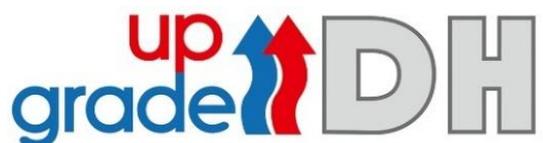




National action plan for retrofitting DH networks in Germany



Upgrade DH Regional/national action plans for retrofitting DH networks

Authors: Sebastian Grimm, AGFW Projekt GmbH, Germany
Daniel Heiler, AGFW Projekt GmbH, Germany

Editors: Staff of AGFW e.V., Germany
Giulia Forgnone, Euroheat & Power, Belgium
Aksana Krasatsenka, Euroheat & Power, Belgium

Contact: AGFW Projekt GmbH
Sebastian Grimm
Email: s.grimm@agfw.de
Tel. +49 69 6304-200
Stresemannalle 30
60596 Frankfurt am Main
<http://www.agfw.de>

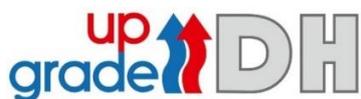
Dissemination Level: Public

Website: Upgrade DH project website: www.upgrade-dh.eu

Cover: View of a finalised “Horizontal Directional Drilling“ (HDD) activity (Image © AGFW)

Project relation: WP6, Task 6.1, Deliverable 6.1

Disclaimer: This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 785014. The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Union nor of the Executive Agency for Small and Medium-sized Enterprises (EASME). Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 785014.

Project Consortium and National Contact Points:

WIP Renewable Energies, project coordinator, Germany
 Dominik Rutz [Dominik.Rutz@wip-munich.de]
www.wip-munich.de



Steinbeis Research Institute for Solar and Sustainable Thermal Energy Systems, Germany
 Thomas Pauschinger [pauschinger@solites.de]
www.solites.de



Lithuanian District Heating Association
 (Lietuvos Šilumos Tiekėjų Asociacija), Lithuania
 Audrone Nakrosiene [audronenakrosiene@gmail.com]
www.lsta.lt



Salcininku Šilumos Tinklai, Lithuania
 Elena Pumputienė [elena.pumputiene@sstinklai.lt]
www.sstinklai.lt



JP Elektroprivreda BiH d.d.-Sarajevo, Bosnia-Herzegovina
 Anes Kazagic [a.kazagic@epbih.ba]
www.epbih.ba



AGFW Projektgesellschaft für Rationalisierung, Information und Standardisierung mbH, Germany
 Sebastian Grimm [s.grimm@agfw.de]
www.agfw.de



University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture, Croatia
 Tomislav Pukšec [tomislav.puksec@fsb.hr]
www.fsb.unizg.hr



COWI A/S, Denmark
 Reto Michael Hummelshøj [rmh@cowi.com]
www.cowi.com



OPTIT Srl, Italy
 Matteo Pozzi [matteo.pozzi@optit.net]
www.optit.net



Gruppo Hera, Italy
 Simone Rossi [simone.rossi@gruppohera.it]
www.gruppohera.it



Euroheat & Power – EHP, Belgium
 Alessandro Provaggi [ap@euroheat.org]
www.euroheat.org

Contents

<i>Contents</i>	<u>4</u>
1 Introduction	<u>5</u>
2 Current policy framework	<u>6</u>
2.1 The Federal Government adopts an Energy Efficiency Strategy 2050	<u>6</u>
2.2 The Climate protection programme 2030 (Klimaschutzprogramm 2030)	<u>6</u>
2.2.1 Act on a national emissions trading scheme for fuel emissions (Brennstoffemissionshandelsgesetz)	<u>6</u>
2.2.2 Act on the implementation of the climate protection programme 2030 into tax law	<u>7</u>
2.3 Act on reduction and termination of coal-fired power generation (Gesetz zur Reduzierung und zur Beendigung der Kohleverstromung, Kohleausstiegsgesetz)	<u>7</u>
2.3.1 Hard coal plants provision	<u>7</u>
2.3.2 Lignite-fired plants	<u>8</u>
2.4 The CHP Act (KWKG)	<u>8</u>
2.5 Energy in buildings Act (Gebäudeenergiegesetz)	<u>10</u>
3 Promotion instruments and incentive programmes for the improvement of district heating systems	<u>11</u>
3.1 Subsidy programme “District Heating Networks 4.0” (Wärmenetze 4.0)	<u>11</u>
3.2 Current CHP Acts sub-programme “innovative CHP” (iKWK)	<u>11</u>
3.3 Current CHP Acts sub-programme “heat/cold storage”	<u>12</u>
3.4 Current CHP Acts sub-programme “heat/cold grids”	<u>12</u>
3.5 Market Incentive Programme	<u>13</u>
4 Large Heat Pumps	<u>14</u>
4.1 Real laboratory large heat pump	<u>14</u>
4.2 Practical experience for large heat pumps	<u>14</u>
5 Proposed action plan	<u>15</u>
6 Promotion of the action plan and recommendations	<u>16</u>
References	<u>17</u>

1 Introduction

The overall objective of the Upgrade DH project is to improve the performance of district heating (DH) networks in Europe by supporting selected demonstration cases for upgrading, which can be replicated in Europe.

