



Info-package No. 2

Low Temperature District Heating (LTDH)



Energy

Introduction:

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 2020¹, the huge energy-saving potential in the building sector and the expansion of existing district heating network with more energy-efficient ones should be exploited².

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 Low Temperature District Heating (LTDH) scheme for annual heat sales to improve the efficiency and profitability.



Figure 1 Eastcroft Incinerator in Nottingham

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 LTDH system) which would be enough to

¹ http://ec.europa.eu/clima/policies/strategies/2020/index_en.htm

² Cross Border Bioenergy Working Group on District Heating technologies: EU Handbook District Heating Markets, October 2012

heat low energy buildings³. This decrease offers many advantages and improves consistently the energy efficiency of the DH system.

This LTDH system can be implemented in different situations presented below:

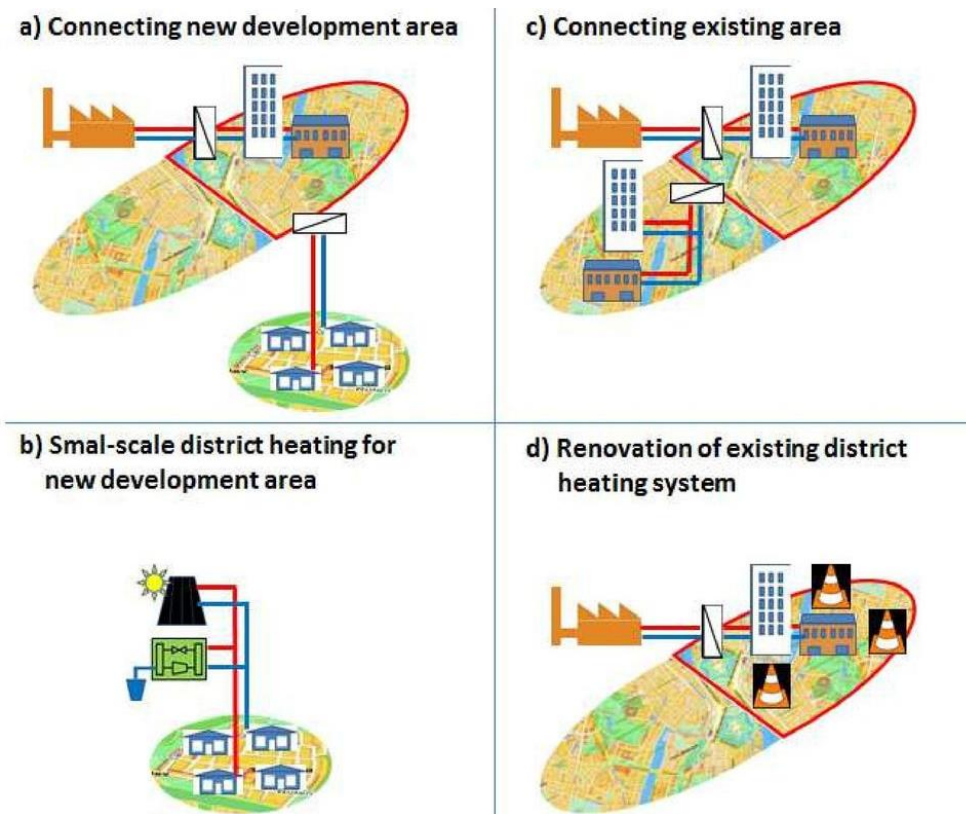


Figure 2 Examples of application of LTDH⁴

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 °C to 60 °C and return temperature approximately at 30 °C, which are much lower than usual and result in lower transmission losses.

