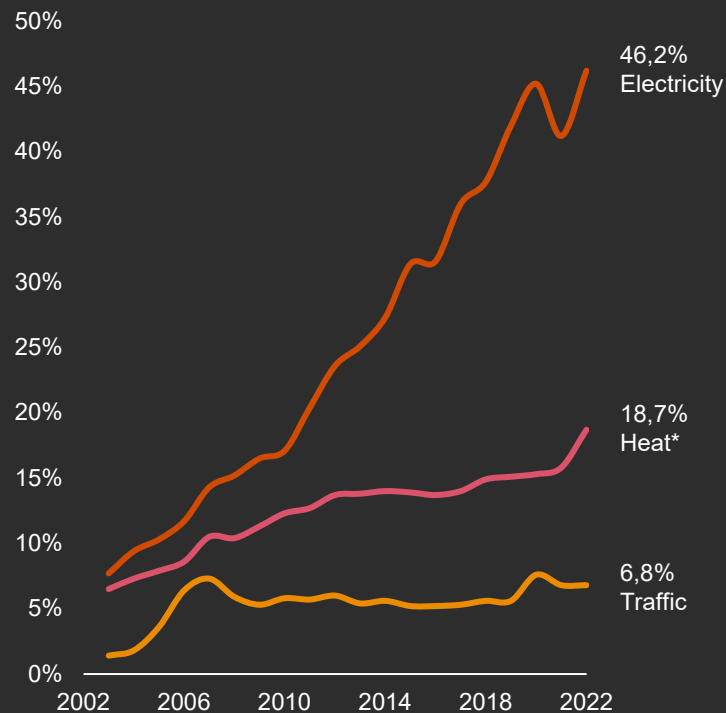


Key Takeaways

- The industrial (702 TWh) and household (689 TWh) sectors have the highest final energy consumption in Germany.
- The industrial sector has a heat share of 73% of final energy consumption. In the household sector, heat accounts for 90% of final energy consumption.
- Final energy consumption in Germany is currently still heavily influenced by fossil fuels. The energy sources mineral oils and gases account for the highest proportion of final energy consumption.

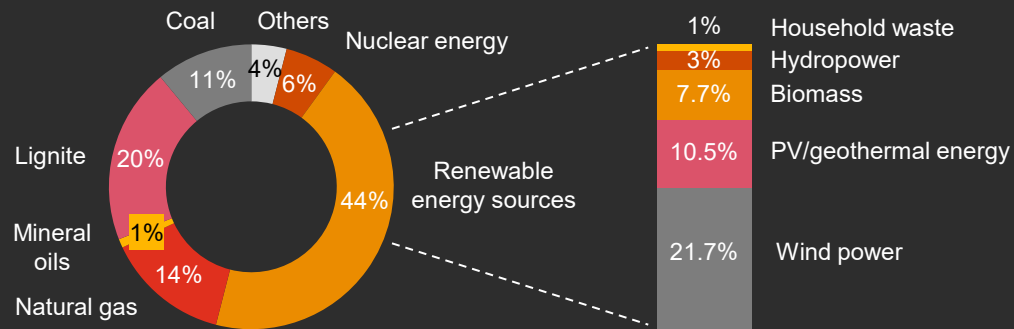
The heating sector in Germany demonstrates a comparatively low proportion of renewable energies

Renewable shares in the electricity, heat and traffic sectors

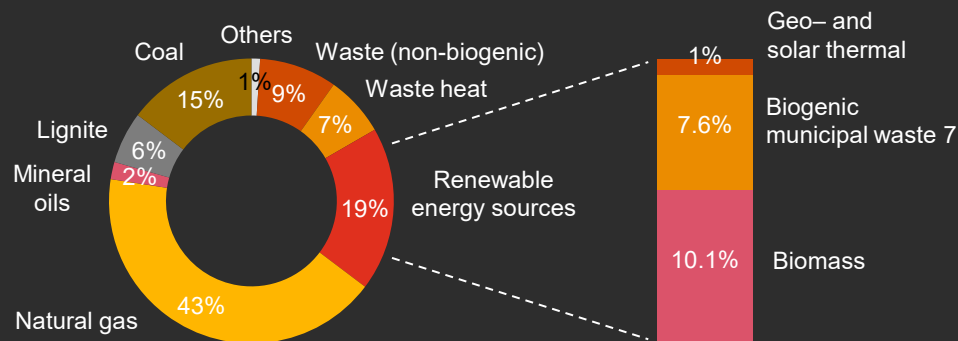


*The district heating/cooling supply as well as feed-in from industry and other market participants

