



# Setting the agenda for further district heating reform in Ukraine

May 2019

## Disclaimer

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## Glossary

AMCU	Antimonopoly Committee of Ukraine
CAPEX	Capital expenditures
CHP	Combined heat and power
CLM	Consumer Level Monetization (of HUS benefits)
CMU	Cabinet of Ministries of Ukraine
CO2	Carbon dioxide
DH	District heating
DHC	District heating company
DP	Development Partner
EBRD	European Bank for Reconstruction and Development
EE Fund	Energy Efficiency Fund
EIB	European Investment Bank
EU	European Union
HOA	Homeowners association
HUS	Housing and utilities subsidies
IFI	International financial institution
IHS	Individual Heat Substation
IRR	Internal rate of return
Minfin	Ministry of Finance of Ukraine
Minecon	Ministry of Economic Development and Trade of Ukraine
Minregion	Ministry of Regional Development, Construction and Housing and Communal Services of Ukraine
Minsoc	Ministry of Social Policy of Ukraine
Naftogaz	National Joint-Stock Company “Naftogaz of Ukraine”
NEFCO	Nordic Environment Finance Corporation
NEURC	National Energy and Utilities Regulatory Commission
PSO	Public Service Obligation for gas supplies (established by CMU Resolution #187)
RES	Renewable energy sources
SCADA	Supervisory control and data acquisition
SOE	State owned enterprise
Ukrstat	State Statistics Service of Ukraine
VRU	Verhovna Rada of Ukraine (the Parliament)

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# 1 Introduction

## 1.1 Executive Summary

### Context for the report

Since 2015, Ukraine has taken major legislative and policy steps to reform its energy sector and introduce competition for natural gas and electricity services, in particular by establishing cost-reflective pricing, phasing out implicit tariff subsidies and introducing the ability for consumers to change suppliers. Because of this transition towards market-based arrangements, the Ukrainian District heating (DH) sector has been faced with major technical, commercial, financial, operational and institutional challenges.

The DH sector play a significant role in the overall Ukrainian energy sector. DH currently represents about 12 percent of total energy used in the country (and more than 20 percent of natural gas use). DH services reach about 40 percent of Ukrainian population. The density of heat consumption (heat load) is a critical economic parameter for DH systems which are characterized by significant fixed capital and operating costs which can be recovered only by selling large volume of heat. In addition to increased energy efficiency of buildings, the DH sector is faced with competition from alternative technologies for heating. If DH service provision remains technically inefficient and unreliable, the trend towards disconnections from DH systems is likely to amplify, further undermining the economic and financial viability of these systems.

DH systems are therefore faced with an existential threat which requires urgent reform actions, not only in response to immediate issues, but also as part of a medium to long-term modernization strategy. However, designing and coordinating the implementation of DH sector reform is made difficult by the dispersion of responsibilities for regulation and decision-making in the sector. This institutional fragmentation has several causes: First, the DH sector is part of the larger energy sector, and therefore directly impacted by natural gas sector and electricity sector developments, as well as by the ongoing reform of energy subsidies. Second, DH is also a local utility service, with Minregion as line Ministry, but under the authority of the national regulator NEURC for the bulk of economic regulation (tariff-setting and investment approvals). Finally, as part of the decentralization process, local authorities which owns and control DHCs, are increasingly required to provide them with financial support. For this reason, the preparation of a comprehensive sector reform plan will need to associate key decision-makers and stakeholders.

### Objective of the report

The main purpose of this Report is to present an analysis of the status of DH sector reform and of the remaining challenges, and to identify proposals to address these challenges, so as to facilitate the emergence of a comprehensive DH sector reform agenda, including an alignment of key decision-makers and stakeholders around crucial reform components and a process to implement these reforms. In addition, several Development Partners have demonstrated an interest in supporting the sector through investment financing and/or technical assistance, and the formulation of a comprehensive and credible sector modernization strategy would help them better coordinate their technical and financial assistance to the DH sector and allow them to more effectively support the preparation and implementation of sector reform.

### Outline of the report

The report is organized as follows:

- Section 2 provides an overview of the current situation of the DH sector including its relative weight in the country's energy consumption in the heating services provided to the population, its financial situation, and the estimate of investments at the national level needed for modernization of the DH infrastructure.
- Section 3 analyzes the reform actions impacting the DH sector which have been implemented or initiated over the last few years, presenting the achievements as well as the limitations of these

reforms. Significant progress was achieved on modernizing the relationships between DHCs and their clients (modernization of billing, generalization of heat meters, reform of the Housing and Utilities Subsidies program). In addition, a number of useful but limited measures were also implemented to stabilize the financial situation of DHCs and facilitate investments under IFI projects (e.g. debt restructuring, special account allocation formula, and protection of investment accounts). On the other hand, very little progress has been achieved with regard to economic regulation of the DH sector in particular on the issues of tariff setting and investment approval.

- The outstanding key issues to be addressed as part of DH sector reform are analyzed in section 4. The objective is to cover the critical reforms necessary to allow DHCs to become financially viable (reforming the tariff adjustment process and methodology, ensuring payment discipline from consumers), as well as the reforms required to enable the modernization of DH infrastructure in a cost-effective manner (planning and implementation of investment projects). ....
- Section 5 discusses two reform options for the DH sector which have been discussed among stakeholders for some time but for which there is no consensus. The first one is mandatory unbundling of heat networks from heat production and supply, which this report does not recommend in the current sector context. The second is the proposal to create a national financing mechanism for DH sector modernization investments: the report's recommendation is to focus first on other key obstacles to investments in the DH sector.
- Section 6 identifies a list of proposed reform actions for each major sector reform strategic priority, separating short term actions (which do not require extensive technical preparation and could be implemented rapidly), and medium-term actions to be implemented in 2020 as part of a comprehensive package of reforms after adequate technical preparation and consultations.

#### Main recommendations:

***The report recommends, as an immediate priority, to initiate a comprehensive modernization and simplification of the technical norms applicable to the DH sector and of the associated State expertise requirements.***

This recommendation is informed by the experience of implementing DH investment projects in Ukraine and by the comparison with similar investments in other countries. Applicable technical norms and expertise procedures for the DH sector in Ukraine have failed to evolve in line with international practices. The specificity of Ukrainian technical norms results in many cases in the need to prepare design documents and receive approval from the State Expertise, instead of being able to procure equipment widely available among international suppliers on the basis of standard designs. Aligning Ukrainian technical requirements with international best practices would have huge and rapid benefits: i) significantly reducing unit costs of investments, ii) increasing competition between suppliers of equipment and contractors during tenders, and (iii) considerably accelerating implementation of investment projects. Our recommendation is to rapidly put in place a technical working group under MinRegion, including DHC representatives, and supported by international DH technical experts to prepare a comprehensive proposal, including draft legislation/regulatory amendments, as needed. Development partners (DPs) could support such an effort by financing assistance from international technical DH experts. Also, given the imperative of cost-effectiveness of their assistance, DPs, who have all complained about implementation delays and inefficiencies related to technical norms and approval procedures, may also require it as a condition for further investment support to the DH sector.

***In parallel, it is proposed to establish a consultative group tasked with preparing a comprehensive DH sector reform plan packaging together the critical legislative, regulatory and financial reform actions.***

The proposed reform group, presumably coordinated by MinRegion, would include the relevant DH sector stakeholders and decision-makers (national line ministries, representatives of local authorities and DHCs, national regulator, parliamentarians) as well as relevant DPs. The purpose would be to overcome institutional fragmentation and to prepare a comprehensive package of the legal and regulatory reforms necessary to enable DH sector modernization. The rationale for a comprehensive reform plan rather than step by step

reforms is related to (i) the urgency of enabling the DH sector to modernize and adjust to a competitive environment, (ii) the difficulty of overcoming resistance to particular reform actions if they are not part of a wider reform plan which will bring benefits as well as costs for the stakeholders, (iii) the complexity and length of the legislative process requires to propose all necessary amendments to primary legislation in a single text. In addition, given the economic importance of the DH sector and potential economic/fiscal benefits of its successful modernization, the implementation of DH sector reform could potentially be supported by Ukraine's Development partners (e.g. IMF programs, budget support).

***In order to put the DH sector on a path towards technical, commercial and financial viability, the reform plan will need to cover the following areas:***

*Comprehensive reform of DH economic regulation, including tariff methodology, tariff adjustment processes, and responsibility for tariff-making.*

The current tariff regulation framework for the DH sector is not adapted to an increasingly competitive environment for DHCs and is incompatible with the planned further steps to liberalize the gas market. The currently applied "COST+" tariff methodology has failed to provide sufficient revenue for DHCs to invest and modernize their infrastructure, or to adequately incentivize efficiency improvements. In addition, insufficient or delayed heat tariff adjustments have resulted in DHCs accumulating significant payment arrears for natural gas towards Naftogaz. It is therefore imperative and urgent to reform the tariff regulation framework so as to allow average heat tariff levels to increase in order to (i) fully cover operating costs while providing more predictability and efficiency incentives over several years, and (ii) provide additional revenue for capital expenditures. In addition, with the prospect of phasing out the Public Service Obligation (PSO) regime for natural gas, the tariff adjustment processes need to be streamlined to allow for automatic pass-through of the variation in fuel costs (natural gas and electricity costs) to end-users. Finally, the overall decentralization process in Ukraine, and the fact that local authorities are increasingly required to support financially their District Heating companies, calls for a gradual transfer of responsibility for tariff-setting responsibility to local authorities. It will be important to organize this transition, by ensuring that local authorities have at their disposal adequate technical support (including sector wide methodologies, technical/financial models and tools, and benchmarking data) to exercise their new responsibilities, and by establishing rules regarding transparent decision-making.

*Creating an enabling environment for the modernization of DHC infrastructure, operations and management.*

DH being a local utility service, the ultimate success or failure of DH service modernization in a given locality will largely depend on the actions of local decision-makers (DHC management and local authorities). However, the national legislative and institutional framework for the DH sector needs to support this modernization instead of hindering it, as is now the case. In this respect, the drastic modernization of Ukrainian technical norms, previously discussed, would be a necessary step. It is also recommended to establish a framework for local energy planning, which would allow local authorities to adequately prioritize their support to DH sector investments on the basis of a long-term strategy. Finally, the shift of decision-making responsibilities towards the local level should also come with a transparency and accountability framework, including for instance the adoption of corporate governance standards for DHCs (financial and technical reporting, disclosure, and supervisory board).

*Supporting a comprehensive financial recovery of the DH sector.*

In complement to the overhaul of tariff regulation, additional reform actions will be required to put the DH sector on a sustainable financial path. This includes strengthening the legal instruments to enforce strict payment discipline for heating bills. Maintaining quasi-perfect payment discipline is necessary from the standpoint of DHC viability but will likely be socially and politically sensitive especially in the context of concomitant tariff increases and further rationalization of means-tested subsidies (HUS reform). Also, even with excellent payment levels, the DH sector will continue to experience a significant liquidity gap during the



heating season (due to the need to pay for natural gas ahead of revenue collection from consumers). With the phase out of the Public Service Obligation (PSO) regime for gas supply, this liquidity gap will no longer be financed by Naftogaz and the establishment of a financing mechanism to secure gas purchase by DHCs throughout the year will likely be necessary and should be planned ahead of time. Lastly, a comprehensive financial recovery plan for DH sector also needs to include a realistic plan for the restructuring of historical debt from DHCs towards Naftogaz.

## 1.2 The urgent need for a comprehensive national District Heating sector reform strategy

Over the recent years, the District Heating Companies (DHCs) in Ukraine have functioned with large operating losses, accumulated significant debt arrears, and failed to invest at adequate levels to maintain reliability and enhance efficiency. Comprehensive sector reform has become urgent, because the DH sector critically needs to adapt to a changing economic, technological and regulatory landscape. Contrary to natural gas or electricity distribution networks, there are technically and economically viable alternatives to DH networks for the provision of heat services. DHCs are therefore exposed to a significant level of competition potentially threatening their continued existence.

The provision of heat supply through District Heating can have significant benefits from an economic and environmental standpoint, depending on the local context as well as national legal and policy environment. District heating systems are most attractive in contexts where the thermal load density and the annual load factors are high, because they result in higher heat volumes, while capital and operating costs related to the construction, maintenance and operation of DH systems are largely fixed. This makes district heating especially attractive for densely populated urban areas and building clusters with high thermal loads (e.g. tall buildings). In addition, in urban areas where real estate is valuable, DH systems allow to save space (no need to equip buildings with boiler facilities). Another important attraction is the potential for DH to enable improved efficiency in use of fuel. In some contexts, depending on local characteristics, DH can enable the use of alternative fuels (Waste-to heat, biomass). Otherwise, one of the major potential advantage of DH is the possibility of producing heat with conventional fuels through Combined Heat and Power (CHP), which is inherently more fuel-efficient than producing heat and power separately. Hence, DH is an important tool from a decarbonization perspective.

One key implication is that the economic attractiveness of DH in a given city is often not determined a priori: some cities can present a potential for a virtuous circle, with high heat load making DH economically attractive, resulting in increasing demand and thereby contributing further to higher load and efficiency. Alternatively, high costs and low reliability of DH services, can result in disconnections contributing to a negative commercial, financial and reliability feedback loop. Whether a given DH company manages to improve its efficiency and commercial attractiveness will depend on a variety of factors, both local and national. At the local level, the initial conditions of the DH infrastructure, the competence, accountability and adaptability of DH utility management, the support of municipal authorities can make a huge difference. At the national level, policies, legislation and regulation can also promote or undermine District Heating viability. In this respect, it is essential and urgent to allow DH utilities, which are now confronted to a competitive and market-based environment, to operate more freely and flexibly. This will require to extensively reassess and simplify the regulatory and administrative environment in which DHCs operate. Also, it is important to ensure that regulation of other energy services (e.g. pricing of gas and gas distribution...) does not create distortions penalizing District Heating.

When a DH system enters into a negative feedback loop, the logical endpoint is a collapse of the system due to lower reliability for lack of investments and maintenance and increasing fixed costs in relation to sales volume. Such as scenario has major negative consequences and can be very disruptive because switching to other modes of heating can be difficult for many buildings and entail significant investments by consumers. Equipment in individual/building level gas boilers are costly, and in some building technically complicated and/or unsafe. Also, the capacity of the gas distribution network to cope locally with increased consumption

may be ensured only with significant investments. Switching to electrical heating require lower individual investments but is inherently less efficient and would create major risks of overloading distribution networks in winter.

For this reason, each DH system would benefit from a long-term strategic plan. The strategic planning will in some cases result in a decision to support densification and modernization of DH services (“DH development strategy”), and in others decide on an orderly retrenchment of a legacy infrastructure (“exit strategy”). In other localities, both approaches could be combined for different areas (densification of the core, conversion in other areas). All these options will entail significant investments and expenditures, but the total costs will eventually be higher if there is no long-term strategic approach guiding investment decisions. DHCs are currently supported financially at the local and national levels through several mechanisms. So far, this has allowed to maintain mostly reliable DH services, and for most DHCs to carry out emergency repairs. This support is however reactive, and mostly designed to avoid short term disruptions. It does not provide an environment in which DHCs can adequately and rapidly modernize.

For each individual DHC, the choice of DH strategy and its implementation will eventually fall primarily on local decision-makers (DHC management, municipal authorities and/or Oblast). It is however the responsibility of the national decision-makers (Government, Parliament, National Regulator) to create an appropriate legal and regulatory environment under which DHCs can compete and adapt.

### 1.3 Overview of recent DH sector reform developments

Even though DH services reach a large share (~40%) of the Ukrainian population, modernization of the DH sector has for a long time been neglected. Until 2015, the sector has been maintained in a situation where non-market relations dominated. DHCs benefited from access to natural gas at subsidized tariffs but were otherwise poorly managed, financially under-resourced for investments and preventive maintenance, and as a result services remained largely provided on the basis of low performance technologies and heavily deteriorated assets. Gaps in the operating cash flow of district heating companies (DHCs) were typically covered by the State, municipalities and accumulation of debts to Naftogaz and other creditors. Starting in 2014-15 the poor state of the sector became even more apparent after significant increases in the natural gas prices were enacted.

The transition to cost reflective natural gas prices has presented significant challenges for the District Heating sector, since natural gas is by far the primary fuel and number one expenditure for DH in Ukraine. Because of gas tariff reform, DHCs have been required to pass-through much higher gas costs in their own tariffs. The required increase in heat tariffs has revealed the inefficiencies in DH operations and made consumers more sensitive to the level of energy bills and more demanding. Higher gas prices have also revealed the real economic cost of low energy efficiency in DH operations, in particular regarding thermal losses in DH networks and to boiler efficiency.

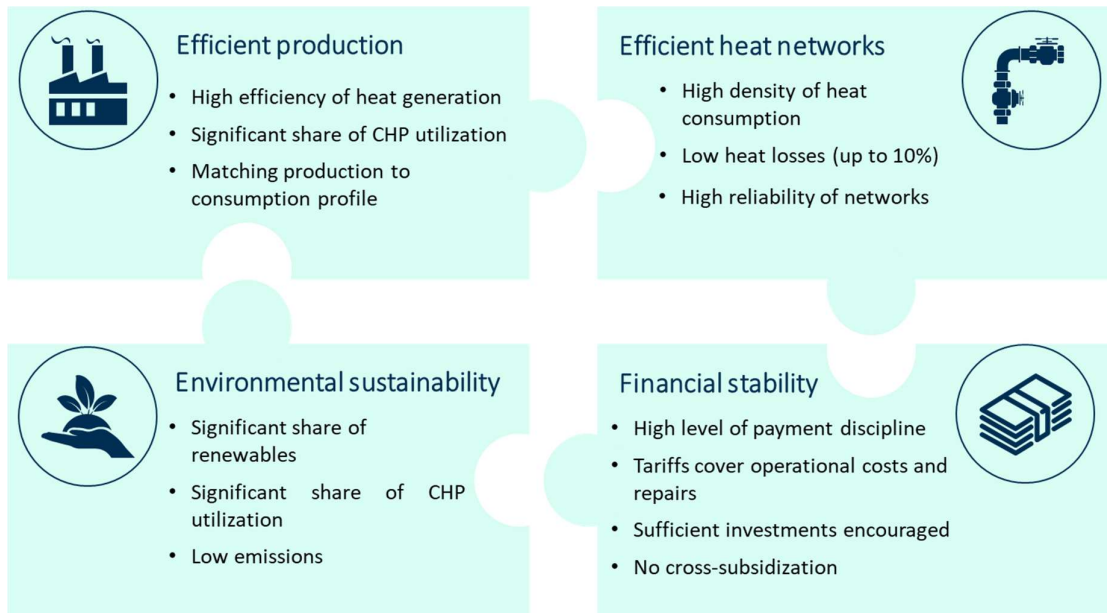
The recognition that in order to adapt to this new economic environment, District Heating companies needed to improve their operational efficiency and reliability of service, starting with modernization of obsolete and decaying DH infrastructure, resulted in actions to support DH sector modernization. First, the Ukrainian government has implemented or initiated several actions at the policy and regulatory level to promote DH sector modernization. Second, international development partners have stepped in to finance critical DH modernization investments.

However, in both cases, the impact has been beneficial but is falling short of what would be required for a successful DH sector modernization.

### Recent national DH sector policy reform actions:

Starting in 2015, the Ministry of Regional Development, Construction and Housing and Communal Services of Ukraine (Minregion) initiated the development of the Concept for comprehensive reform of the DH sector. Eventually, after several rounds of discussions the Concept was adopted by the Government of Ukraine in August 2017. This work was supported by Development Partners including EBRD and the World Bank (ESMAP) and was followed by the preparation of an Action Plan for the Implementation of the Concept of DH sector reform delineating the steps to be taken for sector reform implementation. This action plan for the Implementation of the State Policy in the Area of Heat Supply was formally adopted by the cabinet of Minister in May 2018.

**Figure 1.1 Target state of the DH sector**



One of the key expected outcomes of the reform is the creation of transparent, stable and predictable regulatory and business environment, under which DHCs would be able to attract investments for modernization. In this respect, several important policy steps have been taken to promote investments and strengthen the financial viability of DHCs, including:

- ✓ Monetization of Housing and Utilities Subsidies (HUS) subsidies at utility company level has improved transparency, fairness and payment discipline of the State budget for subsidies;
- ✓ The Law on debts restructuring in the heating sector provided opportunity for DHCs to restructure their debts with Naftogaz and write-off fines and penalties;
- ✓ Policy to generalize building-level heat metering (increased to ~90% from 50% in 2015);
- ✓ The Law on protection of investment accounts unblocked International Financial Institutions (IFIs) projects in the sector.

This policy of modernization of the DH sector has been supported by International Financial Institutions (IFIs). For the last few years, a major source of financing for DH modernization investments have been projects from IFIs, namely the World Bank, the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB) and the Nordic Environment Finance Corporation (NEFCO). These institutions execute projects totaling around US\$ 500 million under state or municipal guarantees and are also providing significant amount of technical assistance in combination with investment financing. While significant, the investments

supported by IFIs fall well short of what would be needed in total to modernize DH systems in the entire country. However, one of the expected benefits of these IFI-supported investments in the DH sector was the demonstration effect.

Unfortunately, the implementation of all IFI DH sector projects has been plagued by multiple issues, and significant delays. While some of the difficulties and delays are related to the relative inexperience of DHCs with implementation of IFI-financed project, most of them can be attributed to a constraining and burdensome regulatory and administrative environment.