The Upgrade DH project supports the upgrading and retrofitting of DH systems in different climate regions of Europe, covering various countries: Bosnia-Herzegovina, Denmark, Croatia, Germany, Italy, Lithuania, Poland, and The Netherlands. In each of the target countries, the upgrading process was initiated at concrete DH systems of the so-called Upgrade DH demonstration cases (demo cases). The gained knowledge and experiences is further replicated to other European countries and DH systems (replication cases) in order to leverage the impact.

Core activities of the Upgrade DH project include the collection of the best upgrading measures and tools, the support of the upgrading process for selected district heating networks, the organisation of capacity building measures about DH upgrading, financing and business models, as well as the development of national and regional action plans.

This document specifically focuses on the **development of a national action plan** for the retrofitting and increasing the efficiency of district heating systems **in Germany** and includes the results of the retrofitting approaches (see also the *District Heating Handbook* developed within the project [1]).

As a background information, the market share of DH in the total heat market in the residential sector in Germany is 13.8 %. While there is room for further growth of the market share, Germany (together with Poland) still remains the biggest market for District Heating and Cooling in the EU in terms of absolute figures. Heat generation in CHP plants accounts for a significant amount of the overall generation (83 % in 2017). The deployment of RES and waste heat is continuously progressing, albeit at a slow pace.[2]

Even though several studies have been published underlying the necessity of the development of District Heating networks, in order to achieve the overarching decarbonisation targets, an integrated strategy for deployment of DHC on the national level is still missing. Therefore, a **list of solutions / actions / activities** that could support the development or retrofitting of DH networks was elaborated and can serve for inspiration for other countries with a similar DH market situation and legislative framework.

More specifically, in Germany, AGFW undertook a comprehensive review of the current national developments of the political framework that are relevant to the project context. Germany is also characterized by numerous promotion instruments and incentive programmes for the improvement of district heating systems. Input to DHC action plan for this country contains recommendations on large heat pumps as an important piece of the puzzle in implementing the planned coal phase-out. Other recommendations focusing on funding opportunities, tax incentives, legislative framework, integrated urban planning and experience exchange are presented in Chapter 5 “Proposed action plan”.

Chapters 2, 3 and 4 of the present report were written in August 2020. Chapter 6 was added in March 2021 after the national action plan for retrofitting DH in Germany was presented and discussed during the public Upgrade DH webinar “Retrofitting DHC - How to develop a successful action plan” held on 23.02.2021. Any legislative changes which took place during this period are out of the scope of this report.

2 Current policy framework

The following overview presents current national developments of the political framework in Germany that are relevant to the project context. The contents were compiled with the support of employees of the German District Heating Association (AGFW e.V.) and refer to applicable rules, laws, standards, etc. Only currently valid and published documents were considered for the creation of the document and no processing statuses. The overview can only reflect the current status, but in case of further processing of the contents, the validity of the individual information should be checked.

2.1 The Federal Government adopts an Energy Efficiency Strategy 2050

In December 2019 the Federal Government adopted the Energy Efficiency Strategy 2050, which aims to set the course for strengthening energy efficiency policy and ensuring that Germany contributes to the EU energy efficiency target of at least 32.5% by 2030. The new Strategy increases the ambitions and implies that by 2030 the primary energy consumption is to be reduced by 30% compared to 2008 (previously 28%). This corresponds to a primary energy reduction of around 1200 TWh (previously 1120 TWh). The additional primary energy savings of 300 TWh are to be achieved through the NAPE 2.0 (National Action Plan on Energy Efficiency), which includes the modernisation and expansion of District Heating networks.

2.2 The Climate protection programme 2030 (Klimaschutzprogramm 2030)

The Climate Cabinet, chaired by the Chancellor Merkel, presented on 20 September 2019 the Climate protection programme 2030. The aim of the Climate Cabinet is to provide the instruments needed to meet the 2030 climate and energy targets, which will be most probably missed under the business as usual scenario. Accordingly to the programme, annually defined reduction targets, resulting from the 2050 climate protection plan, will be set for all sectors in the statutory law and an annual monitoring process will be introduced.

