KeepWarm
Renewing district heating

Improving the performance of District Heating Systems in Central and Eastern Europe

Development of Multi-level policy Plans - DHS recommendations for strategy or plan integration

Horizon 2020 (H2020-EE-2017-PPI) - Project N°784966

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List of Abbreviations

AP	Action plan
AT	Austria
CEE	Central and Eastern Europe
CoM	Covenant of Mayors for Climate and Energy
CRO	Croatia
CZ	Czech Republic
DH	District heating
DHC	District heating and cooling
DHS	District heating system
EC	European Commission
EE	Energy efficiency
EED	Energy Efficiency Directive
EPBD	Energy performance of buildings directive
EU	European Union
GHG	Greenhouse gas
H&C	Heating and cooling
LV	Latvia
MS	Member State(s)
NECP	National Energy Climate Plan
RED	Renewable energy directive
RES	Renewable energy source
SEAP	Sustainable Energy Action Plan
SECAP	Sustainable Energy and Climate Action Plan
SI	Slovenia
SRB	Serbia
UKR	Ukraine

Summary of the project

The project “KeepWarm - Improving the performance of district heating systems in Eastern Europe” is funded under the EU Horizon 2020 programme. Its objective is to accelerate cost-effective investments in the modernisation of District Heating Systems (DHS) in Central and Eastern Europe (CEE). KeepWarm is most active in seven countries: Austria (AT), Croatia (HR), Czech Republic (CZ), Latvia (LV), Serbia (SRB), Slovenia (SI) and Ukraine (UKR). The project focuses on this region, and these particular countries, because in most cases DHSs are frequently still inefficient and for the most part overly reliant on fossil fuels (especially gas, coal or oil).

The aim of this initiative, launched in April 2018, is to modernise DHSs around the whole region in a more sustainable manner. By improving system operations and promoting a switch to less-polluting sources, like renewable energy sources (RES), KeepWarm will contribute to reducing greenhouse gas (GHG) emissions. The eleven project partners strive to ensure that best practices for environmentally-friendlier heating and cooling will be taken up across Europe, replicating KeepWarm’s approach in other countries and regions, even beyond the end of the project in September 2020.

Project objectives

KeepWarm’s specific objectives are:

At least 450 relevant stakeholders with increased capacities on technical, organisational, financial and managerial aspects – includes 150 DHS operators;

At least 95 **DHS operators** are able to **develop business plans** and to identify the most suitable **financial model** for modernisation of their own DHS;

At least 23 **business plans for the modernisation** of DHSs have been developed and **sources for investment** have been identified;

DHS network **retrofitting** is addressed in at least 10 local **energy plans** and 7 regional or **national strategies** or plans;

At least 23,300 **relevant stakeholders** (directly) and 125,000 (indirectly) **reached** across Europe in order to **replicate the project outputs** in primary and secondary target regions and ensure the project’s impact;

Support EU policies and initiatives, such as the Covenant of Mayors for Climate and Energy (CoM) and DecarbHeat, by exploiting key lessons from KeepWarm activities and pilots to disseminate best practices across Europe.

KeepWarm consortium partners

LOGO	PARTNER NAME	SHORT	COUNTRY
	Deutsche Gesellschaft für internationale Zusammenarbeit (GIZ) GmbH	GIZ	Germany
	University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture	UNIZAG FSB	Croatia
	Landeskammer für Land- und Fortwirtschaft in Steiermark	LWK	Austria
	Regionalna Energetska Agencija Sjeverozapadne Hrvatske	REGEA	Croatia
	Jožef Stefan Institute, Energy Efficiency Centre	JSI	Slovenia
	ICLEI European Secretariat GmbH	ICLEI Europe	Germany
	Teplarenske Sdruzeni Ceske Republiky	TSCR	Czech Republic
	Biedriba Zemgales Regionala Energetikas Agentura	ZREA	Latvia
	Zavod Energetska agencija za Savinjsko, Šaleško in Koroško	KSSENA	Slovenia
	LLC KT-Energy Consulting	KT-Energy	Ukraine
	Institut za nuklearne nauke Vinča	VINCA	Serbia

Content

Executive summary

Increasing the energy efficiency and the share of renewables in the heating and cooling systems is part of the national policies of all EU Member States for reaching the energy and climate targets. As they become more and more demanding, strong regulatory obligations for implementing low carbon systems are becoming more common as well. To address the number of challenges and characteristics of the heating sector, which have been identified for the implementation of renewable heat and increased efficiency, countries have implemented different strategies in introducing low carbon and energy efficient technologies. However, the role of district heating is often not properly addressed to take advantage of such processes for energy system transition. As its planning is a complex task due to the intertwining of a number of aspects, this requires coordination between different sectors and the institutional levels.

The review and assessment of the main barriers specific to the partner countries of the KeepWarm project has identified a number of development obstacles and opportunities that need to be clearly addressed in strategic documents and action plans to ensure the effective inclusion of DH as one of the main pillars of future sustainable energy systems. To help overcome barriers to integrating DH aspects into strategic planning documents, like NECPs or SECAPs, this publication provides an overview and guidance to authorities, energy agencies and other institutions responsible for energy planning as well as investors on approaches and strategic tools for planning and implementing more effective solutions.

This document reflects the most effective aspects in policy creation, planning and communication with responsible stakeholders to influence the process. It covers all levels, from national to local, encapsulating the main issues and steps towards the incorporation of DHS aspects and actions in strategies and action plans. Communication and coordination between levels will help to ensure that all stakeholders work towards a common goal and do not hinder or block each other in their efforts. The advantage of a coordinated strategic energy planning at different levels is the flexibility to shape objectives and actions to meet the needs of local societies while working together towards the overall national objectives.

Planning processes strongly depend on legal and strategic frameworks, and therefore more attention needs to be put to this as it is the indispensable basis for efficient energy planning. National authorities are required to enhance the process by formulation of strategic objectives and provision of a framework within which local planning is carried out and of support structures. This could significantly improve the quality of guidance and planning as well as the efficiency of implementation. The key framework elements consist of (1) **a well-founded and sound basis for decision-making**, (2) **national, regional and local energy and climate strategies and visions**, (3) systematic involvement of **and clearly defined responsibilities**, (4) **planning instruments** and (5) **supporting tools and instruments**.

Strategic energy planning is a continuous process aiming to achieve energy and climate goals, which should be seen as a dynamic and iterative process that needs an effective feedback mechanism. The results have to be monitored to identify possible improvements

and make adjustments along the way to ensure that the optimal energy solutions are implemented. In general, the process consists of the following five main phases:

1. Preparation	2. Techno-economic evaluation	
• Identify key stakeholders • Identify data and information sources • Involve relevant policy makers / authorities at all levels of strategic planning	• Establish a sound basis for decision making (spatial data related to energy supply / demand / infrastructure) • Evaluate energy related planning approaches • Cost and benefit analysis	
3. Evaluation of existing policies	4. Policy (re-)design	5. Implementation, monitoring and evaluation
• Policy assessment • Evaluate existing policies • Identify barriers and opportunities	• Define objectives, targets, milestones • Determine the set of policies • Evaluate financial aspects (investments, funding)	• Make strategy public and promoted • Lead the implementation • Monitor, evaluate

DHC have become the visible part of EU Strategies on Heating and Cooling, Energy System Integration and the Renovation Wave, whereas the transposition of EU directives (RED, EED, EBPD) to national legislation provides an opportunity to establish its even stronger future role. These policies build on each other and their feasibility and effectiveness can only be achieved if they are implemented as a comprehensive package. It is essential that there is a link between the national and local levels in such a way that data, information, experience or other feedback relating to the implementation of the plans can be shared. This mechanism allows for the follow-up of activities and the planning of adjustments needed to meet the strategic objectives.

