

Guidelines for connecting to heat networks

Part 1 - A guide for developers and building owners

(A supplement to Islington Environmental Design Planning Guidance)



Contents (Part 1)

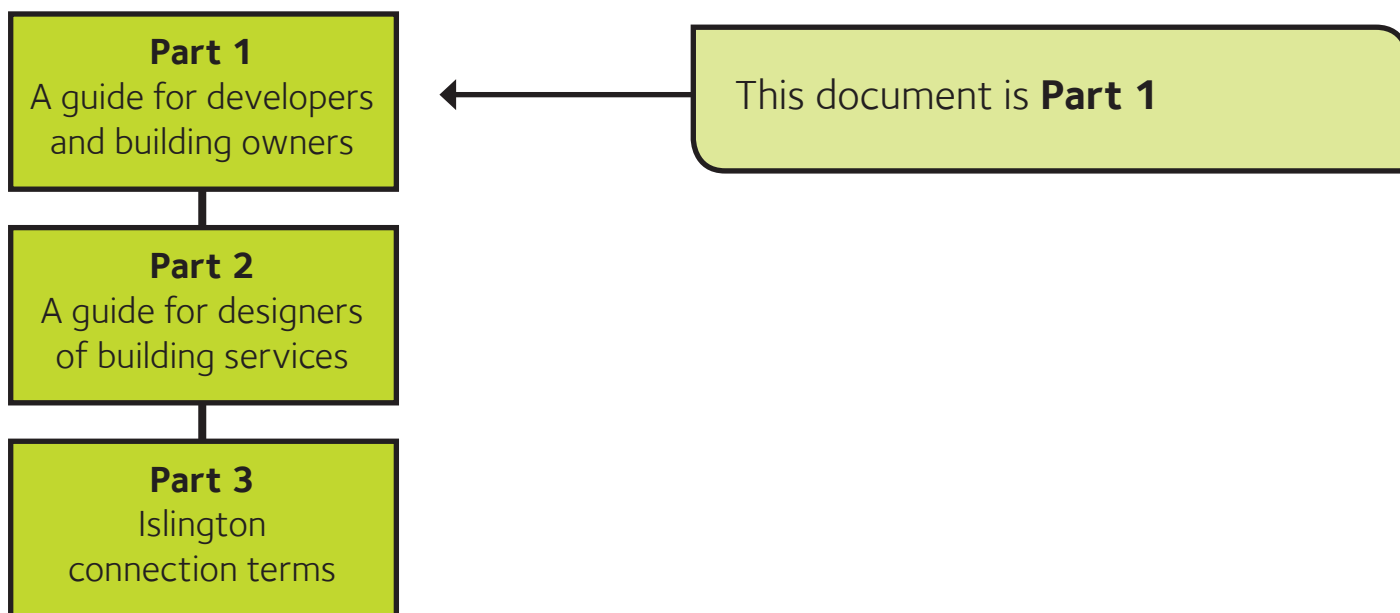
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Guidelines for connecting to heat networks

Part 1 - a guide for developers and building owners

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Appropriate legal and engineering professionals should be consulted before signing any agreements or undertaking any design work.



Note: Part 3 is for relevant parties only and is only available on request from the Islington Heat Network Operator

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1. Background

This publication sets out PART 1 of Islington's Heat Networks Connection Guidelines to give guidance for all those intending to connect to existing and future heat networks within the Borough of Islington.

This document forms supporting guidance to Appendix 1 of the Environmental Supplementary Planning Document¹ (SPD) in order to provide more detailed guidance on connection to Islington's heat networks, including but not limited to the Bunhill Heat and Power network.

This Islington connection guide draws best practice guidance together to provide a coherent package.

Islington Council has set itself a target of reducing borough-wide emissions by 40% by 2020 (relative to 2005/06 levels). It also aims to reduce fuel poverty, and improve health and social inclusion with healthier, more comfortable new and refurbished homes that are cheaper to run. Affordable, more reliable energy supplies from new heat networks (district heating) play a significant part in meeting these targets. Islington Council would like building developers, owners and operators to connect to their heat networks, but in the right way to ensure that heat is supplied to buildings in the most efficient and low carbon way possible.

1.1 The purpose of this guide

This document provides guidance on how new developments and existing buildings in Islington should be designed, built and operated to expand and enhance heat networks. Elements of this guide will also be useful to designers of building-scale communal heating systems to help improve system efficiencies. The aim is to have a positive effect on people's quality of life and the local environment, minimising or avoiding negative environmental impacts. This document will act as further guidance to the Environmental SPD.

The guidelines set out in this document will be kept under review as technologies, policies and practices advance, and will be updated accordingly.

Guide aims & objectives

The central purpose of this guide is to ensure that buildings connecting to Islington's district heating schemes are compatible with the heat network both in their design and operation.

To achieve compatibility, the internal heating systems must be designed and operated in such a way that the temperature of water being returned to the network is as low as possible.

This is because the systems that supply heat, whether CHP, heat pumps or boilers, operate much more efficiently when return temperatures are kept low. A further reason is that heat losses from the network are reduced at lower temperatures.

Lower return temperatures mean that heat can be generated more economically and with lower carbon emissions, leading to lower costs and higher levels of sustainability for both the Heat Network Operator and the building occupants alike. Islington's heat tariff arrangements are designed to reflect this reality.

¹ Environmental Design Planning Guidance – Tackling fuel poverty, enhancing quality of life and environment for all (Islington Council) (2012)
http://www.islington.gov.uk/services/planning/planningpol/pol_supplement/Pages/Environmental-Design.aspx

This guide sets out to show how building heating systems may be designed or adapted to this end. The guide aims to:

- ensure that connections to heat networks are carried out in accordance with best practice to achieve efficient low carbon systems
- reduce operating costs
- reduce greenhouse gas emissions through the use of a wide range of low carbon and renewable heat sources
- improve security of energy supply by diversifying the energy sources used for heating, and reducing our dependence on fossil fuel imports
- offer a more cost-effective and affordable source of low carbon heat

