

Summary report

Conceptual considerations on a legal regulation for the nationwide introduction of municipal heat planning

Research project „Heat transition: The Energiewende in the heating sector“
Summary of the results of the "heat planning" task

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1 Background and objectives

Municipal Heat Planning (KWP) serves to develop and implement spatially resolved municipal heat strategies that aim to ensure a climate-neutral heat supply in the respective municipalities by 2045. Municipal heat planning thus plays a key role in steering the municipal heat transition. On the demand side, it includes building heat as well as industrial and commercial process heat demand, and on the supply side, all centralised and decentralised heat generation options, including waste heat potentials, as well as the associated infrastructures (such as gas and heating networks).

Municipal heat planning comprises various contents. The most important elements are the inventory analysis, the potential analysis, the development of a target scenario as well as an implementation strategy or a plan of measures and the subsequent implementation of these. In this sense, municipal heat planning is to be understood as a process, not as a one-off activity that ends with the preparation of an expert report.

With Baden-Württemberg, Schleswig-Holstein, Lower Saxony, and Hesse, four federal states have already introduced mandatory municipal heat planning. Other states (e.g. Hamburg, Thuringia) pursue strategies similar to Municipal Heat Planning within the framework of their state climate protection laws. The Federal Ministry for Economic Affairs and Climate Action (BMWK) considers a federal regulation to be necessary in order to introduce heat planning nationwide in the near future.

The work on heat planning within the framework of the project "Heat transition: The Energiewende in the heating sector" served to support the Federal Ministry for Economic Affairs and Climate Action (BMWK) and the Federal Energy Efficiency Center (BfEE) at the Federal Office for Economic Affairs and Export Control (BAFA) in the preparations for the legal implementation of a nationwide heat planning. This short report is a summary of selected scientific contributions.

2 Importance of municipal heat planning for the success of the heat transition

From the perspective of the heat transition, municipal heat planning is of great importance. With the inventory and potential analysis, it creates the data basis for the development of a coordinated municipal heat transition. It provides orientation for building owners, industrial and commercial enterprises, energy supply companies, grid operators and municipalities and improves the planning security for investment decisions in heat generation (centralised and decentralised) as well as for the development of the associated infrastructures. It helps to avoid the development of parallel infrastructures and incompatible investments (and the resulting lock-in effects). In this way, it contributes to ensuring a cost-efficient heat transition at regional and local level. It also helps to identify indisputable "no-regret" measures that a municipality can take even before the heat transition strategy is in place (e.g. refurbishment of municipal properties). With regard to infrastructure decisions, e.g. the expansion of a heating network, or political measures, such as

the enactment of district heating bylaws, municipal heat planning creates the necessary transparency to justify such regulations.

With regard to the goals of the heat transition, the effectiveness of municipal heat planning depends both on the design of the accompanying mix of instruments (see chapter 7) and the degree to which it is implemented in a binding manner (see chapter 3).

3 Legal implementation

The federal government cannot transfer (new) tasks directly to municipalities on the basis of Article 84 (1) sentence 7 of the Basic Law. It can only address a corresponding obligation for heat planning to the federal states, which can decide for themselves how to fulfil this obligation. The federal states have the possibility, for example, to delegate the duty of municipal heat planning to municipalities, municipal associations, districts or also other bodies responsible for planning (district governments, regional councils, new heat planning authorities). This principle is also described in the discussion paper on heat planning of the BMWK. In the present context, however, the term "Kommunale Wärmeplanung" ("municipal heat planning") is used, firstly because it has already developed into a standing term and secondly because it can be assumed that in practice the federal states delegate the task quite predominantly to the municipalities.

A federal regulation on comprehensive municipal heat planning should ensure that the federal states carry out regional/local heat planning to a defined extent (see also chapter 4) and along defined minimum requirements. The obligation for heat planning can be introduced at the federal level either through a separate, new federal law or integrated into an existing law. In this context, it should be ensured that heat plans that have already been prepared or are currently being prepared through existing legal obligations of individual federal states retain their validity. These would only have to take into account the requirements laid down in the federal law in the course of their updating.

