



Future of District heating in Germany

Hungarian District Heating Conference 2023

Raphael Schenkel | European Affairs | 06.11.2023

AGFW | Energy efficiency association for heating, cooling and CHP
www.agfw.de



- » **AGFW** is an independent, impartial German association promoting energy efficiency, (district) heating, cooling and CHP – Combined Heat and Power – at national and international levels
- » **AGFW** comprises more than **670** regional and municipal energy suppliers, consultants, experts manufacturing companies including component and system manufacturers, assembling companies and testing institutes within Germany and Europe
- » **AGFW** represents 95% of the heat load connected to German district heating systems – the largest scale in Western Europe
- » **AGFW** with more than five decades of expertise in the district heating sector, covers the entire process chain of efficient district heating, district cooling and CHP

- » **District Heating & Cooling in Germany**
- » **EU legislation for DHC**
- » **National legislation for DHC**
- » **BEW: Funding policy for DHC**

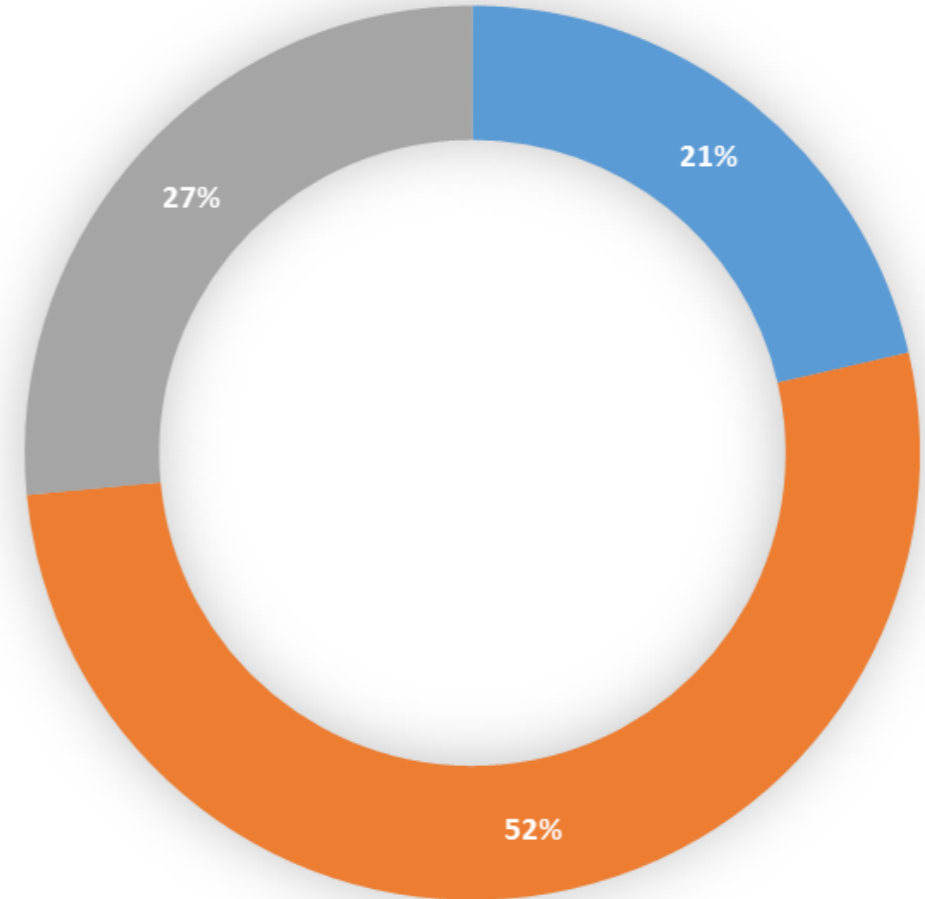
District Heating and Cooling in Germany

The dominant energy consumption in Germany is in the **heating sector**

Total energy consumption in Germany **2.277 TWh** (in 2020)

Data for German DH in 2020:
Current share of district heating in the building sector: **14 %**

Trench length: **31.252 km**
Installed capacity: **49.822 MWth**
Total DH production: **125.034 GWh**



■ Electricity ■ Heating & Cooling ■ Traffic

» Heat generation for heating networks by energy source in Germany 2020; AGFW report with official data