Electricity generation per energy source



Heat generation* per energy source

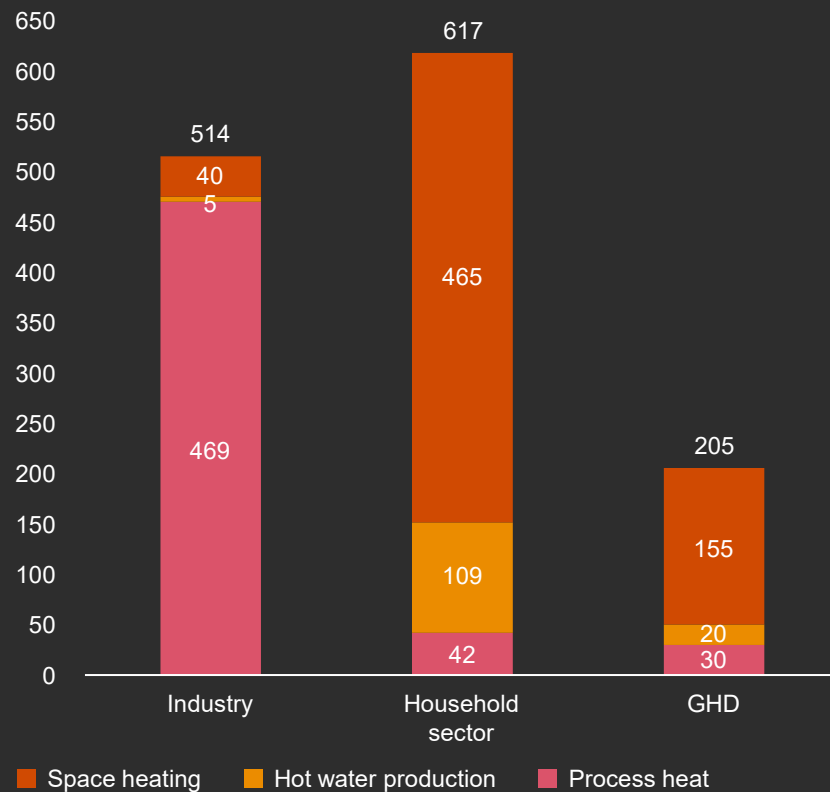


Key Takeaways

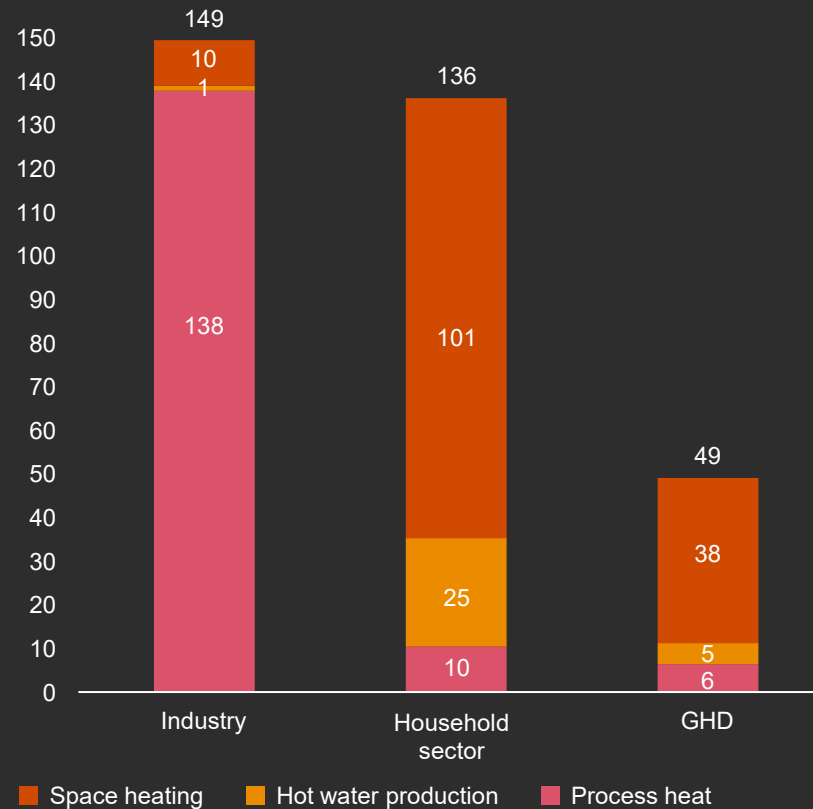
- The share of renewable energies in the electricity sector (approx. 46%) is more than twice as high as in the heating sector (approx. 19%).
- The small proportion of renewable energies in the heating sector shows that the sector clearly needs to catch up in order to achieve climate neutrality in Germany by 2045.

