

Switched on

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The UK is turning on to district energy systems, but these will only fulfil their potential with more regulatory support says Simon Woodward

From district heating and cooling schemes to private electricity networks, the district energy sector looks to be the next revolution in the way we supply our homes and businesses. District energy is widely recognised as one of the most cost-effective ways to decarbonise an urban area because it enables an entire community to be switched to a more sustainable power source collectively, rather than tackling the carbon footprint of each building in isolation.

District heating is widely used in Scandinavia, where uptake is much higher than the UK. In Denmark, for example, more than 60% of heat is supplied by networks that have been developed since the early 1970s, compared to 2% in the UK. Unfortunately there was until recently no clear indication from the UK government that it supported local energy networks ? the 1st white paper considering low-carbon heat networks was only published in 2012 ? and no targets were set for implementing this technology. Instead, the [Department for Business, Energy & Industrial Strategy \(DBEIS\)](#) focused its efforts on generation technologies such as wind and solar photovoltaics, although the recent reduction in government support for these suggests that DBEIS believes they are mature technologies that no longer require support. Together with business as usual by the UK mechanical and electrical sector, this means that district energy has often been disregarded for appearing to be too complex or expensive.

However, in recent years many local authorities have introduced planning requirements to support the development of schemes. In London, it is now hard to find a major new-build development that is not incorporating a district energy network as a result of planning regulations. And in 2016, [the Heat Network Investment Project \(HNIP\)](#) was launched by DBEIS with the aim of providing ?330m in capital support for local authorities and the private sector to develop district energy schemes. Such government funding is vital to the future of district energy in the UK, with the potential to lay the foundations for long-term growth and meet its stated target of creating a self-supporting sustainable sector.

Defining district energy

District energy is the term used to describe the generation and distribution of heating, cooling and electricity in local energy networks. Although schemes that comprise only cooling networks ? supplying, for instance, chilled water for air conditioning ? are common in countries such as Saudi Arabia and Kuwait, district energy in the UK predominantly comprises heat networks supplying low-temperature hot water. This is typically below 95°C, and often much less, for space heating and domestic hot water generation. However, district cooling is becoming more widely adopted alongside district heating schemes where demand is high, particularly in London.

Private electricity networks, also called private wire networks, are becoming more common as well. These generate electricity in parallel with heat, often using gas-fired combined heat and power (CHP) units, and distribute it directly to customers through electricity networks installed

by the heat network developer or owner.

Generation

One of the key benefits of a district energy network is that it is a means to use energy from a range of sources from gas-fired CHP to biomass, geothermal, solar and waste industrial heat or energy-from-waste plants. Indeed a network can even have a range of energy sources at the same time or over its lifetime.

A district heating network customer will not be aware of their heat source, which may change over the life of the network as technologies advance or new sources become available. While most UK schemes will be using gas-fired CHP, as the grid decarbonises these are expected to be replaced with other lower-carbon energy sources.

A new breed of innovative schemes are being created using a wide variety of sources including heat recovered from the London Underground. For example, the London Borough of Sutton has set up an [energy company](#) to purchase heat from an energy-from-waste plant in the borough under a long-term agreement. It then supplies this to customers across a wide area through a district heating network, as shown in Figure 1, under a heat shipper arrangement.