#### An unfinished reform agenda:

Overall, since 2015, Minregion has been very active in attempting to address pressing issues facing the DH sector under its responsibility. However, many of the reform measures (such as in the Action Plan) are reactive measures in response to observed urgent problems (e.g. accumulation of debt arrears).

Nevertheless, there are a number of key areas for the DH sector for which with little or no progress to date has taken place, including:

- x The tariff setting process remains inadequate, lengthy, burdensome as well as insufficiently responsive and transparent. In addition, the process does not foster accountability or adaptation from lessons learned;
- x In addition, the current tariff methodology does not provide adequate incentives and predictability for investments and optimization of operational costs. The combination of inadequate tariff adjustment process and of a flawed tariff methodology have resulted in tariffs which fall systematically short of cost recovery levels;
- x Governance of DHCs remains weak and not transparent with little incentives for the management to improve efficiency of operations and service delivery;
- x Penalizing administrative and regulatory environment for DHC investments characterized by the multiplicity, complexity and lack of relevance of control and approval procedures, and obsolete/costly technical norms, creating significant obstacles to the modernization of infrastructure;
- x The lack of proper heat systems development planning is another obstacle to the mobilization of investment financing for DH sector modernization, including coming from municipalities which are showing willingness to support DH companies financially to support a credible modernization strategy but are reluctant to cover DH companies operating losses in an open-ended manner;
- x Lack of sufficient incentives for consumers for timely payments of bills (i.e. fines and legal enforcement).

#### DH sector reform needs to overcome the obstacles related to institutional fragmentation:

The fact that several major issues in DH sector reform have yet to be addressed can be explained by the specific challenges and characteristics of this sector. District Heating is a local service, managed at the local level, with technical and economic characteristics significantly impacted by local factors. At the same time, DH is also one sub-sector of the overall energy sector, highly dependent and constrained by national policies (e.g. gas prices, utility subsidies, CHP regulation, etc.). As a result, DH sector legislation/regulation and governance are characterized by a high degree of complexity and institutional fragmentation, which has limited the ability of MinRegion to implement a more aggressive reform agenda.

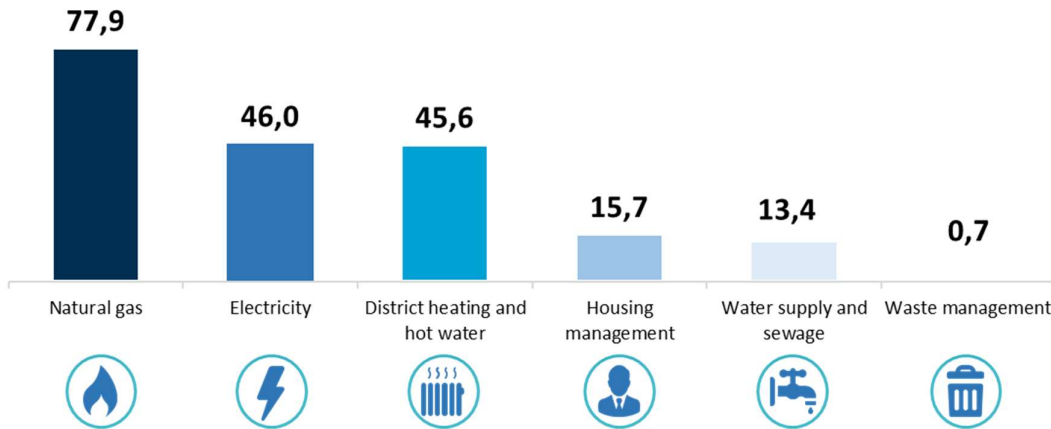
In addition, DH sector reform occurs in the context of overall energy sector reform in Ukraine. Policy and regulatory changes in other energy subsectors can have major consequences for DH. Reform of the natural gas sub-sector has a major impact on DH since natural gas is both the primary fuel and expenditure for DH

companies, as well as the major competitor to DH services (consumers opting for individual or building-level gas boilers). In this respect, gas tariff regulation can artificially promote or undermine the economics of DH. Gas tariff regulation under the PSO regime since 2016, which has consisted in aligning regulated gas tariffs for households and DH companies towards market prices for gas as a commodity, while maintaining artificially low regulated tariffs for distribution and regulated retail costs, makes DH services less competitive against direct gas supply. Likewise, the measures to enforce stricter payment discipline by DHCs for natural gas purchased under the PSO regime are logical and needed but can put DHCs in unsustainable financial positions if they are not accompanied by parallel measures to ensure that DHCs have the legal tools to enforce payment discipline on the revenue side.

## 2 Brief overview of Ukrainian DH sector

District heating services are provided to around a half of population in Ukraine and are estimated to account for about UAH 45 billion per annum (more than 20% of the total housing and utilities services value).

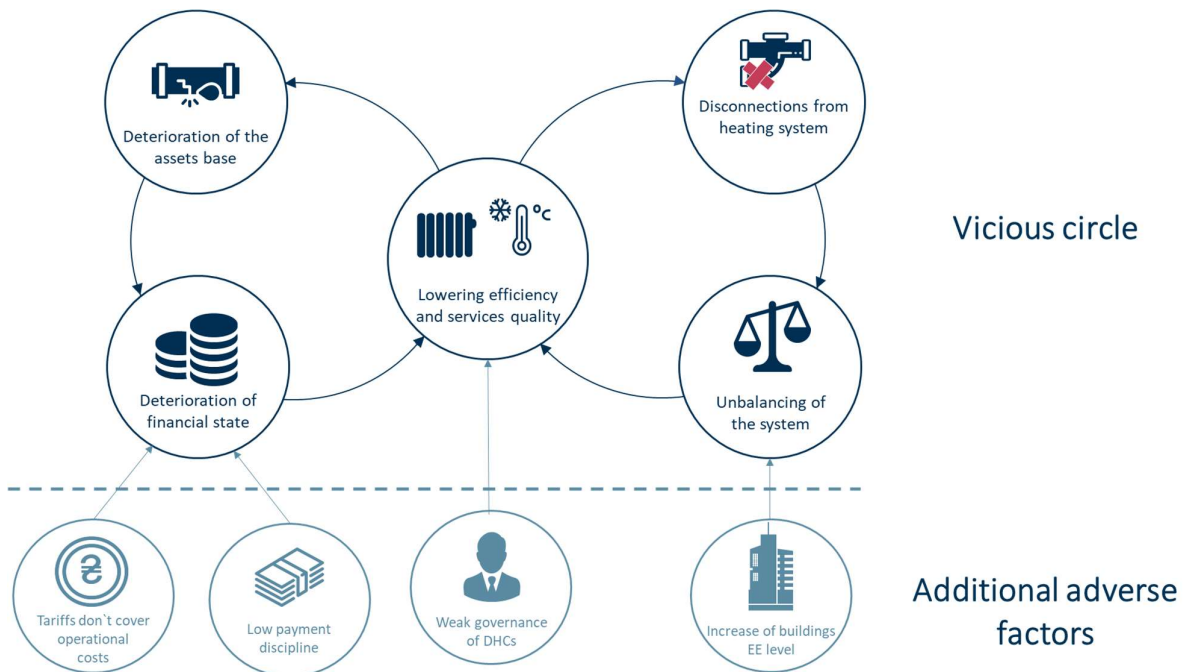
Figure 2.1 Estimate of annual value of housing and utility services to population in 2017, UAH bln



Source: Ukrstat, Naftogaz, NEURC, expert analysis

Unfortunately, over more than 20 years the state policy for one of the largest energy markets in Ukraine was far from being efficient. The sector has been (and still largely is) in a “vicious” circle, whereas financial, operational and technological problems are reinforcing each other.

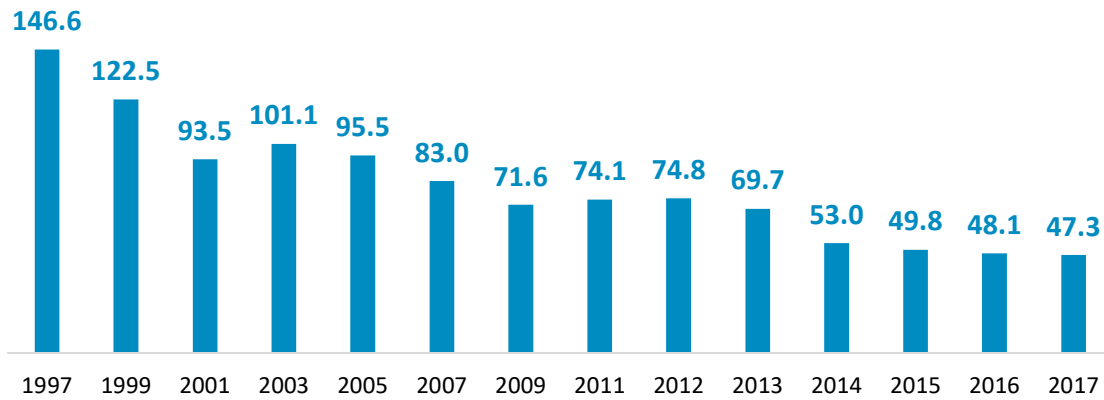
Figure 2.2 Vicious circle of decreasing efficiency of DH system



Source: expert analysis

On the top of deteriorating asset base, district heating in Ukraine experienced constant trend of decreasing demand, which further contributes to lowering system efficiency. Main reasons for that are disconnections from the network due unsatisfactory level of services and general trend for improving energy efficiency in buildings. Over last 20 years the total consumption of DH services has dropped by more than 60%.

Figure 2.3 District heating consumption in Ukraine, mn Gcal



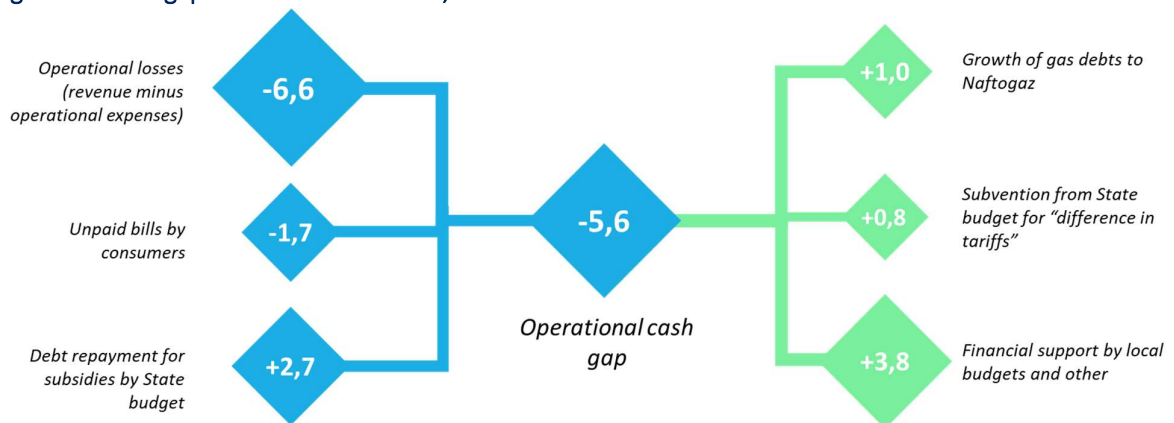
\* data for 2014-17 does not include Crimea and ATO territory

Source: Ukrstat, NEURC, Naftogaz, expert analysis

### 2.1 Financial state of DH sector in Ukraine

Over the recent years the DHCs in Ukraine operate with large operational losses and unsatisfactory payment collection level. According to Minregion data collected from the companies, in 2017 the operational losses of DH sector amounted to UAH 6.6 billion(bn) and the value of uncollected bills to UAH 1.7 bn. It means that the overall operational 2017 cash flow gap for the sector is estimated at UAH 5.6 bn. In such condition the DHCs accumulated large debts to Naftogaz, the primary energy resources supplier to the sector. As of 15.08.2018 the total debt to Naftogaz (including fines and penalties) amounted to UAH 25.9 bn.

Figure 2.4 Cash gaps of DH sector in 2017, UAH bn



Source: data of Minregion, Ukrstat, Naftogaz, experts analysis

The cash gap was covered by increase in accounts payable (mainly to Naftogaz), state support (via difference in tariffs subvention) and local government support (mainly, via injections to statutory capital of municipal DHCs). For instance, during heating season 2016/17 municipal company "Teploenergo" (city of Dnipro) received around UAH 300 million from the local budget via statutory capital injections.





## 2.2 Technical state and investment needs of DH sector in Ukraine

The current technical state of district heating sector in Ukraine is unsatisfactory and results in substantial energy and economic losses:

- About 60% of boilers have exceeded their normative lifetime, and 38% of boilers houses run on low-efficient obsolete equipment (due to combination of both relatively low performance initially and deteriorated condition);
- Almost 40% of heat substations are in emergency state, which causes regular supply interruptions and excess consumption of energy;
- The major part of heat networks has high depreciation level and not covered with modern heat and hydro insulation. Around 15 % of the total network are in emergency state.

According to an assessment of Minregion (Report “Heating in housing and utilities sector” (2016), the DH sector required at least USD 6.0 bn to modernize the networks and heat generation capacities. These investments were in turn is estimated to result in about USD 0.9 bn annual operational savings by DHCs and 2.4 billion of cubic meters (bcm) reduction of natural gas consumption.

**Figure 2.5 Estimate of capital expenditure needs of Ukrainian DH sector**

	 Modernization of heat generation capacities	 Replacement, repair and/or insulation of networks	Total
Investment needs	~USD 3 bn	~USD 3 bn	~USD 6 bn
Annual operational savings	USD 0,4 bn	USD 0,5 bn	USD 0,9 bn
Annual natural gas savings	1,1 bcm	1,3 bcm	2,4 bcm

Source: Minregion

It should be noted that the above figures are of preliminary nature. More precise estimates will require the preparation of professional feasibility studies and the development of proper heating system development plans for municipalities (see section 4.3). In this respect, it will be essential to implement more rigorous investment planning approaches in order to prioritize the investment projects with the highest rates of return. This requirement does not apply solely to the choice between investment options, but also to the technical approach and design of each project which needs a greater focus on optimizing investment costs. For instance, a significant lesson learned from the ongoing WB DH investment project in Ukraine is that there is a significant potential to reduce investment costs and shorten implementation schedules by simplifying and modernizing technical requirements. This will require adapting technical norms, administrative processes, as well as the mindset of DH engineers and managers. DHC investment plans should also be based on realistic assumptions regarding future heat demand which will tend to decline given increasing energy efficiency of buildings, thereby impacting the scale of heat network optimization. The renewal of deteriorated DH infrastructure in Ukraine provides an opportunity to modernize the system and to fully adopt the technologies under so-called “3<sup>rd</sup> Generation DH” (see Annex 2). As part of this modernization, in addition to increased fuel efficiency and reduction of thermal losses, DHCs can also become more responsive to consumer demand (generalization of metering and individual heat substations) and considerably reduce operating costs, including staffing levels



(automatization of boiler houses, and remote leak detections). In a longer term, there is also a potential for further improvement in energy efficiency through the adoption of “4<sup>th</sup> generation DH systems” (which would likely be more promising, at least initially, for buildings not currently connected to District Heating).

### 3 Key recent developments in DH sector

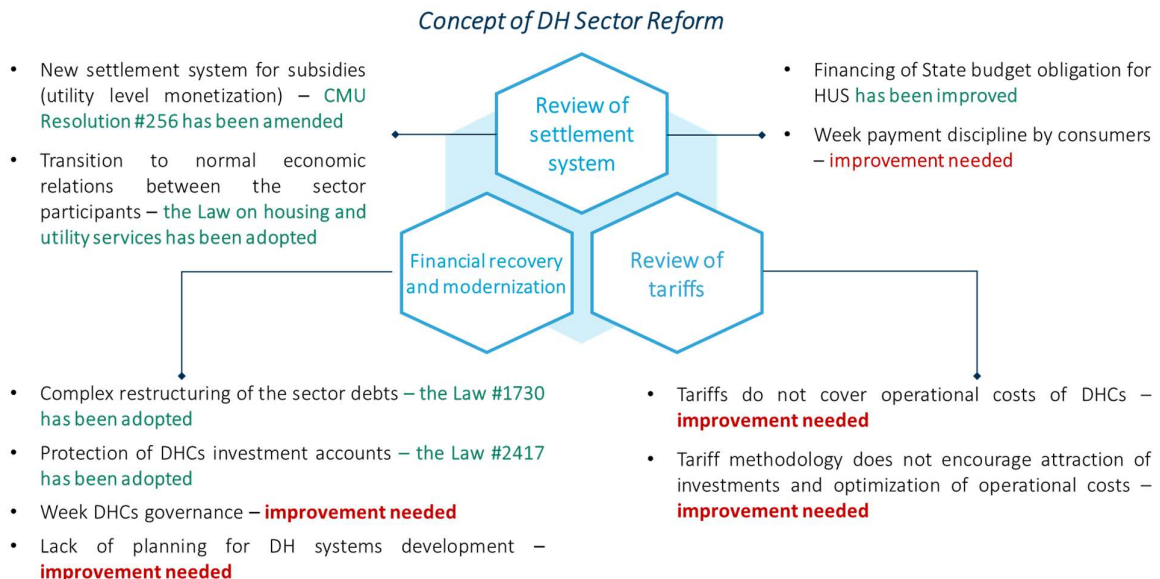
This section describes key developments and reform actions since 2015, which had or expected to have significant effect on regulation and business environment for district heating sector, assessing their impact and recommending follow-up actions where relevant.

#### 3.1 Government Concept and Action plan for heating market reform

Since 2015, on the back of rapid increase of the natural gas prices, the need of the reform in the district heating sector gained even more economic and social importance, and public attention. Therefore, Minregion with the support of World Bank Group and EBRD initiated the development of the Concept for comprehensive reform of the DH sector. The Concept was formally adopted by the Government of Ukraine only in August 2017 (and the formal implementation Action plan only in May 2018), however some reform actions were implemented or initiated already in 2016.

The Concept is the first official document of Ukrainian government, which presented the comprehensive and holistic approach to reforming the district heating sector and consists of 3 key pillars (see the figure below).

**Figure 3.1 Key pillars of the Concept for DH reform adopted by the Government**



Source: Concept for DH reform, expert analysis

Significant progress was achieved in reforming settlements system and financial recovery of the DH sector. In contrast, during the last several years little positive changes occurred in tariffs regulation, in spite of technical assistance to the national regulator on this topic from several DPs – the biggest change was the adoption of the new licensing conditions for DHCs in March 2017, some of which provisions are quite controversial (see more in subsection 3.9).

In May 2018, for the first time in Ukraine's history, the commissioners of NEURC, the key regulatory authority, were selected on a competitive basis. This positive development seemed to open a window of opportunity to accelerate DH sector reform for the issues which are directly under NEURC's responsibility (conduct of tariff reviews and streamlining/improving tariff methodologies), but also for wider sector policy reform for which better alignment, updating and, possibly rethinking of the reform agenda between key authorities (Minregion, NEURC and the Parliament) is needed. However, NEURC has so far not introduced significant changes in its regulatory practices and methodology for the DH sector.

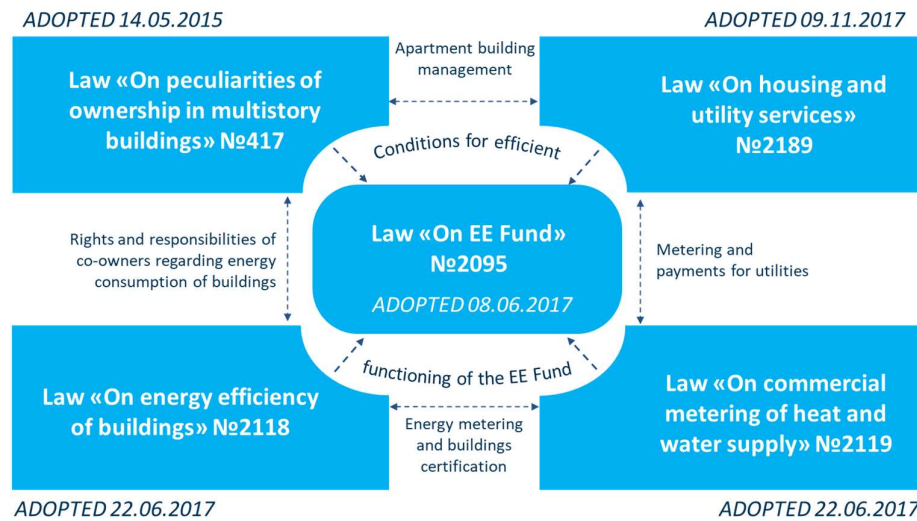
Conclusion/Recommendation:

This report recommends building on the work done and activities implemented/initiated under the concept for DH to prepare a more comprehensive reform plan with the ambition of addressing structural impediments to sector modernization and sustainability.

### 3.2 Housing and utility services reform

In 2015-17 the new primary legislation framework for housing and utility services was established with the adoption of the five Laws. The adoption of the secondary legal acts to these Laws followed in 2018 (see the current status of the secondary legal acts in Annex 1).

