

Experimental statistics on heat networks

Introduction

The Heat Network (Metering and Billing) Regulations 2014¹ came into force on 18th December 2014. The legislation implements the requirements set out in the 2012 Energy Efficiency Directive Article 9 (1)². The regulations require heat network suppliers to submit a notification once operational and at four yearly intervals to provide information on the status and performance of network(s) managed.

The UK had not previously collected detailed information on heat networks though previous studies had attempted to estimate the number of networks such as the DECC Summary evidence on District Heating Networks in the UK³. This did not, however include communal heat networks.

This paper sets out preliminary results of the data collected, the **key points** are shown below;

- There are 13,995 heat networks in the UK
- 2,087 of these networks are classed as district heating
- 1,109 networks provided space heating, hot water *and* cooling
- Just 1,664 networks provided cooling (of which 141 provided *only* cooling)
- Generation for heating and hot water was 17.7 TWh compared to 1.9 TWh for cooling
- Capacity for heating and hot water was 19,362 MW and 2,605 MW for cooling

Background

With growing interest in heat networks as a measure to increase energy efficiency, data collected as a result of the regulations will contribute to monitoring the prevalence of heat networks in the UK. Additionally, the Government launched the Heat Network Investment Project⁴ to deliver capital investment support to increase the volume of heat networks built.

The Department for Business, Energy, and Industrial Strategy (BEIS, previously The Department for Energy and Climate Change, DECC) commissioned The National Measurement and Regulation Office (NMRO, now Office for Product Safety and Standards (OPS & S)) to collect the reporting requirements including;

- Capacity, generation, and supply for space heating, hot water and cooling
- Fuel type and technology
- Number of buildings and final customers
- Type of end user (residential, commercial etc)
- Qualitative information for metering and billing.

The NMRO published on its website⁵ the notification template along with guidance as to how to complete this and also a Question and Answer document steering network operators as to whether their network(s) would be captured by the legislation.

¹ www.legislation.gov.uk/ukxi/2014/3120/pdfs/ukxi_20143120_en.pdf

² <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1416394987283&uri=SWD:2013:448:FIN>

³

www.gov.uk/government/uploads/system/uploads/attachment_data/file/212565/summary_evidence_district_heating_networks_uk.pdf

⁴ www.gov.uk/government/publications/heat-networks-investment-project-hnip

⁵

www.gov.uk/government/uploads/system/uploads/attachment_data/file/212565/summary_evidence_district_heating_networks_uk.pdf

Heat networks can be considered as either district or communal heating as defined in the guidance;

“District heat network means the distribution of thermal energy in the form of steam, hot water or chilled liquids from a central source of production through a network to multiple buildings or sites for the use of space heating or process heating, cooling or hot water.”

“Communal Heating means the distribution of thermal energy in the form of steam, hot water, or chilled liquids from a central source in a building which is occupied by more than one final customer for the use of space heating, process heating, cooling or hot water. It is not necessary for the heat supply to be within the building only that a single building is making use of the heat.”

The key metrics captured by the reporting template, such as capacity, generation and supply are summarised in this report and more detailed Excel tables are available via the following link;

www.gov.uk/government/publications/energy-trends-march-2018-special-feature-articles

Challenges implementing a new reporting requirement

With the introduction of new data reporting requirements, there are challenges to be faced;

- No previous years’ data for comparison purposes
- Ensuring the template design is clear and comprehensive
- Validation checks evolve as more data are received

Early submissions were problematic, with data missing or showing values that were outside expected norms or otherwise incorrect (e.g. networks operating for more than 365 days per year). Provisional estimates were published in February 2017 for a small number of networks (just under 2,000) where data appeared to be of acceptable quality. This was published on the Heat network metering and billing regulations: compliance and guidance page:

[Heat network metering and billing regulations: compliance and guidance - GOV.UK](#)

Further Data validation

Subsequent to the publication of data last year, BEIS have worked with Ricardo Energy and Environment to develop a set of data validation rules that will apply to data collection going forward and can be retrospectively applied to the existing data.

This system of quality assurance techniques was developed using a combination of expert heat network opinion along with a series of histograms applied to the whole data set and used to determine reasonable boundaries for typical capacities, generation and supply figures. Those networks with all three values outside the expected range were excluded from this publication. However, if a network included reasonable values for at least one variable, estimates were made based on typical load factors and efficiencies.

These estimates were made to those networks with only residential final customers; the range for non-residential was difficult to determine due to the high variability and lower number of observations. This will result in a bias towards residential only networks.

Following the application of these rules, the number of networks included in this publication total just under 14,000 compared to the 2,000 published last year (out of a total of 17,000 notifications received). Approximately 3,000 notifications remain excluded from the data due to missing data or no means of interpolating values. In addition, 17 schemes have been added despite not having received a notification; data for these schemes have been sourced from the CHPQA database.