1.2 Who is this guide for?

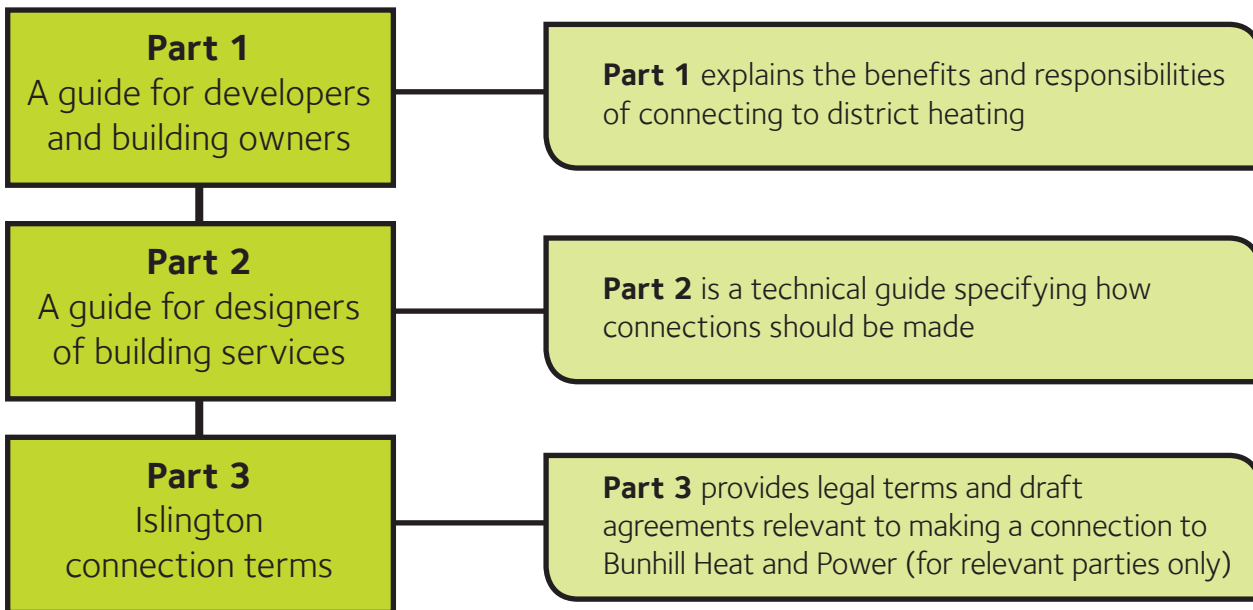
This guide is intended for a wide range of audiences seeking information on connecting to heat networks in Islington, including:

- Planning officers
- Developers (and their clients)
- Building owners and operators
- M&E Engineers involved in designing and implementing heat networks
- Heat consumers, householders and any other interested stakeholders.

Different users will find different sections of the guidance useful.

1.3 Structure of the guide

This guide is in three parts:



Note: Part 3 relates to the connection terms for Bunhill heat network only, and does not include Citigen, or any other networks and is only available on request from the Islington Heat Network Operator for those planning to connect to the Bunhill Heat network.

1.4 Scope of the guide

This guide covers:

- Existing and future heat networks within the London Borough of Islington.
- Systems that cross the borough's borders.
- The applications, requirements, constraints and necessary standards for connection to any Islington heat network.
- Future connections to heat networks. This will take account of the parameters of the existing networks, and in particular the potential design constraints of extensions to the Bunhill Heat and Power network.

This guide applies to both heat networks designed to supply new developments, and networks that are retrofitted to supply existing buildings. Although there are many common issues, networks for new buildings require careful design to keep heat losses from the system low.

The guide does not set requirements for District Cooling. However, this may be addressed in future editions.

The guide sets out:

- What are heat networks?
- Benefits of connecting
- Building Developer, Owner and Operator responsibilities before connection
- Likely connection scenarios and the related technical details
- Technical specifications for connections

1.5 Islington heat networks

Islington Core Strategy Policy CS10² sets out an onsite total CO₂ reduction target (regulated and unregulated) for major developments of at least 50% where connection to a heat network is possible. The target is expressed relative to the total emissions from a building that complies with 2006 Building Regulations. This equates to a proxy target of 40% on 2010 regs and 39% on 2013 regs.

As part of planning, applicants need to demonstrate how the development meets the London plan³ policy 5.6 which states: Major development proposals should select energy systems in accordance with the following hierarchy:

1. Connection to existing heating or cooling networks;
2. Site wide CHP network;
3. Communal heating and cooling

The London Heat Map⁴ will be a useful resource to identify where there is potential to connect or develop heat networks. The council should also be consulted as they may have more up to date information.

There are currently two district heat networks in the borough; the Citigen heat network in Farringdon and the Islington Council network in Bunhill and Clerkenwell (see map in Appendix B). The council plan to extend Bunhill Heat and Power and have identified other heat network development opportunities across the borough (see Islington Council website for further information⁵).

Bunhill Heat and Power (Bunhill heat network) is located in the south of the borough. The Bunhill Energy Centre consists of a gas CHP engine and thermal store which serves heat to 7 local sites, including 850 dwellings and two leisure centres, via insulated buried flow and return pipes. Supplied heat from this network is in the form of low temperature hot water.

² Islington's Core Strategy – Your Neighbourhood, Your Islington (2011) (<http://www.islington.gov.uk/publicrecords/library/Environmental-protection/Quality-and-performance/Reporting/2011-2012/%282012-03-03%29-Core-Strategy-February-2011.pdf>)

³ London plan <https://www.london.gov.uk/sites/default/files/London%20Plan%20March%202015%20%28FALP%29%20-%20Ch5%20London%27s%20Response%20to%20Climate%20Change.pdf>

⁴ London Heat Map (www.londonheatmap.org.uk)

⁵ Islington's Decentralised Energy webpage (<http://www.islington.gov.uk/services/parks-environment/sustainability/energy-services/Pages/decentralised-energy.aspx>)

