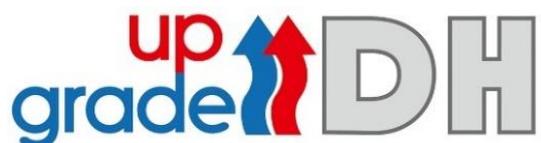




National action plan for retrofitting DH networks in Bosnia and Herzegovina



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Abbreviations

BiH	Bosnia and Herzegovina
CHP	Combined heat and power
DH	District heating
DHC	District heating and cooling
DHS	District heating system
IED	Industrial Emissions Directive
LCPD	Large Combustion Plant Directive
RES	Renewable energy sources

1 Introduction

The overall objective of the Upgrade DH project is to improve the performance of the existing district heating (DH) networks in Europe by supporting selected demonstration cases for upgrading, which can be replicated in Europe. There are two pillars of the upgrading measures promoted within the project; i) energy efficiency measures and ii) RES integration in DH systems (DHS), both contributing to the CO₂ emissions reduction and transition of the heat sector for climate neutral Europe in 2050.

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 was developed in close collaboration with experts from Euroheat & Power and WIP Renewable Energies who shared their experience and proposals. It specifically focuses on the **development of a national action plan** for the retrofitting of inefficient district heating networks in **Bosnia and Herzegovina** and includes the results of the retrofitting approaches (see also the *District Heating Handbook* developed within the project [1]).

In Bosnia and Herzegovina, there was a tradition of using district heating systems to provide heating in cities. Currently, almost all district heating systems aim to expand the district heating network to maximize the use of available capacity. Considering the type of fuel, Sarajevo and Zvornik are the only DHS using natural gas, these two cities are located on the natural gas pipeline route. Ultimately, most DHS in BiH use coal as their primary energy source. Some of them are looking into the possibility of switching to wood biomass. The general problem with almost all DHS built by the 1990s is over-dimensioning. In addition, the thermal needs calculation method was such that the system could heat the buildings adequately at extremely low outside temperatures. Since all systems only provide heat for space heating (not for domestic hot water), there is no operation during the summer.[2]

The analysis showed that even though there have been several initiatives in past, there is no national DH action plan developed so far. Therefore, a **list of solutions / actions / activities** that could support the development or retrofitting of DH networks was elaborated and can serve for inspiration within the country, adjusted to the specifics of cities/systems where it applies, but also to other countries with a similar DH market situation and legislative framework.

More specifically, due to the complex administrative structure of the country, separate laws exist at the state, federal, and canton levels (Chapter 2). Challenges have been identified, as well as priority directions of improving the regulatory market conditions in the heat sector (see 3.1 SWOT analysis). Policy recommendations and actions for the modernization of inefficient district heating systems were developed (Chapter 3) and partially presented during a sister-project KeepWarm final conference held on 12 November 2020 (Chapter 4). Any legislative changes which took place after that date are out of the scope of this report. Current policy framework

2 An overview of the development of fuel use for District Heating (DH) over the last 10 years

The district heating system in urban areas in Bosnia and Herzegovina (BiH) was a common way of heating over the last decades. Namely, most urban environments were dependent on heat from district heating systems. The endeavour was for the society to show its organization in that domain, and for the engineers to show how it was possible to heat more efficiently and to be more environmentally friendly than with individual furnaces. It is safe to say that there was a tradition of heating in cities through a district heating system. The ways of organizing these district heating systems can be divided into three groups:

1. District heating systems in urban areas, mostly based on natural gas;
2. District heating systems from thermal power plants - cogeneration; and
3. Local heating systems from a local factory.

Almost all district heating systems aim to expand the district heating network to maximize the use of available capacity. Considering the type of fuel, Sarajevo and Zvornik are the only DHS that use natural gas. The reason is that these two cities are located on the natural gas pipeline route. Prijedor and Banja Luka had used fuel oil in heating plants, however, in 2015 and 2017, respectively, these two district heating systems switched to wood chips as the primary energy source, while fuel oil plants remained an alternative option. In 2018, fuel oil is still being used as a primary energy source only in heat power plants in Vogošća and East Sarajevo. Ultimately, most DHS in BiH use coal as their primary energy source (Travnik, Zavidovici, Doboj, Tesanj, Bijeljina, etc.). Some of them analyse the possibilities of switching to wood biomass - there is also a trend of switching from coal to biomass due to the environmental aspect on the one hand, and prices on the other, as the wood biomass market is gradually evolving, with costs of biomass often lower than coal costs.