Special feature – Experimental statistics on heat networks

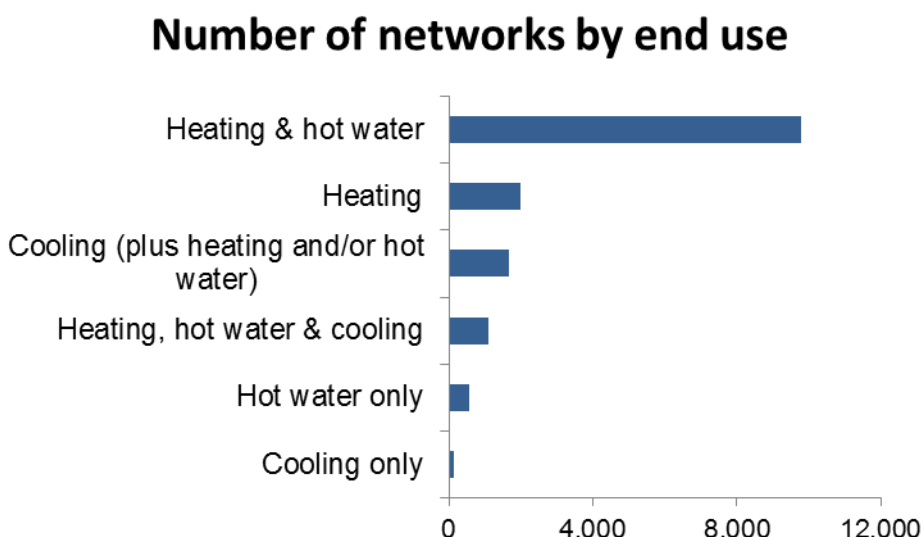
Further data validation is ongoing by the Office for Product Safety and Standards (OPS & S)) and as a result the conclusions outlined here are provisional. Given the developing nature of these data they are classified as ‘Experimental Statistics’.

Results

The majority of heat networks are communal heating with district heating representing 15 per cent of total networks for the UK as a whole (see table 1 in accompanying excel tables). This proportion varies by region with the North West having the lowest percentage of district heat networks (8 per cent) and London the highest at 20 per cent. Densely populated areas lend themselves better to district heating due to the infrastructure required to link end users to the heat source.

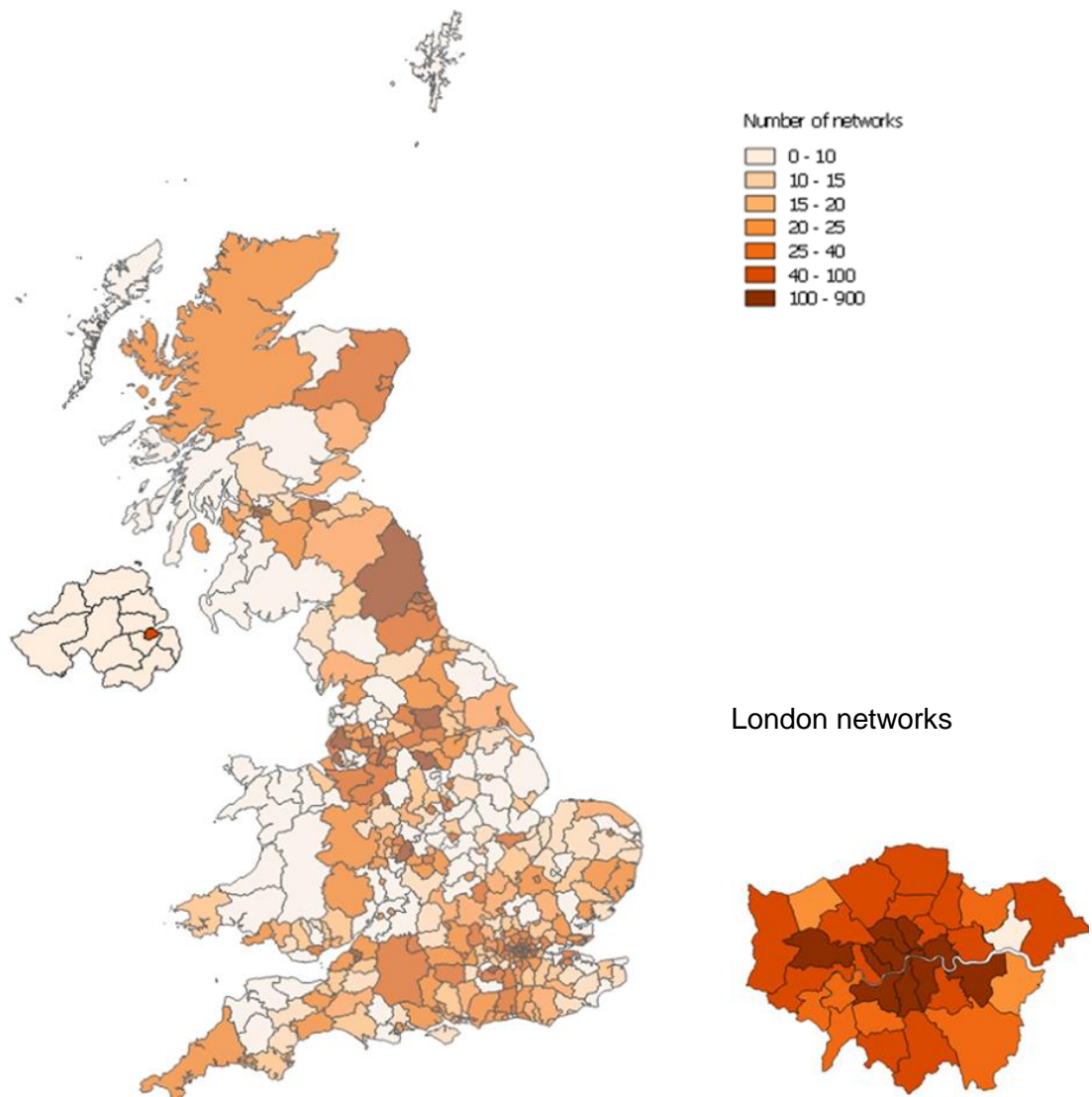
Table 1 also shows the nature of end uses for heat networks in terms of provision of heating, hot water, cooling or combination of end uses. **A large proportion (70 per cent) of networks provides space heating and hot water**, though very few (8 per cent) provide heating, hot water *and* cooling. Even less provide cooling only (just 141 networks). Chart 1 below shows the number of networks operational for various combinations of end uses;