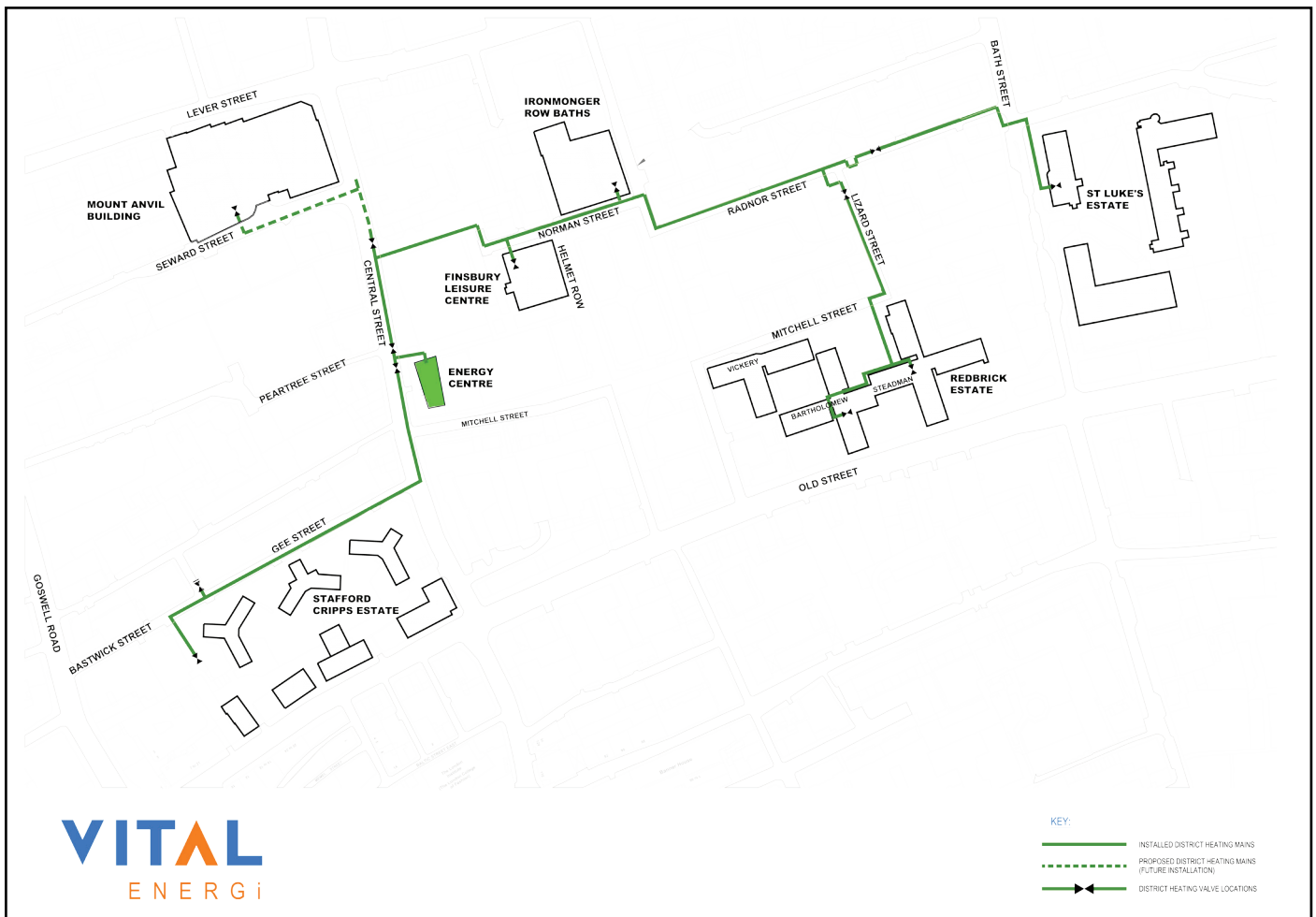


Figure 1.1 – Current Bunhill Heat Network (See appendix for map)

The network is due to be extended in 2016 to serve the King Square housing estate. An additional energy centre will be developed to recover heat from the London Underground via a heat pump and supplied to the network. The network and energy centres are wholly owned and operated by Islington Council. For further information please contact: BunhillHeatandPower@islington.gov.uk

It should be noted that the Bunhill heat network only currently serves a proportion of the connected buildings’ heating and hot water. Therefore connected sites are required to have on-site heating systems to provide peak and backup heat and hot water. In the future Islington’s heat networks may provide heat and hot water to meet 100% of a connection’s supply.

Citigen Heating & Cooling Networks are located on the southern boundary of Islington. The scheme serves numerous City of London buildings including the historic Guildhall, the Barbican Arts Centre, the Guildhall School of Music and Drama, the Museum of London and London Central Markets (Smithfield) as well as other major commercial customers. CHP generation produces up to 28MW of heat and chilled water which are delivered to premises to meet their heating and air conditioning requirements via a separate heating and cooling network. For further information see: www.eon-uk.com/638.aspx

Nearby heat networks include:

Shoreditch Heat Network (SHN) is located in Hackney, to the south east of the Islington. SHN is a combined heat and power system that will initially serve 464 dwellings across three housing estates – Wenlock Barn, Cranston and Fairbank. It is part of a borough-wide Decent Homes Programme by Hackney Homes, the Arm's Length Management Organisation (ALMO) for the London Borough of Hackney. For further information see: <http://www.vitalenergi.co.uk/casestudies/shoreditch-heat-network/>

King's Cross Heat Network is located in Camden, on the western boundary of Islington. As part of the King's Cross Central Development a district heating system has been installed and will serve every building at the site. An Energy Services Company (ESCO), Metropolitan King's Cross Limited (MKC), was created as the vehicle to design, finance, install, operate and maintain the low carbon heating system for King's Cross Central. For further information see: www.kingscross.co.uk/energy-centre

Planning applicants and those wishing to connect to heat networks should consult the council for the latest information on Islington's heat network developments.

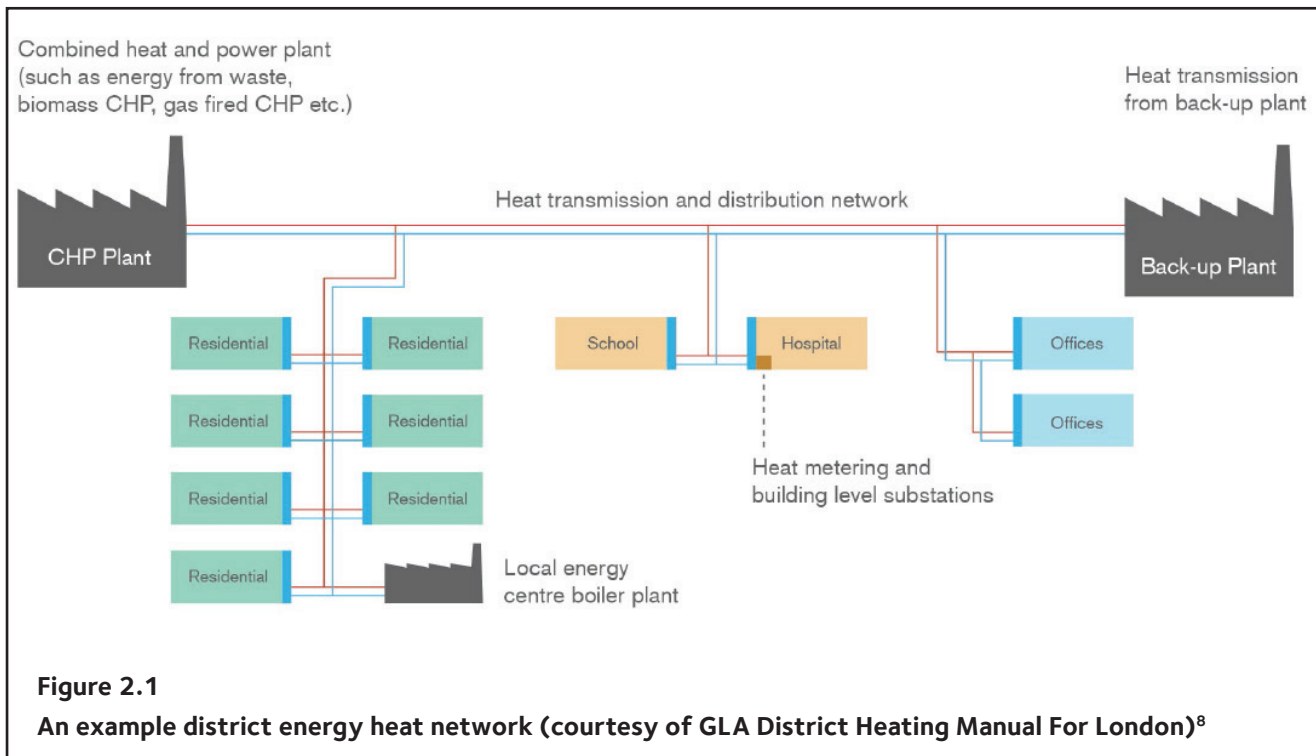
Those wishing to connect to heat networks should follow the principles and guidance set out in the CIBSE/ADE CP1 Heat Networks Code of Practice⁶. Where appropriate, the requirements of the Heat Trust Scheme⁷ should be followed to ensure a high quality and level of protection for heat network customers.

