



In the face of rising energy prices, is it time we gave district heating systems a go? ROGER HUNT looks at the potential of the community heating option



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Green-light district

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ABOVE & TOP Pre-insulated district heating steel pipe system by CPV



ABOVE CGI of the hotel at Kingston Heights

ABOVE RIGHT District heating plant room within the Kingston Heights development



Extracting energy from rivers and water by employing watermills and hydroelectric schemes is nothing new. More unusual is harvesting heat from river water to provide heating and hot water for homes and commercial properties via a district heating system. This is exactly what has been done at Kingston Heights, a £70m mixed-use development on the banks of the river in the heart of Kingston-upon-Thames, where the 136 apartments and a 142-bedroom hotel will receive all of their heating requirements in this way.

Built by United House for NHP Leisure Developments, the technically challenging scheme utilises a state-of-the-art heat pump system that extracts the energy from the sun that has been captured and stored in the river.

"At two metres below the surface, the water never falls below 7°C, even in winter, so we can be certain that it can provide enough energy to heat the apartments," explains Mike Spenser-Morris, managing director of NHP Leisure Developments. "This open water heat pump system is capable of producing over 2MW of thermal energy for this development and will provide it 24/7, 365 days a year, regardless of the weather or air temperature."

To achieve this, equipment inside a specially built pump house, adjacent to the river, draws an average of 6.5 million litres of water per day – some 75 litres

of water per second – through two intake filters on the river bed at an average temperature of 9°C. This is then processed through a high-efficiency heat exchanger, which transfers the low grade heat in the river water to an internal 'closed' water system before the river water is immediately returned, untreated in any way, to the river. The change in temperature of the water is at most only 3°C, a difference that is assimilated almost immediately back into the river.

Once the low-grade heat has been extracted from the river water, it passes into a secondary water circuit that links to a plant room on the fifth floor in the apartment block 200 metres away. Here, 41 Mitsubishi Electric Ecodan water source heat pumps link to this internal 'closed' loop and increase the temperature of the low grade heat up to 45°C, before sending it to mini plant rooms right across the development. Inside dedicated equipment spaces on each floor, a second part of the Ecodan heat pump system upgrades the temperature further to deliver underfloor heating and domestic hot water to the apartments.

"If we'd fitted gas boilers, the site would be dumping around 500 additional tonnes of carbon into the atmosphere each year. In addition, because of this system's exceptional energy efficiency, the equivalent heating cost for a couple living in a one-



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TOP LEFT An Altecnic heat interface unit used within homes.
TOP RIGHT Pre-insulated district heating steel pipe system by CPV
ABOVE An ENER-G Switch2 in-home unit to control the heating and view energy consumption patterns from a district heating system.

bedroom apartment would be 18% more. For an average home, this would mean hundreds of pounds extra," explains Spenser-Morris.

The heat employed in a district or, as it is sometimes known, community heating system is usually generated in an energy centre, with biomass and CHP (combined heat and power) both popular options as heat sources. The district heating network is installed by laying pipes to connect homes and commercial properties to the energy centre. A heat interface unit with a heat exchanger is then usually installed in each property instead of a boiler.

District heating systems have traditionally run at high temperatures so that they maintain a suitable heat output within premises, explains Jonathan Tedstone, product manager at Baxi, a technology provider for district heat systems. "As you might expect, with a larger expanse of pipework running from a pump room to each individual residence, the heat loss can be significant and this must be considered in the design stages."

In London, district heating is being taken seriously. The mayor has issued a District Heating Manual for London, which is intended to provide guidance to the development and delivery of district heating systems in the capital. "District heating networks operating as part of a decentralised energy system have the potential to supply market competitive, low-

to zero-carbon energy in dense urban areas while providing long-term flexibility to accommodate new and emerging heat production technology and energy sources," states the manual.

Ashley Bateson, partner heading the sustainability group at the independent building services consultancy Hoare Lea, points to the fact that district heating has been very successful in Europe. "In places like Sweden, Germany, the Netherlands and Denmark it's very effective.

"In the UK there have been problems because we haven't had the right expertise or methods of procurement. I'm getting anecdotal feedback from clients, such as housing associations, where they have measured large distribution heat losses. Pipework must be very well insulated and, in the dwellings, the heat interface unit has to be of a high specification, well insulated and well controlled."

Robin Wiltshire, BRE building and energy scientist, believes that district heating systems deliver energy and carbon emissions savings if they're using low carbon heating sources and serving areas with a high heat demand density. "Connecting buildings in areas of high heat demand density to a district heating system enables various low carbon heat sources to be used. On an individual building basis this would be awkward, in the case of heat pumps; less efficient, in the case of CHP; or not possible, for example with waste heat from industry or from a municipal waste plant."

BRE, University of Edinburgh and the Centre for Sustainable Energy have undertaken a study titled 'Research into barriers to deployment of district heating networks' for the Department of Energy and Climate Change (DECC). Among the common problems cited among those interviewed are identifying appropriate consultant support with the required level of expertise, inconsistent pricing of heat and lack of generic support. Those interviewed generally felt that central government needs to view district heating as energy infrastructure, similar to other utility networks.

Interestingly, the government recently announced a £6m grant funding programme to assist local authorities in developing new district energy networks. The fund, which will be managed by the new Heat Networks Delivery Unit within DECC, is designed to help local authorities develop robust business plans. ▶



TOP & ABOVE Southampton is one of the places in the UK that has a district heat centre

RIGHT An installation of district heating for Stockport Homes by Woodford Plastics

At the UK District Energy Association (ukDEA), chairman Simon Woodward believes the initiative signals the government's continued will and commitment to the development of low carbon heat networks but still sees the cost of district heating as a problem. "One of the biggest barriers to district energy in the UK is the high cost of installing the networks and we would have preferred to see some capital funding support to address this. The government can still do more to address the issue of the crippling cost of getting networks installed."

District heating works best in developments of anything above 300 to 500 dwellings, explains Ashley Bateson. "If it's too small it's hard to make the business case for it. There are a lot of things to consider when you have a district heating scheme; there's high capital outlay and somebody has to manage the system, some of these things aren't always thought through."

From a technology perspective, there are many options that offer a good source of heating and hot water for district heating schemes. Jonathan Tedstone at Baxi believes the future will bring other technologies, such as hybrid systems, which use air source heat pumps with gas boilers and gas driven heat pumps. "The key for housebuilders lies in the development phase to ensure feasibility studies and projected savings exercises are conducted before any product is installed. Moreover, the biggest task will be in the education of potential occupiers ensuring they get the greatest benefit from the system and at a sensible price."

Yan Evans, director at ENER-G Switch2, a community and district heating service provider,

cites another key consideration with regard to district heating: the rising cost of energy and particularly the effect of this on vulnerable people. "This is actually a key benefit of district heating systems, as the additional elements of the standard energy bill, such as wholesale energy prices, green taxes and government investment, are no longer relevant."

A further factor is that district heating invariably features a heat meter installed in each dwelling so it is possible to monitor if people are struggling and compare consumption to peer groups and neighbours, via the metering and control technology. "This is a major benefit of district heating schemes and it's important that industry and developers continue to explain the benefits of schemes above and beyond just carbon reduction. With the UK suffering from the second highest rate of winter deaths in Europe – next only to Estonia – such schemes are a viable alternative to centralised energy distribution," says Evans. [sh](#)

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