³ Alessandro Dalla Rosa The Development of a New District Heating Concept, 2012

⁴ Guidelines for Low-Temperature District Heating, A deliverable in the project financially supported by the Danish Energy Agency in the R&D programme EUDP (Energiteknologisk Udviklings- og Demonstration Program): "EUDP 2010-II: Full-Scale Demonstration of Low-Temperature District Heating in Existing Buildings", April 2014

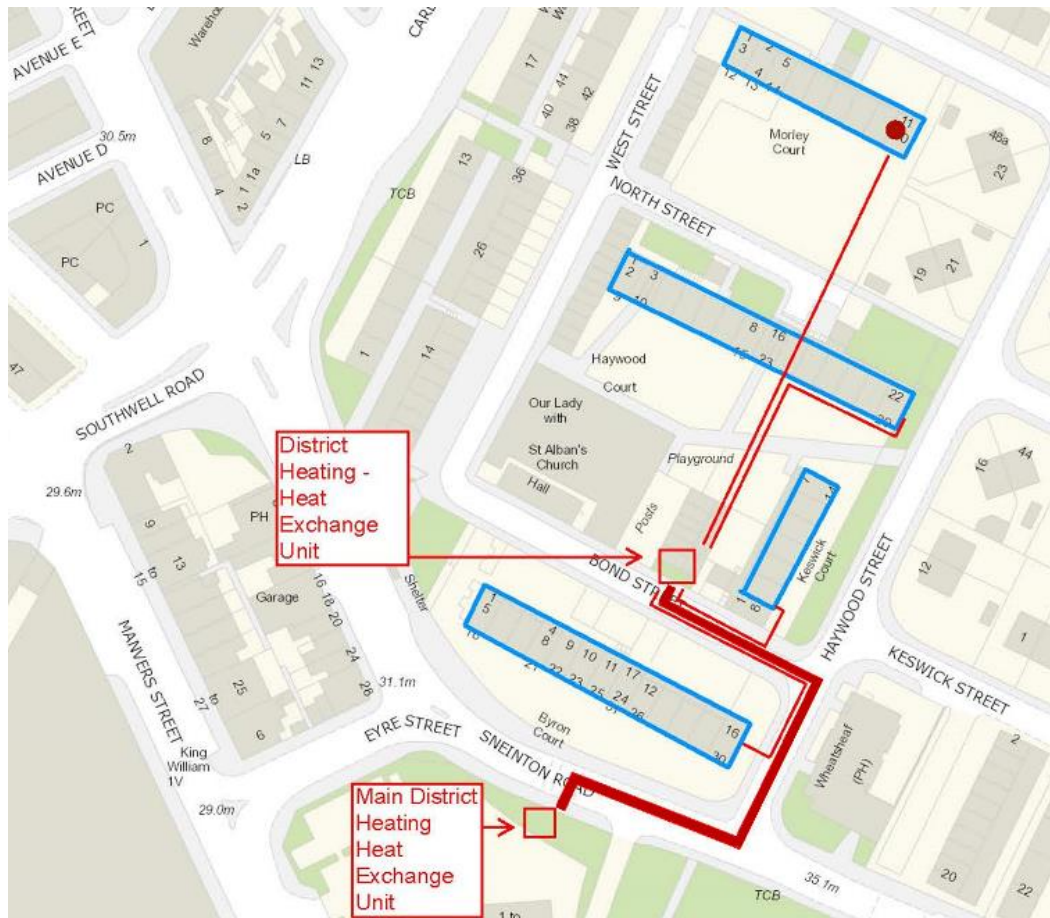


Figure 3 LTDH network planning map in REMOURBAN project

The implementation of this LTDH system 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.

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 (requiring 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 buildings⁵ or significantly improved, retrofitted properties.

Expected results for the system:

- To give clarity on the feasibility:
 - to connect to 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 to implement 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.
- This may lead to an implementation of buffer storage and solar thermal systems to reduce temperatures for existing properties on the district heating scheme for future extensions and the refurbishment of other non-traditional housing of the local region and beyond.

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),

⁵ Alessandro Dalla Rosa The Development of a New District Heating Concept, 2012

- and reduced maintenance.

The increased control levels will provide:

- a better interface with the heating system
 - allowing the user to have more control and
 - feedback from the system to enable better utilisation of the system.
- 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:

- 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.
- The LTDH intervention is planned to be implemented.
- Four low-rise blocks of maisonettes are planned to be refurbished.
- Most properties have an individual gas boiler connected to the gas grid.
- Gas is used for central heating and domestic hot water (DHW), although a minority of properties is still using electric heaters.
- Most will also have thermostatic radiator valves (TRVs).



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