⁶ CIBSE/ADE CP1 Heat Networks Code of Practice (CIBSE) (2015)

⁷ The Heat Trust Scheme (<http://www.heattrust.org>) (2015)

2. What are heat networks?

District heating is the supply of heat from a central heat source via a network of pipes carrying hot water to heat consumers. Figure 2.1 shows an example heat network.



Often called heat networks, district heating schemes comprise the physical infrastructure for the generation, distribution and consumption of heat. Heat networks can cover a large area or even an entire city, or be fairly local, supplying a small cluster of buildings. This guide focuses on 'district' scale networks only, of which there are currently two within Islington and two in close proximity).

The physical network infrastructure from the heat generation through the distribution network to the consumer heat interface typically includes:

- Heat source – often comprising an energy centre or central plant room with heat generation equipment e.g., CHP, heat pumps, boilers etc to supply the heat network
- Heat network route (i.e. the pipes) – usually pre-insulated to a high level in order to minimise heat losses
- Consumer heat interface between the network and the heat consumer.
The consumer heat interface will often comprise a heat exchanger to deliver the heat from the network to the customer. This can be a Building Thermal Substation supplying a whole building or individual Heat Interface Units supplying each property.

Many of the key features of an efficient heat network are illustrated in the Figure 2.2

⁸ District Heating Manual for London (GLA) (2014)

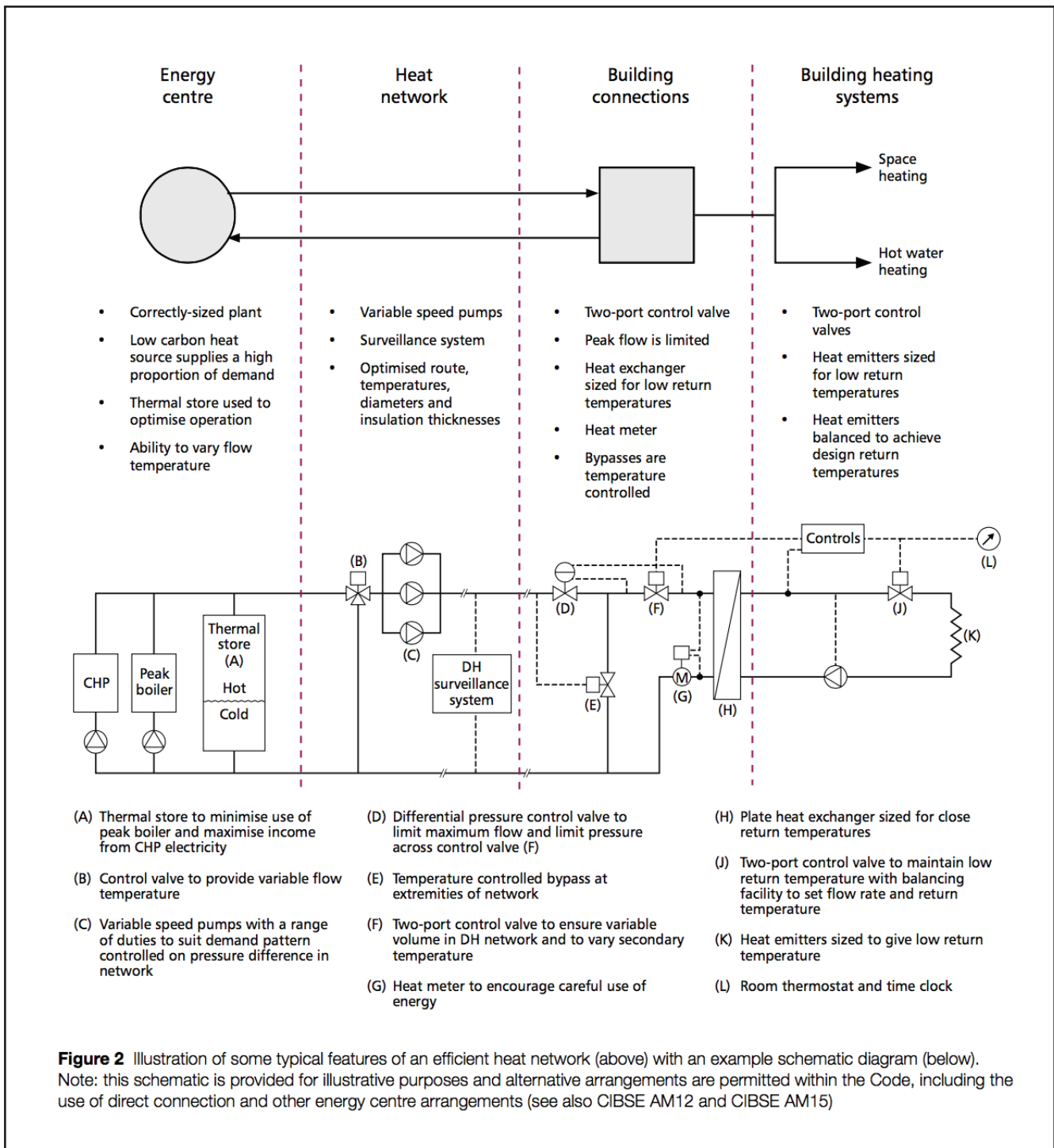


Figure 2.2 – Key features of an efficient heat network (direct connection can also be used and may be more energy efficient) – from the CIBSE/ADE CP1 Heat Networks Code of Practice (2015)

Heat networks can be used to supply new buildings and existing buildings ranging from residential dwellings to commercial offices and public buildings. Indeed, a wider mix of building types is generally desirable as this provides a diversity of heat demands at different times of the day and year.

