KeepWarm
Renewing district heating

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Improving the performance of District Heating Systems in Central and Eastern Europe

Recommendations for the National Action Plan of Ukraine on District Heating Modernization

Horizon 2020 (H2020-EE-2017-PPI)
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Executive summary

Ukraine has a quite developed district heating (DH) infrastructure in all major urban settlements, however, there is a significant potential for improving the efficiency and sustainability of DH systems operation.

The document aims at formulation of proposals for state policy actions directed at the support of modernization projects in district heating systems and transition to efficient district heating in line with the EU standards. Energy Efficiency Directive defines efficient district heating as 'district heating systems using at least 50% renewable energy, 50% waste heat, 75% cogenerated heat or 50% of a combination of such energy and heat.

The document has been developed based on the discussions and activities executed within KeepWarm projects, consultations with KeepWarm project partners and other interested stakeholders.

Recommendations are structured in the following four groups:

(1) Heating visions, strategies and plans;
(2) Supporting actions and expert guidance;
(3) Planning and regulation;
(4) Funding.

(1) Heating visions, strategies and plans

No.	Action	Timing	Responsible stakeholder
1.1	**Approval of district heating development strategy for Ukraine and an action plan with specific measures** Relevant national authorities (Ministry of Communities and Territories Development, Ministry of Energy and Environmental Protection, State Energy Efficiency and Energy Saving Agency, etc.) in collaboration with the DH industry and other stakeholders to establish a clear vision and a strategy for the development of district heating in Ukraine, as well as an action plan with specific measures and targets. The Strategy should reflect existing policy priorities in the area of energy, climate, and environment, as well as additional actions required for sustainable and efficient district heating systems development taking into account heat density in an area, energy sources availability, cost, and other factors. The Strategy should define key indicators on the share of district heating in heat supply, efficiency of district heating systems operation, share of renewable energy sources, etc. The definition of key indicators should take into account heat load density in settlements and potential for efficient heat energy generation, as well as additional benefits of district heating systems with respect to energy security (e.g. diversification of energy sources, use of locally available renewable energy sources, etc.), lower environmental impact (e.g. reduced air pollution in densely populated areas, reduction of greenhouse gases emissions), human health (e.g. due to lower air pollution and lack of risks related to the accumulation of combustion products inside the residential buildings) and integration of energy markets (e.g. use of district heating systems to store energy generated by renewable energy plants, development of combined heat and power generation). The Strategy should be aligned with other key strategic documents in the area of energy, climate change and environmental protection. At least period till 2035 shall be covered, if possible with the view until 2050. For each measure in the Action Plan, it is important to set the responsible body, the timing (start-end, major milestones), the cost estimation and financing/source as well as the indicators for monitoring.	2020-2021	Ministry of Communities and Territories Development
1.2	**Approval of buildings energy efficiency improvement strategy for Ukraine** Planning of district heating sector modernization should be based on an understanding of future changes in heat energy demand and be performed in coordination with the state policy on buildings energy efficiency renovation. Buildings energy efficiency improvement strategy and relevant national action plan should define specific energy performance targets for buildings, including energy consumption for heating, based on the requirements of state construction norms and buildings renovation plans, as well as a timeline for achieving the targets and relevant policy tools to be used. Performance targets should be taken into account while planning district heating development to avoid investment in stranded assets and additional expanses for their servicing and operation. Inclusion of measures related to the modernization of heat distribution systems	2020-2021	Ministry of Communities and Territories Development