Households have the highest heat consumption, while industry has the highest heat-related emissions in Germany

Heat consumption in the sectors
in TWh



Heat-related emissions in the sectors
in million t CO₂

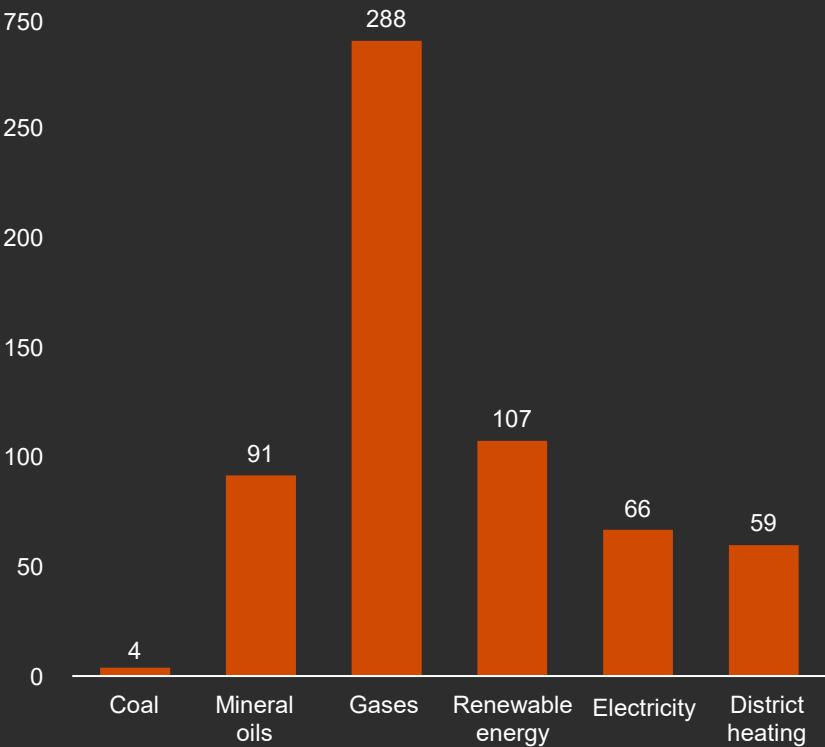


Key Takeaways

- The household sector has the highest heat consumption, while industry has the highest heat-related emissions.
- Within the household sector, space heating has the highest heat consumption at around 75%. Household hot water production, on the other hand, only accounts for around 18% of heat consumption.

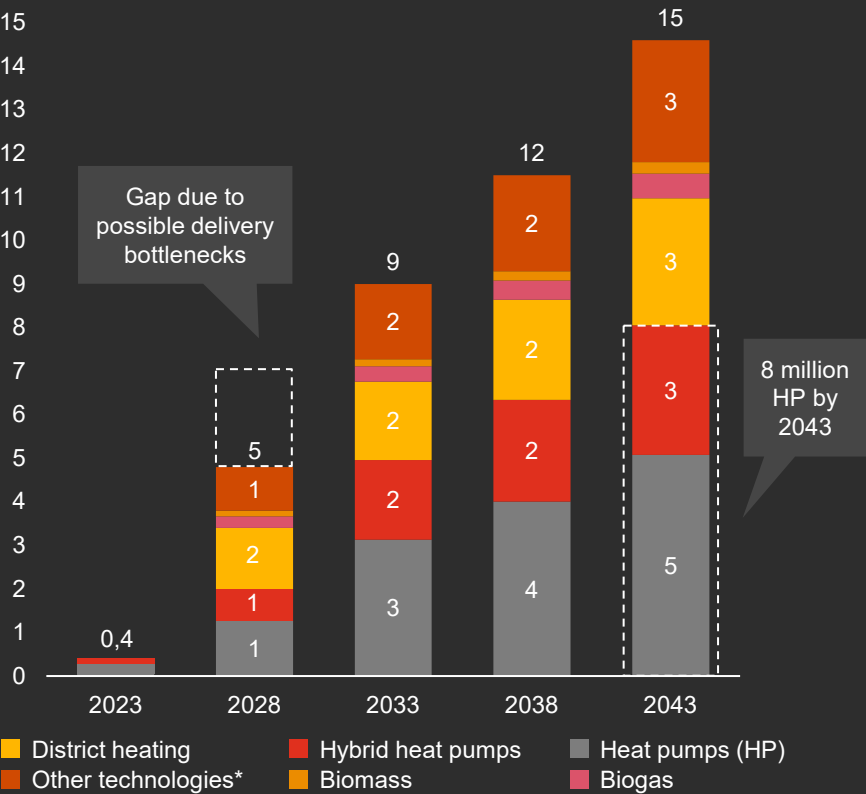
The heat supply of German households is currently largely dominated by gas heating