Decarbonisation of the H&C is essential to achieve the EU's ambitious climate and energy targets. District heating (DH) is key to the vision for the future of heating in Europe and enables countries to (1) use energy more efficiently, (2) increase the possibilities for renewable and low-carbon heating and (3) facilitate the transition to smart energy systems.

Approach to strategic heat planning

The complexity of energy planning

The transition of the energy system is a complex task due to the intertwining of technical, environmental, social and economic aspects. This complexity requires coordination between different sectors and institutional levels, and therefore there is a strong need for energy planning practices that should be able to respond to local energy system challenges while keeping national energy visions and objectives in mind. National energy plans are often developed, but without the inclusion of local implementation strategies, even though local measures are very important to find the right balance between national and local energy planning. The short-term optimisation of energy plans and projects at the expense of long-term optimisation in a sustainable energy system perspective is also often the case, especially as this creates immediate visibility with the potential aim of gaining "political" popularity for the authorities involved.

The integration of energy planning into urban planning processes that explicitly refers to the heating and cooling (H&C) sector and outlines the potential role and benefits of district heating and cooling (DHC) in the context of broader social, environmental and economic drivers, is crucial as it can pave the way for the deployment of DHC. This may include zoning (with the aim of obtaining a comprehensive assessment of the introduction potential of DHC systems), the requirements for DHC in master planning, the promotion of denser urban areas, the development of retrofitting strategies for urban areas, the combination of mixed uses in the building sector and the like.[1] An important means of articulating the role of district energy in terms of energy consumption and its impact on wider policy objectives is the development of a district heating (DH) target or objective. In Box 1, there are indicated several examples of possible targets regarding the introduction of a DHC system.

Box 1: Targets of the DHC system roll-out

- Expansion of the district energy system (number/share of homes, offices, shops, etc. connected to the system).
- Interconnection of segregated district energy networks through transmission pipes.
- Share of total greenhouse gas (GHG) reduction target to be met by district energy systems in the city.
- Share of electricity/ heating/ cooling capacity or consumption provided by district energy systems.
- Share of local government's energy usage that should come from district energy systems.
- Share of renewable energy sources (RES) or waste heat to be used in district energy systems.
- Percentage of energy efficiency (EE) increase due to district energy use.
- Replacement of existing individual H&C systems.

1 https://smartcities-infosystem.eu/sites/www.smartcities-infosystem.eu/files/scis_library/scis_solution_booklet_district_heating_and_cooling.pdf

Once these targets or objectives are identified, specific policies and activities can be developed. Generic targets, such as targets for CO_2 and GHG emissions, reduction of fossil fuel consumption, EE and RES, can be clearly assigned by DHC and its specific targets (e.g. expansion of DH network, share of RES and waste heat to be used in DHS, DH share of municipal heat supply, etc.).

Energy plans aimed at achieving the DHC's objectives must be developed in an integrated manner, assessing and coordinating the various stakeholders and considering other sectors and synergies between land use and infrastructure. Successful integrated planning requires cooperation between the different (local) government organizations involved in land-use planning – such as energy, waste, buildings, transport, etc.

Levels of energy planning

As cities are at the heart of the decarbonisation challenge, co-operative and integrated governance is required to ensure the alignment of policies. The main levels at which energy planning approaches should be shaped, governed and implemented are the following: national, municipal (and/or regional) and community (city, urban) level. All levels are important in strategic energy planning, it is just a matter of finding the right balance between the different levels. In order to use local sources, municipalities, energy utilities and the industry must collaborate across sectors. The inherently local nature of H&C means that cities must play a leading role in developing and implementing strategies for their decarbonisation. Planning processes become more complex at the local (urban) level as the implementation of technological solutions becomes more concrete[2]. Energy related targets (e.g. for DH) can be set at national level, but the placement and installation of DH systems requires longer processes and a stronger involvement of stakeholders at a local level. Municipalities and cities have local knowledge that cannot be acquired at national level, and the coordination between the different levels is therefore very important.

The lack of strategic direction and of clearly formulated medium and long-term strategic objectives at national (governmental) level in the field of energy system transformation creates a great deal of uncertainty about the scope and content of such policies at local level. Therefore, more guidance and support from national authorities is required, e.g. in the form of formulation of strategic objectives, provision of support structures and units or simply as a framework within which local planning is carried out. Such a national structural framework can significantly improve the quality of guidance and planning as well as the efficiency of implementation.

Furthermore, local and regional authorities could lack sufficient regulatory power to implement DH support measures (e.g. changes of national regulations, subsidies, etc.). Continuous dialogue between different levels of governance is important to create an enabling regulatory framework and increase investment in DH modernization. Local authorities are in a unique position to advance district energy systems in their various roles:

[2] A comprehensive framework for strategic energy planning based on Danish and international insights, L. Krog et al., Energy Strategy Reviews Volume 24, April 2019

as planners and regulators, as facilitators of finance, as role models and advocates, and as major consumers of energy and providers of infrastructure and services.[3] This is why it is so important for municipalities to envision (and design) their future energy system in an integrated manner, including interactions with other assets (building stock condition, electricity grid, etc.). In this way, planners, suppliers, financers and customers alike have a framework to effectively implement these kinds of systems and limit the risks associated with them. The initiative for the concrete heat planning and responsibility for its implementation, as a rule, lies with the local authorities.

Stakeholders have much to offer and are generally willing to support government efforts to ensure that the strategies are effective. Where stakeholder forums do not currently exist, governments should establish them urgently. Communication and coordination between levels will help to ensure that stakeholders and actors at different levels work towards a common goal and do not hinder or block each other in their efforts. The advantage of a coordinated strategic energy planning at different levels is the flexibility to shape objectives and actions to meet the needs of local societies while working together towards the overall national objectives. A regular exchange of experience on planning issues between the local and the national level (in the form of permanent strategic or other working groups) can help to further improve the legislative, fiscal and structural framework, thus providing the grounds for continuous improvement of the planning (and implementation) process.

The framework conditions and key elements of energy planning process

The creation of framework conditions is of great importance for district heating (and cooling) progress. They have to be in place at the beginning as precondition for effective adoption of the planning process:

- to define / have / pursue a clear and common vision,
- to connect strategic and operational levels,
- to make the processes of governance (administrative management) efficient,
- to ensure participation of stakeholders and define the responsibilities (e.g. for planning, management, implementation, support, etc.),
- to set a plan and timeframe for actions,
- to elaborate legal instruments for implementation (e.g. contracts, concessions, etc.),
- to enable legal, organisational and procedural (implementation) changes.