3. Benefits of connecting

Heat networks offer a range of benefits over conventional heating methods for heat consumers, building owners and developers.

Well-designed and operated heat networks offer clear advantages in overall energy system efficiency and associated economic and carbon reduction benefits. They also offer a number of other advantages over conventional stand-alone approaches to building heat supply.



Benefits for heat consumers:

Bunhill heat and power thermal storage

- Heat networks can address fuel poverty and give peace of mind to vulnerable residential consumers by:
 - ensuring the efficient management of heat provision.
 - providing lower, more affordable and more stable prices.
 - offering lower costs than micro renewables in achieving low or zero carbon energy supply.
- Resilient design to provide secure heat, with the system potentially supplied by multiple heat sources.
- Where necessary, Heat Interface Units require less space than an equivalent thermal store or an equal capacity combi-boiler, and are simpler and safer to operate than individual gas boilers
- Metered supplies provide clear tariff structures, often made up of a standing charge and a unit charge based on the metered supply.

Benefits for developers and building owners/operators:

- Lower cost solutions – a heat network may provide a lower-cost method of achieving carbon targets than the equivalent deployment of on-site CHP ⁹.
- Reduces labour and maintenance costs compared with individual systems.
- May significantly reduce the developer's cost of compliance with Building Regulations and may even be the factor that enables developments to go ahead.
- Meeting low carbon targets in planning consents can become easier:
 - Improved SAP ratings – the Standard Assessment Procedure (SAP)¹⁰ rating achievable with HIUs in dwellings, fed from a heat network with low carbon heat source, will be significantly better than for systems with distributed combi-boilers or hot water cylinders.
- Lower operational cost overall – evidence indicates that TOTAL operational costs can be lower than individual heater options, when accounting for ongoing lower heat, maintenance and replacement costs.
- Can be a low carbon approach for dealing with difficult-to-insulate buildings e.g. solid wall dwellings and historic buildings.

⁹ CHP For Buildings – AM12, Chartered Institution of Building Services Engineers (CIBSE) (2013)

¹⁰Standard Assessment Procedure (Department of Energy & Climate Change) (2012) www.gov.uk/standard-assessment-procedure

4. Before connecting

Those connecting to a heat network have a key part to play, as without collaboration the heat network operator will not be able to run the heat network efficiently. In particular, it is essential to collaborate with the heat network operator on the design of the building heating system and connection from an early stage.

In order to make heat networks perform well, you need to make sure the building and its systems are designed and operated in the most suitable way possible. Ensuring heating and hot water systems are designed and controlled at appropriate temperatures is key to an efficient and cost-effective heat network. Also, insulating pipework inside your building is essential to prevent heat being wasted and avoid uncontrolled overheating. The GLA strongly recommend that internal heating pipework should be insulated to a standard significantly beyond building regulation requirements, in order to minimise issues of internal heat gain¹¹. The owner/developer of new buildings should:

- Determine peak demands (through the project design team) and agree these with the Heat Network Operator.
- Estimate projected annual consumption (through the project design team) and agree these with the Heat Network Operator.
- Define design operating temperatures for the building services and losses in the secondary heating system and agree these with the Heat Network Operator.
- Ensure that the need for low return temperatures under all load conditions is understood by the design and construction teams.
- Define minimum flow and minimum load conditions.
- Establish a phasing plan for the development taking a gradual building block approach.
- Install and commission the secondary heating systems correctly to ensure what is actually installed meets the original design, and operates effectively/efficiently.
- Operate the building in accordance with the Heat Network Operator's parameters and recommendations (or instruct their facilities manager to do so).

The owner of existing buildings should:

- Measure/determine peak demands and agree these with the Heat Network Operator.
- Measure/estimate projected annual consumption and agree these with the Heat Network Operator.
- Determine opportunities to modify secondary heating systems and their operation to ensure the heat network runs efficiently, i.e. reduce return temperatures.
- Operate the building in accordance with the Heat Network Operator's parameters and recommendations (or instruct their facilities manager to do so).

¹¹ <https://www.london.gov.uk/sites/default/files/GLA%20guidance%20on%20preparing%20energy%20assessments%20April%202015.pdf>

4.1 Connecting parties responsibilities

Differential temperatures – the difference between flow and return temperature in the secondary distribution networks (your heating system) must be kept as large as possible to minimise pipe size, enable the supply of district heat from various heat sources and optimise any CHP or low/zero carbon technology output. To ensure that low grade waste heat, and other heat sources¹² can be utilised on the district heat network, the secondary design must focus on low return temperatures. The temperature differential at the primary/secondary interface will depend on the design of the internal building services. Therefore, all internal systems must ensure compatible designs that maintain optimum differential temperatures and low secondary return temperature at the interface during all demand scenarios, particularly at low or zero load.



Building heating system – key considerations for the design of building internal energy systems are as follows:

- The selection of low temperature operating systems, such as underfloor heating systems to significantly reduce the return temperature.
- Low flow rate radiator circuits for buildings, complete with thermostatic control.
- Where used, radiator circuits should be designed to operate satisfactorily at low temperatures with a maximum 70°C / 50-40°C flow and return (as opposed to the traditional 82°C / 71°C) without compromising the ability of the system to deliver the required level of heat. Return temperatures should be minimised and systems capable of operating at very low flow and return temperatures should be considered.
- The use of direct instantaneous hot water generation should be considered. This removes the need for hot water storage, reducing energy consumption and heat losses, reduces pipework, space and pumping costs, and more importantly, secures low return temperatures by adopting a heat exchanger arrangement that uses the heat network return water to pre-heat the cold water makeup.
- Ensure minimum return temperatures from hot water service connections, whether storage or instantaneous.
- Taking advantage of unique opportunities, like heat sinks such as swimming pools, to optimise return temperatures. Swimming pools require large amounts of heat and can be readily designed to operate at low return temperatures.
- The primary circuit will be sized for a nominal maximum pressure of 16 bar (PN16). Therefore the head loss at the primary circuit connections within the building and the plant room will be a target of 1.5 bar.

¹² London's Zero Carbon Energy Resource: Secondary Heat (GLA Report) (2013)

Two-port control valves and variable speed pumping: The use of two-port control valves in constant temperature system applications is fundamental to ensuring that the unnecessary return of supply water temperature back to the heat exchanger is avoided. Variable speed pumps, in conjunction with differential pressure control valves for system balance, should be used as they provide an efficient method of delivering only the energy that is needed and when combined with the parallel pumping, provides the required turn down of the system to maintain optimum return temperatures throughout the annual demand profiles.

