Department of Energy & Climate Change

# Summary evidence on District Heating Networks in the UK

July 2013

# Summary Evidence on District Heating Networks in the UK

## Background

This is a summary of data collected which was used to inform assumptions within modelling for 'the future of heating: meeting the challenge' published in March 2013. The following evidence is only indicative for heat networks in the UK. A more rigorous data collection will be carried out to inform statistics on district heating networks to be published in 2015 in accordance with the EU Energy Efficiency Directive.

DECC commissioned work from Databuild to create a catalogue of all District Heating in the UK in 2012. The database has been further cleaned and added to by DECC subsequently. The database contains information given with conditions of confidentiality. The data is presented here as aggregated statistics so that individual entries are anonymised.

The aim of the database is to capture all district heating networks in the UK. However, there is no universally agreed definition of what a district heating network is.

For this project, the following definition is adopted; a district heating network is either

- Two or more distinct buildings connected to a single heat source or
- One building in which there are more than ten individual customers connected to a single heat source.

In order to structure the sample for the project and to tailor interviews to network size appropriately Databuild (with BRE) developed some definitions of network size based on the number of residential and non-domestic customers connected to the heat source, agreed with DECC prior to piloting.

These are:

- Large networks – 500 or more residential properties and /or more than 10 non-domestic users.
- Medium networks – between 100 and 500 residential properties and /or between 3 and 10 non-domestic users.
- Small networks – less than 100 residential properties and /or less than 3 non-domestic users.

Databuild used existing databases of district heating networks and then snowball sampling to identify additional networks. Snowball sampling is a process whereby respondents to the questionnaire are asked to identify other networks they are aware of and provide contact details for the network manager. DECC has added to this database following the Databuild work but the database is still not considered to be exhaustive.

The main sources used to create the database were:

- The Databuild and BRE 2000 study cataloguing 1,600 networks in the U.K.
- The NHS database of hospitals which export heat off-site
- Energy Saving Trust Community Energy Programme
- A ‘snowball’ recruitment approach within the survey itself
- GLA database of district heating schemes in London used to develop the London heat map
- Databases from CHPA and UKDEA (there were some restrictions on what data was provided and who this could be shared with)

Each source was reviewed with networks that no longer existed being removed from the database, additional information for existing networks was added and new networks were included.

Not all respondents were able to answer all questions and none of the questions were compulsory. Therefore the following evidence is only indicative for heat networks in the UK and figures have been rounded. Please note that figures may not add due to rounding. The response rate is for each question is given but on average was approximately 30 per cent. A more comprehensive data collection will be undertaken, with statistics reported in 2015.

## Summary Tables

There are 1765 individual District Heating Networks in the database.

Heat networks in the UK are predominantly small. Three quarters of all networks identified were classified as small with an average of 35 residential dwellings and no non-domestic buildings on the network.

**Table 1: Number of networks by size**

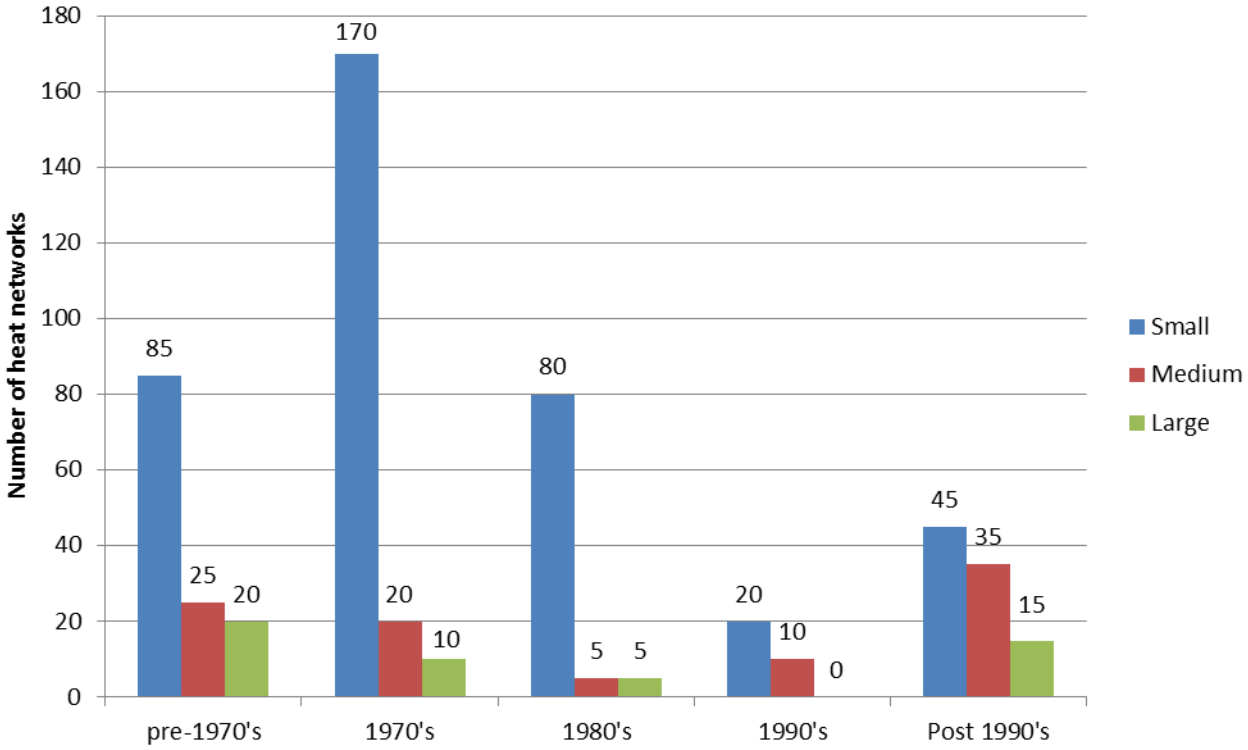
| Size category | No. of Networks | | Average number of dwellings per network[1] | Average number of non-domestic buildings per network[1] |
|---|---|---|---|---|
| Small | 1,280 | 75% | 35 | - |
| Medium | 315 | 20% | 190 | - |
| Large | 75 | 5% | 1,035 | 15 |
| Not classified | 90 | 5% | | |
| **Total** | 1,765 | | | |

