Ternopil District Heating Modernisation







DHS Ternopil



(Municipal utility district heating company "Ternopilmiskteplokomunenergo" of Ternopil City Council)

- Location: Ternopil, Ukraine
- Ownership: municipal
- Grid: 152 km (owned by the municipality)
- Customers: over 42,000
- Production: 471,597 MWh (2018)
- Boiler output: **709 MW** (137 boilers)
- Type of DHS: hot water
- Current fuel: natural gas
- Potential renewables nearby:
 biomass



Source: DHS Ternopil web-site, teplo.te.ua

Investment plans (2020-2025): **10 MW and 4 MW biomass boilers**, modernization of boiler houses, replacement of pipelines, and installation of individual heating units.

The concept of Ternopil District Heating Modernisation

The concept of Ternopil district heating modernisation is a result of collaborative work of the Ternopil City Council and CE «TMTKE» with the constant technical assistance of EBRD, E5P, SIDA, NEFCO, USAID.

The main idea of the concept is transition during modernisation from the model of production district heating management to a consumeroriented model that allows:

consumers to use high-quality, consumer-managed services;

the district heating company to improve the efficiency of its work and adequately maintain the balance between demand and supply, while reducing costs.

Funding for Ternopil District Heating Modernisation Program

Toal capital investments required: **UAH 2 billion / EUR 65 million**. CE «TMTKE» with the assistance of the Ternopil City Council national

authorities managed to attract a number of long-term loans and grants for the total amount of about **UAH 1 billion or 50% of the target:**

- Stage 1 EUR 20 million, including:
 - EUR 10,355 million of long term loans;
 - EUR 6,565 million of grant funding; and
 - EUR 3,115 million of own funds;
 - Funding sources: EBRD, NEFCO, SIDA, E5P, CTF;
 - **Stage 2** EUR 24.67 million long term loans from WorldBank (IBRD and CTF).

DHS modernization measures

- Installation of heat substations (779 units) EUR 12 million; contracts signed for 467 units;
- Construction of 10 MW biomass boiler EUR 5 million;
- Converting a gas boiler to a biomass firing (4,5 MW) EUR 0.4 million; contract signed;
- Modernization of 9 boiler houses EUR 10 million;
- Installation of new puming equipment and frequency converter (42 units)

 EUR 4 million; contract signed for 35 units;
- Installation of SCADA control system EUR 2.6 million;
- Replacement of outdated heating networks (9,4 km) EUR 7.7 million;
- Installation of small cogeneration plants (1,16 MWth) EUR 2 million

Pumps replacement

Seven energy-efficient pumps with frequency convertors (October 2017):

- Funding source: EBRD loan 629,000 EUR, own funds 126,000 EUR
- Equipment installed pumps Wilo (Germany), frequency converters Danfoss (Denmark), pump control system Elas (Ukraine)
- Reduction of electricity consumption by 39% achieved (1,460,000 kW*h during 2017/2018 heating season)





Substations

145 individual heat substations have been installed, mounting work for 85 IHS is on its final stage:

- Funding source: grant EBRD E5P, grant SIDA – NEFCO – E5P, own funds
- Disbursements made 1,291,842 EUR
- Local contribution 25,000 EUR
- Equipment installed controllers AMARC (Italy), Danfoss (Denmark), heat exchangers Alfa-Laval (Sweden), pumps Wilo (Germany), Salmson-Wilo (France)
- All individual heat substations are equipped with heat and water meters



Obstacles for Modernisation Program Implementation

- The procedures established by the Law of Ukraine «On State Assistance to Business Entities» significantly complicated the process of providing guarantees and/or financial support to communal enterprises by local authorities
- The legislation of Ukraine in a controversial way determines the aspects of title to individual heat substations installed in multi-apartment residential buildings, and delays the process of their implementation.
- Changes in legislation in the field of construction made in recent years have led to a significant increase in the duration of design and preparatory work.



Installation of biomass boiler

Centralization of heat supply networks with the construction of a biomass boiler with the capacity of 4 MW at 23 Lemkivska str. boiler house and replacement of pipelines with the use of preinsulated pipes.

Investment - EUR 2.36 million

Scenarios	Subsidized price	Baseline	Market price
Assumed natural gas price, EUR per 1000 m ³	270	371	480
Simple payback period, years	6.2	3.2	2.1
IRR (20 years)	13.9%	29.6%	45.7%
NPV (20 years)	1,247,113	4,594,609	8,224,746



Installation of biomass CHP unit

Centralization of heat supply networks with the construction of biomass CHP unit with electric capacity of 1 MW and heat capacity of 4 MW at 23 Lemkivska str. boiler house and replacement of pipelines with the use of pre-insulated pipes.

Investment - EUR 4.36 million

Scenarios	Subsidized price	Baseline	Market price
Assumed natural gas price, EUR per 1000 m ³	270	371	480
Simple payback period, years	6.2	3.2	2.1
IRR (20 years)	14.9%	23.5%	32.4%
NPV (20 years)	8,914,555	15,499,041	22,639,481



Installation of 10 MW biomass boiler

Installation of a biomass boiler with the capacity of 10 MW at 3 Kurbasa str. boiler house. Annual wood chips consumption is 17,144 tonnes.

Investment - EUR 2.5 million.

Scenarios	Subsidized price	Baseline	Market price
Assumed natural gas price, EUR per 1000 m ³	270	371	480
Simple payback period, years	6.6	3.9	2.9
IRR (20 years)	16.9%	35.0%	53.8%
NPV (20 years)	1,976,131	6,136,448	10,648,036



Primary investment drivers:

- Modernization Program for the District Heating and Hot Water Supply System of Ternopil city for the period 2016-2020
- available financing sources

Strategic background documents:

- Sustainable Energy Action Plan of Ternopil city up to 2020
- National energy efficiency, renewable energy and climate policy



Stakeholder involvement:

- Leading: Ternopil city council
- Other: international financial organizations, customers, contractors

Required resources: Financial investment: 4.9-6.9 million EUR Other: equipment and materials, energy resources, incl. biomass



- RES heat increase:
 271,256 GJ per year
- Emissions:
 - 14,820 tonnes CO2e per year or 12%
- Internal rate of return: 13-54% depending on the intervention and assumed natural gas prices

Want to support our modernization projects? Contact us using the information below!



Thank you for attention!