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Abbreviations

DH	District heating
DC	District cooling
DHC	District heating and cooling
CHP	Combined heat and power
LA	Local authority
O&M	Operation and maintenance

1 Summary

The following report provides an overview of legislation and policies on district heating and cooling in EU countries. A focus is made on the two countries where case studies will be implemented, notably France and Slovenia.

2 Chapter 1 - European Legislative Framework

Heating and cooling in buildings and industry accounts for half of the EU's energy consumption. District heating provides 9% of the EU's heating

In February 2016, the Commission proposed an EU heating and cooling strategy. Plans for this EU strategy were first launched in 2015 as part of the Energy Union strategy. This is a first step in exploring the issues and challenges in this sector, and solving them with EU energy policies. This strategy provides a framework for integrating efficient heating and cooling into EU energy policies by focusing action on stopping the energy leakage from buildings, maximising the efficiency and sustainability of heating and cooling systems, supporting efficiency in industry and reaping the benefits of integrating heating and cooling into the electricity system.

The following directives deal with district heating and cooling:

- **Directive 2015/2193/EU** on the limitation of emissions of certain pollutants into the air from medium combustion plants (MCP Directive): it regulates pollutant emissions from the combustion of fuels in plants with a rated thermal input equal to or greater than 1 megawatt (MWth) and less than 50 MWth.
- **Directive 2015/1127/EU** on waste amending Annex II to Directive 2008/98/EC and repealing certain Directives.
- **Directive 2012/27/EU** on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directive 2004/8/EC on the promotion of cogeneration based on a useful heat demand in the internal energy market and Directive 2006/32/EC on the energy end-use efficiency and energy services.
This directive establishes a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. Under the Directive, all EU countries are required to use energy more efficiently at all stages of the energy chain from its production to its final consumption.
The directive requests EU countries to carry out a comprehensive assessment of the national potential of cogeneration and district heating and cooling by December 2015.
- **Directive 2010/31/EU** on the energy performance of buildings: with the aim of reducing the environmental impact of the energy use for buildings, this directive deals with issues connected to energy performance requirements for new buildings, for the major renovation of buildings and for the replacement or retrofit of building elements (heating and cooling systems, roofs, walls, etc.). Also EU countries must establish inspection schemes for heating and air conditioning systems and have to draw up lists of national financial measures to improve the energy efficiency of buildings.
- **Directive 2010/75/EU** on industrial emissions (the Industrial Emissions Directive or IED): it is the main EU instrument regulating pollutant emissions from industrial installations.
- **Directive 2009/28/EC** on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC: this directive establishes an overall policy for the production and promotion of energy from renewable sources in the EU. It requires the EU to fulfil at least 20% of its total energy needs with renewables by 2020 – to be achieved through the attainment of individual national targets. All EU countries must also ensure that at least 10% of their transport fuels come from renewable sources by 2020.

- **Directive 2008/1/EC** concerning integrated pollution prevention and control (IPPC directive). Operators of combustion installations with a rated thermal input exceeding 50 MW are required to obtain an environmental permit from the authorities in the EU countries.
- The EU Clean Energy for All Europeans Package, published on November 30th 2016, sets the framework for 2030 with new targets on efficiency, CO₂ reductions and the share of Renewable Energies.
- The **revised Energy Performance of Buildings Directive (EU) 2018/844** was published on June 19th 2018.

Two directives are currently under revision: **Directive 2012/27/EU** on energy efficiency and **Directive 2009/28/EC** on the promotion of the use of energy from renewable sources. In the reviews of these directives, the Commission will look into i) promoting renewable energy through a comprehensive approach to speed up the replacement of obsolete fossil fuel boilers with efficient renewable heating and ii) increasing the deployment of renewable energy in district heating and CHP.

In November 2018, the European Parliament adopted the Clean Energy for All Europeans package. The main objectives for Renewable Energy aim at setting a new, binding renewable energy target for the EU for 2030 of at least 32% and increasing the level of ambition for DHC.

As regards State aid, the following rules apply:

- State aid to district heating generation installations may be necessary if such generation is more costly than individual heating. To ensure that aid to district heating results in better environmental protection, a further compatibility criterion is that generation installations should be highly efficient,
- District heating distribution networks are not covered by the Energy Aide Guidelines, but aid to networks may still be declared compatible when Member States show that aid is necessary to improve environmental protection, for instance because without aid the networks would simply not be built, resulting in less environmentally-friendly heating solutions.

3 Chapter 2 - France

3.1 DHC targets

Currently DH only represents 5% of the total heat supply in France. DC sales amount to 1 TWh/yr. However the sector is expected to grow in the near future given the ambitious target set in the 2015 Energy Transition Law. The objectives set out in this Law regarding heating and cooling focus on reducing final energy consumption by 50 % by 2050 and by 20 % by 2030 (compared to 2012), reducing primary consumption of fossil fuels by 30 % by 2030 (compared to 2012), achieving a rate of 38 % of final heat consumption from renewable heat by 2030. DHC from renewable and recovered energy sources is assumed to increase by a fivefold by 2030 (compared to 2012).

DHC are gradually being recognized as a solution that can boost energy transition. They also allow for a better control of pollutant emissions.

Practice

In 2017, 761 DH networks delivered 25 TWh. The residential sector represents 56% and the services sector 35% of the total. They use an increasing amount -56% - of renewables (biomass, geothermal) and recovered energy (from waste or industry treatment).

3.2 Legislative framework

Management and operation of DHC

Main DHC systems are publicly owned. Local authorities (LA) are competent when it comes to creating and managing public DHC. Most networks are managed under concession agreements between the LA and an operator. The operator can be responsible for capital investment as well as operation and maintenance (O&M) costs (“concession with investment”) or only O&M costs, the LA being in charge of capital investments (“concession without investment). Operators are selected through a bidding process. The concession agreement set rules for operation and maintenance for distribution and/or heat production plants, services to customers, security of heating supply, etc.

Direct management is also a possibility, usually chosen by LAs with small networks: a municipal in-house service deals with operation, maintenance and investments.