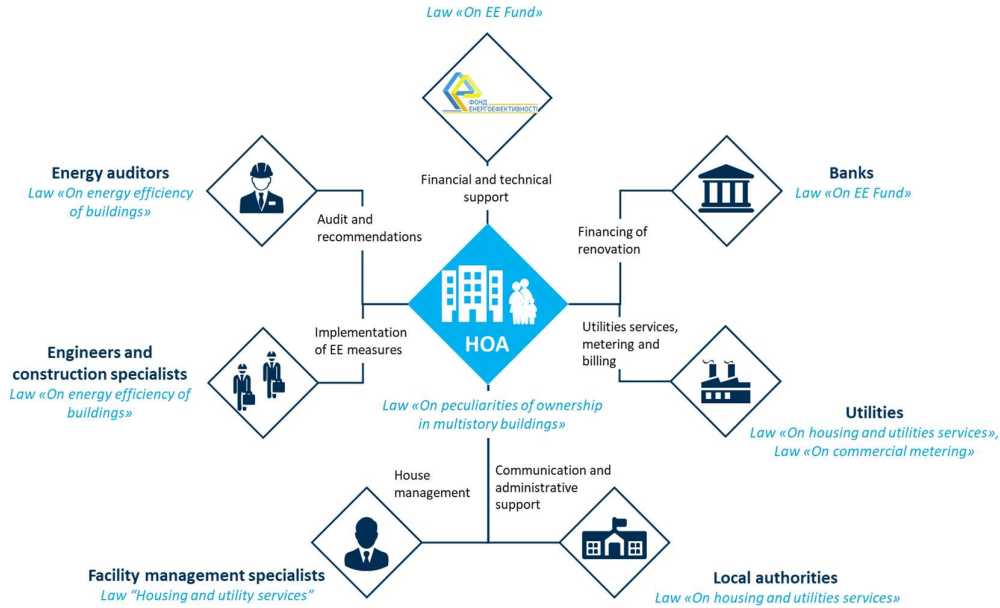
Figure 3.2 Legal framework for housing and utility services reform



Source: Minregion

The key paradigm of this reform is the creation of organized and capable owner of the multifamily buildings, represented by Homeowners Association (HOA), and the market for professional services, which could be contracted by HOAs for efficient management of the building. Specific emphasis is made on improving conditions for implementing energy efficiency projects in buildings, which is expected to strengthen the trend of lowering demand for heating services and shall be considered during heating system planning (see more in section 4.3).

Figure 3.3 New paradigm of multifamily building management



Source: Minregion, expert analysis

For DHCs the most important short-term implications are:

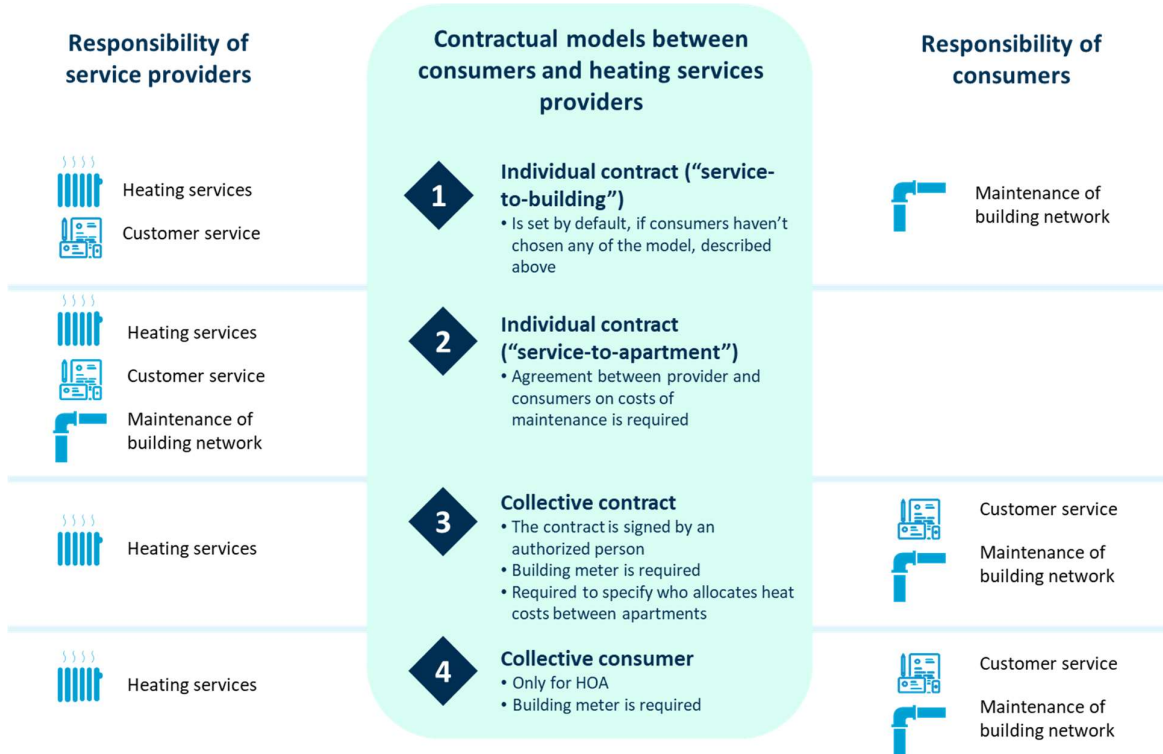
- introduction of the new models of relationship with key consumers (households);
- obligation to insure 100% commercial metering;
- new billing requirements and heat cost allocation methodology.

### New approach for relationship with the key consumers

One of the key intentions of the Law “On housing and utility services”, which shall be fully functioning after the adoption of the secondary legal acts, is to make the contractual relationships between utility companies and their main consumers (households) more transparent and clearer. The Law also creates conditions for development of professional housing services market (Minregion has adopted the typical agreement for such services) and professional housing administrators, which shall substitute soviet-style ZHEKs.

According to the Law, starting in May 2019 the households (co-owners of the building) collectively are able to choose one of 4 models of relationship with DHC. Each model clearly defines services DHCs must provide and be responsible for, and what remains under responsibility of co-owners. For instance, maintenance of the building’s heating system and allocation of heat consumption between apartments can be performed by the homeowner association (HOA) or by a third party contracted separately for this purpose.

Figure 3.4 Models of contractual arrangements between DHCs and households



Customer service includes heat cost allocation among apartments, billing, payments collection etc.

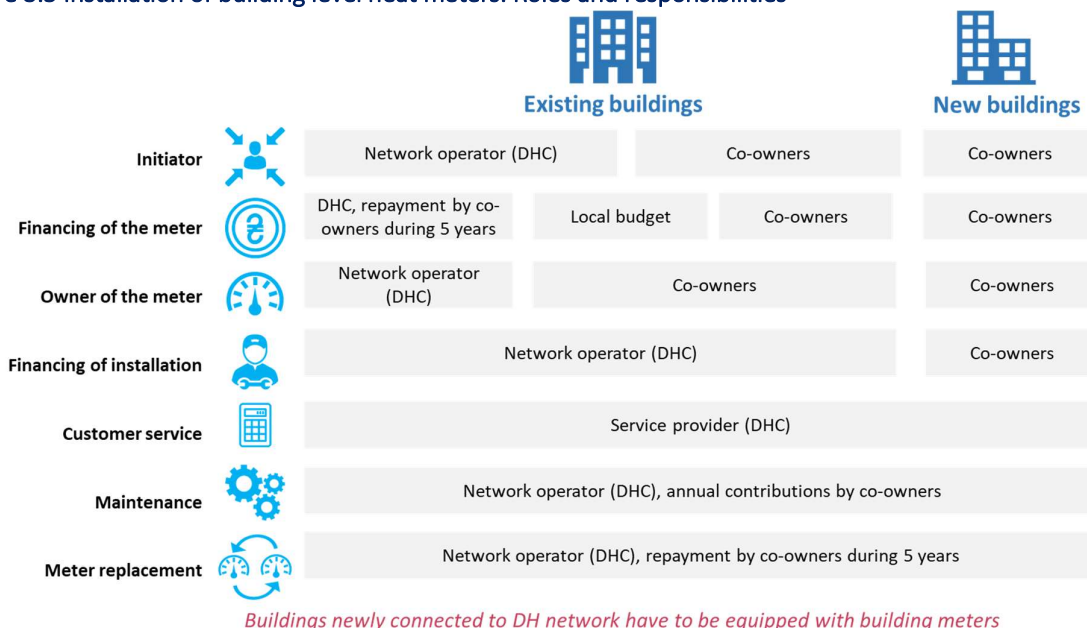
Source: Law “On housing and utility services”, expert analysis

In order to minimize misunderstandings and conflicts with the population, DHCs need to manage the transition to new contractual arrangements by informing and consulting their consumers. Consumer satisfaction is one of the few parameters affecting payment discipline and consumer retention which is directly dependent on the actions of DHCs. Under most contractual models, the responsibility for bill payment to the utility company lies with the households. The exception is the collective consumer model (#4 in figure 3.4 above), in which the HOA (and not individual homeowners) is in theory supposed to pay for heat to the DHC and should therefore bear the financial burden of non-payment by households. In practice, HOAs in most cases will not be able to manage collection. As a result, the related financial risks are very likely to remain with the DHCs.

#### Obligation to ensure 100% commercial metering

According to the Law “On commercial metering of heat and water supply”, DHCs must ensure the installation of building level heat (and if applicable hot water) meters by July 2018 for non-residential building and by July 2019 for residential buildings. If the installation is financed by DHCs, these costs must be repaid by consumers over 5-year period.

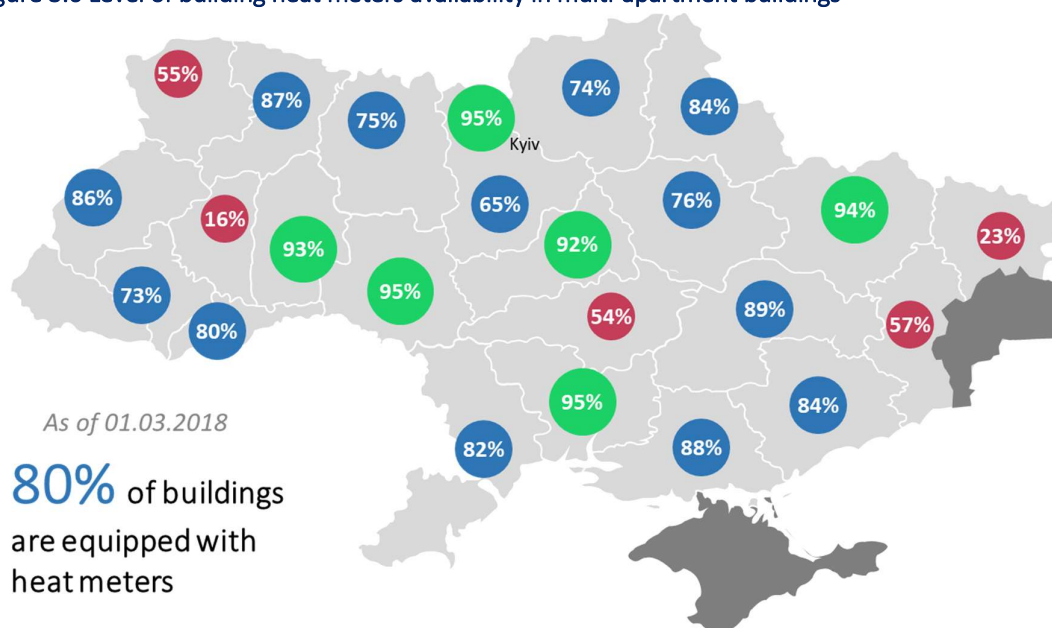
Figure 3.5 Installation of building level heat meters. Roles and responsibilities



Source: Law “On commercial metering of heat and water supply”, expert analysis

According to Minregion, at the beginning of 2019, around 80% of multi-apartment buildings already had heat meters installed (compared to 50% in 2015). Ukraine is close to achieving full metering by the end of 2019.

Figure 3.6 Level of building heat meters availability in multi-apartment buildings

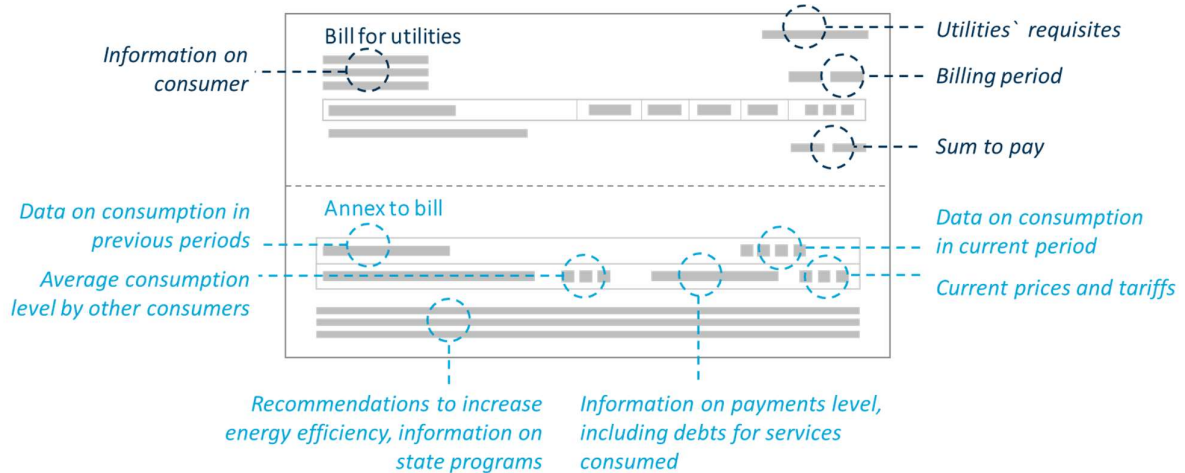


Source: Minregion

### New billing requirements and heat cost allocation methodology

The Law “On commercial metering of heat and water supply” has set the minimum requirements regarding the information and presentation of heating bills provided to the consumers. The new format of heating bill was implemented in the first quarter of 2019.

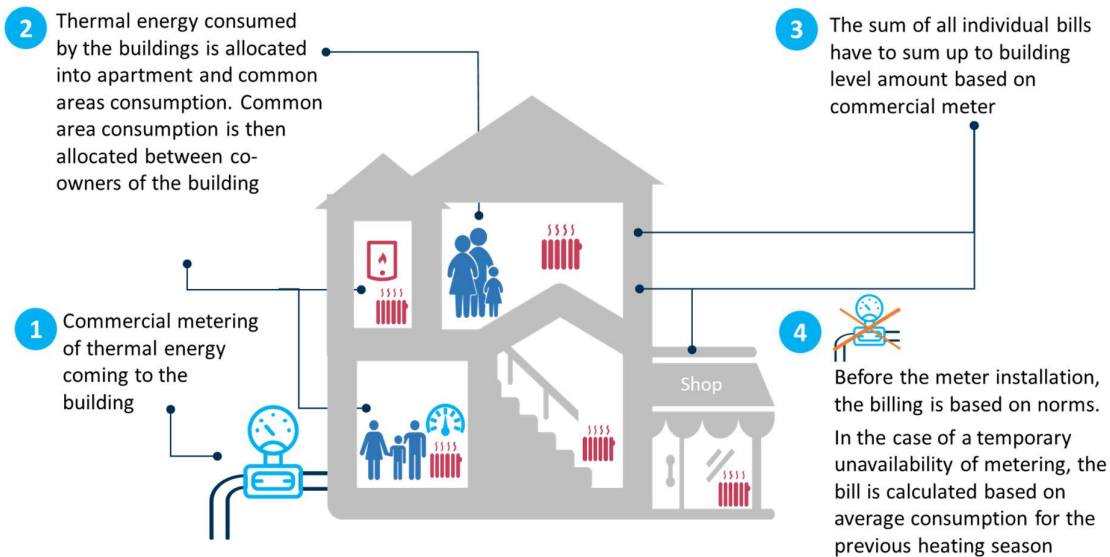
**Figure 3.7 Key requirements to utility bills**



Source: Law “On commercial metering”, experts’ analysis

The Law defines that the commercial metering for heat is performed at the level of the building. Therefore, the cost of heat consumed by the building must be allocated between co-owners of the building. The general principles of allocation are presented in the figure below.

**Figure 3.8 Principles of heat cost allocation among co-owners of the building**



Source: Law “On commercial metering of heat and water supply”, expert analysis

A core factor of the allocation methodology is the area of each individual apartment but additional factors such as the location of the apartment (e.g. corner apartments tend to consume more) are also considered. methodology Once the allocation methodology is adopted, it is important for DHCs, housing administrators, HOAs or other entities, which would be responsible for heat cost allocation and billing to properly apply it. Otherwise, this could lead to confusion, dissatisfaction of households and even further lower payment discipline for consumed services. Therefore, it is important to properly communicate and, possibly, support in application of the new allocation rules.



### 3.3 New settlement system for housing and utility subsidies - monetization

Housing and utility subsidies (HUS) are one of the major sources of revenue for DHCs, in 2017 their share accounted for about 30% or UAH 20 bn. Therefore, timely settlements for HUS is crucial for financial stability for DHCs. Unfortunately, it was one of the major problems for the sector in recent years, for instance only 95% of accrued subsidies were actually settled in 2017 (in 2016 the settlement level was 71%). Moreover, the settlement system itself was not transparent and undermined normal economic incentives of its participants. To address these issues, on 08.11.2017 the Government has adopted the Resolution #951, which introduced the new settlement system for HUS since January 2018 (also known as HUS monetization on utilities level). The key changes in the settlement system are presented in the table below.

**Table 3.1. Key changes in the HUS settlement system**

Before 2018	After 2018
Settlement for HUS is performed only after Common Decision Protocol (CDP) is signed by numerous parties (sometimes more than five), which fixes complex mutual obligations offset scheme	Settlement for HUS is performed without CDPs or any another document defining offset scheme
No deadlines for settlements	Clear deadline for settling HUS before 24 <sup>th</sup> of the month after the utility service is provided
HUS are calculated and accrued based on social consumption norms, which are often higher than actual consumption	HUS value cannot exceed the factual value of utility services consumed. Utility companies must report on consumption of subsidy recipients on a monthly basis

Source: CMU Resolution #951, expert analysis

Despite some operational bottlenecks in the beginning of 2018, new HUS settlement system was mostly welcomed by utility companies (including DHCs). The level of HUS settlement also improved substantially. For the first 7 months of 2018, the Treasury repaid almost UAH 20 bn of debt for HUS accumulated during previous years. As of 01.08.2018 the outstanding state debt for HUS is UAH 6,6 bn.

**Figure 3.10 Accrued and settled subsidies, UAH bn**



Source: Ukrstat

The next step to modernize HUS settlements system reform is the transition to direct subsidy transfers to population (also known as Consumer Level Monetization or “CLM”). The objective is to fully instore a normal economic and contractual relationship between utilities, consumers and other energy markets participants and to increase transparency on the actual cost of energy services (increasing incentives for energy efficiency). However, it is also important to ensure payment discipline on the part of subsidies recipients for their utility bills. CLM implementation was initiated in 2019 through two parallel initiatives. In January 2019 Minsoc introduced new HUS model (type I) for households who applied for subsidies in 2019. These newly enrolled



HUS recipients are receiving HUS funds on a virtual account managed by the State-owned Bank OschadBank. Under this arrangement, OschadBank processes payment to utility companies directly and informs the HUS recipients. At the end of the heating season, residual unused funds under the OschadBank virtual account can be monetized by the HUS recipients.

In parallel, starting in March 2019, another type of monetization was implemented for households already enrolled before 2019. These recipients are receiving a direct cash transfer for HUS t and are responsible for paying their utility bills in full directly.

An evaluation of the outcomes and lessons learned will become possible a few months after the end of the heating season, in particular to assess the impact on consumer behavior (energy consumption, and payment discipline). The two systems may co-exist in the future and may be selected depending on the situation of the household and estimated payment risk. For instance, if a given household accumulates significant debt, it may be transferred to OschadBank arrangement under which HUS funds are by default automatically directed to the payment of utility bills.

### Conclusion

While further adjustments to HUS settlement/monetization mechanisms will likely be required in the future, most of the reform in this area has already been implemented. Over the last 18 months, starting in January 2018, the system has been totally transformed. Until 2017, the HUS settlement mechanisms were complex, mostly cashless, non-transparent and resulted in permanent payment arrears without clear accountability. The system now in place is transparent for all parties involved (utility companies, households, state) with well-identified responsibility for payment arrears.