In order to make the planning process (Figure 1) sustainable and effective, the following key elements must be ensured (see examples in Box 2):

- **a well-founded and sound basis for decision-making** must be established, based on spatial (GIS) data on energy demand, supply and infrastructure (e.g. ensure

[3] UN Environment Programme, 2015, https://wedocs.unep.org/bitstream/handle/20.500.11822/9317/-District_energy_in_cities_unlocking_the_potential_of_energy_efficiency_and_renewable_ene.pdf?sequence=2&isAllowed=y

exchange of data between utilities, grid operator, cities, ministries; clarify data protection; create routines for data collection; set data exchange standards; establish integrated database, etc.);

- **national, regional and/or local energy and climate strategies and visions** defining targets for necessary sustainable energy changes with a focus on the H&C sector; energy concepts, visions and strategies at all levels must be mutually supportive and consider the best solutions from a life-cycle perspective; local policies that are aligned with the long-term objectives of national energy policy and provide clear priorities and quantified targets at local level;
- **clear responsibilities** must be defined in the administrations for (integrative) energy planning or, **if no such organisation or body exists, it must be established**[4] (e.g. in the form of a strategic energy body, committee or board or other permanent task forces within local authorities in order to coordinate local energy activities) and **stakeholders must be systematically involved** in the planning process (the aim is to clarify which stakeholders are needed/crucial, and in which roles they fill at various steps);
- **planning instruments** that enable the spatial coordination of energy (and climate-related) issues; adaptation to general urban planning and declaration of DH priority areas (zoning);
- **supporting tools and instruments** (e.g. energy modelling and calculation, standardised contracts, quality assurance) to manage and improve the integration of DHC benefits in (urban) planning or implementation phases and in negotiation processes between the parties involved (stakeholders), especially at local level (e.g. between the city and the project developer, investor, land owner or buyer).

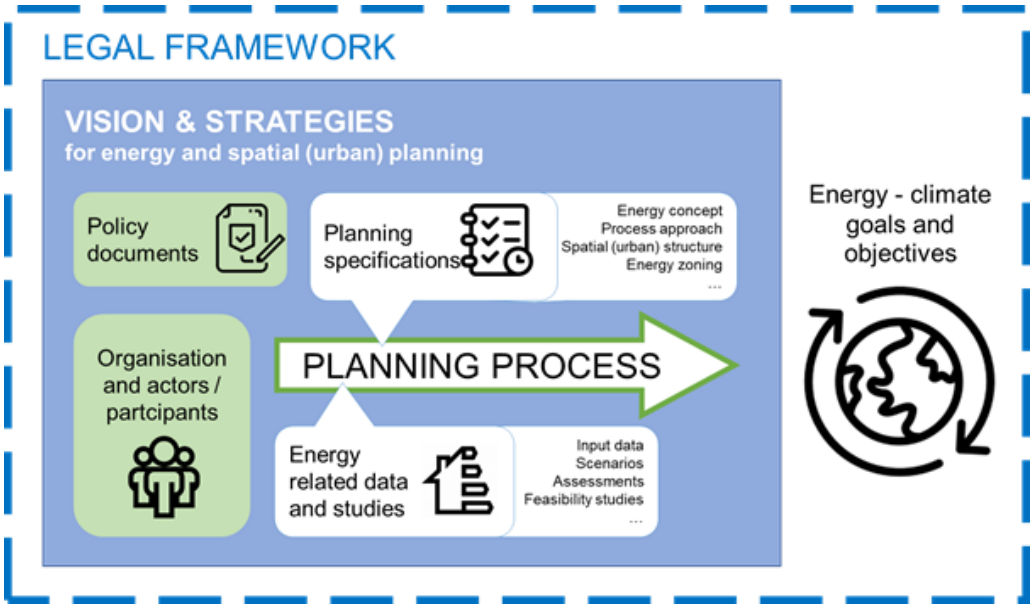

Figure 1: Key elements of the planning process

[4] Challenges for implementing such a body: financial resources (lack of or inconsistent funding makes it difficult to plan), cultural norms (discomfort with new approaches), skills (lack of technical knowledge and understanding) and political will (depends upon individuals in the municipal council). https://doi.org/10.1016/j.esr.2019.02.005

Box 2: Examples of strategic energy planning elements

(1) Ways of influencing energy planning (instruments)

- Visions, strategies and goals (long- mid-, short-term)
- Guidelines (for energy planning)
- Heating plans
- Environmental plans
- Energy aster / development plans
- Energy-related zoning plans
- Sustainable Energy and Climate Action Plans (SECAP)

(2) Supporting means for influencing planning (tools)

- Studies (preliminary, feasibility)
- Energy modelling and calculation tools
- Scenario analyses
- Monitoring tools

(3) Stakeholders and actors

- Administrative management (of energy planning)
- Contracting parties
- Negotiating parties (e.g. real estate owners)
- Policy makers

(4) Data (preferably GIS based)

- Energy related databases (demand, supply)
- Energy atlas
- Heat and cold maps
- Maps of heat sources (e.g. waste heat)
- RES availability mapping (e.g. biomass, solar thermal, hydrothermal, geothermal, etc.)
- Building types/demand and refurbishment maps

The iterative nature of the planning process

Strategic energy planning is a continuous process aiming to achieve energy and climate goals. Like most planning processes, it should be seen as a dynamic and iterative process that goes beyond the original plan. In particular, long-term energy planning, has to deal with uncertain and changing conditions (e.g. technological development, societal needs and risks), therefore it is important to establish a feedback mechanism. The results of the planning process need to be monitored to identify possible improvements and make adjustments along the way to ensure that the optimal energy solutions are implemented. The process must involve a wide range of different decision-makers and stakeholders, using planning methods and tools that enable all stakeholders to cooperate and reach a mutually agreed understanding and solution. In general, the process consists of the following main phases: (1) preparation, (2) technical, environmental and socio-economic

assessment, (3) review and evaluation of existing policies, (4) policy design and (5) implementation, monitoring and evaluation (Figure 2).

1. Preparation

Key representatives of authorities (e.g. departments or ministries) from all relevant policy areas (energy, building sector, spatial planning, economic and financial affairs, business development, etc.) and all policy levels (national, regional, local - municipal and district) shall be involved in the strategic management or/ and in drafting the development process.

The proper implementation of national strategic objectives is only possible if the successful implementation of action plans can be ensured at local levels too. At the same time, the experiences gained at local level can also serve as inspiration for the development of national policies which support replication by other actors. It is crucial to identify which stakeholders should be engaged, how they can be involved or consulted, and how efforts can be coordinated, and cross-cutting initiatives and issues be discussed. The collection of relevant data and information is a prerequisite for gaining insights into the current situation considering all planning elements.

Communication with stakeholders[5] shall be an ongoing activity throughout the development of strategies and plans, enabling the widest possible forum to gain additional data, to consult, to formulate policies and to receive feedback on practical issues and barriers (e.g. for DHS retrofitting).