Shunt pump and low loss header: This is a common inclusion in heating systems but should not be used on a heat network system. This arrangement will only serve to return supply-temperature water back to the heat exchanger as demand reduces on the main building sub-circuits.

Circuit mixing: Wherever possible, water returning from one heating circuit at a high temperature should be used in a second circuit. This is not always possible, since one circuit may demand energy at a different time to another.

Metering: Energy meters measure volume flow rates and supply and return temperatures to provide an accurate record of energy usage.

Meters should be modern ultrasonic types to ensure high accuracy and minimise pressure drop in the system. Metering should be installed to record flow volumes and energy delivered on the primary circuit.

For residential connections, meters will also be installed on the secondary circuit where individual dwelling billing is required. The energy metering system must include a flow meter, two temperature sensors and a stand-alone integrator unit complete with battery back-up facilities.

Route onto and through site: It is a requirement that there is space on site for pipework to connect the point at which primary pipes comes onto site with the on-site heat exchanger/plant room/energy centre. If the proposed site for the heat exchanger and the point at which heat network piping comes onto site are separated by an obstacle such as deep water feature, it may not be possible to connect them. Therefore proposals must demonstrate a plausible route for heat piping, that suitable access could be gained to the piping at short notice and that the route is protected throughout all planned phases of development. Where possible, it is preferable to include a single plant room to allow one connection to the heat network rather than multiple plant rooms.

Plant layout: New developments where the detailed connection arrangement to a heat network is unknown will require physical space to be allotted for the installation of heat exchangers and any other equipment required to allow connection (see PART 2 Section 12).

Organisations connecting to district heating are also encouraged to:

Provide dedicated training and support as part of the handover process to ensure that building/site managers, maintenance personnel and building users fully understand the energy systems of a building, how to operate and maintain them efficiently and effectively, and how to monitor and fine-tune performance.

Plan for post occupancy monitoring and evaluation of building performance to help close the gap between predicted and in-use performance (for major developments, a Green Performance Plan is required). Voluntary adoption of a Display Energy Certificate and/or use of Carbon Buzz ¹³ to anonymously benchmark building performance would be particularly encouraged.

Adopt BSRIA's Soft Landings framework – this includes post-occupancy evaluation, but goes beyond it by seeking a closer working relationship between designers/constructors and building users/operators from the design stage onwards in order to try to close the gap between client/design expectations and delivered performance in use. (See BSRIA soft Landings Guidance)¹⁴

¹³ www.carbonbuzz.org/

¹⁴ <https://www.bsria.co.uk/services/design/soft-landings/free-guidance/>

5. Likely connection scenarios

In general, Islington Council prefer INDIRECT connections to their heat networks. This guide reflects the indirect approach, i.e. there would usually be a Building Thermal Substation (main heat exchanger) or individual dwelling thermal substations separating the building and the heat network system.

5.1 New-build scenarios

In this case, the major consideration is usually how the heat network can contribute to meeting planning policies, Building Regulations and other client requirements like BREEAM standards or similar schemes for dwellings or communities.

New buildings will have much higher standards of fabric insulation and air-tightness than existing buildings. Consequently the heat losses from the building pipework system will have a more significant impact and close attention to the design to minimise such heat losses will be critical as this can lead to over-heating of corridors and other common areas.

New buildings offer important opportunities to utilise lower operating temperatures as the new heating systems can be designed accordingly, with consequential benefits of lower pipework losses and more efficient central plant.

5.2 Existing building scenarios

Existing buildings will generally have lower standards of fabric insulation and air-tightness than new build. When retrofitting heat networks to existing buildings, heat demands can often be estimated using actual fuel use data. Existing building services including boilers, pipework and controls may determine how best the connection should be made.

Heat network operating temperatures will typically be determined by the highest temperatures used in certain buildings, and working with these building owners/operators to reduce operating temperatures would benefit the whole heat network. What may have become common operating practice in an existing building may not align with the original design criteria, as the building may have been modified, reducing the heat demand and enabling lower temperatures to be adopted with no loss of service.

Existing buildings are less influenced by planning policy and usually connect where there is a clear commercial benefit, although in some sectors the low carbon intensity of heat supplied from the network will also be a factor in the decision, especially where CRC costs can be reduced.

5.3 Space heating systems

The space heating circuit within the building needs to be designed to be compatible with the network temperatures. The building services designer should aim to achieve as low a return temperature as practical, as this will benefit both the heat network and the development.

This can be achieved by:

- Selecting lower mean heating circuit temperatures and using larger heat emitters to compensate
- Reducing the flow rates to the emitters to create a wider temperature difference and hence a lower return temperature

The first option may add to the cost of the heating system, but may be beneficial overall taking account of the heat network costs. The second option requires consideration of balancing and control, and also the need to ensure that flow velocities in pipework are not too low, which can result in a sluggish response.

Even where the existing heating system has been designed for the conventional 82°C flow, 71°C return, it is usually possible to reduce the flow rates to provide 70/50°C radiator circuit temperatures, resulting in only a small loss of output. An assessment of building heat loss and existing heat emitter sizing may establish that even lower temperatures can be used, especially where fabric improvements have been made subsequent to the original heating installation. It is also important to investigate whether the control system can be modified to a variable volume (or return temperature) control system that will maintain low return temperatures under part-load operation.

System designers are recommended to review and consider the latest industry best practice guidance and standards, including the CIBSE guides and documentation, British Standards and BSRIA codes. In particular, unnecessary oversizing of the system design should be guarded against, by reviewing the internal comfort conditions required (see CIBSE guide A), air permeability rates achieved in modern construction and external design conditions for Islington (see CIBSE Guide B), where practicable accounting for thermal mass, elevation and the urban heat island effect.

Designers are reminded that Part L of the building regulation penalises the oversizing of boilers in block scale LTHW systems (Non domestic Building Services Compliance Guide: 2013 Edition http://www.planningportal.gov.uk/uploads/br/non_domestic_building_services_compliance_guide.pdf) and recommends a detailed load assessment to ensure the correct sizing of equipment installed.

5.4 Domestic hot water services (DHWS)

Hot water services can be generated with a storage system or instantaneously, either centrally or at a dwelling or outlet level. Design advantages and disadvantages of various DHWS options are shown below.

