



Reconstruction of district heating in Iecava Strasa Konsultanti SIA, Latvia

Summary

Iecava is a 311 km² municipality located in central part of Latvia. The population in 2006 consisted of 9 327 inhabitants located mostly in Iecava village. District heating system consists of 2 boiler houses with separate networks. Total heat capacity was initially 12,4 MW with an annual heat production of 18 000 MWh. A development plan for Iecava district heating system aiming to reduce heating costs and fuel consumption was implemented in 4 stages, from 2001 to 2005. The most efficient activities, switching from 4 to 2 pipes networks and installation of individual heat substations, were done during the first stage. The most important results of the reconstruction were reduction of heat losses 6 fold, reduction of the natural gas consumption by 30 % and general improvement of service quality.



End-user area

- New buildings
- Refurbishment of buildings
- Transport and mobility
- Financial instruments
- Industry
- Legal initiatives (regulations, directives, etc)
- Planning issues
- Sustainable communities
- User behaviour
- Education
- Other

Target Audience

- Citizens
- Households
- Property owners
- Schools and universities
- Decision makers
- Local and regional authorities
- Transport companies
- Utilities
- ESCOs
- Architects and engineers
- Financial institutions
- Other

Technical

- Energy efficiency
- Heating
- Cooling
- Appliances
- Lighting
- CHP
- District Heating
- Solar energy
- Biomass
- Wind
- Geothermal
- Hydro power
- Other

Context

Iecava is located in the central part of Latvia in Bauska district about 50 km from the capital. Main profile of activity in the region is agriculture. Number of inhabitants is 9 644 and most of them are living in Iecava. The largest companies in the region are AS "Balticovo" – poultry farm and products; SIA "Iecavnieks" – food products (rape seed, flax, hemp oil and other products); SIA "Zemgales granulas" – wood briquettes; SIA "Latagra" – agricultural chemistry and mineral fertilizers; SIA "Jaunpagasts pluss" bio-ethanol production; SIA "Spals" – furniture; SIA "Skujenieki" – forest nursery.



Energy data:

- Energy supply : 41 apartment house, 67 th.m² (85% of heat consumption) and several municipal buildings and office buildings (15% of heat consumption);
- Energy consumption (MWh): 54000;
- Type of fuel: natural gas;
- Climatic data;
 - Annual mean temperature: 5,99 °C
 - Average of heating days per year: 211
 - Average temperature during heating season: -1,4 °C
 - The lowest temperature for calculation of heating system capacity: -25 °C

Reconstruction of the district heating system was started at the end of 90th because of very bad networks and boiler houses condition. District heating system in Iecava at that time consisted of two boiler houses with separate networks (initially 4 pipes networks with separate system for hot water). Total capacity of heating system at that time was 12,4 MW, utilized capacity – 10 MW. Length of heating networks 6 km, including 5 km from the central boiler house and about 1 km from the village boiler house.

Annual heat production was 18 035 MWh and heat supplied to end-customers was 12 165 MWh. Total losses in the district heating network was 5 871 MWh or 33 % of produced energy! This includes losses in heating network – 3107 MWh (17%) and losses in hot water network – 2764 MWh (16%). The expenditures of district heating was 338 000 EUR yearly (27,8 EUR/MWh supplied).

Objectives

The heating system development plan consisted of an improvement of the district heating system efficiency and reduction of costs and share of municipal subsidies to heating sector. Priorities of the project were reconstruction of the networks (conversion to 2 pipe networks with following full renovation), modernization of end user side (installation of individual heat substations) and improvement of the heat production (reconstruction of existing gas boiler plants).

In general the project was aimed to secure sustainable heat production and supply to customers within at least 20 years long time period. Energy efficiency and similar activities, which covers end user side, were not included into this project.

Process

Reconstruction of district heating system was divided into 4 steps because of financial and technical reasons – the municipality was not able to cover all costs and the construction companies weren't able to implement such a big project within one summer between two heating seasons.

1. In 2001, 35 automated individual heat substations for heating and hot water preparation were installed in the central boiler house system, switching 5 km of heating networks into two pipes system (costs 230 000 EUR).
2. Second stage (2002) included reconstruction of 2,5 km existing network in the central system and reconstruction of the central boiler house (installed water pre-treatment equipment, replaced furnaces in existing boilers and installed two new gas fuelled boilers, costs 390 000 EUR).
3. Third stage included replacing of the rest 1,5 km of heating networks in central boiler house system (costs 320 000 EUR).
4. Within the scope of the fourth and last stage, 1,1 km of networks in the village boiler plant system were replaced and 17 automated individual heat substations for heating were installed at the customer side (costs 215 000 EUR).

