

Factsheet T.2.2

In depth analysis of the case study
in Stryi

April 2025

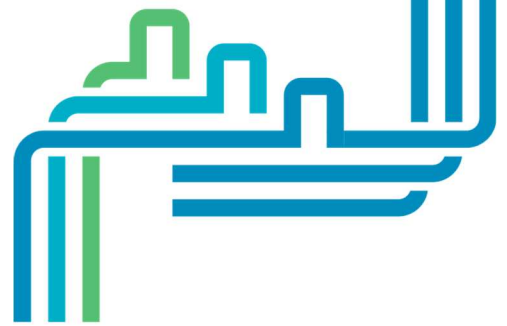
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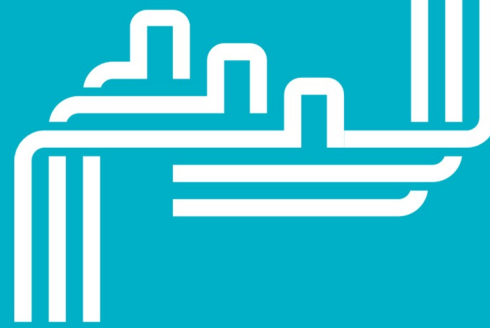


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1. INTRODUCTION

The district heating system in the city of Stryi plays a pivotal role in meeting the thermal energy demands of the local community. Operated exclusively by the municipal enterprise Stryiteploenergo, a publicly owned company under the governance of the Stryi City Council, the system provides centralised heating services to an extensive network of consumers, including residential buildings, educational institutions such as schools and preschools, healthcare facilities, and various administrative and organisational structures within the city. Established in 1978, Stryiteploenergo is responsible for the comprehensive management of thermal energy production, distribution, and delivery.

The Stryi Community comprises approximately 98,000 inhabitants, with around 60,000 residents directly benefiting from the district heating services provided by Stryiteploenergo. Notably, the district heating system supplies heat to approximately 60% of the buildings within Stryi city. The annual heating period in Stryi lasts for 179 days, underscoring the significance of a reliable and efficient district heating infrastructure.

Strategically, Stryi is positioned as a district centre with a development trajectory oriented towards enhancing transit infrastructure and economic growth. Reinforcing this direction, the Strategy for the Stryi Community Development until 2030, officially approved in July 2022, emphasises relocating industrial enterprises outside urban zones to facilitate the establishment and advancement of dedicated industrial parks. This strategic realignment aims to optimise urban land use and bolster economic diversification.

Additionally, Stryi holds considerable strategic importance in the broader European energy landscape as it hosts Europe's largest natural gas storage facility. This facility plays a key role in both regional and international energy security and logistics, further positioning Stryi as a critical hub within Ukraine's energy infrastructure.

2. THE DISTRICT HEATING SYSTEM (AS IS)

2.1 Energy generation

The district heating system in Stryi, managed by the municipal enterprise Stryiteploenergo, currently comprises an extensive network of energy generation facilities. Specifically, the enterprise operates 33 boiler houses equipped with a total of 90 individual boiler units. Collectively, these units represent a total installed thermal capacity of approximately 93.6 MW_{th}, with an average operational efficiency of 88%. These generation units facilitate a reliable thermal energy supply to a diversified consumer base, including residential buildings, educational institutions, healthcare facilities, and other administrative and organisational structures. Among the various consumer categories, residential households constitute the primary demand, accounting for approximately 75.5% of the total thermal energy consumption, whereas the remaining 24.5% is attributed to public institutions and other organisations. In terms of spatial coverage, the supplied district heating system effectively provides heat to approximately 373,300 square meters of residential areas and 156,500 square meters used by public institutions.