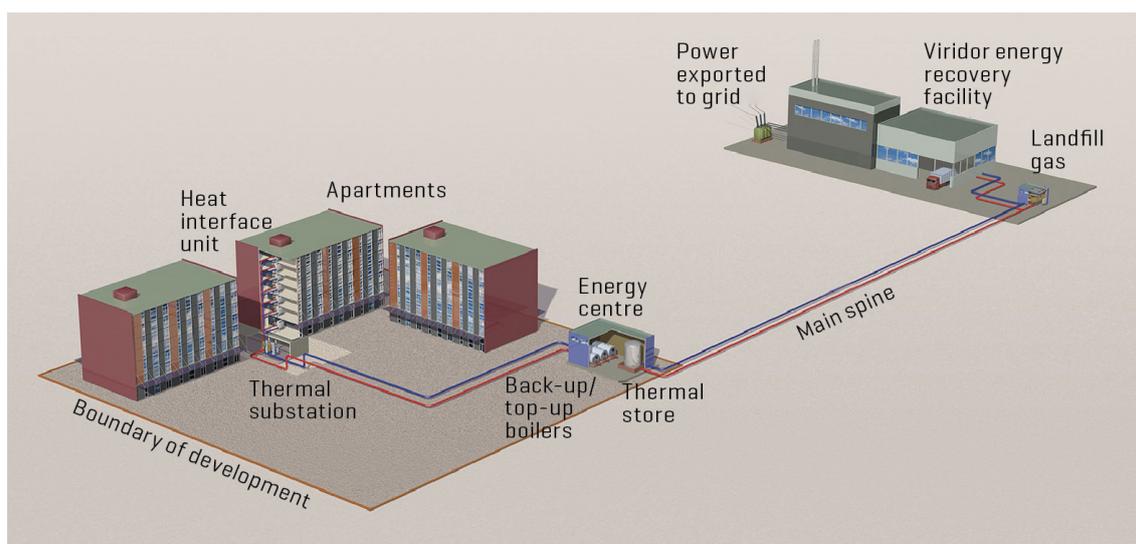


Figure 1: Schematic of the Sutton District Energy Network

Dos and don'ts

Issues faced when developing a district energy scheme include the following.

- **Energy pricing:** always consider the prices you expect to charge customers at the outset, and aim to achieve these once the scheme is constructed and operational. This target can then inform all decisions regarding the way the plant and systems that make up the scheme are selected and link together. Your price should take into account what the customer would pay if not connected to the heat network; in most cases, this counterfactual or alternative cost is taken as the whole lifecycle cost of

heat supplied from a local gas-fired boiler. A number of poorly conceived schemes have not used such a cost avoidance methodology, with the result that the developers have created a scheme with little thought as to the impact of their capital and operating costs on the subsequent customer charges. To recover these costs, they have had to set a heat tariff that results in annual costs to customers well in excess of a reasonable counterfactual.

- **Customer standards:** it is critical to define energy supply standards that reflect the natural monopoly of a district energy network; for example, it is not fair or reasonable to expect customers to purchase energy supplies on an exclusive basis without compensation when these supplies fail.
- **Design standards:** although the concept of district energy has existed for around 100 years, it is still a relatively small sector in the UK. Therefore, it is important to work with designers who have a good record in the area, who will understand how to create a scheme that not only supplies energy reliably but also operates efficiently with minimal energy losses and makes significant use of the scheme's low- or zero-carbon (LZC) heat sources. For example, these LZC sources will typically be backed up by conventional boilers in a heat network that may also be used to meet peak heat loads, so it is critical that the operation of such boilers is minimised to maximise carbon savings and reduce operating costs.
- **Operational methodology:** an holistic operational methodology must then be implemented to ensure that all of the above are achieved in practice. Again, there are specialist operators that will understand how to do so.

New structures

A large number of local authorities are setting up their own energy companies and collecting much-needed revenues from a district energy network. As well as promoting sustainability, district energy schemes also have the potential to support the economic regeneration of their area. The local community can benefit from lower-cost heat and address fuel poverty for vulnerable households, as well as reducing the overheads of small businesses. All of this can potentially boost tax receipts for local authorities.

Such arrangements are supported by DBEIS. The local authority-owned companies will act as the vehicles to apply for and implement the next round of the £300m HNIP grant and loan funding that will be launched in November. This follows a successful pilot phase that resulted in £24m being awarded to nine district energy projects across the UK in April 2017.

Securing a brighter future

District energy is a concept whose time has come in UK energy infrastructure, but state support is needed to ensure new schemes get the funding they need to come to fruition. It is good to see that, over the next 2 years, more than £300m will be invested in the sector, but it is equally important to ensure that this support continues into the 2020s.

In the meantime, local authorities need not wait to lay the groundwork for networks. They can start gathering the information they need to create the best initiatives for their communities through heat mapping, energy masterplanning and detailed feasibility. All these are supported through DBEIS's [Heat Networks Delivery Unit](#), while the Greater London Authority's [Decentralised Energy Enabling Project Framework](#) offers scheme development funding for boroughs in the capital.

Simon Woodward is Chairman of the [UK District Energy Association](#)

Further information

- Related competencies include: [Planning](#), [Sustainability](#)
- This feature was taken from the [RICS Land journal](#) (July/August 2018)

- Related categories: [Infrastructure](#) ; [Policy](#)