

Policy paper on infrastructure

**Making district heating happen:
pathways to financial sustainability**



European Bank
for Reconstruction and Development

Introductory notes

District heating (DH) is the most common form of heating for urban dwellings and businesses in many of the EBRD's countries of operations (CoOs), where heat generation and distribution infrastructure often dates from the era of central planning. There is a clear divide between DH networks in the eight countries of central Europe and the Baltic states (CEB) that acceded to the European Union in 2004 and the less advanced transition CoOs (including countries from the former Soviet Union and south-eastern Europe). Systems in the eight CEB countries are approaching western European standards of service, with upgraded heat generation and networks, demand-side energy efficiency measures, consumption-based billing and growing private-sector ownership and operation. The DH networks in less advanced early transition countries generally have urgent investment needs in order to maintain current levels of heat service to their consumers and avoid major breakdowns. Many networks operate with heavy financial losses and depend on subsidies from local or national governments in order to meet fuel payments and perform reactive maintenance.

This paper looks at the challenges faced by the sector in five participating CoOs: Bosnia and Herzegovina, Kazakhstan, Kyrgyz Republic, Moldova and Romania. It outlines policy options to address these challenges and makes recommendations within a policy roadmap. The views of key players in the DH sector from each participating country were incorporated through a series of seminars and targeted communication.

Key operational challenges identified included: insufficient and unpredictable revenues, high operating costs, accumulated bad debt, degraded assets and a lack of metering and control. Many of these can be addressed through the improvement of governance frameworks or creation of suitable ones where they do not exist. First, the most acute problems of the sector should be addressed, such as a lack of sufficient funding, service break-downs and decreasing customer base. Second, the market and regulatory framework itself can be designed and implemented based on best practice, considering country-specific circumstances. The third, long-term action is to implement a market-based approach within the sector, encouraging private sector participation and gradually opening the market to competition.

These are the main reasons that the EBRD, through its Infrastructure Project Preparation Facility (IPPF), has funded this policy paper with the active engagement of a number of EBRD countries of operations that are reforming their district heating sector. The EBRD's IPPF critical mission is to disseminate good practice and knowledge in addition to preparing projects for CoOs.

We would like to thank the active and engaged contributions from the countries of Bosnia and Herzegovina, Kazakhstan, Kyrgyz Republic, Moldova and Romania; from EBRD colleagues, as well as from Hylton Millar and Petra Szaloky of KPMG who acted as external consultants in the preparation of the paper. Their collective inputs and feedback during the seminars and the preparation of the policy paper itself have greatly improved the final product.

This paper is one of a series of IPPF-funded policy papers on the infrastructure sector prepared over the course of 2016 and 2017. The EBRD looks forward to further dialogue with its countries of operations in the district heating and cooling sectors on financial sustainability as well as on infrastructure investments to modernise and improve the efficiency of networks.

Matthew Jordan-Tank
(EBRD Head of Infrastructure Policy and IPPF)

Greg Gebrail
(EBRD Principal District Energy Specialist, IPPF)

Kjetil Tvedt
(EBRD Principal Economist, Economics, Policy and Governance)

Glossary

Abbreviation	Full Name
BiH	Bosnia and Herzegovina
BOO	Build-own-operate
BOOT	Build-own-operate-transfer
BOT	Build-operate-transfer
CHP	Combined heat and power
CoO	Country of operations
DH	District heating
EBRD, the Bank	European Bank for Reconstruction and Development
EU	European Union
€	Euro
km	Kilometre
n/a	Not applicable
PM10	Particulate matter of a diameter less than or equal to 10 micrometres
PM2.5	Particulate matter of a diameter less than or equal to 2.5 micrometres
PSC	Public service contract
UK	United Kingdom
US\$	United States dollar

Contents

1.	Executive summary	1
2.	Introduction	2
2.1	Structure	2
2.2	Conceptual framework	3
2.3	Typical institutional framework in EBRD countries of operations	4
2.4	Objectives and principles	5
3.	Challenges faced in the district heating sector	7
3.1	Symptoms and their link to policy objectives	7
3.1.1	Insufficient and unpredictable revenue	7
3.1.2	High operating costs	10
3.1.3	High commercial risk	10
3.1.4	Lack of access to capital or financing	11
3.1.5	Degraded assets	12
3.2	Underlying challenges	14
3.3	Summary	17
4.	Potential policy options	18
4.1	Comprehensive national strategy on energy and heat	18
4.2	Roles and responsibilities for national, local and regulatory bodies	19
4.3	Connection policies and long-term customer contracting	21
4.4	Clarity of DH company roles and responsibilities	22
4.5	Accountability of management	23
4.6	Supportive measures to address revenue collection and bad debt	24
4.7	Private sector participation	25
4.8	Summary	26
5.	Policy recommendations	27
5.1	Summary of lessons learned	27
5.2	Towards a policy roadmap	28
5.2.1	Sequencing of actions	28
5.2.2	Time horizon of the policy roadmap	34
5.3	Trade-offs between policy options	37
5.4	Regional differences and their impact on policy reform and its implementation	38

6.	Appendix - Case studies	40
6.1	Appendix 1: Vilnius, Lithuania	41
6.2	Appendix 2: Riga, Latvia	42
6.3	Appendix 3: Kiev, Ukraine	43
6.4	Appendix 4: Tallinn, Estonia	44
6.5	Appendix 5: Belarus	46
6.6	Appendix 6: Moldova	47
6.7	Appendix 7: Brasov, Romania	48
6.8	Appendix 8: Kosovo	49

1. Executive summary

This paper looks at ways to promote long-term operational and financial sustainability in the district heating (DH) sector. It pursues this by identifying challenges and possible solutions and reforms relevant to the EBRD's countries of operations (CoOs).

This paper was commissioned by the EBRD and has been prepared by KPMG in collaboration with them. The views presented in this paper reflect the views and observations on the challenges observed in the EBRD's CoOs as described by the participants of seminars held during the course of the assignment. The paper builds on the experiences of different stakeholders including DH company officials, regulators and policy-makers from Bosnia and Herzegovina (BiH), Kazakhstan, Kyrgyz Republic, Moldova and Romania.

Through the discussions with participants, augmented by desktop research, this paper identifies a number of shortcomings ('symptoms') of DH networks that hamper the sector in the CoOs in terms of financial and operational sustainability, quality of service, operational efficiency, affordability and environmental sustainability.

The problems observed can be grouped into five partly interlinked categories: insufficient and unpredictable revenues, high costs, high commercial risk, limited access to capital and degraded assets.

This paper also investigates the underlying challenges that may be driving the observed symptoms. It identifies eight underlying challenges that act as barriers to commercially viable models in the district heating sector in the EBRD CoOs.

A clear majority of these factors reflect the incompleteness or absence of governance frameworks for the DH sector in CoOs. This in turn suggests that there is significant scope for remedial policy action through the creation of a governance framework that is fit for purpose.

Therefore, this paper identifies a longlist of policy options and aggregates them into a coherent set of recommendations in the form of a policy 'roadmap'.

Based on historical experience, it is likely that it will fall to central government to act as the driving force behind these changes, although it will need to be mindful of ensuring that its influence does not prevent the objective, namely, independent administration of the sector.

This paper recommends the reorganisation of the DH market with regulatory oversight and gradual implementation of market reform in three main phases.

These would focus first on problems related to bad debt and priority investments.

It is recommended that the structural challenges of the sector are addressed in a second phase as part of a broader framework development, once emergency support has been provided to the sector.

A market-based approach and increasing private sector involvement is recommended to follow suit in the third phase.

The specific timeframe of the roadmap needs to be determined individually based on each country's circumstances and political processes.

The next step for parties that are interested in taking forward the recommendations of this paper is to conduct an assessment of current challenges and of how the suggested actions could be successfully applied in their particular jurisdiction. This will involve examining the trade-offs and choices that emerge within each phase of the roadmap, some of which are listed in this report to guide discussion.

2. Introduction

This paper was prepared in the context of the Infrastructure - Economics, Policy and Governance Policy Dialogue Plan (the Plan); a joint departmental approach developed by the EBRD to encourage dialogue with different stakeholders on pressing reform challenges in the infrastructure sector and to pave the way for further policy changes in the CoOs. District heating is among the key focus areas of the Plan and is addressed through the Financial Sustainability in the District Heating Sector – Infrastructure Policy Dialogue project ('the Project'), by focusing on the commercialisation of infrastructure services and achieving financial sustainability in the sector.

The Project aims to provide interested governments in the EBRD CoOs with information and guidance on the reforms required to introduce commercial operating models in the DH sector through structured discussions with key stakeholders in the DH market (regulators, policy-makers and operators).

This paper builds on the experiences and views expressed in the seminars in London, Bucharest and Almaty where discussions focused on the identification of key issues faced by the CoOs, and potential market and policy reforms to deliver long-term operational and financial sustainability in the DH sector. The scope of this paper is the district heating sector, but competing heating markets are also discussed where applicable.

2.1 Structure

This report is structured as follows:

- The remainder of this section sets out the conceptual framework used in this report to analyse DH markets, including the typical institutional framework in the CoOs and the objectives that policy options should aim to achieve.
- Section 3 discusses the problems that have been observed in DH markets within the CoOs under consideration. It then attempts to identify the underlying challenges that may be driving these problems.
- Section 4 identifies a longlist of policy options and examines particular case studies where such options have been deployed.
- Section 5 synthesises the key points from the previous sections and formulates policy recommendations in the form of a policy roadmap.
 - The Appendix provides further detail on the case studies that have been used as evidence of the challenges and policy options identified. It provides real-life examples of how these challenges and policies have played out in CoOs.

This structure is illustrated below.



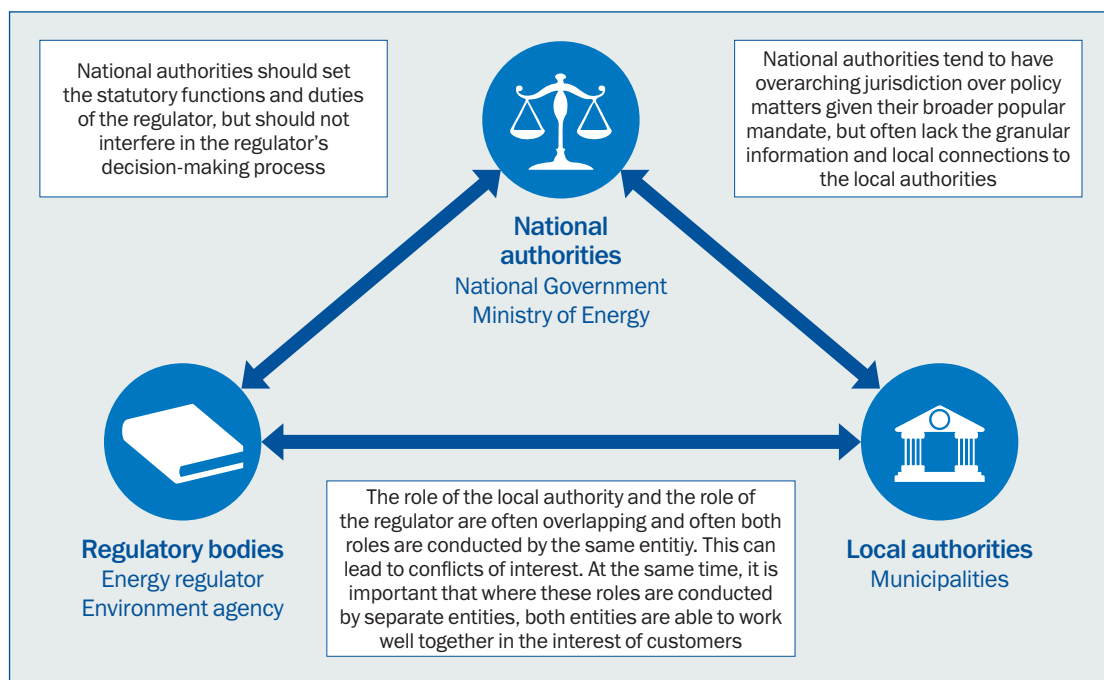
2.2 Conceptual framework

Before proceeding with a detailed discussion of each of the elements described above, it is useful to reflect on how these elements can be defined, and how they interrelate.

- **Objective:** An objective refers to an outcome that is seen by policy-makers as socially desirable for its own sake. An example of an objective could be affordability of DH tariffs.
- **Challenge:** A challenge is defined as an underlying structural obstacle that impedes financially sustainable operation of the DH sector. For an example of a challenge not directly under the control of DH companies, participants in the first seminar pointed to companies' lack of ability to enforce customer commitments (for example, in respect of disconnections and bad debts). A challenge will typically lead to adverse impacts on key objectives such as affordability and quality of service.

- **Manifestation:** A manifestation (of a challenge) represents how actors within the DH sector respond to the challenges they face. For example, a lack of regulatory certainty could cause companies to respond by deferring or reducing capital expenditure.
- **Policy option:** A policy option represents a change that policy-makers may be able to implement in order to mitigate or resolve a challenge faced by the industry.

As far as possible, this report identifies and discusses the interactions and causal links between the different elements of the conceptual framework.



2.3 Typical institutional framework in EBRD countries of operations

It is also useful to reflect on the types of stakeholders that comprise the typical institutional framework in CoOs. The incentives faced by these entities and their response to these incentives will play an important role in determining outcomes in the DH sector. They will also determine how effective policy options are likely to be in addressing the underlying challenges

facing DH networks and hence to improving outcomes. The figure on page 3 illustrates the interrelationships between three key stakeholders: national authorities, local authorities and regulatory bodies. The table that follows sets out the principal characteristics of these stakeholders.

