



## CYEB ENERGY EFFICIENCY SOLUTIONS / WASTE HEAT RECOVERY (WHR)

### INDUSTRY / SEGMENT

District Heating Power Plant,  
Natural gas-fired boilers

### BENEFITS

- Recoverable thermal output:  
275 kW (default operation) –  
500 kW (realized peak)
- Annual cost saving: EUR 42,420  
(default operation)
- Overall simple payback period: 5.26 years  
(default operation)

### APPLICATIONS

Leading edge, highly efficient, tailor-made  
WHR system for natural gas fired boilers

### PREPARATION PHASE

May 2016.

### IMPLEMENTATION PHASE

5 months, May – September 2016.

### SUMMARY

The CYEB Group provides complex energy saving solutions based on a comprehensive review and evaluation of all energy transformation processes at the customer's site. Based on our references and because of our excellent quality/price ratio CYEB was commissioned to design and implement a flue gas energy recuperation solution at the district heating power plant in Štúrovo, Slovakia. The CYEB flue gas heat recovery systems for natural gas-based industries (in particular: chemical, machinery, tire, food, pharmaceutical industries) promise outstanding 4-12% gas saving results and a payback period of 1-5 years. The CYEB condensing flue gas heat recovery systems are available for boilers and for CHP units as well. Further details are highlighted throughout the case study.

### CUSTOMER'S BACKGROUND

The Enerbyt s.r.o. is a district heating and apartment facility management company owned by the city. The company manages a total of 2,000 homes in the city and five surrounding villages. The company's main business activities cover the area of heating, maintenance and other activities associated with housing business. Beyond the apartments Enerbyt s.r.o. also manages public buildings owned by the city.

Main parameters of the district heating operation:

- central boiler room with 3 Viessman Turbomat RN-HW, 5,200 kW boilers
- amount of heat produced: 26,485 MWh (95,346 GJ)
- amount of heat sold: 23,519 MWh (84,668 GJ)
- annual natural gas consumption of 3.5 million Nm<sup>3</sup>
- normative efficiency: 89%
- actual efficiency: 94%

# WHR project main figures

Place	Annual Resource Savings (kWh/year)	Annual Cost Savings (EUR)	Implementation Cost (EUR)	Simple Payback (years)
Enerbyt s.r.o. (Sturovo)	983,000	42,420	223,531	5.26

## OUR APPROACH

After the kick-off meeting with the managing director and the senior experts at the customer's premises the goal was set, recuperate the maximal energy possible from the flue gas. The challenge that lay before us was the complexity of the operation. Two from the three boilers usually work in load sharing at the same time, but of course loads vary in time. This situation calls for a tailor-made energy saving solution. The design of the adequate, unique waste

heat recovery system required professional engineering expertise, and that is what CYEB proposed. Our proposal included the detailed technical description of the CYEB WHR solution, the project and delivery plan and the expected results of the implementation.

## OUR PROJECT

In our tailor-made WHR system by means of variable-position dampers and a centrifugal fan equipped with VSD the flue gas is diverted through branching channels into our central heat recovery unit. The recovered heat from the flue gas in our heat exchanger is used for preheating the return water. After the heat recovery process the cooled down flue gas exits through the new, stainless steel chimney implemented in the scope of our project. The base of the sizing of our equipment was the operation history of the boilers. The two at the same time operating boilers present a total power of 4,027 kW (thermal). According to our measurement the flue gas temperature was 126.3 °C,

with the recovered heat from the flue gas we can increase the water temperature from 46.8°C to 57.8°C. The pre-calculated and measured energy saving produced by our WHR system in default operation condition is 275 kW (thermal) with peaks up to 500 kW (measured data). The produced condensate amount is 190 kg/h. Our WHR system uses a local PLC, which can be accessed remotely as well. We applied also the best available technologies and procedures in accordance with the European standards for software and hardware security.

## RESULTS

The CYEB WHR Solution in Štúrovo is also a project of major importance from environmental protection point of view. Our tailor-made design and implementation produced the maximal potential energy saving in the operation of the district heating power plant. The CYEB WHR system produces ~120,000 Nm<sup>3</sup> annual saving in natural gas.

The annual reduction in CO<sub>2</sub> emissions is 238 t. In addition the condensate ("acid rain") is now selected and fully neutralized (190 kg/h of 3-4 pH) with a simple, cost-effective device, protecting the settlement from contaminated precipitation.



CYEB, as a dynamically growing international company provides its partners with complex, cost effective solutions by means of which they are able to reduce the volume and price of the energy they consume. We plan, implement and, if necessary, operate the energy saving investments. The efficiency of the projects we plan are always verified by means of measuring after the implementation.

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