No.	Action	Timing	Responsible stakeholder
	inside the buildings in priority multi-apartment buildings renovation projects.		
1.3	**Distribution of responsibilities and powers between state and local authorities** State authorities on national, regional and local levels will review the distribution of responsibilities and powers in the area of district heating sector management and development based on wide stakeholder consultations and taking into account the critical role of district heating for the energy security of local communities and political responsibilities of local authorities for the quality of heat supply services from one side, and the necessity to introduce general principles and state policies from the other side. The questions for stakeholder consultations could include distribution of powers with respect to approval of investment programs and profit margins, heat energy tariffs, etc.	2020-2022	Ministry of Communities and Territories Development, National Commission for State Energy and Public Utilities Regulation, regional state administrations, city councils.
1.4	**Support of district heating system modernization in development planning documentation** Identified key indicators related to the share of district heating systems in total heat supply, efficiency of district heating systems operation and share of renewable energy sources should be reflected in the development strategies of the cities. State authorities at national, regional and local level to support the development of district heating systems in line with the national Strategy and Action Plan and incorporate relevant measures in regional and local development priorities taking into account the critical role of district heating systems for energy security of cities (e.g. regional and local programs of socio-economic development, district heating development schemes, municipal sustainable energy and climate action plans). The main measures to be included in the program documents could include goals related to the transition to efficient district heating systems in accordance with European standards and mapping of district heating systems within the preparation of heat supply development schemes.	2020-2030	Regional State Administrations, City Councils
1.5	**Mapping of district heating systems** Local authorities under the support of the Ministry of Communities and Territories Development to conduct DH mapping within heat supply schemes development in order to identify the source of both heat supply and demand and define priority areas for DH development projects. Mapping should take into consideration all available sources of information on consumers and producers of heat energy (statistical data, data from enterprises, regulatory authorities and other state institutions), as well as factors that will define changes in heat supply and demand in short-term, mid-term, and long-term perspectives. It is expected that heat maps will contribute effectively to local decisions on heat networks and at the same time supporting national strategies and targets. Such systems should be based on GIS platforms and include detailed information on the district heating system of cities.	2020-2022	Ministry of Communities and Territories Development, regional state administrations, City Councils
1.6	**Assessment of renewable energy potential for heat supply**	2020-2022	State Energy Efficiency and Energy Saving

No.	Action	Timing	Responsible stakeholder
	Local authorities under the support of the State Energy Efficiency and Energy Saving Agency to conduct assessment of renewable energy sources that could be used in DH systems (e.g. biomass supply sources, geothermal and solar energy), including for combined heat and power generation. Potential for application of heat pumps in DH should be considered. The assessment should take into account restrictions related to the need of additional infrastructure, biomass transportation routes, etc. Growing energy crops should be reviewed as additional potential source of biomass for district heating systems.		Agency, City Councils
1.7	**Assessment of waste heat potential for heat supply** Local authorities under the support of the State Energy Efficiency and Energy Saving Agency to conduct assessment of waste heat energy sources that could be used in DH systems, in particular, waste heat from the exhaust gases of existing DH boiler houses, industrial processes, CHPs, wastewater collection and treatment facilities, commercial buildings with large air-conditioning systems, etc.	2021-2024	State Energy Efficiency and Energy Saving Agency, City Councils
1.8	**Assessment of the feasibility of constructing heat energy storage facilities** Local authorities under the support of the State Energy Efficiency and Energy Saving Agency to conduct an assessment of the technical and economic feasibility for the construction of heat storage facilities for local heating networks. In particular, in case of using CHP units and CHP power plants in the district heating systems and the possibility to optimize their operation under the electricity market rules in Ukraine.	2021-2024	State Energy Efficiency and Energy Saving Agency, City Councils
1.9	**Consideration of climate change impacts and adaptation to climate change** To incorporate climate mitigation and adaptation aspects (reduced heat energy demand and heat load, impact on economic feasibility of operational activities of district heating companies and investment projects, increased need for demand driven heat energy generation control, mitigation measures and reduction of heat carrier losses for more efficient use of water resources, etc.) in the planning of DH development. Adaptation measures in heat supply sector could include: 1) support of heat energy demand control measures and automated adjustment of heat energy generation capacity in order to ensure efficient response to reduced heat demand during the period of higher ambient temperatures; 2) support of measures to reduce heat carrier leakages for more efficient use of water resources and reduction of water consumption in district heating systems; 3) considering reduced heat demand during assessment of financial and technical feasibility of investment projects in district heating systems.	2021-2024	Ministry of Communities and Territories Development, Ministry of Energy and Environment Protection, City Councils
1.10	**Strengthening the resilience of operation under emergency conditions** Strengthening the resilience of DHS companies for the operation under emergency conditions, including the COVID-19 pandemic (personnel management, personnel protection equipment, safety procedures, procurement, communication with the customers, etc.).	2020 - 2021	Ministry of Communities and Territories Development