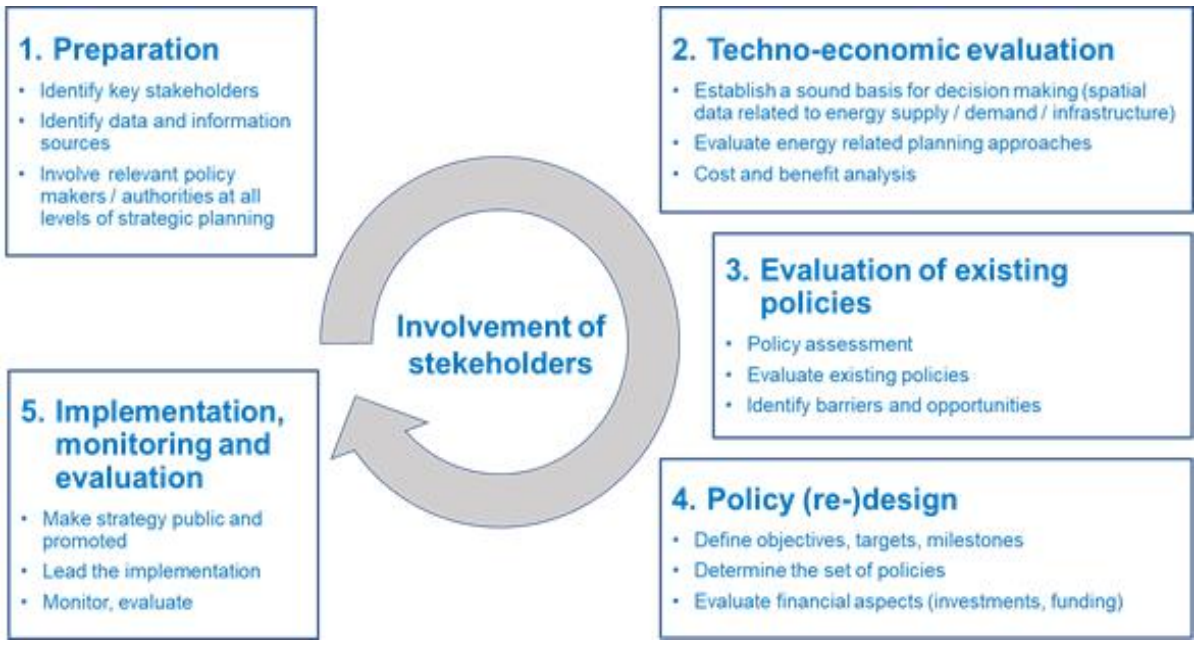

Figure 2: Continuous approach in strategic planning

[5] Useful overview of the DHC related stakeholders and their roles can be found in the KeepWarm document Action plans for retrofitting od DHS.

2. Technical, environmental and socio-economic assessment

This phase is necessary to assess and evaluate the potential of heat demand/supply and for possible cross-sectoral integration on the basis of all data collected from different sources. A detailed overview in the spatial context shall encompass demand and supply sides, energy sources (carriers), technological aspects and conditions related to infrastructure (e.g. heat and gas networks), availability of RES and waste heat, thus providing a clear and objective starting point.

Based on the analysed context different strategic approaches need to be explored to uncover a wide range of sustainable options and measures regarding EE, RES and the integration of energy systems. The alignment of approaches to renovate the building stock and retrofit or extend DH systems is crucial. If this is done, mutual benefits can be achieved for building owners or occupants, for DH suppliers and public/municipal authorities, considering cost-effectiveness in pursuing sustainable energy supply options based on RES or using waste heat.[6]

The quality of the results of the socio-economic assessment depends to a large extent on the costs of the technologies, the savings from retrofit activities and their medium and long-term projections. Some measures may even be based on technologies that are expected to be available on the market in the coming years.

There are other important aspects regarding the creation of supporting measures that will motivate utilities to invest in DHS retrofitting. In addition to the energy (cost) savings, there are also wider benefits from implementing measures that should be considered, such as improved air quality (and therefore health benefits), reduced carbon emissions, improved circular economy, job creation, etc. This evaluation should therefore make it possible to identify priority measures from both, a cost-effectiveness and a societal perspective, while policies can then be designed to drive these measures forward.

3. Review and evaluation of existing policies

The comprehensive review of existing strategies and policies related to DHC planning, including the progress of their implementation, should lead to the identification of the changes and additional policies which are required to improve the DHC systems retrofitting and sustainable development. The “KeepWarm” review of the regulatory framework and barriers for retrofitting of DHS[7] shows that the role of DH in energy planning is often underestimated or even overlooked at a policy level. Furthermore, strategic frameworks for H&C are not available in the countries studied. It was reported that the lack of a strategic framework or its vagueness causes a number of obstacles to the development of the DH sector and its decarbonisation.

However, the appraisal of current policies shall evaluate the role of DH and its contribution to national and EU targets, its impacts and the outcomes of existing policies in terms of energy savings achieved and the share of RES. The review should not involve national

[6] National energy and climate plans and renovation strategies –Guidance for public officers, http://bpie.eu
[7] Regulatory framework and barriers review for retrofitting DHS, D5.1, https://keepwarmeurope.eu/project-results/ Barriers addressed: regulatory, legislative, financial, technical, capacity, communication, etc.

level only, but also achievements at regional and local levels, which can identify successful approaches and policies worth repeating or extending on national level. As already highlighted in the preparatory phase, policy makers at all levels, from national to regional and local, need to be involved in order to gather their contribution and experiences. Additional input can be obtained through consultation with all relevant stakeholders.

In order to increase the likelihood that DH retrofits, network extensions or the construction of new systems will be systematically considered, it is necessary to identify the “policy-milestones” at which DH should be highlighted and appropriately addressed and then include them in the planning process through policies. Such an approach will increase the visibility of DH and allow these systems to be treated fairly and in a timely manner as a viable alternative for heat supply, thus avoiding the lock-in effect or disruptions and drawbacks if they are overlooked. These “policy-milestones” can be initiated by drawing up or updating an urban or regional spatial plan, when planning and constructing new residential or commercial areas, planning air quality measures, analysing waste heat potential, prioritising cost-effective connection to DH for public (or even private) buildings when they are refurbished, etc.

4. Policy design

Policies are designed to address specific concerns, such as regulatory aspects (ensure that processes are in accordance with national law, sector-specific regulations and other relevant rules), advisory perspectives (ensure that actions support sustainable goals and objectives) and informative purposes (designed for raising awareness and knowledge). A set of policies forms the strategy which is providing a forward-looking perspective. Policy making processes include a set of specific aims, objectives, targets and milestones, defining those authorities to implement the policy, identifies the needs and sources (budget) to implement the strategy and defines expected impacts with measurable progress indicators.

DHC sector-specific goals of reducing GHG emissions and the increased share of RES shall be defined together with milestones set at a local (municipal) to national level. It is important to consider interactions between different policies (both synergies and trade-offs) during the policy design. The particular focus shall be on measures within the next 3-5 years.

It is also crucial to identify the scale and sources of investments required to deliver the strategy (e.g. national and local funds, EU Structural/Cohesion funds, banks or possible new funding sources, instruments and mechanisms). The details about quantification of total annual investment requirements to deliver policy package shall be part of the mid-term action planning.

Recent experiences with the covid-19 pandemic confirm that the strategy needs to be resilient to fluctuating market conditions that might be encountered over time.

5. Strategy implementation, monitoring and evaluation

By making the strategy public, polices must evolve towards full implementation through appropriate regulatory mechanisms and various support programmes. This phase is crucial for progress at the operational level and requires the leadership of “Management Group(s)” composed of policy-makers with full authority from all departments and levels.

Broad promotion of the benefits of DH and raising the level of knowledge and awareness can greatly assist this process. The characteristic of good policy-making is also the willingness to learn through implementation and adaptation. Regular monitoring and evaluation must be established to identify whether progress is in line with the targets and objectives or whether adjustments are required.