» CHP production: 86 %

» Heating plants: 14 %

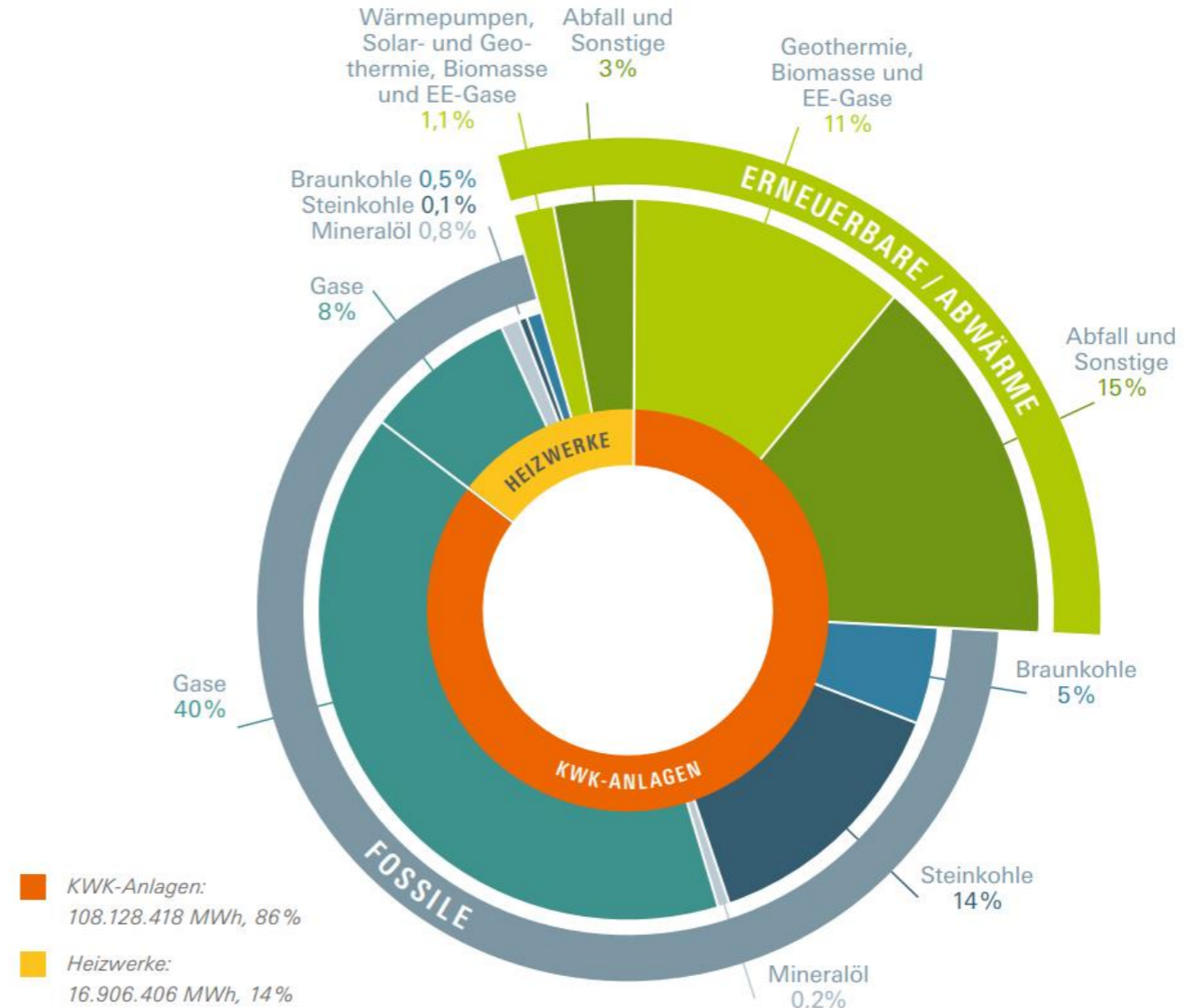
- High share of CHP in German DHC

» Climate-neutral heat (including all renewable sources & waste heat / waste incineration):