(2) Supporting actions and expert guidance

No.	Action	Timing	Responsible stakeholder
2.1	**Strengthening institutional capacity of national state authorities** Strengthening the institutional capacity of state authorities for the coordination of DH modernization process. Ministry of Communities and Territories Development to be responsible for the following roles: (1) Strategic planning, (2) Knowledge and best practice sharing (technical, financial, project development aspects), (3) Identification of collaborative opportunities, (4) Supporting the heat mapping initiative, (5) Identification of funding opportunities and financial support and accompanying the cooperation with international financial organizations, (6) Technical advice and support. State Energy Efficiency and Energy Saving Agency to be responsible for the supporting of DH modernization initiatives targeting energy efficiency improvements, waste heat utilization, and the use of renewable energy sources. Strengthening of institutional capacity will aim at reducing the risks related to lack of coordination of action under conditions of leadership change and reducing the impact of political factors on decision-making process. Strengthening of institutional capacity could include clear formulation of the areas of responsibilities in the area of district heating in relevant organizational policies, human resource management, training, development of guidance documents and other materials, etc.	2020-2021	Ministry of Communities and Territories Development, State Energy Efficiency and Energy Saving Agency
2.2	**Strengthening institutional capacity of local state authorities** Local state authorities will be responsible for the preparation of district heating development schemes and the support of relevant investment programs of the district heating companies. National state authorities will provide support to local authorities on the aspects related to district heating systems development, in particular with respect to securing finance, guidance on development planning and mapping of district heating systems, as well as collection and provision of information on renewable energy potential in the regions taking into account available supply chains, environmental and technical limitations.	2020-2022	Ministry of Communities and Territories Development, State Energy Efficiency and Energy Saving Agency, city councils
2.3	**Basic requirements for modernization projects** To develop benchmarking criteria for the energy efficiency and resource efficiency improvements and renewable energy projects in DH (e.g. minimum efficiency of boilers and pumping equipment, heat losses, biomass sustainability, etc.). Special attention should be given to complex modernization projects, which allow optimization of technical and economic feasibility and include such measures as centralization of heat generation capacity, optimization of diameters of pipelines in heat transportation networks, capacity of pumping equipment and increasing the flexibility of district heating systems operation.	2020-2021	Ministry of Communities and Territories Development, State Energy Efficiency and Energy Saving Agency
2.4	**Increasing the attractiveness of district heating systems for final consumers** To improve customer acceptance of DH systems by the following measures: 1) review of available information on the attitude of consumers towards the district heating systems and execution of additional comprehensive sociological study with the purpose of identification of key problems and reasons of negative attitude; 2)	2021-2024	Ministry of Communities and Territories Development, State Energy Efficiency and Energy Saving Agency,