Implications regarding the timing

Experiences show that considerations of energy supply options, particularly if grids are connected (e.g. in a DHS) and/or using local resources, should be taken into account in the very early stages of the planning process. This implies that there must already be a sufficiently solid idea of the use (e.g. districts and areas, share of housing), which makes it possible to estimate the heat demand and the temperature and load profiles of the heat.

Sometimes the absence of strategic and administrative steering towards decarbonisation leads to solutions that move away from sustainable energy and climate goals.

An early consideration also allows a coordinated solution of supply- and demand-side technologies. Building renovations and deployment of RES solutions should also be planned in conjunction, using an integrated planning approach that captures the interdependencies between supply and demand. This aspect is particularly important for local authorities.

Development of heating and cooling policy plans

Heating and cooling policy framework

Effective policies need to be developed at various levels to facilitate the transition to a decarbonised energy system. Decarbonisation policies are mainly designed at national levels (following EU directives), while the local level plays a crucial role in implementing investment decisions to improve the buildings' EE and to develop H&C systems.

Figure 3 outlines the levels of governance and structure of policies in the support of implementing DH development projects. These policies build on each other and their feasibility and effectiveness can only be achieved if they are implemented as a comprehensive package. As mentioned in the previous section, it is essential that there is a link between the national and local levels in such a way that data, information, experience or other feedback relating to the implementation of the plans can be shared. This mechanism allows for the follow-up of activities and the planning of adjustments needed to meet the strategic objectives.

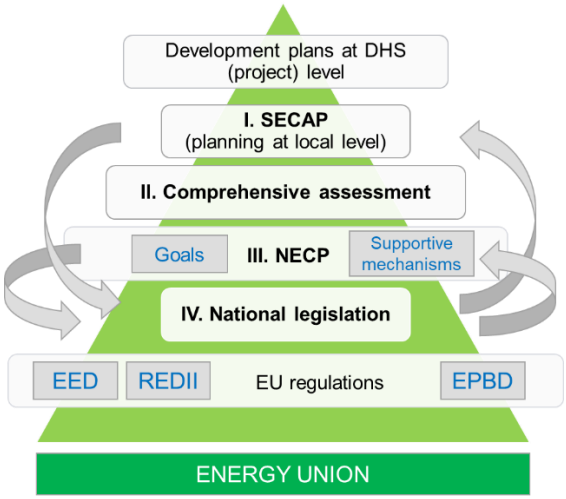

Figure 3: Levels of regulation and planning of the transition to the decarbonised DHC systems

District Heating as part of EU Strategies on Heating and Cooling, Energy System Integration and the Renovation Wave

Renewable energy sources (RES) and energy efficiency (EE) are at the heart of the priorities of a plethora of European Union (EU) initiatives. Decarbonisation of the H&C is essential to achieve the EU's ambitious climate and energy targets. District heating (DH) is key to the vision for the future of heating in Europe and enables countries to (1) use energy more efficiently, (2) increase the possibilities for renewable and low-carbon heating and (3) facilitate the transition to smart energy systems.

The sector integration is a key factor in the decarbonisation of H&C, which will ensure the achievement of a higher extent of RES and improved EE. DH also has great potential to become more efficient by using waste heat and large heat pumps and by providing thermal storage not only for its own uses, but also as a means of storing (volatile) RES electricity. Such development of DH systems is in full swing and this trend is expected to continue as the share of electricity from RES will continue to grow as the decarbonisation of the energy sector progresses.

DHC infrastructure offers the opportunity for centralised solutions that take advantage of economies of scale to improve efficiency and reduce operational costs. They also help to increase the competitiveness of centralised, large-scale renewable H&C technologies, for example in the solar-thermal segment, as some RES H&C technologies such as solar-thermal can be much cheaper in scale but require a DH network for distribution.

With regard to European district energy strategies, EC published the Heating and Cooling Strategy - At the Heart of Europe's Energy Transition[8] in February 2016. This was an important step towards creating a framework for the introduction of sustainable H&C models in Europe. In line with this strategy, countries, regions and municipalities can include ambitious targets in their energy strategies, with DHS being a key element of their proposals. Two highlights of the strategy in relation to DH are shown in Box 3.

Box 3: DH in an EU Strategy on Heating and Cooling

"District heating can integrate renewable electricity (through heat pumps), geothermal and solar thermal energy, waste heat and municipal waste. It can offer flexibility to the energy system by cheaply storing thermal energy, for instance in hot water tanks or underground. In some countries, district heating is seen as an attractive option for companies and consumers and as a means of improving energy efficiency and renewables deployment. Some Member States are making efforts to modernise and expand old systems – others, where the technology is hardly known, are building new ones. District heating and cooling can also contribute to air quality objectives, especially if it substitutes or avoids solid fuel domestic heating."

"Synergies between waste-to-energy processes and district heating/cooling could provide a secure, renewable, and in some cases, more affordable energy in displacing fossil fuels."

In July 2020, an EU Strategy for Energy System Integration[9] was published by EC, in which it was stated that "energy system integration – the coordinated planning and operation of the energy system 'as a whole', across multiple energy carriers, infrastructures, and consumption sectors – is the pathway towards an effective, affordable and deep decarbonisation of the European economy", with DH being one of the main pillars for its implementation. Emphasis has been placed on advanced low-temperature DH systems "as they can connect local demand with (an increasing share of) renewable and waste energy sources, as well as the wider electric and gas grids – contributing to the optimisation of supply and demand across energy carriers".

However, progress in this respect is often hampered by inconsistent taxation levels applied

[8] An EU Strategy on Heating and Cooling, https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v14.pdf
[9] An EU Strategy for Energy System Integration, https://ec.europa.eu/energy/sites/ener/files/energy_system_integration_strategy_.pdf

to various energy sources, but also due to "a number of other barriers, including unfit infrastructure planning, building codes and product standards, lack of skilled workforce for installation and maintenance, lack of public and private financing instruments, and lack of internalisation of CO_2 costs in heating fuels. This translates into low replacement rates of the EU fossil heating stocks, low development and modernisation of district heating/cooling networks, and low building refurbishment rates." Key actions related to DH are presented in Box 4.

Box 4: DH in an EU Strategy for Energy System integration

"Facilitate the reuse of waste heat from industrial sites and data centres, through strengthened requirements for connection to district heating networks, energy performance accounting and contractual frameworks, as part of the revision of the Renewable Energy Directive and of the Energy Efficiency Directive (June 2021)."

"Accelerate investment in smart, highly-efficient, renewables-based district heating and cooling networks, if appropriate by proposing stronger obligations through the revision of the Renewable Energy Directive and the Energy Efficiency Directive (June 2021), and the financing of flagship projects."

In October 2020, EC published the strategic communication document A Renovation Wave for Europe[10] to improve the energy performance of buildings. One of the three areas where the strategy will prioritise actions is the decarbonisation of H&C. It also recognises the introduction of advanced DHC systems as a key infrastructure, in line with the strategic principle of jointly addressing the challenges of the green and digital transition. An additional lead action is also developing neighbourhood-based approaches for local communities to integrate RES and digital solutions and create zero-energy districts. The application of integrated district or neighbourhood approaches for building and EE policies, are based on smart energy distribution systems and can ensure that each building meets the minimum energy performance requirements, for example by means of overall renovation schemes applying to a number of buildings in a spatial context instead of a single building, where the role of DHS could be substantial (see selected actions in Box 5).