Heat consumption in households per energy source in TWh



Sources: AGEB Energy Balances 2021
Energy Transition Tracker – Heat Transition
PwC

Indicative projection of new installations per heating technology, in million



Source: IWU, Destatis, BDH 2022, own calculations
*Other technologies include direct electricity heating and heating with green hydrogen

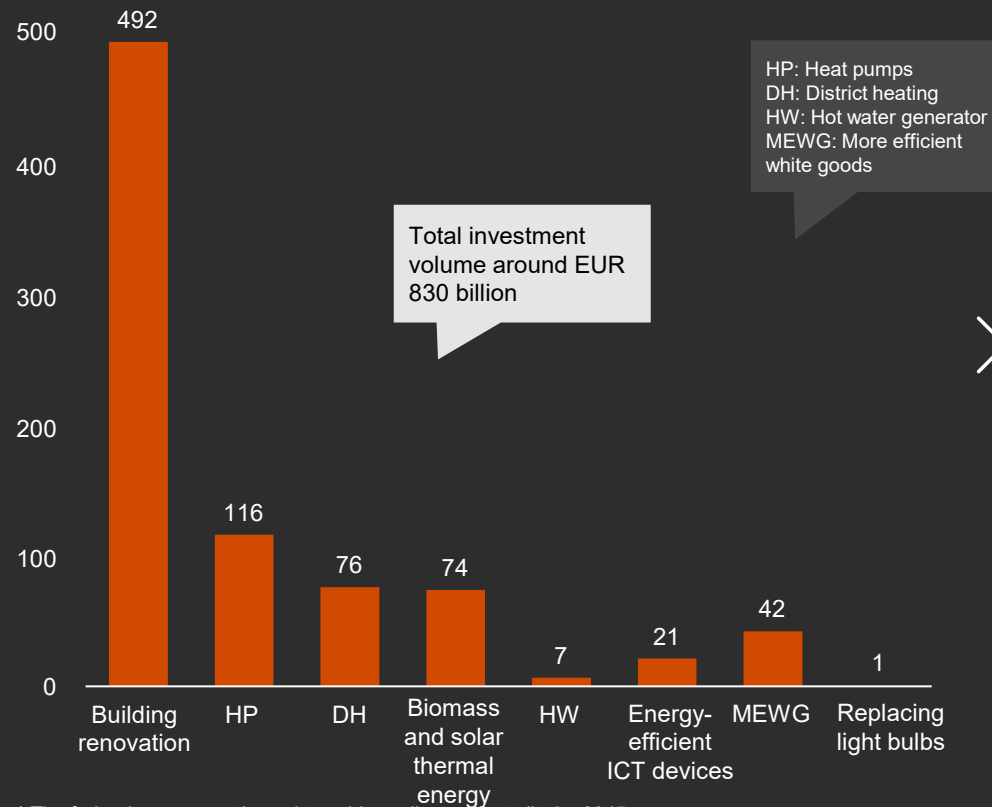


Key Takeaways

- Gas as an energy source dominates the heat supply for German households.
- An indicative projection of new installations of heating technologies to achieve climate neutrality by 2045 shows the particular importance of heat pumps for the household sector. To achieve climate neutrality in Germany by 2045, the installation of approx. 8 million heat pumps will be required.