The programme, which has a character of a non-binding framework but will have to be transposed into binding law, comprises 66 measures. The measures relevant for DH are:

- Introduction of a CO₂ price – a national ETS with an initial price of 25 EUR and the reduction of the burden put upon citizens and business (e.g. reduction of electricity prices). (see Chapter 2.2.1)
- Tax incentives for energy renovation measures in buildings will be provided (see Chapter 2.2.2) and the installation of oil boilers will be prohibited as of 2026.
- Sector coupling, CHP and DH should be further developed and therefore a new support programme for DH with increased share of RES and waste heat and an additional bonus for gas-fired CHP plants will be adopted.

2.2.1 Act on a national emissions trading scheme for fuel emissions (Brennstoffemissionshandelsgesetz)

The act on the fuel emissions trade entered into force in December 2019 and establishes an Emission Trading System in the sectors heating and transport, starting in 2021. The impacted fuels are: coal, petrol, diesel, natural gas, heating oil, other fuels should follow. The system will

be designed as a “cap and trade” mechanism. For each calendar year within a trading period, a quantity of fuel emissions shall be determined which ensures compliance with the reduction obligation Effort Sharing Regulation. At the end of a year an appropriate number of certificates must be submitted.

Initially a very low price (10 EUR) will apply. This a very controversial and criticised aspect of the act. Under the pressure of some federal states the CO₂ price will be adjusted and increased in comparison to the initial proposal. The CO₂ price from January 2021 will initially be 25 EUR per tonne of CO₂, rising to 55 EUR by 2025. From 2026, a price corridor of at least 55 EUR and maximum 65 EUR will apply. The additional revenue from the emission certificates is to be entirely used to reduce the renewable energies surcharge.

2.2.2 Act on the implementation of the climate protection programme 2030 into tax law

As an incentive to reach the energy and climate targets in the building sector, a tax reduction for all those measures such as insulation, installation of new boilers or optimization of already existing ones, is provided. The maximum amount of the tax reduction is 40,000 EUR per property. The connection to DH network is not considered as energy renovation and therefore it is not subject to tax incentives.

2.3 Act on reduction and termination of coal-fired power generation (Gesetz zur Reduzierung und zur Beendigung der Kohleverstromung, Kohleausstiegsgesetz)

On 2 July 2020 the German Parliament adopted the act on reduction and termination of coal-fired power generation. The draft encompasses provisions on the new act on Reduction and Termination of power generation from coal-fired plants and amendments of several acts in force, i.a. the CHP Act (see Chapter 2.4) and the Renewable Energies Act. The Act follows the recommendations of the Commission on Growth, Structural Change and Employment (“Coal Commission”).

The aim of the Act is to gradually reduce as steadily as possible the remaining net rated electrical output of installations for the production of electricity from lignite and hard coal. The expected reduction is of 30 GW (15 GW lignite and hard coal respectively) by 31 December 2022, 17 GW (9 GW lignite and 8 GW hard coal) by 1 April 2030, and 0 GW capacity of lignite and hard coal remaining on the electricity market by 31 December 2038. This target level decreases annually by equal amounts of net rated electrical output between 2022 and 2030 and between 2030 and 2038. The installation and commissioning of new coal-fired plants is prohibited.

The draft provides separate decommissioning pathways for lignite-fired and hard coal-fired installations.

2.3.1 Hard coal plants provision

Regarding hard coal plants the target shall be achieved through tenders, which will take place until 2027. The volume of the tender will be set by the regulatory authority (Bundesnetzagentur). The highest price, which will gradually decrease, is: 165 000 EUR per

MW net rated electrical output in 2020; 155 000 EUR per MW in 2021 and 2022; 116 000 EUR per MW in 2023; 107 000 EUR in 2024; 98 000 EUR in 2025; 89 000 EUR in 2026 and 2027.

From 2031 until 2038 the reduction will base solely on the statutory provisions. The reduction will be ordered by the regulatory authority.

In 2022, 2026 and 2029 a clause to avoid undue hardship for younger plants (connected to the grid since 2010) will be proven. Compensation in line with EU state aid law or measures with equivalent effect could then envisaged for plants, which have neither received compensation through tendering procedures nor been able to benefit from support programmes for the conversion or replacement of the coal installation.

Installations in south regions¹ are not entitled to participate in the 2020 tenders. A grid factor is to be taken into account which will make grid relevant plants shift back in the rank order if the tender is oversubscribed.

In 2022, 2026, 2029 and 2032 it will be examined whether the security of supply of electricity and heat is guaranteed despite the coal phase-out and whether electricity prices remain affordable.

2.3.2 Lignite-fired plants

The closure of lignite-fired plants was subject to negotiations between the Federal government and the operators of the plants. The Federal Ministry of Economic Affairs and Energy may conclude a public-law contract with the operators of lignite plants, in which e.g. the use of compensations and socially just implementation of rights and obligations arising from the act on Coal Phase-out are regulated.