[1] *Response rate 95%*

The age of the networks was sparsely reported, 400 out of 1,280 small networks, 95 out of 315 medium networks and 50 out of 75 large networks were able to provide age information.

The majority (85%) of small networks (where age was recorded) were built before 1990 with a small increase post 1990 (10%), whilst medium networks have more of a mix of new and old networks (with 50% built before 1990). 70 per cent of large networks were built before 1990 but a further 30 per cent were built after 2000.

**Figure 1: Number of networks by size and age band (where age was recorded)**



Most of the networks were not supplied by heat on a Combined Heat and Power (CHP), system. Based on the two thirds of networks where this information was recorded, 85 per cent of networks were not using a CHP system, while 15 per cent were. This varied with the size of the network. Table 2 shows that a higher proportion of large networks had CHP than smaller networks (65% compared to 25% for medium networks and 5% of small networks).

**Table 2: Number of networks with CHP system**

| Size category | Yes | No | Unknown | **Total** |
|---|---|---|---|---|
| Small | 15 | 450 | 815 | **1280** |
| Medium | 30 | 90 | 200 | **315** |
| Large | 35 | 20 | 20 | **75** |
| Unknown | - | - | 90 | **90** |
| **Total** | **80** | **555** | **1130** | **1765** |

Fuel type information was recorded in roughly 40% of networks. Where the information was recorded, the majority of networks, 90 per cent, only used one fuel type and this was mostly gas, 85 per cent. Table 3 shows the number of networks for each type of fuel. Please note that a single network may have more than one fuel type.

**Table 3: Fuel type by size**

| Size category | Gas | Oil | Coal | LPG | Biomass | Waste | Unknown |
|---|---|---|---|---|---|---|---|
| Small | 475 | 10 | 10 | 0 | 15 | 0 | 780 |
| Medium | 95 | 15 | 0 | 5 | 15 | 0 | 200 |
| Large | 50 | 15 | 0 | 0 | 5 | 5 | 20 |
| Unknown | 0 | 0 | 0 | 0 | 0 | 0 | 90 |
| **Total** | **620** | **35** | **10** | **5** | **35** | **5** | **1095** |

For a small proportion of networks (10%) we received the average annual energy supplied. This varies significantly between the different size networks. Larger networks are more likely to have non-domestic buildings on the network so this this variation would be expected. Table 4 shows that the when comparing the average annual energy supplied per building, this is broadly similar for medium and large networks.

**Table 4: Energy supplied by size**

| Size category | Average annual energy supplied (MWh)[1] | Number of responses |
|---|---|---|
| Small | 575 | 100 |
| Medium | 6,145 | 35 |
| Large | 37,360 | 30 |
| **Total** | 8,030 | 165 |

[1] *Response rate 9%*

London has over half the heat networks in the UK (55%) with two thirds (65%) being small. Outside London, Yorkshire and the Humber, the North East and the East of England all have similar number of heat networks which make up a further 25 per cent.

**Table 5: Number of networks by region and size**

| Region | Small | Medium & Large | Size Unknown | **Total** |
|---|---|---|---|---|
| East Midlands | 35 | 10 | 0 | **45** |
| East of England | 105 | 15 | 0 | **120** |
| London | 610 | 235 | 70 | **920** |
| North East | 95 | 20 | 0 | **115** |
| North West | 45 | 20 | 0 | **65** |
| South East | 50 | 10 | 0 | **60** |
| South West | 60 | 5 | 0 | **65** |
| West Midlands | 25 | 15 | 0 | **35** |
| Yorkshire and the Humber | 125 | 30 | 5 | **155** |
| **England** | **1,150** | **355** | **80** | **1,580** |
| **Scotland** | **45** | **15** | **0** | **65** |
| **Wales** | **15** | **5** | **0** | **15** |
| **Northern Ireland** | **0** | **0** | **0** | **0** |
| Region unknown | 70 | 15 | 10 | **100** |
| **Total** | **1,280** | **390** | **90** | **1,765** |

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