A federal law on municipal heat planning should ensure that heat planning is not only carried out selectively, but to a large extent nationwide, and that it takes into account special features of the federal states, such as different settlement structures and population densities. Furthermore, it is essential that heat planning is carried out using the most concrete and uniform methodological specifications possible, so that the heat plans drawn up are comparable in scope and detail and a minimum quality can be ensured. For this purpose, it is important that a clear picture of heat planning as well as its objectives and benefits is laid down in a federal law. The work steps to be carried out (e.g. inventory and potential analysis, see above) and aspects to be investigated must be clearly defined. Detailed methodological recommendations can be given in an accompanying guideline similar to the one in Baden-Württemberg. In addition, the interaction with other legal provisions and the publication obligations must be specified. For heat planning, the availability of certain data is important, in some cases mandatory. Which data may be collected for heat planning and how it may be used must be described as concretely as possible at federal level and supplemented by a corresponding authorisation for data collection and processing. Data protection must always be guaranteed (see chapter 5).

The regulations must also specify which legal effects (should) emanate from the plans. In the "first mover countries", heat planning functions as an informative planning instrument, not as a

basis for regulatory stipulations on how individual buildings are to be heated. In such an understanding, a federal law on municipal heat planning would also supplement the Buildings Energy Act (GEG) but would not intervene in the GEG in a modifying way - which would be quite conceivable from a legal point of view. If the municipalities were to take on the planning task, they could use the plans for their own active real estate policy, use them as a basis for the development and expansion of their own networks and infrastructures or implement them in a binding manner with urban land use planning instruments. The power of heat planning for third parties lies primarily in its high practical benefit for individual, planned and coordinated measures of energetic building refurbishment, for new construction, for the development of infrastructures or the construction of plants for the use of renewable energies for the generation of heat, cooling and electricity.

4 Scope of the heat planning

In Baden-Württemberg, the urban districts and large district towns - which are usually municipalities with more than 20,000 inhabitants - are obliged to draw up a municipal heating plan by 31 December 2023 and to update it every seven years at the latest, taking into account further developments. The remaining municipalities that wish to draw up a municipal heating plan on a voluntary basis are supported by a separate funding programme. In Schleswig-Holstein, the obligation to prepare a municipal heating plan is directed at all large and medium-sized municipalities (specifically, municipalities that belong to the central and regional centres, sub-centres with a partial function of central centres, as well as sub-centres and first-order peri-urban centres).

Table 1 shows an overview of the coverage of municipal heat planning for the whole of Germany, depending on various threshold values for its obligatory introduction. An estimate of the proportion of process and waste heat that would be covered by this is not yet available.

Table 1: Coverage of municipal heat planning depending on different thresholds of its mandatory introduction

	Obligation for municipalities > 10,000 inhabitants	Obligation for municipalities > 20,000 inhabitants
number of municipalities	approx. 1,600	approx. 700
proportion of population covered	approx. 75 %	approx. 60 %
share of recorded useful heat demand for space heating and hot water	approx. 72 %	approx. 55 %

In view of the limited resources of planning offices, it might make sense to introduce the obligation in stages and, for example, to first oblige municipalities with more than 10,000 inhabitants.

5 Data availability and access

In order to be able to give all municipal actors a binding orientation in which parts a central heat network infrastructure will be available in the future and in which parts decentralised use of ambient energy in particular should be given priority, it is necessary to analyse heat network suitability areas. Heat grids are particularly suitable in areas where high, concentrated heat sales are to be expected and/or renewable energies or waste heat sources are available that cannot be used for heat supply without a grid-based heat supply. Conversely, in the future the heat supply will be decentralised, especially in those parts where the buildings are characterised by a large distance to each other (e.g. detached individual buildings, loose building development). The lower the flow temperatures in the buildings, the more efficiently ambient energy can be used.