- already at 30 %

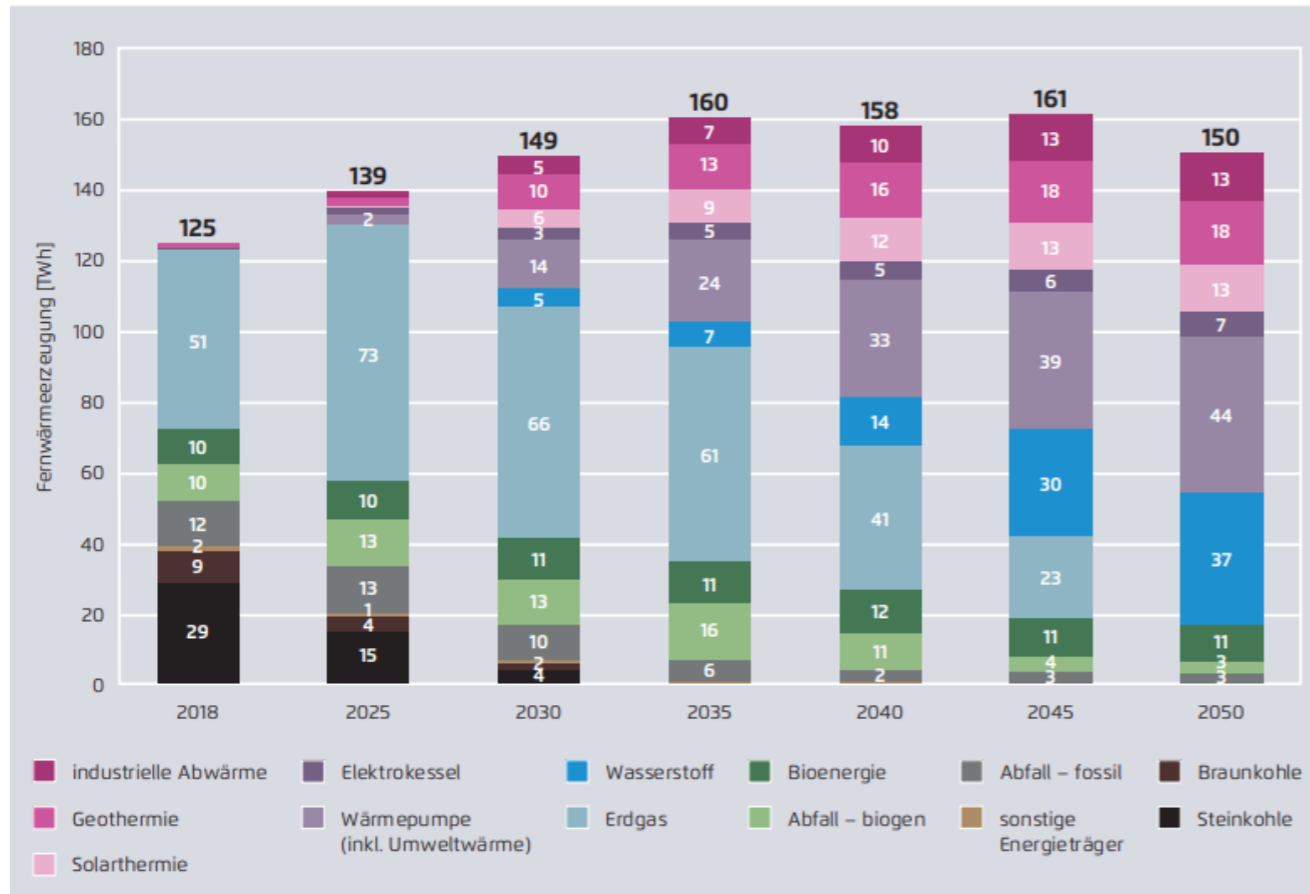
» Heat generated from fossil fuels: 69 %

- 48 % natural gas; 20 % coal; 1 % oil.



» Study „Klimaneutrales Deutschland“ by Agora Energiewende & Prognos (2021)

- Detailed projection for future DHC production in Germany for target years from 2018 until 2050



» DHC Sources in order of appearance

- Industrial waste heat
- Geothermal
- Solar thermal
- E-boiler
- Heat pump (including ambient heat)
- Hydrogen
- Natural gas
- Bioenergy
- Waste – biological
- Waste – fossil
- Others
- Lignite
- Coal

» In 2050: diverse mix of renewable sources & waste heat will fully cover DHC production

The ideal picture of a successful heat transition



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... the reality in big cities ...