2.1 Summary of the national DH market and potential to fulfil EU 2050 objectives

In Bosnia and Herzegovina (BiH), in 2017, a total of 35 companies were identified in the field of DHSs, of which 3 were out of operation while there are 32 DHSs in operation. Of these, 22 are in the Federation of BiH (FBiH), while the remaining 13 are in the Republika Srpska (RS). Some of the 32 operating companies are involved in the production and delivery of heat, while some are only in the delivery. In 2017, the total annual heat production from DHS in BiH amounted to 1,499,571 MWh, of which a total of 1,103,534 MWh of thermal energy was produced in the FBiH heat power plants, while 396,036 MWh of thermal energy was produced in the RS. At the BiH level, 50% of thermal energy is obtained from coal, while 29% of energy is obtained from natural gas and 20% from wood biomass. Fuel oil accounts for only 1% of heat produced. The total heated area of all DHSs at the BiH level is 10,048,516 m². Most DHSs pay for the heat supply service in a combination, i.e. flat rate per heated area (BAM/m²)* and according to actual consumption (BAM/MWh). The average rate of charge for all analyzed DH companies involved in the supply of thermal energy is 86.3%.

According to the International Energy Agency (IEA), the total heating energy consumption in BiH in 2015 was about 71 PJ (IEA, 2015). District heating in 2015 delivered 5.6 PJ, representing about 8% of total heating energy consumption (IEA, 2015). **If the total available technical potential of wood biomass for high efficiency cogeneration and district heating is utilized, then the share of heat supplied from district heating in the total consumption of heating energy would increase from 8% to 48%.** The European Union's recommended share of district heating by 2050 is 50% (Heat Roadmap Europe 2050, 2012). Should BiH reach the level by 2050 to fully exploit the available technical potential of wood biomass for high-efficiency cogeneration and district heating, then it would be in line with the long-term goals of the European Union.

2.2 Energy policy

Bosnia and Herzegovina is a sovereign state with a decentralised political and administrative structure. Decision making involves the Council of Ministers of BiH, the governments of two Entities (Federation of BiH and Republika Srpska) and the government of the Brcko District of BiH. The Federation of BiH is further sub-divided into 10 Cantons. [4]

Bosnia and Herzegovina is a Contracting party to the Treaty Establishing the Energy Community, as of 2006 when the country enacted the Decision on the Ratification of the Treaty (Official Gazette of BiH - International Treaties, issue no. 9/06). By entering into the Treaty, the country committed to gradual adoption of the EU acquis, concerning the electricity and gas sector, environmental protection, competition, renewable energy sources, energy efficiency, oil and statistics. Bosnia and Herzegovina, however, is in a specific position since the Constitution foresees two jurisdictions over the energy sector. These cover responsibilities of entity governments and responsibilities of the state level exercised through the activities of the Ministry of Foreign Trade and Economic Relations of BiH. [6]

At the state level, the Ministry of Foreign Trade and Economic Relations is the responsible party for coordination activities over the state and entity governments regarding the implementation of the directives covered by the Treaty. It should, nonetheless, be noted that at the entity and Brcko District level different regulatory and policy frameworks apply. A detailed overview of the present legal framework is provided in the Draft report on the permitting regime and obstacles to investment in the energy infrastructure projects in BiH [8].

In line with the Decisions enacted by the Ministerial Council of the Energy Community, Bosnia and Herzegovina has several energy targets, of which the ones most relevant to this project are set out below:

- achieving a national renewable energy sources (RES) target share of 40% RES in final energy consumption by 2020, as compared to the 2009 34% reference level [9],
- limitation of emissions of certain pollutants into the air from large combustion plants in line with the Large Combustion Plant Directive (LCPD) and the Industrial Emissions Directive (IED), by 2027 [10; 11],
- implementation of energy efficiency measures in line with the Energy Efficiency Directive, within deadlines specified by each target individually [12].