In order to be able to identify suitable sub-areas for centralised supply by means of heating networks, two criteria are particularly suitable:

- Heat density (MWh/ha): The characteristic value indicates the heat consumption per hectare of floor space and can be determined for different delimitations (e.g. grid cells or building block). The higher the heat density, the lower the specific costs (related to a certain heat consumption) for the construction and maintenance of the heating network as well as the proportional heat losses.
- Heat line density (MWh/m line length): The heat consumption of each building is assigned to the street section to which it is connected, as central supply is usually provided by laying the pipelines in the street. The approach thus offers higher accuracy than the heat densities, as information on the pipe route is taken into account.

A building-specific data basis allows the flexible selection of the appropriate method and is necessary for the determination of the heat line density. Many municipalities already have data from the Authoritative Real Estate Cadastre Information System (ALKIS) of the Working Committee of the Surveying Authorities of the Laender of the Federal Republic of Germany (AdV). This data includes the building outlines with information on address, building type and use and forms a suitable data basis for municipal heat planning. Based on locally available information, this data can also be supplemented by other helpful information and data points, some of which are available at the municipal level, e.g. building age, number of storeys, etc. However, there is a lack of comprehensive information on the heat demand and consumption of the buildings. The collection of building-specific consumption data on gas, district heating and heating electricity allows the energy characterisation of these buildings. In order to also be able to estimate the heat demand for those parts where no piped heating infrastructure is currently available - and could be useful in the future - the digital sweep books of the chimney sweeps are helpful, which contain information on the type of heating, the output and the age. These data are available to the chimney sweeps.

In order to be able to use this building/property-specific data, a corresponding authorisation is required in the law that the bodies responsible for heat planning or third parties commissioned by them to carry out heat planning may collect this data and process it for the purpose of heat planning. It must be noted that the collection and processing of these data constitute interference with the fundamental right to informational self-determination, so that the principle of proportion-

ality must be observed. The collection and processing of data must therefore be specifically necessary for heat planning; the necessity and the permissible purposes of use must be limited and described in the legal authorisation.

In addition to detailed information on heat consumption and existing heat generators, further detailed information is required for municipal heat planning, which is available from various actors:

- **Supply infrastructure:** Information on the location and capacity of relevant supply infrastructures such as gas, heat and electricity lines; these are usually available from the responsible energy supply company (EVU) or the network operator.
- **Heat potentials:** For the survey of renewable energy and waste heat potentials, information is available in varying degrees of detail depending on the federal state and municipality, possibly from different authorities/institutions. Information on the subsurface (temperatures in the subsurface for near-surface and deep geothermal energy, exclusion areas, etc.) is available, for example, from the state offices for geology, solar thermal and PV potentials have been determined for all buildings in some federal states, some municipalities have had solar cadastres drawn up, for others no potential estimates are available. For the estimation of waste heat potentials from trade and industry, information from the relevant companies on site is usually necessary.

A conclusive list of all potential data sources is not possible within this short report. It is important to ensure that all potential data holders who have information relevant to heat planning are addressed within the framework of the anchoring of an authorisation for data collection. In the medium term, it is desirable to establish nationwide registers that contain a large part of the relevant data, e.g. potentials of renewable energies and basic information on buildings. On the one hand, this would considerably reduce the effort required to collect data for individual heat planning, and on the other hand, it would ensure that the bodies responsible for heat planning could carry out their planning with comparable data bases and better coordinate them with each other and with the overarching goals of climate protection.

