

Market uptake of small modular renewable district heating and cooling grids for communities

Project No: 691679



***Guideline on drafting
heat/cold supply contracts
for small DHC systems***

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Abbreviations

BiH	Bosnia-Herzegovina
CHP	Combined heat and power
DH	District heating
DHC	District heating and cooling
EC	European Commission
EU	European Union
O&M	Operation and maintenance
PPP	public-private partnerships
RE	Renewable energy
RES	Renewable energy sources

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1 Introduction

A key success factor for small DHC projects is the elaboration of sound heat/cold supply contracts which provide transparent and clear conditions and a solid long-term relationship between the heat-producers, -distributors and -consumers benefit. This report provides guidance to facilitate and support understanding and preparation of all aspects of heat/cold supply contracts and provides examples of such contracts.

The main goal of this report is to support different actors in preparation of heat/cold supply contracts. Emphasis is placed on the support of actors and target groups with low awareness and limited knowledge about DHC supply, who intend to develop projects and to invest in or to finance DHC projects. Local authorities are frequently interested in new DHC projects utilising local or regional RES. Very often they do not possess knowledge or qualified personnel information and estimations of investment costs, financing possibilities and economic impacts for such projects. This also includes knowledge on contractual obligations and system requirements for energy supply contracts.

The report is closely linked to other reports of the CoolHeating project: For example, the “Handbook on small modular renewable district heating and cooling grids”¹ includes detailed descriptions on the technologies, the “Guidelines for initiators of small heating-cooling grids”² and “Guidelines on improved business models and financing schemes of small renewable heating and cooling grids”³ which provide comprehensive guide and examples for business models and ownership models for small modular DHC projects. All mentioned documents also include some specific contractual aspects which are replicated and used also in this document.

Furthermore, a dedicated economic calculation tool is being developed in order to calculate the economic feasibility of a DHC project. Using the economic calculation tool, stakeholders can expand on the information available in this report and prepare basic business model calculations, tailored to their potential DHC project. The aim of these activities and deliverables within the CoolHeating project is not to provide detailed business model content and economic lessons, but rather to support actors with information, assessments and tools to build their capacity for the developing of local DHC projects as well as to support competent decision-making and setting of procedures for the potential DHC projects. Detailed assessments, business cases and contracts can then be prepared in steps to follow, by specialists.

The document consists of a general introduction and overview of the national regulations on DHC supply contracts, followed by guidelines on contractual issues and examples of contracts.

DHC projects have significant benefits when compared to individual heating solutions. Collective solutions on heating and cooling can provide lower costs for consumers and increasing heating comfort, provide efficient options for heating and cooling using renewable energy sources or waste energy and can help mitigate climate change. Broader impacts of DHC project include also facilitation of local development by fostering local economy chains (e.g. biomass supply), stimulating local employment and stimulating new economic developments (e.g. new business utilising cheap energy).

District heating and cooling represents a relatively large investment and a long-term commitment to a centralised heating solution. This represents an important risk factor which can be mitigated by elaboration of preliminary heat supply contract with heat consumers

¹ http://www.coolheating.eu/images/downloads/D4.1_Handbook_EN.pdf

² http://www.coolheating.eu/images/downloads/Guideline_for_initiators_small_heating_cooling_grids_2.6.pdf

³ http://www.coolheating.eu/images/downloads/CoolHeating_D5.1_Guideline.pdf

already in development phase of a DHC project. Development and implementation of a DHC project involves a plethora of contracts – Contracts with project developers/consultants/experts, contracts with manufacturers, contracts with fuel suppliers, contract related to financing and contracts on heat supply with end users. Usually national regulative treats supply of heat and cold in the same way, therefore when elaborating on (DH) heat supply in this document, both heat and cold supply are considered.

The heat supply contracts and pre-contracts are a key aspect for the development of DHC projects. A contract is a binding agreement between two or more persons or parties and is subject to all relevant legislation, including decisions made by authorities including the court of law. The contracts on heat supply are subject to different legislation and regulation– Code of obligations, the Energy law, Grid Codes, Tariff methodology, Heating Energy Supply Rules, System operation instruction. The extent of legislation and regulative connected to heat supply depends on national specifics.

The heat supply contracts are usually binding the heating utility (can also be the heat distributor or operator of the DH grid or the owner of the overall DHC project – including heating plant) and the heat consumer (household, public building or industrial consumer). They provide the basis for development of DHC projects as they lay forward the real, initial heat load for which the technical development of a DHC project must be optimised. The heat supply contracts also represent a risk mitigating factor as they provide a basis of guaranteed revenue for the project.

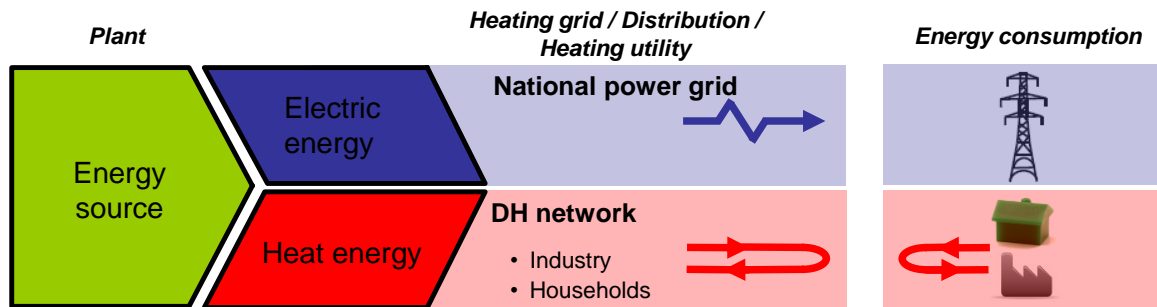


Figure 1. Overview of the DHC project parts. The Heat energy can be used for heating or cooling at the consumer side. (Source: Skupina FABRIKA d.o.o.)

2 National regulations on DHC supply contracts

National legislation and regulations define the basic rules on who can distribute heat, what conditions and criteria have to be met for that, and what are the rights and responsibilities of the heat provider and the heat consumer. They are the basis for heat supply contracts. Moreover, they frequently define additional documents or contract contents that have to be developed and even reported to national bodies which regulate heat supply. The extent of regulations differs country to country. Therefore, this paragraph presents a short outline of the national regulative on heat supply. If the reader would like to receive more information on national frameworks regarding DHC he can access the documents Framework conditions and policies on small district heating and cooling grids and the Guidelines on improved business models and financing schemes of small renewable heating and cooling grids on the CoolHeating project website www.coolheating.eu.