Each of the specified targets is or is still expected to be accompanied by an associated National Action Plan, involving policies, regulatory measures and mandatory targets. An overview of the status in each of the specified sectors is given below:

- *NREAP BiH - National Renewable Energy Action Plan of Bosnia and Herzegovina*, was adopted in March 2016 by the Council of Ministers of BiH. The plan is based on previously adopted entity action plans for the use of renewable energy sources and consolidates the measures set out therein. The sectoral goals for 2020 RES shares adopted by the NREAP are set out as follows: electricity sector 56.9% (baseline 50.3%), heating and cooling sector 52.4% (baseline 43.3%) and transport sector 10% (baseline 0.9%). [6; 13] More details on the specific targets for the heating and cooling sector will be provided in the following paragraph.
- *NERP BiH - National Emission Reduction Plan of Bosnia and Herzegovina*, was adopted in December 2015 by the Council of Ministers of BiH. The plan sets out emission ceiling values for nitrogen oxides (NOx), sulphur dioxide (SO₂) and dust from the combustion plants covered by the plan. The target is to achieve a gradual emission reduction over the timeframe January 2018 - December 2027, in line with the LCP and IED Directives. [13; 14]
- *NEEAP BiH - National Energy Efficiency Action Plan of Bosnia and Herzegovina*, is still under preparation and was still not adopted. The plan will most likely be based on entity action plans for energy efficiency, where plans for Republika Srpska were already adopted, while a draft for the Federation of BiH is still under review. The same applies to

the entity Laws on energy efficiency. Beginning of 2016 a working group was appointed in view of drafting a final version of the document. The general indicative target of the plan is to achieve a 9% energy saving for BiH by 2018 from energy efficiency measures, as compared to the 2010 base demand level. [6; 7]

2.3 DHC related legislation

The district heating sector is regulated at the entity level and there is no regulation governing this sector at the level of Bosnia and Herzegovina. Ministry of Foreign Trade and Economic Relations (MOFTER) performs activities within its competence to carry out operations and tasks within Bosnia and Herzegovina's competence related to the definition of policies, basic principles, coordination of activities and alignment of entity Government bodies and institutions with the international developments in the field of energy, as well as in the area of concession when the concession property is located in the territory of both entities.

Heating activities are regulated by regulations that define communal activities and are operated by public communal companies (heating plants), on cantonal and municipal level. Measurement and billing of the consumed heat in some cases is not done according to the actual heat consumption, which negatively affects rationalisation of heat consumption and energy efficiency. The existing infrastructure does not support introduction of sanitary hot water prepared using heat from the central heating system. Plans or resources do not exist for construction of the cogeneration infrastructure. Due to the outdated infrastructure, high energy losses are recorded.

In general, the state level in Bosnia and Herzegovina has very limited competences in the energy sector, resulting in a scattered regulatory framework for the DH sector, specific to each subnational entity. The most commonly used laws for regulation of DH companies in Bosnia and Herzegovina are the Law on Communal Activities and the Law on Local Self-Governance. With the adoption of the Law on Energy Efficiency (in RS 2016 and FBiH 2017), investors in the building sector are required to prepare investment-technical documentation and construct an energy-efficient building in accordance with the prescribed technical conditions of thermal energy consumption of a maximum of 95 kWh / m² per year. The Law on Energy in Republika Srpska (RS) does not explicitly include heat energy, while a separate Law on Heat Energy market is in the final stage of preparation in the Federation of Bosnia and Herzegovina (FBiH), with an expectation to be adopted till end of 2019. **However, no DH sector strategy still exists on any level.** Ownership of the DH companies rests with the cantons and municipalities. The tariff methodology is established at the canton and municipal levels, and tariffs are calculated and approved by cantons and municipalities.

At the proposal of the Ministry of Foreign Trade and Economic Relations, responsible for energy affairs on state level in Bosnia and Herzegovina, in December 2017, the Council of Ministers of Bosnia and Herzegovina adopted the Energy Efficiency Action Plan for BiH for the period 2016 - 2018, thereby fulfilling BiH's commitment under the Energy Community Treaty as an important segment of the reform processes in the field of energy efficiency.

Article 14 of the EED, adapted for EnC countries, imposes an obligation on all BiH members to create a comprehensive assessment of the potential for the application of high-efficiency cogeneration and district heating and cooling.