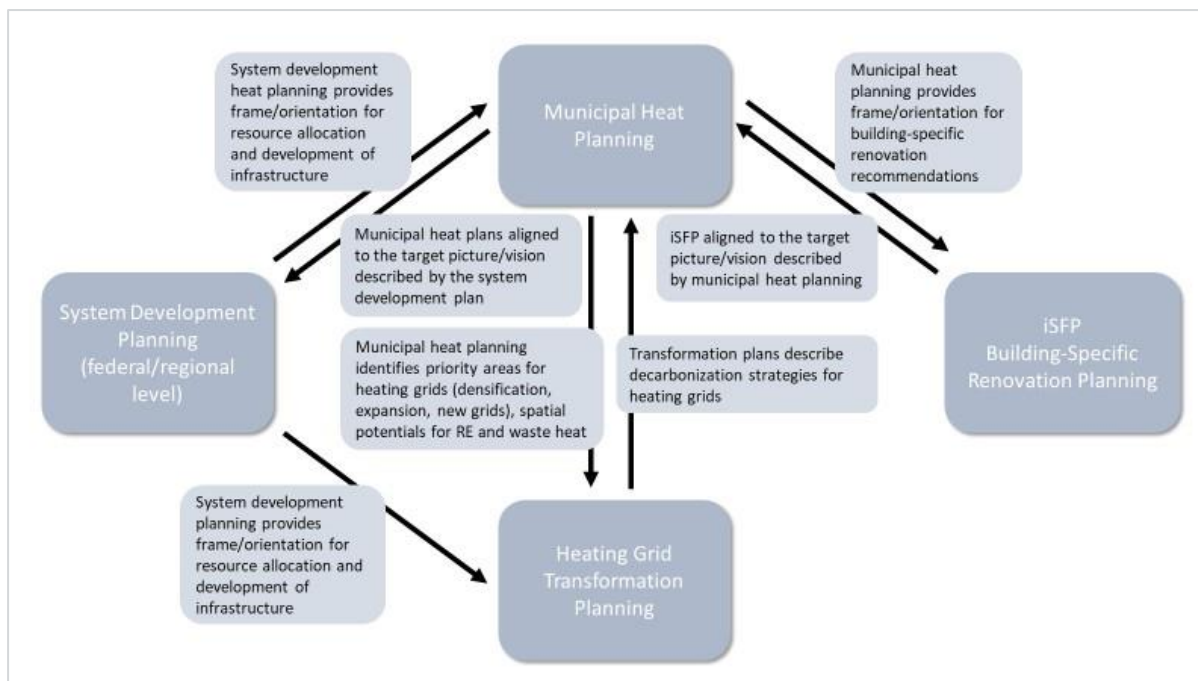
6 Embedding into the planning cascade

Basically, municipal heating planning is embedded in a planning cascade that ranges from system development planning/strategy (above all, development of energy transport infrastructures, possibly allocation planning for limited energy resources) to building-specific renovation planning. Two perspectives have to be reconciled. Municipal heat planning corresponds to a bottom-up approach, in the context of which the agency responsible for planning develops a long-term transformation strategy towards a climate-neutral heat supply - based on and adapted to the local conditions. However, this does not guarantee that the sum of all municipal heat plans will provide a coherent overall picture of the heat supply. This concerns both the availability and distribution of limited resources (e.g. biomass) and the development of the relevant infrastructures (e.g. gas, electricity and hydrogen networks).

Instead, the municipal/regional approaches should be oriented towards an overarching goal. This involves, for example, criteria for the use of biogenic (e.g. wood, biogas) or electricity-based energy sources (especially hydrogen). From the perspective of the planning cascade, the associated guard rails should preferably follow from national system development planning (cf. Figure 1).

There is also an interaction with the heat network transformation planning of existing heat networks. Among other things, there is the challenge of temporal coordination, as the heat network transformation plan will often be available before the heat plan.

Figure 1: Embedding municipal heat planning into the planning cascade



Source: Öko-Institut e.V.

Of particular importance for the dovetailing of urban development with the development of heat supply is the relationship between municipal heat planning and urban land use planning (land use and development plan). It depends on which legal effects are envisaged for a heat plan within the framework of the planned legal implementation.