In terms of annual heat production, Stryiteploenergo generates approximately 64.88 GWh of thermal energy per year. This energy generation relies on a fuel mix based mainly on fossil fuels and supplemented by biomass sources. The primary fuel utilised is natural gas, consumed at a rate of approximately 3.2 million tonnes per

year, equivalent to roughly 6.4 million cubic meters annually. Additionally, renewable biomass fuels are included in the generation mix, comprising approximately 6,820 tonnes of woody biomass annually. These renewable resources currently contribute to a renewable installed capacity of 4.95 MW_{th}.

Associated with the current fuel consumption profile, the district heating system generates greenhouse gas (GHG) emissions totalling approximately 4,823 tonnes of CO₂-equivalent per year. The emissions reflect the high dependency on natural gas, which highlights the potential environmental benefits of an increased use of available renewable biomass resources.

At present, the district heating system does not include any thermal energy storage units. Consequently, the management of heat generation and distribution relies solely on real-time production capabilities, presenting an opportunity to enhance operational flexibility through the future integration of thermal storage systems.

2.2 Energy Distribution Network and Consumers

The district heating infrastructure in Stryi comprises a piping network with a total length of approximately 29.4 kilometres. This network plays a critical role in ensuring reliable heat transmission from the point of generation at boiler facilities to various end-user categories throughout the city. The district heating system currently operates with a peak thermal load of approximately 43.47 MW_{th}, reflecting the aggregated maximum thermal demand of connected consumers during peak heating conditions.

The existing distribution network exhibits a varied age profile, ranging from newly installed pipeline segments (approximately 1 year old) to older sections nearing their 20th year of operation. Maintenance and modernisation efforts are continuously undertaken, including the annual replacement of obsolete, unusable, or dilapidated pipeline sections with modern pre-insulated pipes. This practice enhances thermal efficiency, reduces heat losses, and improves the reliability and operational lifetime of the overall network infrastructure.

In terms of heat distribution methodology, the system utilises hot water as the primary heat carrier medium. The operational temperature schemes are seasonally adjusted, adopting a standard range of 95/70 °C during the summer months and an elevated temperature range of 115/70 °C during the winter heating season. This seasonal variation accommodates fluctuating ambient conditions and consumer heat demand, ensuring adequate heat delivery and thermal comfort across connected buildings.

From a hydraulic standpoint, the distribution of thermal energy through the network is actively managed using pumps whose operational control is regulated by pressure difference. This hydraulic control strategy maintains appropriate flow rates and pressures throughout the network, ensuring uniform heat distribution and efficient performance across the entire service area.

3. UPGRADING MEASURES

The modernisation of the district heating system in Stryi is strategically guided by the development of a comprehensive District Heating Scheme, which incorporates a long-term investment plan aimed at enhancing the system's energy efficiency, sustainability, and resilience.

The planned upgrading measures are primarily oriented towards transitioning the energy generation portfolio from fossil-based sources to renewable alternatives, in alignment with national and regional decarbonisation objectives.

A key component of the proposed upgrading strategy involves the progressive replacement of natural gas-fired boilers with biomass-based thermal energy units. Specific interventions have already been identified within the investment roadmap. These include the decommissioning and substitution of existing natural gas boilers at three critical locations:

- At Novakivskoho 9, a natural gas boiler with an installed capacity of 4.65 MW_{th} is scheduled for replacement by a biomass boiler with a nominal capacity of 4 MW_{th}.
- At Kossaka 11, a larger-scale replacement is planned, where the current 8 MW_{th} gas-fired boiler will be substituted with a 6 MW_{th} biomass-fired unit.
- At Hrabovetska 108, a similar conversion will be executed, with the current 6.5 MW_{th} gas boiler to be replaced by a 4 MW_{th} biomass boiler.

These measures are expected to significantly reduce the carbon intensity of the heat generation mix and promote the utilisation of local renewable resources, such as woody biomass, which have already been integrated into the existing system on a limited scale.

In addition to biomass conversion, the integration of heat pump systems and Combined Heat and Power (CHP) units is under consideration to further diversify the generation mix.

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