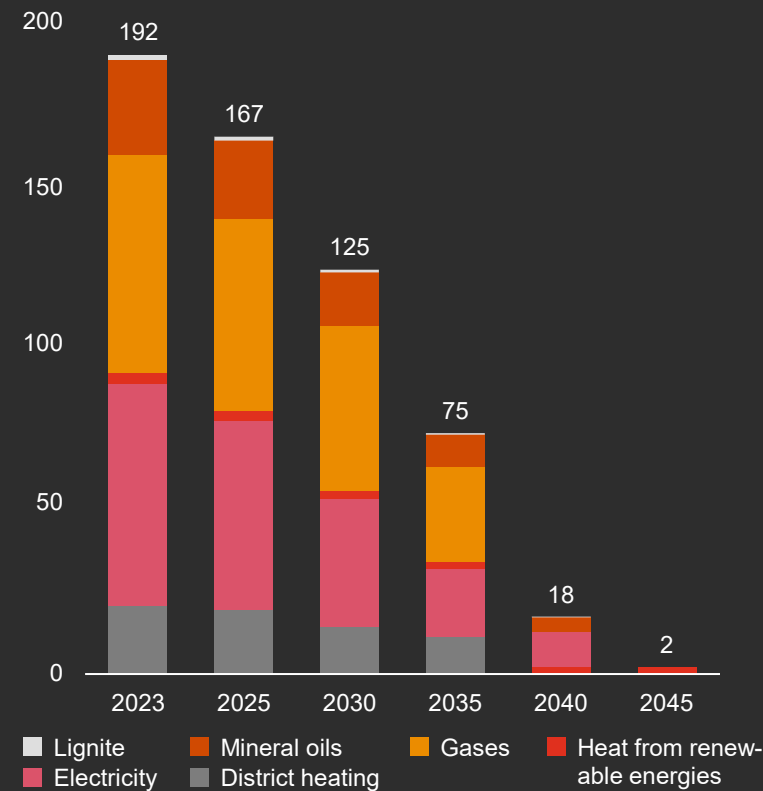
The goal of climate neutrality* can be achieved by 2045 through investments in households amounting to approximately EUR 830 billion

Investment costs of climate protection measures in households by 2045* in billion euros