2.1 Denmark

From Danish experience, the recommended total scope of agreements between the DH utility and the customer includes:

- Articles of association
- Contract conditions for DH supply
- Technical conditions for DH supply
- Tariff sheet
- Agreement on DH supply
- Welcome letter

The “Agreement on DH supply” includes the following points:

- Parties
 - The district heating utility
 - The customer, name and address, title number in the land registry
- Reference to documents (provided to the customer)
 - Articles of Association
 - Conditions for district heating supply
 - Technical conditions for district heating supply
 - Tariff sheet
- Indication by the house-owner
 - Want to be a shareholder, indication of share capital
 - Does not want to be a shareholder
- Information about the building
 - Liveable area
 - Commercial area
 - Number of flats
 - Area of basement

Standard articles of association have been developed by the Danish District Heating Association. It applies for consumer-owned district heating utilities, and comprise the following main points:

- Name, office of the company; shareholder company with limited liability
- Purpose and supply area; non-profit, conditional tax exemption
- Shareholders, consumers; shareholders (house-owners), "non-shareholders" consuming (tenants)
- Share capital, shareholders liability and economic responsibility; 1) No share capital (most common) or 2) Payment, only liable for paid amount
- Conditions of withdrawal; possible provided payment of due payments, related costs and share of capacity
- General assembly; votes proportional to heat consumption to some extent
- Board; eligible: shareholders, heat consumers etc. and one appointed by the council
- Management of the company; sets the tariffs, Board members can be held personally responsible
- Accounting and revision; auditor elected by the general assembly
- Dissolution of the company; can be decided by the general assembly only

A guideline on contract conditions has also been developed by the Danish District Heating Association. It applies to consumer-owned as well as municipal district heating utilities, and highlights the following main points:

- Establishment or change of DH supply
- Operation and maintenance of equipment
- Tariffs
- Measurement of DH consumption
- Payment
- Example of contract on DH supply

The definition of the customer is important. If technically possible, i.e. if a closable connection and a separate heat meter can be established, the DH utility is obliged to establish a direct relationship with the consumer, regardless whether the consumer is owner or tenant. Historically, the DH supply has been based on agreements between the DH utility and the owner. Change of the Heat Supply Act in 1997 implied equal status of owners and tenants. Consequently, payments due are only relevant for the single customer – no longer the owner.

Some relevant links to Danish regulations on heat are:

The Danish Energy Agency: <https://ens.dk/en/our-responsibilities/heat>

The Danish Energy Regulatory Authority: <http://energitilsynet.dk/tool-menu/english/>

The Danish District Heating Association: <http://www.danskfjernvarme.dk/english>

2.2 Germany

The legal framework on DHC supply contracts in Germany is complex and is related to various laws and ordinances. An excellent overview on this is given by the German District Heating Association (AGFW, AGFW-Projektgesellschaft für Rationalisierung, Information und Standardisierung mbH): <https://www.agfw.de/recht/avbfernwaermev/waermecontracting-im-mietwohnungssektor/2-rechtliche-einordnung-des-waermelieferungsvertrages/> (in German), which is summarized below.

Market actors in the DH sector use various term and definitions for heat supply, including "local heat supply", "heat delivery", "direct thermal service", "heat services", "contracting" and the like. Also "district heating supply" is used. These terms are used, depending on the scale

of the DH system and the provided services. However, these marketing definitions are usually not in line with the legal classification of heat supply. It is very important to classify the legal terms precisely because it has an impact on what is legally permissible.

Legislators have not defined the term "district heating". The concept of district heating is, not only for that reason, vividly controversial.

The legal framework of the energy industry regulates the supply of electricity and gas in the **Energy Industry Act** (EnWG). Between DH companies and with other suppliers in the heating market (gas, oil, coal, LPG and electricity), there is free competition. There are no "monopolies" for district heating.

DH companies conclude so-called concession contracts with the municipalities of their supply area, which regulate (sometimes for a fee) to use public space, such as roads or community sites for the construction of their pipelines. The municipalities may also decide to compulsorily connect the inhabitants of certain municipalities to the district heating supply. This obligation of connection and use is made by a community statute. The authorization to do so derives from the municipal ordinances of the individual federal states.

The legal status of heat delivery contracts is not self-evident, since the **Civil Code of Germany** (BGB) does not include "heat supply contracts". The Civil Code includes various types of contracts.

Heat and district heating is sold on the basis of simple civil contracts. According to the case law of the Federal Supreme Court, these are sales contracts in accordance with § 433 BGB (see NJW 1979, p. 1304, 1305). These are successive delivery contracts.

The supply of district heating itself was regulated by civil law. A federal ordinance, the **AVBFernwärmeV**, specifies the content of the contract. It was formerly based on § 27 AGBG, now on Art. 243 EGBGB.

2.3 Austria

In Austria, there is especially the law "Heizkostenabrechnungsgesetz - HeizKG 1992" (law for invoices for heating costs) to consider before setting up supply contracts. This law regulates the metering of heat consumption. The costs for heat and domestic hot water must be separated. The billing is also regulated in this law.

The law "Maß- und Eichgesetz – MEG" states that it is necessary having a gauged heat meter (heat and cold) if it is relevant for billing. The heat meters need to be gauged every 5 years.

Additionally, there is no fixed layout or content for heat supply contracts. The general issue is to fix all relations and boundary conditions in such contracts. Usually there is following stated:

- Names of contractual partners
- Temperature levels for supply
- Heating period (time to deliver heat)
- Technical system for connection
- Limit of supply and property lines
- Provided heat load (kW)
- Price index to calculate the heat price in the future
- Prices for basic price (usually in € per kW per year), heat price (usually in € per kWh), meter charge (usually in € per year)
- Costs for connection to the DH grid
- Interval for invoices

- Interruption in heat supply and back-up for heat
- Termination of contract and duration of term

2.4 Slovenia

In Slovenia, the supply of heat and other energy gases is provided within the framework of closed distribution systems. The energy activities of heat distribution may be carried out as an optional local service of general economic interest (in majority of cases), or as commercial distribution (only for small/micro grids). In the national regulation heat represents heat and cold, which are used for heating or cooling of rooms, the needs of industrial processes and for the preparation of sanitary hot water. By the regulation heat supply covers the activity of heat distribution and heat supply in both cases heat price and supply is regulated by the competent authority.

For a heat consumer to be supplied by DH grid, consent for the connection from the distributor has to be obtained. The distributor defines the conditions for connection in the **system operating instructions** or **general contractual conditions**, if the distribution activity is performed as a market activity. These documents (depending on the form of heat supply) define the quality and security of supply. They regulate the operation and method of managing the distribution system. The regulation demands that they are public, transparent, objective and non-discriminatory and prepared in accordance with the general act of the Energy agency. All system operating instructions are published on the Energy Agency web page.⁴

A distributor must take appropriate steps to ensure the security of the operation of the distribution system by providing sufficient capacity and the reliability of the system and the security of the supply to the distribution system. It must ensure that consumers receive information about disruptions in the system and at the request of a consumer eliminate disturbances that prevent the consumption of heat or other energy gases in the agreed quality and quantity.

A distributor must not disconnect a consumer who is entitled to emergency supply, or restrict his consumption of heat or other energy gas under the quantity that is absolutely necessary in view of the circumstances (the season, temperatures, place of residence, health conditions and other similar circumstances) in order not to jeopardise the life and health of a consumer and persons living in his household.