Connection and disconnections rules

In general customers can freely disconnect from the district network at the end of their contract with the DH operator. During the contract period, every user can disconnect but has a penalty to pay which usually amounts to the amortization of the connection costs and takes into account the loss of earnings until the end of the contract.

However under the 2010 Environmental law (“Loi Grenelle I”) local authorities can put in place “DH priority areas” provided their DH network uses at least 50% of renewable or recovered energy sources. New buildings or buildings that are undergoing extensive renovations and that are located within the DHN “priority perimeter”, have an obligation to connect to the network unless they can prove that another solution is both more economically and environmentally friendly.

2015 Energy Transition Law

The Energy Transition Law promotes green growth and aims to reinforce France’s energy independence. An ambitious target is set for DHC: a fivefold increase in heat and cool deliveries using renewable and recovered energy by 2030 (3, 4 Mtoe in 2030). Intermediate targets were specified in a ministerial order in April 2016. The French multiannual energy program (Programmation pluriannuelle de l’énergie in french, PPE) quantified development objectives were determined for 2018 (1, 35 Mtoe) and 2023 (between 1, 9 and 2, 3 Mtoe). The objectives are reviewed and completed every five years. The second PPE, covering the period 2023-2028, is currently under review.

The law includes other clauses that aim at developing DHC:

- DHC master plans are to be produced by municipalities by 31 December 2018 for public DHC networks operational in 2009. Master plan contributes to achieving the goal of supplying heating and cooling networks from renewable and reclaimed energy in 2020. It includes an evaluation of the quality of the service provided and the possibilities of densification and extension of this network and interconnection of the latter with the other networks located nearby, as well as an evaluation of the development potential of renewable energy and recovery in the supply network
- DHC are to be taken into account in regional and local planning documents.

Also development of electricity, gas and heat networks is expected to be better coordinated.

Cost-benefit analysis

The obligation to conduct a cost-benefit analysis for all new installations over 20 MW and those undergoing major refurbishment to assess the suitability of connecting the installation to DHC in order to be supplied by waste energy has been included into French law through the decree n°2014-1363 of 14 November 2014 and the order of 9 December 2014 which specifies the content of the cost-benefit analysis.

Energy Data Access

Article 179 of the Energy Transition for Green Growth Act (LTECV) provides for the data transmission to local authorities. Three decrees, published on July 2016, specify the application. For each network, the data concern the installed capacity and the annual production of heat or cold, with its CO₂ content and, where appropriate, the share of cogeneration installations. Total annual deliveries of heat or cold well as the number of corresponding delivery points, are also provided. Data will be produced at size of the building.

Principle of the distribution of heating loads

A decree on the distribution of heating costs in collective buildings provides that main residential buildings with collective heating shall have, where technically feasible and economically feasible, an installation that determines the amount of heat used by each dwelling. This installation consists of measuring devices, which allow to individualize the consumption of each dwelling. The heating costs for this installation are divided, on the one hand, into fuel or energy costs and, on the other hand, into other heating costs, such as costs related to the maintenance of heating installations and those related to the use of electrical energy.

Thermal building regulation

The existing thermal regulation (RT2012) provides for a construction bonus for virtuous DH networks.

The future regulation, under development, stipulate an experimentation with the label E+C- (Low energy buildings / Low carbon buildings) that introduces the concept of buildings environmental performance.

3.3 Support mechanisms

Reduced VAT rate

DH end users can benefit from a reduced VAT rate (5, 5%) applicable to the fixed share of the bill and to the variable share of the bill (proportionate to the energy consumption) if the network uses at least 50% of renewable and recovered energy sources.

The Heat Fund

This fund in place since 2009, supports the production of heat from renewable and recovered energy sources in the industrial, tertiary and public housing sectors. During the period between 2009 and 2017, the heat fund was endowed with a budget amounting to 1.9 billion €. About € 200M are disbursed yearly to that effect, notably for DH projects.

According to the current Minister in charge of Energy, this fund should be doubled within the next few years to help achieve national sustainable development objectives. In November 2018, the Government announced that the fund credits shall be increased to 315 M€ in 2019.

The DC have been eligible since 2018 for the Heat Fund for the creation of networks with cold substations linked to new renewable cold production for cold uses considered as necessary.

The National Court of Auditors has recognised several times the relevance and efficiency of this mechanism.

White Certificates

White certificates aim to promote energy efficiency. Under such a system, energy producers, suppliers or distributors are required to undertake energy efficiency measures for the final user that are consistent with a pre-defined percentage of their annual energy deliverance.

For the period between 2015 and 2017, France's energy savings target is 700 TWh (of final cumulative discounted energy¹).

The following actions can be eligible to white certificates:

- Increase in insulation of DH pipes,
- Changing current networks to low temperature heating systems,
- Connecting residential and tertiary buildings to a DH network using renewable energy sources.

CHP

CHP has been encouraged by French energy policies for the last 20 years. Therefore CHP capacities have grown continuously until recently. Following the new European rules on public support for environmental protection and energy, France changed its aid mechanisms for CHP. Aids will be reduced with the implementation of the new scheme and CHP operators are therefore expecting a decrease in installed power in France over the next years.

In France, the national CHP assessment carried out in 2010 concluded that there is no potential for new fossil CHP, but a potential for the development of biomass-fired CHP, in line with the binding target of 23% of renewable energy set by Directive 2009/28 / EC, as well as a potential for the development of micro-CHP. As a consequence, the first PPE sets out quantitative objectives for developing the high-efficiency CHP fired with biomass or biogas, but does not set any target for gas-fired CHP.

Energy tax credit

Implemented from September 2014 until December 2016, the main objective of this tax credit is to encourage households to undertake energy efficiency works and to contribute to the development of renewable and recovered energy. Connection to a DH network using at least 50% of renewable energy or CHP is listed among the eligible actions even though it remains inapplicable to-date due to unclear legislative wording. The 2018 Finance Law operationalizes the energy tax credit (30%) for connection to DHC network.

3.4 Challenges and barriers

In spite of the targets set in the 2015 Energy Transition Law and the overall progress that has been made in regards to DHC in recent years, French energy production is still very much nuclear orientated even though the share of nuclear energy in electricity production should be decreased within the near future.