The main objective of this provision is to evaluate the potential for highly efficient cogeneration and cooling and heating in Bosnia and Herzegovina. The requirements taken into account by the assessment are set out in Annex VII to the Energy Efficiency Directive (2012/27 / EU). Pursuant to Article 14 of the EED Directive, Bosnia and Herzegovina is expected to implement, by 30 November 2018, and report to the EnC Secretariat, a comprehensive assessment of the potential for the use of high-efficiency cogeneration and district heating and cooling, which contains the requested information in Annex VIII of the EED, what was successfully completed through the comprehensive study supported by GIZ and completed in 2018. Also, in BiH, the obligation to conduct a cost-benefit analysis (CBA) must be established in accordance with

Part 2 of Annex IX of the EED and after 15 October 2017 for all plants of the following categories:

- Construction of a new thermal power plant with installed capacity exceeding 20 MW;
- Initial reconstruction of the existing thermal power plant with installed capacity exceeding 20 MW;
- Construction of a new or significant reconstruction of an existing industrial plant with a total installed capacity of more than 20 MW that produces waste heat at a useful temperature level;
- Construction of a new or significant reconstruction of the existing district heating or cooling system, with a total installed capacity of more than 20 MW.

With a view to the successful transposition and implementation of Article 14 EED, the Roadmap provides for individual programs and activities, and the entity EE Action Plans have identified the need to conduct a comprehensive Potential Assessment for the implementation of high-efficiency cogeneration and district heating and cooling systems based on cost analysis and benefits. The assessment should be updated every five years.

In addition, it is necessary to adopt procedures for obtaining permits for electricity producers, industrial plants, district heating and cooling system operators, which will include the obligation to carry out a cost-benefit analysis for the construction and reconstruction of high-efficiency cogeneration plants and efficient heating and cooling systems. The entity ministries responsible will make an Assessment in the area of their competences. A comprehensive assessment will be made by the competent state ministry, based on entity assessments. Also, the Entity Regulatory Authorities will adapt the procedures for obtaining licenses to perform energy activities according to this requirement.

According to the First biennial update report of BiH under the UNFCCC [4], **buildings are responsible for the highest share of end-use energy consumption in Bosnia and Herzegovina, due to their age and low energy efficiency**. In total thermal energy consumption households accounted for 75.8% in 2012. At the same time, **the main source of CO₂ in Bosnia and Herzegovina was the energy sector**, contributing to more than 75% of the total CO₂ emissions (77.7% in 2011). The progress on key documents regulating energy consumption and GHG emissions, has nonetheless been very slow.

The state level in Bosnia and Herzegovina has very limited competences in the energy sector. This results in a scattered regulatory framework for the DH sector and is specific to each entity. There is no DH sector strategy on any level and the most commonly used laws in operating DH systems are the Law on Communal Activities and the Law on Local Self-Governance. Other laws relevant to the sector cover only some aspects of DH sector development (Law on Renewable Energy Sources and Efficient Cogeneration, Law on Spatial Planning and Construction), and are specific to each entity. With regard to laws specific to the sector, the Law on Energy in Republika Srpska does not explicitly cover heat energy, while the Law on Heat Energy in the Federation of BiH is still under preparation. Regulatory responsibility for the DH sector is not separated from the ownership and is in practice exercised through local authorities. Due to significant decentralization, decision making is locally driven and differs substantially depending on the location. There is no independent regulatory authority and the tariff methodology, calculation and approval is established at the canton and municipal levels. Social protection programs targeted at low-income households are less developed and act as blanket subsidies benefitting all connected households.

The prices of thermal energy are not based on actual costs and a vast majority of buildings are still covered by lump-sum billing systems. Most DH companies are subsidised by local governments, which does not allow for any major investments. [4]

In the First biennial update report of BiH under the United Nations Framework Convention on Climate Change [4], an overview of activities for climate change mitigation measures is provided, covering the heating and cooling sector as well. The measures involve, amongst others, installation of new plants based on RES for heating, introduction of biomass to existing DH companies, reconstruction and modernisation of DH networks, as well as energy efficiency

measures in buildings. The deadlines are set over a timeframe from 2020-2040, with a clearly defined overview of the current status, coordination and management, as well as expected outcomes.

With regard to strategic actions in the heating and cooling sector, according to the NREAP BiH [6] an increase of 9.1% in RES share in final energy consumption is foreseen for the 2010-2020 timeframe. The expected 2020 RES structure would consist of 99.6% solid biomass, 0.1% biogas and 0.2% geothermal energy. In addition, 1% of the planned electricity sector target capacities are expected to be installed in biomass fired CHP plants. Energy efficient heating systems are considered as well, as one of the measures in improving energy efficiency in the residential sector.

