



# District Heating in Ukraine: Impulses from Lviv, Poltava and Stryi

Hakan Ibrahim Tol, Stefan Retschitzegger, Maksym Terletsky

Photo: AdobeStock/ronedya

Decades of dependence on natural gas, ageing Soviet-era infrastructure, and war-related damage pose immense challenges to Ukraine's district heating sector. Nevertheless, municipalities view the energy transition as an opportunity, linking modernisation and renewable energy deployment with enhanced resilience. Under the guiding principle of "building back better", resilient and sustainable systems are intended to pave the way toward a peaceful future.

## Heat Transition in Ukraine Under Crisis Conditions

EU-funded projects such as *SUPPORT DHC* and *ENABLE DHC* provide Ukrainian cities with strategic guidance while promoting modernisation, renewable energy integration, and resilience in district heating systems. This article compares the transformation approaches of Lviv, Poltava, and Stryi – three cities in Ukraine, each with different size and complexity together with distinct challenges on the path toward decarbonisation. These case studies offer scalability and replicability, supporting the nationwide adoption of integrated approaches for a climate-friendly future.

## Lviv | A Metropolitan-Level Strategy

Lviv, the largest city in Western Ukraine with approximately 750,000 inhabitants, operates one of the country's largest district heating systems. Managed by Lvivteploenergo and merged in 2024 with Zaliznychteploenergo, the system comprises more

than 170 boiler houses and one CHP plant, supplying over 7,500 buildings. Almost the entire heat supply is based on natural gas, while ageing infrastructure leads to persistent heat losses and inefficiencies. Most connected buildings are Soviet-era multi-apartment blocks with poor insulation and limited control over internal heating systems.

Between 2020 and 2022, the city developed a forward-looking strategic framework, including a Sustainable Energy and Climate Action Plan (SECAP), the "Green City" Action Plan, and the Integrated Urban Development Concept 2030. These initiatives aim to reduce greenhouse gas emissions and improve overall system efficiency. Long-term targets are ambitious: a 35% CO<sub>2</sub> reduction by 2030 and a 100% renewable energy supply by 2050, aligned with EU climate and energy policies.

In this context, cooperation with AEE INTEC under the *SUPPORT DHC* project plays a catalytic role. AEE INTEC supports the preparation of a comprehensive district heating plan, including a 10-year investment and operational roadmap integrating renewable energy and waste heat sources. Feasibility studies assess the potential of wastewater heat pumps, geothermal energy, and bioenergy utilisation, while future storage options are evaluated to enhance system flexibility. This metropolitan initiative demonstrates how integrated planning and renewable energy integration can reposition district heating as a driver of sustainable urban development.



Newly installed air-to-water heat pump system in Lviv.  
Photos: Lvivteploenergo/City Institute Lviv

## Poltava | Gradual Modernisation of a Regional Network

Poltava, a city in central Ukraine with approximately 300,000 inhabitants, operates one of the largest regional district heating systems in the country. About 95 % of the city's 3,400 buildings are supplied through a network comprising 91 facilities with a total installed thermal capacity of nearly 890 MW<sub>th</sub> and over 215 km of distribution pipelines. Annual heat production amounts to approximately 756 GWh, with the majority of demand originating from residential consumers. The system remains heavily dependent on natural gas, and renewable integration is still at an early stage. To date, two biomass boilers and one solar installation have been implemented.

The existing infrastructure faces significant challenges: installed boiler capacities exceed connected loads by more than double. Ageing equipment, insufficient automation, and the absence of thermal storage add financial pressure and vulnerability to gas price volatility.

Within the framework of *ENABLE DHC*, Poltava, in cooperation with AEE INTEC, aims to develop in-

vestment portfolios and energy management approaches aligned with European standards. Priority measures include boiler house modernisation, network rehabilitation, and the introduction of combined heat and power systems. The Municipal Energy Plan 2030 foresees a 23 % reduction in CO<sub>2</sub> emissions and increased deployment of biomass and solar energy. Poltava thus illustrates how gradual modernisation of a large regional system can lay the foundation for long-term decarbonisation and energy security.

