MODERNISATION OF THE DISTRICT HEATING SYSTEM IN VASTSELIINA BOROUGH

VASTSELIINA BOROUGH *(ESTONIA)*

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According to the Vastseliina Municipality energy plan the inefficient district heating (DH) supply in Vastseliina borough was modernized by connecting two separate DH systems into one system, improving reliability of the DH supply and converting DH system more environmentally friendly with wider and efficient use of wood fuels. One boiler house was closed down and second was reconstructed with installation base load wood fuel boiler with capacity 1000 kW and light oil peak load boiler with capacity 500 kW.

MUNICIPALITY

Location:

Vastseliina borough as the administrative centre of Vastseliina Municipality is situated in south-eastern part of Võru County about 24 km south-east from county centre town Võru and 285 km from Estonian capital Tallinn. Vastseliina borough is located not far from Latvian and Russian borders.

Population:

The number of inhabitants of Vastseliina borough is 750, i.e. 33% of the total number of inhabitants of Vastseliina Municipality.

Activities in the region:

Main economic activities: agriculture, forestry, tourism.

Climatic data:

Annual mean temperature: +5.4 ℃
Heating season degree days (18 ℃): 4212
Snow cover duration: 123 days

CONTEXT

The main supplier of heat energy for the dwellings, municipal and public buildings in Vastseliina borough has been for a long time VAKS Ltd, owned 100% by Vastseliina Municipality. Before implementation of present project there has been two separate district heating (DH) systems in Vastseliina with boiler houses in Võidu and Rahu streets. The boilers in the both boiler houses were more than 20 years old and outdated. The boilers in the Võidu street boiler house were fuelled manually with wood logs and coal. The annual boiler house efficiency was low – some 50%. The second, Rahu street boiler house has been reconstructed in 1993 by installation prefurnaces to the existing two boilers to burn woodchips. The boiler house equipment has been worned out. The annual heat production in both boiler houses

amounted to 3100 MWh and heat sale to 2800 MWh. The heat meters are installed to measure the actual heat consumption in the buildings. The total length of the complete pipelines of both networks was about 660 m. All pipelines have been renovated by installing UPONOR pre-insulated plastic pipes.

The inefficient and increasingly expensive to operate DH system of the borough was in need of renovation and improvement i.e. reconstruction of unefficient heat production side into more energy efficient and environmentally friendly with wider use of wooduels. According to the Vastseliina Municipality energy plan, where several alternatives of the development of Vastseliina borough DH system are analysed. The Vastseliina Municipality has selected the reconstruction alternative, including connection of two separate DH systems into one system, improving reliability of the DH supply and reconstruction of Rahu street boiler house with installation new boilers. The main fuel in the boiler house was planned to be wood fuel (woodchips, sawdust, bark).

Duration of the project: 12 months, January 2005 - January 2006

EXPERIENCE OF THE MUNICIPALITY

Partnership process

The project was implemented with active participation of municipal leadership, experts and foreign partners: Aluksne County Government from Latvia, Cita Buve Ltd from Latvia, Institute of Agricultural Engineering of the Lithuanian Agricultural University. The role of the foreign partners was first and foremost to gain experience in implementing DH systems in smaller settlements and disseminate bio-energy related know-how to our specialists. Project partners were involved in the procurement commission. Lithuanian and Latvian partners were also lectors at the project seminar on bio- and renewable energy for the specialists of municipalities held in Vastseliina on January 06, 2006, giving an overview of the use of bioenergy and experiences in their own regions.

The main contractor of the reconstruction works has heen Märja Monte Ltd with local subcontractors
Kurmik Ltd (dismounting, construction and casting works) and Amto Ltd (installation of the DH pipeline). The training course for boiler operators has been carried out on December 2005 by main contractor.

Technical data

During the reconstruction of Rahu street boiler house there was removed old equipment and installed REKA wood fuel boiler with capacity 1000 kW, operating as base load boiler and light oil boiler with capacity 500 kW, operating as reserve and peak load boiler. The both boilers will operate automatically. The larger wood fuel (woodchips, sawdust, bark) storage has been constructed, including automated storage with volume 95,0 m^3. The multicyclon has been installed to clean flue gases. The new wood fuel combustion equipment comprised also wood fuel handling system, flue gas system and ash handling system. The existing steel chimney has been insulated. There is not needed the permanent personal in the boiler house during its operation. The boiler house has been equipped with alarm system on the base of GSM modem. The annual heat production on wood fuel is estimated to be 2900 MWh.

To connect DH networks of Võidu and Rahu streets boiler houses the connection pipeline has been installed with length 590 m using UPONOR pre-insulated plastic pipes Ecoflex Thermo 110 x 10. The second, Võidu street boiler house has been closed down.

The project also consisted of installation of domestic hot water heat exchangers with control equipment in the heat substations of the five apartment buildings to improve domestic hot water supply for the inhabitants.

The DH reconstruction works were commissioned on January 2006.

COST AND BENEFITS

Economical

The project was supported by the European Union Phare 2002 CBC Programme in Estonia "Medium Sized Project Fund (MSPF)". 75% of the costs were financed by the MSPF, and 25% by the Vastseliina Municipality. The total project cost was 361 000 EUR, including installation of the DH pipeline 71 750 EUR.

The financial indicators of the project can be stated as follows without investment support: 1) the Internal Rate of Return (IRR) - 5,3 % (for 20 years); 2) simple payback period – 12 years. The total savings of the project are estimated to be 29700 EUR, from which 67% are savings in manpower and 16% are savings in repairing costs the rest in the fuel and maintenance costs.

Environmental

The environmental impact of the project has been evaluated as reduction of the emission of the following pollutants to due more efficient use of wood fuel and no use more coal: 1) CO_2 – 34 t/year; 2) SO_2 – 0,4 t/year. The annual decrease of using of fuels is esitamated to be 4590 GJ. Closing down Võidu Street boiler house in the central part of the Vastseliina borough will improve air quality and surrounding environment nearby closed down boiler house.

EVALUATION AND OUTLOOK

Monitoring and evaluation of success and/or failure, activities undertaken after the end of the project (the impact on the development of the area)
(12 lines)
The project was successful with positive impact on the development of the Vastseliina and its neighbourhood regions:

- Reconstruction of the DH system will improve the quality of life of local entrepreneurs as well as household consumers by offering stable heat prices and cheaper service and reducing pollution of environment. Modernised DH system will offer the entrepreneurs and another consumers new possibilities for connecting to the heat distribution network.

- Reconstruction of Vastseliina DH system is a good example and motivator for Aluksne region for construction or reconstruction of DH networks in similar settlements ensuring thus improved quality of life in the region.

After starting up the reconstructed boiler house there were started the monitoring activities. The following monthly data are collected and monitored by local heating company VAKS Ltd:

- Fuel consumption;
- Total heat production of the boiler house;
- Heat production on bio fuels;
- Heat sale to consumers.

An example of collected and monitored data is given in the table below.

Month, year	Fuel consumption, GJ	Total heat production, MWh	Heat production on wood fuel, MWh	Heat sale, MWh
jaan.06	2343	566,1	565	500
veebr.06	2389	526,1	525	457
märts.06	2070	501,1	500	408
apr.06	1005	246,1	245	220

FURTHER INFORMATION

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