In order to achieve the set targets, a set of actions and support schemes is foreseen by the Draft report on the permitting regime and obstacles to investment in the energy infrastructure projects in BiH [8]. A general overview of the current and the planned framework is provided in the following paragraph.

2.4 Incentives – taxes and subsidies

When it comes to present support mechanisms, both entities have feed-in tariffs in place for CHP electricity exported to the grid. Other incentives include Priority access and dispatching for CHP and renewable plants, in terms of interconnection policies. A general overview of the current feed-in tariffs applicable to electricity exported to the grid by technologies associated to the heating/ cooling sector is provided in Table 1.

Table 1. Overview of current feed-in tariff support applicable to electricity from technologies associated to the heating and cooling sector [15; 16]

Technology	Federation of BiH	Republika Srpska
Biomass - solid (up to 10 MW)	0.11 - 0.15 €/kWh	0.11 - 0.12 €/kWh
Biogas (up to 1 MW)	0.13 - 0.44 €/kWh	0.12 €/kWh
CHP (up to 5 MW/ 10 MW)	0.07 €/kWh	0.03 - 0.08 €/kWh
Duration	12 years	15 years

As according to the National Renewable Energy Action Plan of BiH [6] the entity governments, upon proposal from the Ministry where applicable, may introduce the following additional incentive measures as well:

- subsidies and other reliefs for domestic production and procurement of equipment used for heating or cooling using RES (solar collectors, heat pumps, etc.),
- setting up of a local energy market for RES heat trade by introducing a register of heat origin,
- introducing an obligation for large consumers of heat to have a share of the heat generated from RES.

It should, nonetheless, be noted that there are no specific feed-in tariffs for heat production from cogeneration or renewable sources. Besides, though feed-in tariffs are foreseen for CHP generated electricity, according to the dynamic quota from [8], no CHP will receive such support for now. With regard to technologies relevant to the heating and cooling sector, the quota foresees support for up to 70.04 GWh (19.45 MW) electricity from biomass plants in

2020, which corresponds to only 6.5% of the estimated technical potential. [3] In addition, the current prices of thermal energy are not based on actual costs and most district heating companies are subsidised by local governments, as previously explained. [4] Decision making is locally driven and differs substantially depending on the location, including the heat tariff methodology, calculation and approval, which results in significant differences in the heat tariff level as well.

2.5 Permitting procedures

The permitting procedures for the construction of plants in Bosnia and Herzegovina are quite complex. They involve a number of licenses and permits administered at more than one level of government, which sometimes causes overlaps in jurisdictions as well. The procedures differ by entity and in the case of the Federation of BiH by entity and canton level as well. Plant construction primarily implies compliance with building procedures, which in line with [3; 8], involves the following key permits listed in order of issuance:

- Urban permit
- Construction permit
- Operational license

Other key documents involve the: Environmental permit, Energy permit, Water permit and Permits associated to grid connection (where applicable), as prerequisite for some of the previous documents.

A detailed overview of the present legal framework is provided in [8].

2.6 Time for authorization and transaction costs

In [8] a detailed overview of the permitting regime in Bosnia and Herzegovina is provided. In this paragraph only some of the points will be touched upon.

It is worth noting that the **permitting procedures for the construction of plants in Bosnia and Herzegovina involve obtaining more than 50 permits, consents, approvals and other administrative acts**, as according to information available to [8]. The amount of documents varies, however, depending on the plant capacity.

Administrative procedures prescribe a general deadline of 30 days for permitting proceedings. An administrative body, however, may request additional documents to be submitted, which usually results in an extension of the deadline. The procedures cannot proceed in parallel, because they are for the most part mutually conditioned.

The provision of information on permitting procedures is not done institutionally and there is no single body that has the jurisdiction to manage an entire permitting process. Cooperation, at the same time, is rather insufficient between the competent institutions involved.