Dwelling storage hot water systems	
Advantages	Disadvantages
<ul style="list-style-type: none"> • Lower peak demands in the final branch pipework to the dwelling • Storage provides a degree of standby enabling short-term interruptions of the network supply to be tolerated in summer, especially where electric immersion heaters are also installed as back-up • Opportunity to provide intermittent heat supply from the network to reduce heat losses from local branch pipework and there is no need for local thermal bypasses • Opportunity to schedule the time when the heat from the network is used (e.g. use of night-time heating if a heat pump based heat network is used) 	<ul style="list-style-type: none"> • Possible to 'empty' the tank if long demand duration • Heat losses from the cylinder need to be taken into account and may contribute to summer overheating in well insulated properties • Water needs to be stored at 60°C for legionella control • Where a domestic storage cylinder with a coil is used, return temperatures will generally be higher than for instantaneous except in the unlikely case of heating up from cold • Space is required in the dwelling for the storage cylinder

Dwelling instantaneous hot water systems	
Advantages	Disadvantages
<ul style="list-style-type: none"> • No limit to duration of hot water supply • Low return temperatures achieved when drawing off hot water • Compact design, releasing space within dwelling • Low heat losses from heat exchanger (when insulated) so minimal impact on overheating risk 	<ul style="list-style-type: none"> • Higher flow rates and diameters in branches serving 5 or fewer dwellings • Heat exchanger needs to be kept warm at all times to give good response time, this can lead to higher return temperatures in off periods and higher losses from branch pipes • No opportunity for short interruptions of heat network supply without impacting the service • Risk of scaling in hard water areas (i.e. London) especially with high primary side temperatures • May have higher maintenance costs for control valves and heat exchanger, especially where the HIU is located within a dwelling and so less accessible; good water quality will minimise these costs

Centralised hot water systems

Advantages	Disadvantages
<ul style="list-style-type: none"> Lower cost for heat exchanger equipment as it is centralised Lower maintenance costs as simpler system at dwelling No space required in dwellings No heat losses within dwellings so no impact on overheating risk Legionella risk can be controlled as water is stored and circulated at 60°C with a maximum return temperature of 50°C (see HSE Guide L8¹⁵) Space heating circuit can have variable flow temperature to limit heating use (valuable for unmetered schemes) Space heating circuit can be shut down entirely in summer (subject to contractual arrangements), reducing secondary pipework heat losses in summer Opportunity for use of a two-stage DHWS system where cold feed water is pre-heated by space heating return 	<ul style="list-style-type: none"> Higher cost for distribution pipework (as 4-pipe system – flow and return heating and flow and return DHWS). More space is required in risers for 4 pipes. However, these higher costs can sometime be offset by simpler Heat Interface Units. Additional heat losses in winter from DHWS flow and return as well as space heating flow and return (although latter can be smaller than for a two-pipe system which offsets this disadvantage) Separate metering of hot water use is needed resulting in higher costs – (this could be an advantage in providing feedback of energy use data and volume based metering for hot water use is low cost however a more complex metering and billing system would result)

In the new-build sector, individual dwelling instantaneous hot water heat exchanger systems predominate due to their compactness and because lower return temperatures can be achieved compared to cylinders with coils. Where centralised hot water is produced, external plate heat exchangers should be used instead of coils and this could also be a good technical solution for individual dwellings. Existing buildings will have a wider range of designs, with the 4-pipe centralised hot water system being common in unmetered social housing.

5.5 Likely heating system configuration options

Given that Islington Council's preference is for INDIRECT connections to Bunhill Heat and Power using Building Thermal Substations, the seven most likely heat network scenarios in Islington are:

Scenario 1A	Residential – centralised DHW and indirect high-rise space heating
Scenario 1B	Residential – centralised DHW and direct low-rise space heating
Scenario 2A	Residential – dwelling space heating via HIU PHEX with dwelling DHW storage cylinders
Scenario 2B	Residential – dwelling space heating via PHEX with dwelling DHW PHEX (combined HIU)
Scenario 3A	Residential – direct space heating with dwelling DHW cylinder
Scenario 3B	Residential – direct space heating with dwelling DHW PHEX (Combined HIU)
Scenario 4	Non-residential – direct commercial space heating and centralised DHW

Table 5.1 (see next page) sets these out in more detail. PART 2 of this guide provides detailed design layouts and specifications for each of these scenarios.

¹⁵ The control of legionella bacteria in water systems – HSE Approved Code of Practice and Guidance L8 (2013)

ALL HAVE BUILDING THERMAL SUBSTATIONS				EXISTING SCENARIO	SPACE HEATING SOLUTION	DHW SOLUTION	METERING SOLUTION
GROUP	TYPE	MAIN FEATURE	SECONDARY FEATURE				
RESIDENTIAL	1	1A	Centralised DHW	High-rise indirect space heating	Residential - Centralised DHW and indirect high-rise space heating	Building Thermal Substation & Central Space Heating PHEX	Block metering OR separate central Space Heating & DHW meters
		1B	Centralised DHW	Low-rise direct space heating	Residential - Centralised DHW and direct low-rise space heating	Building Thermal Substation	Block metering OR separate central Space Heating & DHW meters
RESIDENTIAL	2	2A	Dwelling Space Heating PHEX [HIU]	Dwelling DHW cylinder	Residential - Dwelling Space Heating via HIU PHEX with dwelling DHW storage cylinders	Building Thermal Substation AND Local Dwelling space heating HIU's	Block metering AND may have individual dwelling meters in HIU's
		2B	Dwelling Space Heating PHEX [Combined HIU]	Dwelling DHW PHEX [Combined HIU]	Residential - Dwelling Space Heating via PHEX with dwelling DHW PHEX (Combined HIU)	Building Thermal Substation AND Local Dwelling HIU's (Space Heating & DHW)	Block metering AND may have individual dwelling meters in HIU's
RESIDENTIAL	3	3A	Direct Space Heating	Dwelling DHW cylinder	Residential - Direct space heating with dwelling DHW cylinder	Building Thermal Substation	Block metering AND may have individual dwelling meters
		3B	Direct Space Heating [Combined HIU]	Dwelling DHW PHEX [Combined HIU]	Residential - Direct space heating with dwelling DHW PHEX (Combined HIU)	Building Thermal Substation	Block metering AND may have individual dwelling meters
Non Residential	4	Direct Space Heating	Centralised DHW PHEX	Non Residential - Direct commercial space heating and centralised DHW	Building Thermal Substation but with tertiary solutions for CT, VT and LT	DHW Thermal substation	Block metering only

Table 5.1 Most likely district heating scenarios

6. Customer/supplier responsibilities

A key challenge is to deliver a high standard of service to customers, who may have had good long-term experience using gas-fired boilers or previous heat networks. Therefore, it will be vital to have a high quality installation offering good reliability, a long life, low carbon intensity of heat supplies and low operating costs.

The cost-effectiveness of the heat supply will also depend on achieving low-cost finance over a long time period, while funders will also be looking for long-term performance and reliability.