The act encompasses a detailed list regarding the phase-out of each installation. Furthermore, the parties agreed upon the framework for compensation (4.35 billion EUR). The agreement ignores the report of the Coal Commission, which set a linear path for capacity and emission reduction of lignite until 2025². The decommissioning path for lignite-fired plants is gradual rather than continuous decommissioning. A continuous reduction of the remaining capacity is ensured by safeguarding that hard coal plants leave the market on a larger scale in the years when a smaller number of lignite-fired plants is phased out.

In 2026, 2029 and 2032 it shall be examined whether the decommissioning date for lignite-fired plants after 2030 can be brought forward by up to three years and whether it is necessary to transfer them to the capacity reserve.

2.4 The CHP Act (KWKG)

The CHP Act entered into force in 2017 and was recently amended by the Act on reduction and termination of coal-fired power generation, which provides an extension of the CHP Act

¹ South regions are: Baden-Württemberg, Bavaria, Hesse south of Frankfurt and Offenbach, Rhineland-Palatinate apart its north part, Saarland).

² According to the report, 10 million tCO₂ should have been saved in lignite-fired power generation in that year; this would correspond to the reduction of about 2 GW of capacity. The agreement, however, provides for only 500 MW, or one quarter. By 2030, a total of 40 million tons more CO₂ will be emitted from lignite than had been agreed.

until 2029 and simultaneously amends it. However, the basic structure, targets and the funding priorities will be retained.

The reference for the development of CHP electricity generation is 110 TWh for 2020 and 120 TWh for 2025. As a basic legal instrument, the CHP Act obliges grid operators to connect CHP plants to their grid. A CHP surcharge is provided for CHP plants, DHC networks and storage. In principle, for electricity from cogeneration, a premium is paid by the grid operator on top of the market price for electricity or the price the CHP plant operator achieved by marketing the electricity from cogeneration (only for installations below 100 kW). The costs for this premium can be shifted towards and shared among all electricity customers. The premium is granted for a limited time only (limited number of full load hours) and serves to offset higher investment costs for CHP plants in comparison with conventional power plants.

The support mechanism is technology and fuel neutral, coal-fired plants are excluded from the support, though. However, the form of financial support for new installations varies regarding the size of the installation. The act includes provisions on tenders for new installations with capacity in range of 1-50 MW_{el}. Annually two auctions take place and the tendered volume is divided between CHP plants (150 MW) and innovative CHP plants (50 MW). Financial support for CHP installations smaller than 1 MW and bigger than 50 MW and District Heating and Cooling networks is granted in form of a surcharge. Installations exceeding 300 MW require an individual notification to the European Commission.

One of the pivotal points of the Act is so-called coal replacement bonus, which creates an incentive to replace coal-fired CHP plants with modern gas-fired CHP and innovative CHP systems. The bonus was increased by the Act on Coal Phase-out, is based on the capacity of the existing plant and the date of the initial commissioning of the existing cogeneration plant and the start of continuous operation of the new cogeneration plant and amounts to 50 EUR/kW_{el} (after 12/1974 and before 01/1985), 225 EUR/kW_{el} (after 12/1984 and before 01/1995) or 390 EUR/kW_{el} (after 12/1994) if the new plant was commissioned in 2023. From plants commissioned from 2024 onwards, the surcharge will be reduced respectively.

The Act aims at rendering the CHP plants more flexible. An additional bonus of 70 EUR /kW_{th} is provided for a PtH installation located in Northern regions, which covers 80% of the max. heat output of the CHP plant (above 1 MW_{el}), is brand new and is subject to obligatory redispatch agreement with TSO. However, CHP plants in the southern region are not eligible.

A so-called South bonus of 60 EUR/kW_{el} (one-off) will be introduced for operators of new, modernised or retrofitted CHP plants in the south regions, which are commissions after 31.12.2019 and until 31.12.2026.

New heat networks are eligible for support when the commissioning takes place until the end of 2029. What is more, incentives for integration of heat from renewable energy sources shall be adopted within the framework of innovative CHP systems by introducing a renewable-innovative-CHP-bonus³. The new bonus is granted on the top of a basic bonus for innovative/RES heat share of reference heat and will increase gradually from 0.4 ct/kWh for 5% of the innovate/RES heat to 7.00 ct/kWh for 50% of the innovative/RES heat. Waste heat and biomass are not considered renewable in the meaning of the CHP Act.

³ Innovative renewable heat means renewable heat from heat technologies,

(a) each of which has an annual performance factor of at least 1,25,

(b) whose heat production is used outside the innovative CHP system for space heating, hot water production, refrigeration or process heat; and

(c) that, in so far as they use gas, use exclusively gaseous biomass.

