
REBUILD UKRAINE
5ª МІЖНАРОДНА ВИСТАВКА | КОНФЕРЕНЦІЯ
CONSTRUCTION & ENERGY
ON THE ROAD TO URC`26
ЖИТОМИР
FREE CITY OF STRONG PEOPLE
ZHYTOMYR
Dmytro ROGOZHYN
DIRECTOR OF THE MUNICIPAL ENTERPRISE
«ZHYTOMYRTEPLOKOMUNENERGO» OF THE ZHYTOMYR CITY COUNCIL

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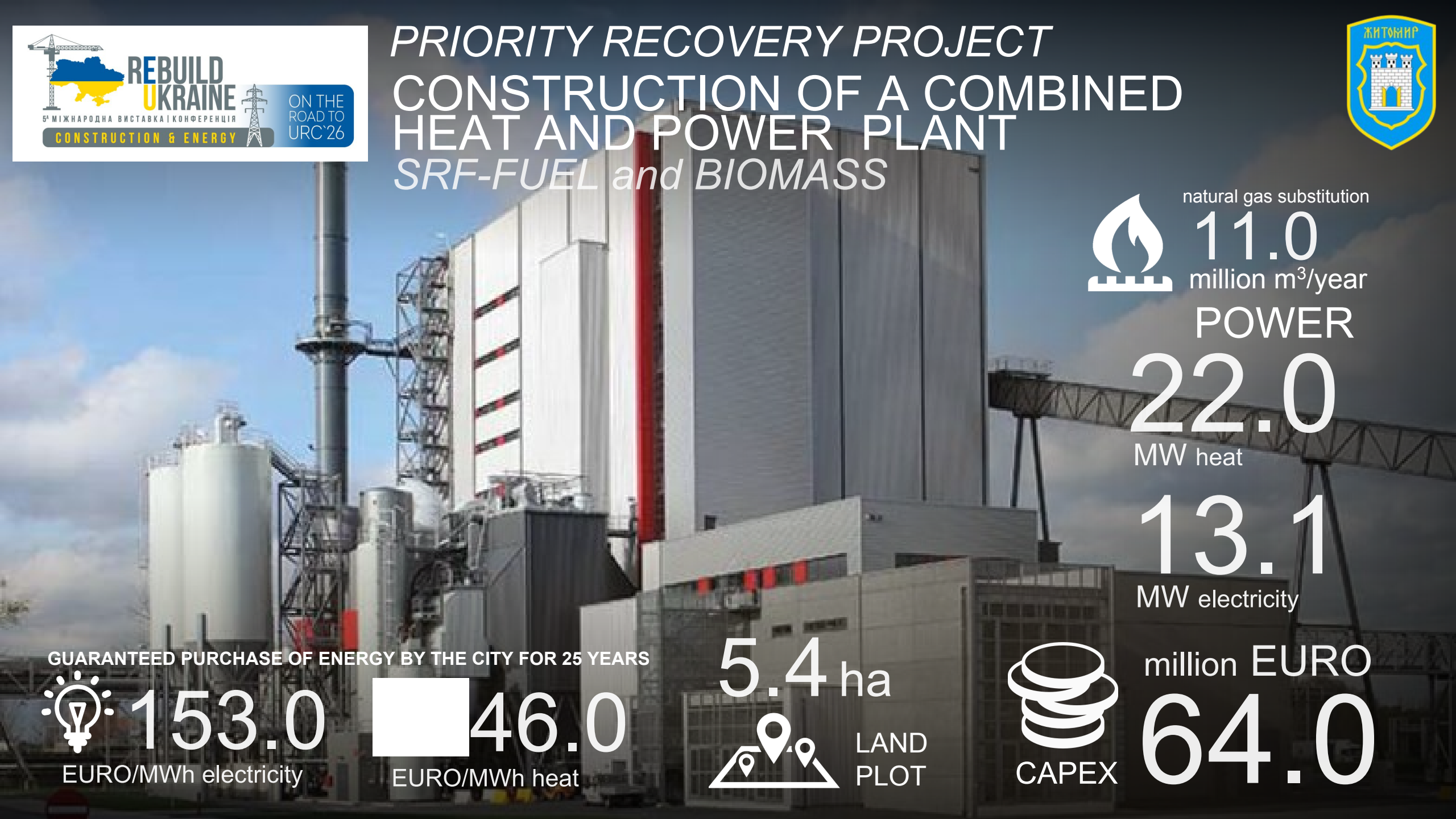
PRIORITY RECOVERY PROJECT