Box 5: DHC related actions in an EU Renovation Wave Strategy

"Synergies for renovation become evident when scaled up to district and community approaches. Aggregating projects at this level may lead to zero-energy or even positive energy districts (e.g. advanced district heating and cooling systems with large potential for renewables and waste-heat recovery). These offer cheaper ways to decarbonise heating and cooling and can offer system efficiencies at an industrial scale by fuel switch, increased flexibility and thermal storage, and creating space for nature."

"Local authorities and utility companies have an important role, in creating the necessary regulatory framework, market conditions and skills and in preparing a robust pipeline of projects to finance the modernisation of heating and cooling systems. Integrated planning, specific information about the building stock and energy supply options are necessary to decarbonise heating and cooling in neighbourhoods and at the national level."

[10] An EU Renovation Wave Strategy, https://ec.europa.eu/energy/sites/ener/files/eu_renovation_wave_strategy.pdf

Energy Union

The main objective of the **Energy Union[11] strategy[12]** is to ensure that EU consumers - households and businesses - make the transition to secure, sustainable, competitive and affordable energy systems in which DHC can play an important role. This strategy is based on five dimensions:

- **Climate action, decarbonising the economy** - the EU is committed to a quick ratification of the Paris Agreement and to retaining its leadership in RES;
- **Energy efficiency** - improved energy efficiency will reduce the dependence on energy imports, lower emissions, and drive jobs and economic growth;
- **Security, solidarity and trust** - diversifying Europe's sources of energy and ensuring energy security through solidarity and cooperation between EU countries;
- **A fully integrated internal energy market** - enabling the free flow of energy through the EU adequate infrastructure and without technical or regulatory barriers;
- **Research, innovation and competitiveness** - supporting breakthroughs in low-carbon and clean energy technologies by prioritising research and innovation to drive the energy transition and improve competitiveness.

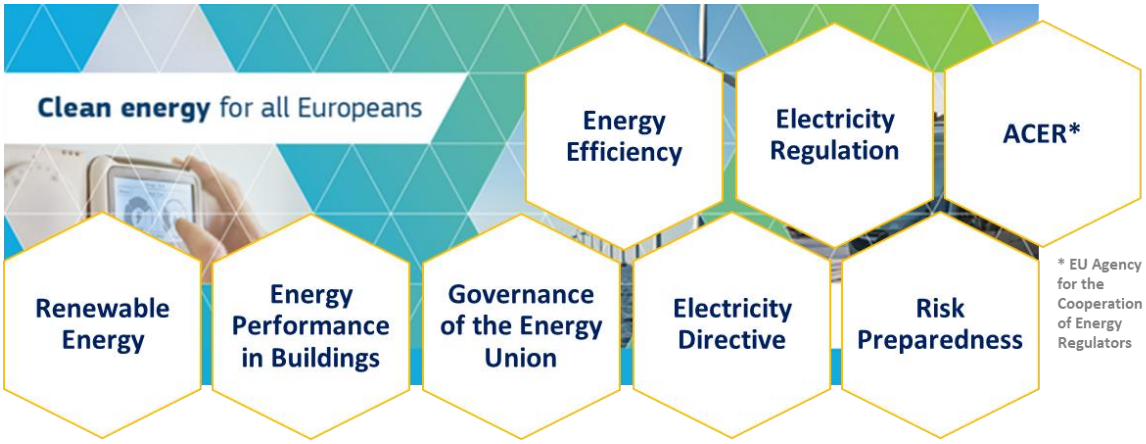

Figure 4: The legislative acts of the *Clean energy for all Europeans package*

The ***Clean energy for all Europeans package***[13], which consists of eight legislative acts (Figure 4) is marking a significant step towards the implementation of the Energy Union Strategy. The ***EU Regulation on the Governance of the Energy Union and Climate Action***[14] (EU/2018/1999) entered into force in December 2018 as part of this package and is providing the governance mechanism based on integrated National Energy and Climate Plans[15] (NECP) covering ten-year periods starting from 2021 to 2030, EU and national long-term strategies (to achieve the greenhouse gas emissions reductions needed to meet

[11] https://ec.europa.eu/energy/topics/energy-strategy/energy-union_en?redir=1
[12] (COM/2015/080), published on 25 February 2015
[13] https://ec.europa.eu/energy/topics/energy-strategy/clean-energy-all-europeans_en
[14] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0001.01.ENG&toc=OJ:L:2018:328:TOC
[15] https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/national-energy-climate-plans

national commitments under the Paris Agreement and EU objectives)[16], as well as integrated reporting, monitoring and data publication.

In December 2018, the recast **Renewable Energy Directive**[17] (EU/2018/2001, RED II) entered into force, driving the EU to meet its emissions reduction commitments under the Paris Agreement and aimed at keeping the EU a global leader in renewables[18]. The overall EU target for Renewable Energy Sources consumption by 2030 has been raised to 32%. EU MS are required to outline how they will meet the new 2030 targets for renewable energy (and for energy efficiency) in their NECPs for 2021-2030. The transposition of RED II into MS national laws, which needs to be implemented by end of June 2021, provides an opportunity to establish a strong future role of DHS. The review and revision of the existing legislation is required due to the increased EU climate ambitions articulated by the European Green Deal, which outlines a number of initiatives across all policy sectors, aiming to make the EU climate neutral by 2050. This will be assisted by the accelerated transition towards a more integrated energy system as outlined in EU Energy System Integration Strategy. As the technologies have become more accessible, citizens have also become more empowered. The Clean energy for all Europeans package, and the recast Renewable Energy Directive, makes it easier for citizens to form energy communities, but also to produce, store and sell their own renewable energy.

In 2018, the new amending **Directive on Energy Efficiency**[19] (EU/2018/2002, EED) was agreed to update the policy framework to 2030 and beyond.[20] Among others it includes (1) an extension to the energy savings obligation in end use (introduced in the 2012 directive), (2) the requirement that EU countries will have to each year achieve new energy savings of 0.8% of final energy consumption for the 2021-2030 period, (3) the new EU efficiency target for 2030 (at least 32.5%), (4) stronger rules on metering and billing of thermal energy, (5) the requirement that MS must have transparent, publicly available national rules on the allocation of costs for heating, cooling and hot water consumption in multi-apartment and multi-purpose buildings with collective systems for such services, etc. Updated measures relating to national long-term renovation strategies have been covered under the amended Energy Performance of Buildings Directive (EU/2018/844). The EC has provided several guides to help MS to transpose fully the different elements of the 2018 amending directive into national law (e.g. on the content of the comprehensive assessment of the potential for efficient heating and cooling under Article 14 of the EED). Under the European Green Deal, the EC has committed to stronger action on climate change, aiming to assess how the EU's GHG emissions could be reduced by at least 50% - 55% by 2030. As the efficient use of energy is crucial to achieving such a target, EC launched the review process in August 2020 to provide insights on how the EED could be revised to contribute to these goals.