	Regulator	National authorities	Local authorities
Role	<ul style="list-style-type: none"> • efficient and proportionate regulation • licensing • market monitoring and regulatory oversight • tariff-setting (optional) • establishment of framework agreements • determination of quality, technical and environmental standards • facilitating competition 	<ul style="list-style-type: none"> • implementation of a legislative framework that ensures accountability, predictability, transparency and coherence in the market • setting long-term strategy for the sector • creation of a regulatory body • determination of roles and responsibilities between institutional actors • provision of grants and subsidies 	<ul style="list-style-type: none"> • responsible for local services such as rubbish collection, district heating, transport, housing, policing, social services and so on • promotion of infrastructure development • financing and funding of investments • tariff-setting of DH (optional) • determination of planning and consent policy • establishment of fuel mix for heat • provision of subsidies to companies and customers • ownership of DH companies
Focus	<ul style="list-style-type: none"> • long term • energy sector of DH 	<ul style="list-style-type: none"> • long term • economy-wide 	<ul style="list-style-type: none"> • short term • DH and other municipal services
Objectives	<ul style="list-style-type: none"> • safe and efficient operation of the DH supply • best value for money in the long term by taking into account the investment needs of the sector • environmental sustainability 	<ul style="list-style-type: none"> • security of supply • investment in the economy • economic growth • environmental sustainability 	<ul style="list-style-type: none"> • affordability and ensuring that no customer group is excluded from the service • continuity of supply • adequate service quality • required capacity is in place
Constraints	<ul style="list-style-type: none"> • in the absence of effective independence the regulator can experience pressure from national authorities 	<ul style="list-style-type: none"> • national elections represent a natural constraint on the government 	<ul style="list-style-type: none"> • local elections represent a natural constraint on local authorities if they are elected by their respective communities • if the mayor is nominated by the central government, local authorities can encounter pressure from national authorities

The objectives of the actors are driven by the constraints and pressure they face and these differ from actor to actor. National authorities tend to have a long-term focus and consider options from an economy-wide perspective. Local authorities are closer to their communities, are involved in the daily delivery of services and thus have a more direct contact with customers. Given the different perspectives of national and local authorities it is essential that there is a balance between central and local regulation and that roles and responsibilities are set out clearly between the actors. If national and local authorities are elected by the nation or by their respective communities, their agenda is likely to be driven by political considerations, especially close to election dates. Objectivity, predictability and an approach free of political short-term objectives is reinforced by the existence of an independent regulator.

2.4 Objectives and principles

This section sets out the objectives that DH policy should ultimately aim to achieve. For the purpose of this paper, the overall objective for the DH sector is defined as providing financially sustainable, high-quality services and operational efficiency. Policy may also need to take into account social considerations, such as affordability of tariffs for vulnerable customers and environmental sustainability.

These objectives are:

- **High quality of service:** High quality of service means that DH companies meet customer needs by providing highly reliable heat supply and ensuring continuity and availability of the service under changing external conditions as well. Moreover, DH companies satisfy customer expectations by proactively listening and responding to their needs.
- **Financial and operational sustainability:** Policy should be targeted at ensuring that an efficiently run DH company covers its operating costs while maintaining confidence that it will be able to recover its historical capital expenditure (providing that this has been efficiently incurred). In addition, the company should be able to earn a sufficient rate of return to facilitate access to debt and equity capital.
- **Operational efficiency:** Operational efficiency stands for an optimal mix of resources which leads to an efficient operation. In order to achieve operational efficiency companies are incentivised to allocate resources effectively, to become more efficient and productive and to seek ways to reduce their DH supply costs.

In addition to the above outcomes, policy may need to take into account social considerations. Two such considerations are: the affordability of tariffs from the perspective of vulnerable customers; and environmental considerations. While these objectives will not result in benefits for DH companies or non-vulnerable customers per se, they may be important from the perspective of ensuring that DH policy is politically – as well as economically – sustainable.

- **Affordability:** Affordability relates to the customers' ability to pay for the service and is often expressed as the percentage customers are required to spend from their monthly income on the service. Affordability for the average household is linked to willingness to pay and value for money. A key aspect of affordability is the risk related to the exclusion of certain customer groups from the supply, in other words, when certain customer groups are not receiving service due to high costs or low incomes.
- **Environmental sustainability:** In the case of DH, environmental considerations mainly refer to its impact on carbon dioxide (CO₂) emissions, levels of pollutants produced (including nitrogen oxides (NOx) and particulates (PM10 and PM2.5)). Also, potential environmental benefits of the DH include the use of heat that would have been lost or wasted otherwise and supporting the change to renewable fuels. Moreover, reduced water consumption from repaired networks and greater consumer control also contribute to greater environmental sustainability.

These considerations are consistent with the objectives that have been set by policy-makers in EU countries. For example, the UK Department for Business, Energy and Industrial Strategy refers to the 'trilemma' of balancing affordability, security of supply and climate change when implementing energy policy.

Participants referred extensively to financial viability and sustainability as key objectives with respect to policy-making in DH markets. For example, there were numerous references to the precarious financial position of DH companies and the implied threat to continuity of service (at current prices, at any rate). Other objectives were mentioned also, although given lesser prominence. For example, participants stressed that when addressing disconnections, affordability and social concerns also need to be considered. Broadly speaking, the views of participants with respect to overarching objectives appear to be consistent with those discussed above. In particular, the emphasis on financial sustainability is noted and will be given due consideration when examining policy options.

3. Challenges faced in the district heating sector

Over the course of the dialogue with participants, a number of shortcomings ('symptoms') of DH networks in the CoOs have been identified. This section of the paper first sets out and describes the symptoms observed in the CoOs and discusses how these affect outcomes against the objectives a DH policy should ultimately aim to achieve. Through the discussions with participants, and desktop research, five main groups of symptoms have been identified: insufficient and unpredictable revenue, high costs, high commercial risk, limited access to capital, and degraded assets.

The section then explores the underlying challenges that may be causing the observed shortcomings and which would need to be addressed by policy reforms. A total of eight underlying challenges are identified and described.

3.1 Symptoms and their link to policy objectives

3.1.1 Insufficient and unpredictable revenue

Participants stressed that DH companies in the CoOs often face insufficient and unpredictable revenue streams. This can be driven by a number of factors, including inappropriate restrictions on tariff-setting, non-payment or late payment of customers, unpredictable or insufficient subsidies or grants from local or central government and decreasing customer base, in other words, disconnections from the heat network. These are discussed in more detail below.

Inappropriate restrictions on tariff-setting

Tariffs are often set by regulators or local/national authorities at a level that does not enable DH companies to recover their costs. In some cases, compensation for this under-recovery is provided via subsidies. However, these subsidies are not always predictable or sufficient to cover losses.

Even where tariffs and subsidies are sufficient to cover current operational costs, they can be insufficient to cover the return on and return of capital expenditure both past and present. This can limit the ability to access the debt and equity required to improve the operational performance of the assets.

The lack of forward-looking visibility over tariff-setting policy compounds this problem. For example, the temporary suspension of increases in tariffs for thermal energy until 2017 in the Kyrgyz Republic deprived companies of a sufficient level of revenues and created uncertainties around future revenue streams.

Low levels of bill collection

Non-payment or late payment of bills are common issues in the CoOs and an important driver of insufficient revenues in the DH sector, especially in Bosnia and Herzegovina (BiH). Non-payment and late payment are often driven by customer groups whose incomes are insufficient to cover even basic living expenses. Non-payment and late payment also occur in situations where the property owner lives abroad and leaves the property vacant.

Insufficient subsidies

As collected revenues do not cover the operational and investment costs of most DH companies in the CoOs, they are highly reliant on subsidies, grants or budgetary transfers from the government or local municipality to fill the gap between amounts received and owned.

The DH markets in the CoOs often lack predictable and stable access to subsidies and grants, leading to uncertain revenue streams for DH companies. In addition to the challenges arising from insufficient and unpredictable revenues, DH companies in the CoOs also experience adverse impact on their cash-flow position when the subsidies granted are paid out with significant delays, causing DH companies to fall into arrears to suppliers, such as gas companies.

In some cases, DH companies facing short-term cash-flow difficulties due to lack of funding decide to delay or cancel payments to suppliers in order to keep the business operational. This behaviour has three consequences. First, it leads to a build-up of debt and payables. Second, it reduces the willingness of suppliers (including both heat suppliers and general suppliers) to extend trade credit to the DH company in the longer term; and third, it could lead to suppliers facing financial difficulties, which could jeopardise the supply chain on which the DH company depends.

Case study: Kiev district heating network

The Kiev DH network was facing insufficient revenues due to tariffs set below cost-recovery level by local governments (household tariffs covered only 50-80 per cent of costs in Kiev), accumulating bad debt arising from notorious late and non-payments by customers and unpredictable and insufficient levels of subsidies resulting from the lack of clearly stated government intentions regarding the availability of subsidies.

In the framework of a loan agreement with the World Bank and ongoing EBRD-led policy dialogue, a tariff reform has been introduced aiming to promote cost-recovery policies and practices. The local authority was required to set tariffs at cost-recovery level of the DH company or finance any gaps between revenues and costs resulting from tariffs below cost-recovery level with annual funds.



As a result, average tariffs almost doubled. However, driven by political sensitivity, a year later the local authority decided to stop adjusting tariffs to cost-recovery levels and decreased tariffs by 30 per cent retrospectively. Although the local authority fulfilled its obligation to cover the emerging revenue gap of the DH company with annual funds, these funds were not provided in a timely manner. The Kiev case study highlights that it is not conducive to financial sustainability if the profitability of the DH company depends on discretionary government policy. Moreover, it shows how important it is to carefully consider the impact of price increases on vulnerable customers, given the political sensitivity surrounding affordability for certain user groups.

Disconnections

Like all commercial enterprises DH companies rely on an adequate customer base. In many CoOs, DH companies face increasing challenges from customers disconnecting from the network, resulting in lower revenues for these firms. In addition, high rates of disconnection have been recorded in a number of Romanian cities where consumers in apartment buildings have resorted to individual heating systems. In BiH, the total number of residential DH users has been decreasing continuously in recent years, by approximately 3.4 per cent per year.

In some cases, such as in BiH, disconnections are requested by property owners with regard to vacant flats in order to stop paying for a service that they are not actually using.

More often, however, disconnections are driven by customers deciding to opt out of the DH network for an alternative heat solution such as individual gas boilers, stoves or electric heating. The main competitive advantages of alternative heating solutions include quality of service, price and control over individual consumption. With regard to service quality, the DH system's inability to provide heat in late spring and early autumn, and the amount of time customers have to wait for their domestic hot water to become warm (instances of up to 10-15 minutes have been observed in Romania), play a key role in customers' experience, satisfaction and loyalty and thus the likelihood of their switching to alternative heat solutions.

Link to policy objectives

It was generally emphasised by all stakeholders that sufficient and predictable revenue streams are fundamentally important for the financial soundness and sustainability of DH companies to fund operations, maintenance and investment both in the short and long-term.

Delays in maintenance and investment due to insufficient revenue lead to the deterioration of assets. This endangers the policy objectives of security of supply and quality of service.

In addition, insufficient revenues risk disproportionate tariff increases in the future, which may negatively impact the affordability of the DH service for certain customers and further increase the risk of non-payment and late payment by customers.

General under-pricing of DH services may also lead to inefficient use of heat and come into conflict with policy objectives related to energy efficiency and environmental sustainability.

3.1.2 High operating costs

DH companies in the CoOs are generally characterised by high costs of operation, typically driven by inadequate underlying levels of capital investment, leading to outdated assets in poor condition and inefficient operating processes.

In both BiH and Kazakhstan, for example, the deterioration of heating systems has led to widespread over-expenditure on material resources and higher-than-necessary energy losses for DH companies.

High costs can also be attributed to a lack of focus by management on profitability in favour of other objectives. For example, some DH companies are pressured into retaining larger workforces than they need to facilitate operations. In Romania, DH companies have been known to operate with almost twice as many employees as required for efficient operations, on account of the unwillingness of local municipalities to accept redundancies.

Lack of metering and control

Lack of metering is a legacy of the collective spirit of centrally planned economies. Apartments in the CoOs are generally not equipped with individual metering devices. In BiH, although customers would like to have individual metering that allows for consumption-based billing, they cannot afford it due to high installation costs.

Furthermore, the lack of horizontal piping arrangements within multi-apartment buildings prevents DH companies from metering consumption in individual apartments. Arrangements are needed which require new buildings to be equipped with both individual and building-level metering.

The absence of metering devices makes it more difficult for DH companies to reduce heat losses and leakage and to optimise the use and deployment of demand-side solutions in response. Moreover, it prevents them from addressing unauthorised use of heat supply by customers and physical theft of network water, which is a common phenomenon in the CoOs under consideration in this paper.

Link to policy objectives

All participants agreed that cost control plays a key role in reaching sustainable operation for DH companies.

On the one hand, if high costs of operation are reflected in tariff increases and passed on directly to customers this has implications for affordability and creates a disincentive to improve operational efficiency.

On the other hand, however, if tariffs are not fully cost-reflective, either through customer-tariff increases or additional subsidies or grants, this undermines the financial sustainability of DH companies. In addition, the funding gap is likely to exacerbate the issue of asset condition with further consequences for operational performance and service quality.

Lastly, high operating costs of DH companies impact their competitiveness relative to alternative heat sources. This increases the risk of disconnections and exacerbates inadequate revenue streams, further undermining financial sustainability.

3.1.3 High commercial risk

A sector which is hampered by low revenues and high costs is generally unattractive from a commercial perspective. Unpredictable regulation and operational frameworks will further increase the commercial risk in the sector.

High commercial risk in the DH sector manifests itself in the reluctance of market players to make long-term commitments to the sector. The drivers of high commercial risk are primarily related to the governance framework in place for the sector and represent uncertainties and ambiguities faced by market players.

Some of these drivers are related to the institutional framework with regard to the triangle of regulatory/national authorities, local authorities and DH companies. The absence of clearly defined roles and responsibilities for each of these entities is a significant driver of commercial risk, insofar as it can lead to moral hazard and opaque regulatory decision-making.

3.1.4 Lack of access to capital or financing

The primary impact of high commercial risk is that it limits DH companies' access to capital, through a number of mechanisms:

- First, high commercial risk limits the creditworthiness of DH networks and limits their access to much-needed debt financing for future investments.
- Second, to the extent that high commercial risk entails an increase in systematic risk, this will translate into a higher cost of equity, which limits the quantity of new equity that the company will be able to access.
- Lastly, the existence of moral hazard (in other words, the ability of government and regulators to renege on agreements with DH companies after the fact) can dissuade investors from committing capital to the business altogether.

Lack of access to capital often forces DH companies in CoOs to delay or cancel investments or maintenance.

Underinvestment is one of the most striking symptoms in CoOs. For example, in BiH capital expenditure is very much limited to intervention maintenance and longer-term asset management is largely lacking. The situation is similar in the Kyrgyz Republic, where a lack of funding forces companies to avoid new investments, curtail asset upgrades and focus solely on emergency maintenance work. This results in a situation where the equipment and heat network are ageing at a faster rate than reconstruction and repair take place.

In addition to delaying or avoiding enhancements to the network, delaying maintenance is also a common occurrence, and is particularly detrimental to financial sustainability. In Bishkek, for example, as delaying investment is not sufficient to close the gap between revenues and costs, DH companies are forced to limit the scope of annual repair and maintenance work to heat network pipelines with a length of 6-7 km, with the norm in a network of such a size being 20 km.