### 3.4 Amendment to special accounts allocation formula

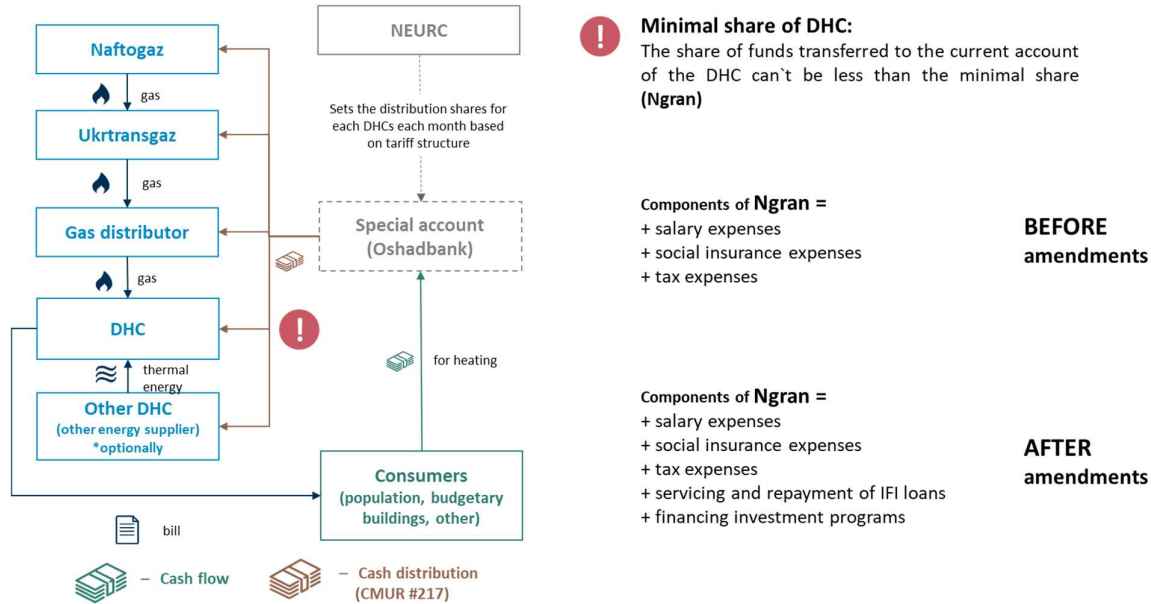
In Ukraine, the Government has established Public Service Obligation (PSO) on gas supplies (see acting CMU Resolution #187 and CMU Resolution #758 expired in April 2017), under which Naftogaz is obliged to sell gas to DHCs with the pre-specified price. In order to limit potential abuses of PSO by DHCs, the Government also established the system of special accounts (see CMU Resolution #217), under which Naftogaz automatically receives a major share of payments for heat supplied by DHCs.

The system of special accounts is justified in the presence of PSO and significant indebtedness of DHCs to Naftogaz, but distorts normal business operations of the companies and their authority over the cash flow received from consumers. This, in turn, undermines the ability of relatively financially healthy DHCs to raise and service financing of investment project.

In order to unblock at least some of the investment project for DHCs, the Government recently made two amendments to CMU Resolution #217:

- In October 2017 the formula for minimal share of cash flow, which a DHC is guaranteed to receive from the special account, was amended to account for repayment and servicing of IFI loans;
- In July 2017 the formula for minimal share of cash flow was further amended to account for financing of investment programs approved by NEURC.

Figure 3.11 Special accounts for heat



Source: CMU Resolution #217, expert analysis

One of the drawbacks of the special accounts system, which could be fixed relatively easy, is that even “good” DHCs with low level of debts to Naftogaz are still forced to use them. One possible recommendation is to establish some settlement level criteria (for instance gas payments to Naftogaz cannot be overdue for more than 1 or 2 months), which if satisfied, would lift DHCs from special accounts system rules (receive 100% of settlement on their current account). It would provide additional incentives for DHCs to timely settle payments to Naftogaz and improve operational environment for credit-worthy DHCs. Another option would be to leave the special account arrangements unchanged until the PSO regime is phased out. According to the most recent amendment to Resolution #187 (adopted in October 2018), the PSO regime for gas supply is scheduled to expire in May 2020. DHCs would be required to purchase natural gas on the wholesale market, and the supply obligation by Naftogaz would disappear. This would be a logical step in the energy sector reform process and potentially allow DHCs to benefit from competition in the gas market. However, in their current situation, the great majority of DHCs would be required by gas traders to pay in advance for gas deliveries (given their lack of creditworthiness). Under current PSO arrangements, the payment schedule for gas to Naftogaz is largely synchronized with the normal bill payment cycles by DHCs consumers. If DHCs had to anticipate payment for gas by 45 days or more, this would create a significant financing need for the sector in winter (~UAH 8 billion under conservative estimate).

Conclusion / Recommendations

The existing arrangements for payment of gas by DHCs under PSO (special accounts, allocation formula) have allowed DHCs to continue to be able to purchase natural gas and receive a predetermined share of income collected from consumers to cover other operating costs, while guaranteeing the bulk of gas payment owed to Naftogaz. The allocation formula has resulted in the revenue deficit of the DH sector (both seasonal and structural) being shared between participants (Naftogaz and DHCs). With the programmed end of PSO, this arrangement will also have to be phased-out in an orderly manner. For this, the issue of the liquidity gap of the DH sector during the heating season, will need to be addressed, together with the debt restructuring and flexible heat tariff adjustment mechanisms before the final phase out of PSO for gas supply to DHCs becomes realistic.

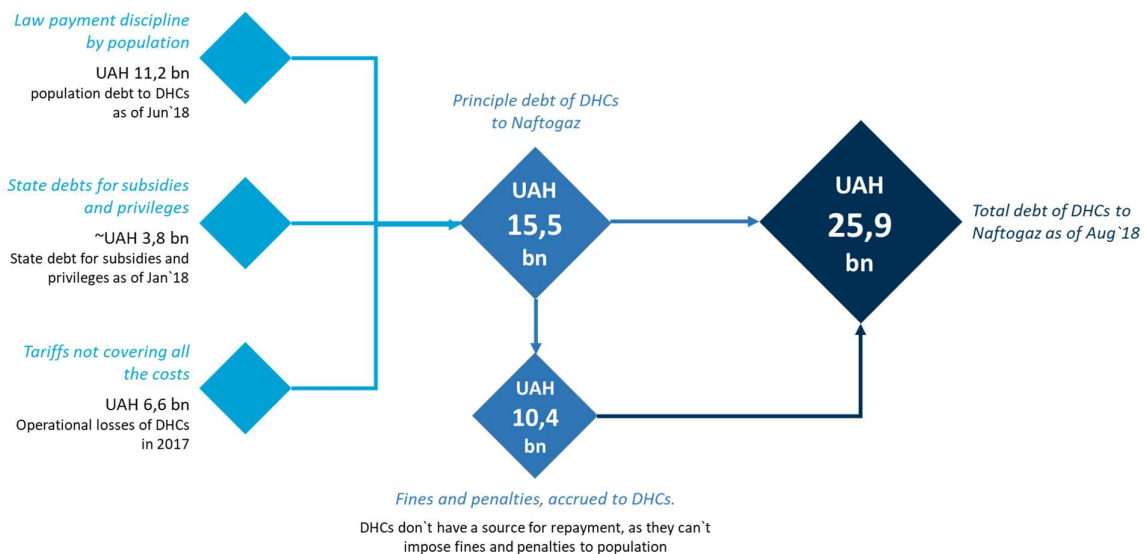
### 3.5 Restructuring of gas debts to Naftogaz. Status and planned amendments

DH industry has accumulated substantial debts to its primary energy resources supplier, Naftogaz. Most of this debt arose due to the factors on which DHCs have limited influence:

- Significant debt from population for heat in a challenging legal environment for enforcing payment discipline (no fines/penalties for late payments, lengthy and costly enforcement procedures);
- Heat tariffs which do not fully cover operational expenses;
- Significant debt for HUS from the state budget.

The third factor (delayed HUS reimbursements by the state) has largely been solved by the monetization of HUS initiated in January 2018. However, the first two factors (non-payment/delayed payment by consumers, tariff regulation) contributed to the bulk of the debt arrears in combination with the accumulation of fines and penalties applied to this debt. The debt accumulated by DHCs reflect their asymmetrical situation with regard to payment discipline: under current conditions, DHCs are not allowed to apply realistic fines or penalties on their consumers and have no source of income available to repay similar fines and penalties applied by their gas supplier.

Figure 3.12 Structure of debts in DHC sector, UAH bn



Source: data of Naftogaz, Ukrstat, Minregion, experts analysis

In order to address this problem, Minregion has developed a Law on debt restructuring (#1730), which was supported by IFIs (including, IMF, World Bank and EBRD) and eventually adopted by the Parliament in November 2016. The Law sets the conditions for DHCs to restructure gas debt with Naftogaz and write-off corresponding fines and penalties.

This legislation created a process for DHC debt restructuring under which DHCs have the possibility to apply for debt restructuring, under a process managed by Minregion, and recorded under a Register kept by the Ministry. The advantages of the restructuring for DHCs are to: (i) put a stop to enforcement proceedings on DHC banking accounts by Naftogaz, (ii) spread debt repayment for the principal over five years, and (iii) allow accumulated fines and penalties to be written-off once the principal is fully repaid according to agreed schedule.

Figure 3.13 DHCs gas debt restructuring process according to the Law



- ◆ Repayments of restructured debts is foreseen **during 5 years**. Fines and penalties aren't accrued for restructured debt
- ◆ Municipalities have to **provide guarantees** regarding DHCs' commitments
- ◆ After the restructured debts are repaid, the corresponding accrued **finances and penalties are written-off**

Source: Law "On gas debts restructuring of DHCs", expert analysis

This legislation has had a positive impact and helped manage a crisis situation for DHCs (which were often no longer able to operate in a satisfactory manner due to blocking of their bank accounts). In August 2018, 217 DHCs were included in the Registry with the total gas debts to be restructured of UAH 9.4 bn and the total fines and penalties to be written of UAH 6.4 bn. This corresponded to 61% of the total DHCs' debt to Naftogaz. Total arrears for payment of gas from DHCs remained mostly stable in 2017 and 2018 indicating that the debt situation of DHCs had stabilized, in a context where regulated gas prices under the PSO remained unchanged and where settlement of HUS was reformed in a direction favorable to DHCs. However, this trend was not sustained during the 2018/2019 heating season, which saw an increase in gas debt on the part of DHCs. While a seasonal increase is normal, this heating season was also characterized by several events with a negative impact on the ability of DHCs to fully pay for gas supply: i) increase in gas tariffs in November only reflected in heating tariffs in January 2019, ii) rationalization of HUS benefits and reduction of the number of beneficiaries, and iii) monetization of HUS at the consumer level.

### Conclusion / Recommendations

The Ukrainian Parliament has been considering amendments to the November 2016 Law for some time, in particular to extend the timeframe for gas debt restructuring and repayment. Such a "restructuring" of the debt restructuring law appears necessary, due to the limited progress of other reform actions necessary to allow DHCs to meet their debt service obligations after the debt restructuring. Without reforms to address the cost of non-collection, and inadequate tariff levels, most DHCs will remain unable to reach financial break-even for their current operations, let alone debt service for historical debt. In this context, a possible approach would be to amend the legislation to make it easier for DHCs currently engaged in the restructuring process to remain on track, which would not preclude the later adoption of a final restructuring plan which would logically be adopted as part of a wider set of reform of the DH sector allowing DHCs to revert to financial sustainability.

### 3.6 The Law on protection of DHCs' investment accounts

Due to poor financial conditions (c.f. Section 2), most of DHCs were under a constant threat of legal enforcement procedures and blocking of accounts. In some cases, the funds provided by IFIs to DHCs for modernization projects were withheld due to such procedures. Obviously, it significantly undermined the execution of any DHC modernization project.

In May 2018, the Parliament adopted the Law (amending other Laws of Ukraine), which prohibited blocking of funds of DHCs and water utilities, which were provided by IFIs for investment projects. According to the Law, utilities shall open special investment account to which IFIs financing is transferred and which are protected from being blocked.

### 3.7 The Law on promotion of RES for heat generation

In March 2017, the Parliament has adopted the Law “On stimulation of heat generation from renewable energy sources”. According to the Law the tariff for heat generation could be automatically set to 90% of the heat tariff on natural gas. This Law is expected to stimulate investments to heat generation capacities from renewable energy sources (RES), mostly biomass, and reduce consumption of natural gas.

This simple link between heat tariffs from RES and gas heating tariffs has been effective at promoting the initial rollover of RES capacities. It made regulatory approval of RES heat tariffs straightforward and simple. The low initial prices of biomass fuel in Ukraine also made investments in biomass-based boilers financially attractive. However, biomass prices in Ukraine have significantly increased over the recent years due to increased national demand, as well as demand from some Western European countries (driven by renewable mandates). The use of biomass for heat production is beneficial from an emission reduction perspective only where biomass is a truly renewable resource, for instance produced as part of sustainable forest management (as opposed to illegal logging). Several Ukrainian DHCs are exploiting either imported woodchips or peat as biomass fuel, which are both problematic from an environmental standpoint (long distance transportation, non-renewable character of peat).

Ukraine being a country with a major agricultural potential which is only partially exploited, the potential for increased exploitation of agricultural byproducts for sustainable biomass-based heat production is significant. In this respect, the traditional model is for DHCs to invest in biomass boiler capacity. But private companies operating in the agricultural sector are also potential investors, with the advantage of controlling biomass production. Some companies have started to enter this market by entering into contracts with DHCs under which they sell heat produced with biomass. For this, they usually deploy containerized boilers, which provide a flexible solution (fairly low investment costs, rapid installation, possibility to redeploy to another location depending on demand).

### 3.8 The Law on NEURC

The currently operating National Energy and Public Utilities Regulatory Commission (NEURC) was set up by a decree of the President of Ukraine on 27 August 2014 to replace the two liquidated commissions, the National Energy Regulatory Commission and the National Public Utilities Regulatory Commission. Until 2016, NEURC operated under the legal acts adopted by the President. Such set up did not comply with the basic EU principles of national regulatory authorities and undermined the independence and legitimacy of NEURC decisions.

In September 2016, the Parliament has adopted the Law “On the National Commission for the State Regulation of Energy and Utilities” (the Law on NEURC), which defined the NEURCS’s legal status, objectives, functions

and powers. According to the Law, NEURC performs state regulation, monitoring and control of entities in energy and utility spheres. This includes heat generation (inc. CHP), heat transport and distribution, and licensing of such activities. The adoption of the Law was welcomed by international partners, including the Energy Community Secretariat. In May 2018, for the first time in Ukraine's history, NEURC commissioners were selected on a competitive basis.

However, while the legal framework for operation of NEURC has been aligned with the EU acquis, practical implementation does not live up to this. This includes the failure to adjust national legislation in order to bring into effect the financial independence of NEURC as stipulated by the Law on NEURC. There is a significant room for improvement both as regards the commitment of public institutions of Ukraine to respect the independence of NEURC as enshrined in national legislation, but also as regards the independent performance by the regulator. More information on problematics and recommendation can be found in the report “Governance and Independence Review of NEURC” by the Energy Community Secretariat published in March 2018.

### 3.9 New licensing conditions for DHCs

On 22.03.2017 the NEURC adopted the Resolution #308, which established the new licensing conditions for district heating sector. It significantly increased the heat volume threshold for DHCs to be regulated and licensed by NEURC (all companies below the threshold are licensed by local authorities). Moreover, the Resolution specified additional condition for DHCs to be licensed the NEURC – the level of building level meters installed in the DHC’s network.

**Table 3.14. Licensing conditions of DHCs**

<b>NEURC</b>	<b>Local authorities</b>
DHCs with both conditions satisfied	DHCs with one condition satisfied
<ul style="list-style-type: none"> <li>• &gt; 90% of building level metering</li> <li>• &gt; 170 ths Gcal per annum</li> </ul>	<ul style="list-style-type: none"> <li>• &lt; 90% of building level metering</li> <li>• &lt; 170 ths Gcal per annum</li> </ul>
<b>47</b> DHCs	<b>209</b> DHCs
<b>~50%</b> of the total heat supplied	<b>~50%</b> of the total heat supplied

*Source: NEURC Resolution #308, expert analysis*

As a result, only by applying the heat volume condition, 74% of DHCs shall be licensed by the local authorities (though by heat volume it represents only 12% of the DH market). After applying the metering condition (at the time of the new licensing conditions were adopted) about 90% of DHCs were subject for licensing by local authorities (by heat volume it represented 75%). For the 2018-2019 heating season, several large DHCs (for instance, in Kyiv, Odessa, Lviv, Zhytomyr) were licensed on the local level because of the metering criteria for licensing.

### Conclusion / Recommendations

In our view, the metering condition for licensing creates adverse incentives for DHCs and should be revised. In particular, some DHCs may want to slow the installation of commercial meters if they prefer to be licensed and regulated locally. It also creates ambiguity and increases turnover of licensing authorities, which could create additional operational problems for DHCs. This issue should be addressed as part of the larger issue of the relevance of continued centralized regulation of DHCs at the national level. A system under which local authorities would have the option of assuming responsibility for licensing and regulation of DHCs, in

exchange of well-defined commitments (typically financial commitments such as municipal guarantees for DHC borrowing) ensuring that they have “skin in the game” and incentives to fulfill their responsibility in a responsible manner, would be preferable to the current arrangements which do not seem to allocate responsibility for regulation on the basis of a rational criteria.

### 3.10 Municipal guarantees for DH investment projects

In 2017 there were both positive and negative developments relating to the procedure of providing municipal guarantees for investment projects of utility companies. Due to the current financial state of the DH sector, such guarantees are de facto necessary to raise external financing for any investment project in DHCs.

From one hand, Amendments to the Law “On Investment Activity” were adopted in March 2017, which simplified approval of municipal guarantees. From another hand, the Law “On State Aid to Business Entities” came effective in August 2017 and defines any guarantees, equity contributions, and other financial transactions made by municipalities as a form of the state aid requiring to obtain approval by the Antimonopoly Committee of Ukraine (AMCU). The Law introduced 70 days approval procedure (in practice may last more than 100 days), which substantially delays the execution of IFIs funded projects with utility sector.

According to the EU guidelines, natural monopolies (a criteria which could include DHCs since switching to alternatives for heating would entail considerable costs/and or delays for many consumers) may be exempted from the scope of the State Aid Law regulation. Moreover, most of DHCs are owned by municipalities which are being required to provide financial support to maintain the continuity of heating services and modernization investments.

#### Recommendations

In our view, and especially for IFIs funded project, the AMCU approval requirement is redundant and should be lifted. This requirement will add yet another bureaucratic obstacle to DH modernization investments. The priority for the DH sector is to promote the modernization of network infrastructure for which there is no potential for competition.

There are two possible solutions:

- fast track – clarification to be issued by the AMCU on non-application of state aid definition to natural monopolies (or even for narrower scope of cases, which should include municipally owned utilities);
- longer-term solution – amending the Law “On State Aid to Business Entities”.



## 4 Key areas to address in further DH sector reform

This section identifies key areas in the legal and regulatory framework for DH which critically require reform to create enabling conditions for modernization of DHCs. These areas are critical for the continued viability of the DH sector because they condition: (i) the financial viability of DHCs (tariff regulation and payment discipline), (ii) the ability to implement the investments necessary for modernization of DH infrastructure (improving strategic planning, optimizing investments costs and delays) and (iii) the accountability and incentives to improve DHCs’ management and corporate governance.

### 4.1 District heating tariffs

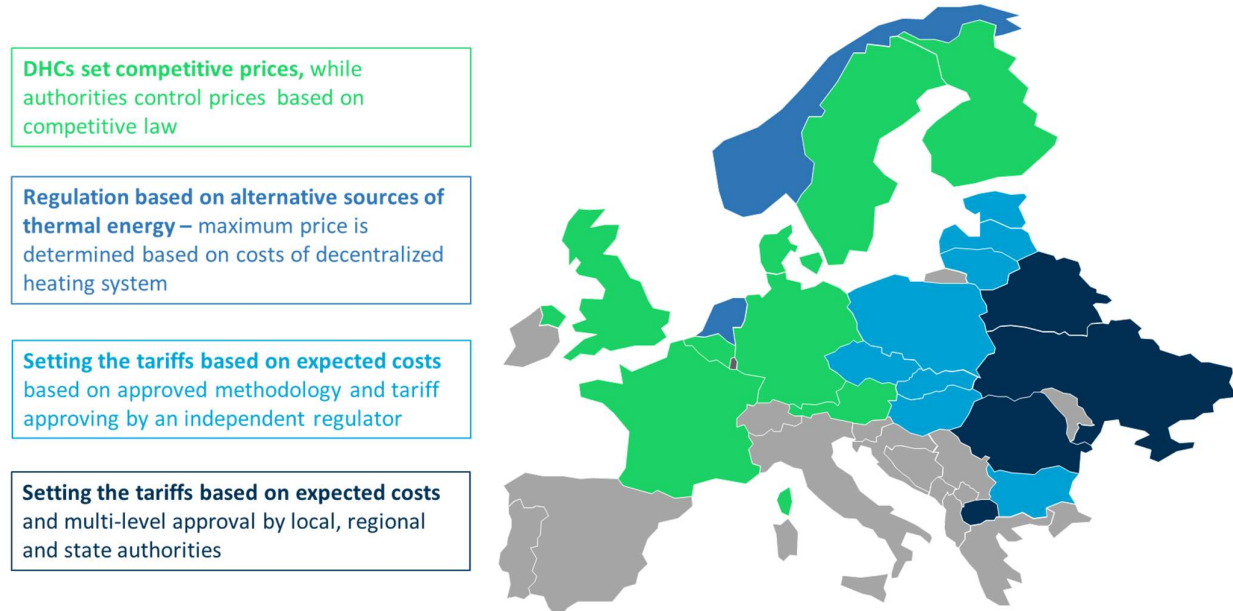
Tariffs and licensing are one the most crucial factors, which determine operational, financial environment and investment attractiveness of DHCs. In Ukraine, we see a significant room for improvement and streamlining for licensing rules, tariffs setting methodology and procedures.

#### Authority for licensing and tariff setting. Centralized or local?

In the majority of Eastern European countries of the EU (the Member States with DH systems which have much in common to Ukraine), most of regulation functions for DH were performed by a central independent authority, at least in the initial transition phase after the end of the Soviet Union.

As already described in section 3.3 current licensing conditions in Ukraine are quite controversial and may create adverse incentives for DHCs. Moreover, the roles of different authorities in regulation are fragmented, which may create confusion, delays, inefficiencies and create a lack of accountability and consistency (see Annex 4 for roles of different authorities).