Chart 1



A further level of regional disaggregation is provided in table 2 which shows the **number of heat networks by local authority**. This data are mapped below in Figure 1;

Figure 1; Number of heat networks by Local Authority



This shows the absolute number of networks with a separate inset for London. As would be expected, it is the more highly densely populated areas with the higher number of heat networks, particularly around London, Manchester, Belfast, Birmingham, Newcastle, and Sheffield.

Heat networks provided heating and / or cooling to **75,645 buildings** with **476,951 individual customers**. **Table 3** shows the type of building and final customer, split by dwellings, commercial, retail, light industrial, industrial, education, and the public sector, see charts 2 and 3 below;

Chart 2; Number of buildings

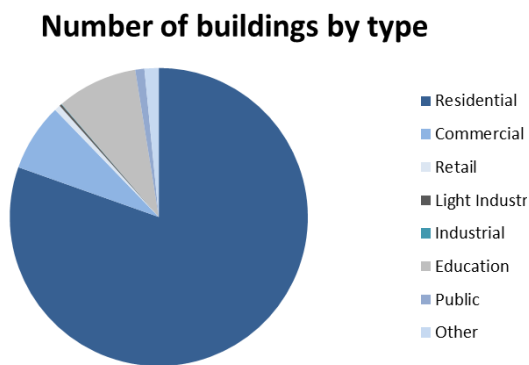
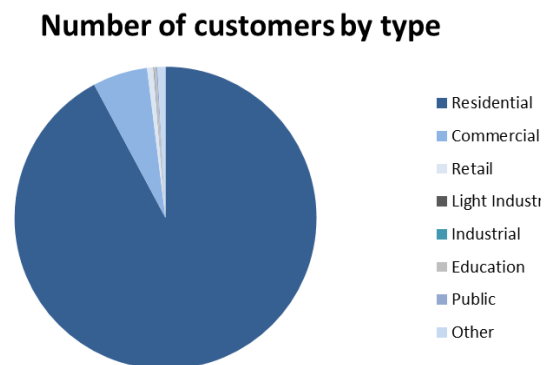