Main challenges and barriers also include:

- Current prices of fossil fuels have dropped by 20% in the last two years and this has a major impact on the development of new as well as existing district heating networks,
- Competition of individual solutions (important place of electric heating),

¹ The energy savings target is expressed in "cumulative discounted energy", defined in Article 3 of Decree 2006-603, of 23 May 2006, on energy savings certificates. "The value of energy savings certificates attributed to an operation corresponds to the sum of annual energy savings made for the life of the product or the duration of the service contract. This amount is expressed in kilowatt-hours of final energy. The energy savings made over the years following the first year of the life of the product or service contract are calculated using the decreasing weighting factors set by the Minister for Energy." The weighting factor is set at 1.04 (discount rate of 4%) by the above mentioned decree

- The carbon tax does not act as an incentive to choose DH solutions (22 €/t in 2016) and the increase planned for this tax in the near future is far too slow (56 €/t CO₂ in 2020, 86 €/tCO₂ in 2022 and 100 €/t in 2030),
- A “territorial” reform was adopted in France in 2014 which has the following consequences:
 - Reduction of the number of French Regions from 22 to 13 since beginning of 2016. These Regions are to produce a global planning document including provisions on energy by 2019: the challenge is for DHC to be properly taken into account in these documents;
 - DHC fall under the prerogative of new local authorities (metropolis, conurbations, community of municipalities): this could slow down DHC development.
- High investment costs,
- Legal obstacles such as the energy credit tax which is not applicable,
- General lack of awareness regarding DHC and its positive contribution to the energy transition.

4 Chapter 3 – Slovenia

4.1 DHC targets

Slovenia has no specific targets set for DHC.

There is a new program in preparation to co-finance biomass district heating systems and geothermal district heating systems. The basic targets are:

- Reduction of CO₂ emissions,
- Increase energy efficiency,
- Use of local/domestic biomass,
- Decrease air pollution,
- Use of renewable energy sources to produce heat and electricity.

In accordance with the required Directive 2009/28 / EC on the promotion of the use of energy from renewable sources, Slovenia has a set goal to achieve at least a 25% share of RES in final gross use of energy by 2020. In line with the National Action Plan, share of RES in gross final energy consumption:

- heating and cooling : 30.8%
- Electricity : 39.3%
- Traffic : 10.5%

In order to increase the production of heat from renewable sources, the implementation of the European cohesion policy will support investments in the construction of new and reconstruction of existing heating systems by 2020, as well as incentives for connecting new users to existing capacities (geothermal heating systems, solar collectors, biomass in the public sector, service industries and industry, biomass district heating systems BDH above 1 MW, local BDH systems up to 1 MW of power, heat pumps).

4.2 Legislative framework

- **2014 Energy Law (EZ-1), new 2015**
- **2014 Regulation on the provision of energy savings**
- **2015 Rules on reporting and remittance of funds** from the contribution to energy efficiency and funding as a form of compulsory ensure energy savings among final customers of suppliers of electricity, heat, gas and liquid and solid fuels to Eco Fund
- **2016 Act on the methodology for pricing of district heating**
- **2016 Act on compulsory system operation instructions for district heating systems**
- **2016 Rules on financial incentives for energy efficiency, district heating and renewable energy sources:** new support mechanism for district heating systems, renewable energy sources, CHP systems; co-financed up to 45% eligible costs.

4.3 Support mechanisms

- **Rules on financial incentives for energy efficiency, district heating and renewable energy sources:**
 - a) efficient use of energy: 30% of eligible costs;
 - b) energy production from renewable energy sources; up to 45% of eligible costs;
 - c) cogeneration with high efficiency: 45% of eligible costs;
 - d) efficient district heating and cooling: 45% of eligible costs;
 - e) studies: 50% of eligible costs;
 - f) intelligent energy networks: the amount of the difference between the eligible costs and business profit investment. Operating profit previously deducted from the eligible costs, or via a mechanism for repayment of funds.
- **Eco Fund** for connecting existing one- or two-apartment buildings to the district heating systems using renewable energy sources: 20 % financial support on cost and installation of heat station, associated installations and appropriate control and protective equipment.
- **Ministry of Infrastructure, Directorate for Energy** finances BDH projects via Public tender for co-financing district heating for renewable energy sources for 2017-2020 for the construction of BDH systems with boiler capacity of up to 10 MW or the construction of micro RES systems with a boiler capacity of up to 1 MW, extension of the heating network in the existing BDH system with or without the addition of additional wood biomass boilers, in so far as the use of solar energy, as an additional source, contributes to improving the economy of the entire DOE system, the solar system for the preparation of hot water can also be part of the operation.
The total amount of the financial incentive in the form of grants for carrying out an individual operation is up to 35% of the value of the eligible investment costs, if the applicant is a large enterprise. In medium-sized companies, this % is 45% and for small enterprises 55%. Systems that include a cogeneration unit for electricity and heat, from which heat is delivered to the district heating network, the financial support is 65%.

4.4 Challenges and barriers

For two years there were no funds available for co-financing the DH systems, so there was less investment in DH. In July 2016 Rules on financial incentives for energy efficiency, district heating and renewable energy sources were published: it states the specifications, amounts, etc. regarding co-financing of DH systems. Based on previous tenders for co-financing DH one can expect an increase in investments for biomass district heating systems, CHP, etc. In 2017 new calls for funds were opened (as mentioned above) and from 2017 to November 2018 20 new BDH systems were approved (average power 1 MW). Projects that are new or follow rationalization and try to install central control systems for monitoring energy consumption, but there are very few actual implementations (less than 40% of this 20 mentioned projects, especially smaller ones). Most of the older systems that are being upgraded do not install central control systems.

Nevertheless DH systems also face challenges and barriers, similar to other EC countries:

- High investment costs,
- Time consuming process for obtaining necessary permits,
- Disorderly legislation: users living in areas where a DH system using renewable sources is in place or will be developed have no obligation to connect to the DH network. They are eligible for receiving financial support to use other heating sources (i.e. heat pump, wood boiler...),
- In direct competition with natural gas.