Figure 4.1. DH sector regulation models in Europe



Source: Fortum

A case can be made for and against both the centralized and decentralized models of regulation. Both options have their pros and cons, which are briefly summarized below.



### Centralized regulation

- Economy of scale – it is cheaper to administrate the system centrally
- More specialized professional staff can be kept on the central level
- Lack of knowledge and understanding of the local context
- Difficulty to coordinate and carry out analysis and approval of investment projects (interaction with local authorities will be required in any case)
- Independence from local populist influence, but the risk of political influence on the central level, which will affect the whole sector
- Lack of consequences and accountability for failure and inadequate performance (e.g. failure to adjust tariffs, delays in investment approval, etc.)

### Local regulation

- Total cost of administration would be higher – each locality with DH system must have its own regulation unit
- Less professional staff – it might be difficult or too costly to find professional specialist for regulation (especially in smaller municipalities)
- Good knowledge and understanding of local context
- Easier to coordinate and perform investment projects and raise financing
- The risk of populist political influence on the local level
- As municipalities are taking an increased financial burden to support financially DH companies, they need predictability regarding adequacy of tariffs compared to costs.

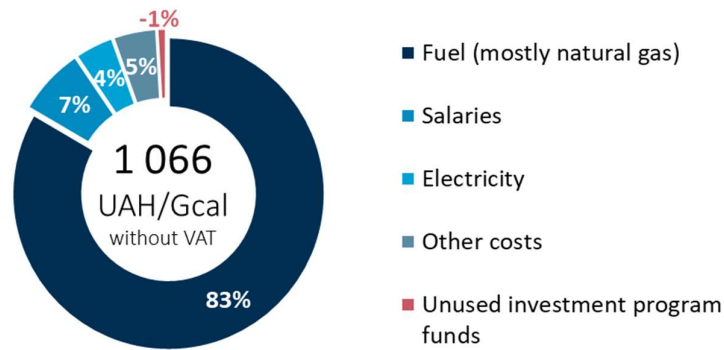
Overall, formerly planned socialist economies initially put in place centralized mechanisms for DH tariff regulation, often with the support of international partners. Such a centralization made logical sense when DH was supported financially at the central level (through direct financing as well as regulated gas prices below markets prices) while local authorities had limited capacity and financial resources. However, the centralized model of regulation has demonstrated its limits over the last few years and has failed to evolve in parallel with the reform of the gas market. In addition, municipalities are being required to provide increasing financial support to DHCs, without being able to influence tariff setting or investment approval. The transition towards a decentralized regulation model needs to be considered, with some safeguards to mitigate risks of adverse or unprofessional local influence. In this respect, the central authority (i.e. NEURC) may be given ex-post supervision powers.

One option would be to allow local authorities which have accepted to support their DH operator to opt out of tariff setting by NEURC. The possibility of tariff-setting delegation would be open to the relevant local authorities who have committed to provide significant support to their DHC, either through direct financial support for investments or through the provision of municipal/local guarantees. This approach would be consistent with the overall principles of decentralization policy aimed at stimulating regional development.

In any case, a discussion on the proper regulation model for Ukraine should be conducted as soon as possible among key stakeholders (Parliament, Minregion, NEURC, local authorities and DHCs representatives) because the current arrangements are not conducive to consistent and transparent regulatory decision-making, and to an efficient allocation of responsibility fostering accountability.

### Tariffs methodology and procedures currently in application in Ukraine

Current tariff setting procedures for DH services are complicated, time-consuming and involve many parties. The procedure for a heat tariff adjustment decision typically takes more than 50 days for NEURC licensees, and more than 30 days for local authorities' licensees. These delays do not include the time required for the calculation of the tariff and documents preparation by the DHCs. Moreover, the procedures contain provisions that allow the authorized body to extend review time for an indefinite period.

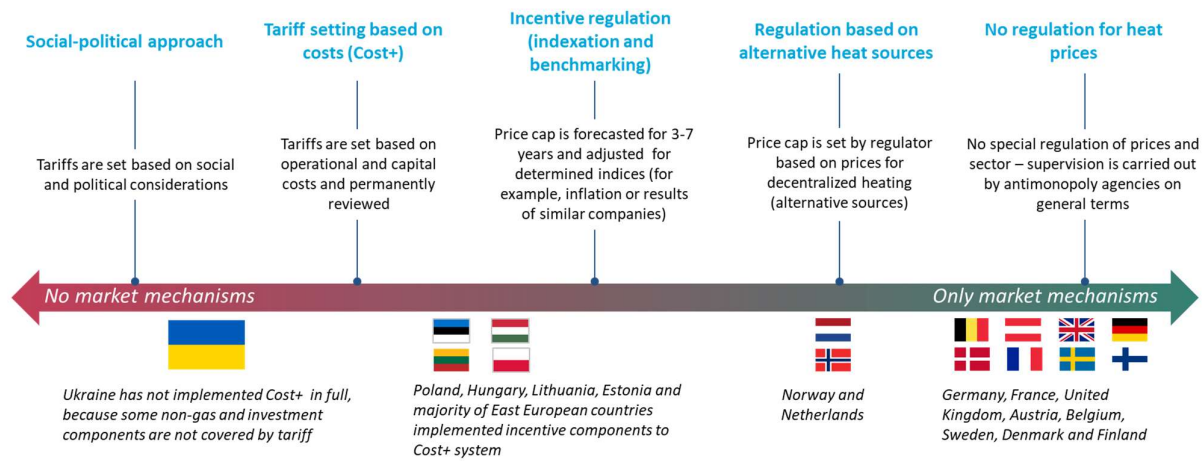
**Figure 4.2 Weighted average heating tariff structure for population (2018)**


Source: NEURC

The length of the procedure is less of the problem when the price of key cost component, which is the natural gas, is set at the central level. The regulated natural gas price for households and DHCs (PSO price for gas) remained unchanged for two heating seasons after April 2016 ensuring consistency between regulated natural gas and heat tariffs. However, the adjustment of the PSO gas tariff decided by the GoU in October 2018 and applicable from November 1<sup>st</sup>, 2018 could only, based on applicable procedures and mandatory consultations, be reflected into heat tariffs on January 1<sup>st</sup> 2019. The corresponding losses for DH companies have been estimated in excess of UAH 2 billion which is significantly more than the regulated margins allowed by the regulator under the applicable “COST+” methodology. One of the stipulated goals of the ongoing natural gas market reform is to abandon price subsidization – all consumers of gas (direct or indirect) will procure for gas on a competitive basis and pay the market price (and pay a regulated gas price reflecting fluctuating market prices until the full transition is completed). Such transition to market-based gas pricing will create significant operational problems for DHCs operations, if the tariff setting procedures are not adjusted to reflect the variation of gas prices. One of the possible solutions is to implement a simplified tariff adjustment procedure for automatic “pass through” external costs such as energy resource prices (including at least natural gas and electricity prices) which are uncontrolled from a regulatory standpoint.

In addition to a burdensome adjustment process, the tariff methodology itself is unsatisfactory. The tariffs while based on “COST+” methodology, do not fully cover the operational cost of DHCs. For 2017, the revenue gap of the sector was estimated at UAH 6.6 bn. This gap can be attributed to several features of the methodology which does not allow for full recovery. Another issue is the inadequate operating efficiency and bloated cost structure of DHCs. The gap is partially compensated by “difference in tariffs” subvention from the State budget, but the amount of compensation is relatively low (UAH 0.8 bn for 2017) and the allocation procedure is not transparent. The current COST+ tariff methodology, implemented on an annual basis, is not conducive to improvements in efficiency. It does not provide for adequate tariff recovery of financing costs for investments, considers efficiency parameters separately and independently instead of allowing for overall optimization, and in some areas strongly disincentivize modernization and efficiency improvements. For instance, DHCs which often have massive excess staffing, are not allowed for cost-recovery purpose in heat tariffs to reduce staffing levels and increase salaries to the levels required to retain or attract competent specialists.

Figure 4.3 European models of tariff setting for district heating



Source: Inogate, Fortum, expert analysis

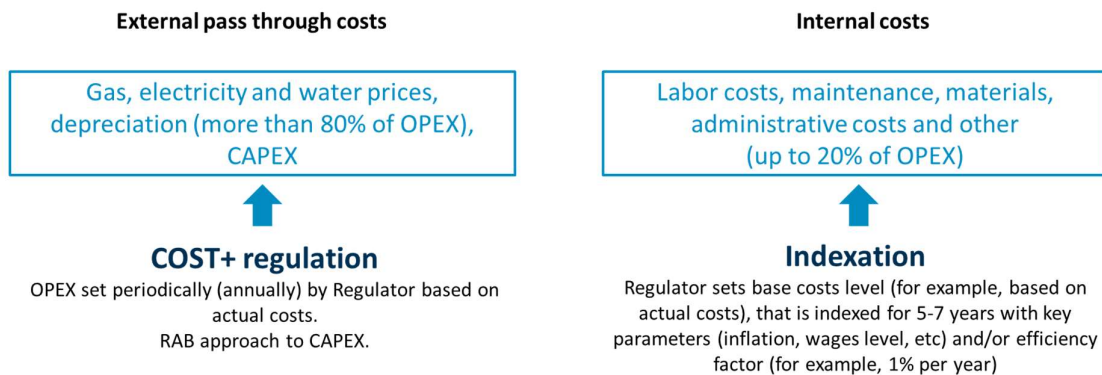
In addition to the requirement to improve the current “COST+” methodology, gradual incorporation of more advanced features shall be considered:

- Two-tier tariffs (fixed and variable parts) would lower the seasonality and cash gaps for DHCs and ease the payment burden for households during the heating season;
- RAB (Regulatory Asset Base) methodology could improve accounting for CAPEX and amortization expenses in the tariff and promote investments but the implementation of RAB tariff for DHCs, as well as other energy sub-sectors, has lagged and could be problematic when applied to decrepit infrastructure. It is however necessary and urgent to provide a predictable and financially viable regulatory framework for the financing of new investments;
- Incentive based elements (indexing and benchmarking of certain cost components over several years) would increase incentives for DHCs to optimize operating costs and improve efficiency.

Figure 4.4 Combining Cost+ and incentive regulation (Eastern Europe)

Eastern Europe countries implemented components of incentive regulation to Cost+

**Example of implementation** – divide operational costs on two (or more) groups, that calculated with different approaches (for example, COST+ and indexation)



Source: expert analysis

## Recommendations

The key conclusion from the above is that the current centralized regulatory arrangements for DH have failed to evolve and adapt in response to a more competitive environment for DHCs. Improvement in the tariff adjustment procedures and in the underlying tariff methodology are urgently needed to enable investments and create appropriate incentives to improve DH efficiency, but also critically to allow to DHCs to continue to be able to purchase natural gas after the planned phase-out of PSO is implemented. At the moment, there is no clear consensus regarding the optimal tariff methodology for DH services in Ukraine, and arguably, there may not be a one-size-fit-all methodology given the diversity of the sector and specific economic characteristics of each DH system. In addition, the local authorities controlling DHCs are not similarly ready (in terms of technical capacity and willingness) to take on responsibility for DH sector regulation. For this reason, a pragmatic approach would to give an option but not an obligation to local authorities to take on responsibility for DH sector regulation. This ability of exercising this option could be conditioned on the local authority providing some financial support to its DHCs.

The national level (NEURC and Minregion) would still have to play a significant role in terms of definition of technical support to local authorities regarding the collection of sector information (e.g. establishing and implementing a uniform and standardized accounting system to permit meaningful cost comparisons, introducing cost forecasting/benchmarking for DH providers, requiring reporting inputs and outputs in physical terms for heat flow quantities, etc.) and on assistance to economic regulation (recommendation on possible tariff methodologies, diffusion of models and tools...).

## 4.2 Payment discipline

*This section is partially inspired from the EBRD report “Improvement of Payment Discipline in the District Heating Sector” (2017) prepared as a part of technical assistance to Minregion.*

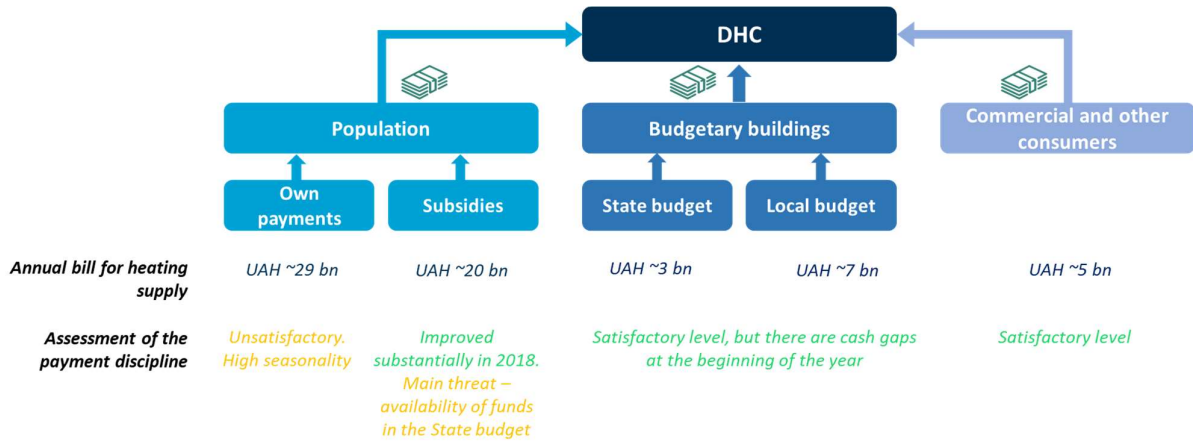
Ensuring a high level of payment discipline is a necessary prerequisite for proper development for any utility business. Usually, when a utility company is not collecting close to 100% of billing one of three things is happening (or a combination of them):

1. The utility company is charging the remaining customers more in order to cover all the costs. This state of affair is not fair to paying customers. Eventually, paying customers may become resentful and stop paying as well. This can start a downward spiral of non-payment;
2. The utility is subsidizing its costs by other means, such as State or local budgets. This arrangement can work temporarily but is unstable: subsidies can dry up in harder economic times, leaving the company financially vulnerable. Additionally, the money being used to subsidize the utility could be used providing other necessary services in the community. Also, if significant non-payments persist, the risk of downward spiral is also significant;
3. The company, lacking the appropriate financial resources, is not being operated or maintained properly. The result is deterioration of operation and maintenance, lowering quality of service, and also decreasing the sustainability and life span of the utility, making it more likely to break down sooner than it should. Such scenario could cost much more for the community in the long-run.

The current DH tariff methodology in Ukraine does not make any allowance for non-recoverable revenue. The situation of DHCs is best described by a combination of scenarios 2 and 3. It is therefore critical to create the conditions for improving DH collection rates so that every customer is paying their fair share for district heating and any other utility services.

In Ukraine, DHCs have 3 main types of clients: population (households), budgetary buildings, commercial and other consumers. The major revenue source and the major payment discipline issues relate to the consumption by population, which, in turn, consists of two streams – own payment by households and HUS subsidies. Payments for budgetary, commercial and other consumers, collectively account for about 20% of DH revenue and have better collection rates.

Figure 4.3. Revenue sources for DHCs

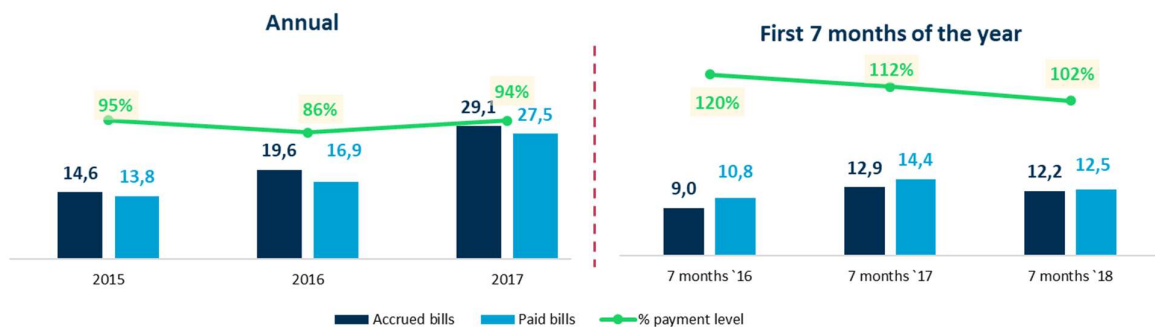


Source: Ukrstat, expert analysis

### Direct payments by households

Over 2014-2017, the level of payments for heating services by population is relatively stable but not satisfactory, it fluctuated in the range of 85-95%. As of 31.07.2018 the total debt from population to DHCs amounted to UAH 10,8 bn. In 2019, the combination of DH tariff increases applicable from January and of HUS monetization from March has resulted in an increase in non-payment levels, but it is at this point too early to assess to which extent it reflects a structural trend or a temporary phenomenon related to households having to adjust to much higher utility bills.

Figure 4.4. Payment discipline by population, UAH bn



Source: Ukrstat

Another important issue is that population payments are highly seasonal. The level of payments much higher in the first half of the year (usually even above 100% as households repay accumulated debts), and drops dramatically as the heating season starts. Such trend creates significant liquidity gaps for DHCs.

There are three main conceptual elements that are necessary to provide high level of payment discipline by consumers – financial capabilities of consumers to pay for services, consumers` loyalty and tools available to enforce consumers to pay or to collect the debt. Providing for these elements depends on DHCs` actions, legislation and general economic conditions in the country.

**Affordably of services.** This factor is mostly affected by economic situation and social policies in the country. Taking into account current economic conditions in Ukraine, the housing and utility subsidies system is crucial to provide financial assistance to households, which cannot afford to pay their bills (by the design of the HUS system each household shall pay for utilities no more 15% of income).

In 2018 almost 50% of population received HUS subsidies. However, this situation created substantial fiscal burden for the state and was not financially sustainable. For the 2018/2019 heating season, the government has taken steps to reduce the scale of the HUS coverage resulting in a significant reduction in the number of households eligible to HUS, and therefore to a larger proportion of HUS clients having to fully pay their utility bills (therefore ensuring payment discipline will gain even more importance).

However, some (other than social) policy measures could be performed to reduce burden of payment for the population. For instance:

- Two-tier tariffs for district heating (fixed and variable parts) would smooth the seasonality and reduce the weight of heat bills in households` monthly budgets during the heating season;
- Stimulation of energy efficiency measures in residential buildings would reduce heat consumption. This can be done via implementation of EU energy efficiency directives, financial and technical support for implementation of energy efficiency projects, awareness campaigns, etc.

**Consumers loyalty.** The more population is satisfied with the quality of the services, the more likely it to pay for utility bills. It refers not only to the quality of heating provided, but also related activities, such as transparency of tariffs calculation and utility bills (the fair value of services provided), adequate communication with consumers and convenient means of payment. DHCs and local authorities are responsible for such elements:

1. Proper heat metering and user`s friendly billing;
2. Improved two-way communication between consumers and utilities and ability to communicate (e.g. web-sites of companies to include some compulsory information and where consumers can provide metering data and pay for services);
3. Consider transition to fixed monthly payments with annual adjustments (like in many EU countries)
4. Public Information and education campaigns, clear and transparent utility ordinance to be publicly available and describing the following topics:
  - a. Who owns, makes decisions about, and operates the utility, authority to operate;
  - b. Services to be provided by the utility;
  - c. Utility responsibilities;
  - d. Customer responsibilities;
  - e. The cost of service, billing procedures;
  - f. Payment and delinquency procedures and collection policies.

Certain minimal standards were already imposed nationally as part of ongoing housing and utility services reform (see section 3.2).

**Enforcement tools.** Even if the bills are affordable and the quality of service is satisfactory, the certain share of the consumers still will not pay if the enforcement tools are weak. This very much applies to Ukraine with the lack of penalties or fines for overdue payments, and lengthy and costly legal enforcement procedures. For

instance, one of the buildings with the highest level of heating debts is newly constructed residential building, situated in the Kyiv city center with property prices well above the average (see Annex 3).

Enforcement is crucial and the most sensitive element to insure adequate payment collection levels. It is even more important for district heat sector, as in many cases it may be difficult to terminate such service. The following changes, which would require amendment to existing legislation, are needed to create adequate enforcement possibilities:

1. Introduce fines and/or penalties for late payments of population higher than inflation level in the country (for example, anchoring to the NBU refinancing rate could be considered), otherwise from the consumer perspective it is rational to delay the payment as long as possible (interest for late payment is currently capped at 3% annually);
2. Simplify the legal enforcement procedures for utility debts (court decisions and execution). For instance, electronic court could be created for simple cases (e-court established in Poland was proven to quick and efficient instrument to deal with simple cases like overdue utility bills).

### Recommendations

As detailed under section 3.2, Ukraine has achieved considerable progress in modernizing the legal and contractual framework for housing and utility services, including greater emphasis on proper information of consumers (improved billing information, generalization of metering, etc.). Accountability and the enforcement of contractual obligations need to go both ways and existing legislation will need to be amended to provide more effective tools to DHCs to ensure timely payment for services.

## 4.3 Planning for DH system development

DH is inherently local, requiring local knowledge, specific opportunities, their optimum timing and potential for integration with other infrastructure development projects. Therefore, local authorities played a crucial role in developing most of the significant heat networks in Europe.