Chart 3; Number of customers

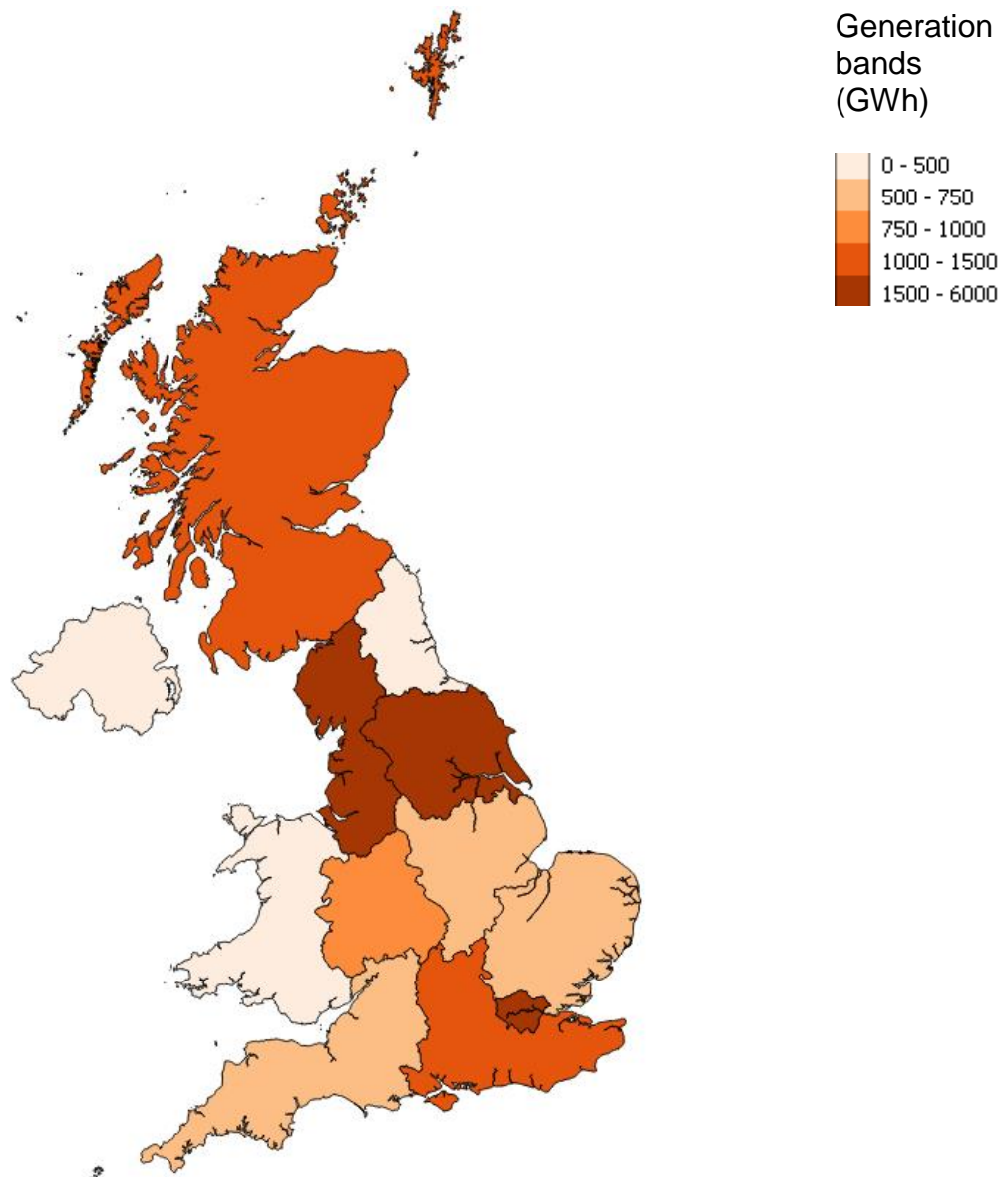


The majority of buildings are classed as residential (80 per cent) and an even higher proportion of final customers are residential (92 per cent). This reflects the higher proportion of communal heating networks which are generally apartment blocks. There are 15,440 building level meters installed across the 75,645 buildings and 134,996 final customers whose consumption is measured by meters or heat cost allocators.

Table 4 shows the number of networks using at least some of each fuel type. Most networks (12,645, or 90 per cent) used at least some natural gas. The next most widely used fuel source was electricity (5 per cent) followed by bioenergy and waste (2 per cent of networks). It was not possible to apportion fuel types to actual generation due to multiple fuel use.

Capacity, generation and supply by region are shown in table 5, and mapped below in Figure 2. Across the UK, installed capacity for heating and hot water is 19.4 GW with Yorkshire and The Humber showing the highest capacity for heating and hot water (6.0 GW).

Figure 2; regional distribution of generation



London has the highest levels of generation and supply at 3.7 TWh and 2.8 TWh respectively, compared to 17.7 TWh and 14.4 TWh for the UK as a whole. London also has the highest installed capacity, generation and supply for cooling. **For the UK as a whole, cooling generation represents 10 per cent of total generation.** The second section of table 4 shows generation and capacity for those networks classified as district heating; although the number of district heat networks is relatively small compared to the number of communal schemes, generation is disproportionately higher reflecting the increased demand from larger installations and also a small number of unusually large schemes.

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