The revised **Energy Performance of Buildings Directive**[21] (EU/2018/844, EPBD) entered into force in July 2018. It sets a clear direction for the decarbonisation of the European building stock by 2050, including strengthened provisions for national renovation strategies

[16] https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/national-energy-climate-plans#national-long-term-strategies
[17] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC
[18] https://ec.europa.eu/energy/topics/renewable-energy/renewable-energy-directive/overview_en#the-recast-directive-2018-2001-eu
[19] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2018.328.01.0210.01.ENG
[20] https://ec.europa.eu/energy/topics/energy-efficiency/targets-directive-and-rules/energy-efficiency-directive_en
[21] https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en

and supportive measures that help national EU governments boost energy performance of buildings and improve the existing building stock[22]. National renovation strategies were first introduced in 2012 by the EED, this latest revision moves the requirement from the EED to the EPBD to align with other aspects concerning the energy performance of buildings. It strengthens the requirement with special attention to worst-performing buildings, split-incentive dilemmas and market failures, energy poverty and all public buildings. The new requirements in terms of planning and reporting for national renovation strategies as part of NECP have been set by the Governance Regulation, which stresses the importance of stakeholder exchange and consultation in various ways. Besides the specific reporting requirements set out for the long-term renovation strategies and the NECPs, it also foresees nationally organised multilevel climate and energy dialogues as well as regional cooperation. This creates opportunities to link renovation strategies to other national, regional and local initiatives and facilitates synergies.

In December 2019, EC presented the **European Green Deal**[23] as a roadmap for making the EU's economy (including the energy sectors) sustainable, while in March 2020 EC proposed a European Climate Law[24] (and amended proposal in September 2020[25]) to turn the political commitment of the EU Green Deal into a legal obligation and to amend Regulation EU/2018/1999 to include the objective of climate-neutrality and to ensure the consistency of measures taken with that objective should build upon and be consistent with the governance framework.

Key DHC aspects to be integrated in strategies and plans

The assessment of the existing national strategies and plans in the seven pilot countries of the KeepWarm project[26] shows that many improvements are required to strengthen these strategies, to ensure that they not only meet EU legislative requirements, but also provide strong support for DHC systems to play a visible role as a highly energy-efficient and cost-effective way of moving towards a decarbonised and sustainable heat supply.

The EU "winter legislative package" does not indicate the direction for the development of the individual sectors, but sets the framework for the MSs to lead the energy sector towards the 2030 targets. It introduces increased demanding commitments for DHC systems which need to be clearly reflected and supported at national level (e.g. NECP) and even more specifically addressed with a number of concrete goals and initiatives at local level (e.g. in SECAP).

The main themes of the related directives, which are crucial for the formulation of policies on the use of RES or EE in the DHC sector, have been selected for the three main areas where the EU is setting the direction of national legislation: energy efficiency, use of

[22] The Commission has also published a series of recommendations on the building renovation (EU)2019/786 and building modernisation (EU)2019/1019 aspects of the new rules.
[23] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
[24] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588581905912&uri=CELEX:52020PC0080
[25] https://ec.europa.eu/clima/sites/clima/files/eu-climate-action/docs/prop_reg_ecl_en.pdf
[26] Pilot countries in the KeepWarm project: Austria, Croatia, Czech Republic, Latvia, Serbia, Slovenia and Ukraine.

renewable energy and energy efficient buildings. In the following three sections, the articles of the Directives with direct strong DHC implications are presented to guide and support each of the stakeholders systematically through the integrity assessment of the relevant policy regulations, particularly those set at national level. Policy development in non-EU countries is also influenced by bilateral cooperation and the use of EU experience during the policy development process.

Energy efficiency

Main legislative framework: Energy Efficiency Directive (Directive 2012/27/EU – EED; amended by (EU) 2018/2002; Annexes VIII and IX amended by Commission Delegated Regulation (EU) 2019/826) and its transposition to national legislation of EU MS

Selected EED Articles with direct DHC implications

1) *Energy savings obligation (EED, Article 7)*

Is the calculation of the amount of energy savings to be achieved in the period 2021 - 2030 (referred to in EED Art 7, Para 1, b) described in the NECP (in accordance with Annex III to Regulation EU/2018/1999)?

Is the contribution of the DHC sector defined and clearly described?

How realistic and development-oriented are the goals and targets of DH?

Is the contribution of an efficient DHC infrastructure counted to energy savings? Is there a methodology defined by the MS?

2) *Energy efficiency obligation schemes (EED, Article 7a)*

Is the DHC sector included in an energy efficiency obligation scheme?

Are there criteria for obliged parties in the DHS sector objective, non-discriminatory and balanced with other sectors?

Is the amount of energy savings required of obligated parties defined by the MS? Is the same methodology applied to express the amount of energy savings required and to calculate the claimed savings?

3) *Energy audits and energy management systems (EED, Article 8)*

Does the MS require that an assessment of the technical and economic feasibility of connecting to an existing or planned DHC network is part of the energy audit? How this has been implemented?

4) *Metering, sub-metering and cost allocation for heating, cooling and domestic hot water (EED, Articles 9 and 9a)*

Does the MS ensure for DHC and domestic hot water supply that final customers are provided with competitively priced meters that accurately reflect their actual energy consumption?

Are there national rules on the allocation of the cost of heating, cooling and domestic hot water consumption in multi-apartment or multi-purpose buildings supplied from DHC publicly available (to ensure transparency and accuracy of accounting for individual consumption)?

5) *Promotion of efficiency in heating and cooling / Potential for efficiency in heating and cooling (EED, Article 14)*

Remark: MSs are required to provide an assessment of how their H&C systems can be decarbonised using their potential for efficiency, RES and waste heat, and to include this in the comprehensive assessment by December 2020. The KeepWarm guide for the 2nd comprehensive assessment of the potential for efficient heating and cooling[27] is applicable as a supportive tool for this implementation.

6) *Energy Efficiency National Fund, Financing and Technical Support (EED, Article 20)*

Are there national funds (e.g. Energy Efficiency National Fund) available to support DHC EE measures?

7) *Minimum requirements for billing and consumption information for heating, cooling and domestic hot water (EED, Annex VIIa)*

How has the MS ensured that clear and comprehensive information on DHC consumption is available to end users? Is there information about the fuel mix used and the associated annual GHG emissions for final users supplied by DHC, as well as a description of the different taxes, charges and tariffs applied? Is the scope of the requirements limited to provide information about GHG emissions?

8) *Cost-benefit analysis (CBA) (EED, Annex IX)*

Remark: The CBA shall provide information for the purpose of the measures in Article 14.

9) *EED Introduction*

How are sustainable technologies in efficient DHC systems and an efficient H&C infrastructure promoted by MSs to achieve the required cumulative final energy savings? Are there alternative policy measures that are designed and implemented to achieve maximum flexibility also for the DHC sector? (18)

Utilisation of renewable energy

Main legislative framework: Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources (The recast Renewable Energy Directive, 2009/28/EC), RED II.

Selected RED II Articles with the DHC implications

1) *Stability of financial support (RED II, Article 6)*

[27] https://keepwarmeurope.eu/fileadmin/user_upload/Resources/Deliverables/KeepWarm_D5_4_final.pdf

Has the MS published a long-term schedule of support granted to RES projects (including the indicative timing, the frequency of tendering procedures, capacity and budget or maximum unitary support, eligible technologies), anticipating the expected allocation of support, covering, as a reference, at least the following five years (or three - in the case of budgetary planning constraints)? Is it specified how the DH is addressed?

2) *Calculation of the share of energy from renewable sources (RED II, Article 7)*

Does the calculation of gross final consumption of energy from renewable sources in the H&C sector include the total quantity of DHC produced from RES in a MS, including ambient and geothermal energy used for H&C? Is it consistent with the methodology set out in Annex VII?