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... and in small cities/rural areas



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... this means that instruments and laws need to be more closely focused on local circumstances

- » **District Heating Summit** on 12.06.2023: Energy, building and consumer associations met with two German federal ministries (BMWK, BMWWSB) to discuss the future of DHC in Germany.
- » The **expansion and conversion of district heating** is of outstanding importance for achieving the **goal for climate-neutrality in Germany by 2045**, which leads to a “**decarbonisation**” of the heat supply.
- » Heating networks can be a **flexible and** - compared to other types of heating - a particularly **cost-efficient, climate-neutral solution** for the heat supply of municipalities or urban districts.
- » Therefore, the current **legal and funding policy framework should be improved**.
- » **Concrete goal following DHC Summit**: the number of **connected buildings by 2045 compared to today will approximately triple**. At least **100.000 buildings should be connected to heating networks every year**.

Facts about German DHC

- » **75 %** of the global pollutants are **emitted in cities** (mostly major cities and metropolitan areas)*
- » Cities which have developed **DH in favor of individual heating** (oil, natural gas, coal) were able to significantly **lower their air pollutants** (CO₂, CO, SO₂, NO_x, particulate matter)*
- » The DHC sector in Germany has always been advocating for an **efficient, environmentally friendly and secure heating supply** at fair market conditions
- » Around **56 % of the space heat** in German residential and administrative buildings is **suitable for district heating** supply**
- » **Investments in these future-proof technologies have to be realized today** in order to be **effective in the following 60 years** and provide security of supply for our citizens

* source: IEA – International Energy Agency

** source: BEI - Bremer Energie-Institut in order of the German Ministry of Industry and Energy

EU legislation

Energy Efficiency Directive – EED – Article 26(1)

Definition for efficient district heating & cooling systems:

- » *until 31 December 2027, a system using at least 50% renewable energy, 50% waste heat, 75% cogenerated heat or 50% of a combination of such energy and heat;*
- » *from 1 January 2028, a system using at least 50% renewable energy, 50% waste heat, 50% renewable energy and waste heat, 80% of high-efficiency cogenerated heat or at least a combination of such thermal energy going into the network where the share of renewable energy is at least 5% and the total share of renewable energy, waste heat or high-efficiency cogenerated heat is at least 50%;*
- » *from 1 January 2035, a system using at least 50% renewable energy, 50% waste heat, 50% renewable energy and waste heat or a system, where the total share of renewable energy, waste heat or high-efficiency cogenerated heat is at least 80% and in addition the total share of renewable energy or waste heat is at least 35%;*
- » *from 1 January 2040, a system using at least 75 % renewable energy, 75 % waste heat or 75 % renewable energy and waste heat, or a system using at least 95 % renewable energy, waste heat and high-efficiency cogenerated heat and in addition the total share of renewable energy or waste heat is at least 35 %;*
- » *from 1 January 2045, a system using at least 75 % renewable energy, 75 % waste heat or 75 % renewable energy and waste heat;*
- » *from 1 January 2050, a system using only renewable energy, only waste heat, or only a combination of renewable energy and waste heat.*

Article 24 - District heating and cooling

- » 4. Member States shall **endeavour to increase the share of energy from renewable sources and from waste heat and cold in district heating and cooling by an indicative 2.2 percentage points** as an annual average calculated for the period 2021 to 2030, starting from the share of energy from renewable sources and from waste heat and cold in district heating and cooling in 2020, and shall lay down the measures necessary in their integrated national energy and climate plans to that end. The share of renewable energy shall be expressed in terms of share of gross final energy consumption in district heating and cooling adjusted to normal average climatic conditions.