5 Chapter 4 – Other European Countries

5.1 Austria

DHC targets

There are no set DHC targets. However several laws and policies have been adopted to promote the development of district heating and cooling networks because they offer the following advantages:

- Reduction of CO₂ emissions,
- Increase in energy efficiency,
- Lower electricity use on air conditioning,
- Decrease in air pollution,
- Use of waste heat.

Practice

- 41% RES-DH share (2012)
- 33.3% RES-H&C generation (2016)

Legislative framework

- **2008 Law** to expand DHC networks (WKLG): € 60M/yr. to be mobilised by the State for DHC development
- **CHP-Law** (KWK-Gesetz): Subsidies for high efficient CHP (Subsidy can't exceed 30% of investment costs / € 12M annually)
- **CHP-Points-Law** (KWK-Punkte-Gesetz): New financial support mechanism for existing CHP plants (Up to € 36 M/yr.)

DH market structure

There is a lack of mandatory price regulation

- There is no national regulation involving heterogeneous local frameworks. Municipalities are usually responsible for price setting. Nevertheless, in some cases DH operators may set prices freely (with the control of the Competition Authority).
- Prices are different among the country's geographic areas. In 2016, prices where ranged between €95, 44/MWh (Graz) and €141/MWh (Birkfeld).

Supporting mechanisms

- **Environmental support scheme** (UFI): It targets projects that contribute to reducing CO₂ emissions and where profitability is not guaranteed. Subsidy can't exceed 30% of investment costs
- **Regulation on buildings** (Wohnbauförderungen): Most of the States provide financial support for District Heating

Challenges and barriers

Despite the provisions of the 2008 Law subsidies have been only partially allocated. Moreover, DHC is also confronted with the following barriers:

- High (preliminary) investment costs;
- Time-consuming administrative procedures to get permits;
- Lack of adequate planning;
- Deterioration of the economic situation of CHP plants
- Uncertain economic situation on the global energy market

5.2 Bulgaria

DHC Targets

There are no set DHC targets. Nevertheless Bulgaria has a national energy strategy which sets the following priorities for 2020:

- Energy development and energy security through efficient use of energy and energy resources;
- Creation and development of a stable energy market;
- Energy supply with minimum costs;
- Environmental protection;
- Consumer protection.

Legislative framework and supporting mechanisms

- **Bulgarian Energy Strategy**
- **2003 Energy Law**

The following documents serve as for government authorities to define, regulate and control the energy sector:

- Ordinance for electricity and heating prices
- Ordinance for DH activities
- Ordinance for CHP
- Ordinance for electricity and heating prices
- Ordinance for licensing in the energy sector

Supporting mechanisms

There are no supporting mechanisms for DHC in place.

Challenges and barriers

DH sector development suffers from poor driving forces. On the one hand the advantages of DH system in terms of financing and environment protection are not sufficiently communicated to the population. There is also a lack of preconditions provided in the current legislation to develop DH: for instance there are no tax or investment incentives and no DH master plan.

Furthermore, Bulgaria is confronted with the following barriers:

- Lack of pricing regulation;
- Decline from 21 to 13 DH systems between 2004 and 2014;
- Insufficient return on investment rates for new and environmentally friendly technologies;
- Insufficient incentive for new investments in modern CHP technologies;
- Lack of political determination to install DH systems in new building developments;
- Lack of generated interest in DHC from users.

5.3 Croatia

DHC Targets

There are no set DHC targets.

Legislative framework

- **Energy Law (Official Gazette 120/12)**
- **Law on Regulation of Energy Activities (Official Gazette 120/12)**

- **2013 Heat Market Law (Official Gazette 80/13, 14/14 and 102/14):**
 - Legislation on safe and reliable delivery of heat, market development, protection of end-users, heat price competitiveness, efficient production and use of heat
 - Legislation to minimising impacts of DH systems on the environment

Supporting mechanisms

There are no supporting mechanisms for DHC in place.

Challenges and barriers

The main challenges for DH are:

- Profitability;
- Negative public outlook;
- Natural gas in direct competition with DH;
- Significant investments needed to modernise existing DH systems in order to improve reliability and security of heat supply;
- Insufficient energy planning.

Development of DC remains low on the agenda in spite of huge potential.

5.4 Czech Republic

DHC targets

Although District Heating is supported by a new energy policy, there are no targets set for DH systems and no clear heat development strategy. DH is only seen as a supporting factor to increase the use of renewable energy sources in heat production to attain EU 2050 climate and energy objectives.

Some objectives regarding the use of RES in a heat production shall be set in the near future.

Practice

- 11% RES-DH share (2012)
- 19,9% RES-H&C generation (2016)

Legislative framework

- **2000 Energy Act no. 458/2000 Coll.:**
 - Energy sector framework,
 - Rights and obligations of DH companies including metering and billing,
 - Heat price regulation.
 - Legal regime of network construction and operation,
 - Cogeneration legal framework;
 - Mine gas use specificities
- **2000 Act on Energy Management no. 406/2000 Coll.:** energy efficiency requirements for boilers, CHP and heat distribution;
- **2012 Act on Supported Energy Sources no. 165/2012 Coll.:** feed-in tariffs and green bonuses (from 2013) for renewable energy and CHP electricity , overcompensation issues, auction for RES and CHP from 2021 on;
- **Act on Air Protection no. 201/2012 Coll.**
 - Mandatory emission limits for combustion installations including District Heating,

- Obligation to connect to District Heating provided that it is technically feasible and economically viable.

DH market structure

Heat prices are subject to a regulation by the Energy Regulatory Authority (ERU). Prices are fixed on an annual basis based on the submission of all eligible operating and service costs associated with the facility.

The infrastructures are mainly Municipality or privately owned & operated.

Supporting mechanisms

VAT is reduced to 15% for CHP. Financial support is also available for high efficiency CHP.

Financial support is also available for high efficiency CHP in terms of green bonuses for electricity from high-efficient cogeneration. Renewable heat supply also enjoys an operational green bonus for renewable heat supply.

Subsidy schemes for DHNs reconstruction esp. when switching from steam networks to hot water ones.