The heat consumer must also enter into a **heat supply contract** with the distributor, which must be concluded in written or electronic form, whereby the distributor must not use unfair and misleading methods of selling heat or other energy gas.

One of the key components of the heat supply contract is the heat price e.g. heat tariff system. The price of heat for DH in Slovenia is regulated if (based on the new Energy Act that entered into force in 2014):

- a heat distributor carries out the activity a service of general economic interest (which is mandatory, if a distributor supplies or intends to supply more than one hundred household consumers);
- in case of distribution system where the total rated power capacity of the connected consumers' equipment on the network exceeds 500 kW or more.

Energy Act determines that the Energy Agency prescribes the price regulation and methodology in its general act⁵. The tariff system for heat from the distribution network is to be produced and publicly announced by the heat distributor after the consent is given by the competent local authority (self-governing local community or a joint body of the municipal

⁴ The web page of the Energy Agency of Slovenia www.agen-rs.si

⁵ <https://www.agen-rs.si/podzakonski-akti11>

administration). The tariff items for heat on the distribution system are made and publicly announced by the distributor after the approval of the competent local authority. The web portal of Energy Agency of Slovenia holds all information and forms for definition and reporting of the heat prices in a DHC systems. The methodology⁶ defines:

- types and criteria for determining eligible costs, which are the basis for calculating the heat price
- elements of the starting price, including the fixed and variable part,
- the way in which the starting price is formed and the reasons for its change,
- criteria and mechanism for adjusting individual elements of the starting price in regard to changes in eligible costs,
- the types of data, the form and method of transmission of the data reported to determine the eligible costs and the starting price.

2.5 Croatia

The Croatian Heat Market Law defines five key players in the heat market: heat producer, heat distributor, heat provider, heat buyer and end buyer.⁷

Consumers, i.e. households are labelled as end buyers and the contract is being signed between them and the heat buyer. The contract itself contains several dozens of Articles. These Articles define the payment for heat, different charges that need to be payed, method for electricity consumption calculation, contract duration, conditions for contract termination, other mutual obligations, etc. The main steps which have to be carried out to sign a contract can be found on the web page of Croatian national utility' heat sector subsidiary HEP Toplinarstvo⁸.

The relations between the heat buyer and the end buyer are defined in the "General conditions for the heat supply"⁹. This document is elaborated and passed by Croatian Energy Regulatory Agency¹⁰. The main goals of the Agency are: ensuring objectivity, transparency and impartiality in carrying out energy activities; ensuring the implementation of the principle of regulated access to the network/system; adopting methodologies for determining the heat price in the tariff systems; establishing an efficient energy market and introducing the competition; providing protection for the energy buyers and energy entities. By fulfilling these goals, the Agency promotes efficient and rational use of energy, entrepreneurship in the energy sector, investments in the energy sector and the protection of the environment. All the regulations regarding the heat sector can be found on the web pages of the Agency¹¹.

The heat price for the households has two components: the price for energy and the price for the installed capacity in the household, i.e. the peak power of that household. The methodology for the calculation of these prices is elaborated by the Agency and provided in the form of two documents: Methodology for the calculation of heat price for heat production¹² and Methodology for the calculation of heat price for heat distribution¹³.

⁶ Act on the Methodology for the Design of the Price of Heat for District Heating <https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina?urlid=20172&objava=54>

⁷ <http://www.coolheating.eu/images/downloads/D2.5-Framework-conditions-DHC-Croatia-Ozalj.pdf>

⁸ Available online: <http://www.hep.hr/toplinarstvo/ugovaranje-1607/ugovor-o-potrosnji-toplinske-energije/1608>

⁹ Available online: http://narodne-novine.nn.hr/clanci/sluzbeni/2014_03_35_629.html

¹⁰ Available online: <https://www.hera.hr/hr/html/index.html>

¹¹ Available online: https://www.hera.hr/hr/html/propisi_tenergija.html

¹² <https://narodne-novine.nn.hr/clanci/sluzbeni/dodatni/431534.pdf>

¹³ <https://narodne-novine.nn.hr/clanci/sluzbeni/dodatni/431536.pdf>

Furthermore, the Agency also provides Methodology for the calculation of the connection fee and the increase of installed capacity¹⁴.

2.6 Bosnia-Herzegovina

Experience in Bosnia-Herzegovina shows that there is no general definition of heat supply contracts, all depends from project to project, on who is the investor. The most common practice was that the projects were realized on the principle of public-private partnerships (PPP).

There is no PPP strategy on any level in BiH, nor is there a state-level PPP framework, while the two entities have very different PPP legislation.

The Law on Production, Distribution and Supply of Thermal Energy/Heat has not yet been adopted. Adoption of this law was proposed by number of relevant strategic documents, e.g. Energy Sector Study – Module 9 (20089, Energy Sector Strategic Plan and Development Programme of BiH (20099, Climate Change Adaptation and Low-Emission Development Strategy (2013).

The Law should regulate the production, distribution and supply of thermal energy, the rights and obligations of service providers, and the rights and obligations of thermal energy consumers. Thus; having a significant impact on heat supply contracts and relationship between the heat supplier and heat consumer.

The entity laws that govern to a certain extent the heat supply issue are as follows:

- Federation of BiH
 - Law on physical planning and land utilization ("Official Gazette of FBiH", No. 2/06, 72/07 and 32/08)
 - Law on Use of Renewable Energy Sources and Efficient Cogeneration, transposing the provisions of Directives 2009/28/EC – Directive on the Promotion of the Use of Energy from Renewable Sources and 2004/08/EC – Directive on the Promotion of Cogeneration
 - Law on Energy Efficiency, transposing the provisions Directives 2006/32/EC – the Energy End-Use Efficiency and Energy Services Directive, 2010/30/EC – Energy Labelling Directive, and 2010/31/EC – the Energy Performance of Buildings Directive
- Republic of Srpska
 - Law on Spatial Planning and Construction, transposing the provisions of Directive 2010/31/EC – Energy Performance of Buildings Directive
 - Law on Energy Efficiency, transposing the provisions of Directives 2006/32/EC – Energy End Use Efficiency and Energy Services Directive and 2010/30/EC – Energy Labelling Directive
 - Law on Renewable Energy Sources and Efficient Cogeneration, transposing the provisions of Directives 2009/28/EC – Directive on the Promotion of the Use of Energy from Renewable Sources and 2004/08/EC – Directive on the Promotion of Cogeneration

It is expected that Energy Efficiency Directive (2012/27/EC) will have a significant impact on the future implementation of the consumption based billing model in BiH, as well as customers demand/desire to pay only for what they use.

Most of the DH systems in BiH do not have metering systems installed on the end user side. Moreover, there is almost no heat energy/consumption metering system within the entire

¹⁴ https://narodne-novine.nn.hr/clanci/sluzbeni/2016_05_42_1098.html

network. It is assumed that the consumption-based billing is present for only 20% residential sector users.

The main prerequisite for the improvements is the adoption of relevant legal frameworks and the definition of conditions of the heat supply, as well as the regulation of the distribution system operation and of end users supply tariffs for heat.