CONSTRUCTION OF A COMBINED HEAT AND POWER PLANT

SRF-FUEL and BIOMASS



natural gas substitution
11.0
million m^3/year

POWER

22.0
MW heat

13.1
MW electricity

GUARANTEED PURCHASE OF ENERGY BY THE CITY FOR 25 YEARS

153.0
EURO/MWh electricity

46.0
EURO/MWh heat

5.4 ha
LAND PLOT

CAPEX
million EURO
64.0

PRIORITY RECOVERY PROJECT

CONSTRUCTION OF A COMBINED HEAT AND POWER PLANT

SRF-FUEL and BIOMASS

Construction of a modular Biopower 11 CEX thermal power plant (CHP) on RDF/SRF fuel, supplied from the existing solid waste plant, in the city of Zhytomyr

Electrical capacity: 9.9-13.1 MW **Heat production:** 0-22 MW

Project goals

- enhance the city's energy independence, stability and security of heat and power supply;
- introduce a new source of combined heat and power generation;
- reduce energy costs for heating and decrease pollutant emissions.

Project Initiator:

Zhytomyr City Council

Business model:

- The investor establishes an enterprise and undertakes the construction and operation of the CHP plant.
- The city guarantees supply of the primary energy source (RDF/SRF) and purchase of 100% of the produced thermal energy and a portion of the generating electricity is sold by the investor to the energy market.

Expected capital expenditure financing

- Investors and international financial institutions are invited to participate in the project.
- The total cost - **EUR 64.0 million**, implementation - 2.5 years.

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What are the benefits of this project implementation?

1. **Approximate Key Performance Indicators (KPI) and Financial Metrics:**
   - Expected Discounted Payback Period (DPP): 7.2 years;
   - Internal Rate of Return (IRR): 16.4%
2. **Benefits for the investor:**
   - A reliable source of income that will be insured by:
   - a) reliable supplies of cheap alternative fuel,
   - b) guaranteed sales of electricity and heat.
3. **Expected Social Outcomes:**
   - The project will ensure reliable heat supply to the “Skhidny” microdistrict of Zhytomyr (about 40 thousand residents).
   - The project will create new jobs and generate tax revenue for the city

What are the advantages and opportunities of this project?

Use of Alternative Fuel:

The project uses SRF produced in the region, eliminating the need for gas. A new plant for processing municipal solid waste (MSW) and producing RDF/SRF (fuel calorific value 3964 kcal/kg, capacity 40.0 thousand tons per year) is located 4 km away. This fuel can be used by the CHP plant with minimal modifications to the boiler.

City Government Support:

The city authorities plan to enter into a 3-party investment agreement with the investor and the solid waste plant for a certain period. This agreement will guarantee the sale of electricity and heat of the new thermal power plant and its fuel supply by SRF.

Proximity to Electrical Infrastructure:

An existing electrical substation and network nearby transmits the generated electricity to the Zhytomyr city grid.

Reducing Environmental Impact:

The project minimizes the negative impact on the surrounding

What have been already performed by initiators?

A **feasibility study (FS)** for the project has been developed and its environmental impact assessment has been conducted.

Allocated Land Plot: A land plot of Zhytomyr city territorial community of 5.3765 ha in the industrial part of the city has been allocated for the project and is in the communal ownership of the city of Zhytomyr.

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SPECIFICATIONS OF THE BIOPOWER 11 CEX MODULAR BIOMASS POWER PLANT BY VALMET (FINLAND):

Electrical Capacity: 9.9-13.1 MW; annual electricity production (net) – 78.5 million kWh/year.

Heat Production: 0-22 MW; annual heat energy production – 84.5 thousand Gcal/year.

Fuel Consumption: 41.9 thousand tons of standard fuel/year.

MAIN EQUIPMENT:

one 'Valmet' steam boiler with a fluidized bed on biomass : Capacity of 28.9 MW, steam parameters: 9.27 MPa (abs.), 505°C, superheated steam production of 53.28 t/h (14.8 kg/s).

one steam condensing unit: Steam parameters at the inlet of 9.0 MPa, 500°C, with controlled steam extraction for cogeneration, electrical capacity of 10.0-13.1 MW, with a condenser and water cooling of the fan cooling tower.