Implementation of the project gave optimistic feeling to decision makers, heat suppliers and customers starting from the first stage, because installation of individual heat substations and reduction of heating networks (from



4 to 2 pipes) provided significant direct savings and lead to improvements of the heating service in general. Customers were also happy because they now were able to regulate heat supply by themselves. But, despite savings from heat losses reductions, the potential of heat substations is not utilized fully yet, especially in apartment houses, mainly because of poor house holding and lack of responsible organizations taking care about management of heating infrastructure inside the buildings.

Financial resources and partners

Total costs of reconstruction project of the heating system were approximately 1,16 mill.EUR. Current heat tariff for customers in the village is 32,86 EUR/MWh. Actual production and supply costs in heating season 2005/2006 was 31,17 EUR/MWh, but the last heating season (2006/2007) it was 34,96 EUR/MWh.

The highest share of costs is fuel; 17,58 EUR/MWh (56% of total) in 2005/2006, and 21,29 EUR/MWh (61% of total) in 2006/2007. Next position is salaries; 6,86 EUR/MWh (22% of total) in 2005/2006 and 7,29 EUR/MWh (21% of total) in 2006/2007.

Total heating costs in 2006/2007 was 685 000 EUR, about twice as much than in 1998/1999, when the project was initiated. If we take in account increase of gas price, salaries and inflation rate during this time, heating costs would be nearly twice higher than they are now, if the project would not be implemented. Payback period of different activities were 7-15 years.

Results

The most important result by the implementation of the heating system development plan was the reduction of heat losses in networks six fold, which consequently lead to better quality of heating service and reduced the gas consumption in the boiler plant. Compared to heating season 1998/1999, natural gas consumption in 2006/2007 was about 30 % less. Another important result was increasing the boilers' efficiency.

Nowadays there are 4 installed boilers in central boiler house with 7,7 MW capacity and peak load 6,5 MW. (RK-1.6 x 2, 1980, 1,86 MW x 2, efficiency 94%, TTKV-10-10, 2003, 1 MW, efficiency 95%, TTKV-30-30, 2003, 3 MW, efficiency 95%). The boiler in the village boiler house have a comparable good efficiency and are therefore excluded from the primary activities plan (RK-1.6 x 2, 1996, 1,86 MW x 2, efficiency 92%).

Installation of heat substations gives opportunity to introduce different energy efficiency measures, because customers nowadays have to pay for actually consumed amount of heat and not average tariff, thus making possible to implement insulation projects using bank loans. It's still missing an organization link in the heating sector (house holding organizations in apartment houses), which could be able to organize residents and manage investment projects.

Lessons learned and repeatability

The project resulted in a significant reduction of heat losses and stabilization of heating costs. Iecava municipality utilized the most of economical and environmental potential of reconstruction of heating system, but there are still lot of things to do especially at customer side, where investment costs are much higher, but potential savings – lower.

The first stages of the project were implemented by the heating company, which is responsible for heat production and distribution. Now house management companies and house owners should take initiative to improve the situation at customer side, which includes rather simple activities, like education of customers to utilize individual heat substations, energy efficiency improvements, energy management in apartment houses and installation of individual heat sources (solar collectors etc.). The Municipality is now planning to invest in energy efficiency improvements and energy management in public buildings, which consumes about 10% of total supplied energy.

Heat production still can be improved by diversification of energy sources and outputs: for instance, installation of gas co-generation (about 0,5 MWel), installation of an economizer, decentralized heat production with solar collectors on the roofs for hot water, or to increase temperature of back-flow and switching to biofuel (wood chips, pellets). The most realistic future of heating system in Iecava is connecting of both networks and



increasing the capacity of the central boiler plant keeping natural gas as main fuel to reduce salaries and other management costs.

Contact for more information:

Project Web Site: http://www.strasa.com/sec_tools/

Organisation / Agency: Strasa Konsultanti SIA

Main contact

Address: Braslas street 27/1-5, Riga, LV-1035, Latvia

Tel: +37167514741

Fax: +37167514742

E-mail: info@strasa.lv

Web Site: <http://www.strasa.lv>

Other contact information:

Name of the contact person: Andis Lazdiņš

Position: consultant

Organisation: Strasa Konsultanti SIA

Address: Braslas street 27/1-5, Riga, LV-1035, Latvia

Tel/fax: + 37126595586 / +37167514742

E-mail: andis.lazdins@strasa.lv