* The federal government's goal to achieve climate neutrality by 2045

Development of household GHG emissions in million t CO₂ equivalents

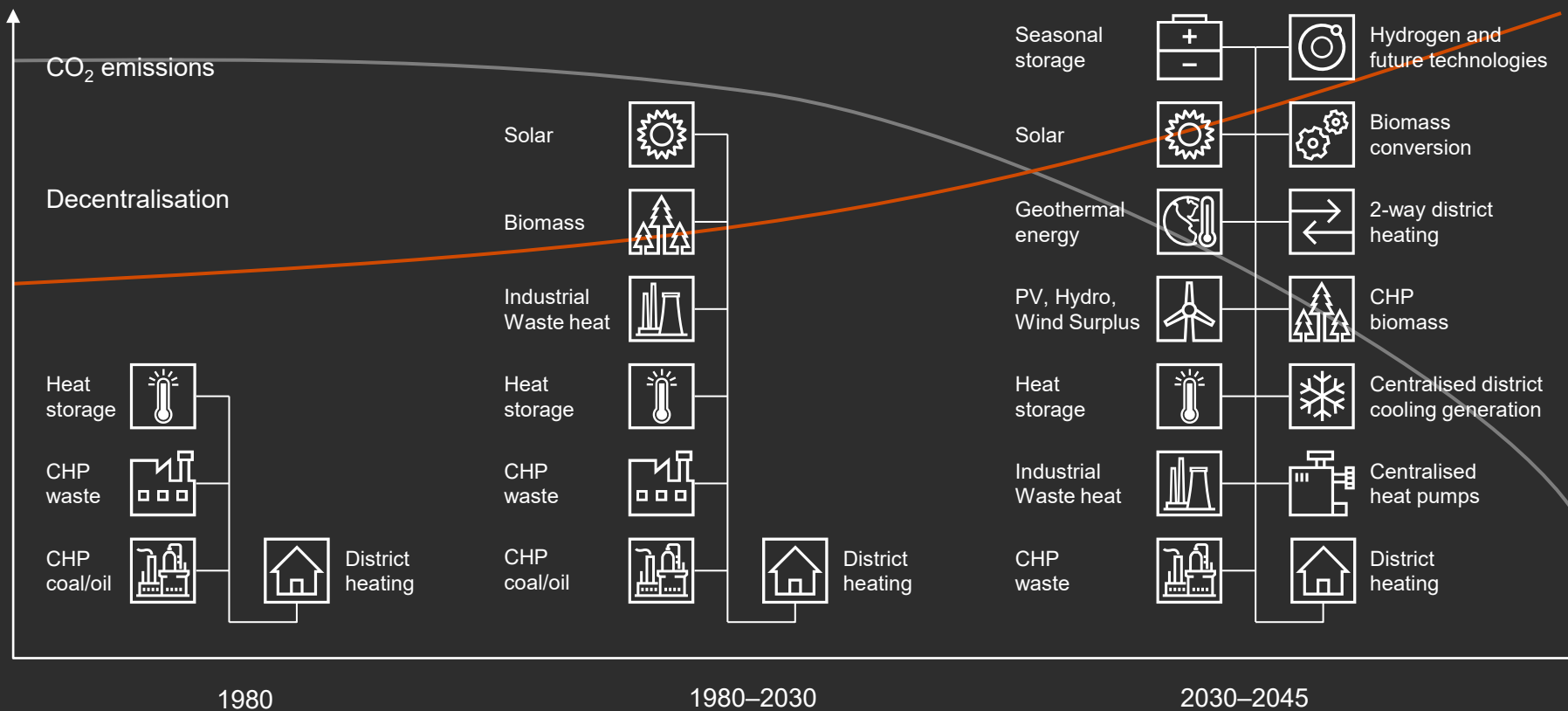


Key Takeaways

- Households' greatest investment needs in terms of decarbonisation lie in building renovations and switching to climate-friendly heating technologies, e.g. heat pumps.
- With a total investment volume of around EUR 830 billion, the goal of a climate-neutral household sector can be achieved by 2045.
- By 2035, household GHG emissions could be reduced to more than half compared to 2023.

District heating in Germany shows an important trend towards decentralisation

District heating in Germany



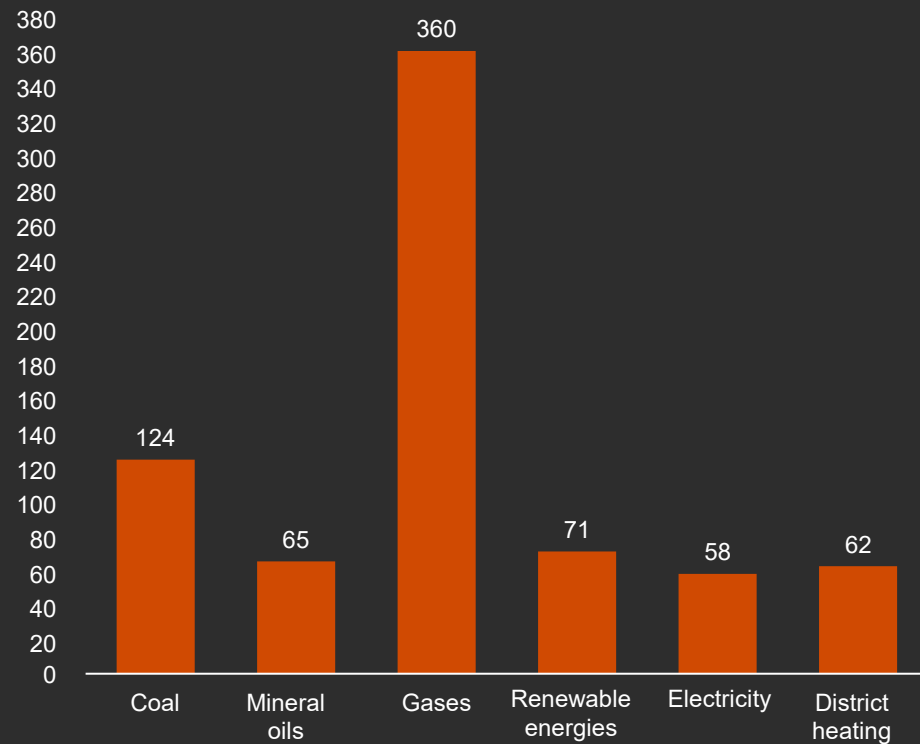
Key Takeaways

- Increasing decentralisation of district heating
- Increased integration of fluctuating or renewable generation sources
- Complex control of the systems
- Economic and ecological assessment of expansion of district heating networks