- » 4a. Member States shall ensure that operators of district heating or cooling systems above 25 MWth capacity **are encouraged to connect third party suppliers** of energy from renewable sources and from waste heat and cold or are encouraged to offer to connect and purchase heat or cold from renewable sources and from waste heat and cold from third-party suppliers based on non-discriminatory criteria set by the competent authority of the Member State concerned, where such operators need to do one or more of the following:
 - (a) meet demand from new customers;
 - (b) replace existing heat or cold generation capacity;
 - (c) expand existing heat or cold generation capacity.’;

- » 5. Member States **may allow an operator of a district heating or cooling system to refuse to connect and to purchase heat or cold from a third-party supplier in any of the following situations:**
 - (a) *the system lacks the necessary capacity due to other supplies of heat or cold from renewable sources or of waste heat and cold;*
 - (b) *the heat or cold from the third-party supplier does not meet the technical parameters necessary to connect and ensure the reliable and safe operation of the district heating and cooling system;*
 - (c) *the operator can demonstrate that providing access would lead to an excessive heat or cold cost increase for final customers compared to the cost of using the main local heat or cold supply with which the renewable source or waste heat and cold would compete*
 - (d) *the operator's system meets the definition of efficient district heating and cooling set out in [Article x of the proposed recast of the Energy Efficiency Directive].*

- » *Member States shall ensure that, when an operator of a district heating or cooling system refuses to connect a supplier of heating or cooling pursuant to the first subparagraph, information on the reasons for the refusal, as well as the conditions to be met and measures to be taken in the system in order to enable the connection, is provided by that operator to the competent authority. Member States shall ensure that an appropriate process is in place to remedy unjustified refusals.*

National legislation

"...We will advocate comprehensive municipal heat-planning and the expansion of heating networks. We are aiming for a very high proportion of renewable energies for heating and we want to generate 50 percent of the heat in a climate-neutral manner by 2030..."

**Start 2020:
Coalition contract**

Replacement Power Plant Availability Act (EKBG), Energy Security Act (EnSiG)

Municipal heat planning

Heating network expansion & transformation
50 % climate neutral heating in 2030; 30 % heating networks

Federal funding for efficient heating networks (BEW) and efficient buildings (BEG)

- Relief measures**
- Gas procurement contribution,
 - storage contribution,
 - VAT reduction,
 - heat price reduction



Quelle: iStock 1301770011

» **Aim of the Law**

- economic and socially acceptable measures for the efficient use of energy as well as the **increasing use of renewable energies or unavoidable waste heat for the energy supply of buildings**
- **General rule: 65% minimum quota for renewable energies and waste heat for heating systems put into operation.** Also applies to existing buildings when heating systems are replaced. Requirements can be fulfilled by:
 - **Connection to district heating**
 - Usage of heat pumps
 - Usage of direct electric heating
 - Usage of solarthermal heating
 - Usage of biomass and hydrogen
 - There are specific requirements for each technology (e. g. characteristic efficiencies)

» **Specific requirements for DH**

- Regulated in Heat Planning Act (WPG)

- » **Requirements** for shares of renewable energies and waste heat in existing DHC networks for annual net heat generation:
 - From 2030: at least **30 % from renewable energies and/or unavoidable waste heat**
 - From 2040: at least **80 % from renewable energies and/or unavoidable waste heat**
 - By 2045: **Complete climate neutrality of the heating networks**
 - **New DHC networks:** 65 % from renewable energies and/or unavoidable waste heat **by 2024**

- » **Rules for specific DHC fuels**
 - In theory: **all sources of renewable energy and unavoidable waste heat are allowed**
 - **Biomass:** limit for larger DHC networks, e.g. only 15% biomass in DH networks above 50 km allowed
 - **Waste incineration:** only partly recognised as „unavoidable waste heat“, commercial waste not recognised