Case study: Moldova district heating network

This case study illustrates the importance of access to capital in the context of a DH network in need of significant restructuring.

The district heating company in Chisinau, Moldova, was transferred from national to municipal ownership in 2000. The municipality enforced below-cost tariffs on the company in order to provide cheap heating for its residents. As a result, the company went bankrupt in 2001, and was financing its operations by not paying its heat suppliers. The lack of capital crippled the company's ability to carry out adequate maintenance on its assets, which subsequently led to the deterioration of assets, and to customer disconnections.

Underinvestment and delays in maintenance result in deterioration of the physical condition of DH assets, which in turn leads to reduced reliability and poorer quality of service.

Link to policy objectives

Lack of access to capital jeopardises the commercial and financial sustainability of DH companies.

It can also jeopardise the reliability, safety and quality of the network, to the extent that these objectives rely on the physical condition of the assets.

Moreover, non-payment of trade payables by DH companies can potentially result in spill-over effects on the broader economy to the extent that this behaviour results in suppliers to DH companies experiencing financial distress. Together with the deteriorating physical condition of DH networks, this can have negative implications for security of supply.

3.1.5 Degraded assets

Poor asset conditions

Inadequate funding and lack of access to capital has led to degraded infrastructure. DH networks in CoOs are characterised in general by poor asset conditions, mainly driven by the age of the assets and insufficient maintenance of the infrastructure. In the Kyrgyz Republic more than 75 per cent of heat networks have surpassed their normative life and require urgent replacement. For example, 75 per cent of the OAO 'Bishkekteploset' heat network (328 km out of a total 436 km) has surpassed its standard asset life of 25 years and requires replacement. Furthermore, 19 pumping stations operate with outdated pumping units and 12 central heating stations have been in use for over 30 years. In Kazakhstan, the technical condition of the heat network has been deteriorating for years. About 70 per cent of Kazakh heat networks are more than 20-30 years old.

A further aspect and implication of poor asset condition is the increasing failure rate in the DH networks. For example, the Kazakh DH system is experiencing an increased number of incidents that are particularly critical during the heating season, when large-scale failures compromise the operation of the DH network, leading to inconvenience for customers and large material losses for DH companies. The situation is similar in the Kyrgyz Republic, where system failures increased by 12 per cent between 2014 and 2015 due to the deterioration of pipes.

Case study: Kiev district heating network

In 1998 the Kiev DH system had been subject to several years during which there was limited or no maintenance or replacement of assets, leading to corroded pipework and infrastructure, especially due to the deteriorating and ineffective pipeline waterproofing.

The principal reason why the assets were permitted to degrade was the absence of funding from tariffs and subsidies (with household tariffs covering only 50-80 per cent of costs in Kiev), and hence the limitation of available resources with which to conduct such activities.

This degradation of the assets resulted in an increase in heat network losses – at peak, of about 20 per cent of output – and inefficiencies in operation. Old and unreliable valves, and other equipment, and the lack of substation control systems simultaneously reduced the reliability of the heat network for customers. Inefficient fuel use resulted in high environmental emissions, while the ineffective water treatment system and high water losses also contributed to high environmental pollution.

The absence of funding referred to above also prevented the rollout of individual heat meters. This meant that it was not possible for customers to be billed based on actual heat used, which both reduced the quality of service (since the basis of customer billing would not have been transparent) and resulted in over-consumption of heat (of approximately 10-15 per cent).

To overcome the challenges driven by the poor technical condition of the assets, in the framework of a loan agreement with the EBRD, significant investments were made in capacity improvements and rehabilitation of the DH network, together with the implementation of important policy actions promoting cost-recovery in the sector.

Another symptom of degraded assets in CoOs is the lack of reliable data on asset condition. In Kazakhstan, for example, no reliable data is available on the technical condition of boilers.

Heat losses

Heat losses are often the result of ageing infrastructure. Low levels of investment in asset maintenance, and thus outdated and deteriorated network systems, and the lack of pre-insulated pipes, lead to significant losses in distribution networks. These are often between 15 per cent and 30 per cent in some CoOs with an average heat loss of approximately 22 per cent.

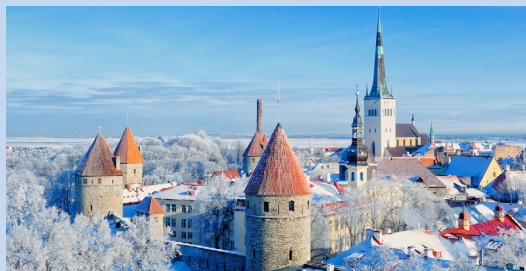
In the Ukrainian DH sector, for example, there is clear evidence that insufficient investment in asset maintenance has resulted in frequent breakdowns in the heating network.

When assessing heat losses one should differentiate between open versus closed networks, and summer and winter heat losses. Heat losses in the summer are generally significantly higher. Furthermore, heat losses should be distinguished from under-billing of customers or from leakage.

Also, the lack of metering devices at generation plants, intermediary points, at building level and at consumption points makes it difficult to detect heat losses and to pinpoint defective infrastructure or abnormally high consumption.

Case study: Tallinn district heating network

In 1992, the DH system in Tallinn was in serious need of financial support to overcome the numerous challenges resulting from the poor technical condition of its assets. The technologies in use were outdated and the whole DH system was characterised by low technical standards and low operational efficiency, including heat production. Pipes were poorly insulated and heat losses in the system were high, ranging around 25 per cent as compared with about 8-12 per cent in Western systems. Due to the lack of metering devices, production and consumption of heat were generally not metered. Boiler designs were of an outdated technology and of low efficiency, typically around 60-65 per cent. Maintenance in all parts of the DH system was either deferred or was poorly conducted for several years. Due to the poor technical condition of assets, the DH network was characterised by inadequate environmental conditions (five to ten times higher water losses than in Western systems and high air pollution during the winter heating season due to coal- and oil-burning low-efficiency boilers) and with high operational costs.



The main driver behind the deterioration of assets was the company's lack of funding. Due to high operational inefficiencies, cost-reflective tariffs would have resulted in unaffordably high tariffs for customers. For this reason affordability concerns called for government subsidies.

This case study illustrates the importance of access to capital in the context of a DH network in need of significant restructuring. With the aim of overcoming the challenges in the sector a World Bank project was initiated, focusing on rehabilitation and efficiency improvements in the DH system.

Link to policy objectives

A lack of adequate funding and access to capital lead to deteriorating infrastructure. Ageing and degraded assets further threaten the reliability and safety of the DH network and thus reduce the quality of service and the operational efficiency of the operators. Moreover, from a customer perspective, poor service quality can reduce the appeal of DH over alternative heat sources, which can increase the rate of disconnections. This in turn can jeopardise the financial sustainability of the network.

Poor asset conditions and high losses increase the operating and maintenance costs of DH companies. The increased need for funding results in greater financial pressure on DH companies, putting the policy objective of financial sustainability further at risk.

3.2 Underlying challenges

The symptoms described previously all form part of a chain of causal linkages between underlying challenges and their ultimate impact on desired objectives. The interrelations between policy objectives, symptoms and their underlying challenges are summarised in the diagram below. The five key symptoms identified in the CoOs are driven by eight underlying challenges.



National and local policy framework

DH companies often face uncertainty about which authority has jurisdiction over a particular aspect of their operations. The absence of a clear governance framework can lead to overlapping areas of jurisdiction, which can mean that a determination by one authority can be overridden by another, with deleterious consequences for investment and consistent business planning. At the same time, there may be gaps in the governance framework where no authority claims responsibility for decision-making. For example, where a DH company needs to discuss a requirement for additional funding, it may find the request being constantly referred elsewhere.

Governance framework for the duties and objectives of the regulator

Even where a single separate regulatory body exists (which is not always the case, for example in Romania), its duties and objectives are not necessarily set out explicitly, nor its progress monitored against these objectives. This can lead to conflicts of interest, particularly where the regulatory body forms part of a broader national or local authority. For example, where the regulator and local authority are a single entity, its priorities are likely to coincide with its political objectives, which in turn are likely to align with the electoral cycle rather than the longer-term functioning of the DH market. This can lead to decisions that benefit customers in the short term (such as lower tariffs), but act against the customer interest in the long-term (for example, in financial sustainability).

For similar reasons, where a regulator's duties and objectives are explicitly set out, it can also be the case that the regulator can be pressured by national and local authorities to act against these duties and objectives.

Case study: District heating tariffs in Belarus

The district heating sector in Belarus provides a good example of how lack of clarity around institutional structures can result in severe misalignment of tariffs, both within the DH sector (for instance, between different customer groups) and between DH and other related sectors (such as between DH and electricity generation).

In this case study, neither the residential nor the non-residential or electricity tariffs were set by independent bodies, leading to tariffs that bore little resemblance to cost in any of these sectors. In Belarus, tariff-setting is split between the regulator at the national level, who sets tariffs for non-residential consumers, oblasts at the regional level that set the tariff for residential consumers, and the national-level energy efficiency department that indirectly participates by approving norms for heat loss, a factor influencing both tariffs.

The result of this complex and opaque system is to drive down tariffs for DH network operators to 14.5-21.4 per cent of total costs, and inefficient cross-subsidisation between residential and non-residential customers, further complicating tariff-setting.



Consistent planning policy

The business model of DH networks entails frequent and significant interfaces with public planning. Networks often require and possess significant landholdings, and construction of new plant typically requires consent from local authorities. More generally, the growth of DH network businesses relies on being involved with urban development planning. For instance, where a new property development is being considered, DH companies need to be involved in the initial design work in order for an extension to the new development to be viable. Where DH companies are remote from local planning, or where local authorities face incentives to obstruct DH companies through the planning process, this can have significant negative implications for both their cost and revenues.

Accountability of management and stakeholders

The key underlying challenge behind high operating costs lies in the lack of alignment of management reward with desired objectives. Lack of alignment often occurs if there is a lack of clearly defined and communicated roles and responsibilities within the company and if goals are not supported by incentives. Where the management is not scrutinised over the efficiency of their spending they are less likely to drive the DH company towards more efficient operation. In the absence of financial rewards or penalties for cost savings or overruns management has no incentive to implement measures to save costs. A similar incentive mechanism applies with regard to other desirable objectives, such as high quality of service, environmental sustainability, revenue maximisation, and so on.

Also, the activities that a DH company is expected to undertake (and for which it is compensated through tariffs and/or subsidies) is not always clearly set out in CoOs. A DH company's activities may be defined in one way when determining performance or objectives, but defined in another when setting tariffs, leading to a shortfall in cost recovery. Alternatively, a DH company's designated activities may be amended after the fact or on a retrospective basis, which can have deleterious consequences for financial sustainability if the amendment reduces revenue or increases costs. There may also be components of the supply chain for which no entity assumes responsibility for delivery and/or for which no revenue is made available.

Cost-reflective tariffs

The tariff-setting mechanism is an important determinant of behaviour for both the DH company and its customers. Unless tariffs are set in a manner that permits the DH company to retain at least some of any cost savings achieved (and equally, exposes the company to at least some of any cost overruns incurred), there will be little incentive for the firm to control its costs. On a related note, unless tariffs are at least partly cost-reflective, customers' consumption choices will be inefficient. Specifically, in the context of DH networks, tariffs are often set below cost, which encourages excessive consumption and leads to higher costs.

Revenue collection and sustainable level of bad debt

Non-payment or continued delays in payment by customers are one manifestation of demand risk for DH networks. Many businesses face risk in respect of bad debt, and it is generally accepted as a cost of doing business. However, where the level of bad debt is particularly high and/or particularly volatile, this can have a material impact on the risk profile of the company, and hence its ability to access capital.

Perhaps more significantly, in the case of DH networks it is often the case that no robust mechanism exists with which the company can manage and enforce payment of bad debt. For example, DH companies cannot typically disconnect a customer from their heat supply even where the customer is in default. This creates a significant moral hazard problem, as the DH company will have limited means of mitigating or managing their bad debt risk.

Government intentions regarding availability of subsidies

Related to the above, DH companies that depend on subsidy for their financial sustainability often have little or no assurances with respect to the longevity of these subsidies, and hence whether they will need to restructure their businesses in the future.

Government intentions regarding fuel and heat sources, and competing markets

DH companies in CoOs are often not privy to the intentions of national and local governments with respect to the DH sector. This can undermine DH companies' ability to plan for the future, and can mean that local DH companies are unable to act on information about nationwide trends in DH.

Subsidising of alternative heat sources, such as individual gas boilers, is relatively common in CoOs which can be problematic where they distort customer choices and incentives. A subsidy regime that does not clearly consider both the purpose and the impact of the subsidy can lead to such distortions, and may undermine the viability of a DH network even where its existence is in customers' best interests.

3.3 Summary

This section has identified some of the key underlying challenges driving the problems observed in DH markets and how they affect outcomes of interest to policy-makers. Many of these relate to governance of the sector, which suggests that policy action could be usefully targeted at addressing these challenges. Having identified the underlying challenges, it should now be possible to identify corresponding policy actions that could be targeted at addressing them and not simply their observable symptoms.

4. Potential policy options

The objective of this section is twofold. First, it aims to create a longlist of policy options that could conceivably be deployed in the context of DH markets, drawn from various sources. Second, it examines case studies where such options have been deployed in practice.

Some policy options seem appropriate in principle but limited evidence can be found in respect of their effectiveness in practice. In such cases, the policy is included in the overall recommendations in section 4. However, further analysis and consideration could be warranted regarding how these policies might impact outcomes in specific CoOs.

The policy options considered need to be relevant to the set of challenges that DH companies face, as set out in the previous section. By ascertaining which challenges the policy option can help to remedy, it is possible to understand how the policy in question can be evaluated with respect to the objectives.

The discussion of each policy option also includes: which stakeholder(s) would be required to take action; an outline of the nature of the action the stakeholder would be required to take; an outline of the mechanism by which the policy option in question could address the challenge; and some idea of the timeframe within which the policy would take effect. It also highlights potential drawbacks or unintended consequences of which policy-makers should be aware.

The longlist of options has been developed based on a first-principles consideration of how each of the challenges could be addressed, and cross-checked against options encountered in practice (either by participants or through our own experiences).

4.1 Comprehensive national strategy on energy and heat

A clear and transparent strategy on energy and heat enables DH companies to make long-term investment decisions without the uncertainty associated with changing government interventions in the DH sector and in related sectors. Long-term clarity and predictability provided by the national strategy is key to reducing risk and protecting investments in the sector.