The act on Coal Phase-out amends the criteria for support of DH networks. Systems in which at least 75% of CHP heat or 75% of a combination of CHP heat, renewables or waste heat are fed, would receive support of up to 40% of all investment costs. New or modernised systems, in which 50% of a combination of CHP heat, renewables or waste heat is injected, would receive financial support amounting to 30% of investment costs, provided that the commissioning takes place until 31.12.2022.

The total sum of CHP surcharges cannot exceed EUR 1.8 billion per year. The sum of the surcharges for DHC networks and storages cannot exceed EUR 150 million per year.

The amendments to the CHP Act introduced by the act on Coal Phase-out will only enter into force after a State aid approval issued by the European Commission.

2.5 Energy in buildings Act (*Gebäudeenergiegesetz*)

In July 2020 the Energy in buildings act, which targets the reduction of red tape, simplification and unification of existing energy-saving legislation for buildings, was adopted by the German Parliament. Initially, the existing legislation was supposed to be amended in order to implement the EPBD 2010 and introduce the definition of nZEB into the German law. However, the act does not introduce new standards for buildings, as, according to the ministry the existing requirements for new buildings already fulfil the nZEB criteria. The act fails to implement the target of decarbonizing the building stock by 2050 as well.

The act introduces a ban on installation of new oil and solid fossil fuel boilers from 2026. Exceptions would be allowed only in those regions where a connection to gas or DH network is impossible or heat pumps are economically not feasible. Financing programmes for replacement of old oil heating boilers and subsidy of up to 40% of the investment costs will be provided.

Regarding DH no new allocation method for the calculation of PEF will be introduced, however a re-examination of the existing method will take place by the end of 2025. Furthermore, according to the Act 0 PEFs will not be allowed, a floor of 0.3 will be introduced and 0.2 in case of RES or waste heat deployment.

The energy efficiency classes of residential buildings will be final energy based.

3 Promotion instruments and incentive programmes for the improvement of district heating systems

Numerous support measures are available in Germany to help implement the political goals of recent years. Some of them aim to promote the construction of modern district heating systems and thus support the upgrade of the entire district heating system (e.g. Wärmenetze 4.0 or iKWK, see 3.1 and 3.2) others focus on the upgrade (storage integration see Chapter 3.3) and expansion (heat/ cold grids, see Chapter 3.4) of existing DH systems.

3.1 Subsidy programme “District Heating Networks 4.0” (Wärmenetze 4.0)

On 1 July 2017 the Federal Ministry of Economic Affairs and Energy (BMWi) launched a subsidy scheme for 4th generation district heating networks. With the main objective to provide federal funding, that addresses innovative heating network systems with a predominant share of renewable energies and waste heat.

A “district heating network 4.0” is characterised by a high share of renewable energies, an efficient use of waste heat and a significantly lower temperature compared to conventional heating grids (the maximum allowed supply temperature is 95°C).

The subsidy programme is divided into four funding modules.

- **Module 1 – Feasibility**

Funding will initially be provided for feasibility studies with up to 60% of the eligible expenditure of this module and a maximum funding amount of 600 000 EUR.

- **Module 2 – Realisation**

In the second module, the realisation of a heating network system 4.0 can be subsidised with up to 50% of the eligible expenditure in the investment project. Since the support programme for heating network systems 4.0 follows a systemic approach, no individual measures such as the construction of a heat generator or the laying of pipelines are supported, but rather the construction or transformation of complete heating network systems. Heating network systems within the meaning of the funding announcement include the house transfer stations at the end customers to be supplied. The house transfer stations also represent the system boundary of the heating network system. The maximum subsidy per investment project is 15 million EUR.

- **Module 3 – Customer Information**

Within the third module, customer information measures in the area of the planned heating grid system 4.0 will be granted as a subsidy, to increase the connection rate to a model project. With up to 80 percent of the eligible costs and up to a maximum amount of EUR 200 000 per project.

- **Module 4 – Capacity building**

Within the fourth module, expenditure incurred by universities, research and science institutions in the course of a non-economic activity (in cooperation with an applicant in Module II) can be funded up to a maximum of 1 million euros in grants

3.2 Current CHP Acts sub-programme “innovative CHP” (iKWK)

Innovative cogeneration systems should not only be highly efficient and integrate a high proportion of renewable energies, but also meet the requirements of sector coupling. Innovative CHP systems are selected modern power-heat systems. An innovative CHP system essentially consists of three components: a CHP plant, an electric heat generator (power-to-

heat) and an innovative renewable heat generator with a min. annual COP of 1.25. This requirements could for example be met by integrating solar thermal or geothermal energy, as well as power-consuming technologies such as heat pumps using ambient heat.