Challenges and barriers

Challenges for DH are the following:

- Modernise plants and networks to increase efficiency;
- Replace coal;
- Decrease the emissions and respect the stringent emission limits;
- Managing rising CO2 prices without compromising the competitiveness
- Raise comfort for customers;
- Keep heating prices competitive;
- Provide a well-qualified workforce;

5.5 Denmark

DHC Targets

Denmark has established a general political consensus which specifies the following:

- Energy supply must be based on renewable energy sources by 2050;
- Fossil fuels use in electricity and heat to be eliminated by 2035.

In order to achieve these ambitious objectives, a national energy policy was adopted by the Parliament in 2012 with targets to be achieved by 2020:

- more than 35% renewable energy sources in final energy,
- 7.6% reduction in gross energy consumption (compared to 2010);
- 34% reduction of greenhouse gas emissions (compared to 1990);
- A ban on the installation of oil-fired and gas-fired boilers in new buildings as of 2013;
- No more installation of oil-fired boilers in existing buildings as of 2016 in areas with District Heating systems or natural gas;
- The conversion from coal to biomass of large-scale CHP plants;
- An analysis of the future role of District Heating in the energy system.

Legislative framework

- **1979 Heat Supply Act:**
 - Promotes the most socio-economic and environmentally friendly use of energy for heating buildings;
 - Not-for-profit principle that governs DH utilities operation.

DH market infrastructure

Heat prices are regulated and supervised by the energy market authority

- Prices are set based on a cost-plus principle
- Prices may only cover “necessary costs” (purchase of energy, financial costs, operations, administration etc.) and, with a few exceptions, cannot cover a profit.

The infrastructures are mainly municipally owned companies & Community-owned cooperatives.

Supporting mechanisms

Subsidies used to exist for the development of networks. They ceased to exist in the 1990s.

There is however still some financial support available for DH development projects such as reduced interest rates.

In Denmark, price of DH tend to be lower than individual oil or gas solutions. There are also cost-benefit analyses that demonstrate the socio-economic gain of the switch to DH. Also to be noted the highly developed supporting sector (consultants, contractors and equipment suppliers).

A complex regime of high taxes on fossil energy and certain pollutants strongly influences operations and developments in district heating

Challenges and barriers

DH is already highly developed in Denmark. Therefore expansion is limited to new building developments. For instance, in Copenhagen, 98% of existing buildings are connected to the DH network.

Other barriers for development of DH include:

- Building codes of 2015 and 2020: difficulty to introduce DH because buildings’ energy performance requirements tend to favour on-site energy production;
- Danish national policy (elimination fossil fuels in heating by 2035): using natural gas as a main fuel is requisite for certain existing DH equipment;

Strong need for biomass in DH to achieve RES targets (conversion from coal to biomass at large-scale CHP plants)

- A ban on installation of oil-fired and gas-fired boilers in new buildings from 2013;
- A halt to installation of oil-fired boilers in existing buildings from 2016 in areas with district heating or natural gas

5.6 Estonia

DHC Targets

There is lack of DHC targets.

Practice

- 29% RES-DH share (2012)
- 51.2% RES-H&C generation (2016)

Legislative framework

- **2003 District Heating Act:**
 - DH prices to be regulated as from 2010
 - It introduces a “DH area” classification: in such areas all new buildings are required to be connected to the DH networks
- **2007 Electricity Market Act**
 - Feed-in tariff of € 0.05/MWh when using electricity produced by CHP plant
 - Higher feed-in tariff of € 0.07/MWh when using CHP plants that use renewable sources

Supporting mechanisms

- **Establishment of DH areas:**
 - Right conferred to municipalities;
 - Obligation for new buildings to be connected to the DH system.

Challenges and barriers

- Uneven distribution of CO₂ cost among heat producers (DH systems vs local boilers and small engines).
- Direct price regulation of DH. The Estonian Competition Authority (District Heating Department) approves the maximal price for heat production for each producer and maximal heat sale price for each supplier and each region/city.
- Low purchasing power of customers concerning fuel prices: as a consequence DH companies tend to postpone works to keep heat price affordable.

5.7 Finland

DHC Targets

There is lack of DHC targets.

Practice

- 32% RES-DH share (2012)
- 53.7% RES-H&C generation (2016)

Legislative framework

- **General competition legislation and consumer protection** (no regulation of DH pricing)
- **Land Use and Building Act:** municipalities can choose to make it compulsory for buildings to connect to a DH system unless they already use renewable energy sources.
- **2015 Efficiency Act:**
 - New obligations concerning metering, billing of DH and transparency
 - Provisions on cost benefit analysis on CHP and waste heat utilisation as well as energy auditing.
 - New environmental protection regulations, land use and building regulations, tax regulations.

Market structure

District heating prices are not regulated. However, the dominant market position requires pricing to be on equal terms for all customers: the Competition Authority controls the reasonability of prices and abuse of dominant position.

There is a lack of information regarding the main business model (can be municipally or privately owned & operated).

Challenges and barriers

DH is already highly developed in Finland. There are currently no institutional barriers for DHC and CHP. As well as all market leaders, the biggest challenge for DH will be to stay at the top of the heating market.

5.8 Germany

DHC Targets

There are no set DHC targets.

Practice

- 19% RES-DH share (2012)
- 14.7% RES-H&C generation (2016)
- 83% CHP share in DH generation (2015)

Legislative framework

Nowadays CHP plants account for approximately 16% of the electricity production in Germany. Several laws and policies have been adopted to promote the development of DHC networks, seen as a means to increase electricity production from CHP and combat climate change.

- Combined Heat and Power Act (KWKG)
- Act on the promotion of renewable energy in the heat sector (EEWärmeG)
- Act on granting priority to renewable energy sources (EEG)
- Ordinance on general conditions for the supply of District Heating (AVBFernwärmeV)
- Energy saving ordinance (EnEV)

Provisions on data management

- Lack of provisions regarding data management for DHC infrastructures
- General Regulation regarding data management for electricity: The Digitising the energy transition-Act (Gesetz zur Digitalisierung der Energiewende) also from summer 2016 sets the start signal for smart grids, smart meter and smart home in Germany. Most important elements of the new act are the obligation for the smart meter rollout with a pre-defined pricing model according to consumption and regulation as regards data communication and security
- General data protection laws: Germany adapted the Federal Data Protection Act (“FDPA”)² to the provisions of the GDPR in June 2017 (the “new FDPA”). The adaptation of various sectoral and state laws, such as the German Social Code and the majority of State Data Protection Acts, is still pending.