Through various energy efficiency measures and switching energy sources, a significant reduction in CO₂ emissions from industry is possible

Example

Heat consumption in industry and GHD per energy source in TWh



Example transformation path for the metal and electrical industries

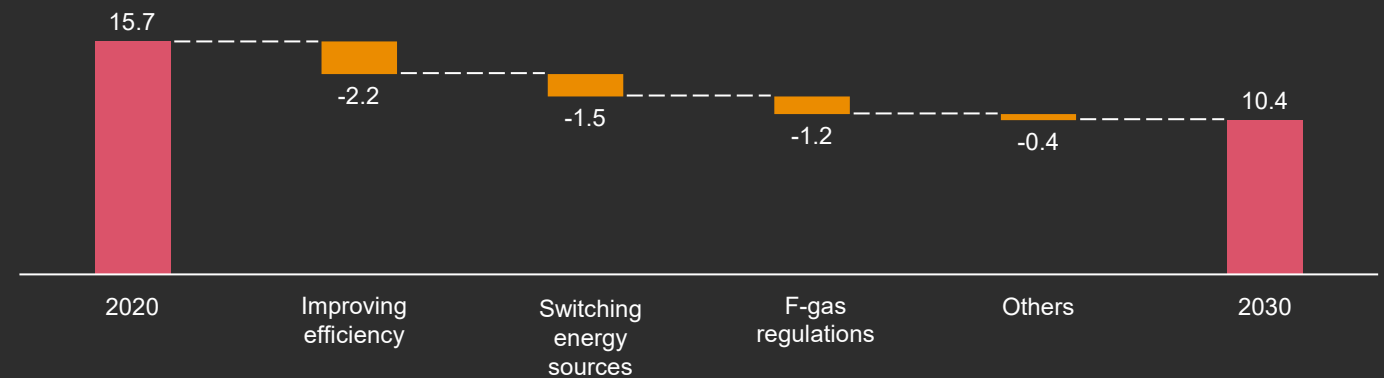
Initial situation:

- 1/3 of emissions are combustion-related, 2/3 are process-related

Overarching measures (selection):

- Improving efficiency through the use of cross-sectional and process technologies (“Efficiency First”)
- Reducing CO₂ intensity by switching energy sources (e.g. from oil to biogas)
- Reduction of process-related emissions, e.g. through F-gas regulations

Million t CO₂ eq.



Current national and Europe-wide legislation accelerates decarbonisation and sets important guardrails



Federal funding for efficient heating networks



- Today, district heating production is still predominantly fossil-based. The goal is to use a total of 50% climate-neutral heat by 2030. Given the current share of renewable energies (17.4%), decisive impulses must be given in the next seven years.
- Federal funding for efficient heating networks (BEW) promotes the construction of new heating networks with a high share of renewable energy as well as the decarbonisation of existing networks. Feasibility studies and transformation plans are specifically funded to examine feasibility and economic viability.



Laws for heat planning and decarbonisation of the heating networks



- Municipal heat planning lays the foundation for the strategic planning and steering of the heat transition at the local level. Its main goal is to address the challenges of a comprehensive, climate-neutral heat supply in a targeted manner using defined steps. In this way, planning security can be guaranteed for citizens and other municipal stakeholders.
- Currently, obligations exist in various federal states to create municipal heat planning. The federal government has also published a draft law that will require municipalities across Germany to create heat planning.



Amendment to the Building Energy Act



- The Building Energy Act (GEG) regulates requirements for energy efficiency and the use of renewable energies in buildings in Germany.
- From January 2024, installed heating systems in new buildings located in new development areas must operate with at least 65% renewable energies. In existing buildings and new buildings outside of new development areas, the installation of fossil-fueled heating systems is allowed until a municipal heating plan has been submitted.



Energy Performance Buildings Directive



- The Energy Performance of Buildings Directive (EPBD) aims to improve the energy efficiency of buildings in its member states. The main objectives of the directive are to promote energy efficiency and reduce greenhouse gas emissions by setting minimum standards for energy consumption in new and existing buildings. For example, the EPBD envisages emission-free new buildings from 2028.
- The EPBD requires EU member states to adopt and implement regulations that address various aspects of the energy performance of buildings, such as heating, cooling, ventilation, lighting and insulation. It also requires the creation of energy certificates that provide information on the energy efficiency of a building for potential buyers or tenants.

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