

CENTRALIZED HEAT DISTRIBUTION SYSTEM RECONSTRUCTION IN VIMPERK

VIMPERK (Czech Republic)



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TOWN

Vimperk, a town in Šumava mountains, is located in the south-east part of the Czech Republic in a broken terrain in Volyňka river valley, surrounded by forested hills close to Šumava Protected Natural Area and Šumava National Park, at the intersection of Prachatice – Sušice and Strakonice – Strážný boarder routes (Golden Route branch from the Middle Ages). Šumava Mountains are very close. First written document about this town is dated 1264. Town Historical Preserve is established within the town territory, including the originally Gothic castle from half of the 13th century. Currently approximately 7,500 people live in the town.



Climatic data:

During the year the territory is characteristic with intensive wind, mainly western wind and overage winter temperatures from -5 to -9°C (the calculation temperature according to ČSN 06 02 10 is -18°C), summer temperatures from 13 to 17°C , common inversion situations and 253 heating days.

Elevation: 630 – 815 above sea level

Overage temperatures in hearing season:

month	9	10	11	12	1	2	3	4	5
Average air temperatures ($^{\circ}\text{C}$)	11,9	6,8	1,4	-1,8	-3,0	-1,6	1,7	5,8	11,4

CONTEXT

Two central heating distribution systems were gradually established in Vimperk. These are two island systems without interconnection. The centralized heat distribution system in Vimperk is the main heat supplier for the purpose of space heating and water heating mainly in the locations with the newer concrete apartment blocks and older brick houses and presents the public infrastructure also for other heat consumers.

At the end of 2005 the town implemented substantial reconstruction of the Central centralized heat distribution system.

Glass Factory centralized heat distribution system

The boiler station supplies heat within insulated small heat distribution system for concrete apartment blocks with 424 apartments and the public infrastructure of K. Weise's blocks of apartments.

Two of the boilers are part of the independent steam system established for glass factory operation – which is currently out of operation.

Originally low pressure coal-fired steam boiler station was partly upgraded in 1995 for use of natural gas and equipped with three identical warm water boilers - Průmyslovesta Brno, type HVP 1500, with unit output of $1,5.MW_{tep}$. Annually the boiler station supplies heat for space heating and water heating (app. 16.000 GJ) to small concrete blocks of apartments with 424 apartments and to the public infrastructure. Originally the boiler station has been equipped with two low pressure steam boilers for the glass factory technology. These boilers are currently out of operation since the glass factory is out of business. The annual natural gas consumption is app. 470 - 500 thousands of m^3 .

The distribution network from the Glass Factory boiler station is a warm-water line of four pipe type. Warm water routes length is 775 m, length of the inlet utility warm water inlet line is also 775 m.

Central centralized heat distribution system

The source was established in 1978 as a medium pressure brown coal fired steam source. It serves for heat supply to concrete and older blocks of apartments with 1.530 apartments, including public infrastructure. In 1998 medium pressure natural gas fired steam boiler has been installed, but it is has not been operated. The total installed output of the source was 13.5 MW.

The primary steam distribution within the centralized heat distribution system supplied in total seven heat exchange stations, from which four of them supplied heat to secondary heat distribution systems for residential houses, including central utility water heating and three stations were located directly in specific buildings (school, Český Telecom and Health Centre). The exchange stations were not suitable from the technical and economical point of view. The secondary distribution system was of four pipes type.

Reconstruction of the centralized heat distribution system was implemented in the summer 2004. The original central boiler station was cancelled and new condensation gas boiler station was installed in the original heat exchange station at

Rokle. The boiler station includes three Viessmann gas boilers with power output 3.1 MW and Weisshaupt single unit burners. Two boilers are equipped with condensation heat exchangers with maximum output of 0.35 MW. The total installed output of the warm-water gas boilers including flue gas exchanger varies between 9.3 – 9.8 MW. In addition the boiler station also includes TEDOM 22 kW_{el}, 44 kW_t cogeneration unit (for own power consumption in the boiler station). The heat generation efficiency during the year is about 95 %.

The original four pipes lines were replaced with double pile distribution lines 95/65°C. Unit heat transmission station with heating water regulation and decentralized utility warm water preparation were installed directly in the individual supplied buildings.

The boiler station operation as well as of the entire centralized heat distribution system is controlled by Johnson – Controls system.