## Stryi | Regional Strategic Transformation

The city of Stryi, with approximately 98,000 inhabitants, operates a district heating system managed by the municipal utility Stryiteploenergo. Established in 1978, the system consists of 33 boiler houses and 90 individual installations with a total installed capacity of 93.6 MW<sub>th</sub>. Annual production amounts to approximately 65 GWh, primarily based on natural gas, supplemented by around 6,800 tonnes of woody biomass (approximately 5 GWh or 7.7 %). The network extends nearly 30 km and supplies about 60 % of the city's buildings, with more than three-quarters of demand originating from households.

As in many Ukrainian municipalities, the infrastructure suffers from ageing pipelines and a lack of storage capacity. However, ongoing measures are replacing obsolete sections with modern pre-insulated pipes to reduce heat losses. Under *ENABLE DHC*, Stryi benefits from network analyses conducted by AEE INTEC, including thermo-hydraulic assessments to better understand flow behaviour, pressure dynamics, and operational bottlenecks – forming the basis for more efficient and flexible operation.

Strategically, the city aims to diversify its fuel mix by gradually replacing gas-fired boilers at three key sites (each 4–6 MW<sub>th</sub>) with biomass installations. Future concepts include heat pumps, combined heat and power units, and thermal storage to enhance both efficiency and resilience. Beyond its local framework, Stryi holds strategic significance as the location of Europe's largest underground gas storage facility, positioning the city at the intersection of regional and international energy security.

## Comparative Insights – Three Levels of Transformation

All three cities share common challenges: high gas dependency, ageing Soviet-era infrastructure, and vulnerability to both price volatility and war-related disruptions. Common strategies include prioritising modernisation over expansion, reducing network losses, and integrating renewable energy and waste heat into existing systems. However, the scope and scale differ. Lviv demonstrates the importance of integrated planning and alignment with EU policies to mobilise large-scale geothermal, solar, and waste heat projects. Poltava shows how an efficiency-oriented approach focusing on boiler modernisation, automation, and combined heat and power can stabilise one of Ukraine’s largest regional networks. Stryi illustrates how gas substitution through biomass and thermo-hydraulic optimisation can create replicable models for medium-sized cities. Together, these cases highlight the scalability of diversified approaches, from metropolitan strategies to regional and municipal transitions, providing a blueprint for resilient, renewable-based district heating across Ukraine.

## Outlook – From Crisis Resilience to Climate Neutrality

Ukraine’s district heating sector plays a decisive role in both crisis resilience and long-term decarbonisation. The experiences of Lviv, Poltava, and Stryi demonstrate that strategic planning, efficiency improvements, and renewable energy integration can progress even under extreme conditions.

Looking ahead, the focus will increasingly shift toward scalable solutions: geothermal energy and large-scale heat pumps in metropolitan systems; combined heat and power and digital energy management in regional networks; and biomass-based diversification in municipal utilities. These pathways align with EU energy and climate policies and strengthen Ukraine’s integration into the European energy framework.

Crucially, capacity building and international cooperation through projects such as *SUPPORT DHC* and *ENABLE DHC* provide the technical foundation for this transition. By combining short-term resilience with structural reform, Ukrainian cities demonstrate how district heating can evolve into a resilient and sustainable backbone of urban energy systems, setting a precedent for post-war reconstruction and future climate neutrality.

### Supported by



Co-funded by  
the European Union



### Further information and links in the e-paper

[https://www.aee-intec.at/zeitung/nachhaltige\\_technologien-4-2025/12/](https://www.aee-intec.at/zeitung/nachhaltige_technologien-4-2025/12/)

**Dr. Hakan Ibrahim Tol** is a researcher in the “Cities and Networks” division at AEE INTEC. [h.tol@aee.at](mailto:h.tol@aee.at)

**Dipl.-Ing. Dr. Stefan Retschitzegger** is a researcher in the “Cities and Networks” division at AEE INTEC. [s.retschitzegger@aee.at](mailto:s.retschitzegger@aee.at)

**Maksym Terletsy** is Managing Director of the City Institute in Lviv.

## Sources and further information

Selected article from the journal

**nachhaltige technologien 04 | 2025**

**The Transformation of District Heating Networks**



AEE INTEC

[www.aee-intec.at](http://www.aee-intec.at)

E-Papers *nachhaltige technologien*

<https://www.aee-intec.at/en/e-paper/>

E-Paper *nachhaltige technologien 04 | 2025* – Transformation der Fernwärme (DE)

[https://www.aee-intec.at/zeitung/nachhaltige\\_technologien-4-2025/](https://www.aee-intec.at/zeitung/nachhaltige_technologien-4-2025/)