



Energy  
Security  
Project

# INSTALLATION OF A CONDENSING ECONOMIZER TO RECOVER FLUE GAS HEAT FROM THE BOILER OF CHP-5, SU KYIVSKI CHPS, CU KYIVTEPLOENERGO

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Kyiv, Ukraine  
February 2021

# BASIC INFORMATION

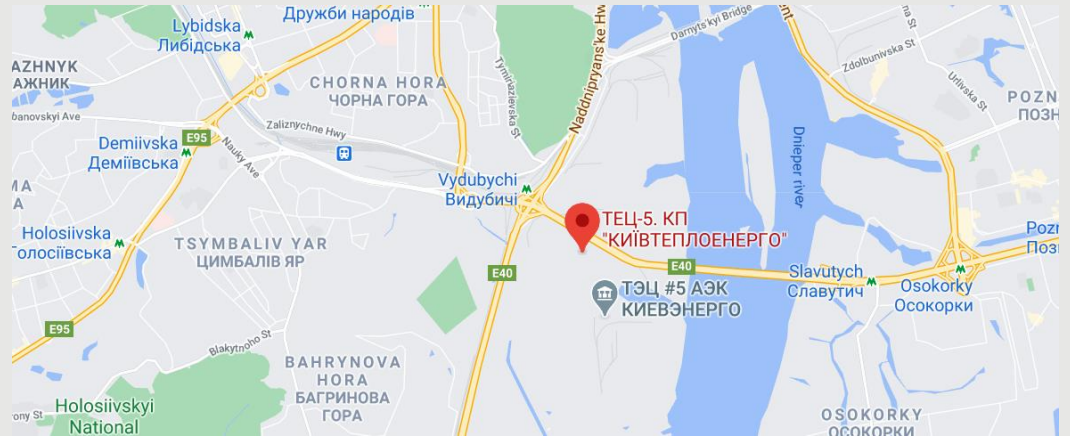


Location where the condensing economizer will be installed

**Technical solution:** Install a condensing economizer (CE) to recover the heat of flue gases from the boiler through deep cooling, using the effects of water vapor condensation with heat power of 30 MW.

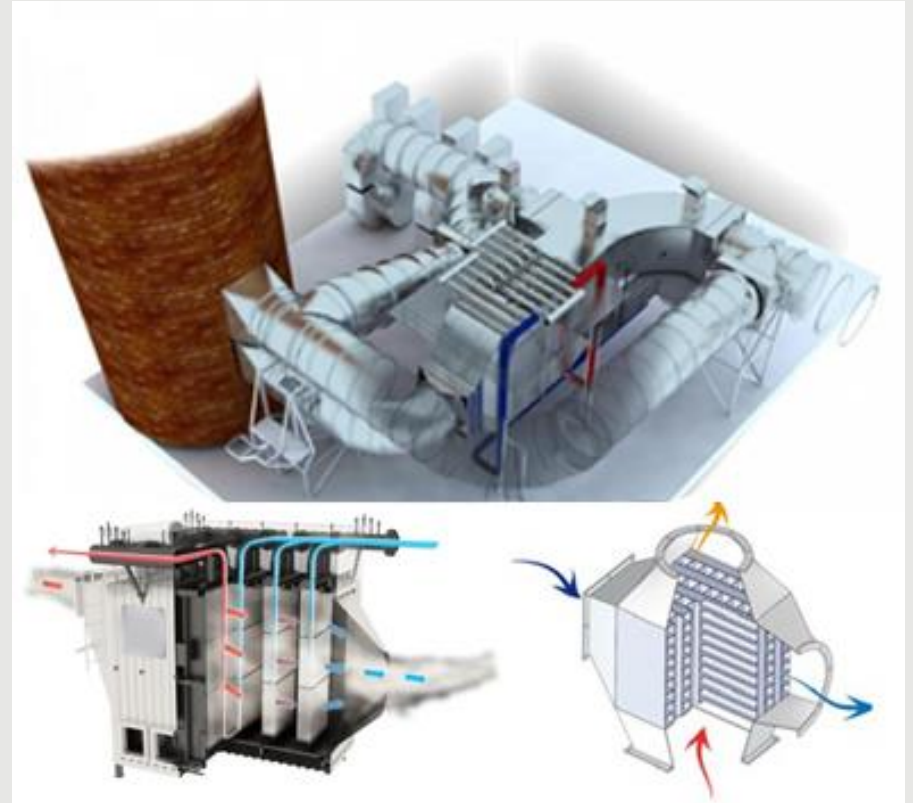
**Address:** Kyiv CHP-5, Promyslova Street, 4, industrial area Telychka, Holiivskyi district, Kyiv

**Coordinates:** Latitude N 50°23'36", longitude E 30°34'12".



# HOW THE CONDENSING ECONOMIZER (CE) WORKS

- A CE is a tubular heat exchanger installed behind the gas-fired boiler that recovers heat energy from flue gases, including vapor generation energy.
- First, flue gases from the boiler pass through intertubular space in the exchanger and are cooled to the dew point temperature, transferring their heat to the system water flowing in the heat exchanger pipes.
- Next, the flue gases are cooled further below the dew point and transfer heat to chemically treated water that is used to replenish heat networks. The condensate is neutralized and used again in the water treatment cycle.
- Using a CE will increase boiler unit efficiency by 10 percent.