7 Embedding into the instrument mix

In addition to the question of its legally binding nature, the role of municipal heat planning within the overall mix of instruments for the heat transition depends in particular on its design. Different roles are conceivable here, depending on how effective the instrument mix is. Figure 2 shows the possible role spectrum based on two variants (policy mix "moderate" and policy mix "ambitious"). In the "moderate policy mix" variant, the steering impulse of the overarching instrument framework is rather weak. In this variant, the success of the heat transition is partly the responsibility of the municipalities. This would require an expansion of the scope of municipal policy. In the variant

"ambitious policy mix", the steering framework for the heat transition through federal policy instruments is strong, and the need for regulatory control through municipal policy instruments is correspondingly lower. In this variant, municipal heat planning primarily serves as an orientation aid for investment decisions, both in buildings and infrastructures.

Figure 2: Role of municipal heating planning in the face of different policy mixes

Moderate policy mix variant	Ambitious policy mix variant
<p>BEHG¹⁾: Moderate increase in CO2 price</p> <p>No activation of strong regulatory elements (such as 65% requirement²⁾, MEPS³⁾)</p> <p>Financial support programs: steady continuation of the current support framework</p>	<p>Energy prices: Politically determined price components set in such a way as to ensure the economic viability of climate-friendly heating systems</p> <p>Regulation: more ambition (e.g. more triggers for boiler replacement and renovations via 65 % requirement, MEPS)</p> <p>Financial support programs ensure adequate funding</p> <p>Reduction of legal/regulatory barriers (e.g. gas distribution network regulation⁴⁾, WärmeLV⁵⁾)</p> <p>Mandatory transformation planning and ambitious consumer protection level for district heating</p>
<p>Role of Municipal Heat Planning</p> <p>Success of the green transition of the heating sector is partly the responsibility of the municipalities</p> <p>Measures need to be initiated by policy interventions on the local level, legal which may require an expansion of the scope of municipal policy</p> <p>Municipal heat planning serves as a basis for municipal infrastructure planning (gas networks, heating grids, management of the underground, land provision, etc.)</p> <p>Federal government: alignment of financial support programs with conformity with the results of municipal heat planning</p>	<p>Role of Municipal Heat Planning</p> <p>Municipal heat planning provides orientation for individual investment decisions</p> <p>Less need for interventions by local policy instruments</p> <p>Municipal heat planning serves as a basis for municipal infrastructure planning (gas networks, heating grids, management of the underground, land provision, etc.)</p> <p>Federal government: alignment of financial support programs with conformity with the results of municipal heat planning</p>

¹⁾ BEHG: Brennstoffemissionshandelsgesetz (Fuel Emissions Trading Act)

²⁾ 65% requirement: Planned requirement that from 01.01.2024 every newly installed heating system should be operated on the basis of at least 65% renewable energies.

³⁾ MEPS: Mindestenergieeffizienzstandards für Gebäude (Minimum Energy Performance Standards)

⁴⁾ EnWG: Energiewirtschaftsgesetz (Energy Industry Act)