There exists only the Regulatory Agency for Electricity, but none for the heat production, distribution and supply.

The heat supply contracts are within the jurisdiction of local suppliers trying to offer economically acceptable conditions for end users. The price of heat energy is not regulated and varies significantly for different systems, depending on production costs. The following are examples of tariff methodologies and heat prices for larger heat suppliers in BiH:

- DHS on biomass (with oil peak boiler) – heat price
 - <http://www.eko-toplane.ba/Download>
- The largest DHS in B&H – capital Sarajevo, based on natural gas – heat price
 - <http://toplane-sa.co.ba/cjenovnik.php>
- DHS based on excess heat from TPP Tuzla – tariff methodology
 - http://www.grijanjetuzla.ba/udocs/Tarifni_pravilnik.pdf
- DHS based on excess heat from TPP Kakanj
 - <http://www.grijanje.co.ba/zahtjevi>
- DHS in Zenica city (JP “GRIJANJE” Zenica) based on excess heat from Arcelor Mittal Zenica and heating plant Nemila:
 - <http://grijanjezenica.ba/wp-content/uploads/Odluka-o-cijeni-isporučene-toplotne-energije-u-sezoni-2017-2018-1.pdf>
- DHS in Banja Luka city – oil fuel – heat price
 - <http://www.bltoplana.com/index.php/Lat/cjenovnik/cijena-toplotne-energije>
- DHS in Doboj city (Gradska toplana a.d. Doboj) – lignite – heat price:
 - <https://toplanadoboj.ba/potrosaci/cjenovnik/>
- DHS in Prijedor city (AD Toplana Prijedor) – fuel oil with the possibility of using natural gas – heat price:
 - http://www.toplanapd.com/index.php?option=com_content&task=view&id=33&Itemid=39

There are no companies offering cooling services on the territory of Bosnia and Herzegovina so far.

2.7 Serbia

The national regulation which influences the heat supply contracts in Serbia includes the Energy Law („Službeni glasnik RS“ br. 145/2014)¹⁵, Chapters 354-366, followed with a Decree on price methodology for heating („Službeni glasnik RS“ br. 63/15)^{16,17,18}, and Law on

¹⁵<http://www.mre.gov.rs/doc/efikasnost-izvori/EnergyLaw.doc>

¹⁶http://www.mre.gov.rs/doc/efikasnost-izvori/uredba_metodologija_toplotna_energija0138_cyr.pdf

¹⁷http://www.mre.gov.rs/doc/efikasnost-izvori/Metodologija_za_odredjivanje_cene.pdf

¹⁸http://www.mre.gov.rs/doc/efikasnost-izvori/Tabele%20metodologija%2007_08.xlsx

Communal Activities ("Sl. glasnik RS", br. 88/2011 i 104/2016)¹⁹, while other Decrees are under the decisions of the local authorities. Those decisions by the local authorities may include among others:

- Decree on conditions and performance of district heating supply,
- Decree on the tariff system,
- Decree on cost separation at the common heat substation point of supply²⁰,
- Decree on conditions for the disconnection from the supply.

The contract relations between heat producer and consumer in Republic of Serbia are subject to Decree on conditions and performance of district heating supply from the local self-government. This decision from the local self-government includes the following contents:

- general,
- planning,
- supply,
- maintenance,
- operation,
- connection,
- distribution system construction,
- billing,
- quality of supply,
- measurement,
- tariff and other aspects of district heating.

For the City of Šabac, Chapters 33-37 of the Decree are explaining the contract form which may or may not be in a written form. The Decree of the local self-government of City of Šabac is presented in the paragraph 4.²¹ The article 34 provides that the Contract for the heat supply should consist of: name of the consumer, address of the consumer and the heat power of connection, tariff system. The example the City of Subotica²², in the Chapter 4 names the following parts of the Contract: Name of the Supplier and Consumer, consumer number, time of connection, place of connection, heating area, energy efficiency grade, nominal heating power, data on the measurement device, tariff type, methodology for the calculation of the supplied energy, payment conditions and type, contract breaking terms and conditions, complaints and other if necessary.

The Decree on tariff system of the City of Šabac includes 2 different consumer groups:

- Households,
- Others

¹⁹http://paragraf.rs/propisi/zakon_o_komunalnim_delatnostima.html

²⁰<http://www.coolheating.eu/images/Link/cost-separation-at-the-common-heat-substation-point-of-supply.pdf>

²¹<http://www.coolheating.eu/images/Link/Decree-on-conditions-and-performance-of-district-heating-supply-from-the-local-self-government-of-Sabac.pdf>

²²http://www.toplanasubotica.co.rs/sites/default/files/dokumenti/odluka_o_uslovima_i_nacinu_snabdevanja_te_2015.pdf

The details of billing have also been explained in Annex 1 of the Decision on tariff system document. The billing has been divided into 12 monthly payments in the way that variable costs have to be paid according to real consumption measured on substation level, after that apartment owners have to pay according to share of their own apartment liveable area in relation to whole building liveable area; fixed parts are equal during regulatory period²³. Since adoption of "Decree on price methodology for heating" by national government, there is no need for "Decree on the tariff system" to be adopted by the local authorities.

The Decrees on cost separation at the common heat substation point of supply and, on conditions for the disconnection from the supply are drafted by the Association of Serbian District Heating Utilities but their adoption from the local authorities is expected in the future, as they are sensitive parts for the overall successful operation of district heating systems.

2.8 Republic of Macedonia

The activity of heat production, distribution and supply are regulated by the Energy Regulatory Commission, as stated in Macedonia's Energy Law²⁴ (at the time of writing this document a new Energy Law is being developed). It is the Energy Regulatory Commission²⁵ that has a number of competences related to adopting decisions for prices and tariffs, methodologies etc. It also approves the Grid Codes adopted by the energy system operators (in this case the operator of a small DH grid) and adopts Heating Energy Supply Rules²⁶.

The Heating Energy Supply Rules regulate the mutual rights, obligations and duties of **the supplier, the consumer and the operator of the distribution system**. The supplier of heat is a separate entity which is licensed to supply consumers with heat and to deal with the trade of heating energy. For each district heating system, the supplier is obliged to sign an annual contract with the distribution system operator for the purchase of heat for the needs of its consumers, as well as an agreement for using the distribution system under the prices and tariffs approved and previously published by the Energy Regulatory Commission. The supplier is thus obliged to provide heating energy with security, continuity and quality as prescribed in the Heating Energy Supply Rules, the contract with the consumers and its license.

In case a new consumer wishes to be connected to the distribution system, he should file a request for consent from the heat distributor. Then, a trial supply period may take place during which the investor, contractor, distributor, supplier and consumers monitor the quality of service and the technicalities of the project. After that, the distributor approves the request and the consumer is granted approval for connection to the distribution network. Finally, the consumer and supplier can sign a **contract for heating energy supply**. This kind of a procedure is described in detail for the case of heat supplier BEG in Skopje, Macedonia²⁷.