Central government should ideally set out a comprehensive national strategy for energy. The strategy should provide the strategic objectives and direction for the market which include the following elements:

- a clear government policy in respect of the subsidies that will be available to DH companies. This will facilitate more robust projections in terms of revenue that must be recovered from tariffs, and hence reduced commercial risk.
- a clear government policy in respect of interventions (including subsidies) that will be available to competing heat sources. This will reduce commercial risk by providing more certainty over the competitiveness of DH compared with other heating sources.
- government expectations regarding the fuel mix that will prevail in future periods (possibly based on data aggregated from individual market participants). Central government has the means to aggregate national-level statistics that are unlikely to be available to individual participants. Providing these statistics will support business planning and reduce commercial risk.
- government priorities and expectations with respect to different customer groups (for example, whether DH companies should expect to fund tariff concessions for vulnerable customers from subsidy or from undiscounted tariffs). This will support cost recovery, while ensuring that key customer groups are protected.

Although strategy-setting needs to stay with central government, it is important that it takes the form of a dialogue where market players have the possibility to express their views, actively participate in the process and shape the outcome.

The strategy is to be implemented by the local authorities, regulatory bodies and DH companies. The implementation should take the form of a coordinated activity within the framework established by the national strategy where there is interaction between the different stakeholders throughout the process.

The national strategy on energy and heat needs to be translated into binding legislation for market players. The legislative framework is to be based on the primacy of national legislation which is to be translated into local laws, regulation, codes of conduct and guidelines governing most aspects of the daily operation of the DH market. It is essential that the legal rules form a coherent framework without any internal contradictions.

With regard to the implementation of the national strategy on energy and heat, it can follow a multi-step approach and span a longer period of time.

4.2 Roles and responsibilities for national, local and regulatory bodies

Interrelationships between the three key stakeholders, in other words, the national, local and regulatory bodies, need to be governed in a way that enables stability and a clear understanding of the roles and responsibilities of each stakeholder. Apart from the principle of clarity, roles and responsibilities should be set out in a coherent way by ensuring that different stakeholders do not have conflicting duties or incentives and that there is no room for political interference.

The typical geographical scope of DH companies' activities means that local authorities necessarily play a key role in administering the system of regulation to which DH companies are subject. At the same time, it is important that the strategic objectives and overarching supervision are provided by national bodies that create the framework for the market and define the statutory functions and obligations of the local and regulatory bodies.

Furthermore, it is essential that the regulation of technical issues requiring objectivity and expert knowledge (in other words, tariffs and outputs) is conducted by an entity (regulatory body) that does not face conflicting interests.

At a minimum, it is important that the objectives of the regulator (including their remuneration and/or their basis of public support) do not conflict with their administration of the regulatory framework. It is desirable for the individuals who are in position of decision-making responsibility with respect to DH to be insulated as much as possible from other, conflicting considerations and interference from other national and local bodies.

It will likely fall to central government to designate responsible entities and individuals for the regulation of individual heat networks, and to specify their responsibilities and obligations. This would ideally include specifying 'fit and proper' requirements in respect of lead individuals at the regulator.

Case study: Tallinn district heating network

In 1992 the DH system in Tallinn faced serious challenges due to the poor technical condition of its assets, lack of alignment of management reward with desired objectives and lack of clearly defined scope of DH company activities.

As a response to that, a project was initiated to rehabilitate the network, realise efficiency improvements, and implement important policy actions aimed at strengthening and restructuring the DH institutions. The policy actions focused on both the Estonian State Energy Department and municipalities. With regard to the latter, the project developed a legal and regulatory framework for the energy sector as a whole and for DH as a subsector. This included: the approval of new sector legislation by the government; the separation of the policy-making and regulating roles from those of ownership and management of enterprise; the transfer of DH companies to municipal ownership, support for the formation of joint-stock DH companies; organisation of autonomous regulatory agencies to carry out the regulatory function in the sector; decentralisation of the responsibility for heat-tariff regulation to

municipalities; clear allocation of responsibilities and accountability among the agencies; and appointment of regulatory entities to approve tariffs on the basis of cost recovery.

Moreover, municipalities were required to prepare heating plans and state or municipality-owned DH companies to prepare restructuring plans. In addition, the project established capability within the State Energy Department to undertake long-term heat planning for the future development of the DH system and to provide a basis for decisions on future investments.

With regard to municipalities, the policy actions taken by the project included the restructuring of the Tallinn and Tartu district heating companies, focusing on the introduction of effective management and operation systems, and the institutional development of the Pärnu district heating company. This case study illustrates how the establishment of a robust legal and regulatory framework can contribute to the rehabilitation of the network by making business cases for infrastructure investments viable.

To ensure that tariffs in the DH market are based on objectivity and allow for financial sustainability, the regulator should be responsible for establishing a sector-wide, universal tariff-setting methodology. Furthermore, as a general rule, it is important to include a requirement for the regulator to set restrictions on tariffs in a manner that enables an efficiently operated DH company to finance its functions and to achieve a reasonable return on its economically efficient investments. This is commonly referred to as the 'finance duty'. This would mean that local bodies can only set the tariffs for their respective municipalities below the minimum level determined by the regulator if they ensure the funding of the accruing gap in financing. Moreover, the regulator needs to assume the function of protecting companies from political interference or misconduct.

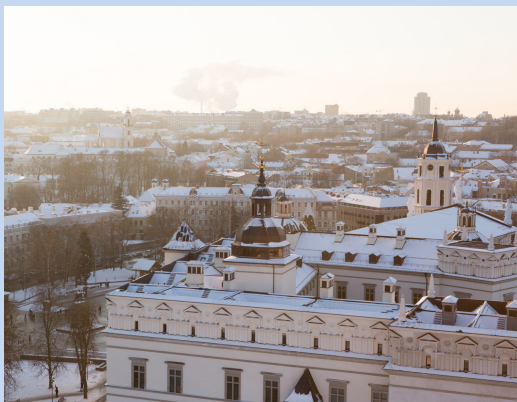
The regulator will also have a role to play in protecting customers from over-pricing by overseeing how companies use their allowances (allowed revenues) and by providing an independent assurance on the appropriateness of companies' dealings. Light-touch oversight is possible through establishment of the framework and setting the appropriate licence conditions, or greater involvement by effectively overseeing and monitoring companies' performance. Having a regulator fulfilling this duty gives confidence to all stakeholders including national and local authorities, suppliers and customers about the sound operation of the market.

The regulator needs to assume the function of protecting firms from political interference or misconduct and needs to help them achieve a reasonable return on their economically efficient investments.

It is also necessary to ensure that the regulator has sufficient resources – both financially and in terms of information availability – to adequately discharge its functions. It is common practice for regulators to fund their requirements via industry levies, which are then passed on to the customers. It may be necessary for central government to require that designated DH companies furnish the regulator with any information that can reasonably be obtained on demand (subject to confidentiality and other legal restrictions).

Case study: Vilnius district heating network

In 2001, a loan in the amount of €19 million was provided by the World Bank to the Vilnius district heating network. In the period preceding the issuance of the loan, the government had put in place what it considered to be a robust regulatory framework, including an independent and fully funded regulatory body (Energy Pricing Commission) for the energy sector (including DH). The regulator laid out a clear set of principles on which heat tariffs would be set which included the use of an incentive-based approach. It also reduced the cross-subsidy that had previously been put in place from gas heating for industrial customers to gas heating for residential customers (which had undermined the competitiveness of district heating to residential customers relative to gas heating). These measures could be seen as pivotal in resolving the commitment problem associated with allowing political bodies to administer the regulation of district heating, and may well have been an unstated precondition of the loan agreement with the World Bank.



4.3 Connection policies and long-term customer contracting

Given the capital-intensive nature of DH infrastructure development one of the risks DH companies are facing with regard to new investment (be it new system development or system upgrade or enhancement) is related to load uncertainty. Local authorities can help DH companies through different connection policies to ensure a certain level of demand, de-risk (at least to some degree) and thus encourage or promote DH investment and help the operation of DH firms to become economical. Certainly, DH companies will continue to face uncertainties in the future, such as demand risk related to customer retention.

Connection policies can be applied both for existing buildings and new developments. In the case of existing buildings, availability of information on load provides certainty about future load volumes, and thus supports the business case significantly. However, the influence of local authorities on heat supply choices of existing buildings is considerably more limited. Therefore, connection policies often focus on new developments where local authorities have discretionary power to set the rules governing heat supply.

The main form of connection policies represent mandatory connection, when local authorities prescribe the use of DH as a mandatory source of heat supply for new developments or existing buildings, in respect to a certain geographic area (the city or certain zones in the city). Also, local authorities can require mandatory connections to the DH network unless it can be proven that connection would not be economically or technically feasible or viable.

A specific, reverse form of mandatory connection relates to disconnection rights, where the local authority bans customers disconnecting from the network if they are already connected permanently or over a pre-defined period of time. This measure protects DH companies from a decreasing customer base. However, it does not address the underlying issue in terms of poor service quality or uncompetitive prices and mandatory connection or lock-in of end-users is not in line with a competitive and market-based approach to the heat sector.

Local authorities can also support long-term customer contracting through encouraging voluntary connections by streamlining permitting processes, waiving or decreasing certain fees related to the investment, providing density bonuses such as allowing extra storeys in case of connection to the DH network, restriction of undesirable alternative heat sources and providing financial assistance to new connections.

The impetus for action with respect to connection policies and long-term customer contracting lies largely with local authorities. However, central government can support this by, for example, empowering local authorities to make decisions and implement and enforce connection policies, disseminating best practice methodologies for local planning.

4.4 Clarity of DH company roles and responsibilities

A formal framework setting out the scope of DH companies' activities will reduce the risk that the outputs produced by the company may change arbitrarily and without consultation. It will also enable regulators to more rigorously hold companies accountable for their performance against these outputs.

Where a company is publicly owned, legislation is likely required from central government, for the structuring of the company as a standalone, for-profit business in the first instance.

Full privatisation should be considered only when this has been put in place, and where adequate regulatory and statutory safeguards have been set up. But encouraging private capital investment need not entail loss of control by the public sector, and is likely to enhance the responsiveness of the company to incentives. As such, this could potentially be considered fairly early in the process.

Regardless of whether companies are publicly or privately held, both central and local authorities have a potential role to play in developing and implementing the framework around the scope of DH companies' operation. At a central government

level, general guidance – ideally enshrined in legislation – should be provided in respect of defined activities and the boundaries between these activities. For example, roles and responsibilities of DH companies can be enacted as part of an existing licensing regime that designates DH companies as the undertaker of clearly defined activities subject to transparent requirements under the licence. The local authority should then set out clearly how this is to be implemented in practice, and be held accountable for adhering to this framework. This will consist of drafting the terms of the licence, consulting appropriately on the content and implementing a modification process.

Where a company is municipally owned and especially when there is no licensing regime in place, there is a risk that the DH company's operation is impacted by a politically charged environment, and that the short-term political agendas incentivising low customer prices override the long-term sustainability of the DH company's operation.

A possible solution to ensure that the objectives of the company align with the desired objectives of the sector and are separate from narrow political aspects is the introduction of public service contracts that aim to formalise the relationship between the municipality as an owner and the DH company as the service provider. By adopting clear rules and setting out clear responsibilities and competences, public service contracts can lead to increased service quality and reduced costs.

By detaching the company from political factors, public service contracts can help to adapt a long-term perspective in the operation. The success of the public service contract, however, is not guaranteed, but depends very much on the structure of the relationship between the municipality and the company and the management efficiencies. In order to realise their potential benefits, public service contracts need to have strong contractual standards and specifications, allowing for efficient monitoring of delivery and also assurance of the independence of the company from political interference.

DH companies should not assume a social function and take responsibility for affordability issues of low

income and vulnerable households unless specifically mandated to do so and adequately compensated for this function. The preferred approach to protecting vulnerable customers is addressed in sections 4.1, 4.6 and section 5 in this paper. At the same time, DH companies have an important role to play in engaging with customers and raising public awareness of the problems the sector is facing and educate people on the importance and necessity of reforms (including potential price increases) and their benefits to customers.

4.5 Accountability of management

Management accountability is key for ensuring high performance of companies and the delivery of high-quality service for operational efficiency. Accountability should be based on objective and transparent targets. For this purpose, companies should develop long- and medium-term strategies setting out the direction of travel and the investment plans for the future and translate these into coherent annual business plans with effective targets in the specific service areas. These targets will need to represent the desired outcomes for the sector and the management will have to be held accountable for delivering them. Delivery needs to be monitored and supervised by the company's shareholders and the regulator, for which DH companies should be required to establish an efficient reporting and monitoring framework. This should allow them to provide accurate and up-to-date information on their operations to their key stakeholders.

The reporting framework should cover both historical data on past performance and forward-looking information in the form of medium and long-term business and investment plans.

In order to achieve the best outcomes, company targets must align with the manner in which a DH company is permitted to earn its allowed revenue. The principle of profit maximisation can be applied to public companies by putting financial incentives in place so that companies strive to achieve the desired outcomes. Such a policy option can represent an efficient way to ensure reliable, high-quality and environmentally sustainable service to customers.

Case study: Kiev district heating network

In 1998, the Kiev DH network was in a highly degraded state due to continuous delays in infrastructure maintenance and investments since gaining independence. In order to address these shortcomings, a loan programme was put in place in association with the World Bank. A key element of the agreement with the World Bank was the establishment of key performance indicators (KPIs) aimed at measuring the delivery of the project objectives. The KPI framework introduced both technical and financial metrics. Technical metrics included gas consumption (in million m³), gas into plant, total fuel consumption (gas and mazut), monthly overall efficiency (per cent), electricity consumption of circulation pumps, and added make-up water, while the financial metrics consisted of accounts receivable, debt to service coverage ratio, average heat tariff, residential heat tariff (as a percentage of the average heat tariff). However, neither the company's revenues nor management's total reward were directly linked to these metrics. As a consequence, significant improvements in cost efficiency were not realised, and the programme was determined by the central government to be 'moderately unsatisfactory' in terms of its outcomes.

The basis of remuneration and reward for the management of publicly owned DH companies should be aligned with the company's performance against the desired objectives and should be free of political considerations. Management compensation needs to be linked to company's performance and must include rewards for outperforming targets set out in the business plan. This could be based both on financial and operating metrics, but should in either case provide an incentive for management to exert an effort towards desirable objectives. Shareholders of the company represented by a board, preferably with independent directors, need to carry out ongoing monitoring of the delivery against the targets.