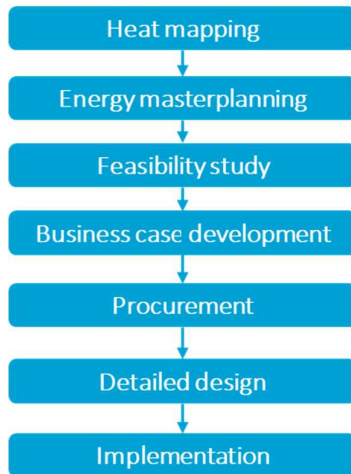
Successful development of DH systems is a long-term undertaking, which requires much planning and preparation. Under the best practice, it starts with the current and projected heat map of the territory (spatial distribution of the heat demand). Afterwards, a series of techno-economic stages are performed for assessment of different options available (usually, specialized techno-economic modeling software is used for this purpose).

For instance, in the UK before proceeding to procurement and project design stages, energy masterplanning, feasibility study and business case development are prepared.

It shall be noted that the DH system is not the only option considered during techno-economic analysis. Certain parts of municipality, with low heat demand density, may be more economically viable to serve with decentralized heating solution.

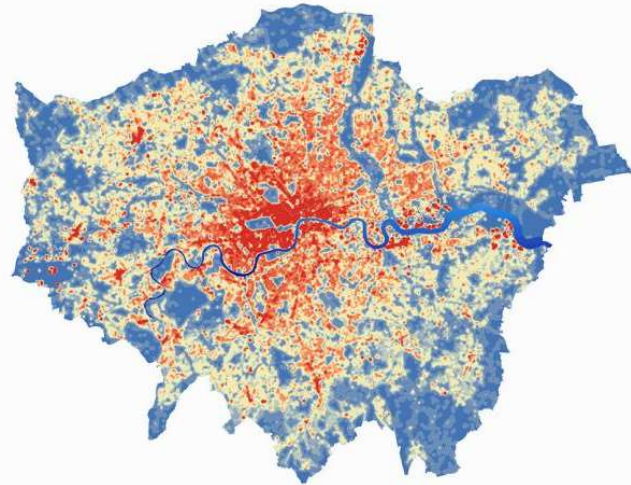


**Figure 4.7. Energy planning and development process in the UK**



Source: [www.london.gov.uk](http://www.london.gov.uk)

**Figure 4.8. Heat map of London**



Source: [www.london.gov.uk](http://www.london.gov.uk)

Please, see Annex 6 for results of techno-economic modeling of 4 scenarios of heat network development for one of the districts of London.

Unfortunately, for the majority of Ukrainian DH systems, no systematic approach for planning and development is implemented. In spite of the fact that the Law “On heat supply” stipulates that each municipality shall have heat supplies scheme (the document which shall prescribe the development of heating system for at years to come), in practice, such scheme in the most cases do not exist, are outdated or are not applied for DH system development. The absence of defined DH development strategy will result in sub-optimal and even chaotic investment decisions and undermine opportunities for raising financing.

We suggest that Ukraine needs to establish proper framework for planning (including but not limited to heat supply schemes) and development of heating systems based on the best international practices and in compliance with EU Directives (in particular, Directive 2012/27/EU). Such framework can be designed in partnership with IFIs as the major providers of capital for DH systems investment projects.

The approach to promote planning should preferably be flexible and provide tools and incentives, rather than impose rigid processes. Under current regulations, DHCs are subject to annual approval of their investments, with procedures which are constraining by the excessive level of detail (review item by item, lack of flexibility to adapt design during implementation) and lose sight of the long-term perspective. One option to promote heat planning would be to allow DHCs and municipalities to replace existing approval procedures for implementation of investment plans when they prepare heat development plans. Minregion has expressed a significant interest in reviving heat planning and could provide methodological and technical support to local authorities and DHCs (and coordinate possible technical assistance from development partners).

## Recommendations

In the context of Ukraine, given the massive need for modernization of DH infrastructure, solid planning is critically important for efficient investments. It should start with load forecast given the declining population in most of cities and towns served by DH, real estate developments, and potential for energy savings from energy efficiency improvements in buildings. DH planning would create **an opportunity to modernize heat supply schemes by keeping DH only in areas (parts of city) where it makes economic sense and by applying best practice technologies for heat supply.** The deployment of modern practices and technologies would however require changing engineering practices and mindsets, but also technical norms and their administrative enforcement/implementation (see 4.5 below).



However, at this stage, we do not recommend mandating local energy/DH planning which could end up creating an additional administrative procedure. One possibility would be to promote planning by local authorities showing an interest by providing technical assistance, and when possible additional incentives (lending for investments). Such an arrangement could help in the mobilization of support from DPs while maintaining flexibility and allowing to incorporate lessons learned in the planning process.

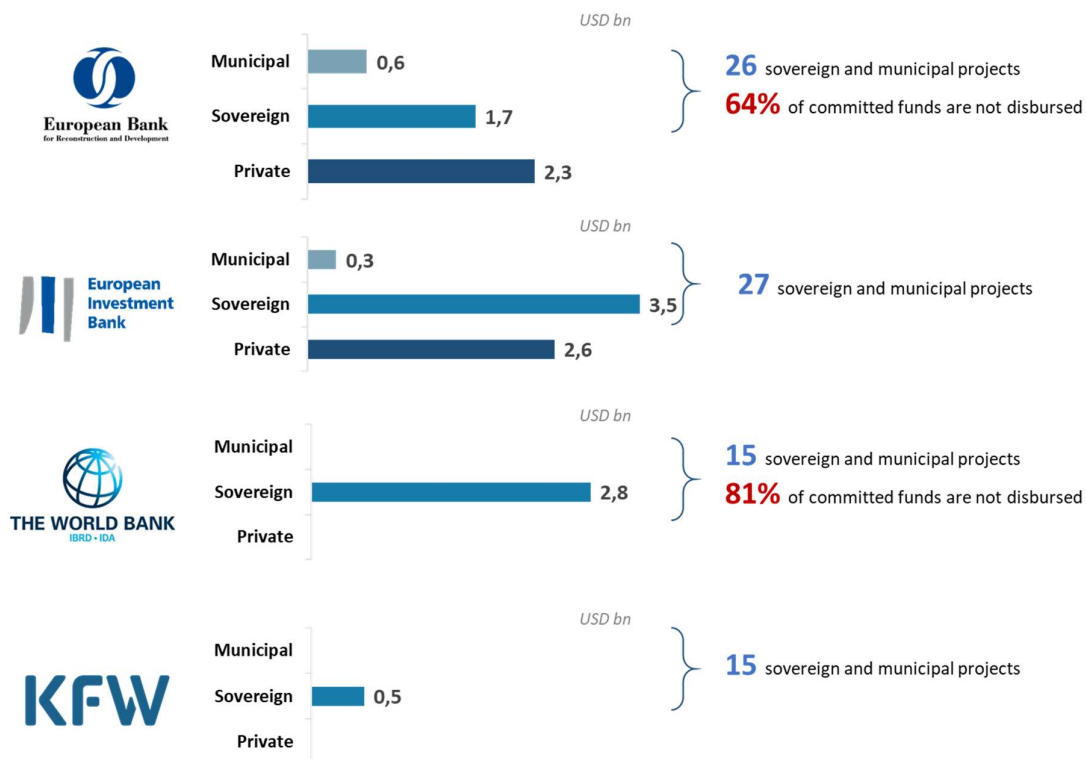
#### 4.4 Streamlining the conditions of execution for IFI investment projects

During the last years Ukraine enjoys a great deal of support from IFIs and international donors. As of March 2018, there are around 100 active sovereign and municipal loan projects (programs) signed with the largest IFIs (EBRD, EIB, World Bank, KFW) with the total value of committed capital around USD 10 billion. In many cases, these projects are supported with technical assistance to beneficiaries, implementing agents and evaluators (Ministries) intended to improve the quality and timely implementation of projects.

These projects and programs are vital source of funding to support modernization of Ukraine’s energy, transport and other municipal infrastructure to improve social and environmental conditions and facilitate Ukraine’s transition to a free market economy. For some sectors (including DH sector) it is the only source of financing to perform modernization project, which one can be relied on in the short term.

In spite of the urgency of modernization investments, the rate of loan drawdowns remains low for most of the projects and actual implementation tends to systematically suffer from significant delays against agreed schedules. Some programs reach the end of funding availability period without drawing even half of the committed amounts. Such situation is not satisfactory both for Ukraine and for IFIs. It demonstrates vividly that the existing system of development, evaluation and implementation of sovereign and municipal investment projects financed by IFIs needs a major overhaul.

Figure 4.9. IFIs’ portfolio of projects in Ukraine (as of March 2018)



Improving conditions for investment projects execution goes beyond the sole DH sector. A number of problems are common for most of investment projects:

- Ukrainian legislation and related procedures are not harmonized with IFI’s internal limitations, policies and guidelines, which cause complications of project structuring and implementation;
- The methodologies used for project development and implementation are dated and not compatible with requirements of the IFI’s;
- Project beneficiaries are lacking the capacity to prepare good quality projects, to make justified investment decisions and to effectively run project implementation units;
- Ministry of Finance, other ministries and regulators struggle with thousands of investment projects evaluation requests, often return the documents for corrections to beneficiaries, evaluation procedures are vast and cumbersome.

**Figure 4.10. Key stakeholders and processes for execution of sovereign and municipal projects with IFIs**



Source: expert analysis

The resolution of these issues requires comprehensive and systematic reform to cover methodological, procedural and capacity aspects for projects execution. Such reform shall be developed jointly by Ukrainian side (most importantly, Ministry of Finance) and key IFIs active in Ukraine. The outcomes of this reform might be further expanded to investment projects financed by Ukrainian public funds.

Nevertheless, many “no regret” actions could be made to speed up implementation of emergency investments in DH even before the comprehensive reform plan is prepared. In particular, a series of actions have been proposed by EBRD and the World Bank based on implementation experience.

**Summary of key regulatory issues impeding implementation of IFI -financed DH projects**

Several policy issues faced by EBRD during implementation of public sector projects in Ukraine with possible resolution options are summarized below (information provided by EBRD Kyiv office):

**Allocation of signing authority between the Ministry of Finance and Project Companies on implementation matters**, including signing authorities for disbursement application under the sovereign

loans. EBRD aims to work directly with the entities implementing the projects (SOEs or municipal), however, in certain cases, IFIs provide financing as sovereign loans with proceeds to be on-lent to the implementation entities. Under the current practice, this requires Ministry of Finance as authorized representative of the state as a borrower to sign all disbursement applications. It is proposed to review this approach and consider the possibility to delegate signing authority to the implementation agencies as it is done under the sovereign guaranteed projects.

**Requirement of state price expertise for IFI-financed projects where IFI procurement rules apply.** The Law of Ukraine on the Regulation of City Building Activity (Article 31) currently requires the state price expertise review of design documentation cost estimates for all projects financed from the public sources (state or local) with the value exceeding UAH 300,000 (less than EUR 10,000 equivalent), including construction projects, which are implemented in accordance with procurement rules of the respective IFIs. It runs contrary to Article 6 of the Law of Ukraine on Public Procurement regarding international obligations of Ukraine to use IFI procurement rules as it introduces superfluous price restrictions based on obsolete norms (construction, wages, etc.) and leads to significant delays with project implementation, but does not add value to the procurement/implementation process since the contacts are in any case awarded based on the tender results not State expertise. Removing the requirement for State price expertise for the construction contracts awarded in accordance with IFI procurement rules would require amending the Law of Ukraine on the Regulation of City Building Activity.

**Approvals of design documents by the Cabinet of Ministers of Ukraine based on the CMU Resolution No. 560.** The Decree currently requires approval by the Cabinet of Ministers of the project design and cost estimates for all construction projects in the country financed from the public sources (State or local) with the value exceeding UAH 400 million (ca US\$ 14 million equivalent). Such threshold implies that technical documentation for projects financed at the municipal level (for services such as DH, water, solid waste treatment...) need to be approved by the highest executive body in the country, which also implies review and sign offs from the relevant state agencies, regional authorities etc. It would seem rational to allow for delegation of approval to the relevant authorities with the required technical expertise.

**Timely tariff adjustments** for district heating (DH), water, energy and municipal solid waste services to achieve full cost recovery. Tariff adjustment delays, especially in the DH sector, have been the primary reason for the sector-wide liquidity crisis, accumulation of gas and tax debts, blockage of accounts and subsequent inability of the utility companies to implement investment projects. Although the legislation of Ukraine provides for full cost recovery tariffs in various sectors, the Regulator (NEURC) has not always adhered to this principle in the past. It is therefore, proposed to open the possibility to delegate the tariff setting to the relevant local authorities for those utilities, which implement investment projects supported by local guarantees. When municipalities decide to provide municipal guarantees in order to support their DH companies (or similarly for water and wastewater projects), they are exposed to financial risks which they should be able to control and mitigate. These municipalities should have the right to adjust tariffs for their DH, water and wastewater utilities in order to ensure sufficient liquidity of their utilities and eliminate one of the key reasons for project implementation delays. This approach could be incorporated into the Licensing Conditions for the utilities working in the DH, water and wastewater sectors.

**New Law on State Aid (adopted in 2018).** Due to the lack of precedents and specific regulations, the impact of this new legislation on investments projects in municipal utilities remains uncertain, but seems likely, unless mitigating actions are implemented, to further complicate and delay project implementation.

Modernization of the DH sector will require financial public support of various type which will be categorized as State Aid, such as municipal guarantees, capital grants from the public sources (State or local budgets, international or bilateral donors), equity contributions or other forms of support (regular or ad hoc) from the state or local budgets. It would be important to establish applicability of this law to municipal support to DHCs including IFI-financed projects and to avoid time-consuming additional approval procedures. At the moment, it appears that new projects in support of the DH sector from donors (e.g. NEFCO) are required to seek approval from the Antimonopoly Committee on an individual basis. This requirement will add additional costs and delays for urgent and critically needed investment projects.

The recommendations in this sub-section would help improve the implementation performance (delays/costs) of IFI projects in the DH sector. They would have concrete benefits regarding the implementation of these projects. They also illustrate the burden of administrative and regulatory complexity in which DHCs have to operate, especially as they attempt to modernize. These measures should be part of a more radical administrative and regulatory simplification of the DH sector in Ukraine, necessary to mobilize other sources of financing.

#### 4.5 Need for radical technical and administrative simplification to reduce investment costs and delays

Many of the implementation issues encountered during the execution of IFI projects in the DH sector apply to other investments by DHCs. In this respect, two key areas need to be addressed in parallel:

- Technical norms and standards need to be modernized and simplified in order to align Ukraine with modern international practices,
- The administrative procedures for prior approval of investments, prior approval of design and ex post inspection are also a source of delays.

Applicable DH technical norms and practices in Ukraine are obsolete and costly.

Technical norms and practices currently applied in the Ukrainian DH sector are derived from Soviet norms and practices and are often inconsistent with modern international best practices. These norms, which were suboptimal in the first place and reflected limited concerns for the optimization of investment costs, have also failed to keep up with recent technical and operational progress.

Their overall impact is to significantly increase investments costs, reduce competition between suppliers and/or contractors, and to seriously slow down implementation of investments. While it is difficult to provide an overall estimate of the cost for the DH sector of obsolete technical norms, this cost is clearly very high. In particular, it is clearly significant with regard to the investments in modernization of Boiler Houses, and for the installation of Individual Heat Substations, which are both critical for DH sector technical and commercial modernization.

With regard to Boiler Houses, the commonly observed practice is for DHCs to continue to adhere to the requirement of having 100% back-up capacity installed for heat production. This requirement results in considerable additional capital costs and does not make sense in terms of reliability of supply risk management, given inter alia: i) the long term trend in reduction of heat volumes, ii) excellent reliability of well-maintained modern and efficient boilers, iii) the availability of cheap containerized boilers to provide back-up when needed. In addition to the investment cost reduction possible by optimizing heat production capacity, there is room for further cost reduction through simplification of Boiler House design and connection schemes. Based on actual cases of contracts financed under the World Bank project, cost reduction could be achieved inter alia through the following:

- Removing the requirement for expansion tanks for Boilers (this safety feature is specific to Ukraine and unnecessary because it could be replaced by safety valves),
- Removing unnecessary “additional” expansion tank for network (also specific to Ukraine),
- Removing unnecessary fast make-up water system,
- Removing unnecessary duplicate Water Treatment system.

The above requirements have not only an impact on investments costs, but also reduce the competition between contractors. International contractors are often deterred by the complexity of Ukrainian technical norms and by the requirement of *ex ante* approval of technical documents by the State Expertise. As a result, Boiler House reconstruction contracts tendered under the World Bank project have never attracted more than four bidders, and in most cases only two bidders.

The inadequacy of Ukrainian technical norms is also evident for Individual Heat Substations (IHS). IHSs allow consumer to control the level of heat consumption according to their needs and their deployment is widely seen as integral to the commercial modernization of DH services, as well as important from the point of view of residential energy efficiency. For this reason, a number of Development Partners (WB with CTF support, EBRD, bilateral donors) have financed the deployment of IHSs by DHCs in Ukraine. However, the unit costs of IHSs in Ukraine are higher than in other countries, and the installation time is much much longer. Ukrainian technical norms for IHSs are derived from Soviet or post-Soviet norms (construction norms and regulations-“SNIP”) for network substations, are typically overly complicated and contain unnecessary costly features (e.g. functionally unnecessary components include extra/redundant shutoff valves, manometers, thermometers, etc.). Likewise, as per international practices, IHSs can be designed without reserve heat exchanges and pumps (which also in turn require additional sets of shutoff valves and other elements). The DH / service company shall have stocks of reserve pumps (or heat exchanger) to promptly replace these components in case of unexpected failure... Due to these specifically Ukrainian requirements, such substations require complicated and costly on-site assembly of components, and the installed IHSs occupy more space. In addition, before installation of IHS, the contractors are required to prepare design documents for each IHS which have to be approved by local State expertise.

The Ukrainian practices differ completely from Northern/Western Europe practices where IHSs are procured as prefabricated substations with design by the manufacturer based on typical schematics and solutions, with some adjustment for the specific requirements requested by the client. In Moldova, the Chisinau DHC (Termoelectrica) has decided to follow the European practice and to procure fabricated standard modules for IHSs. Prefabricated substations with optimal standard schematic are relatively compact, do not require separate detailed design and are delivered as assembled units. The outcome for Termoelectrica has been increased competition between suppliers and significantly lowered unit costs. In Ukraine, the total cost of procuring and installing IHSs under “SNIP” norms in Ukraine is typically around US\$23K per unit on average against US\$14.3K in Moldova in most recent contracts financed. In addition, the installation of IHS in Moldova tends to be fast and within contractual schedules, while IHS installation contracts in Ukraine have usually experienced major delays. Without changing technical requirements for IHSs, their roll out across Ukraine will remain seriously constrained by the lack of funding by the lack of qualified contractors able to perform design and installation works.

#### [Streamlining approval, expertise and inspection procedures.](#)

The authorizing environment for investments by Ukrainian DHCs is also constraining. This includes in particular the requirement of annual investment approval by NEURC. The need for *ex ante* approval of detailed investment plans each year, with a high level of scrutiny for each individual item (technical characteristics, unit costs) is inefficient because: (i) implementation of investments often goes beyond a single year, (ii) DHCs need to be allowed to adjust the technical design of investments compared to the approved plan.

The role of the State Inspection/Expertise also needs to be reassessed. Ideally, the focus of State technical bodies should be on the establishment of norms (which need to be modernized), with conformity assessments to be carried out by qualified Engineering and Consulting companies accredited for this purpose. At very least, the current State inspection process should be improved in order to better guarantee greater transparency and predictability and reduce delays.

Many Ukrainian DHCs have initiated the transition to deploying building level IHSs, instead of group substations, but the implementation of this transition is being significantly delayed and made costlier by burdensome country specific technical requirements. The Ukraine DH sector is also lagging considerably behind with regard to the installation of Supervisory control and data acquisition (SCADA) systems but has the opportunity to catch up by deploying modern systems at relatively low cost (given the reduction in cost of software, sensors, remote metering and communication...). In this respect, Ukraine could look not only at Western Europe and Nordic countries, but also at China where DH utilities have recently deployed modern technologies (e.g. Internet of things) on a large scale. But Ukrainian DHCs will not be able to modernize if they have to go through lengthy administrative for the approval of each individual investments and to conform to obsolete technical norms.

#### Conclusion and recommendation.

The modernization of technical norms and of approval procedures is indispensable for enabling a large-scale modernization of Ukraine DH infrastructure, and requires urgent attention. It is recommended that Minregion take the leadership on addressing this issue and mobilize a Technical Working group with representatives of DHCs and the support of DH experts familiar with European practices to recommend a comprehensive overhaul of applicable technical norms and expertise procedures which would then have to be incorporated in draft legislation.

## 4.6 Corporate governance standards

In Ukraine over the last decades the corporate governance of municipal utility companies (including DHCs) has largely remained unchanged and unsatisfactory both with regard to the legal framework and in practice. The two relevant laws of Ukraine, namely On Local Self-Governance and On Housing and Communal Services, determine only general duties of municipal governments regarding utility governance. In practice, local authorities often do not possess technical competence to supervise local utilities. Proper systems to make utility managers accountable and motivate them are often not in place. Local authorities with the responsibility for supervising utilities do not always the means (reporting) to consistently assess and monitor company's performance. In this context, the risk is to see ungrounded interventions in the day-to-day activities of utilities in lieu of serious monitoring of managerial performance.

