Info-package 2

Low Temperature District Heating (LTDH)

Energy

Introduction

Description

In England, Nottingham's ambition as a smart city is to reduce carbon emissions by 26% and generate 20% of its energy requirements from renewable and low carbon sources by 2020. The Nottingham City Council aims to create a citywide heat network that will further enable Nottingham to cope with climate change and build resilience to external energy price pressures. To speed up the process toward 20% energy efficiency improvement required by the EU by 2020, the huge energy-saving potential in the building sector and the expansion of existing district heating network with more energy efficient ones should be exploited.

From the 375 GWh heat generated by the Combined Heat and Power (CHP) plant, 144 GWh are used for heat distribution and 60 GWh for electricity production. This means that 171 GWh of valuable heat energy resource is unused and can be potentially recovered by various schemes like the present LTDH scheme for annual heat sales to improve the efficiency and profitability.

The technological innovation (specifically regarding the thermal insulation) of the last decades, enabled to reduce the temperature level of the transfer fluid used in the DH system between 50°C and 60°C (and become a Low Temperature District Heating (LTDH) system) which would be enough to heat low energy buildings. This decrease offers many advantages and improves consistently the energy efficiency of the DH system.

In Nottingham the LTDH flow will be drawn from the return pipe of the main district heating with the medium-temperature water travelling back to the CHP for reuse. Figure 3 shows the approximate planned route of high to low temperatures infrastructure to connect the four maisonette blocks with a total of 94 properties in the demo site to meet the demand of space heating and DHW. The LTDH will provide a primary flow temperature at approximately 50 ºC to 60 ºC and return temperature approximately at 30 ºC, which are much lower than usual and result in lower transmission losses.

The implementation of this LTDH systems in Nottingham brought two members of the consortium of REMOURBAN to develop or improve the following two technical solutions composing the LTDH Solutions Package:

- Smart Net Controller (from Sasie): to better manage and control a DH or LTDH Systems in order to improve its efficiency.
- Skid (Enviroenergy ltd.): improving the efficiency and maintenance time of pumps.

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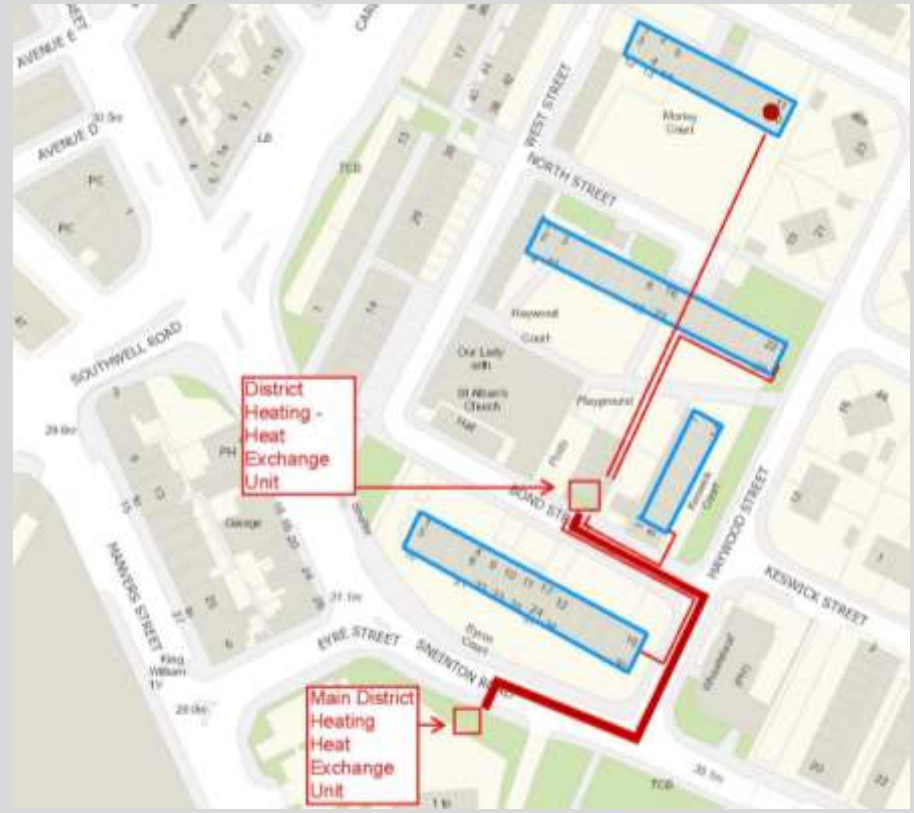

Figure

Goals

The opportunity to use the return flow from the existing high temperature network rather than extending high temperature supply has presented Nottingham with a cheaper and effective proposition for heating residential homes without the need for high pressure, high temperature resilient infrastructure (needing expensive steel tubes instead of cheaper plastic tubes usable for a LTDH system). Due to the lower flow temperature, the network heat loss will be reduced by 75% compared to the present district heating systems. This makes the LTDH systems economically more sustainable and competitive for modern well-insulated, low energy buildings or significantly improved, retrofitted properties.

- To give more clarity on the feasibility of LTDH intervention:
  - to connect to the existing district heating network,
  - to use lower grade materials on the secondary connection at a reduced cost.
- To assess the ability to increase the efficiency of district heating.
- If proved, this could allow implementation of more connections using this method, based on the current hydraulic capacity of the existing infrastructure.
- Based on current working practices more energy may be extracted from the network, this is subject to risk evaluation of available stand-by plant capacity.

Householders can expect to benefit from:

- an improved internal climate with a faster heating response time,
- higher comfort levels (due to the more even temperature distribution),

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- reduced maintenance.

The increased control levels will provide:

- a better interface with the heating system
  - allow the user to have more control
  - feedback from the system will provide better heat utilisation.
- Billing will be simpler for both user and provider.
- Energy use will be accessible remotely in real time.

Users will be able to see what is being used in their property and will be able to tailor their use accordingly.

Progress

Describe here the overall progress of the development of the solution.

- The LTDH intervention has been designed and is ready to be implemented.
- Four low-rise blocks of maisonettes will be refurbished and the design and planning of the work is in progress.
- Most properties in the intervention will have the existing individual gas boilers replaced with the new LTDH system. Work is in progress to reassure residents that the change will provide residents with an improved internal climate and better comfort in their flats.
- Most properties will be supplied with innovative energy measuring system and new generation thermostatic radiator valves (TRVs).
- Various studies have been conducted to help identify potential new customers.

Heat mapping exercises have taken place to show properties with a viable heat demand in proximity to the DH network.

Lessons learnt

01	LTDH is the most efficient DH at present, but in order to compete with other space heating methods the overall energy demand needs to be reduced (retrofitting the building).
02	In the development of LTDH the priority should be given to the end users' demand, what thermal comfort they need and how to achieve it.
03	Monitoring and data collection should be embedded in all LTDH associated stages, from generation and distribution to substation and end-user metering.

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