To participate in the subsidy programme “innovative CHP” the applicant needs to develop an innovative concept, which includes an economic calculation. Afterwards the different iCHP solutions participate in a tender process and the most economical are awarded the subsidy. The following graph shows the results of the first three tenders. [3]

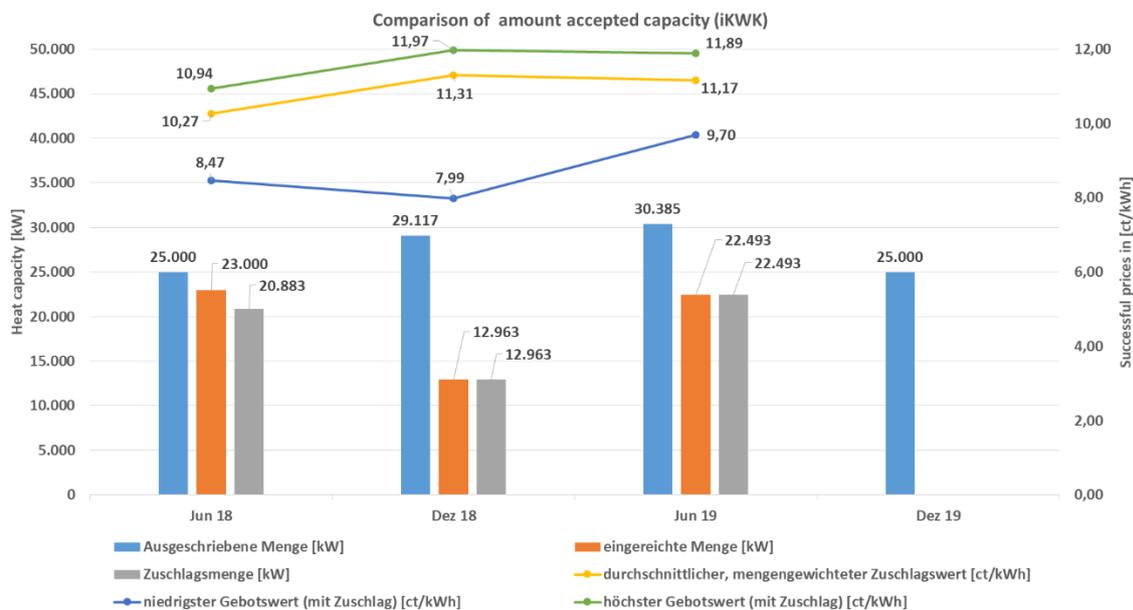


Figure 1: Overview on prices and accepted bids “iCHP” [4]

3.3 Current CHP Acts sub-programme “heat/cold storage”

Even existing CHP plants could be upgraded by an integration of a heat or cold storage. So they will be able to be operated more flexibly and thus compensate for the volatile electricity generation from renewable energies. This is becoming increasingly important against the background of increasing electricity generation from renewable energies. Therefore the Federal Office of Economics and Export Control (BAFA) is responsible for the funding sub-programme of the CHP Act that offers the chance for a co-financing of 250 EUR/m³ water equivalent storage volume. With a limitation of max. 30% of the eligible investment costs and a total maximum of 10 million EUR per project investment in storage technologies should be stimulated. From 2012-2018 over 700 heat/cold storages were granted with a water equivalent storage volume of around 400 000 m³ and 55 million EUR in total.[5]

3.4 Current CHP Acts sub-programme “heat/cold grids”

In order to increase efficiency in the area of electricity and heat generation, the Federal Government supports the expansion of combined heat and power generation, in particular through the CHP Act. In addition to electricity remuneration for CHP plants and the promotion of heat and cold storage facilities, the CHP Act provides investment support for heating and cooling networks. A condition for eligibility is that at least 75% of the supply of heat to customers connected to the new or upgraded heating network must come from CHP heat. Alternatively, a heat mix of CHP heat and heat from renewable energies or CHP heat and industrial waste heat of 50% each is sufficient, provided that at least 25% CHP heat is available. The amount of the grant is based on the average diameter of the heating or cooling

pipes listed in the grant application and varies from 30-40% of the eligible investment costs with a total maximum of 20 million EUR per project. Starting from 2009 until 2018 more than 370 million EUR were used for heat/cold grid expansions.[6]

3.5 Market Incentive Programme

As a part of the Market Incentive Programme (MAP), the Federal Office of Economics and Export Control (BAFA) promotes efficient technologies that supply the building sector with heating or cooling on the basis of renewable energies.

Even though DH networks are eligible for financial support from the MAP, the conversion from individual oil-fired boilers to district heating is not subsidised by this programme. While implementing the Climate Protection Programme 2030 in the building sector, the Federal Ministry of Economic Affairs and Energy (BMWi) has not provided support for connection to a heating network in the amended guidelines for the promotion of measures for the use of renewable energies in the heating market (MAP guidelines) as an exchange premium for oil-fired boilers.