No.	Action	Timing	Responsible stakeholder
	development and execution of massive information campaign with the involvement of national media groups and other communication channels in order to improve the attitude towards district heating and demonstration of successful cases of district heating systems renewal using modern and safe technologies; 3) strengthening legal framework on customers' rights protection, transparency of billing information and information of the quality of the services; 4) public participation in decision-making process; 5) support of projects enhancing demand control and automation of DH services, as well as individual consumption-based billing using heat allocators in multi-apartment buildings; as well as and provision of additional energy services. The measures should also target the drawbacks of individual heating solutions (efficiency loss with aging, servicing needs, safety, impact on human health, environmental pollution, impact on heat networks efficiency, etc.). Potential state policy instruments to address the drawbacks of individual heating solutions include introduction of mandatory insurance requirements to compensate the damage caused to third parties and taxation of air emissions and carbon emissions from individual boilers. Attention should be given to the attractiveness of restoration of hot water supply in case of substation installation by demonstrating economic feasibility and reliability comparing with alternative options for hot water provision.		City Councils
2.5	**Capacity building and training** Capacity-building (trainings and education) and awareness raising campaigns bring together various stakeholders – from city officials to real estate developers, representatives of district heating companies, local experts, journalists and business owners – to learn from each other. Priority areas of focus could include capacity building (e.g. training centre, advisory services) on the installation and setup of heating substations and systems targeting automatic regulation of heat consumption based on ambient air temperature and temperatures inside the building. Demonstration of successful case studies of using modern renewable energy technologies and waste heat technologies for the representatives of district heating companies taking into account technology specifics and environmental requirements. Involvement of scientific and educational institutions for conducting trainings for the representatives of district heating operators and development of dedicated guidance. Conducting training for journalists on modern district heating technologies with demonstration of successful cases of efficient district heating with involvement of broad audience of journalists from national and regional media.	2020-2035	Ministry of Communities and Territories Development, State Energy Efficiency and Energy Saving Agency
2.6	**Awareness raising activities** Awareness raising through large-scale national promotional campaigns in order to attract the public and trigger policy-making plans favourable to DH. Information campaigns on successful cases of district heating modernization in Ukraine and worldwide with the focus on the impact on heating cost, quality and reliability of heat energy supply after modernization, including complex modernization of heat generation capacities, transportation networks, and buildings. Informing on key indicators of district heating system modernization in	2020-2030	Ministry of Communities and Territories Development, State Energy Efficiency and Energy Saving Agency, City Councils

No.	Action	Timing	Responsible stakeholder
	cities and their impact on the cost and quality of the services. Supporting measures on installation of smart metering and control systems for individual consumers, as well as cost allocators for a just division of cost and ensuring ability to control heat energy consumption. Cooperation with the household owners associations and provision of support for modernization of distribution networks in multi-apartment buildings. Cooperation with developers and informing about the possibilities and benefits of district heating systems at early stages of residential buildings construction projects.		
2.7	**Increased transparency of information on the operation of district heating systems** To improve data transparency on the operation of DHSs, including information on efficiency, renewable energy use, carbon emission reductions, cost, etc. Data allowing tracking the achievement of key performance indicators are to be published in open data format. Openly available publication of district heating systems passports with the information on the structural aspects (e.g. share of heat generated from renewable energy sources and other fuel types, share of district heating system in heat supply, carbon intensity of generated heat energy, etc.), efficiency (e.g. specific fuel consumption for heat energy generation, energy losses during heat energy transportation, specific electricity consumption), reliability (e.g. share of deteriorated heat networks, number of accidents per year per km of networks), quality (e.g. correlation between fuel consumption and ambient air temperature, number of accidents), and environmental characteristics (e.g. specific emissions of main polluting substances and greenhouse gases) of district heating systems of a human settlement in the baseline year and targeted performance indicators after proposed modernization measures. Support of automated monitoring and control systems with the possibility to collect and publish data on district heating systems operation both from consumers and district heating operators. Approval of procedures for collection, analysis, storage, exchange and use of data taking into account requirements for personal data protection.		Ministry of Communities and Territories Development, City Councils

(3) Planning and regulation

No.	Action	Timing	Responsible stakeholder
3.1	**Preparation of district heating development schemes** The national authorities need to create guidance on both national and local aspects of planning for district heating. District heating development scheme is a document, which contain technical and economic justification for construction, reconstruction (extension, technical rehabilitation) and modernization of facilities in district heating systems taking into account perspective development of a human settlement, as well as measures relate to ensuring energy efficiency, quality, safety, reliability and environmental performance during operation of district heating systems. Guidance documents should contain detailed structure of the district heating development schemes and key requirements for the main sections. Local authorities in cooperation with district heating companies should develop district heating development schemes. These local heat-	2021-2024	Ministry of Communities and Territories Development, Local Councils