# FEASIBILITY STUDY

- **Technical evaluation:**
  - Capacity of the condensing economizer (CE): **26 Gcal/h (30 MW)**
  - CE is used for **6,000 hours/year**
  - CE generates **156,000 Gcal/year**
- **Economic evaluation:**
  - 156,000 Gcal of heat energy is equal to firing **20.3 million m<sup>3</sup>/year** of natural gas
  - Natural gas consumption before reconstruction: **183 million m<sup>3</sup>/year**
  - Annual gas savings after reconstruction: 10 percent
- **Financial evaluation:**
  - Annual cost savings at a gas price of 7 UAH/m<sup>3</sup>: **UAH 142 million**
  - Cost of implementation: **UAH 373 million**
  - Payback period: **2.6 years**

# ENVIRONMENTAL IMPACT

**Boiler in its current condition, t/year**

**After CE installation, t/year**

*Nitrogen dioxide*

*Carbon dioxide*

*Nitrogen dioxide*

*Carbon dioxide*

449

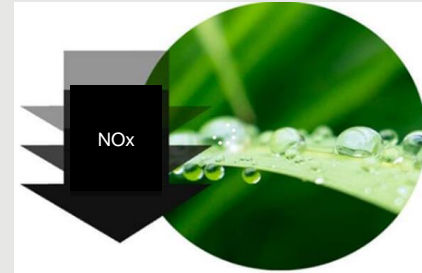
215.055

409

200.587



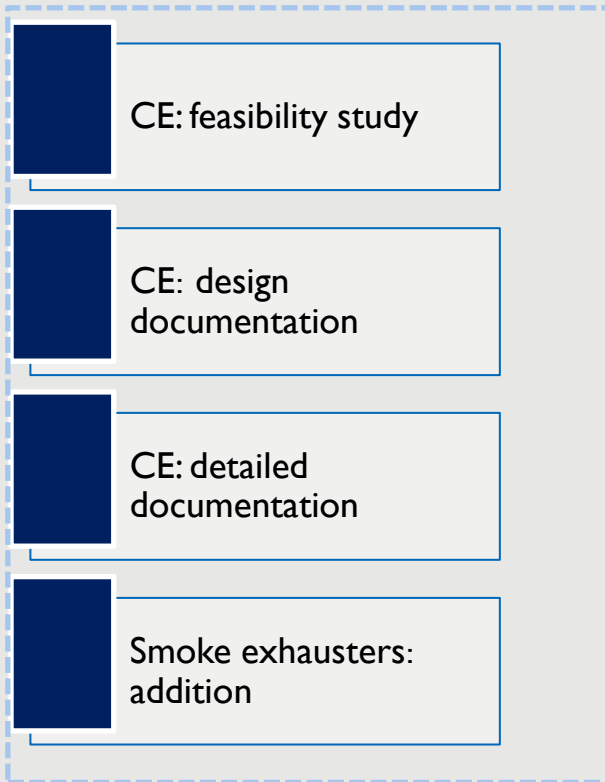
6.7% (14,183 t/year)



9.1% (40,855 t/year)

# DESIGN DOCUMENTATION

39 documents



## Required approvals:

- Technical services for CHP-5 of SU Kyivski CHPs: design documentation approved as a whole, minutes of the technical meeting on November 23, 2020.
- Ministry of Environmental Protection and Natural Resources of Ukraine, conclusion on environmental impact assessment, case registration number 2019122215054, January 9, 2020.
- LLC Ukrainian Inter-Regional Construction Expertise, expert opinion (positive) on review of the design documentation for construction, December 22, 2020. No. 000936-2.

# FINAL COMMENTS

- The use of water vapor condensation heat in the condensing economizer can increase boiler efficiency by 10 percent.
- Installing the condensing economizer at CHP-5 is a priority project for Kyivteploenergo under the anticipated EBRD program as per Memorandum of 2018, aimed at modernizing and developing the district heating system in the capital of Ukraine.

— Thank you!

## Energy Security Project

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