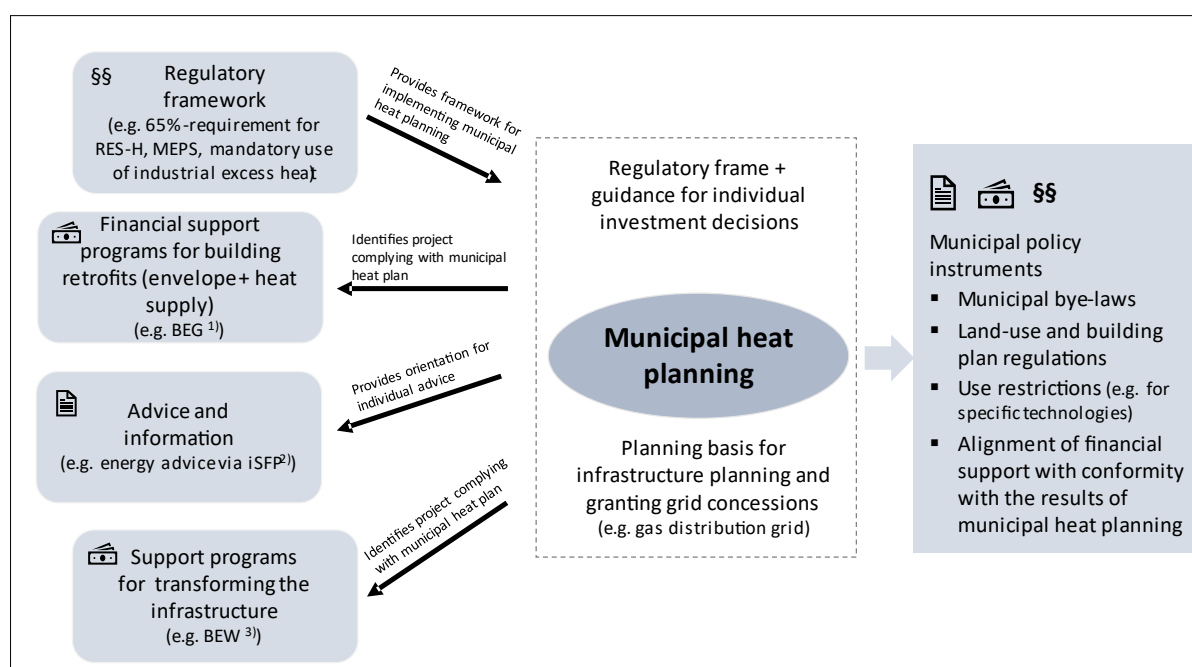
⁵⁾ WärmeLV: Wärmelieferverordnung (Heat supply regulation)

Source: Öko-Institut e.V.

Figure 3 shows an exemplary embedding of municipal heat planning in the existing mix of instruments announced in the coalition agreement. In this example, municipal heat planning serves as an orientation aid for individual investment decisions as well as a planning basis for infrastructure planning and the awarding of concessions. The regulatory framework of e.g. the 65% renewable heat requirement, minimum energy performance standards (MEPS) and the Energy Efficiency Act in turn provides the framework for the material implementation of municipal heat planning. The Municipal Heat Planning identifies Municipal-Heat-Planning-compliant investments in buildings, businesses and infrastructure that can be supported by federal funding programmes (while investments in non-Municipal-Heat-Planning-compliant measures, for example the installation of

a decentralised heat pump in an area identified as a priority area for district heating in the Municipal Heat Planning, may receive less or no funding). Furthermore, the Municipal Heat Planning provides an orientation framework for advising and informing homeowners, for example. With regard to municipal policy instruments, the Municipal Heat Planning sets a framework for municipal instruments such as municipal bylaws, building planning law, possible restrictions on use or municipal support programmes.

Figure 3: Embedding municipal heat planning into the existing mix of instruments and in the mix of instruments announced within the coalition agreement



¹⁾ BEG: Bundesförderung für effiziente Gebäude (Federal Subsidy for Efficient Buildings)

²⁾ iSFP: Individueller Sanierungsfahrplan (Individual Renovation Roadmap)

³⁾ BEW: Bundesförderung für effiziente Wärmenetze (Federal Funding for Efficient Heating Networks)

Source: Öko-Institut e.V.

8 Summary

The heat transition can only succeed if many millions of individual investment decisions by homeowners and businesses are coordinated in such a way that a target-compliant heating system is created. Municipal heating planning is the key instrument for the necessary orientation and coordination. Since the federal government cannot directly oblige the municipalities to implement municipal heat planning, the legal implementation must be carried out by the federal states. There are challenges in the concrete material implementation of municipal heat planning, including data procurement and vertical coordination within the planning cascade. With regard to the latter,

it must be ensured that the sum of all locally pursued heat transition strategies results in a coherent target picture for a climate-neutral heat supply.