The result is insufficient transparency, limited accountability, vulnerability to political environment and a lack of motivation schemes for key employees to improve performance of companies. These factors, in turn, lead to poor managerial decisions, misconduct, poor public perception and adversely affects operations and financial results.

Therefore, the corporate governance practices of DHCs (as well as other local utility service providers) must be significantly improved. The key role in this shall be played by municipalities, which in most of the cases are owners of the utility companies. However, certain minimal standards may be established on the central level, for instance, in licensing conditions (NEURC, CMU Resolutions or even on the level of the primary Law).

The following initiatives should be considered for improving corporate governance standards:

**Establishment of Supervisory Boards.** The Supervisory Board with proper powers and selection procedure is internationally recognized way to improve quality of corporate governance.



Independent members of the Board will also improve transparency and credibility of utility companies' operations.

**Financial reporting and audit under international standards** is way to significantly lower misconduct and potential abuses in operations and reporting. Moreover, proper accounting can improve quality of managerial decisions, regulation and investment attractiveness of companies.

**Disclosure of information.** Disclosing key financial and operational information (including financial statements and audit reports), as well as development plans in standardized and user-friendly form can greatly improve transparency and credibility of companies. Moreover, it would allow to perform benchmarking of results between different companies and lower possibilities for potential abuses. Utility activities should be supervised through review of audited financial and technical reports, CEO interim reporting sessions, and annual Director performance reports. Local authorities would be able to assess company performance from audited financial reports, and technical reports/audits. Annual technical and financial audits may prove costly to utility companies in small towns, but such audits should be conducted with some regularity, perhaps once every three years. Benchmarks for utility development could be set in the business plan and annual financial and technical reports should demonstrate the progress made toward completion of established goals. Supervision of management performance could also be complemented with periodic reports to local executive authorities and the municipal (or oblast where applicable) council. These reports should be available to the local public and mass media

**Accountability and autonomy of management.** A practice to be encouraged would be for local authorities to conclude long-term contracts with DHC Directors (e.g. three to five years) in order to give the Director some freedom to act and sustain a long-term vision of company development. At the same time, the local executive council would be able to submit a proposal to the municipal council to dismiss the Director for unsatisfactory performance and significant deviation from the agreed business plan or benchmark.

**Remuneration and motivation schemes.** Professionalism and quality of managerial decision directly depend on remuneration and financial incentives of employees. Therefore, establishing proper motivation (for instance, bonuses for reaching certain performance indicators) for management and key employees could payoff greatly even in the short term. To make the Director position attractive to private sector managers, the remuneration floor could be established at levels commensurate with private sector level and not linked to salary levels of local officials. Salary revisions could be proposed by the local executive body based on the review of annual reports and compliance with agreed performance indicators, then discussed and approved by local municipal authorities.

### Conclusion and recommendation.

The transfer of responsibility for DH sector development from the national to local level is a logical and necessary evolution which will however require to significantly improve the governance practices of DHC management and local authorities. In many respects, this is a matter of adopting good practices rather than changing the legal framework (e.g. the establishment of supervisory board is possible under applicable legislation). IFIs and lenders can contribute to improved DHC governance by directly supporting changes in governance arrangements with technical assistance and/or as part of loan conditionalities (ongoing activities for Kyiv could provide a model if successful).



## 5 Reform proposals which would require further analysis

There are also reform proposals for the Ukrainian DH sector which have been discussed among stakeholders for some time, but for which there is no prospect of achieving rapidly a reasonable consensus on either the principle of the reform itself or on the modalities.

This is the case for imposing an unbundling of DH networks from heat production and supply. This report argues against this approach, which is not required under EU energy law and has not been widely adopted in the EU and would likely be risky and difficult to implement in Ukraine.

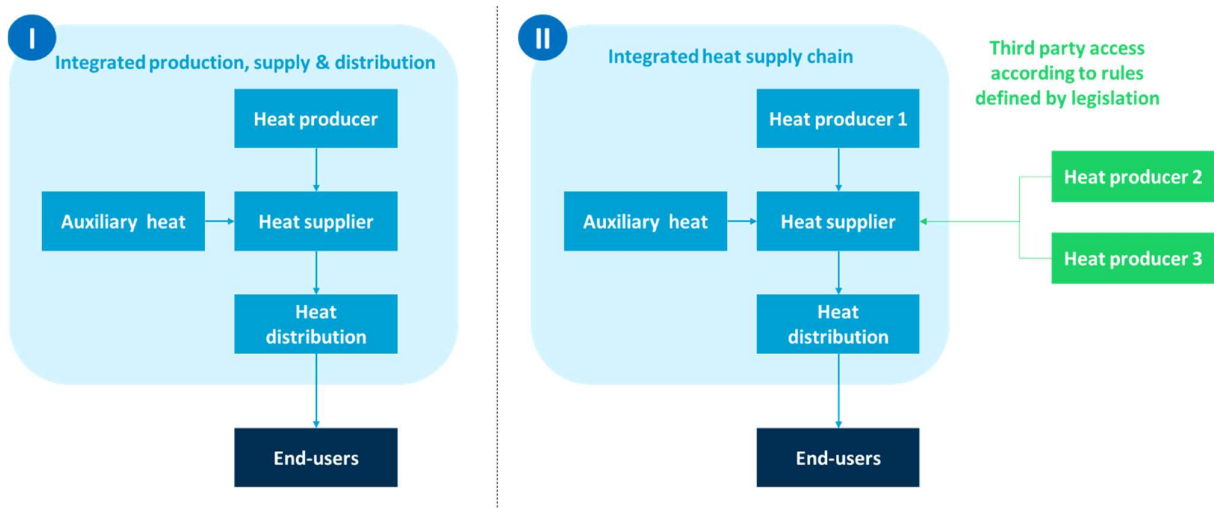
The other reform proposal is the creation of a national financing mechanism and fund for DH modernization investments. This report concludes that this reform proposal may not be a priority focus for urgent DH sector reform actions but could be potentially useful in a later phase of sector reform.

### 5.1 The debate regarding the feasibility of unbundling of DH networks

One of the key pillars of the EU Third Energy Package is the liberalization of electricity and gas markets through economic separation of network and production activities. In the EU such unbundling has paved the way for (new) electricity and gas supply companies to enter the market and make use of the public transmission and distribution grids under non-discriminatory (regulated third-party access) conditions and allowed the consumers to choose their own electricity or gas supplier.

A logical question is whether the similar approach can and should be applied for district heating systems. Even in the developed EU Member States there is not definite affirmative answer to this question and noticeable differences between the district heating market, on the one hand, and the gas and electricity markets, on the other, remain. From a legal standpoint, the Third Energy Package does not require DH unbundling. Neither is DH unbundling supported analytically: for instance, policy brief “District heating systems: Breaking the monopoly?” claims that a policy regime based on unbundling and third-party access is expected to only have a marginal positive impact on competition in heat production and might even have some significant negative side-effects in terms of overall efficiency.

Figure 5.1. Models of DH system operation



Note: the TPA is possible (and happens in many European networks) under the first model, but if the rules of access are defined by the incumbent DHC or local authorities

Source: policy brief “District heating systems: Breaking the monopoly?” by the Bioteam project

In addition, under current Ukrainian conditions with lack of transparency, poor technical conditions of DH systems and poor financial state of DHCs, the negative effects could be substantially stronger comparing to most EU Member State. Therefore, we recommend setting aside this policy option at least for the mid-term perspective and focusing instead on addressing fundamental and urgent problems of the DH sector.

### The risks and potential downsides of DH unbundling.

Similar to electricity and gas markets, the main argument for unbundling and third-party access to the DH networks is the creation of conditions for competition, which in turn should mobilize investments, adoption of modern technologies and, eventually, would result in lower prices for final consumers.

However, the conditions in DH sector are different from gas and electricity markets, and the desired outcomes may not be achieved. Below we present several arguments against unbundling to be considered:

**Adequate level of competition may not arise.** While both gas and electricity are commodities that can be traded cross-border via extensive public grids, heat generally is a local product, transported via a local network (within a town or city). Therefore, the potential for competition is significantly lower.

Several studies have shown that at best there are only a few new entrants to be expected in a locality. The market outcome for end-users with 3-4 suppliers (oligopoly) instead of one (monopoly) might not necessarily spur an adequate level of price competition on the heat production side. If only a marginal improvement is to be expected, the price gain for the end-user might be more than offset by the increased costs and additional risks (see below).

**Integrated DHC is less costly to operate.** Brining new players to the DH system will increase transactions cost and will make balancing the heating network more difficult. Eventually, these costs will add up to the final price for heat.

**Last resort capacities must be maintained.** To date it has proven to be difficult to find third-party heat producers that were willing to commit to a guaranteed heat production and supply to the grid (even if such guarantee is provided it may be difficult to enforce). Usually such producers are willing to benefit from short term opportunities and, if market conditions change for worse, stop supplying heat to the grid. Therefore, the incumbent supplier shall still maintain auxiliary heat generation capacities (maintenance costs may be quite high). Otherwise, the security of supply would be put at threat.

**Most of DHCs are not abusing their monopoly position.** Promoting completion would lead to best outcomes if integrated DHCs were making windfall profits. However, no such evidence exists. For instance, in Netherlands the Authority for Consumers and Market (ACM) published a report in 2009 which shows that returns for most heat suppliers have been far below even fair-return levels.

**Increased risks for the continuity of DH system operation.** The simulations of long run DH system operations with unbundling and TPA show that in such cases the system is much more vulnerable to external shocks. This especially concerns the incumbent heat producer (which usually maintains the grid and auxiliary capacities). In “good” times part of the incumbent DHC revenues and profits are taken by the third-party producers, while under unfavorable conditions it accumulates all the losses.

For more details on potential impacts of the economic separation of network and production activities on the entire market chain, see policy brief “District heating systems: Breaking the monopoly?” prepared in October 2015 by the Bioteam project (co-funded by the EU) and can be accessed by <http://www.warmtenetwerk.eu/assets/bioteam/JIN-Bioteam-policy-brief-2-on-District-Heating.pdf>.

Finally, unbundling of Heat transmission/distribution networks from heat production, would make even less sense in the perspective of transition to 4th generation District Heating, under which heat production would be more decentralized and part of an array of energy services.

### Additional Ukrainian factors

Compared to the EU Member States, in Ukraine unbundling and enforced third-party access possess even more risks due to the factor described below:

**Poor technical conditions of the heating networks.** Technical conditions of the DH networks are far from being satisfactory, which results in higher energy losses and frequent accidents. Access of the third-party producers, which under TPA would not be fully controlled by the incumbent DHC, could possess additional challenges for network balancing.

**Poor financial state of DHCs.** As claimed above, the currently unsatisfactory financial state of incumbent DHCs could be undermined even more and put it closer to bankruptcy.

**Possibility of third-party producers to become “profit centers”.** Transparency, accountability and underlying legal enforcement system in Ukraine are far from the EU levels. Therefore, the new policy regime with unbundling and TPA could potentially be abused to generate excess returns. In such case independent heat producers could become “profit centers”, while incumbent DHCs and municipalities would accumulate losses.

In summary, while mandatory unbundling and third-party access to heat network cannot be recommended under the current critical situation of the Ukrainian DH sector, it might be useful and realistic to request separate accounting for production, network and supply/sale to be able to identify and focus on key issues and support benchmarking.

## 5.2 Establishment of a national financial mechanism

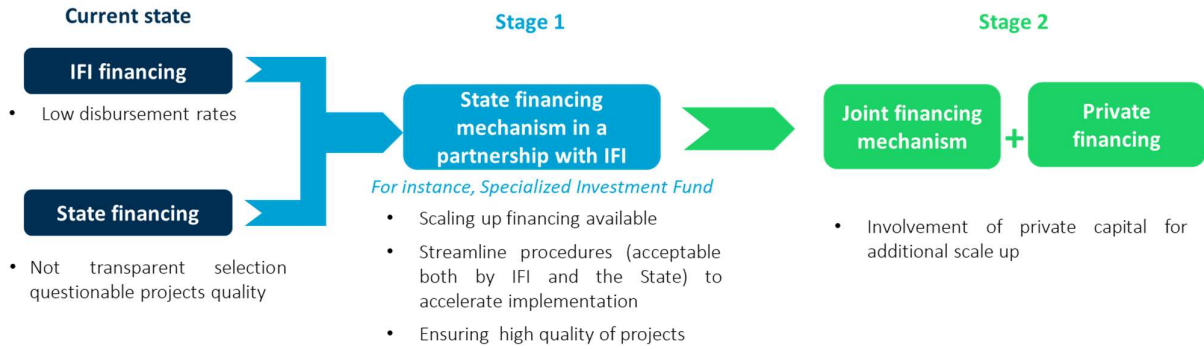
It is clear that even under the best-case scenario, the financial resources provided by IFIs and international donors would not suffice for country wide modernization of DHCs and other utility companies. Therefore, the establishment of the efficient national financial mechanism for utility companies’ modernization (or even broader infrastructure projects) shall be considered. Such financial mechanism (for instance, specialized investment fund) could be created with support of donors and IFIs, which could provide both co-financing of projects and technical assistance for establishment and initial operations.

Currently, national public investments in utility companies (except Ukraine’s participation in international entities like World Bank) can be made only directly from the State budget. For instance, State Regional Development Fund is not a legal entity but the specified amount in the State budget and the set of rules are defined by the Government. This is not an efficient set-up, especially, for larger and more complex project. Moreover, it is criticized for lack of transparency in project selection and, the low quality of projects financed.

While the establishment of the national financial mechanism for utilities in a partnership with IFIs and/or international donors is lengthy and will require significant political leadership and coordination, the potential benefits are also significant and may include:

- Significant scale up of the capital available for utilities modernization projects with further potential to attract private capital;
- Synchronization of national and IFI processes and procedures, which will make disbursement of international financing and execution of projects must faster;
- Application of high international standards for state funds usage to insure high quality projects, accountability and transparency;
- Additional momentum and motivation to accelerate DH and other reforms in utilities sector.

Figure 5.2 (Potential evolution path for financing DH and other utilities modernization projects)



A similar approach is now being implemented for multifamily buildings renovation via creation of the national Energy Efficiency Fund. This initiative is strongly supported by European Commission and German Government since 2015 and developed with the participation of the World Bank Group. Although, the Fund was registered only in Summer 2018 and the first projects are expected to be financed only next year, there are several achievements to date, which must be noted. First of all, this initiative accelerated the adoption of primary legislation – together with the Law On Energy Efficiency Fund, three other Laws were adopted, which previously were discussed in the Parliament for years (see section 3.2). Secondly, the EU and Germany already committed Euro 100 and 10 million, respectively, to support the Fund’s operations and co-financing of projects.

Overall, it seems that the most urgent priority for DH sector reform is to allow DHCs to become financially viable, and to remove the regulatory, technical and administrative obstacles to the formulation and implementation of modernization strategies. However, it is clear that significant investments in the sector are badly needed and the establishment of a national funding mechanism for the DH sector would likely be needed for this, to complement other sources of funding (local authorities, development partners, commercial banks...). Such a mechanism could initially support “no regret” investments, which can be implemented quickly and have a short pay-back period. In a second phase, the national mechanism could provide lending to investments projects with a longer pay-back period which would be selected and prepared on the basis of viable long-term modernization plans so as to support DH reform champions.

## 6 Summary of recommendations for further DH sector reform

This section contains summary of recommendations to be considered for further DH reform in Ukraine. The strong recommendation of this report is to aim for comprehensive reform rather than step by step approach, which would not be adequate to address major and urgent challenges to the DH sector financial viability. For comprehensive reform, we recommend establishing a dedicated consultative group dedicated to the preparation of comprehensive sector reform. This reform group would need to have a clear timetable and mandated and ability to mobilize expert capacity as needed. Discussions with stakeholders, including central and local governments, donors, DHCs, expert community, and civil society and HOAs can help establish priorities, though preferably, reform actions on several issues should be taken at the same time to ensure consistency and break the vicious circle for DH.

We also recommend the creation of a separate technical working group to prepare and propose legislative and regulatory reforms related to the modernization of technical norms (given the technical character of the topic and the need for specialized expertise).

### 6.1 Initiating a comprehensive reform process

#	Action	Parties concerned
<i>Initiating process for preparation comprehensive sector reform</i>		
1	Establish technical DH working group to recommend before end of the year legislative and regulatory proposals for comprehensive modernization of technical norms and expertise requirements.	Minregion, DHC representatives, international experts
2	Create consultative group for comprehensive DH sector legal and regulatory, comprising all relevant DHC stakeholders and decision-makers, as well as Development partners, and tasked with preparing a comprehensive package of reforms to enable DH sector modernization.	Minregion, NEURC, Minfin, representatives of DHCs and municipalities, Development partners, Parliament

### 6.2 Key reform actions, by strategic priority

The recommended reform actions are summarized below, broken down by strategic priorities (though some actions support several strategic objectives). A few actions would require minimal technical preparation and could be adopted rapidly and are listed first under each strategic objective. The major reform actions however would need proper technical preparation, as well as discussions/consultations to promote stakeholder alignment. Ideally, the proposed reform groups for comprehensive DH sector reform would be the arena for identifying key reform actions and delegating/supervising the preparation of corresponding legal/regulatory amendments (to be delegated to relevant Ministry, technical body with Technical Assistance as relevant and available). The complexity of the proposed reforms should however not be exaggerated. The objective for all listed reform actions should be their adoption by the end of the third quarter of 2020 (ahead of the 2020/2021 heating season), with the exception of the implementation of local energy planning and of the possible establishment of a national sector financing mechanism which may require more preparation/consultation.

***Strategic priority 1: Technical and administrative simplification***

	<i>Description of recommended action</i>	<i>Parties concerned</i>
1	Reform and simplify Organizational set-up and procedures to support acceleration of disbursement for IFIs projects	Minfin
2	Remove or streamline regulatory barriers for IFI projects execution (state price expertise, approvals of design documents, VAT, duties exemption, etc.)	CMU, Minfin, Minecon
3	Removal of the obligation for local authorities to receive AMCU approval for financial support (including guarantees) of DHCs and other municipal utility companies	AMCU, Minfin, VRU
4	Comprehensive amendment of legislation and regulations to enact drastic simplification and modernization of technical norms and expertise requirements	DH working group proposal. VRU, CMU, Minfin, Minregion

***Strategic priority 2: Modernizing DH sector regulation***

	<i>Description of recommended action</i>	<i>Parties concerned</i>
1	Amend licensing conditions including (i) removing link between licensing authority and the level of commercial metering, (ii) creating an option for local authorities providing financial support to DHCs to request delegation for licensing (including tariff-setting and approval of investments)	NEURC
2	Take a strategic decision on licensing and tariff approval authority model and how to manage the transition (centralized vs local)	DH sector reform group, VRU, CMU, NEURC
3	Review and streamline tariff setting procedures and methodologies, including introduction of simplified procedure (or automatic adjustment) for “external pass through” cost	CMU, Minregion, NEURC
4	Promote two-tier tariffs (with fixed and variable parts) to lower the seasonality and cash gaps for DHCs and ease the payment burden for households during the heating season	Minregion, NEURC, local authorities
5	Gradual incorporation of more advanced features to “COST+” methodology (for instance, RAB, indexing, benchmarking)	CMU, Minregion, NEURC

***Strategic priority 3: Ensuring the financial viability and continuity of DH operations***

	<i>Description of recommended action</i>	<i>Parties concerned</i>
1	Amendment to Law №1730 to extend the timeframe of gas loans restructuring	VRU, Minregion, Minfin
2	Amend special accounts functioning – allow DHCs with no overdue debts to Naftogaz to receive all the payment to their current account	CMU, Minregion, Minfin
3	Strengthening payment discipline: <ol style="list-style-type: none"> <li>1. Impose penalties and/or fines for late payment of utility bills</li> <li>2. Simplify the legal enforcement procedures for utility debts (court decisions and execution)</li> </ol>	DH sector reform group, VRU
4	Design and implement comprehensive financial recovery plan for DH sector (including realistic plan for historical debt restructuring and repayment, establishing bankruptcy mechanism for DHCs, establishment of financing mechanism to secure gas purchase by DHCs and finance liquidity gap during heating season)	DH sector reform group, VRU, CMU, Minfin, Minregion

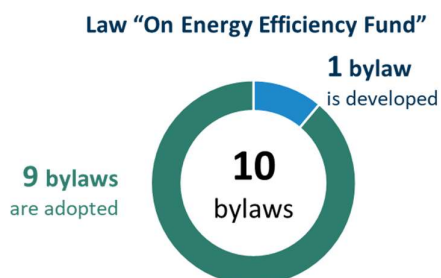
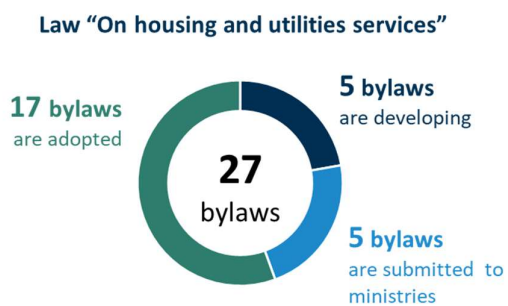
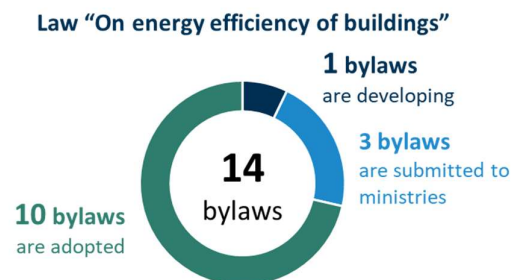
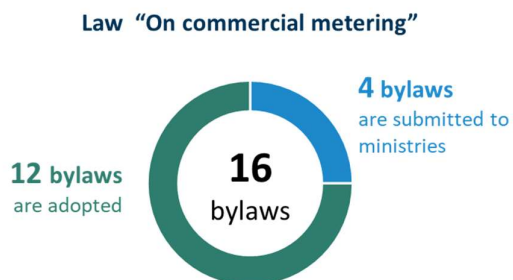
***Strategic priority 4: modernization of DH sector governance and planning***

	<i>Description of recommended action</i>	<i>Parties concerned</i>
1	Improving corporate governance standards for utility companies (establishment of Supervisory Boards, financial reporting and audit under IFRS, disclosure of information...)	DH sector reform group, VRU, CMU, NEURC, local authorities
2	Establish voluntary framework for local energy planning (including but not limited to heat supply schemes) and development of heating systems based on best international practices	DH sector reform group, VRU, CMU, Minregion, NEURC
3	Assess options for establishing a national financing mechanism for DHC infrastructure modernization	DH sector reform group, VRU, CMU, Minregion, NEURC



## 7 Annexes

### 7.1 Annex 1. Status of secondary legislation for housing and utilities reform implementation



Source: Minregion

## 7.2 Annex 2. Evolution of district heating systems, from 1<sup>st</sup> to 4<sup>th</sup> generation

*The first generation of District Heating Systems* appeared at the end of the 19<sup>th</sup> century and were steam-based. They operated at very high temperature (up to 300°C) and pressure (up to 20 Bar). As a result, first generation systems had significant drawbacks (high thermal losses, lack of safety, unreliability, etc.).