No.	Action	Timing	Responsible stakeholder
	planning processes should be used to examine the potential for improving the efficiency of heating networks and converting the heating networks to renewable energies. District heating development schemes should define zones for the use of heat supply options — districts of a human settlements, for which based on the results of cost benefit analysis a certain type a heat supply system is feasible (central district heating, decentralized solution, individual heating), and which is characterized by a certain level of heat load density. Besides, the schemes could foresee zones for priority or compulsory connection to district heating systems in case of new construction of large-scale reconstruction of buildings to increase the efficiency of district heating operation and investment in modernization. Foresee mechanisms for integration of heat supply systems development schemes in city planning and development documentation, as well as control over compliance with key requirements of such schemes.		
3.2	**Assess the feasibility of launching competitive heat energy market** Access the feasibility of legislative changes aimed at launching competitive heat energy market and access of third-party heat energy producers to district heating networks. To develop and approve legal framework for the competitive district heating market operation and free access to the district heating systems for independent heat energy producers. Development of heat energy market will eliminate market entry barriers, increase competitiveness and support the reduction of energy and carbon intensities of DH systems. At the same time, launching of heat energy market contains risks related to the stability of municipal enterprises operation and energy security of the cities. Defining the need for unbundling of heat generation and heat supply, conditions for granting access to heat transportation networks and relevant contractual obligations of the parties involved.	2020-2022	Ministry of Communities and Territories Development, State Energy Efficiency and Energy Saving Agency
3.3	**Launching electronic trading of biomass fuel** To develop and approve legal framework for electronic trading of biomass resources to ensure market transparency and competitive prices. The provisions of the legislation should ensure drivers for the supply and demand for biomass fuels, as well as biomass quality control provisions. The electronic trading of biomass will reduce biomass prices volatility and support the investment in biomass energy projects.	2020-2022	Ministry of Communities and Territories Development, State Energy Efficiency and Energy Saving Agency
3.4	**Improving regulatory base for approving the level and structure of heat energy tariffs** To improve regulatory framework on DH tariffs structure and approval targeting such aspects as automatic adjustment of natural gas and electricity costs, possibility to increase personnel wages, and new tariff incentives for renewable heat.	2020-2022	Ministry of Communities and Territories Development, National Commission for State Energy and Public Utilities Regulation
3.5	**Introducing state support system for district system development in cities**	2020-	Ministry of Communities

No.	Action	Timing	Responsible stakeholder
	The national authorities shall establish support to the municipalities in heat planning in various ways, in particular by helping with the procurement of funds, guidelines for municipal heat planning, training, the creation of inter-municipal data, e.g. “waste heat register” (industry and trade), possible areas for large open-space solar thermal systems, potential for geothermal energy, building and energy-related data. Support of district heating systems development should include mechanism for incentivizing new connections; in particular, via partial compensation of the costs, simplified procedures and provision of technical assistance for consumers, who plan to connect to district heating systems.	2030	and Territories Development, local councils
3.6	**Assessment of waste energy potential utilization for large energy producers** To require producers of significant amounts of heat and electricity to investigate options for capture and use of their waste heat and to facilitate the supply of waste heat to a network where this is economically viable. This shall apply to all electricity generation and industrial plants, which need to be required to carry out a cost benefit analysis on heat use. DH networks will also need to carry out a cost benefit analysis where potential industrial heat sources are available.	2022-2030	Ministry of Communities and Territories Development
3.7	**Reforming carbon taxation mechanism** To improve the legislative framework on carbon tax and strengthen its climate mitigation impact. The changes to be considered include exemptions from carbon tax for biomass fuel, increasing the level of carbon tax for fossil fuels and broadening the base for taxation by covering fossil fuel consumption by individual consumers, including natural gas consumption for individual heating. The interaction with GHG emissions trading, which larger DH producers are subject to, must be also considered.	2021-2024	Ministry of Energy and Environmental Protection / Ministry of Finance
3.8	**Construction norms and technological standards for district heating sector** Ensuring renewal of state construction norms, which are applied during district heating modernization projects and/or affect the development of district heating systems in order to take into account the development of modern technologies and information about potential risks (e.g. norms on heat networks, environmental requirements, installation of individual heating systems, etc.). To introduce technological standards for district heating sector for individual equipment and/or overall performance of district heating operators with the minimum performance requirements for generation equipment and auxiliary equipment (grace period and gradual standards strengthening schedule could be provided).	2021-2024	Ministry of Communities and Territories Development / Ministry of Energy and Environmental Protection
3.9	**Improvement of public procurement procedures** Improvement of regulatory and legislative base for the organization and execution of procurement process for the implementation of district heating modernization projects in line with the requirements of the Law of Ukraine On Public Procurement, including the introduction of energy efficiency criteria and other non-financial criteria.	2021-2022	Ministry of Economic Development, Trade and Agriculture, Ministry of Communities and Territories Development