The content of the contract between the heat supplier and consumer is regulated with Article 6 of the Heating Energy Supply Rules. One necessity, according to Macedonia's Law on Obligations²⁸ and the above mentioned Article 6 of such contracts is that they should contain information for the price of the heating energy.

The price of heat is formed according to the Rulebook on prices for heat and system services²⁹ and the Tariff system for heat sales³⁰. The prices (tariffs) are regulated by

²³ <http://www.coolheating.eu/images/Link/conditions-for-the-disconnection-from-the-supply.pdf>
²⁴ http://www.ea.gov.mk/images/stories/E_Izdanija/Regulativa/SLUZ.VES.BR.16-10.02.2011-ZAKON%20ZA%20ENERGETIKA.pdf

²⁵ <http://www.erc.org.mk/>

²⁶ <http://www.erc.org.mk/odluki/2013.07.11-%20TARIFEN%20SISTEM%20ZA%20PRODAZBA%20NA%20T.E.pdf>

²⁷ <http://beg-snabduvanje.com.mk/customers/connection/>

²⁸ <http://www.pravdiko.mk/zakon-za-obligatsionite-odnosi/>

²⁹ <http://www.erc.org.mk/odluki/2013.02.22-%20T.E.-%20PRAVILNIK%20za%20TOPLINSKA%20ENERGIJA%20ZA%20GREENJE%20.pdf>

determining the upper limit of the profit which a company can have in one fiscal year. The methodologies for calculating the maximum allowed profits for generation, distribution and supply of heat are provided in the Rulebook on prices for heat and system services. These prices form the basis for defining the tariffs. The total sum which the heat supplier invoices to the final consumers consists of a variable and fixed element.

The supplier must deliver heat to its consumers according to the Heating Energy Supply Rules and the Rulebook for Determining the Quality of Supplied Heat³¹.

³⁰ <http://www.erc.org.mk/odluki/2013.07.11-%20TARIFEN%20SISTEM%20ZA%20PRODAZBA%20NA%20T.E.pdf>

³¹ <http://www.erc.org.mk/odluki/2013.11.27%20-%20PRAVILNIK-KVALITET-ISPORAC-T.E..pdf>

3 Guidelines on contractual issues

The heating and cooling business is highly regulated in majority of European states. As DHC is monopolistic by nature there are regulative means to mitigate risks connected to that. DH is a local affair where customers, employers, owners and production facilities remain principally the same decades after decades. Contracts and legislative obligations are ensuring quality of the DHC service and protection of the heat consumer rights. Moreover, in development phase they provide risk mitigation and a reliable fundament for the technical layout of the DHC project extent/size.

In general, it must be highlighted that the most important contracts in DHC projects should involve professional advice of a lawyer. The contract must comply to different legal frameworks therefore it can be difficult for an unexperienced person to prepare a binding document that will define all aspects of the heat supply and consumption transparently and clearly and in accordance with national legal and regulative framework. Usually the heat supply contract for households and public buildings in force are public so new projects can use them as template. On the other hand, the heat supply contracts for industry are rarely publically available.

Heat supply contracts with the heat consumers

Heat supply should be the core of the DHC plant business. Therefore, it makes sense to sign preliminary contracts with potential heat consumers during the planning phase to provide security for the DHC plant investor/operator and on the other hand, the heat consumer receives security to get connected to the heating grid and to get the heat at a certain price. In view of the DHC project development it is important to secure preliminary contracts with as many heat consumers as possible or at least with the key heat consumers. And it is also important to secure resource/fuel supply contracts in the planning phase. As plant operator it is important to secure long term contracts for the fuel purchase and for the heat sale.

It is advisable to develop the project size based on pre-contract signed and not only based on forecasts for customer connection. It is frequently favourable to offer incentives for heat consumers who would connect to the DHC grid in the initial project outlay. It is a lot cheaper to connect customers in the phase when the overall heating grid is built rather than when the grid is already built. Therefore, these incentives tend to be significant – in case of the DH grid in Vatersdorf, Germany, the connection fee for initial connection was 250-300 EUR/kW and for new customers after the initial phase 9.500 €/customer.

The most important basic content of heat supply contracts may include (based on Wagner & Glötzl, 2014³²):

- Subject of the contract: start time, duration, termination clause
- Heat supply specifications: capacity, quantity and temperature of heat supply, minimum and maximum supply, details on the heat source (renewables)
- Grid issues: map of the grid, location of the heat consumer and heat generator(s)
- Heat transfer station: location of the heat transfer station, ownership of the heat transfer station, transfer point
- Installation costs: costs for the installation of the connection pipes, energy meter, and transfer station, re-establishment of damages after construction

³² WAGNER R., GLÖTZL M. (2014) VORSCHLÄGE FÜR DIE INHALTE EINES WÄRMELIEFERVERTRAGES. – Nr. V – 8/2014 (2.AUFLAGE); ARBEITSGRUPPE V (ÖKONOMIE) IM „BIOGAS FORUM BAYERN“, CARMEN E.V., [HTTP://WWW.BIOGAS-FORUM-BAYERN.DE/DE/FACHINFORMATIONEN/OEKONOMIE/WAERMELIEFERVERTRAGES-VORSCHLAEGE_8.HTML](http://www.biogas-forum-bayern.de/DE/FACHINFORMATIONEN/OEKONOMIE/WAERMELIEFERVERTRAGES-VORSCHLAEGE_8.HTML) [24.11.2016]

- Heat counting and monitoring: installation and ownership of the heat meter, data transfer and data protection, measurement frequency
- Maintenance and operation: responsibilities for maintenance (e.g. heat transfer station) and operation, electricity for the heat transfer station, calibration of energy meters
- Information: obligations to inform about maintenance work, failures, price changes
- Prices: basic price, connection price, energy price, measurement prices, equipment (rental) prices, heat price calculation
- Payment: instalment payments, final revision and payments, accounting period, default of payment, payment type
- Access right: for maintenance work, meter reading
- Liabilities: in case of disturbance
- Severability

The extent in which above mentioned elements are included in the heat/cold supply contract and whether they are covered in separate documents such as the system operating instructions document in Slovenia, depends on national regulative. In Slovenia the heating and cooling energy distributor, which carries out public utility service, has to define the quality and security of the distribution in the system operating instructions (which are strictly defined in national legislation) and if the service is carried out in as commercial activity (usually only possible for small operations) the quality and security of the distribution has to be defined in general contract terms. Frequently the national Energy agency or other competent authority issues mandatory contents of these documents and also publishes the documents in current for all distributors.

The heat supply contract and its accompanying documents must be lawful, transparent, objective and non-discriminatory, and prepared in accordance with the national legislation within the legal deadline. General contract terms are an integral part of the supply contracts and have to be in accordance with the national legislation. They shall be fair and the distributor must inform the client prior to the conclusion of the contract, even if the agreement is made through intermediaries.

Any change in the contractual terms and conditions must be directly and in a transparent and comprehensible manner communicated to the client at least one month before they come into effect by the distributor (the period is defined in national legislation and may vary between countries).