In order to increase performance and detach management from political agendas, shareholders should consider the use of transparent public tenders for management positions, the introduction of a minimum length for management contracts and the establishment of an independent supervisory board overseeing the management.

Increasing accountability helps to enhance companies' efficiency in their operation and can be achieved through different forms of restructuring.

4.6 Supportive measures to address revenue collection and bad debt

Arrears and non-payment of tariffs by customers can significantly undermine the financial sustainability of DH companies. In the short term, non-payment of tariffs reduces DH companies' ability to meet financial and operating commitments. In the longer term, accumulated bad debts can contribute to high leverage (to the extent that the DH company finances the lost revenues through borrowing) and low working capital (to the extent that the gap is funded with trade credit).

Putting a framework in place that provides DH companies with possible measures to address late payments and deal with non-payment by customers contributes significantly to the sustainable, efficient and sound operation of the sector. Possible policies and consequences set out by such a framework centre around strong contractual relationships between the company and its customers. It also generally confers specific rights on DH companies to take steps under predefined conditions. This can include sending official notification letters to late payers, charging interest rates on late payments, using a debt-collection agency, selling the debt to a third party or taking legal actions and going to court which generally proves to be a lengthy and costly measure.

Final remedies of DH companies can take the form of their ability to reduce supply or disconnect non-paying customers. Further supportive policy measures include the abolition of exemption which public sector customers enjoy in terms of payment obligations and consequences. Supply suspension is easier to implement in the case of combined utility bills where non-payment of the total bill leads to the disconnection of the services, where disconnection is possible, such as electricity.

For special cases specific legislation needs to be considered. For situations where the non-paying customer is defaulting on their mortgage, a possible solution could include putting DH service providers upfront in the priority order before banks. Where the non-paying customer is a renter moving out of the property, liability of payment could be transferred to the owner. Where the property owner is the state, further alternatives will need to be considered eventually.

In addition to measures available to companies, legislation can offer additional options such as restrictions on leaving the country with unpaid DH bills or requesting proof of utility payment discipline for credit approval.

As the framework needs to be enforced by legislation, this will require action from central government. Obligations of customers towards their suppliers as well as rights of DH companies regarding bill collection and payment enforcement need to be set out in respective laws and ordinances.

Besides enforcing actions, preventive measures should also be deployed on the part of companies by the means of increased customer engagement. Raising awareness of how the money collected from bills is used (such as new investments) helps to improve payment discipline and reduce the free-riding attitude of customers.

Also, as non-payment is often driven by social circumstances, targeted subsidies to vulnerable customers can effectively contribute to lowering the bad debt levels of companies and make their operations financially more sustainable. Subsidies and tariff-setting can be an area of government intervention or addressed locally by the municipalities. Furthermore, protection of vulnerable customers can also be dealt with by the regulator.

4.7 Private sector participation

Some of the challenges faced by the district heating sector can also be addressed through private sector participation. While DH is often primarily regarded as a public domain, experience shows that with effective policies and adequate financing, the private sector can effectively contribute to the efficient, affordable and profitable operation of the DH network. By bringing in capital, technology, and management expertise, the private sector can increase the efficiency of internal processes, leading to shorter lead-times in decision making and improve performance of the DH assets and the quality of service provided to customers and so advance commercial and financial sustainability in the sector.

Private sector arrangements can vary in scale, nature and, most importantly, the respective roles of the public and private sectors. Private sector arrangements can be grouped into two broad categories, (1) those where ownership of the assets remains public, and (2) those where partial or full ownership is transferred temporarily or permanently to the private sector. The first category includes service and management contracts, lease arrangements, and concessions. The second category includes models where the asset is built by the private sector and progressively transferred to the public sector, joint ownership, and privatisation. The variety of options gives flexibility to the public sector to design the private sector participation as best fit for purpose and gives the option to move from less risky and simpler arrangements to riskier and more complex models by progressively increasing the share of private investment. Models where assets are gradually transferred to the public authority constitute a useful transitional mechanism for countries without prior private sector involvement. Specialised private outsourcing contracts for services such as bill collection or management/advisory contracts, where the private sector works alongside public staff, represent less comprehensive arrangements than full private concessions and privatisation.

It is not only the risk appetite of the public sector that drives the appropriate form of private sector participation but also the return and additional guarantees required by the private capital which are a function of the risks associated with the investment. If the revenue streams are not predictable and/or do not cover fully the costs efficiently incurred by the company, the higher returns that the private investors expect for the operation of the DH service are likely to make less complex forms of private sector participation more desirable, such as focusing on the contracting and outsourcing of specific services.

Private sector participation also calls for more regulation and requires increased regulatory oversight in the sector.

The government is required to provide for legislation allowing private sector participation, setting out rules, duties and accountabilities related to the increased regulatory oversight and ensuring predictability for the sector by granting legal security for private actors entering the market. Local authorities have an essential function in enabling private sector participation in their respective municipalities. They can support and encourage private players to engage in the DH market by tendering a new DH development as a concession for private investors, ensuring there is a regulatory and legal framework for private investment, setting prices and overseeing performance. They can also do so by acting as a customer, by taking off the heat from the DH company and so ensuring a long-term customer contract for the project and support its viability.

4.8 Summary

In summary, the following policy options have been put forward and discussed in this section:

- comprehensive national strategy on energy and heat strategy
- roles and responsibilities for national, local and regulatory bodies
- connection policies and long-term customer contracting
- clarity of DH company roles and responsibilities
- accountability of management and stakeholders
- supportive measures to address revenue collection and bad debt
- private sector participation.

In countries at an early stage of development, policies in the area of long-term customer contracting may have adverse outcomes. Removing competitive pressure from DH companies may send the wrong signal in the market. Limiting competition to DH from alternative heat sources or restricting disconnections would fail to encourage companies to increase efficiency, improve customer mindset and step up for competition, which might hamper the long-term objective of reaching commercial and financial viability in the sector. To this end, this policy option has been excluded from the recommendations in this report.

All the other policies are broadly consistent with each other and there is no evidence to suggest that any of these policies will have unintended consequences that are sufficiently significant to warrant excluding them from the recommendations presented in this report. They are therefore all included as recommendations in the following section.

5. Policy recommendations

This section synthesises the findings from the previous sections and formulates recommendations for stakeholders in the CoOs on required reforms to introduce commercial operating models in the DH sector.

The adverse characteristics of the DH networks observed in the CoOs, in other words, insufficient and unpredictable revenues, high costs and commercial risk, lack of access to capital and degraded assets point to structural challenges that impede operational and financial sustainability in the DH sector.

The majority of these challenges mirror the incompleteness or absence of an appropriate governance framework and call for remedial policy actions. The policy recommendations of this paper have been developed by aggregating and logically structuring the policy options discussed in the previous section into a comprehensive and coherent guidance and an overarching framework in the form of a policy roadmap.

Section 5.1 summarises the principle lessons learned and implications for participants, while Section 5.2 sets out the proposed policy roadmap first by recommended actions in each policy area and then by arranging and sequencing them into a proposed high-level timeline of implementation. The trade-offs between policy options and the regional and country-specific characteristics need to be also considered regarding any future implementation of market reforms in the respective CoOs.

These are discussed at the end of this section.

5.1 Summary of lessons learned

The preceding discussion in respect of policy objectives highlighted that a number of actions could be considered in principle. However, there appears to be relatively limited evidence regarding the effectiveness of each policy in addressing the challenges faced in the individual jurisdictions. This reflects a combination of three main factors:

- To date, relatively few jurisdictions in CoOs can be considered to have fully committed themselves towards implementing policy changes along the lines considered.
- Where jurisdictions have attempted to implement these changes, the policies are either at an early stage of implementation, or there has been limited retrospective review of the policies' effectiveness in practice.
- Jurisdictions at an early stage of implementation, which already carried out some of the actions recommended (for example, published a national energy strategy), can build on the achievements and experiences when taking the implementation of the roadmap forward.

Where evidence does exist, it highlights the following overall trends:

- Central government is typically the driving force behind policy changes, and plays a critical role in progressing these changes through to their logical conclusion.
- Policy reform is more likely to be successful if central government is able to commit to the reform programme over the longer term.
- Where decision-making power is retained exclusively by local authorities in their current form, the commitment problem remains, since local authorities continue to be restricted by conflicting objectives (such as, political sensitivity versus financial sustainability).
- Where subsidies are made available, it is important that the system of regulation does not render DH companies' ability to recover their costs conditional on discretionary government policy, in other words, the framework needs to ensure predictability of subsidy payments to companies.

- Private sector participation has the potential to improve outcomes by bringing in expertise and improved technology, as well as by strengthening management focus on profitability and performance. At the same time, it is important that private sector participation takes place within the context of a carefully considered governance structure. This will help to ensure that the incentives facing private participants align with broader policy objectives, while also providing private participants with confidence in the credibility of the regulatory framework.

As such, the policy recommendations put forward in this report are not restricted to those policies that can be explicitly validated using case studies.

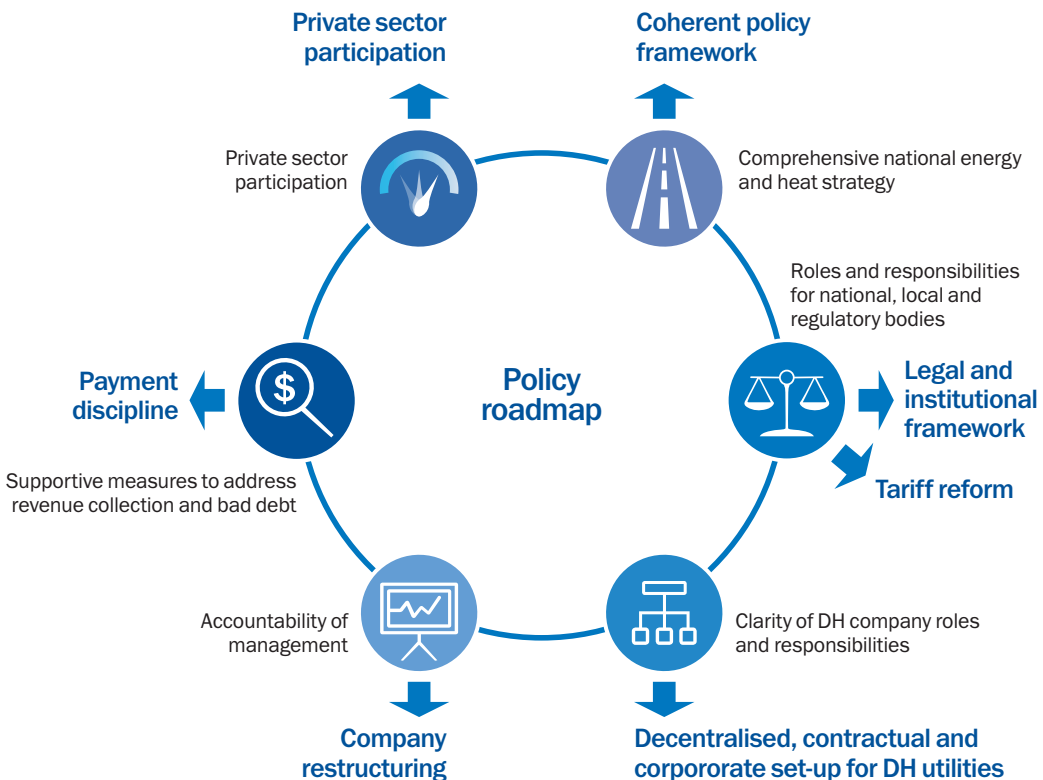
The effectiveness of a policy option depends largely on the specific circumstances the jurisdiction is facing. Therefore, the reader should exercise caution when extrapolating the general recommendations in this report to their own jurisdiction and situation.

5.2 Towards a policy roadmap

Policy recommendations will have to be tailored both in nature and sequencing according to the current situation in respective countries; however, there are some general principles and steps that can form the basis of a policy roadmap which are outlined at the beginning of this section. A high-level discussion of the regional characteristics, which also need to be considered in a country-specific implementation, is provided in the next section.

5.2.1 Sequencing of actions

The recommended policy actions for the roadmap are explained in detail by policy areas with an upfront summary of the direction of travel with regard to each policy area presented below.



Coherent policy framework

One of our key recommendations is to develop a comprehensive national energy and heat strategy which provides a clear direction of travel for market players in the long term. It should set out the objectives and key priorities of actions for the market, determine the scope of the development over the long term and influence how resources are used and allocated for the best interests of the customers, while taking care of externalities and ensuring security of supply. That is, the government should define the desired fuel mix over the long term, the interventions into different markets including subsidies that will be available to companies and customers and its position towards protection of certain customer groups.

It is essential that the national energy and heat strategy fits into a coherent and comprehensive policy framework. The national government is advised to develop a legislative framework in line with the national energy and heat strategy covering all the policy areas relevant for the DH sector, including environmental policies, housing and development policies, building codes, and to ensure that there is no contradiction between the individual policies and that they all form a clear and coherent framework.

Referencing national legislation to regional and international laws or EU practice can help to enforce the direction of travel and strengthen the obligations set out for the market.

Legal and institutional framework

Participants favoured the establishment of a legal and institutional framework based on the principle of subsidiarity, which aims to ensure that decisions are taken as closely as possible to citizens with a central definition of the formal organisational structures in the sector, and the rules and norms for the DH service provision. A fit-for-purpose legal and institutional framework is the prerequisite for the successful implementation of other policy measures and therefore needs to be carefully considered.

Based on the views of participants, this Paper recommends the provision of a clear and transparent delineation of roles and responsibilities between the main institutions in the market, in other words, national government, local authorities and regulatory bodies with regard to various aspects of the DH sector. The responsibility of each body should be provided by laws or legal documents setting out their objectives, incentive mechanisms, and accountability mechanisms. The framework should ensure transparency of procedures and a clear understanding of the hierarchy of responsibility established at respective levels of institutions and in functions.

For the long-term sustainability of the sector, it is strongly recommended that an independent regulator for the DH sector is established and legislative safeguards are put in place to protect its independence and authority from any political influence. Independence of the regulator is recommended to be enforced by removing budgetary constraints and ensuring funding of the regulator via levies on regulated companies rather than public budgets. Adequate funding also helps to safeguard the competence of the regulator and to ensure that the regulator has the expertise and knowledge-base necessary to perform a high-standard market overview.

A DH regulator can be strengthened in its role by merging its function into a well-established, strong and independent regulator in a related sector.

