

Factsheet T.2.2

In depth analysis of the case study
in Poltava

March 2025

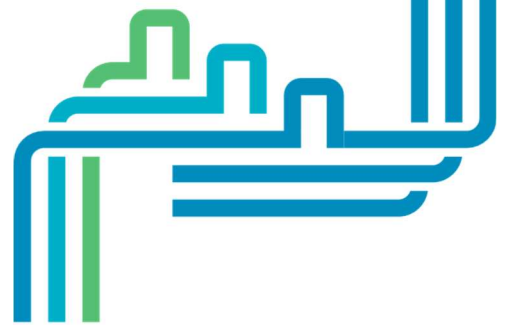
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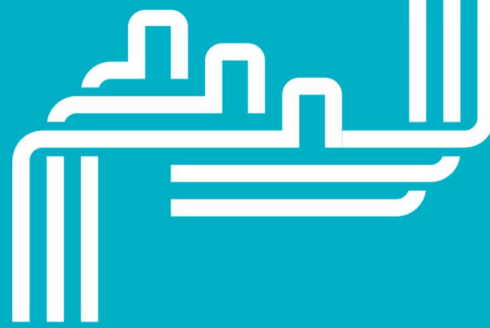


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D2.2 Poltava

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R	Report, document	<input checked="" type="checkbox"/>
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DEC	Websites, patents filing, press & media actions	<input type="checkbox"/>
DATA	Datasets, microdata, etc.	<input checked="" type="checkbox"/>
DMP	Data management plan	<input type="checkbox"/>
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1. INTRODUCTION

Poltavateploenergo is the principal district heating and cooling operator in the Poltava Community, fully owned by the Poltava Regional Council. The municipal company is responsible for providing centralised heating and domestic hot water services to residential, municipal, and various other institutional facilities within its jurisdiction. Poltavateploenergo ensures reliable operations and continuous maintenance of boiler houses, heating substations, and distribution networks. The company's responsibilities encompass regular and major maintenance interventions, preparation of detailed design and estimate documentation for the construction and reconstruction of heat management infrastructure, as well as the installation and repair of heat engineering equipment.

The Poltava region stands out as one of Ukraine's most agriculturally advanced areas, complemented by significant natural gas production capacities. The region has identified strategic growth in sectors including chemical and food processing industries, development of industrial parks in the city of Poltava, and enhancement of logistics infrastructure tailored to support the agricultural sector.

The district heating infrastructure in the city of Poltava currently serves approximately 95% of buildings, a total of 3374 structures, which break down by heated area (in m²) as follows: about 80.8% residential buildings, around 11.2% public institutions, and the remaining 8.0% commercial units. The standard heating season duration in Poltava is approximately 165 days per year.

Poltavateploenergo continuously pursues strategic objectives in rational energy resource management, the integration of environmentally sustainable technologies, and decarbonisation initiatives aimed at reducing greenhouse gas emissions associated with thermal energy production. Energy efficiency improvements remain central to their ongoing operational and developmental efforts.

Recently, Poltava has actively participated in the European Sustainable Energy Days initiative, aligned with Ukraine's overarching theme, "Green and sustainable reconstruction of Ukraine - equal opportunities for everyone." This initiative places specific emphasis on ambitious targets, such as achieving a 35% reduction in CO₂ emissions by 2030, advancing the growth of an ecological economy, elevating the quality of life for residents, enhancing community awareness regarding efficient energy use, and advocating for widespread adoption of energy-efficient technologies.

2. THE DISTRICT HEATING SYSTEM (AS IS)

2.1 Energy generation

The district heating system in Poltava is primarily managed and operated by the Poltavske Regional Communal Production Enterprise of the heat sector, Poltavateploenergo.

The present infrastructure consists mainly of multiple decentralised power plants, amounting to 91 plants in total, delivering a combined thermal capacity of approximately 891.5 MW_{th}. In addition to conventional energy generation facilities, Poltava incorporates renewable energy sources into its heating network, notably two biomass boilers with a cumulative installed capacity of 1.5 MW_{th} and a solar plant installation with a capacity of 30 kW_{th}, dedicated specifically to supplying administrative buildings.