Furthermore, the rights and obligations of consumers in respect of the heat supply are defined in general contract terms. Including technical and other requirements for the safe operation of the system, the conditions and manner of connection to the system and other issues related to the reliability and quality of supply are defined there. It is advisable to carefully define the ownership of heating equipment and buildings to avoid any overlapping or mixed responsibilities.

The DHC operator is obliged to familiarize consumers with these conditions. The DHC operation must define appropriate steps to ensure reliable distribution of energy by providing sufficient capacity and reliability of the distribution system. This should ensure customers feedback about disturbances in the system of energy supply and at the customer's request eliminate the malfunction, which prevents the consumption of heat in the agreed quantity and quality.

The household customer is entitled to emergency care and the distributor may not disconnect or limit the consumption of heat below the minimal quantity needed in the circumstances (time of year, temperature conditions, place of residence, health status and other similar circumstances), so that there is no danger to life and health of the client and the persons who reside with him.

Consumer connection and ownership

An important aspect of the heat supply contract is the connection of the consumers object. The agreement defines the scope of ownership – usually the utility owns and maintains the connection pipeline and main valves, until the inside of the outer wall of the customers building. But the ownership of the utility company or the overall owner/investor in the DHC project can extend also to the heating station/heat exchanger. This option can be favourable in case financing of the DHC project can benefit of subsidies and ownership of heating stations can extend the subsidies.

The heat supply contract also defines initial installation and maintenance access and conditions regarding the eventual disconnection of a customer (related to the equipment).

O&M and equipment access

The consumer is responsible for operation and maintenance of equipment, house installation as also safety, operation and regulation. Only authorized personnel should work on the house installations and the heating station and house installations should be checked periodically. This is especially important in case of a direct connection of consumers to the heating network as damage to the central heating system at the consumer's side can represent significant problems for the distribution of heat. Usually the heating stations are checked annually.

The contract also includes information on mandatory supply and necessary maintenance. DH utility can change supply terms, such as pressure and temperature. It is advisable that the contracts also include the ability to request from the consumer to change some parts of the hydraulic installation in case return temperatures are too high.

Tariffs and metering

The DH operator elaborates the tariffs in accordance with the national regulation. Usually the tariffs consist of the **connection fee**, the **metering cost** and the **price for the delivered heat**.

The cost of delivered heat is usually divided in the **fixed or basic price** and **variable or energy price**. The basic, fixed charge covers mainly the fixed costs (labour and service costs, maintenance and amortization cost, and of heat procurement, heat distribution and customer service and is charged based on the connection power in €/MW/year. The Danish Energy Regulatory Authority recommends that the fixed tariff is set at least at 20% of the costs. Price differentiation between large and small users should be applied only to the fixed tariff, and should reflect the opportunity costs of both the large user and for the DH operator – it should reflect the potential other heating solution economics.

Variable or the energy price covers the variable costs (fuel and electricity cost, heat transfer medium costs) and reflects the measured delivered heat in €/MWh. Variable tariffs should at minimum cover variable costs.

National regulations can prescribe the methodology on calculating the variable and fixed prices. It is usually based on definition of eligible costs which can be used for calculation of both price parts and a predefined formula for calculating the variable and fixed prices. When national regulative is obligatory grid operators usually cannot select extreme tariffs such as using variable or fixed price only. Nevertheless, the grid operator usually has room to decide whether he will use a larger variable or larger fixed price.

It is important to consider that the DH tariff system should be transparent and clear to consumers who are not always capable of understanding various technical aspects. A good tariff system can facilitate a good relationship between the DH provider and the end user. Therefore, a tariff system is considered also as a communication tool.

Overall, best practice is to set the variable tariff at the long run marginal costs of the district heating network. Most DH grids will set a variable tariff at a price higher than the short run marginal cost and keep it at a constant level throughout the year. Historically, fixed tariffs in Denmark correspond to 25-27% of costs. As mentioned before the Danish Energy

Regulatory Authority recommends that the fixed tariff is set at least at 20% of the costs. Variable tariffs should at minimum cover variable costs. This promotes investment in viable energy saving measures, including allowing for investment in domestic heat production (e.g. from solar thermal panels or heat pumps, transition to a prosumer grid).

The price of the heat is the most important part of the heat supply contract. The national framework usually also defines how the tariff system is confirmed by the competent authorities. E.g. in Slovenia initial tariff system and any change in tariff system is reviewed and must be confirmed by the local authority (municipal council).

As mentioned national regulative usually defines the exact methodology used to calculate variable and fixed heat price. It usually also defines eligible costs that are used in the calculation. Below is the example from the Slovene methodology of calculation of fixed and variable parts of the heat price.

$$VC_i = \frac{VSTR_t}{Q_t}$$

VC_i *the initial variable part of the heat price*

$VSTR_t$ *the sum of the planned eligible variable costs of heat distribution with own production of heat, distribution of heat without own production heat or heat production in € (legislation provides the definition of what costs are eligible fixed costs for heat distribution in DHC systems with own heat procurement and without own heat procurement)*

Q_t *the sum of all planned heat to be delivered in MWh*

T *the time frame.*

$$FC_i = \frac{FSTR_t}{P_t}$$

FC_i *the initial fixed part of the heat price in €/MWh*

$FSTR_t$ *the sum of the planned eligible fixed costs of heat distribution with own production of heat, distribution of heat without own production heat or heat production in € (legislation provides the definition of what costs are eligible fixed costs for heat distribution in DHC systems with own heat procurement and without own heat procurement)*

P_t *the total conneted heating power in MW*

T *the time frame.*

The Slovene methodology also demands that the average heat price is calculated and also provides methodology on that. The regulative further demands that the average heat price (€/MWh) must not exceed the cost price per MWh of a DHC project. In other words the Slovene national regulative demands that the sum of the planned revenue may not exceed the sum of the eligible costs. And in calculating the average price, the estimated revenue from the fixed part of the price should not exceed the planned eligible fixed costs³³.

Similarly, according to Macedonia's regulation, the compensation payed by tariff consists of a fixed and a variable element. The tariff related to the fixed element is calculated as follows

$$C_{mmfd} = \frac{\sum N_{mmf}}{\sum W_{mmd} + 2.0 \sum W_{mmo}}$$

C_{mmfd} *the specific price for engaged heat power (fixed element) of households in MKD/kW*

³³ Source of the above presented formulas and methodological contents is Energa Agency of Slovenia. <https://www.agen-rs.si/web/portals/izvajalci/toplota/metodologija-regulacije-cen>

N_{mmf} *fixed compensation element of all measurement points (consists of generation, distribution and supply costs) in MKD*

W_{mmd} *total engaged heat power of all household consumers in kW*

W_{mmo} *total engaged heat power of all other consumers in kW.*

On the other hand, the variable element of the heat bill depends on the amount of energy supplied to the consumers. The corresponding tariff is calculated by the following equation

$$C_{mmvd} = \frac{\sum N_{mmv}}{\sum E_{mmd} + 2\sum N_{mmo}}$$

C_{mmvd} *the specific price for consumed energy (variable element) at the level of final consumers in MKD/kWh*

N_{mmv} *compensation for delivered energy at the level of consumers in MKD*

E_{mmd} *sum of consumed heat (variable element) of all household consumers in kWh*

E_{mmo} *sum of consumed heat (variable element) of all other other consumers in kWh*

The variable compensation, on the other hand, depends on the amount of energy supplied to the consumers and is calculated by the following equation.