The form and structure of the institutional framework may vary depending on the country specific characteristics, however, it is strongly advocated to incorporate mechanisms for dialogue and co-ordination between the institutions and establish consultative mechanisms and linkages between different sectoral agencies especially with regard to cross-sectoral issues.

Voluntary and non-profit associations can also play an important role in facilitating dialogue in the market. They can promote information-sharing among parties and establish best practices in the DH market. Thanks to their objective and non-biased form, they are well positioned to efficiently engage with DH companies to collect their data and carry out benchmarking exercises on an anonymous basis.

As there are many possible forms of legal and institutional frameworks, the development of such a framework should be based on a sequence of actions for which it is advisable to build on and strengthen the existing structure rather than start from scratch. Key actions to consider include the assessment of the existing legislation and institutional framework, identification of shortcomings, contradictions and gaps, development of a proposal, public consultation and implementation.

Tariff reform

Participants acknowledged that tariff-setting is one of the most difficult issues to address, however, at the same time, it is one of the most acute issues in the CoOs. Experience has shown that continuous underpricing leads to inefficient use of resources, higher operational costs, delay or deferral of investments driven by lack of funding and the vulnerability of DH companies' autonomy.

It is recommended that moving towards fully cost-reflective, market-oriented tariffs based on a well-defined and transparent methodology be adopted. In practice, this is likely to be one of the more challenging recommendations to implement given the social considerations and political factors in play. The basis of the long-term goal of cost-reflective tariffs should be a clear and transparent methodology developed by a single body, preferably by an independent regulator. Key principles of the tariff regime should include economic efficiency, cost recovery, simplicity and transparency and non-discrimination. The journey to get there can be described by six high-level steps, outlined here:

- **Appointment of a single body, preferably an independent regulator, responsible for establishing the tariff setting methodology.** It is important that the framework includes safeguards for situations where local authorities have the discretion to decide on deviating from the tariff recommended by the regulator, to ensure adequate and predictable revenues for the DH companies. This can take the form of a legal obligation on local authorities to fund any gap between recommended and applied tariffs.
- **Determination of an efficient level of DH supply costs.** Cost reflectivity requires tariffs that allow the DH company to earn sufficient revenue to cover its efficient operations and maintenance, fuel and capital costs (including depreciation and financing costs), as well as a reasonable rate of return. The first step and key prerequisite to achieve this is a clear understanding of the actual costs of the companies. This is to be supported by a monitoring and reporting framework discussed in more detail under accountability of management.

- **Separation of the subsidy regime from tariff-setting as they have different objectives to achieve.** While tariff-setting should ensure cost recovery for companies in case of efficient operation, subsidies need to address social considerations to protect the income of low-income or poor households. Affordability issues should not be addressed as part of the tariff regime of DH companies.
- **Replacement of a universally subsidised DH price with a targeted subsidy arrangement for the poor.** A targeted subsidy regime is a much more efficient way of forming a social safety net than providing low heat prices to everyone.
- **Design of the tariff structure.** Possible choices include one or two-part tariffs depending on whether there is also a consumption-based element to a fixed fee. The Paper favours the implementation of a two-part tariff structure that reflects the structure of costs, in other words, where variable costs of heat supply are covered by a consumption-based element and fixed costs are recouped by a set element based on the heated area, for example.
- **Gradual reduction of cross-subsidies and increase of tariffs to households** based on a 'cost-plus' principle and introduction of market pricing for industrial customers

Introducing cost-reflective tariffs for DH companies which are competing with alternative heat sources benefiting from lower commodity costs can create a challenging market environment. For this reason, some temporary limitation on competition could be considered in the early phases of tariff reform. Companies' revenue streams could be protected during a pre-defined transition period by putting a temporary restriction on customers to opt out of the DH service.

Locking-in customers should only be introduced, however, as an interim measure alongside guaranteed service standards and as part of a comprehensive reform with the long-term aim of developing a competition-driven industry. Otherwise it risks sending the wrong signals to companies and creating the incentive to 'race to the bottom' on the quality of service provision.

Decentralised, contractual and corporate set-up for DH utilities

One of the key recommendations of this paper is to strengthen the transparency, autonomy, predictability, accountability and incentives of the DH companies.

In this sense, policy reform should consider the introduction of decentralised ownership where sufficient municipal capacity exists. Furthermore, it is recommended that DH companies be corporatised, that is to say, established as separate legal and commercial entities, rather than simply operated as a division of central or local government.

In order to increase efficiency and predictability and to overcome the legacy of low accountability, it is suggested that clearly articulated and transparent public service contracts (PSCs) be introduced between the DH company and its owner to delineate and define the relationship between the two entities. These PSCs would specify the rights, obligations and procedures linked to decision-making, planning, investments, operations, funding of operations and financing of investments. In this way they should provide clarity and detail on the scope of work, outcome measures, payment and its schedule, contract duration, incentives for outperformance and sanctions for non-delivery, renewal provisions, if applicable, and reporting requirements. PSCs are intended to mitigate the potential for political interference in the DH company's operation and to depoliticise the relationship between the company and its public owner.

Other forms of management contracts may also be considered, especially in the case of private sector participation. More detail is provided under private sector participation in section 4 and later in this section.

Company restructuring

In order to increase efficiency and overcome the legacy of low accountability, some form of company restructuring is recommended.

First, it is recommended to carry out portfolio and asset restructuring through the unbundling and divestiture of non-core activities. This allows the DH companies to minimise interaction costs and focus on the main activities and core processes of the DH business where their knowledge and expertise give them real competitive advantage.

Second, it is advisable to implement gradual organisational and management restructuring focused on changes in organisational design, with the aim of reducing complexity and increasing transparency and accountability. As a first step, a review of existing functions or units of the DH company is necessary followed by a decision on the desirable level of centralisation; restructuring needs to result in the elimination of duplication and redundant activities. Roles and responsibilities need to be mapped out clearly and decision-making processes and accountabilities established within the new structure. Internal processes of the DH company should be set out in a way that allows for efficient monitoring and reporting and leads to an understanding of the company's cost structure and revenue requirements. Organisational restructuring always has the aim of increasing efficiency, and strengthen accountability and predictability within the organisation at a business-unit level and can include the merger of business units or a reduction in staff.

Payment discipline

In light of our assessment, our main recommendation to address problems related to revenue collection and bad debt from non-paying customers is the introduction of combined utility bills and the disconnection of customers from services where disconnection is possible in the case of non-payment of any part of the utility bill. This has proved especially efficient where companies are facing general difficulties with the payment discipline of their customers. Combined billing has been successfully introduced in Tbilisi, Georgia, and in Belgrade, Serbia.

More broadly, it is also recommended to generally enforce the contractual relationship between the DH company and its customers. This is to be based on standard commercial contracts with clear and transparent rules for disconnections as well as consequences and penalties for a breach of contract from either side.

It is advisable to tackle bad debt arising from affordability-based non-payment through a targeted subsidy regime, which is discussed in more detail later in this section.

With regard to older bad debt resulting from past public-service obligations, the recommended supportive measure is based on shared responsibility. It is advisable to introduce some form of rescheduling and partial elimination of unpaid debts to suppliers instead of full write-off or bailout. Shared responsibility would incentivise companies to avoid future non-payment to suppliers. Further incentive to increase payment discipline in the sector can be provided via making the provision of government budgetary transfers conditional on not accumulating any future bad debt with suppliers. The restructuring of the debt is to be settled through a process of negotiation involving all key stakeholders, including the owner and management of the DH company, local municipality and national government, if necessary, and the supplier and its shareholders in question.

Private sector participation

There was general consensus among participants that private sector participation (PSP) and the introduction of private capital could deliver certain benefits. This was, however, conditional on a number of pre-conditions being met and PSP should not be considered a universal panacea.

The policy recommendations set out above do not preclude future PSP and furthermore, if followed, are likely to allow the flexibility for this policy option to be considered at some later date.

The effectiveness and sustainability of any PSP depends on how effectively risks (including, for example, political risk) can be managed and to what degree the measures recommended in this paper can establish a stable and predictable investment environment. For this reason it is recommended that if a policy of PSP is to be pursued then relatively simple models with clear delineation and transfer of risk be adopted in the first instance. Over time private sector participants can take a higher level of risk and more responsibilities over a significantly longer contract period or through the full transfer of equity capital.

A potential pathway for increased levels of PSP over time could be:

- **Service contracts:** Outsourcing individual support services, such as meter reading, billing, maintenance of specific micro districts, etc.
- **Management contracts:** Delegating the entire DH operation to a private entity.
- **Lease contracts:** Delegating the entire DH operation and revenue/collection risks
- **Concessions:** Devolving the operation, funding and investment related to a specific investment.
- **BOOT** (build-own-operate-transfer) where the investment and operation of an asset is mandated to a private entity with an asset transfer at the end of a pre-defined period. Its alternatives include BOT where the ownership of the asset is not delegated to the third party, BOO where the asset is not transferred back to the public, and the reverse BOOT where the asset is built by the public sector and progressively transferred to the private sector.
- **Privatisation:** Transferring the entire operation, investment and financing of the DH supply.

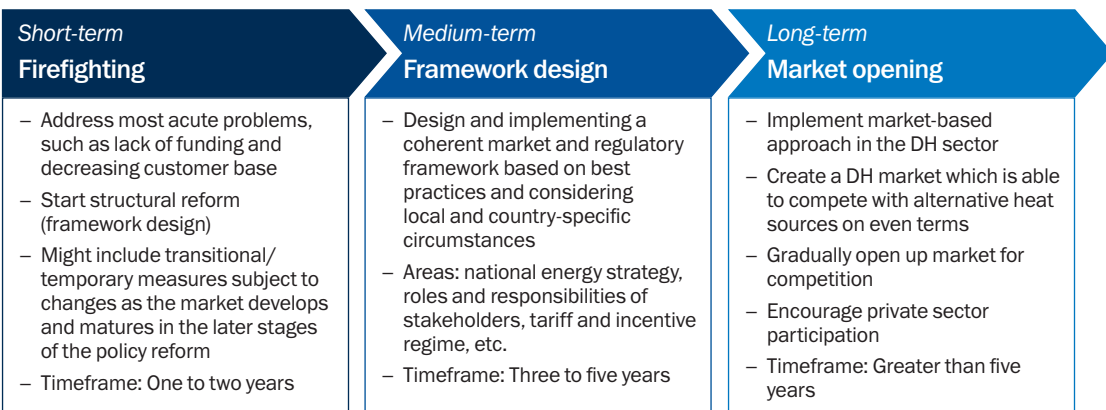
Service and management contracts are discussed under the policy area 'Clarity of DH company roles and responsibilities', while more detail is provided for the other forms of private sector participation in section 4 on potential policy options.

5.2.2 Time horizon of the policy roadmap

There is no single blueprint for market reform and the sequencing of recommendations should be considered more as a menu of options covering various combinations and orders of reform steps.

As a general rule, and based on current circumstances in the CoOs, the introduction of a competition-driven organisation of the DH market

is advocated, with regulatory oversight and gradual implementation of a market reform in three main phases as depicted by the diagram below. Competition-driven organisation implies preparation of the sector for future competition between heat sources and gradually liberalisation of the sector going forward.



In the short term, reform actions should provide emergency support to DH companies by focusing on addressing the problems related to bad debt and ensuring priority investments. The aim of the first phase is to find the right balance between keeping DH companies afloat and starting to address the structural challenges in the sector, which are mostly developed and implemented in the second phase of the reform. The third phase of the reform focuses on the overall competitiveness of the sector and gets the DH sector to a stage where it is able to compete with alternative heat solutions on equal terms. In our view, the market reform evolves over time in response to progress towards market-based approaches, maturing markets and economic development.

The policy recommendations discussed by policy area in the previous section need to be logically structured and sequenced in time in line with the three phases set out above in order to support a future implementation. In particular, the recommendations should:

- set out dependencies between policies where these exist
- highlight responsibilities for actions.

The schematic set out in the figure below illustrates the policy roadmap that encompasses the evidence reviewed and analysis conducted to date.

Policy Roadmap									
	Reform steps (1/2)	Short term	Medium term	Long term					
Comprehensive national energy and heat strategy	Coherent policy framework								
	Development of a national energy and heat strategy								
	Initial proposal derived from the long-term national strategy and national commitments to long-term objectives								
	Public consultation								
	Publication of national energy and heat strategy								
	Development of a coherent legislative framework of policies								
	Energy sector-specific policies (DH, electricity, gas, and so on)								
	Cross-sectoral policies (building, environmental, and so on)								
	Codes and standards (for buildings and so on)								
Roles and responsibilities for national, local and regulatory bodies	Legal and institutional framework								
	Establishment of an independent regulator								
	Review and reform of current institutional framework								
	Identification of existing shortcomings and contradictions in current framework								
	Clear delineation of roles and responsibilities between national and local government								
	Introduction of safeguards in place to protect stakeholders from political interference								
Tariff reform	Tariff reform								
	Appoint a single body responsible for tariff setting								
	Set revenue requirements for DH companies								
	Establish a reporting and monitoring framework for companies on their cost								
	Establish efficient level of DH supply costs								
	Subsidy regime reform								
	Separation of subsidy regime from tariff setting								
	Replacing universal subsidies with targeted arrangements for the poor								
	Tariff reform								
	Tariff design (two-part tariffs)								
	Gradual reduction of cross-subsidies								
	Introduction of cost-reflective tariffs								
Clarity of DH company roles and responsibilities	Decentralised, contractual and corporate set-up of DH companies								
	Introduction of decentralised ownership								
	Corporatisation of DH companies								
	Implementation of public service contracts								
	Establishing a framework for business planning								

Policy roadmap								
	Reform steps (2/2)	Short term		Medium term		Long term		
Accountability of management	Company restructuring							
	Unbundling of non-core activities and assets							
	Organisation and management restructuring							
	Establishment of a Board with independent directors							
	Organisational restructuring							
Supportive measures to address revenue collection and bad debt	Addressing bad debt							
	Increasing revenue collection rate							
	Introduction of combined utility bills							
	Enforce contractual relationship between DH company and customers							
	Resolve unpaid legacy debts to suppliers							
	Reschedule and partially eliminate legacy debts							
	Link any budgetary transfers to paying suppliers							
Private sector participation	Private sector participation							
	Outsourcing individual support services (non-core)							
	Set up management contracts							
	Exploit opportunities related to lease contracts							
	BOOT, BOO, BOT							
	Privatisation							

By necessity, the roadmap abstracts from jurisdiction-specific considerations (these are discussed in more detail later in this section) which impact the length of each phase and the level of effort and resource involved, so timeframes should be considered as guidelines for the policy implementation.