3) *Information and training (RED II, Article 18)*

Is there clear guidance made available by the MS to all relevant actors, in particular to planners and architects so that they are able to properly consider the optimal combination of energy from RES, high-efficiency technologies and DHC when planning, designing, building and renovating industrial, commercial or residential areas?

4) *Access to and operation of the grids (RED II, Article 20)*

What kind of steps has the MS taken (or planned), based on the assessment in the integrated NECP on the necessity to build new infrastructure for DHC from RES, to enable the development of a DHC infrastructure to accommodate the development of H&C from large biomass, solar thermal energy, ambient energy and geothermal energy, as well as from waste heat and cold?

5) *Mainstreaming renewable energy in heating and cooling (RED II, Article 23)*

How was DH considered by the MS in prioritising of the best available technologies to promote the use of RES in the H&C sector?

When deciding on the measures to be taken for the purposes of using energy from RES, did the MS take into account cost-effectiveness, which reflects structural barriers resulting from the high share of natural gas or cooling or from a dispersed settlement structure with low population density? Where have these measures been published (e.g. in the NECP) and if/how DH entities have been designated for implementation?

Are there options or measures to achieve the recommended annual increase in the share of RES, which has been developed (e.g. in the NECP) in such a way that a fair positioning and sustainable development of DHC is possible?

6) *District heating and cooling (RED II, Article 24)*

How has the MS ensured that information on the energy performance and the share of RES in their DHC systems is provided to final consumers in an easily accessible manner? How has the MS ensured that consumer rights and the rules for operating DHC systems are clearly defined and enforced by the competent authority? Who has been designated as the “competent authority”?

What kind of measures and conditions have been set by the MS to allow customers of DHC systems which are not efficient (as defined in point (41) of Article 2 of Directive 2012/27/EU) or which are not such a system by 31 December 2025 on the basis of a plan approved by the competent authority, to disconnect? Are there measures foreseen for DHC systems to support or assist their transformation towards efficiency?

How has the MS defined the necessary measures to ensure that DHC systems contribute to increasing the share of RES in the H&C sector (as defined in Article 23(1) of RED II) by implementing at least one of the two options defined in Article 24(4) of RED II (i.e. increase the share of energy from RES and waste heat, or connect suppliers of energy from RES and from waste heat)? Are these measures laid out in the integrated NECP (pursuant to Annex I to Regulation (EU) 2018/1999) or elsewhere and how should they be implemented?

Does the MS require operators of DHC systems to connect suppliers of energy from RES and from waste heat and cold, or are they required to offer to connect and purchase heat or cold from RES and from waste heat and cold from third-party suppliers on the basis of non-discriminatory criteria set by the competent authority of the MS? What arrangements does the MS take in the event that operators of a DHC system refuse to connect a supplier, as mentioned above?

Does the MS require operators of electricity distribution system to assess, at least every four years, in cooperation with the operators of DHC systems in their respective areas, the potential for DHC systems to provide balancing and other system services, including demand response and storage of excess electricity from (volatile) RES, and to consider whether using the identified potential would be more resource- and cost-efficient than alternative solutions?

7) RED Introduction

Is the use of efficient DHC accepted by the MS as a means to fulfil the minimum levels for the use of energy from RES in buildings? (48)

Is the assessment of their potential of energy from RES and the use of waste heat and cold in the H&C sector, which has to be carried out by MSs, promoting competitive and efficient DHC? (This assessment should be included in the comprehensive assessments in accordance with EED, Article 14.) (49)

Are their final consumers given transparent and reliable information on the efficiency of DHC systems and the share of energy from RES in their specific heating or cooling supply? Are there solutions provided that make the fuel switching possible without disabling DHC systems to make timely progress towards the required RES share and to avoid lock-in/lock-out? (78)

Energy efficient buildings

Main legislative framework: Energy Performance of Buildings Directive (Directive 2010/31/EU, EPBD; amended by (EU) 2018/844)

Selected EPBD Articles with the DHC implications

1) *Long-term renovation strategy (EPBD, Article 2a)*

Does the long-term renovation strategy encompass DHC in an overview of national initiatives to promote smart technologies and well-connected buildings and communities, as well as skills and education in the EE sectors? (1f)

Does the long-term renovation strategy include an evidence-based estimate of the expected energy savings and wider benefits, e.g. in terms of health, safety and air quality, also for DHC? (1g)

Does the roadmap for the long-term renovation strategy include measures that address the RES-based DHC as a possible cost-effective solution for enabling transformation of existing buildings to near zero-energy buildings? (2)

2) *New buildings (EPBD, Article 6)*

Is it ensured (at national level) that the technical, environmental and economic feasibility of high-efficiency alternative systems (inclusive efficient DHC, if applicable) is taken into account before construction of new buildings starts?

3) *Technical building systems (EPBD, Article 8)*

Are there requirements for the buildings to be equipped with self-regulating devices considering specifics of buildings that are connected to DH?

Are there coherent urban planning policies (taking into account DHC infrastructure and other related aspects) that have been established or somehow considered?

4) *Information (EPBD, Article 20)*

Is there guidance and training made available for those responsible for implementing the EPBD so that the use of DHC can be taken into account when planning, designing, constructing and renovating industrial or residential areas?

5) *Common general framework for the calculation of energy performance of buildings (Annex I, referred to in Article 3)*

Is there a calculation of primary energy factors or weighting factors per energy carrier that allows the use of specific information defined by the MS and provided for individual DHC systems?[28]

Do methodologies for calculating energy performance take into account the positive influence of DHC systems?[29]

[28] Commission Recommendation (EU) 2019/1019 of 7 June 2019 on building modernisation, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019H1019
[29] This requirement is stipulated also by the Commission Recommendations for building renovation, EU/2019/786, https://eur-lex.europa.eu/legal-content/GA/TXT/?uri=CELEX:32019H0786

Concluding remarks

The evolution and maintenance of multi-level policy plans is key for district heating and cooling (DHC) progress. Given the long-term nature of the DHC infrastructure lifetime and the planning process complexity, the activation of governments and all other key stakeholders at all levels of governance as well as continuous dialogue between these levels is crucial to create an enabling regulatory framework for the support of DHC solutions and increase investments for their developments. Adequate regulation that enables local authorities to act in an appropriate, strategically defined direction should be ensured at national level, while local governments are responsible for planning, stakeholder coordination and implementation of DHC infrastructure.

Broad political support for policies and a harmonised participatory development process which aligns district energy, energy efficiency and decarbonisation is essential to avoid a stop-and-go approach to such policies or even unnecessary investment and lock-in effects. This will also ensure that these policies remain priorities and that the supportive policy framework is maintained. A harmonised approach means that policies can be designed to complement each other and ensure that they are implemented in the most effective way. These plans should not only define specific policy approaches and actions, but also define responsibilities at political and administrative level.

Long-term strategies, which also aim to mobilise investment in the development and renovation of DHC systems, have the potential to deliver multiple benefits under the sustainable development agenda - by mitigating the impact of climate change, improving healthy environmental conditions by reducing air pollution, improving access to affordable and clean energy and creating green jobs. A stronger policy leadership and better coordination between the different departments and sectors that should be involved in DHC renovation is also crucial in order to better understand the benefits that will impact on broader areas (e.g. energy communities or smart cities).