The replacement premium for oil-fired boilers could be an attractive incentive to connect to renewable heat or to efficient hybrid gas heaters, which integrate RES. With the now valid regulation, not even the connection to a 100% renewable heating network is supported.

The BMWi is thus undermining not only the efforts to strengthen buildings connection to heat networks, but also negates any future prospects, and discredits district heating as a future technology. This amendment does not benefit the expansion of district heating, which is why the national associations must present their concerns to politicians and campaign for district heating networks to be considered.

4 Large Heat Pumps

On the way to the German energy turnaround, the heating market in Germany is also undergoing a process towards more renewable energies and other CO₂-free and low-carbon heat generation technologies. Of course this development will affect the district heating supply, so that, the decarbonisation technologies, previously known from the building sector, such as heat pumps or solar thermal energy, must be considered on a large scale and evaluated with regard to their possible use in heat networks.

In 2015, the proportion of heat that was provided by heat pumps was not very significant. However, numerous studies and analyses show great potential for this technology and there is hope that it will play a major role in district heating in the future. Access to renewable heat sources (air, water, soil) or other waste heat sources (e.g. exhaust air, waste water) is of great importance, as these are often available in the immediate vicinity of heat networks and can therefore be used for district heating. In order to achieve the required temperature level of district heat networks, large heat pumps can be used, the advantage of this is that they can be operated in a controllable and adjustable manner. This enables heat network operators to optimise the use of large heat pumps as part of their district heating generation fleet and thus simultaneously provide renewable or CO₂-free heat for the heating network. For these reasons, large heat pumps can be an important piece of the puzzle in implementing the planned coal phase-out.

4.1 *Real laboratory large heat pump*

Even though the heat pump technology has been used successful for several years in small-scale applications, the scalability for use in large performance classes and at the temperature level of classic German district heating networks is a challenge. Developments in recent years have already made it technically possible for it to be used as a generator in a district heating network and the first lighthouse projects can already be found in Europe. However, before a large-scale application becomes possible, there are still some questions to be answered. Within the framework of the call for proposals "real laboratories" as part of the 7th Energy Research Programme of the German Federal Government, a corresponding practical test has been initiated, which will examine both the technical and the economic challenges.

4.2 *Practical experience for large heat pumps*

Practical experience must be compiled as a basis for industry-wide communication of the technology, its advantages and challenges. In addition to the technical requirements, the organizational and legal requirements must also be taken into account. In addition, possible business models and economic modes of operation have to be identified and checked for the influence of political framework conditions and available funding opportunities.

The national and international exchange of experience can help to disseminate new technologies in the use of district heating, because on a technical level, concrete recurring questions can often be answered quickly and purposefully.

5 Proposed action plan

Short term:

- Introducing appropriate funding opportunities for DH network development, which would also enable connection of renewable energy sources and waste heat to DHC including modernisation of the pipes, in order to enable lowering the temperature of the medium.
- Channelling and streamlining the existing funding programmes. Not the number, but the appropriate structure of the programmes is decisive in this context;
- Expanding the scope of the tax incentives for energy renovation measurers to district heating and make sure, that a switch from (oil-fired) boilers to district heating is incentivised and included in MAP guidelines. Avoiding lock-in effects;
- Introducing an obligatory share of energy from renewable sources/decarbonised energy in building stock, alongside the already existing regulation for new buildings. DHC must be considered an alternative method in this context;
- Developing a roadmap for district heating, including mapping of existing networks and existing waste heat sources;
- Recognising waste heat and heat from waste-to-energy plants as decarbonised/climate neutral energy source;
- Strengthening measures, including financial support, which would incentivise the flexibility of the energy system: enable conversion of CHP plants to gaseous and biogenic fuels, incentivise energy storage and Power-to-Heat installations.

Medium term:

- Expansion of the thermal grid: expanding the thermal grid is crucial to redesign the energy system and enable better integration of renewable energy and excess heat sources, from around 13% to at least 48% of the heating market in 2050 (*Heat Roadmap Europe 2018*⁴);
- Enhancing the use of waste heat recovery by removing all those barriers such as taxation or technical barriers (*Heat Roadmap Europe 2018*);
- Strengthening sector integration through an amendment of the fiscal system and reduction of regulatory obstacles and enhanced use of excess renewable electricity to generate heat/gas in Power-to-X installations;
- Introducing a CO₂ oriented tax system (taxation of the CO₂ content of the energy source);
- Introducing obligatory connection to efficient DHC (art. 2(41) EED). Exemption allowed only, when the customers proves the planned alternative supply solution to result in a significantly better energy performance;
- Ensuring an appropriate method for PEF calculation, which takes into consideration, that district heating networks deliver heat to building stock as well Concentrate on modernisation of districts.