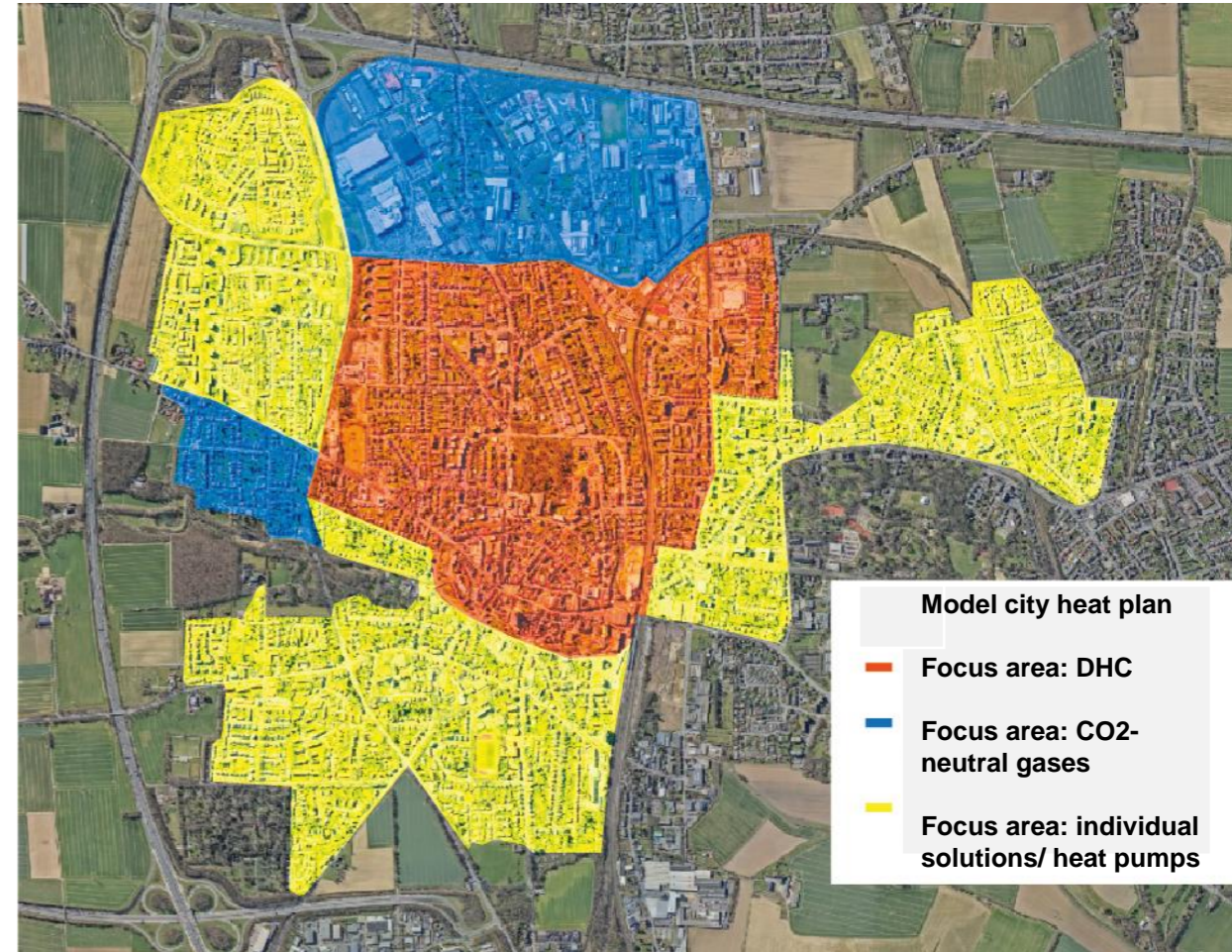
All German municipalities: **must formulate heat planning for future target scenario of climate neutrality by 2045**

Deadlines for municipalities for heat plans:

- June 2026 (above 100.000 inhabitants)
- June 2028 (below 100.000 inhabitants)

How can the target be achieved?

- Identify conditions and measures
- Outline of different sub-areas (focus areas)
- Formulation of an implementation strategy



