Pilot Testing Measures

1. General information

The partner municipalities of the LowTEMP project implemented pilot activities to test the implementation of Low Temperature District Heating (LTDH) in their District Heating (DH) infrastructure. These pilot measures had different characters, depending on the current type of the DH supply infrastructure, types of connected buildings, existing problems, and potential improvements in the energy supply systems. The pilot measures aimed to check the possibility of applying the low-temperature DH supply in existing buildings and housing areas in the Baltic Sea Region (BSR).

The output helps to understand which actions are required and what kind of efforts are necessary to realize them. This way, the output also contributes to tackling planners and operators' reluctant attitude towards implementing a novel approach and technologies to adapt DH grids to diminishing heat demands.

The key aspects of two implemented pilots at Gulbene (Latvia) and Halmstad (Sweden) are summarized bellow.

2. Gulbene municipality

2.1. Aim and scope of the pilot measure

The pilot measure's aim in the Belava parish of Gulbene municipality is focused on the renewal of a former 3rd generation DH distribution network and old wood logs boiler. The pilot measure includes the development of a novel LTDH system including a new boiler house with pellet boiler (0.20 MW), the change of the distribution grid's pipes (for a length of 491 m) and the installation of a remote data reader system to provide continuous monitoring of the system.

2.2. Implementation of the LTDH technological solution

The complex DH modernization and transformation to a LTDH was raealized including:

- Heat production – actual heat load calculation and installation of the container type house with 200 kW pellet boiler with high heat production efficiency. Automatically operated boiler house (one worker with workload 0.2).
- Heat transportation – decreasing DH grid length (disconnection of 4 private houses and boiler house placement closer to main heat consumers); replacing old pipes to new industrially isolated pipelines; decreasing the grid's temperature to 65/35 °C for renovated buildings and 80/60 °C in buildings without insulation.
- Heat consumers – substations and heat distribution system for each consumer; heat meter installation for consumers and ensuring payment for heat based on a heat meter readings

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2.3. Benefits

The transformation of Belava DH to LTDH allowed to achieve:

- Heat production efficiency increase at boiler house to 92 %;
- Heat loss decrease at DH grid to 3.8 %;
- Used fuel energy decrease from 1 179 MWh to 504 MWh (by 57.3 %);
- Electricity consumption decrease to 10.1 kWh/MWh (was 20-25 kWh/MWh);
- Heat tariff decrease from 87.50 €/MWh to 69.07 €/MWh (by 21.1 %);
- Reduction of CO_2 and other gaseous emission pollution;

3. Halmstad municipality

3.1. Aim and scope of the pilot measure

The pilot measure aims to build a LTDH grid in a completely new residential area in Halmstad. The main goals of the pilot measure are

- testing and comparison advantages/disadvantages with the three-pipe system in terms of energy efficiency, construction. The fourth Generation District hearing with 3 pipes (4GDH-3P) is a 3-pipe system that is energy efficient and allows lower water temperatures.
- handle the challenge of designing and dimensioning of the grid for the three-pipe system.

3.2. Implementation of the LTDH technological solution

Ranagård in Halmstad is divided in three areas. Area 1 will be supplied with 4th generation district heating, LTDH with 3 pipes (addressed as 4GDH-3P). Area 2 will be supplied with conventional low temperature district heating with 2 pipes (addressed as LTDH). These two areas have one downshift station. Area 3 is designed just as area 2 but with a separate downshift station. The project has produced drawings and dimensioning of both grid and downshift stations. The idea is that those who are interested in implementing a LTDH network in an existing high-temperature network can use this work and the gained experiences.

3.3. Benefits

A network allows energy to flow in and out depending on needs and design. This concept provides the concept to have losses as small as possible. With three pipe systems, energy losses are reduced. With low-temperature water, the network can both deliver and more easily receive surplus heat. The return temperature can be lowered, which makes the incineration plants more efficient. A more efficient incineration plant saves energy and reduces emissions. All in all, this creates a better environment but also a basis for more flexible business models. Even if the grids are static, the use and way of doing business with energy can become flexible and thereby be adapted to different customers and their changing needs.

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Conclusion

- The pilot testing measures show the proof-of-concept for an action plan of DH system improvement, showing. The pilot project implementation offers the opportunity to identify main barriers and bottlenecks for a successful realization at a larger scale;
- An in-depth analysis of the existing situation and the development of a clear and tailored action is necessary for new LTDH system construction or existing DH transformation to low temperature;
- System monitoring and optimization is necessary to preclude the possibility of shortcomings and further achieve optimal working conditions of the system;
- These pilot activities supplement the development of pilot energy strategies in municipalities and regions;
- Existence of a reluctant attitude toward LTDH implementation does to the lack of knowledge. Informative campaigns are necessary to change people attitude and show a positive experience of LTDH project realization.

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