EXPERIENCE OF THE CITY

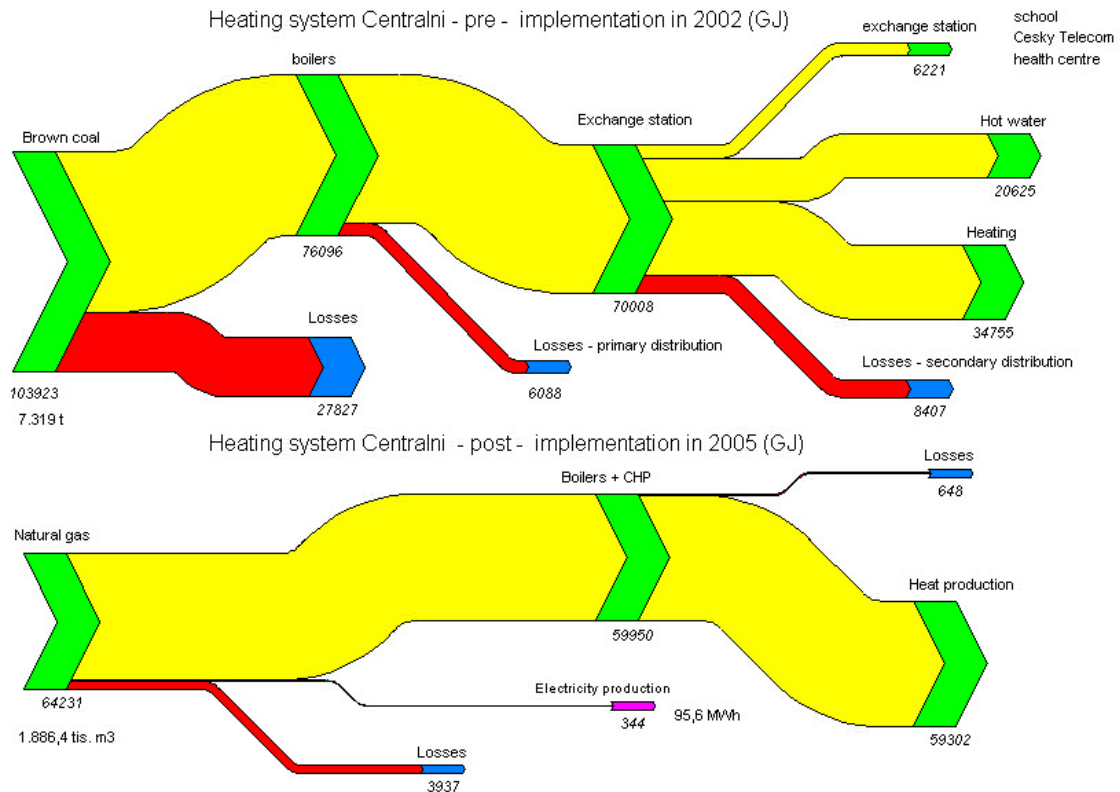
Partnership process

The current state of heat management in Vimperk town presents one of the most advanced heating systems in South Bohemia. The project was coo-financed by the State Environmental Fund. SEVEN, The Energy Efficiency Center, prepared the technical solution in cooperation with K-projekt company from Dačice. The project was implemented by Kotlemont Praha in cooperation with EVČ Pardubice (design documentation, transmission station) and Johnson – Controls (measuring and regulation).

Technical data

Fuel and power flows within the Central centralized heat distribution system are displayed on the Sankey's diagram before and after upgrade.





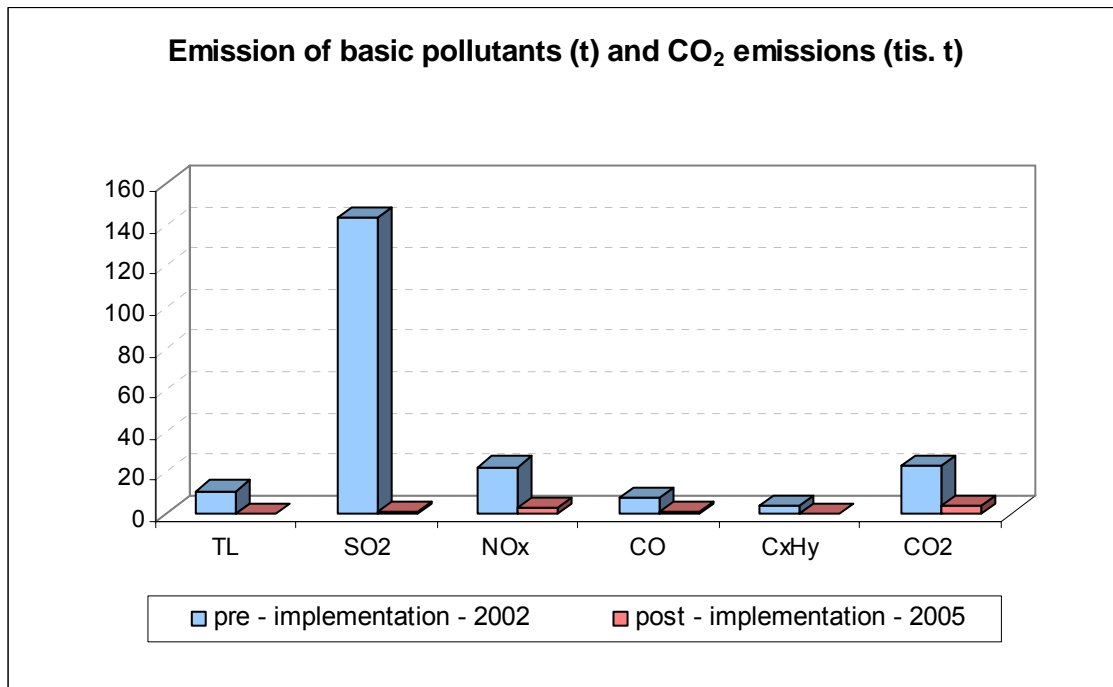
COST AND BENEFITS

Economical

The town heating management upgrade has been implemented on the basis of technical documentation prepared by SEVEN and K – projekt Dačice. The upgrade has been implemented during the summer months of 2004. The new system is in operation since the 2004/2005 heating season. The total project implementation costs totaled CZK 66,789.5 thousands, from that the subsidy from SFŽP was CZK 28,159.6 thous..

The total savings including fuel and energy costs, wages, service and maintenance as well as other services, air pollution fees etc., present CZK 3.175 mil. a year. The investment return is 12.7 years.

Environmental



The basic pollutants emission was reduced in average by 94% and CO₂ emissions by 84%. This significant reduction of basic pollutants and CO₂ emissions results from the change of the fuel basis – transmission from brown coal to natural gas, installation of high efficiency heat generation equipment, installation of cogeneration unit and reconstruction of distribution lines – it all significantly reduced loss from distribution.

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