*Second generation type District Heating* has been dominant from the 1930s to the 1980s. The distribution networks under 2<sup>nd</sup> generation DH carry pressurized water (instead of steam) at temperatures above 100°C. 2<sup>nd</sup> generation DH networks typically consist of two steel pipes (flow pipe and a return pipe).

*Third generation district heating systems* have become the norm, starting in Nordic countries, since the 1980's for all newly built DH infrastructure (as well as for major renovation). The technologies under 3<sup>rd</sup> generation allow for increased thermal efficiency and significant reduction in capital and operating costs.

Key characteristic of 3<sup>rd</sup> generation DH system (compared to 2<sup>nd</sup> generation) include:

- Use of pre-insulated pipes;
- prefabricated compact substations;
- Operations at lower temperatures (while the system are usually designed for higher temperatures, they typically operate below 100 °C): this allows to reduce thermal network losses, to improve plant efficiency (heat plants or CHPs), and to provide more flexibility regarding the type of fuel used;
- Installation of leakage detection systems on the network and of control and monitoring systems to allow optimal operation and load dispatch of larger systems;
- Use of energy meters (and individual heat substations) to enable consumption-based billing.

Most of Ukraine DH systems remains characterized by 2<sup>nd</sup> generation features though new investments, including under the World Bank investment projects, are helping with a transition to third generation systems (e.g. systematic use of pre-insulated pipes for network reconstruction, deployment of heat meters and individual heat substations, installation of control and monitoring systems).

### *The future of District Heating: fourth generation*

The rationale for so-called 4<sup>th</sup> generation DH systems is to further lower temperature of water distribution (to around 60°C) so as to further reduce network heat losses and allow higher contribution from renewable energy and waste heat. This evolution would be made possible by the use of new technologies as well as increased energy efficiency of buildings (reducing heat demand and temperature requirements).

Technologies and services listed under 4<sup>th</sup> generation district heating systems often include:

- Co-generation of heating and cooling in electric heat pumps supplying heat to low temperature district heating grids (~60°C).
- Combined use of cold and hot water aquifer seasonal storage
- Combined use of heating and cooling installations in buildings.

The potential and promises of 4<sup>th</sup> generation district heating (and cooling) are attractive: flexibility within a menu of technical solutions which can be adapted to respond to specific consumer requirements and local context, fuel efficiency and decarbonation, reduction in capital costs. Conceptually, 4<sup>th</sup> generation systems are usually thought as part of the future development of integrated smart energy systems which would also include electricity and gas distribution systems. Ukraine is still at an early stage of energy sector reform, with in particular electricity and gas tariff which are still regulated for the household segments. While it would be important for Ukraine to ensure that its regulatory framework allows innovation and the deployment of innovative heating and cooling technologies, for many DH utility companies, the full adoption of third generation technologies would have significant and predictable benefits. Fourth generation type solutions may however be attractive for either areas/buildings not yet equipped with DH, or for segments of existing DH networks considered as non-viable from an economic standpoint (typically because thermal load density is too low). Some localities in Ukraine have decided, or are contemplating, a phase-out of their DH systems, usually for economic and financial reasons. Such phase out of DH systems can be difficult to implement,



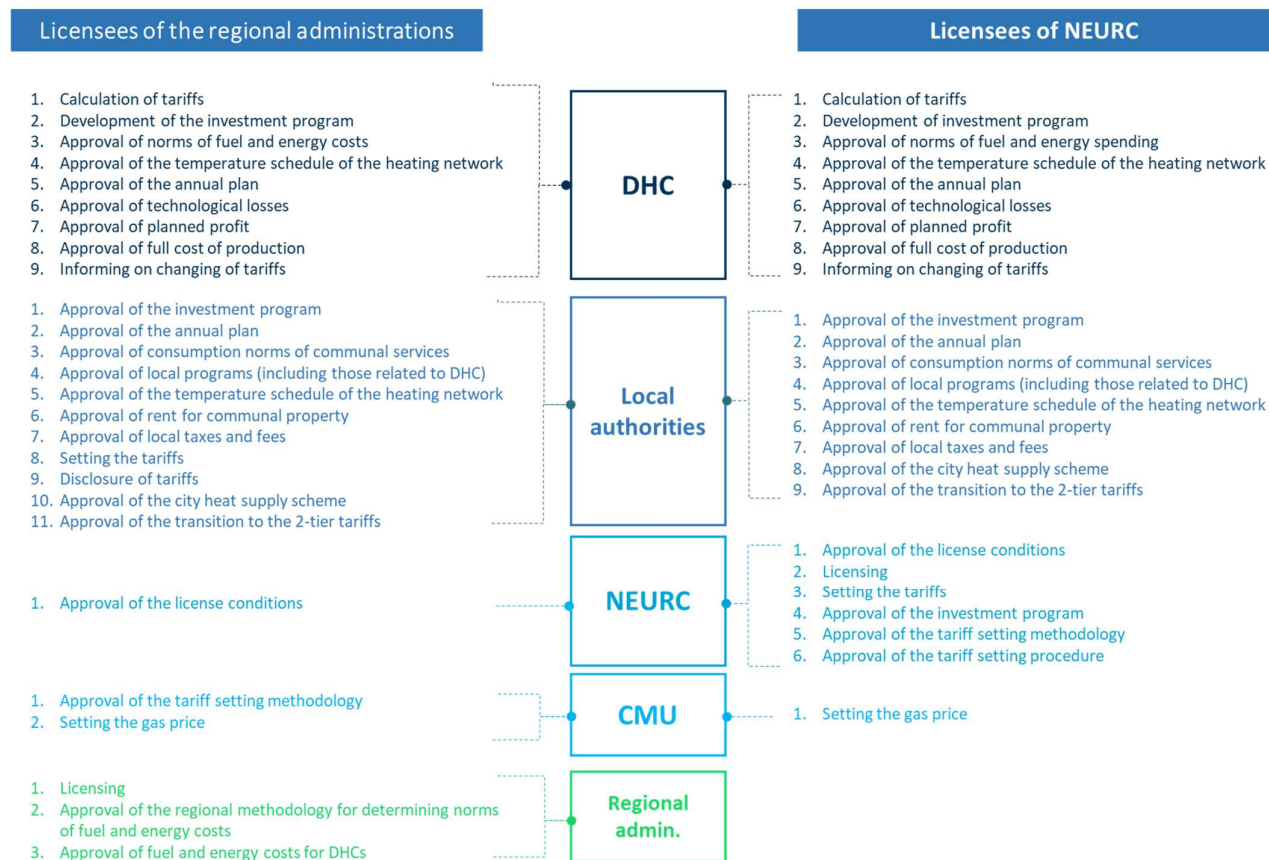
### 7.3 Annex 3. Residential building with one of the highest debts for heat in Ukraine



<b>Address</b>	Kyiv, Konovaltsia street, 44a (Pechersk district)
<b>Indicative property price</b>	~USD 2 000 per m <sup>2</sup>
<b>Cumulative debt for heating and hot water supply</b>	USD 120 000 as of 01.07.2017 (the second biggest debtor building in Kyiv)
<b>Year of construction</b>	2010

Source: Kyivenergo, experts analysis

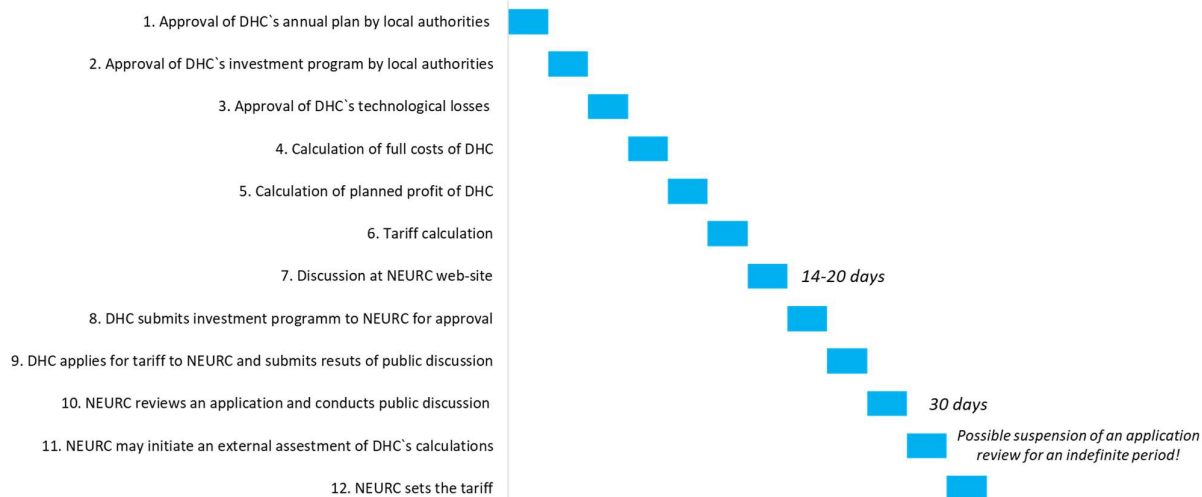
## 7.4 Annex 4. Roles of different parties in regulation of DHCs operations



Source: experts analysis

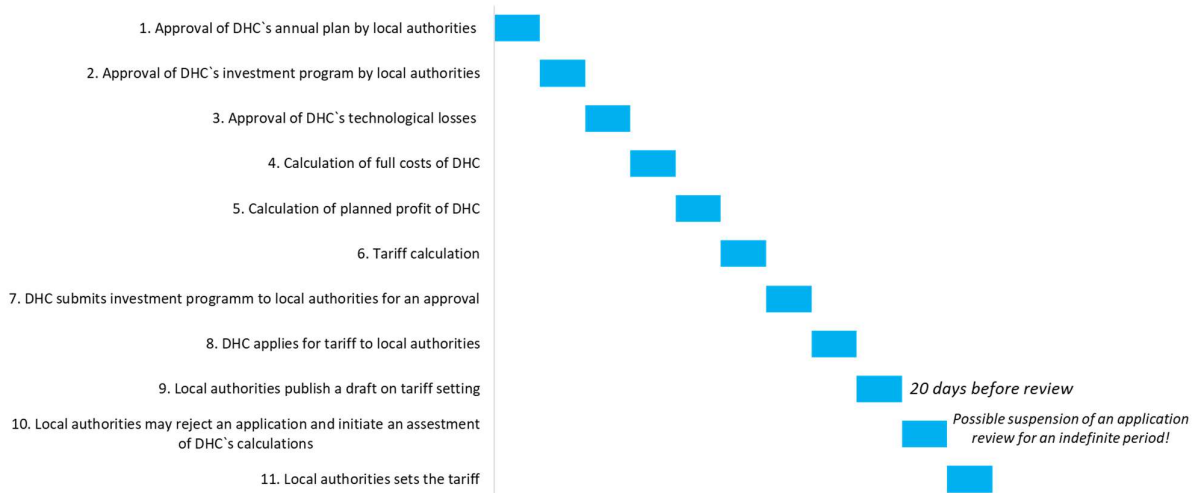
## 7.5 Annex 5. Tariff setting procedure

### Tariff setting procedure for NEURC licensees



Source: experts analysis

### Tariff setting procedure for regional administrations licensees



Source: experts analysis

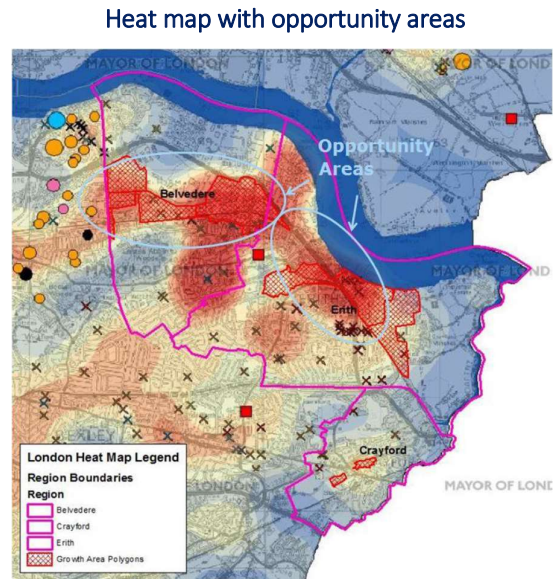


## 7.6 Annex 6. Summary scenario analysis from energy masterplan for Borough of Bexley

All of the information for this Annex is taken from the report "Energy masterplan, London Borough of Bexley" (2015) available on [www.london.gov.uk](http://www.london.gov.uk)

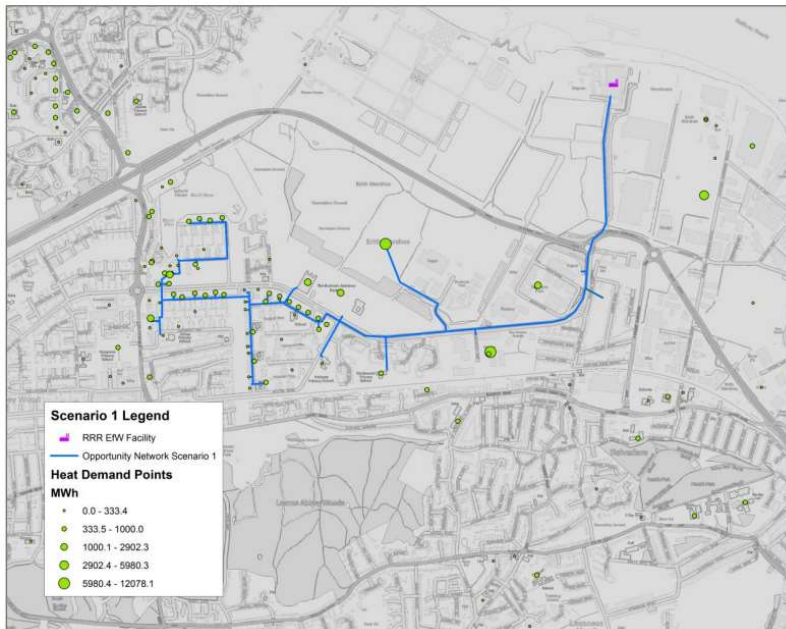
This annex describes key results of techno-economic modelling of DH system development prepared for one of London's districts. At the first stage the heat demand was assessed to identify potential clusters of high density, which are typically suited to district heating. Thereafter, a full heat demand appraisal was carried out for new and existing residential and commercial buildings. A heat supply appraisal was then carried out to assess the available and potential heat supply assets within the study area.

Following the initial identification of opportunities and appraisals of the heat demand and supply, four main heat network development scenarios were identified.



### Scenario 1. Core Belvedere and Thamesmead

This scenario considers a large proportion of the existing Peabody housing and the Belvedere Growth Area, SHLAA and employment land sites.

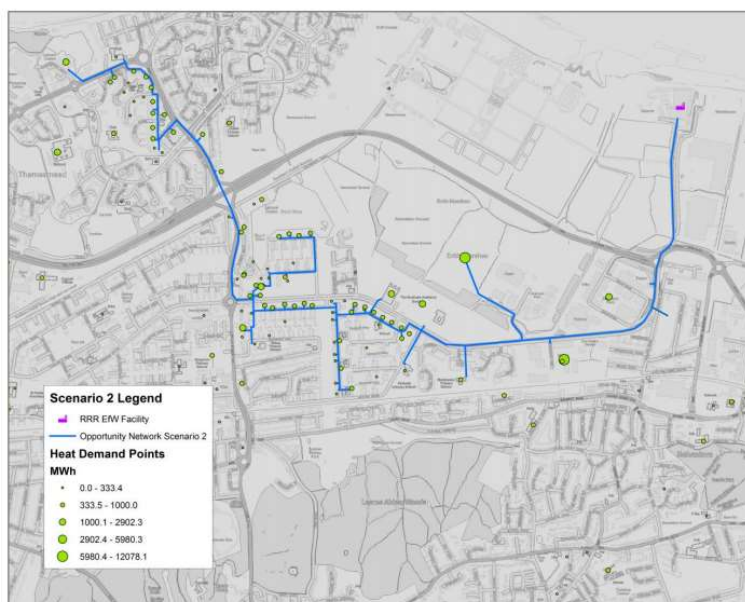


<b>CAPEX</b>	<b>£ 11,6 mn</b>
- Energy Centers and Plant	£3,3 mn
- Heat Exchanger Connections	£0,7 mn
- Network Costs	£6,1 mn
- Contractor and Design	£1,5 mn
<b>IRR over 25 years</b>	<b>13,1%</b>
<b>CO2 savings over 25 years</b>	<b>106 ths tonnes</b>



## Scenario 2. Extended Belvedere and Thamesmead

In this option, Scenario 1 has been extended to the North West into Greenwich to encompass a number of existing high-density heat loads.



**CAPEX** **£ 13,9 mn**

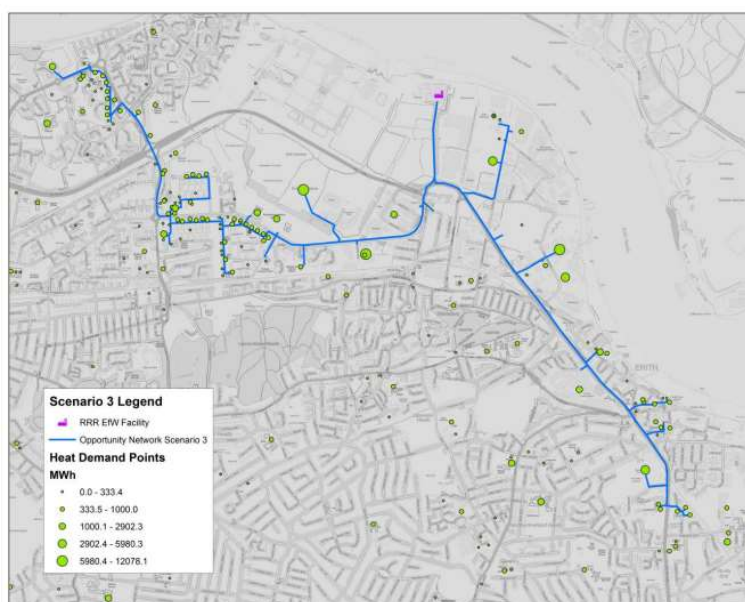
- Energy Centers and Plant £3,3 mn
- Heat Exchanger Connections £0,9 mn
- Network Costs £8,0 mn
- Contractor and Design £1,7 mn

**IRR over 25 years** **14,7%**

**CO2 savings over 25 years** **139 ths tonnes**

## Scenarios 3a and 3b. Belvedere, Thamesmead and Erith

Scenario 3a considers a network route into Erith in addition to the route specified in Scenario 2. The heat demand density of this route is less than in Scenarios 1 and 2 and therefore the project may be more difficult to justify economically. Scenario 3b represents a connection across the River Thames to available heat loads.



### Scenario 3a

**CAPEX** **£27,0 mn**

- Energy Centers and Plant £6,0 mn
- Heat Exchanger Connections £1,4 mn
- Network Costs £16,1 mn
- Contractor and Design £3,5 mn

**IRR over 25 years** **10,9%**

**CO2 savings over 25 years** **193 ths tonnes**

### Scenario 3b

**CAPEX** **£ 10,9 mn**

- Energy Centers and Plant £2,9 mn
- Heat Exchanger Connections £0,4 mn
- Network Costs £6,1 mn
- Contractor and Design £1,5 mn

**IRR over 25 years** **6,5%**

**CO2 savings over 25 years** **36 ths tonnes**

### Comparing IRR against CAPEX in different scenarios

When taking a decision about the most attractive scenario from the economic point of view, two indicators are the most important to evaluate: capital expenditures and internal rate of return (IRR).