Heat customer responsibilities

A successful heat network depends on the co-operation of the heat customers. The following sets out some responsibilities that customers will be asked to follow when connecting, and at regular intervals thereafter. Customers should:

- recognise the importance of return temperatures and ensure that their system operates as designed, as well as accepting and acting on advice provided by the Heat Network Operator
- not interfere with the system and should not touch the valves or any parts of the system except designated user controls. Lead seals should be used where possible
- check whether their system is at fault before calling the Heat Network Operator, in case it is an issue with their building heating system
- treat operatives with respect and understand that if a heat network failure has taken place, then the operator will be doing all that they can to resolve the issue, but by virtue of it being a heat network there are likely to be multiple customers affected
- pay charges levied in accordance with the contract between the customer and the Heat Network Operator in a timely manner
- respect unauthorised access and not use heat network plant rooms for storing other equipment.

Building operator responsibilities

A successful heat network also depends on the building operator meeting their responsibilities for heat customers. The following sets out some responsibilities that building operators are recommended to adopt, particularly in residential scenarios:

- aim to meet the requirements of the Independent Heat Customer Protection Scheme (IHCPs)¹⁶
- prepare billing in accordance with the Energy Efficiency Directive and the Heat Trust
- monitor customers' heat consumption, and where significant divergence from typical trends are seen, undertaken investigations to ensure the heat meter and AMR system is operating correctly
- where a prepayment system is used, the adjustment of the meters to reflect any price changes will be carried out within one month
- provide general information to customers about the operation of the scheme on at least an annual basis in the form of a newsletter. This will include information on the availability of the heat supply over the year, reasons for any outages and the terms under which compensation payments will be paid
- aim to provide notice of any interruptions of supply at least 2 days before any planned works and as soon as possible for any unplanned works
- keep heat network plant rooms securely locked preventing unauthorised access
- make specific arrangements to communicate with vulnerable customers regarding any interruption to supply
- ensure that all customers are aware of a helpline phone number to call in an emergency or to report a fault
- set up a complaints procedure and a dispute resolution procedure, and ensure customers are aware of this
- provide information to prospective buyers or renters about the heat network and the expected charges.

¹⁶ Independent Heat Customer Protection Scheme (CHPA) (2014)

7. Next Steps

If connection to a heat network is a planning requirement, or appears to be an attractive proposition, provide a copy of PART 2 of this guide to your M&E designer or current building services operator. PART 2 provides more detailed technical guidance about connections, pipework layout, controls and commissioning.

We recommend that you inform the Islington Heat Network Operator that you are considering a connection. If you would like further information about connecting to an Islington heat network then please contact the Decentralised Energy Project Officer at planningenergyadvice@islington.gov.uk or 020 7527 3062.

It is recommended that if you are looking to connect to Bunhill Heat and Power that you review PART 3 of this guide which provides a draft 'Heat Supply Agreement' and a draft 'Deed Of Grant Of Easement For Heat Supply'. 'PART 3 - Islington District Heat connection terms' is available for those looking to connect on request from the Islington Heat Network Operator.

8. Appendices

8.1 APPENDIX A - GLOSSARY

Please note that legal definitions are listed separately in PART 3 of this guidance.

Heat Network–the pipework carrying heat from the central heat source to individual buildings.

Combined Heat and Power–the combined production of heat and power (usually in the form of hot water and electricity). This is often an engine driving a generator, but can sometimes be a turbine-driven system.

Core Strategy–the Core Strategy is a Development Plan Document setting out the long-term spatial vision for the local planning authority area and the spatial objectives and strategic policies to deliver that vision. Islington’s Core Strategy – Your Neighbourhood, Your Islington (2011) is available at http://www.islington.gov.uk/services/planning/planningpol/local_dev_frame/pol_corestrat/Pages/default.aspx

Environmental Supplementary Planning Document (SPD)–supplementary environmental guidance and requirements for those making planning applications. Environmental Design Planning Guidance – Tackling fuel poverty, enhancing quality of life and environment for all (Islington Council) (2012) is available at [http://www.islington.gov.uk/publicrecords/library/Planning-and-building-control/Publicity/Public-consultation/2012-2013/\(2012-10-22\)-Environmental-Design-SPD-FINAL.pdf](http://www.islington.gov.uk/publicrecords/library/Planning-and-building-control/Publicity/Public-consultation/2012-2013/(2012-10-22)-Environmental-Design-SPD-FINAL.pdf)

Building Thermal Substation–a main heat exchanger between the heat network and the building heating/DHWS systems.

Heat Interface Unit–an integrated solution for delivering and recording the heat consumed by an individual dwelling served from a heat network.

Low/Zero Carbon technology–includes renewable technologies like PV, solar water heating, biomass but also includes low carbon technologies like CHP and Heat Pumps.

Acronyms

- Automatic Meter Reading (AMR)
- Combined Heat and Power (CHP)
- District Heating (DH)
- District Heating Network (DHN)
- Domestic Hot Water Service (DHWS)
- Heat Networks (HN)
- Heat/Hydraulic Interface Unit (HIU)
- Measurement Instruments Directive (MID)

8.3 APPENDIX C – ISLINGTON ENVIRONMENTAL DESIGN PLANNING GUIDANCE

We strongly recommend that anyone considering making a connection to an Islington heat network should make themselves fully conversant with all relevant Islington Council policies.

In particular, the Environmental Supplementary Planning Document¹⁷ (SPD) should be consulted. Appendix 1 of this SPD (shown below) provides more detailed guidance on connection to Islington Heat Networks and the Bunhill Heat and Power network¹⁸.

The council has also produced a series of Good Practice Guides, which provide information on sustainable design for planners, developers and interested residents or businesses. These guides can be downloaded using the link below.

- **Good Practice Guide 1 - Green roofs and walls**
- **Good Practice Guide 2 - Sustainable drainage systems**
- **Good Practice Guide 3 - Climate change adaptation**
- **Good Practice Guide 4 - Biodiversity in the Built Environment**
- **Good Practice Guide 5 - Low-energy cooling**
- **Residents guide – Reducing carbon emissions and adapting to climate change in historic buildings**
- **Residents guide – Installing renewable energy on your home: When is planning permission required?**

http://www.islington.gov.uk/services/planning/plan_conserve/urban_design/sustainable/Pages/default.aspx

¹⁷ Environmental Design Planning Guidance – Tackling fuel poverty, enhancing quality of life and environment for all (Islington Council) (2012)

¹⁸ [http://www.islington.gov.uk/publicrecords/library/Planning-and-building-control/Publicity/Public-consultation/2012-2013/\(2012-10-22\)-Environmental-Design-SPD-FINAL.pdf](http://www.islington.gov.uk/publicrecords/library/Planning-and-building-control/Publicity/Public-consultation/2012-2013/(2012-10-22)-Environmental-Design-SPD-FINAL.pdf)