Annually, the total thermal energy generated by the existing infrastructure reaches approximately 756 GWh. Despite the extensive generation capacity, the current configuration of the heat source system does not include thermal energy storage facilities.

Natural gas remains a significant energy input for the existing district heating infrastructure. Associated greenhouse gas emissions from current operations stand at about 304.7 thousand tonnes of CO₂-equivalent annually.

Waste heat recovery within the existing system has been initiated, though it remains limited to approximately 1.12 MW_{th}. Nevertheless, there is an untapped potential for further exploitation of waste heat recovery, identified at 2.81 MW_{th}.

2.2 Energy Distribution Network and Consumers

The district heating distribution infrastructure in Poltava comprises an extensive network, currently spanning approximately 214.9 kilometres. The network experiences a substantial peak thermal load of approximately 1.9 GW_{th}.

The age of the existing district heating distribution network is around 45 years, with individual segments ranging widely from 1 to 69 years. However, comprehensive GIS data detailing specific network locations and conditions is currently unavailable, presenting challenges for precise diagnostics and targeted infrastructure interventions.

Heat is distributed throughout the network using hot water as the heat carrier medium, operating under a temperature regime of 90°C for supply and 65°C for return. Notably, the temperature levels in the heat supply scheme are adjusted throughout the year, exhibiting distinct operational variations between winter and summer seasons to accommodate fluctuating heating demands.

From a hydraulic perspective, the network is equipped with an extensive array of 792 pumping units. These pumps exhibit individual capacities ranging from 0.085 kW to as high as 320 kW, with a cumulative installed capacity totalling approximately 9.75 MW. Operational efficiency and system flexibility are enhanced through the implementation of frequency converters, facilitating precise control of flow and pressure conditions within the network. It is notable, however, that the network configuration does not currently include pumps designed to feed the network from multiple directions.

Thermal and hydraulic calculations, as well as modelling of the heating networks, have been developed and are actively maintained.

Operationally, the district heating network exhibits common infrastructural challenges, predominantly manifesting as water leakages and heat losses. Current assessments quantify these heat losses at approximately 11%, representing a significant area for efficiency enhancement and operational optimisation in future network improvement initiatives

3. UPGRADING MEASURES

Currently, Poltavateploenergo has not outlined immediate investment plans for additional heat generation or storage infrastructure. Instead, significant attention is being directed toward addressing existing operational inefficiencies and technical faults within the district heating system.

Priority technical investigations predominantly focus on pipeline replacement, implementation of frequency converters on existing equipment, substantial reduction of water leakages and heat losses, and the comprehensive reconstruction of boiler houses and heating substations.

At the systemic level, Poltava has articulated clear objectives aiming at broader improvements, which include the reconstruction and modernisation of boiler houses, optimisation of the district heating system configuration, selective renovation of the heating network infrastructure, installation of advanced control and automation devices, and establishment of cogeneration units for enhanced efficiency and sustainability.

The boiler house reconstruction strategy involves upgrading facilities by integrating modern automated process equipment, targeting operational efficiencies of no less than 94%. Specifically, automation initiatives are planned for natural gas combustion processes on VK-type boilers, alongside the installation of automated modulating burners and waste gas heat recovery units at selected boiler models, including KVG-6.5, TVG-8M, and PTVM-50.

Optimisation efforts within the district heating system are envisioned through strategic consolidation, particularly combining heat supply systems of boiler houses geographically situated in proximity, thereby enhancing operational efficiency and reducing overall energy consumption.

Regarding infrastructure improvement, the heating network reconstruction is planned for an estimated length of 27.4 km, aiming at enhancing the reliability, efficiency, and performance of the distribution system.

Further efficiency measures encompass the installation of advanced control devices and automation systems at 8 central heating stations and 107 individual heating substations. These improvements are anticipated to significantly reduce overall energy consumption across the network by ensuring more precise and adaptive regulation of thermal energy delivery.

Finally, Poltavateploenergo plans the construction and deployment of cogeneration units within the company's boiler houses, achieving a total projected electrical capacity of approximately 4.93 MW_{el}. The implementation of cogeneration units will enhance the energy conversion efficiency, enabling the combined generation of heat and electricity and contributing to the overarching strategic goals of energy efficiency, emissions reduction, and sustainable district heating operations.

GET IN TOUCH WITH US



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