No.	Action	Timing	Responsible stakeholder
3.10	**Incentives for heat energy generation from renewable energy sources** Ensuring a stable incentive mechanism for fostering heat and power generation from renewable energy sources using the existing green tariff mechanism, incentivizing renewable energy generation using auctions and quotas mechanisms, as well as development of new mechanisms for supporting heat energy generation from renewable sources (e.g. premium for heat energy from renewable energy sources during a specified period). The use of renewable energy sources requires larger capital investment and faces additional barriers (technical barriers, capacity barriers, etc.), however at the same time brings society benefits due to lower negative environmental impact and social benefits and thus requires state support measures.	2021-2022	Ministry of Communities and Territories Development, Ministry of Energy and Environmental Protection
3.11	**Environmental requirements for the use of biomass in heat supply systems** Reforming legislative and regulatory base for the introduction of environmental requirements for the use of biomass for heat energy generation, in particular with respect to: 1) sustainability criteria for biomass and 2) air emissions limits for small and medium biomass installations and measures to avoid violation of air quality standards near residential and public buildings.	2021-2022	Ministry of Energy and Environmental Protection, State Energy Efficiency and Energy Saving Agency

(4) Funding

No.	Action	Timing	Responsible stakeholder
4.1	**State support program for district heating modernization projects** To develop a state support program for the implementation of DH modernization projects and define relevant financing sources, including a defined minimum share of funds from the State Fund for Regional Development and Energy Efficiency Modernization Fund that should be directed to DH modernization projects and/or establishment of a dedicated state fund with defined funding sources. The tools used by the program could include direct finance and partial reimbursement of interest rates or loans. The funding should target sustainable retrofitting of DH systems aiming at increase of efficiency and competitiveness (optimization of operation, expansion of networks), increasing the use of RES and excess heat, promotion of CHP in DH systems. The focus should be on the modernization measures that demonstrate medium of low cost-efficiency (based on the analysis of net present value of cash flows, internal rate of return and discounted payback period indicators) and could not be financed from other available sources but important to ensure energy security and sustainability of DH development (e.g. replacement of pipelines with the installation of pre-insulated pipes) and allows to significantly improve the overall efficiency of district heating systems (e.g. centralization of district heating sub-systems or separate sections of the grid).	2020-2021	Ministry of Communities and Territories Development, State Energy Efficiency and Energy Saving Agency, Ministry of Finance of Ukraine
4.2	**Support of district heating systems modernization by local authorities** Support of district heating modernization projects implementation using funds from local budgets to reduce the	2020-2030	City councils