² https://www.gesetze-im-internet.de/englisch_bdsch/

DH market structure

DHC is not a centralized regulated activity. Prices are subject to general competition law.

Infrastructures are mainly privately owned & operated, with a high involvement of local public communities.

Supporting mechanisms

The main driving forces behind the development of DHC and CHP are:

- The current legislative framework;
- Financial support for heat and cool storages (max. € 5M per project) and DHC networks (max. € 10M per project) in order to improve flexibility of CHP installations. Thereon, a majority of new grids constructed between 2009 and 2012 involved heat supply from bio energy and were partly funded;
- A Feed-in-Premium support scheme for electricity generation via CHP.

Challenges and barriers

The expansion of DH in Germany is facing several barriers:

- Competitive price: precondition for further development;
- Very price-sensitive and liberalised heat market;
- Decrease of the number of operating hours during which CHP plants (especially the ones based on natural gas) run profitably since it does not receive a feed-in tariff but a premium.

5.9 Hungary

DHC Targets

The 2030 National Energy Strategy issued in 2011 aims to increase the share of renewable energy and waste incineration in DH. According to the strategy the share of energy used from renewables for residential and institutional heating should increase from 12% to 32% by 2030 and that the use of renewable energy should double by 2030 within the same timeframe. This strategy also provides for the drawing up of an operation plan on the future of DH and cogeneration.

Practice

- 31% RES-DH share (2012)
- 20.8% RES-H&C generation (2016)

Legislative framework

- **2005 District Heating Law** (modified several times since then)
 - It specifies the legal relations DH supplier/consumer and heat producer/DH utility;
 - DH is a public service: DH utilities must be owned in majority by the municipalities (max. 49% of the shares can be privatised);
 - Regulation of DH prices from CHP plants.

DH market structure

Prices are regulated (from CHP) with a decreasing trend regarding their amount.

DH distribution networks are mostly owned by the public sector. In the majority of district heating companies, the local municipalities own at least 50% of the shares.

Supporting mechanisms

An Environment and Energy Efficiency Operative Programme (KEHOP) was put in place in 2007. Until 2014 it supported district heating energy modernization (in terms of energy efficiency). Since 2014 it provides financial support to DH converting to renewable sources.

Challenges and barriers

Hungarian DH expansion is facing some barriers:

- Since the feed-in tariffs for cogenerated electricity were stopped, CHP production for DH has decreased by 40% and some small units were shut down;
- Poor cross-financing and supporting system does not encourage DH to really compete with natural gas heating solutions;
- Poor profit leads to few modernisation and expansion plans for DH systems.

5.10 Italy

DHC Targets

National targets according to the National Energy Strategy 2030

- 30% RES-DH share by 2030;
- Heat pumps as the more efficient technology to reach thermal RES targets by 2030.

Practice

- 14% RES-DH share (2012);
- 18.9% RES-H&C generation (2016).

Legislative framework

There is no legislative framework for DH.

DH market structure

The heat prices are not regulated, define in the contract between the supplier and the user in compliance with competition law principles.

Support mechanisms

Nowadays, being connected to a biomass and/or geothermal DH network allow end-users to be granted with:

- a credit tax (in €/MWh);
- an ait to cover connection costs (in € /MW installed in substations).

Challenges and barriers

Because many Italians and environmental associations believe that DH is an efficient solution and requires high investments, preference has been given to individual heating installations.

5.11 Latvia

DHC Targets

Latvia, whose DH system covers 65-70% of the total energy demand, has set the following target: 40% of the energy consumption will have to be covered by renewable energy by 2020.

Practice

- 51.9% RES-H&C generation (2016)
- 30% RES-DH share (2012)

Legislative framework and support mechanisms

- **2009 Energy law**

DH Market structure

Prices are only regulated for heat producers with a great yearly capacity, but unregulated for small (scale production).

District heating systems mainly owned by local municipalities, in some cases by private owners.

Supporting mechanisms

There are overall guidelines for the development of the energy sector which covers the period from 2007 to 2016.

There is no central supporting mechanism for DHC.

Challenges and barriers

There are not enough investments to enhance energy efficiency of DH. Other barriers against the expansion of DH are:

- lack of financial support,
- high prices of DH,
- increasing debts from DH clients,
- inefficient CHP electricity support,
- high cost of CHP from biomass.

5.12 Lithuania

DHC Targets

A National Energy Independence Strategy was adopted in July 2012. The targets for the heating sector are the following:

- increase energy efficiency in heat production, distribution and consumption;
- shift from mainly gas-based production towards biomass;
- reduce heating consumption of households and public buildings (by 30-40%);
- ensure heat supply services at most affordable prices.

Nevertheless the expansion of the DH is not a priority of Lithuania. Furthermore the quantity of heat generated is expected to decrease up to 2020 as well as the consumption.

Legislative framework

- **2002 Energy Law** (regulation of the energy sector)
- **2003 Heat Law** (regulation of the state management of the heat sector) amended in 2009, 2011 and 2013
- **2011 Law on the renewable energy** which aims to ensure a well-balanced development of the use of renewable energy sources
- **2012 Law on Liquefied Natural Gas** which sets out the principles for installation, financing and operation of natural gas terminals and natural gas trade in Lithuania

Supporting mechanisms

- VAT is reduced from 21% to 9% for heat and hot water supplied to households by DH systems
- Establishment of local heat plans by municipalities with the aim of minimising costs whilst satisfying the consumer and protecting the environment. Specific targets can be set to develop district heating.