5.3 Trade-offs between policy options

Throughout the implementation policy-makers are likely to encounter trade-offs that give rise to different pathways. These are not comprehensively reviewed in this report (the number of potential configurations being very large); however, key potential choices and trade-offs are set out below.

Affordability, cost efficiency and environmental impact

Affordability can be addressed by increasing the subsidy levels or transfers provided by the municipality which represents a trade-off in terms of resource efficiency, increased costs, environmental impact and the autonomy of the DH operator.

Affordability relates to the level of subsidy which is ultimately a matter for public policy. Some considerations include whether the subsidy is progressive or regressive, and whether there are externalities associated with DH provision (that is to say, the benefits of DH are not fully captured by the DH company and its direct customers). There is also the equality dimension of affordability which connects to the choice between universal subsidies for all end-users or targeted subsidies to the poor. Universal subsidies for all end-users mean that large (wealthy) heat consumers receive a larger nominal heat subsidy and so they result in greater trade-off problems than targeted subsidies to the poor. In the case of targeted subsidies the key questions is how the concessions to vulnerable customer groups are to be funded – such as whether the cost of insulating vulnerable customers should be covered by increased tariffs to non-vulnerable customers; via direct subsidy to the DH company; or via direct subsidy to the vulnerable customers themselves.

Any form of subsidies have the consequence of increased costs that depending on the form of the subsidy have to be paid either by DH customers (in the case of cross-subsidies) or tax payers (in the case of budgetary transfers).

With regard to subsidies it should be also considered how lower (subsidised) tariffs impact the level of consumption. As a general rule lower tariffs result in increased heat volumes consumed by customers which emphasises the importance of metering and consumption-based tariffs and makes it critical for long-term sustainability.

Also, there might be a trade-off between cost efficiency and environmental impact. While in some cases DH might not turn out to be the most efficient heating solution in terms of costs, it is the most environmentally friendly option for heating a large number of consumers in the urban environment.

Governance framework on local versus national level

The governance framework will need to take account of political realities and information availability and transparency with respect to the balance between local versus central regulation. Policy-makers encounter trade-offs with regard to the interrelationships and distances between national authorities, local authorities and regulatory bodies. A national regulator can help to prevent DH companies being captured by local politics; however, it can also be captured by national politics.

Also, the role of the local authority and the role of the regulator often overlap and often both roles are conducted by the same entity which can lead to conflicts of interest.

Commercial predictability and level of competition

A further policy question emerges with respect to the degree of choice that customers should be afforded with respect to heating their homes. For example, several participants questioned whether or not customers should be permitted to switch between DH and individual gas boilers. A related consideration is whether other providers of heating solutions (including other DH providers) should be permitted to offer their services in areas where a DH network already exists. Where customers are permitted to switch and/or other heating solutions actively compete for customers with DH providers, DH companies face increased levels of commercial uncertainties. Under these circumstances, there is a possibility that DH may become more costly for customers who choose to remain and DH service provision may even cease to be financially viable altogether. This may be, however, a desirable outcome if the alternative heating solutions can provide better value for money. Where DH companies are provided with commercial predictability via limited competition from alternative heat sources by locking in DH customers (either by preventing the development of alternative heat solutions, such as gas-fuelled individual boilers, or by restricting DH customers' disconnection rights) and insulating the company from demand-side risk the operation and revenues of the DH company may be protected. But this framework may fail to encourage the most resource-efficient solution for all and may remove disciplinary pressure on the DH operator and so hamper accountability and efficiency improvements in the DH sector. At the same time (as noted in section 5.2.1), temporary lock-in of customers can be justifiable and desirable as an interim measure, part of a comprehensive reform introducing cost-reflective tariffs with the long-term aim of a competition-driven DH market.

With regard to private capital participation the question policy-makers face is that while private capital formation brings expertise and discipline with respect to efficiency, it entails a reduction of the ability of central government to use DH companies as instruments of public policy.

5.4 Regional differences and their impact on policy reform and its implementation

Ahead of implementing any policy reform it is necessary to conduct an impact assessment in respect of the recommended policy actions within each respective CoO and address the trade-offs between policy options as part of a broader country-specific plan.

Country-specific tailoring of the reform is essential as different policy options are suitable under different circumstances and the impact of a given policy may vary across jurisdictions and over time.

The jurisdictions assessed within the frame of this policy dialogue show similarities in terms of the legacy problems they face. Throughout the various jurisdictions the DH sector suffered in the past from systematic under-investments and under-funding of the DH operation leading to dilapidated infrastructure and, in some instances, also unsustainable levels of outstanding payables and significant financial arrears. The short-term focus in the sector targeted short-term operating expenditures and affordable tariffs and neglected long-term financial and operational sustainability of the DH companies and the sector as a whole. The short-term approach and resulting interventions have not only prevented an adequate level of funding to the sector, but also hampered predictability, transparency and accountability. There is a lack of clear tariff-methodologies and well-defined responsibilities implemented in a transparent and professional manner. As a result, the DH sector is characterised by inefficient operation with high operating costs, low service quality and under-priced heat resulting from continued political interventions.

When looking at the specific countries of operations a clear pattern evolves in terms of similarities and differences between the two regions, Central Asia and south-eastern Europe. Differences between the two regions are mainly present in the area of market orientation and density of regulation.

In Central Asia there is a more centralised approach to the DH sector compared to south-eastern Europe under which the clarity of national policies and the regulator's ability to balance economic and social aspects become even more important. Capacity of local authorities is often limited and so decentralisation should only be rolled out slowly with the aim of testing and demonstrating the benefits of decentralised approach of the DH sector.

At the same time, the contractual relationship between the DH companies and the residential customers is weaker in Central Asia which makes the problem of bill collection more difficult to address.

Regulators, with the backing of politicians in the CoOs appear to perform well in terms of customer protection, but less so with regard to ensuring operators' independence from political interference. Balancing the interests of customers and companies is especially important in a thermal market that has not yet been opened up for competition.

Tailoring the reform to the regional characteristics discussed above contributes significantly to the successful implementation of the reform. Even so, reforming and changing the sector is a long journey in any region and jurisdiction and requires careful planning, strong and long-term political commitment and open dialogue with stakeholders but delivers benefits along the route at each step as the sector progresses towards financial and commercial sustainability.

6. Appendix – Case studies

This section sets out the case study assessment that informed the identification of policy options in section 4 by providing real-life examples of challenges faced by the DH sector in comparable jurisdictions. The findings of the case study assessment represented a core input for the identification of possible policy options to address existing challenges and implement market reforms and informed the determination of lessons learned for participants when transitioning to commercially viable models in the DH sector.

The sample of case studies was selected from the district heating sector. The geographic scope was narrowed down to eastern Europe and the selected sample was subject to data availability. The sample does not represent a comprehensive set of case studies.

The case studies have been subject to a detailed assessment in order to understand the symptoms and underlying challenges faced by the respective DH network, the policy actions and other actions taken to remedy these challenges and to identify the key success factors as well as to establish how the case study can serve as an example for overcoming the challenges faced by the DH sector in the CoOs set out in this paper.

The key findings of the assessment are summarised for each case study separately and are presented by individual tables in this section.

6.1 Appendix 1: Vilnius, Lithuania

Project name	The Vilnius District Heating Project, Lithuania
Description	Loan of €19 million provided by the World Bank to the district heating company with the guarantee of the Republic of Lithuania
Challenges	<ul style="list-style-type: none"> • Regulatory framework for gas undermined the competitiveness of the DH heating network • Lack of clearly defined duties and objectives of the regulator • Lack of alignment between DH company rewards and objectives: in the absence of market incentives the DH company developed an inward-looking and supply-based culture, rather than a demand-focused one • Lack of long-term contracts, leading to a customer loss of approximately 3 per cent per year.
Symptoms	<ul style="list-style-type: none"> • Insufficient revenues • High commercial risk • Lack of access to capital • Low service quality provided by the DH company • Inefficient operation, up to 28 per cent of heat produced was lost in the network • Unsustainably high operating costs • Degraded assets, such as blocked pipes from corrosion and assets beyond their economic life, creating reliability problems in the network • Disconnections due to reliability problems in the network.
Policy actions taken in the frame of the project	<ul style="list-style-type: none"> • Not applicable
Other actions taken in the frame of the project	<ul style="list-style-type: none"> • National government providing guarantee for the World Bank loan
Associated supporting policy actions	<ul style="list-style-type: none"> • strong emphasis by the Lithuanian government on privatisation and economic pricing in the energy sector through unbundling and divestiture of energy assets • establishment of an independent regulatory body equipped with competent staff.
Policy effectiveness and efficiency	<ul style="list-style-type: none"> • Funding provided by the World Bank allowed for a significant upgrade to the DH network, leading to increased efficiency and competitiveness of the DH company. • Establishment of a capable and independent regulator who decreased the cross-subsidies from larger customers to residential consumers in both the gas and DH sectors, which were skewing the revenue profile of the DH companies, doubly so as gas was the main fuel supplier of DH and also its main competitor in providing heat to buildings. Cross-subsidised gas tariffs for residential consumers meant decreased competitive advantage in terms of prices for DH in the heat market. • Appointing the regulator to set heat prices based on predefined principles alleviated the commercial risk around price setting in the sector.
Project timeframe	<ul style="list-style-type: none"> • Four years for investment, and 14.5 years for loan repayment
Lessons learned	<ul style="list-style-type: none"> • Government guarantees represent one potential means of facilitating access to new capital. Guarantees are more difficult than, for example, subsidies to revoke at the discretion of central government, and so alleviate the commitment problem. On the other hand, guarantees require central government to make use of its balance sheet and be prepared to transfer funds in the event that the guarantee is called. • The establishment of a robust regulatory framework in advance of the loan is likely to have contributed significantly to the viability of the business case and may have been a precondition of the loan issuance.
Source	Project Appraisal Document, Report No: 22596-LT., World Bank, 27 July 2001

6.2 Appendix 2: Riga, Latvia

Project name	The Riga District Heating Rehabilitation Project, Latvia
Description	Loan of US\$ 58 million provided by the World Bank for the district heat operator with co-financing of US\$ 27 million loan from a European private bank, and the guarantee of the Republic of Latvia
Challenges	<ul style="list-style-type: none"> • Lack of clearly stated government intentions regarding competing markets; there was uncertainty around when a new regulation was to be introduced to decrease gas prices • Due to the powers of the vertically integrated gas monopoly, a lack of experienced regulatory staff and the lack of a gas pricing methodology, the rebalancing of gas tariffs for small and large gas consumers had not yet taken place • New legislative measures introduced in 2000 by the national parliament introduced changes to the energy law allowing free choice of heat energy supply to customers and required the Riga City council to cancel its law that limited disconnections from DH • The risk of future customer disconnections from the DH network resulted in uncertainty around future revenues and sustainability of the DH network, which prompted the Minister of Finance of Latvia to rescind the national government's guarantee on the DH company's loan due to concerns around the company's financial sustainability.
Symptoms	<ul style="list-style-type: none"> • Insufficient revenues • High commercial risk • Lack of access to capital.
Policy actions taken in the frame of the project	<ul style="list-style-type: none"> • Riga City Council passed legislation limiting disconnections from the DH network
Other actions taken in the frame of the project	<ul style="list-style-type: none"> • The national government provided a guarantee for the World Bank loan and co-financed the project with private bank loans • The guarantee was subsequently revoked, leading to a withdrawal of the loan agreement.
Associated supporting policy actions	<ul style="list-style-type: none"> • The national government approved the gradual liberalisation of the gas sector in line with EU directives • Discussion with the World Bank begun as part of another loan agreement, and looked at drafting of legislation for public utilities to be regulated under The Public Utilities Commission.
Policy effectiveness and efficiency	<ul style="list-style-type: none"> • Riga City Council introduced regulation limiting DH network disconnections which helped to secure the loan agreement • However, the national government overruled this local regulation by amending the energy law and introduced free choice for customers in the heating sector and thus undermined the viability of the DH sector. This prompted the Finance Minister to withdraw the national guarantee on the loan • Upon the withdrawal of state guarantee, the loan financiers withdrew their funding and the rehabilitation project collapsed.
Project timeframe	<ul style="list-style-type: none"> • Project funding was withdrawn after year 1.
Lessons learned	<ul style="list-style-type: none"> • Legal certainty and clarity around government objectives in the market are key requirements of a sustainable DH sector. Long-term customer contracts can act as key enablers for network investment. • Where the profitability of the company is dependent upon discretionary government policy, this is typically not conducive to financial sustainability. • Long-term customer contracts can support financial sustainability, but legal restrictions on customers' ability to switch may not be justifiable politically or economically.
Source	Project Completion Note, Report No. 24447, World Bank, 26 June 2002

6.3 Appendix 3: Kiev, Ukraine

Project name	Kiev District Heating
Description	Loan of US\$ 200 million equivalent to the Government of Ukraine for the Kiev DH improvement project
Challenges	<ul style="list-style-type: none"> • Lack of alignment between tariffs and objectives as tariffs were set below the cost recovery level of the DH company, tariffs set by the local governments for households in Kiev covered only 50-80 per cent of costs • Lack of alignment between management reward and desired objectives • High and unpredictable levels of bad debt • Lack of clearly stated government intentions regarding the availability of subsidies; the difference between costs and tariffs was covered by subsidies from the central and local governments and/or by cross-subsidies from industrial to household consumers.
Symptoms	<ul style="list-style-type: none"> • High operational inefficiencies • High fuel and operating costs • Supply deficit • Poor quality and reliability of the service (old equipment and a lack of control systems) • Lack of individual metering • High emissions due to inefficient fuel usage • High levels of environmental pollution due to ineffective water-treatment systems and high water losses • Late and non-payment by customers.
Policy actions taken in the frame of the project	<p>Promoting sound cost recovery policies and practices, which included:</p> <ul style="list-style-type: none"> • implementation of unified retail tariffs for electricity (meaning that electricity tariffs are provided on a monthly basis by each electricity-generating company) • heat tariffs allowing for cost recovery; the local authority of Kiev is required to set tariffs at cost-recovery level of the DH company or finance any gaps between revenues and costs resulting from tariffs set below cost-recovery level. <p>Supporting institutional strengthening and commercialisation of the DH company, which included:</p> <ul style="list-style-type: none"> • reviewing options for the most efficient institutional and corporate structure for DH in Kiev • identification of the requirements for effective management, corporate and operations systems • support for implementing the study recommendations.
Other actions taken in the frame of the project	<ul style="list-style-type: none"> • Replacement of heat-generation capacity with higher capacity, and more efficient units • DH network rehabilitation: introduction of modern technologies and materials.
Associated supporting policy actions	<ul style="list-style-type: none"> • Institutional development programmes for government agencies working in the sector, helping to strengthen their management and operations
Policy effectiveness and efficiency	<ul style="list-style-type: none"> • The project was considered a moderate success with regard to the objective of promoting sound cost recovery. Tariffs were increased to reach cost-recovery level, however, later the local authority decided to stop adjusting tariffs to cost-recovery levels and decreased tariffs retrospectively. Although the local authority covered the arising revenue gap of the DH company with annual funds, these were nonetheless not provided in a timely manner
Lessons learned	<ul style="list-style-type: none"> • The impact of price increases on vulnerable customers should be carefully considered given the likely political sensitivity of tariff affordability • Decisions regarding tariff-setting and price regulation should be undertaken by an independent entity that is subject to appropriate duties and objectives • Where the profitability of DH companies is dependent on discretionary government policy, this is not conducive to financial sustainability. Where subsidies exist, provision should be made for variability in the level of subsidy (for example, via a K-factor adjustment mechanism and/or a reopener provision). • Discounted tariffs for specific, vulnerable customer groups and/or direct government support for these groups may represent preferable alternatives to flat-rate tariffs.
Source	Project Completion Note, Report No. 24447, World Bank, 26 June 2002