⁴ Paardekooper, S., Lund, R. S., Mathiesen, B. V., Chang, M., Petersen, U. R., Grundahl, L., ... Persson, U. (2018). Heat Roadmap Germany: Quantifying the Impact of Low-Carbon Heating and Cooling Roadmaps.

Long term:

- Acknowledging that district heating is a crucial technology to decarbonise heating sector;
- Creating an appropriate and stable regulatory framework, which would ensure connection of renewable energy sources and waste heat to DH networks;
- Strengthening urban planning of heat networks and integrated approaches;
- Introducing a centre of expertise for “heat networks”.

6 Promotion of the action plan and recommendations

As the content of the present document is relevant for national stakeholders, all the information is available in German language and AGFW is focusing on different aspects of this action plan in their advocacy work. Many of the above mentioned activities are promoted in newsletter style:

- Aktuell 32: Update on the climate protection programme 2030. Related to chapter 2.2
- Aktuell 31: Short information on climate protection program and emission trading. Related to chapter 2.2/ 2.2.1
- Aktuell 26: Information on latest update to the CHP act (News: <https://www.agfw.de/energiwirtschaft-recht-politik/recht/neues-aus-dem-bereich-recht/>) related to chapter 2.4
- Aktuell 24: Related to chapter 4.2 Practical experience for large heat pumps (final document here <https://www.agfw.de/technik-sicherheit/erzeugung-sektorkopplung-speicher/sektorkopplung/grosswaermepumpen/>)

For more information, please get in touch with the responsible contact person at AGFW Projekt GmbH.

At the European level, the German “technical” approach (incl. Codes and Standards of Practice) was presented at the public webinar, jointly organised by Upgrade DH, KeepWarm and the Celsius Initiative on 23 February 2021. During this webinar participants explored how to develop successful action plans to retrofit DH networks in Europe, learning from concrete case studies from the three abovementioned projects, such as Germany, Slovenia and France. The speakers analysed expected legislative challenges and recommended solutions to successfully overcome them.

The webinar recording (<https://youtu.be/1jR-Y-q1CE>) includes presentations and discussions with:

- Werner Lutsch, Managing Director and CEO of AGFW, the German Energy Efficiency Association for District Heating, Cooling and CHP
- Jure Čižman, Senior Advisor at the Jožef Stefan Institute in Slovenia
- Jacqui Cullen, Project Manager District Heating and Cooling at the Eurometropolis of Strasbourg

It was moderated by Giulia Forgnone, Policy Officer at Euroheat & Power

References

The following sources were used during the elaboration of the document:

- [1] UpgradeDH (2019): “Upgrading the performance of district heating networks Technical and non-technical approaches - A Handbook”, Public (Deliverable 2.5). Available online at: https://www.upgrade-dh.eu/images/Publications%20and%20Reports/D2.5_2019-07-02_Upgrade-DH_Handbook_EN.pdf
- [2] Euroheat & Power “Country by Country” (2019). Available online at: <https://www.euroheat.org/cbc/2019/>
- [3] Bundesamt für Wirtschaft und Ausfuhrkontrolle Federal Office of Economics and Export Control (2018): Merkblatt für innovative KWK-Systeme. Available at: https://www.bafa.de/SharedDocs/Downloads/DE/Energie/kwk_merkblatt_innovative_kwk-systeme.pdf?__blob=publicationFile&v=4
- [4] Solnet 4.0 “Infoblatt Solare Wärmenetze | Nr.5” (2020): Innovative Energiesysteme mit Solarthermie. Available at: <https://www.solar-district-heating.eu/de/wissensportal/wissensdatenbank/?se=Infoblatt+Solare+W%C3%A4rmenetze+Nr.5&orderBy=date>
- [5] Bundesamt für Wirtschaft und Ausfuhrkontrolle Federal Office of Economics and Export Control (2017): [Merkblatt Wärme- und Kältespeicher](https://www.bafa.de/SharedDocs/Downloads/DE/Energie/kwk_waerme_kaeltespeicher_merkblatt.html). Available at: https://www.bafa.de/SharedDocs/Downloads/DE/Energie/kwk_waerme_kaeltespeicher_merkblatt.html
- [6] Bundesamt für Wirtschaft und Ausfuhrkontrolle Federal Office of Economics and Export Control (2017): Merkblatt Wärme-und Kältenetze. Available at: https://www.bafa.de/SharedDocs/Downloads/DE/Energie/kwk_waerme_kaeltenetze_merkblatt.pdf?__blob=publicationFile&v=12