Challenges and barriers

Lithuania is facing many challenges and barriers in view of DH expansion:

- Inefficient licensed business activity
- Energy market regulation
- Lack of interest from certain municipalities

5.13 Poland

DHC Targets

The following targets are set for DH:

- Low-emissions and decarbonisation of sources producing DH with an emissions' reduction target of 90% by 2050;
- Heat produced from renewable energy sources to reach at least 50% in the balance of final gross energy by 2050;
- Heat produced, delivered and used efficiently i.e. achieving at least 20% of heat consumption reduction in 2020 and 30% by 2050.

Practice

- 10% RES-DH share (2012)
- 14,7% RES-H&C generation (2016)

Legislative framework

- **1997 Energy Law amended in 2014**
- **2014 Ordinance of the Minister of Transport, Construction and Maritime Economy** (technical conditions to be met by buildings and their location)
- **2016 Energy Efficiency Act**
- **2017 Ordinance of Minister of Energy on detailed rules of setting and calculating tariffs and financial settlements in heat supply**

DH market structure

Heat prices are set by the energy companies according to the rules determined in the Energy Law Act and the Ordinance of Minister of Energy on detailed rules of setting and calculating tariffs and financial settlements in heat supply. Tariffs are being sent to President of ERO for approval, mainly once a year.

2017 average heat prices (according to ERO data base) was ~€8.79/GJ (heat price from DH for end customers) and average distribution fee was ~€4.02/GJ.

The majority of the infrastructures are privately owned and operated.

Supporting mechanisms

- Support mechanisms for achieving investment projects and financial means (subsidies or loans from European and national funds);
- Implementation of a programme supporting the construction of energy-saving houses which aims at decreasing emissions by 50,000 tonnes of CO₂ annually in order to build about 16,000 high-standard energy-efficient houses and apartments.
- Energy Efficiency Law introduced White Certificate system to promote energy efficiency. The EE Law obliges energy suppliers to undertake energy efficiency action in three areas: increasing energy savings in the end-users, increase energy savings by devices used for their production needs, reducing the heat loss in transmission or distribution. Since the beginning of the system, 3, 3 Mtoe has been saved. The National Fund of Environment Protection and Water Resources Management (NFEP) provides financial support for undertaking pollutions reduction projects, including modernization of CH Plants. The loans cover up to 50% of total project costs.
- The Environment Protection Bank is partly owned by NFEP and provide financial support for environmental projects. Projects regard to DH sector, RES and energy efficiency can receive soft loans.

Challenges and barriers

- DH system faces with the following challenges and barriers:
- Mainly coal based DH systems,
- Ineffective existing DH systems,
- Ensuring competitive prices of DH compared with other fuel prices,
- Increase the amount of small DH systems.

5.14 Romania

DHC Targets

There are no set targets for DH.

Practice

- 12% RES-DH share (2012)
- 27% RES-H&C generation (2016)

Legislative framework and supporting mechanisms

Lack of regulatory framework in Romania regarding data management for DHC networks

- **Act No. 71/1 Law no.51/2006**, addressing public services of lighting, waste, heat and water
- **Government Decision 1215/2009** on the cogeneration support scheme
- **Law no.325/2006**, on the heating sector (regulation of activities and prices of DH operators)

- **Law no.123/2012** on electricity and gas, also addressing cogeneration
- **Law no.121/2014** on energy efficiency, transposing Directive 2012/27/EC. It promotes:
 - possibility to recover waste industrial heat,
 - massive use of renewable energy (biomass),
 - efficient production,
 - better air quality and safety in comparison with individual heating solutions.

DH market structure

The prices are local (per company) and calculated based on a methodology approved by the energy regulator. However, final prices as well as their updates are approved by local councils, which may ignore the decision of the regulatory authority.

The most common business model is a network municipality owned & operated.

Challenges and barriers

Due to institutional, legal, technical, administrative financial and social issues, DH supply sector is declining in Romania.

Main challenges include:

- Lack of efficient institutional and legislative framework;
- Lack of investment funds to modernise cogeneration installations and develop new projects;
- DHC pricing;
- Preventing disconnection from existing DH through higher quality of service

5.15 Slovakia

DHC Targets

There are no set DHC targets.

Since the beginning of the 1990s Slovakia was facing a growing issue concerning disconnection from DH systems and decreasing of heat consumption due to insulation and energy efficiency measures. Disconnections have slowed down thanks to the legislative framework currently in place (amendment of the Act on heat energy n°657/2004 in 2014). The law defines strict conditions for terminating consumption and practically prevents consumers from disconnecting from DHs using renewable energy sources. The legislation also addresses conditions for construction of new thermal facility systems.

This trend, followed also by public services, mainly schools and health services, is such that in 2030, it is expected that only 50% multi-apartment buildings will be connected compared to 75% in 2010.

Practice

- 15% RES-DH share (2012)
- 10% RES-H&C generation (2016)
- District cooling is not a widespread national concern (absent from energy policies)

Legislative framework

- **Decree of RONI No. 248/2016** , which sets price regulation for heat
- Act No. 250/2012 Coll. (pdf) on Regulation in Network industries
- Act No. 251/2012 Coll. (pdf) on energy
- **Act No. 276/2001**, Coll. of 14 June 2001 on the Regulation in Network Industries
- **Act No. 657/2004**, Coll. of 26 October 2004, on the Thermal Energy Sector
- **Act No. 656/2004** Coll. of 26 October 2004, on energy
- **Decree of RONI No. 222/2013**, Coll. 6/2008 of 11 July 2013, which sets price regulation for heat

- **Act No.476/2008** on the efficient use of energy
- **No. 309/2009**, Coll. of 19 June 2009, on the promotion of renewable energy Sources and high-efficiency Cogeneration
- **Act No. 321/2014**, on energy efficiency implementing directive 2012/27/EU

Supporting mechanisms

A revision of the Building Act from 1976 is currently envisaged. It should bring some improvements to the sector in order to slow down the decrease of DH in the country.

Legislative framework setting up conditions for building new thermal facilities protects in practice DHS from disconnections.