CHP Service Life: 25 years

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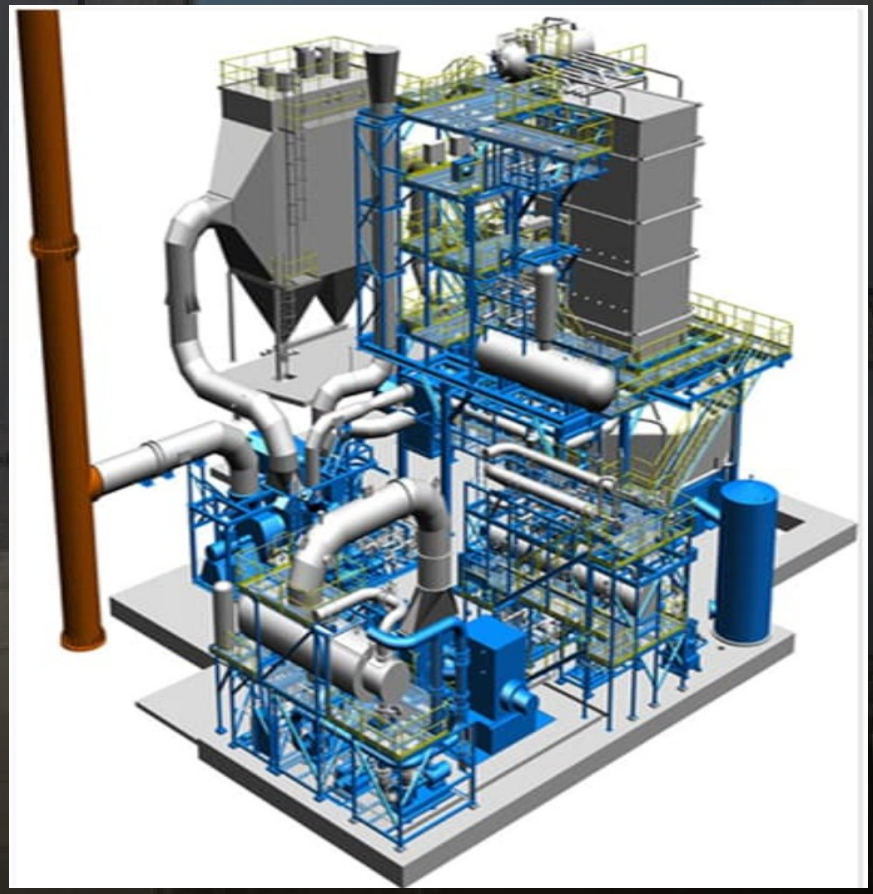
Visualization (Schematics, Conceptual Designs) of the CHP Project



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INSTALLATION OF A 5.64 MW HEAT PUMP

COMBINED AIR-TO-WATER + WATER-TO-WATER HEAT PUMP

Clean energy — for a sustainable future of Zhytomyr

Installation of a 5.64 MW heat pump on the premises of the existing district boiler house RK-6, Zhytomyr

Relevance of the project

Why a heat pump?
Use of **renewable energy sources** (the Teteriv River, air)
Reduced dependence on imported gas
Reduction of CO_2 emissions by 8,000 tons/year
Improving the city's energy security
Demonstrating innovation - one of the first projects of this scale in Ukraine

- **Location:** Zhytomyr, boiler room RK6, Zhytomyr
- **Technology:** combined air-to-water + water-to-water heat pump
- **Energy source:** Teteriv River + ambient air
- **Capacity:** 5.64 MW
- **Integration:** connection to the boiler room's T2 return pipeline

Expected financing of capital expenditures:

Investors and international financial institutions are invited to participate in the project.

The total cost is **EUR 6.5 million**, and the implementation period is

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WHAT ARE THE ADVANTAGES OF IMPLEMENTING THIS PROJECT?

1. **Approximate Key Performance Indicators (KPI) and Financial Indicators:**
   - Expected Discounted Payback Period (DPP): 5.6 years;
   - Internal Rate of Return (IRR): 15.9%
2. **Advantages:**
   - Reduction of natural gas consumption to 35%
   - Reduction of CO_2 emissions to 8,000 t/year
   - Compliance with the UN Sustainable Development Goals
3. **Expected Social Results:**
   - Reduction of heating supply costs for connected consumers
   - Improvement of the environmental situation in the city

WHAT ARE THE ADVANTAGES AND OPPORTUNITIES OF THIS PROJECT?

Technical Innovation:

Combined Heat Pump (air-to-water + water-to-water)
Use of the Teteriv River as a renewable energy source
Compatibility with existing gas boilers

Proximity to the thermal infrastructure of the existing boiler house:
The existing district boiler house RK-6 and the nearby heating network make it possible to transfer the generated thermal energy to the Zhytomyr city network.

Reduction of environmental impact:
Stable heat supply for residents
Reduced dependence on gas price fluctuations
Positive perception of "green" changes in the community

WHAT HAS ALREADY BEEN ACCOMPLISHED BY THE INITIATORS?

A technical and economic feasibility study (TEFS) for the project has been developed.