The permitting procedures at all government levels are characterized as lacking transparency. Information and guidelines are not easily accessible, they are for the most part not available on websites, and are often not in electronic form. Information is mainly provided in the local language, which adds additional difficulty in obtaining information on specific regional requirements by foreign investors. Administrative fees and taxes payable in proceedings to the institutions of Bosnia and Herzegovina differ by document and stage and are defined by the Law on Administrative Taxes and amendments thereof (Official Gazette of BiH, issue no. 16/02, 19/02, 43/04, 08/06, 76/06, 76/07). [17]

3 Proposed action plan

Due to the complex administrative structure of the country, separate laws exist at the state, federal, and canton levels. In general, the state level in Bosnia and Herzegovina has very limited competences in the energy sector, resulting in a **scattered regulatory framework for the DH sector**, specific to each subnational entity. The most commonly used laws for regulation of DH companies are the Law on Communal Activities and the Law on Local Self-Governance. The Law on Energy in Republika Srpska does not explicitly include heat energy, however a Law on Heat Energy is in preparation in the Federation of Bosnia and Herzegovina. No DH sector strategy exists on any level. Ownership of the DH companies rests with the cantons and municipalities. The tariff methodology is established at the canton and municipal levels, and tariffs are calculated and approved by cantons and municipalities. Subsidies to DH companies and direct household subsidies also are allocated at the canton and municipal levels.

On the other hand, there are DH systems within the country that can serve as best practice examples and whose concept of functioning and network refurbishment principle can be replicated to others.

3.1 SWOT analysis of the DH network in BiH

Based on the above, a SWOT analysis of the DH network in Bosnia and Herzegovina is provided in the table below.

<p>STRENGTHS</p> <ul style="list-style-type: none"> • Significant share of CHP in the generation mix • Low prices for end users • Some best practice examples of distribution networks refurbishment • Some best practice examples of DH concepts 	<p>WEAKNESSES</p> <ul style="list-style-type: none"> • Old and inefficient distribution networks with high losses • Old and inefficient production units • High share of fossil fuels in the heat production mix • High supply temperatures • Low prices for the end user • Not regulated heating temperatures at the end-user level • In most cases of CHP solutions, domestic hot water is not supplied • No law on district heating at national level
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • High potential for using renewables (especially biomass and solar thermal) in district heating production • Adopted laws on a public-private partnership at some cantons to fasten DH concepts implementation • Modifying the current incentive system and apply it to heat production as well • Providing incentives for efficiency improvements and simultaneous investment in energy efficiency at demand side 	<p>THREATS</p> <ul style="list-style-type: none"> • Old buildings with inadequate insulation • Vertical piping in the buildings • Poor public perception of district heating • Lack of zoning at the local level • Inadequate measurement and control • Lack of a coherent strategy for the development of the DH sector • Low prices for the end user • No law on district heating at national level

<ul style="list-style-type: none"> • Implementing DH concepts based on RES to reduce pollutants and greenhouse emissions • Implementing storage options for better electricity and heat production and supply opportunities • Coupling heat and hot water production • Developing feasibility studies on optimal options for district heating for specific case studies (at local level) • Creation and adoption of laws and by-laws that regulate the heating sector 	
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3.2 Policy recommendations and actions

Following the analysis, as well as the current situation, institutional and regulatory framework policy recommendations and actions are:

Market			
Topic	Action	Timing	Relevant stakeholder
Extension and improvement of the district heating sector	<ul style="list-style-type: none"> - Modernisation of DH infrastructure in parallel with the development of district heating system - Introduction of sanitary hot water into the district heating systems which would increase market competitiveness 	2021-2023	Municipalities; District heating companies.

<p>Development of feasibility studies on the optimal options for district heating</p>	<ul style="list-style-type: none"> - Involve the top academic community and university experts, also research centres in all research and studies with the aim to propose concrete measures on targeted district heating systems how to improve them. - Creation and continuous update of a heating system map with the purpose to serve as a basis for the investments into district heating systems - Generating a comprehensive assessment of the potential of the high-efficiency cogeneration and efficient district heating and cooling systems, as well as establishing concrete measures and investments in line with the requirements of the Energy Efficiency Directive - Reconstruction of the existing boilers and a switch from fuel oil to biomass - Use of biomass-fired condensation boilers where it is an optimal solution - Further investigation of integration possibilities of RES into district heating systems 	<p>2021-2024</p>	<p>Municipalities; District heating companies; Ministry of Physical Planning; Construction and Environmental Protection at the cantonal levels</p>
<p>Implementation of energy efficiency measure according to the EU Directive 2012/27/EU and Directive on Energy Efficiency (2018/2002)</p>	<ul style="list-style-type: none"> - Optimise the measuring and billing system of consumption and relationship with consumers. - Define measures and set up an implementation framework for the rationalization of losses and unit consumption of thermal energy through energy efficiency measures both on the thermal energy generation side and the consumers side. 	<p>2021-2022</p>	<p>Federal Ministry of Energy, Mining and Industry; Municipalities</p>
<p>Regulation</p>			