- Support for electricity from RES and high efficient cogeneration
 - Until 31/12/2018 by Feed in tariffs, support for 15 years;
 - From 1/1/2019 the support for new RES facilities will be subject to auctions. Exemption for existing CHP plants (reconstruction needed) and cogeneration units up to 1 MW: the support by means of FIT for 15 years.
- ESIF – Operational programme Quality of Environment (Ministry of Environment): investment subsidies for renovation of heat distribution system, for construction of plants using RES, for building and renovation of plants for high efficiency cogeneration (up to 20 MW).

Challenges and barriers

The main challenges for future development of DH systems will be to:

- Protection and modernisation of existing DH networks;
- Increasing the renewable energy sources share in the energy mix;
- Meeting parameters of “efficient DH” according to the definition in EED especially for small and medium DH systems that are currently mono heat producers;
- using bio-methane for electricity generation;
- Managing rising prices for CO₂ and natural gas and maintain heat from DH competitive;
- Manage the fuel transition from coal to natural gas;
- Provide a well-qualified workforce;
- Link small DH systems;
- Allow the use of cogeneration for existing DH plants and bio-methane for electricity generation.

5.16 Spain

DHC Targets

Data for 2016

- 1,219MW DHC installed capacity
- 74% RES-DH share
- 16.8% RES-H&C generation

DH market structure

The prices for District heating are not regulated by a national authority.

- Prices are not regulated, but usually based on a pass-through cost basis (supply and O&M costs).
- Lack of public information about DHC transfer prices.

The market structure regarding the business model: DH networks are mainly municipality or privately owned & operated.

- Most of the DHC installed capacity is developed under public-private partnerships
- According to ADHAC (Asociación de redes de calor y frío) the proportion of the installations are as follow
 - 47% Public
 - 48% Private
 - 5% mixed

DHC regulation on data management

There is a lack of specific regulation applicable for District Heating and Cooling.

Nevertheless, the electricity regulation requires for the DSOs to have an updated database of their supplying points. The royal decrees and royal decrees-law that cover this topic are the followings:

- Real Decreto 1435/2002, de 27 de diciembre, “por el que se regulan las condiciones básicas de los contratos de adquisición de energía y de acceso a las redes en baja tensión”³ includes on its article 7, the requirement for DSOs to have a data base with the information of all the supply points connected to their distribution networks and transport networks in their zones. This database should be continuously updated, and it has to include a minimum set of data. The related databases are called “Supply points information systems” (SIPS). The main data, included on the SIPS are the following: universal code of the supply points, distribution company, supply point location, starting date of the supply point, tariff, voltage, maximum power...
- Real Decreto 1074/2015, de 27 de noviembre, “por el que se modifican distintas disposiciones en el sector eléctrico”⁴ removes the possibility of the different retailers to access to the load curve data of the different supply points included on the SIPS, guaranteeing the consumers’ privacy. The Royal decree adds the current retailer name of the supply points as a new field of information to be included in databases.
- Real Decreto-ley 15/2018, de 5 de octubre, “de medidas urgentes para la transición energética y la protección de los consumidores”⁵ removes the possibility of the different retailers to access to the field mentioned in point 3: “current retailer”.

5.17 Sweden

DHC Targets

There are no set DHC targets. However the Swedish Energy Agency specifies in a report published in 2013 the potential for DHC expansion by 2020 and 2030:

- DH: 4 TWh by 2020 and 8 TWh by 2030;
- DC: an additional 1 TWh by 2020 and 2 TWh by 2030;
- 5 TWh by 2020.

Practice

- 54% RES-DH share (2012)
- 68.6% RES-H&C generation (2016)

³ <https://www.boe.es/buscar/pdf/2002/BOE-A-2002-25422-consolidado.pdf>

⁴ <https://www.boe.es/boe/dias/2015/12/04/pdfs/BOE-A-2015-13140.pdf>

⁵ <https://www.boe.es/buscar/pdf/2018/BOE-A-2018-13593-consolidado.pdf>

Legislative framework

- **2008 Swedish District Heating Law**

DH market structure

Heat prices are not regulated. The district heating prices vary between different locations because the district heating price is based on local conditions. Fuel prices are the factor that has the greatest impact on pricing.

The main model regarding ownership & operation of the infrastructure: moving from an historical municipal to a diversified ownership.

Supporting mechanisms

There are no supporting mechanism for DHC development.

Challenges and barriers

The main challenges and barriers are:

- Decline of the heat market due improved energy performance of buildings;
- Current low electricity prices;
- Current Swedish building codes which favour individual heating solutions;
- Reducing competition for DH on the heating market.

5.18 The Netherlands

DHC Targets

There are no set DHC targets.

Legislative framework

- **2003 Dutch Heat Act**
- **Building Regulations relevant for CHP/DHC:** it sets an “Energy Performance Standard” to be taken into account for new building. Buildings to be connected to DH are given a higher energy performance rating as an incentive.

Legislative framework and supporting mechanisms

- **Renewables subsidies scheme** to promote the development of DHC systems

5.19 United Kingdom

DHC Targets

DH is currently underdeveloped in United Kingdom. A national strategy foresees a possibility of connecting over 50% of buildings to heat networks by 2050 compared to 2% today.

Furthermore, the Scottish Government targets 40,000 homes connected to DH and 1.5 TWh of district heat delivered to industry, consumers and business by 2020, which represents a fivefold increase.

Practice

District heat networks currently supply around 10TWh of heat demand.

14 000 heat networks⁶ (around 12,000 are communal heat networks (serving only one building) and 2,000 are district heat networks (serving multiple buildings)).

Legislative framework and supporting mechanisms

There is no legislative framework for DH. However a seed-legislative framework is provided by the Heat Metering and Billing Regulations.

The UK government announced in December 2018 that it will put in place a regulatory framework for district heating networks to support market growth. The priorities are to encourage investment in DH, ensure consumer protection and support decarbonisation.

Supporting mechanisms

There are no central financial support to support the development of DH. There is however an Energy Company Obligation (ECO) under which electricity and gas suppliers have to give financial assistance to new DH or DH undergoing renovation to meet government regulations and increase energy efficiency in dwellings.

Challenges and barriers

The main challenge facing DH in the UK stems from the fact that fossil fuels are anchored on heat supply habits.

⁶https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/712370/Energy_Trends_article_on_heat_networks_revised.pdf

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