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TECHNICAL SPECIFICATIONS :

Heat generation:

5.64 MW;

annual heat energy production – 29 thousand MW/year.

Average electricity consumption:

6.1 thousand MW/year.

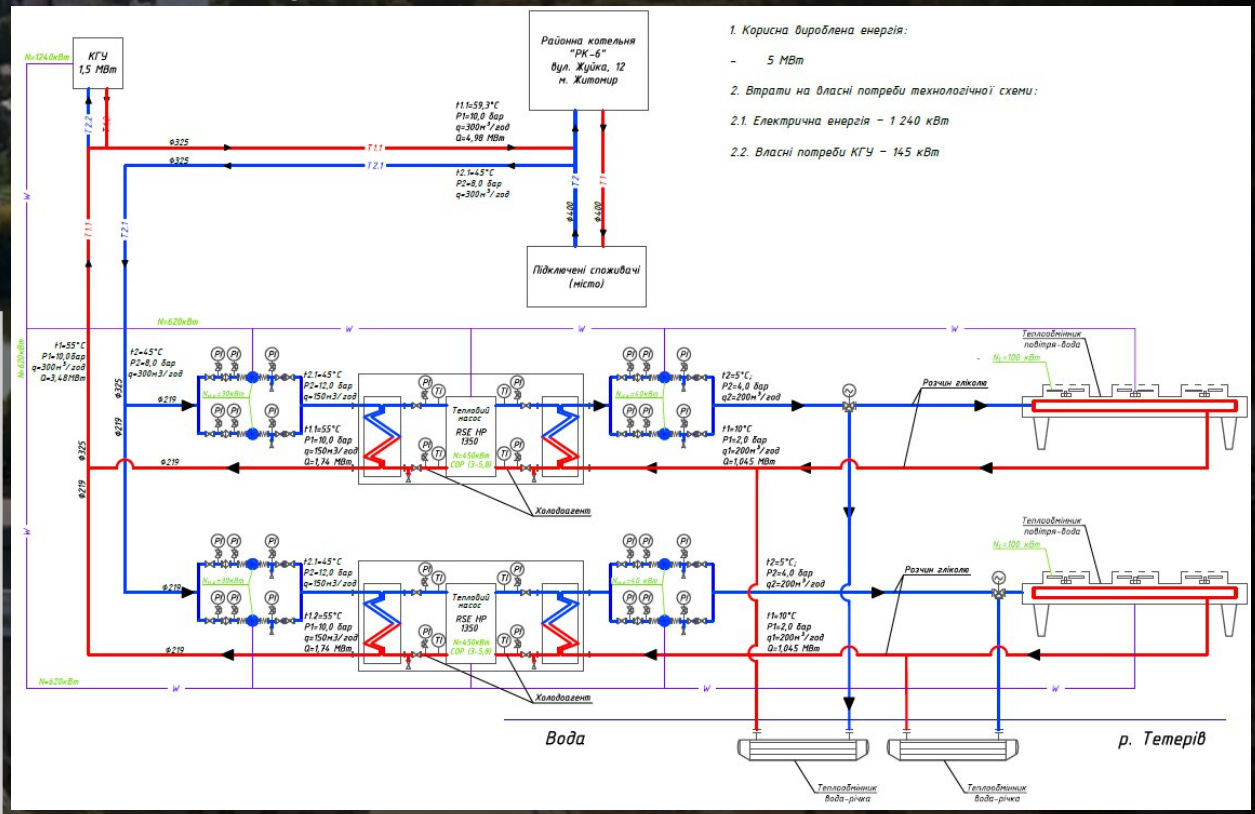
MAIN EQUIPMENT:

Heat pump:, automated control system, automated security system. Power - 5.64 MW.

Heat exchangers for energy extraction from the heat source, pump unit, SCADA.

Service life: 30 years

Visualization (diagrams, concept development) of the heat pump project



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Possible impacts on the river

1.Local water cooling

a) The discharge temperature will be lower than in the river, but the difference is insignificant (2–4 °C).

b) Due to the current, rapid mixing occurs, and at a distance of 5–10 m from the outlet, the temperature practically equalizes.

2.Biological impact

a) In winter, local cooling can affect microflora and fish (especially spawning).

b) In summer, the effect is less noticeable, since the river is warmer and has a larger heat reserve.

3.Hydrodynamic effect

a) Means for holding down mechanical parts.

4.Visual and noise impact

a) Shoreline structures should be minimally invasive (underwater fence, small pump chamber).

b) The heat pump shall be quiet, especially compared to gas boilers.

THANK YOU FOR ATTENTION

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