Climate Protection Act – German Climate Neutrality by 2045

EU - EED

Heat Planning Act

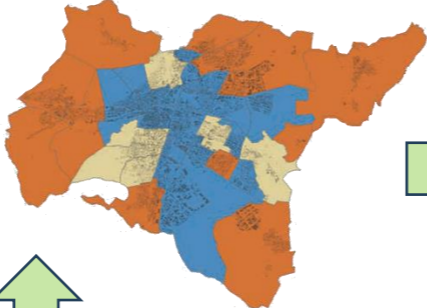
Municipal heat planning for

- cities
- municipalities

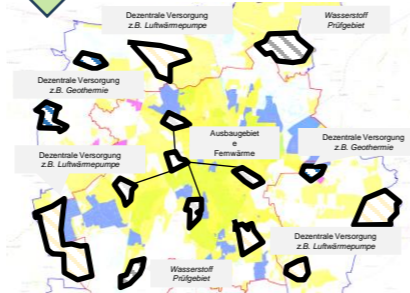
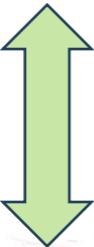
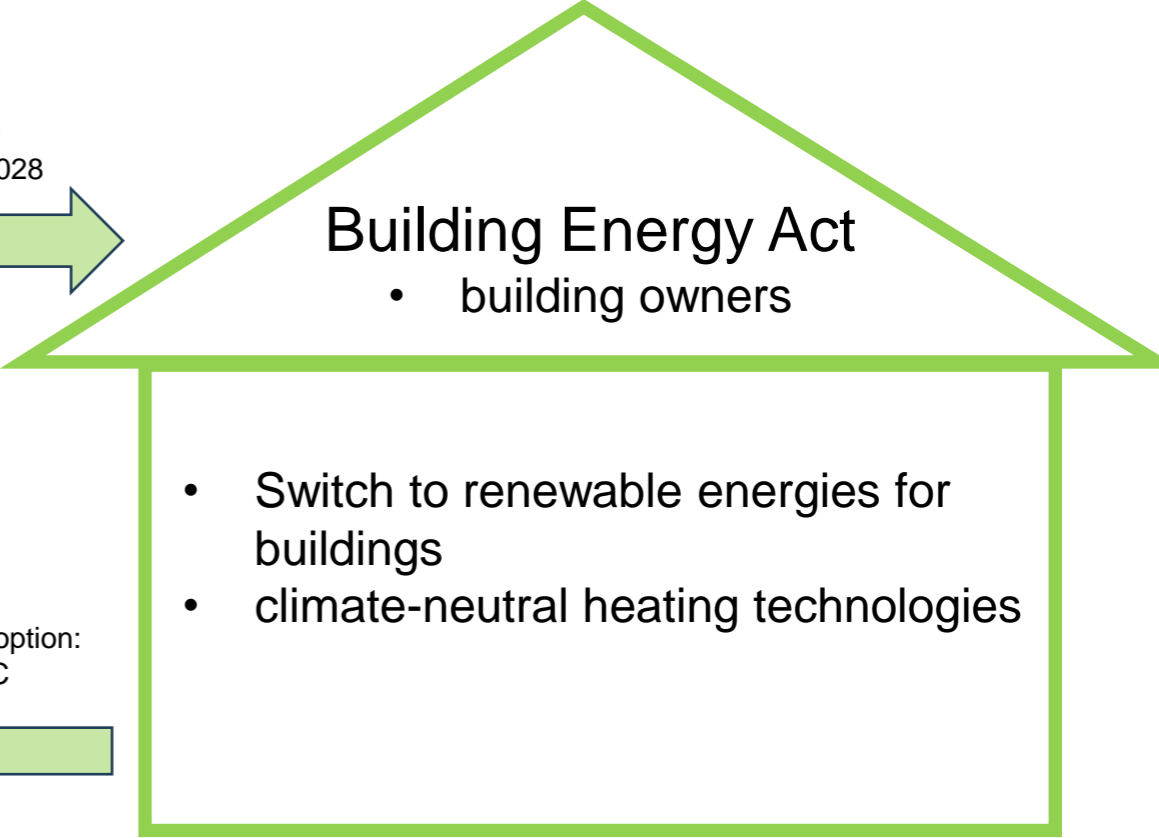
- Organised on site with local conditions in mind
- Binding plans/ certainty for providers

Transformation plan:

- Utilities: for DHC & gas



until 2026/2028



Possible option: DHC

BEW: DHC operators Funding programmes BEG: building owners

Funding program: BEW

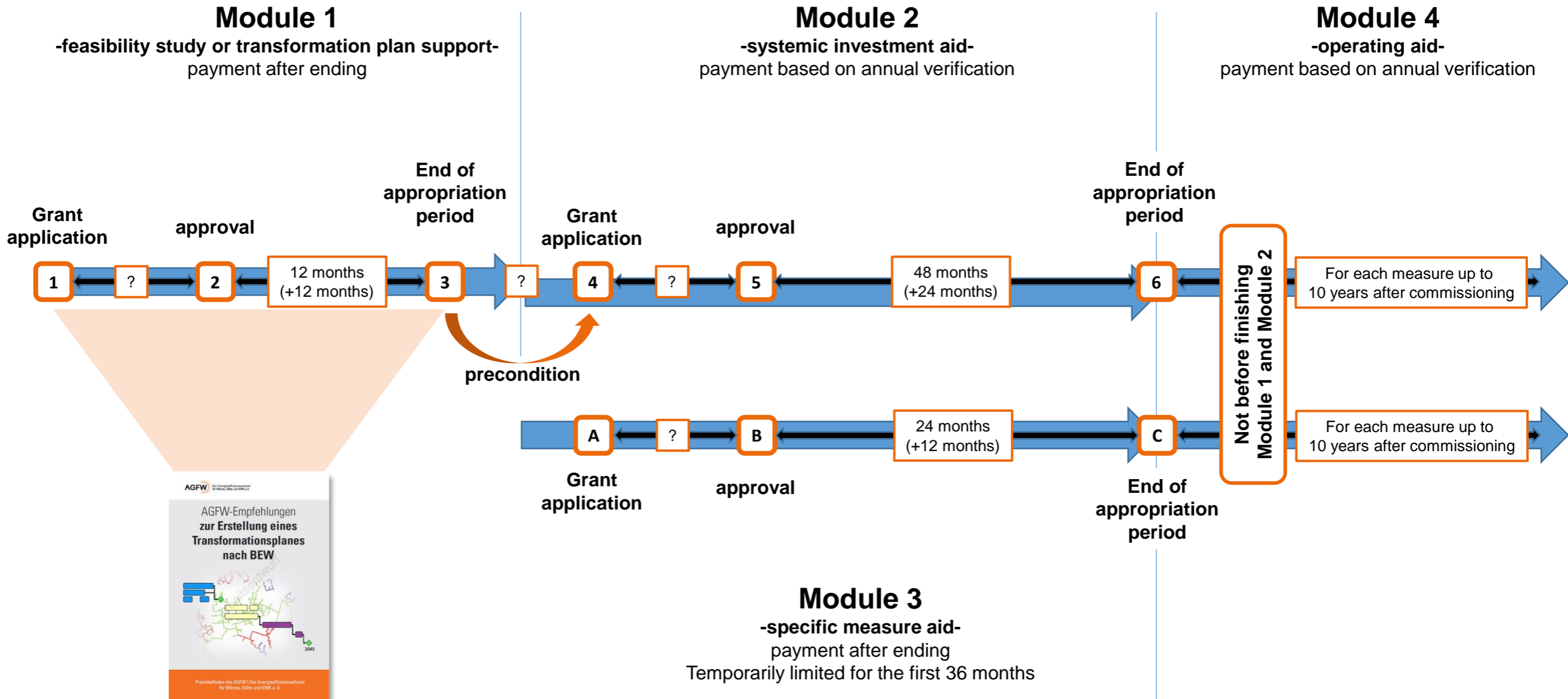
Funding possibilities:

- » **Module 1 (feasibility study or transformation plan)**
 - Max. contribution per application 2 million €
 - Covers up to 50% of costs
- » **Module 2 (systemic investment aid)**
 - Max. contribution per application 100 million €
 - Covers up to 40% of the eligible investment costs
 - Max. amount limited to funding gap
- » **Module 3 (specific measure aid)**
 - Max. contribution per application 100 million €
 - Covers up to 40% of the eligible investment costs
 - Max. amount limited to funding gap
- » **Module 4 (operating aid)**
 - Max. funding period: 10 years
 - Max. amount limited to funding gap (annual monitoring)

Supported items:

- » **Module 1 (feasibility study or transformation plan)**
 - Newbuild and extension of heat grids
- » **Module 2 (systemic investment aid)**
 - Facilities of renewable heat generation
 - Integration of waste heat
 - (heat) infrastructure (piping, fittings, ...)
 - Optimisation measures (heat storages, measurement and control technology, ...)
- » **Module 3 (specific measure aid)**
 - Facilities for heat generation (solar thermal or heat pumps)
 - Piping to integrate or distribute renewable heat and optimisation measures
- » **Module 4 (operating aid)**
 - Operating costs for solar thermal or heat pump heat generation

Programme runs until August 2028 with 4 bn Euro reserved until 2026



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