<p>Adoption of laws and by-laws that regulate the heating sector</p>	<ul style="list-style-type: none"> - Adoption of laws in order to regulate the issues of generation, distribution, thermal energy supply, tariffs policies and the relationship between suppliers and consumers of heat and other relevant issues in this sector. - Adoption of law on district heating and heat energy systems that will define measures for safe and reliable supply of heat, thermal systems for the use of heat energy for heating and cooling. - Metering is necessary both at the heat production (supply) side and the heat consumption (demand) side. It is of equal importance for capacity management, demand management, cost allocation and energy conservation. - Establishment of a body which coordinates support for DH development. 	2021-2022	Federal Ministry of Energy, Mining and Industry; Municipalities
<p>Modify the current Incentive System and apply it to heat production as well</p>	<ul style="list-style-type: none"> - Changing the incentive system for the production of heat energy based on renewable energy sources or waste heat would surely attract many investors but also cooperatives to engage in the construction of the district heating system. 	2021-2023	Operator for renewable energy sources and efficient cogeneration; Federal Ministry of Energy, Mining and Industry; Municipalities;
<p>Provide incentives for efficiency improvements and simultaneous investment in energy efficiency at demand side</p>	<ul style="list-style-type: none"> - Introduce incentives for efficiency improvements also on the consumers side, although it is obvious that inefficiency is significantly poorer at the demand side. - Setting targets and road maps for upgrading insulation of the public sector buildings, as well as for incentive and support actions for individual and commercial housing owners. 	2021-2024	Operator for renewable energy sources and efficient cogeneration; Federal Ministry of Energy, Mining and Industry; Municipalities

<p>Legislative framework should consider more incentives for private sector participation in the DH sector</p>	<ul style="list-style-type: none"> - Facilitate the bureaucratic procedure, obtaining permits and create an incentive system for individuals or energy cooperatives who want to invest in the construction and modernization of district heating systems (as stated in the IFC-World Bank Group report [5]) 	2021-2023	<p>Operator for renewable energy sources and efficient cogeneration; Federal Ministry of Energy, Mining and Industry; Municipalities</p>
<p>First steps toward sustainable energy policy should be done at local level</p>	<ul style="list-style-type: none"> - Energy policy should recognize the need for the renewable energy usage, but also allow the establishment of an energy services market that will make renewable energy competitive compared to the use of fossil fuels. - Institutional framework should take into consideration the obligation for state owned energy companies to adjust their development plans and activities with development plans of municipalities. - From the aspect of environmental protection it is necessary to consider the possibility of limiting the use of fossil fuels and electricity as well as the use of biofuels in inefficient individual furnaces and devices. - Adoption of methods of support to the municipalities in heat planning. - Strengthening urban planning of heat networks and integrated approaches - Revision of planning documents at municipal level is recommended. 	2021-2022	<p>Municipalities; District heating companies; Ministry of Physical Planning, Construction and Environmental Protection at the cantonal levels</p>

4 Promotion of the action plan and recommendations

This document will be shared with relevant stakeholders involved in the decision-making process at national and local level. It will be (partially) translated and distributed to district heating companies, different municipalities and relevant ministries within the country.

The main outcomes of this document will be promoted during the final workshop that will be organized in 2021 in the premises of JP Elektroprivreda BiH in Sarajevo, or held as an online event within the scope of the UpgradeDH project.

For more information on different aspects of this document in local languages, please refer to the responsible contact person at JP Elektroprivreda BiH.

At the European level, the Bosnian perspective to DH policies and planning was presented at the UpgradeDH workshop, which took place during the KeepWarm final event on 12 November 2020. The overall objective of the session was to discuss local aspects, challenges and policy solutions for energy efficiency in DH systems.

The event recording (<https://keepwarmeurope.eu/finalconclusions/>) includes presentations and discussions with:

- Ina Bērziņa-Veita – President; Latvian District Heating Association
- Valdas Lukoševičius – President; Lithuanian District Heating Association, Lithuania
- Ajla Merzić – Lead Expert Associate for Power Generation Unit Development; JP Elektroprivreda BiH d.d., Bosnia and Herzegovina
- Susana Paardekooper – PhD Fellow; Aalborg University, Denmark

It was moderated by Dominik Rutz – Head of Unit Bioenergy & Bioeconomy, WIP Renewable Energies

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