The methodology for calculating the compensation of individual consumers which draw energy from one measurement point is based on the floor area of the households.

The heat supply contract must include also **the connection fee**. It is usually expressed in €/kW or in € per connection point. This unique fee, only paid at the first connection of the heat transfer station to the grid, represents another communication tool with which consumers can be motivated to attach to the grid. It is sometimes favourable to offer a low or even zero connection price in order to motivate high initial connection rate among potential consumers. This measure has a negative impact on the initial project incomes, but this negative impact can be mitigated by setting a higher fixed part of the heat price.

In some heat supply models, the payment for delivered heat occurs through delivery of fuel (biomass). In case the biomass for heat model is applied the heat supply contract has to include exact information on how biomass is evaluated (amount, water content, quality), how its energy value and the corresponding monetary value is calculated (including the final heat for biomass rate, which doesn't necessary reflect direct monetary value for value). It is advisable to calculate all mentioned aspects in order to avoid possible misunderstandings in evaluating the delivered biomass.

The heat price for the consumer can also be either **fixed** or is related to an **index** (e.g. in relation to fossil fuel price). This index and the methodology on its calculation must be included in the heat supply contract.

The consumer is obliged to inform the utility about any changes with influence on the payment. The DH utility is obliged to inform the customers about tariffs and changes by direct contact. The DH utility decides on account payments (defines the period), which can be differentiated. In case of missing payments, standard fees can be applied.

The DH operator defines the necessary equipment, size, type and location of **heat consumption measuring equipment**. This is an obligatory part of the contract or the accompanying document of the contract. National regulative usually provides definition in which document metering is defined (e.g. in Slovenia it is an obligatory part of system operation instructions). The heat distributor is responsible for providing metering data for calculating the received or supplied heat quantities, and the heat consumer must provide access to the heat meter and measuring data to the heat distributor.

The main heat meter is owned and maintained by the DH utility. Reading of the meters can be automatic reading, announced by the DH utility or self-reading by the customers. In case

of missing or unlikely reading of meters, billing can be based on calculated consumption. The DH utility is responsible for functioning of main meters.

- Measurement price: annual fee for the measurement, maintenance and calibration of the energy meter
- Equipment rental price: in case that the heat transfer station is owned by the grid operator, he may charge a rental fee for it

Supply models

In the contract with the heat consumer, the **heat supply model** needs to be agreed. Basically there are two main models, namely supply of basic heat, and full heat supply.

In the concept of **basic heat supply**, the grid operator supplies only the available fraction of a heating plant to the heat consumer. This model is often used if the heat is supplied by the waste heat from already installed biogas plants or other facilities that have waste heat available. In this model heat provider does not guarantee the full heat supply. Therefore, it is necessary that the heat consumer is also equipped with additional (e.g. existing) boilers that can be switched-on in case that insufficient heat is supplied by the biogas plant operator. This mainly occurs in times of peak demand or during system failures and maintenance. In this option, the risk of the heat plant operator is reduced very small. However, the plant operator usually does not receive high prices heat in this supply model. Heat consumers generally benefit from very low heat prices, but have to pay for the installation and maintenance of additional boilers. (Rutz et al. 2016³⁴). Frequently peak boilers at consumer side in this model are made to cover whole consumer heating needs, as the investment in this case is not significantly higher. This model is more frequently used in industry with waste heat and also for industrial consumers. Namely industrial consumers can afford to invest into own full heating solutions and into connection to external heating source (they also frequently require full backup heating system) and can still be motivated in the basic heat supply model if the heat price is favourable.

In the model of **guaranteed heat supply**, the whole heat demand is supplied by the heating plant operator. This is the typical model if dedicated heating facilities and heating grids will be newly installed, this is also a typical solution for supply of households. This model includes also the supply of peak demand e.g. in cold winters, as well as the supply in case of system maintenance or failure. In many contracts in Germany, the heat supply for temperatures of down to -15°C is guaranteed. In this system the heating plant operator has higher investment costs, since he has to install and maintain peak or emergency heaters. In this concept, the risk is higher for the plant operator since he has to guarantee continuous heat supply. Since the consumer has fully outsourced the heat supply to the biogas plant operator, higher heat prices can be charged. The comfort for the consumer is higher. (Rutz et al. 2016)

³⁴ RUTZ D., DOCZEKAL C., HOFMEISTER M., LAURBERG JENSEN L. (2016) SMALL MODULAR RENEWABLE HEATING AND COOLING GRIDS, A HANDBOOK

4 Examples of contracts on supply of heat/cold

Examples of supply contracts are listed by country from which they originate. The examples are presented in source language. For specific cases additional comments of the contracts are provided.

4.1 Examples of contracts on supply of heat/cold from Denmark

In Denmark the technical terms for installations and delivery of heat can typically be found on the DH company's webpage. This is for instance the case for the guiding example of Brødstrup DH, where all terms and conditions can be found at:

- <http://www.braedstrup-fjernvarme.dk/firmaprofil/vedtaegter-og-bestemmelser>

This is also the case for the best practice example of Thisted DH company, which delivers both heating and cooling. The technical terms and conditions for both heating and cooling delivery can be found at the following link:

- <http://www.thisted-varmeforsyning.dk/firmaprofil>

The transparency of delivering heating and/or cooling in Denmark is important for both the consumers but also the companies due to the rather strict regulation. The DH companies is for instance not allowed to profit from the heat production. Therefore, the Danish District Heating Association made a guideline on technical terms and conditions as mentioned in Section 2.1: "Vejledning – Tekniske Bestemmelser for Fjernvarmelevering":

- <http://www.danskfjernvarme.dk/viden-om/publikationer>

The guideline contains all topics in relation to the technical terms and conditions for delivery of heat, but also topics such as operations conditions and conditions for the heat installation at the individual households.

Another important parameter of the transparency is the prices of DHC supply and the connection costs. All these costs are always visible at the companies' webpages. Some examples are for instance:

Brødstrup DH: <http://www.braedstrup-fjernvarme.dk/%C3%B8konomi/priser>

Bornholm DH: <https://beof.dk/varme/priser/>

Thisted DH: <http://www.thisted-varmeforsyning.dk/forbrugervejledninger/priser>

Some statistics on the DH in Denmark for both organization of the sector but also prices are made each year by the Danish Energy Regulatory Authority:

- <http://energitilsynet.dk/varme/statistik/fjernvarmestatistik/>
- and for English version: <http://energitilsynet.dk/tool-menu/english/>.