No.	Action	Timing	Responsible stakeholder
	financial burden on final consumers.		
4.3	**Debt management strategy for district heating system operators** To develop and execute debt management strategy for DH operators to deal with accumulated debts for natural gas supply during the previous years. Improving the mechanism for debt collection from customers of the heat supply companies.	2020-2024	Ministry of Communities and Territories Development, Ministry of Finance
4.4	**Supporting the development of new business-models for district heating systems** The national (government) and local (municipal) authorities to support the development of new business models for the delivery, refurbishment and financing of heat networks. Possible business models to consider include establishment of ESCO, ensuring access of independent producers to the grid of district heating systems, public-private partnership models, extending the scope of services by covering emergency and maintenance servicing of distribution networks within the buildings and apartments, substation servicing and maintenance, conducting energy audits, renewal of hot water supply, participation in electricity market, etc. Definition of the scope of additional services, pricing mechanism, as well as development of relevant cooperation procedures for different parties, typical agreement forms and other required documents. One of the priority measures could be new business-models for servicing and modernization of distribution networks within multi-apartment buildings, as their conditions impact financial feasibility of other modernization measures in district heating systems.	2020-2024	Ministry of Communities and Territories Development, Local Councils
4.5	**Support energy efficient renovation in residential and public buildings** To continue support of energy efficiency improvements in residential buildings via warm loans program and State Energy Efficiency Fund and other instruments. The coordination between the measures targeting energy efficiency improvements in buildings and planning DH systems development should be ensured, including the possibility of development low-temperature DH sub-networks. An important aspect of energy efficiency measures in buildings would be rehabilitation, replacement and balancing of heat energy and hot water distribution networks within multi-apartment buildings, as their conditions impact financial feasibility of other modernization measures in district heating systems. In case, if a building is not connected to the district heating system, include a requirement to assess the feasibility of such connection during the energy audit of the building. Assess international experience and possibilities of involving private companies in buildings renovation state support programs to mitigate capacity barriers (technical, legal, financial, etc.). At the same time, include measures on capacity buildings for household owners associations on topics related energy efficiency projects in buildings sector.	2020-2030	Ministry of Communities and Territories Development, State Energy Efficiency and Energy Saving Agency

No.	Action	Timing	Responsible stakeholder
4.6	**Cooperation with international financial organization and other partners** To continue cooperation with international development institutions, technical assistance programs, development agencies and other donors to secure financing sources for DH modernization. Ensuring attractive financing conditions due to low interest rates, extended crediting period, and soft collateral requirements. Mitigation of regulatory and capacity barriers related to cooperation with international financial organization, including project approval and registration procedures.	2020-2030	Ministry of Communities and Territories Development, Ministry of Finance
4.7	**Mitigation measures for potential delays in payments in case of emergency situations** Development of mitigation measures for the potential non-payments for the heating services stemming from emergencies, including COVID-19 pandemic.	2020	Ministry of Communities and Territories Development

Conclusions and further steps

District heating plays a crucial role in securing energy needs on millions of Ukrainian and state policy should focus on improving the efficiency and sustainability of DH systems operation. The goal of the state policy should be guided not only by the aim of reducing the cost of heat energy supply to the final consumers but also should take into account economic, environmental and energy security objectives.

The current proposals for the national action plan for retrofitting of district heating systems in Ukraine has been developed within the Horizon 2020 KeepWarm Project (Improving the performance of District Heating Systems in Central and Eastern Europe) based on the experience received during implementation of various tasks under the project, including training and capacity building activities, development of feasibility studies and business models, as well as broad consultations with the partnering DHSs operators and other stakeholders in Ukraine.

The current document contains proposal for the following key directions:

- Heating visions, strategies and plans: measures to enhance the role of district heating modernization priorities in national, regional and local development planning process;
- Supporting actions and expert guidance: measures to strengthen institutional capacity of state authorities, technical, organizational and financial capacity of DH operators, as well as legal framework improvement and awareness rising;
- Planning and regulation: measures to address legal and regulatory barriers for DH modernization projects, as well as create additional incentives for improving energy efficiency and use of renewable energy sources;
- Funding: measures to assist DH operators in attracting financial resources for DH modernization projects and provision of targeted financial support.

The proposals presented in the document are expected to serve as a basis for further stakeholder consultation activities on the state policy in the area of district heating sector modernization and adoption of relevant state support measures.