6.4 Appendix 4: Tallinn, Estonia

Project name	Tallinn, Estonia
Description	Loan of US\$ 38.4 million equivalent to the Republic of Estonia
Challenges	<ul style="list-style-type: none"> • Lack of alignment of management reward with desired objectives • Lack of clearly stated government intentions regarding fuel and heat sources • Lack of clearly defined scope for national and local policy frameworks • Lack of clearly defined duties and objectives of the regulator • Lack of clearly defined scope of DH company activities.
Symptoms	<ul style="list-style-type: none"> • DH network had low technical standards and low operational efficiency • Heat production also had high inefficiencies • Large heat losses, ranging around 25 per cent as compared with 8-12 per cent in Western systems • Outdated boilers with typical efficiencies of 60-65 per cent • Unsustainable fuel costs, representing 80-90 per cent of the total cost of heat production of some heat-generation units • Lack of metering on production facilities and at points of consumption • Poorly insulated pipes • Degraded assets utilising outdated technologies • Poor maintenance in all parts of the DH system • High cost of network operation • Air pollution in urban areas (especially during the winter heating season) due to coal and oil use in low-efficiency boilers • DH prices are often perceived to be too high for customers raising the need for sector subsidisation • Increasing levels of bad debt due to late payments and non-payments by customers, especially in the case of vulnerable customers who struggle in the absence of insufficient levels of government support • Uncertainties regarding the subsidies available to the DH sector as the subsidy regime experienced a serious of changes over a short period of time. In August 1993 direct subsidies to heat producers were replaced by an increase in subsidies to qualifying households. This scheme, however, did not prove to be effective and was superseded by a new scheme.
Policy actions taken in the frame of the project	<p>Focus of the policy actions has been on strengthening and restructuring the institutional framework of the DH sector.</p> <p>Policy actions taken by the Estonian State Energy Department:</p> <ul style="list-style-type: none"> • Developing the capability of long term heat planning to inform DH network planning and investment decisions • Developing a legal and regulatory framework for the energy sector as a whole and for each subsector separately (DH, electricity, gas, oil, others) • Ministry required to draft new sector legislation with the government approving it • Separating the policy-making and regulatory roles from the ownership and management function of the DH company • Transferring the DH companies to municipal ownership • Supporting the formation of joint-stock DH companies • Organising autonomous regulatory agencies to carry out the regulatory function in the sectors • Delegating the responsibility for heat tariff regulation to municipalities (decentralisation) • Clearly allocating responsibilities and accountabilities among the agencies • Mandating the regulatory entities to approve tariffs on the basis of cost recovery • Requiring municipalities to prepare heating plans • Requiring the state or municipality-owned DH companies to prepare restructuring plans • Privatising companies with activities not considered of strategic importance. <p>Policy actions taken by the municipalities:</p> <ul style="list-style-type: none"> • Restructuring the Tallinn and Tartu DH Companies, which included the identification of the requirements for effective management and operations systems • Institutional development of the Parnu DH Company.
Other actions taken in the frame of the project	<p>Other actions focused on rehabilitation and efficiency improvements and included</p> <ul style="list-style-type: none"> • Small boiler conversion/replacement programme • DH rehabilitation programme • Iru (CHP, Tallinn) Power Plant improvement.

Policy effectiveness and efficiency	<ul style="list-style-type: none"> • Not applicable
Project timeframe	<ul style="list-style-type: none"> • Loan maturity of 15 years • No timeframe has been specified for the implementation of the policy actions.
Lessons learned	<ul style="list-style-type: none"> • This case study illustrates the importance of access to capital in the context of a DH network in need of significant restructuring • The establishment of a robust legal and regulatory framework in advance of the loan is likely to have significantly contributed to the viability of the business case and may have been a precondition of the loan issuance.
Source	Staff Appraisal Report, Report No. 12864-EE, World Bank, 5 May 1994

6.5 Appendix 5: Belarus

Project name	Belarus District Heating Sector
Description	General overview of the Belarus district heating sector
Challenges	<ul style="list-style-type: none"> The residential DH sector is significantly cross subsidised by non-residential consumers and the electricity sector as a whole leading to tariffs well below actual cost levels. As a result, DH companies active in the residential DH sector are not incentivised to provide quality service to their customers. Lack of clarity regarding tariff setting: Tariffs for non-residential customers are set by the regional governments know as Oblasts, while tariffs for residential customers are set by the national government. Also, the Energy Efficiency Department has an indirect role in the tariff setting process by approving the norms of technical heat losses which are a key input used by governments to determine heat tariffs.
Symptoms	<ul style="list-style-type: none"> Since 2005, cost of heat production has doubled in real terms due to rising gas prices, while tariffs have remained flat over the same period, resulting in cost-recovery levels for residential DH services of between 14.5 - 21.4 per cent Residential tariffs are artificially kept below cost-recovery level High non-residential tariffs High commercial risk
Policy actions taken in the frame of the project	<ul style="list-style-type: none"> The national government has set a goal to phase out cross-subsidies, and to restructure tariffs by 2020 National government passed a number of legislations to establish clarity around price regulation, and the role of different national bodies responsible for the regulation and governance of the DH sector In order to phase out cross-subsidies and increase cost-recovery levels of residential DH supply the national government also passed legislation mandating an annual increase of residential tariffs of up to US\$ 5 per year. This law mandated quarterly updates to residential tariffs by the growth rate of household income in case they are below the nominal growth rate of wages.
Other actions taken in the frame of the project	<ul style="list-style-type: none"> Not applicable
Associated supporting policy actions	<ul style="list-style-type: none"> Not applicable
Policy effectiveness and efficiency	<ul style="list-style-type: none"> Not applicable
Project timeframe	<ul style="list-style-type: none"> Not applicable
Lessons learned	<ul style="list-style-type: none"> Lack of clarity around institutional structures can result in severe misalignment of tariffs, both within the DH sector (such as between different customer groups) and between DH and other related sectors (such as between DH and electricity generation) In this case study, neither the residential nor the non-residential or electricity tariffs were set by independent bodies, leading to tariffs that bore little resemblance to cost in any of these sectors.
Source	Belarus Heat Tariff Reform and Social Impact Mitigation, a World Bank Study, Fan Zhang and Denzel Hankinson, 2015

6.6 Appendix 6: Moldova

Project name	District Heating Efficiency Improvement Project, Moldova
Description	Loan of US\$ 40.5 million to Republic of Moldova from World Bank, supported by US\$ 20 million co-financing from Republic of Moldova.
Challenges	<ul style="list-style-type: none"> • The DH operator Termocom declared bankruptcy in 2001, after being transferred from state to municipal ownership in 2000, and after the municipality imposed tariffs that were below cost-recovery levels • Lack of long-term contracts: customers are disconnecting from the network due to the poor quality and reliability of the service that is mainly a result of the outdated infrastructure, which continues to operate well beyond its economic life. The system breakdown rate of 1.1 per km is 10 times higher than in the rest of Europe, while heat losses exceed the rates in modern systems by 5-10 per cent.
Symptoms	<ul style="list-style-type: none"> • Insufficient revenues • Bad debts: the DH company accumulated significant arrears to the two CHP plants, providing heat to the network which is owned by the government of Moldova and a Russian energy company, in the range of US\$ 220 million, or 3.5 per cent of GDP • Assets were in a degraded condition as a result of the inability to generate enough revenue for rehabilitation and capital investments • Disconnections by wealthier citizens led to a situation where the high costs of the DH systems were borne disproportionately by the poor and vulnerable population.
Policy actions taken in the frame of the project	<ul style="list-style-type: none"> • Not applicable
Other actions taken in the frame of the project	<ul style="list-style-type: none"> • The national government developed a restructuring plan for one of the CHP operators to purchase the DH company and the other CHP operator to create a new company • The national government secured a loan from the World Bank to improve operating efficiency and financial viability of the new company through network investments and by streamlining operations and corporate structure of the new company
Associated supporting policy actions	<ul style="list-style-type: none"> • Not applicable
Policy effectiveness and efficiency	<ul style="list-style-type: none"> • Project is still being implemented
Project timeframe	<ul style="list-style-type: none"> • 5.5 years
Lessons learned	<ul style="list-style-type: none"> • This case study illustrates the importance of access to capital in the context of a DH network in need of significant restructuring • The establishment of a robust regulatory framework in advance of the loan is likely to have contributed significantly to the viability of the business case and may have been a precondition of the loan issuance.
Source	Project Appraisal Document, Report No: PAD567, World Bank, October 30, 2014

6.7 Appendix 7: Brasov, Romania

Project name	Brasov District Heating Feasibility Study, Romania
Description	Feasibility study on the upgrade of existing DH system in Brasov with a cost of €32 million
Challenges	<ul style="list-style-type: none"> • Lack of long-term customer contracts • Lack of clarity, objectives and harmonised approach regarding tariff-setting: the national regulator is responsible for tariff-setting in the DH sector, while municipalities determine the level of subsidies for customers • Lack of regulatory clarity as regulation of heat is split between two national regulatory bodies based on generation type • Lack of clear national and local government subsidy policy with frequently changing subsidies. The national government provides subsidies to vulnerable customers, while the local government provides subsidies to customers based on an amount determined in the city's annual budget • Lack of clear ownership rules for common infrastructure in shared buildings.
Symptoms	<ul style="list-style-type: none"> • Insufficient revenues • Extensive disconnections over the last 15-20 years • Each of the DH companies in the city of Brasov is regulated by a different body • High heat losses and poor maintenance of assets in shared buildings.
Policy actions taken in the frame of the project	<ul style="list-style-type: none"> • No policy actions recommended in the report
Other actions taken in the frame of the project	<p>Recommended actions:</p> <ul style="list-style-type: none"> • Investment in network and generation plant upgrades, shorter pipelines to reduce heat losses and network expansion - connecting more apartment blocks to the network in order to increase customer base • Public awareness campaigns to increase consumer demand.
Associated supporting policy actions	<ul style="list-style-type: none"> • Local government introduced mandatory connection to DH network for new builds to promote and secure demand for DH • National regulator embarked on privatisation of the gas sector which would probably lead to price increases for gas customers. This would result in a decrease in DH subsidies required to maintain DH's competitiveness with gas as alternative heating source.
Policy effectiveness and efficiency	<ul style="list-style-type: none"> • Mandatory connection for new buildings to the DH network is estimated to increase demand for DH by 5 per cent
Project timeframe	<ul style="list-style-type: none"> • Five years
Lessons learned	<ul style="list-style-type: none"> • The absence of a clear institutional framework for DH companies over several years can lead to tariffs being set by local authorities below cost recovery levels with a corresponding reliance by DH companies on subsidies • The lack of incentives for management through different reward schemes to increase efficiency and corporate financial performance result in a vicious cycle of falling efficiency, poor financial performance and rising costs.
Source	Brasov District Heating Project – Feasibility Study for European Bank of Reconstruction and Development (2012)

6.8 Appendix 8: Kosovo

Project name	Improvement of District Heating in Kosovo
Description	Independent report commissioned by the World Bank on improvement programme for three cities in Kosovo
Challenges	<ul style="list-style-type: none"> • Lack of long-term customer contracts • Lack of alignment between tariffs and objectives • Lack of clearly defined scope of DH company activities: according to their licences DH companies are required to install meters and bill customers based on metered volumes, however, no deadline for installation has been defined because of the poor financial situation of the DH companies.
Symptoms	<ul style="list-style-type: none"> • Insufficient revenue (tariffs are below cost-recovery levels and companies accumulate big amounts of bad debts due to low collection rates which are not considered in their allowed revenues) • High water losses • Frequent failure due to poor water quality and old pipes.
Policy actions taken in the frame of the project	<ul style="list-style-type: none"> • Not applicable
Other actions taken in the frame of the project	<p>Recommended policies:</p> <ul style="list-style-type: none"> • Replacing the cost-plus tariff setting with an incentive based approach to foster technical and financial performance improvements. Under the proposed approach a baseline tariff would be fixed for the whole regulatory period, usually for 3-5 years. The actual tariff would be set with the help of an indexation formula allowing the tariff to be adjusted to variations in input prices. The proposed approach would incentivise companies to generate extra profits by improving efficiency and performance • Introduction of clear cost-allocation rules for electricity and heat produced in CHP plants thus incentivising companies to upgrade inefficient boiler heat-generators into CHP plants • Municipality of Mitrovica is recommended to establish a new DH department providing planning and operational support to developers looking for DH network extension covering a wide range of areas, such as assessing the willingness of apartment owners to connect to DH, supporting the preparation of the feasibility and design study, assisting in the procurement process, concluding a contract for heat delivery, concluding final connections contracts with customers, and operating and managing the DH system in the south of the city.
Associated supporting policy actions	<ul style="list-style-type: none"> • Not applicable
Policy effectiveness and efficiency	<ul style="list-style-type: none"> • Not applicable
Project timeframe	<ul style="list-style-type: none"> • Not applicable
Source	Improvement of District Heating in Kosovo, Energy and Utility Consulting, 19 February 2009

European Bank for Reconstruction and Development
One Exchange Square
London EC2A 2JN
United Kingdom
Tel: +44 20 7338 6000
Fax: +44 20 7338 6100
www.ebrd.com