4.2 Examples of contracts on supply of heat/cold from Germany

The heat is transferred from the heat generator to the consumers through a DH grid. Thus, heat supply contracts are made with the consumer. These contracts are usually done in dedicated written contracts, but they can be also made without written documents. However, in order to minimize potential conflicts, it is recommended to elaborate and sign dedicated written heat supply contracts.

Examples of contracts:

- <http://www.waso-energie.de/fileadmin/templates/downloads/WASO-Waermeliefervertrag-Muster.pdf>
- http://www.energiegenossenschaft-gussenstadt.de/mediapool/135/1353524/data/000_Waermeliefervertrag_Gussenstadt_EntwurfWK_EGG_131215.pdf

4.3 Examples of contracts on supply of heat/cold from Austria

Some Austrian examples of heat supply contracts in German language are available at these websites:

- https://www.bmwf.gv.at/EnergieUndBergbau/Energieeffizienz/Documents/Anlagen-Contracting_Mustervertrag%20kommentiert_PC-Ansicht.pdf
- http://www.noe.gv.at/noe/Energie/Muster-Waermelieferungsvertrag_2014-04-14.doc

4.4 Examples of contracts on supply of heat/cold from Croatia

Some examples of heat consumption contracts can be found on the webpage of Karlovac district heating utility available online:

- <http://gradska-toplana.hr/hr/wp-content/uploads/2014/06/2014-Ugovor-o-potro%C5%A1nji-TE.pdf>

And Brod-Plin company, which acts as the heat buyer in the city of Slavonski Brod:

- http://www.brod-plin.hr/_Data/Files/Ugovor%20o%20potro%C5%A1nji%20toplinske%20energije%20-%20CTS.PDF

4.5 Examples of contracts on supply of heat/cold from Slovenia

Contract for supply of heat within the Metlika DH system example. Source: Petrol d.d., Slovenia:

- <https://www.petrol.si/za-dom/energija/daljinsko-ogrevanje/sistemi-daljinskega-ogrevanja/daljinsko-ogrevanje-v-metliki>.

Contract for supply of heat within the Ribnica DH system example. Source: Petrol d.d., Slovenia:

- <https://www.petrol.si/za-dom/energija/daljinsko-ogrevanje/sistemi-daljinskega-ogrevanja/daljinsko-ogrevanje-v-ribnici>.

4.6 Examples of contracts on supply of heat/cold from Bosnia and Herzegovina

Contract for heat supply for DHS based on excess heat from TPP Tuzla:

- For end users with metering systems installed
<http://www.grijanjetuzla.ba/udocs/MWh-TG%20II.3.pdf>
- For end users without metering systems installed
<http://www.grijanjetuzla.ba/udocs/m2-TG%20I.1.pdf>

Contract for heat supply for DHS in Sarajevo based on natural gas:

- For end users with metering systems installed
http://toplana-sa.co.ba/docs/ugovor_objekti_sa_mjerenjem.pdf
- For end users without metering systems installed
http://toplana-sa.co.ba/docs/ugovor_objekti_bez_mjerenja.pdf

4.7 Examples of contracts on supply of heat/cold from Serbia

- Contract for supply of heat within the Nis DH system example. Source: AERS,
http://www.nitoplana.rs/uploads/file/news/mod_Stambeni_Prostor.pdf

- Contract for supply of heat within the Šabac DH system example.
<http://www.coolheating.eu/images/Link/Example-contract-on-supply-of-heatcold-from-Sabac.pdf> Source: AERS

4.8 Examples of contracts on supply of heat/cold from Macedonia

An example of a contract for supply of heat for the heat supplier BEG is provided bellow.
Source: BEG Snabduvanje:

- <http://beg-snabduvanje.com.mk/wp-content/uploads/2016/10/%D0%94%D0%9E%D0%93%D0%9E%D0%92%D0%9E%D0%A0-%D0%B7%D0%B0-%D1%81%D0%BD%D0%B0%D0%B1%D0%B4%D1%83%D0%B2%D0%B0%D1%9A%D0%B5-10.02.2016.pdf>

Another example for such a contract for the heat supplier Snabduvanje Zapad. Source: Snabduvanje Zapad doel.:

- <http://snabduvanjezapad.mk/toplifikacija%20akti/S.%20Zapad%20%20DOGOVOR%20PRAVNI%20LICA%2011.06.2010.pdf>

5 Summary

Heating and cooling constitutes around half of the EU's final energy consumption and is the biggest energy end-use sector, ahead of transport and electricity.³⁵ DHC is a proven solution for heat and cooling supply in private, public and industrial sector. Heating and cooling can incorporate a complex network of (business) relations including fuel supply, O&M services, supply of consumers, relations to local and national governance and relation to the competent agencies (e.g. Energy Agency), to mention only some. All these relations are usually regulated through contracts - an (voluntary) arrangement between two or more parties that is enforceable by law as a binding legal agreement. Different legislations cover the content of the mentioned contracts, ranging from laws on physical planning to laws on use of RES and Energy Efficiency and Obligation Codes. As such setting up of contracts in DHC can represent a complex issue. It is therefore recommended to use legal advice for the definition of required contracts or at least for proofing.

The extent in which national regulations define the content and requirements of contracts in DHC varies. Usually the content of heat supply contracts is well defined in national legislation and regulatory documents such as the Code of obligations, the Energy law, Grid Codes, Tariff methodology, Heating Energy Supply Rules, System operation instruction etc. The extent of legislation and regulations connected to heat supply depend on national specifics where in some countries national regulations provide significant support for definition of heat supply contracts including easy access to contract examples and examples of other accompanying document such as technical terms for installation and delivery. Access to these documents can be found in paragraph 4 on Examples of contracts on supply of heat/cold and paragraph 2 on National regulations on DHC supply contracts in this document.

The content of heat supply contracts is well synchronised in different countries. The heat supply contracts usually include general information, terms of connecting to the DHC grid and ownership of equipment, heat supply specifications, costs (installation costs, heat costs and metering costs), other specifications (metering and monitoring, maintenance, payment specifics, access rights, liabilities). It is important that heat supply contract follow defined national rules, where also methodology of calculations of tariffs is provided. It is also advisable to define heat supply contracts in a transparent manner. This is especially important for small DHC projects where each heat consumer is important and unsatisfied customers can represent an important risk factor. Therefore, it is advisable to conclude heat supply contracts or pre-contracts even during development of the DHC project. In case of small DHC projects it can also be of benefit to organise a workshop for heat consumers where heat supply contracts and other accompanying documents such as technical terms and tariff methodologies are explained. Nevertheless, a solid heat supply contracts is a prerequisite, well informed and satisfied heat consumers are the key element for a successful long term DHC business.

Information and concepts available in this document can be further supported by other outcomes of the CoolHeating project such as the Guidelines for initiators of small heating-cooling grids, Handbook on Small Modular Renewable Heating and Cooling Grids, Guidelines on improved business models and financing schemes of small renewable heating and cooling grids and the Economic calculation tool for simple economic assessments of DHC business models. These documents are available on the CoolHeating web page <http://www.coolheating.eu>.

³⁵ <https://ec.europa.eu/easme/en/heating-and-cooling>