

DISTRIBUTED ENERGY GENERATION IN KHMELNYTSKYI

– *Khmelnyskyi, Ukraine (Khmelnysk oblast)*

In a nutshell

The Khmelnytskyi municipality has introduced a modern distributed energy generation system to increase its energy efficiency and strengthen energy security.

Background

In 2015, Khmelnytskyi joined the Covenant of Mayors initiative, committing to reducing its energy consumption and CO2 emissions while significantly increasing the share of energy generated from renewable sources (RES). Since February 2022, similarly to other regional cities, Khmelnytskyi has been severely affected by power outages due to Russian attacks on energy infrastructure, which also disrupted the operation of the municipal heat supply company Khmelnytskteplokomunenergo, causing interruptions in heat supply for its clients.

The municipality decided to re-organise its heat supply system by installing the combine heat and power plants (CHP) already in 2003.

CHP is a technology that produces electricity and thermal energy at high efficiencies using a range of technologies and fuels. There are different types of CHP systems exist:

gas turbine or internal combustion engine CHP: It burn fuels like natural gas or biogas to turn turbines or engines that drive electricity generators. Waste heat is captured from exhaust gases or the cooling system.

Steam turbine CHP: A boiler burns the fuel to produce steam, which then drives a steam turbine to generate electricity. The leftover steam or hot water is used for heating purposes.

Micro-CHP systems: Small-scale systems for individual buildings or small facilities, often powered by natural gas, biogas, or solar energy.

Fuel cell CHP: Uses hydrogen or natural gas in a fuel cell to generate electricity. The heat generated during the chemical process is recovered for heating.

As of 2024, 15 CHP plants have been installed and are operational in the city of Khmelnytskyi. Total installed capacity of CHP plants in Khmelnytskyi is 7.5 MW of electricity and 10.5 MW of heat generation, providing 30 GWh of heat and 21 GWh of electricity annually. In total, they can cover the entire energy demand of the city's public building sector or need in electricity of all boiler houses.



Опис діяльності

01

Technical design preparation and its state expertise leading to approval is obligatory for starting the construction works.

02

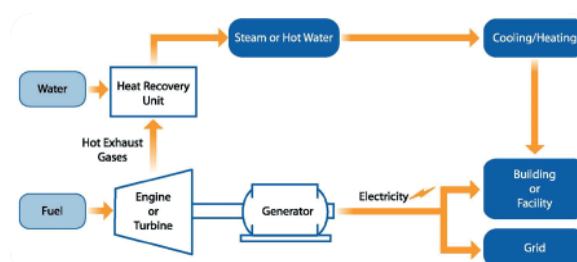
Completion of construction and acquisition of a state-issued license for heat and electricity production (required if capacity exceeds 5 MW)

03

Additionally, if the utility company plans to sell electricity to the grid, a separate license must be obtained for that purpose.

04

Construction works and equipment commission



Focus on distributed energy generation in Ukraine

Currently, Ukraine is focusing on the development of distributed generation of any capacity and using all available resources. That process is in line with the resolution of the Cabinet of Ministers of Ukraine as of August 13, 2024 No. 761-p "National Action Plan for Renewable Energy for the Period up to 2030" (hereinafter referred to as the "Plan"). The Plan defines the directions of development of the renewable energy sector up to 2030 and specific measures for their implementation.

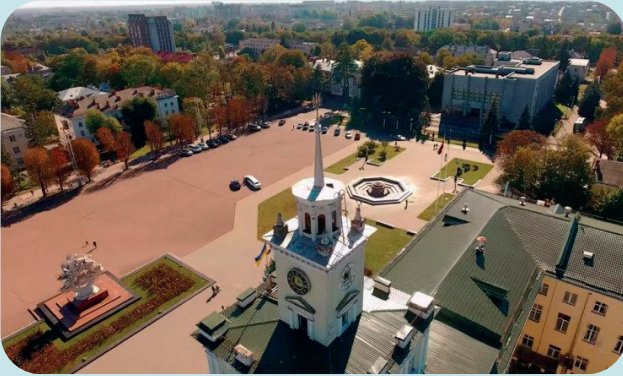
As Russia continues to destroy Ukraine's energy infrastructure, it has become critical for the country to expand its distributed energy generation in municipalities to enhance energy security and reduce dependence on vulnerable power grids. "

Photo



CHPs in a boiler house in Khmelnytskyi

Khmelnytskyi



Population:

299 000

Area

93 sq. km

CoM Signatory since:

2015

CO₂ emission reduction target:

238 154 tons by 2025

Key figures



60-90% efficiency rate of CHP units



CO₂ emission reduction – **0.2-0.3** tons per MWh of electricity and heat per year



Monetary savings – EUR **150.000-250.000** per 1MW CHP annually per year



200.000 residents who receive heat and electricity



5 jobs created

✓ Achievement and advice for replication

Benefits of CHP installation:

• Energy independence and resilience:

Decentralization of energy supply reduces reliance on centralized power grids, which are often vulnerable to attacks, as seen during the war. Also, the CHP plants produce both electricity and heat on-site, making municipalities less dependent on national infrastructure and more capable of sustaining essential services (e.g., hospitals, shelters, heating systems) during outages.

• Efficiency and cost savings:

CHP systems can achieve energy efficiency rates of 60-90%, significantly higher than traditional separate electricity and heat production methods. Fuel flexibility allows the use of local biomass, natural gas, or renewables, reducing the cost burden associated with expensive or unreliable fuel imports.

• Sustainable energy security:

CHP can integrate renewable energy sources like biomass, geothermal, or biogas, contributing to long-term sustainability goals and reducing dependency on fossil fuels, which are vulnerable to supply chain disruptions during war. Reducing the carbon footprint and fostering environmental sustainability, even during reconstruction, aligns with EU directives, which could further attract international aid and investment.

Advices for replication:

• Assess local energy needs and resources:

conduct feasibility studies to understand local energy demand (both heat and power) and available resources like biomass or geothermal energy. Tailor CHP installations based on the unique characteristics of each municipality.

• Start with small-to-medium scale

CHP plants that can be expanded or replicated in other regions based on success. Modular systems allow for gradual scaling as funds and resources become available. Prioritize installations in critical infrastructure (hospitals, district heating centers) to maximize immediate impact.



Financing the project



Cost range:

\$1.5-2.5 Mio per 1MW of CHP
incl. 60-70% equipment cost



Saving potential:

CHP efficiency rate is 60-90%



Return on investments:

App. 150.000-250.000 EUR per 1MW
CHP annually



Payback period:

3-7 years depending on



Useful links

<https://www.youtube.com/watch?v=1say9GozzXk>

<https://www.khm.gov.ua/uk/content/chotyrnadcyatu-kogeneraciyu-us-tanovku-u-hmelnyckomu-vvedeno-v-ekspluatacyu>

Contact

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