Investing in the UK's heat infrastructure:

Heat Networks

INVESTMENT IS GREAT BRITAIN

Contents

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Gateshead Energy Centre
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Heat networks in the UK

Bunhill Heat and Power, courtesy of Islington Council

Infrastructure is a vital part of many investment portfolios with business seeking new opportunities that deliver the stable, long-term returns characteristic of infrastructure projects. UK heat infrastructure is a significant and growing investment opportunity. Delivering the current pipeline of heat infrastructure projects will require up to £2 billion of capital investment over the next 10 years. This portfolio of heat networks will require investment from a range of funding sources not least heat network operators and third party financers, taking the form of equity, corporate loans or project finance. For the supply chain this pipeline also represents £3.2 to 6.4 billion of operations and maintenance contracts across the 40 year lifetime of these low-carbon energy infrastructure assets.

This guide seeks to raise awareness of the scale of heat infrastructure development that is underway in the UK currently and will come to market in the next 10 years. Through this document, Government hopes to start a conversation between key stakeholders (investors, supply chain and project sponsors) about how the market might evolve to deliver the step change in deployment levels suggested by the pipeline of heat network projects across England, Scotland and Wales.

This combined pipeline of 280 projects will have a capital requirement of £2 billion and will be commencing procurement between now and 2025. This is only the start of the pipeline, however, with additional opportunities identified by local authorities (municipalities) at energy masterplanning stage, that may proceed as the market evolves, and a number of projects being developed by wider public sector bodies and community groups as well as the private sector.

Grant funding and guidance from central Government and devolved administrations and support from local government, as project sponsors bringing together key partners to explore these opportunities, has developed a significant pipeline of high quality investment opportunities whose trajectory is likely to continue apace. Support from the Department of Energy & Climate Change (DECC) has laid the ground work for investment and sought to ensure that a suitably wide range of heat sources, commercial structures and funding sources are explored through development, to bring forward as many technically feasible and economically viable projects as possible. These projects are optimised for their locality, exploiting a range of heat sources including local recovered or renewable heat where suitable. When these projects come to market it is likely that they will meet the technical standards and customer protections recently developed by industry, further improving their attractiveness as an investment opportunity.

This guide introduces the Heat Infrastructure Investment Pipeline[1] developed for investors and supply chain companies with a potential interest in the significant opportunities presented by the fast developing UK heat network market. Key project metrics, such as capex and pre-financing internal rates of return (IRR), will be regularly published for project opportunities in England and Wales alongside details of tender websites. This complements the Scottish heat network project directory[2]. These tools will provide an overview of the volume and timing of projects coming to market and also provide an outline of the nature of these projects, to aid investor and supply chain business decisions.

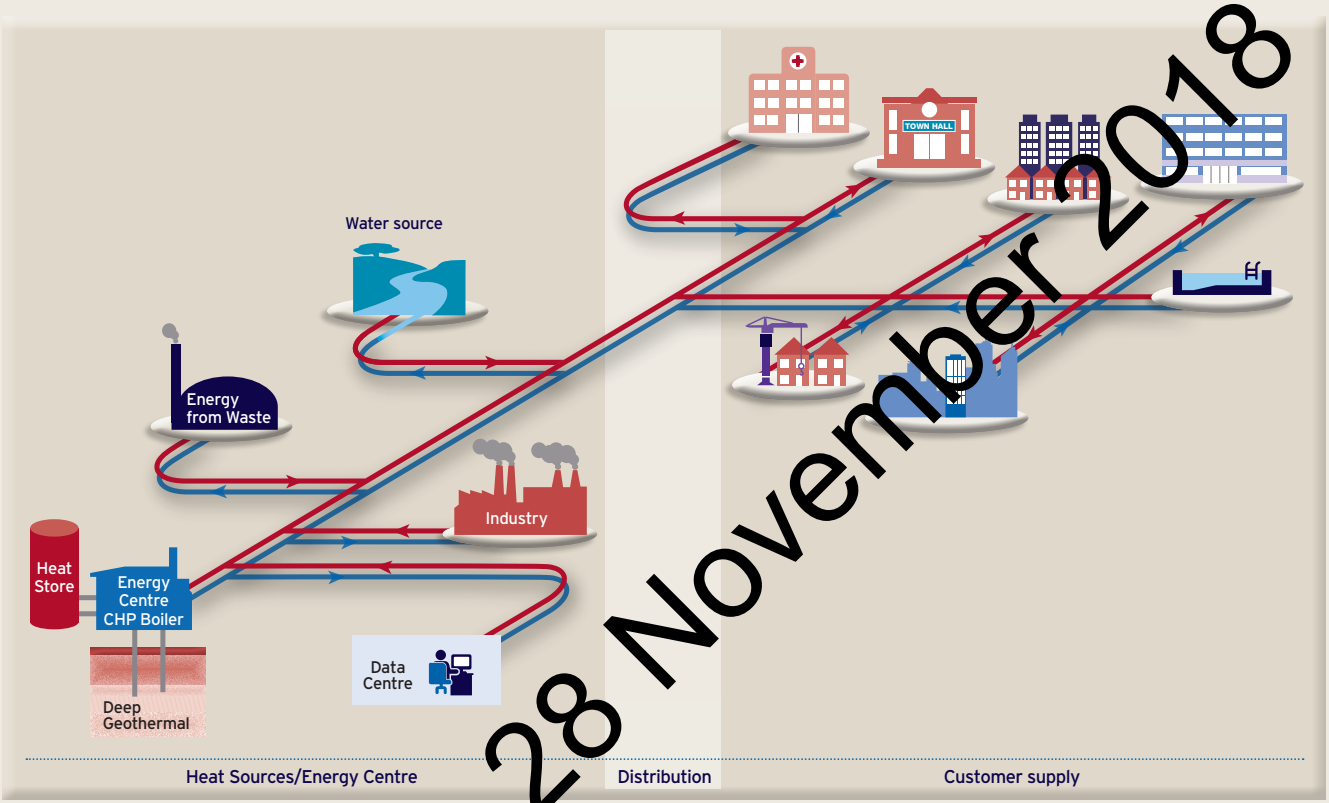
As this Heat Infrastructure Investment Pipeline grows and heat network deployment rates increase, there is an opportunity for current market participants to expand operations, and for new market players to enter the UK heat network market; including through partnerships or joint ventures. This growth may bring about an evolution of the UK's heat network market over the next 10 years: – with economies of scale realised, cost reducing innovation deployed and new commercial structures, possibly centred around aggregation or unbundling of generation and distribution, emerging.

*This **investment guide** seeks to stimulate a **conversation** about how to create the **heat networks** market **of the future**.*

[1] Heat Infrastructure Investment Pipeline https://www.gov.uk/government/publications/energy-networks-in-the-uk-investment-opportunities

[2] Scottish heat network opportunities http://www.districtheatingscotland.com/hnp-projects-map and http://www.districtheatingscotland.com/content/ investment-heat-networks-scotland

Heat Network diagram



Heat networks are a distribution system of insulated pipes that take heat from a central source and deliver it to a variety of different customers that can include public sector buildings, shops and offices, sport facilities, universities and homes. The term 'heat network' has been used in this guide, but many networks also generate electricity and may also provide cooling.

Heat network pipe infrastructure is technology- and fuel-agnostic and can accommodate a wide range of heat sources. Networks can utilise single or multiple sources of heat, controlled through 'energy centre(s)', which can include conventional boilers or Combined Heat and Power plants (CHP or cogeneration), but can and do also include large sources of low-carbon heat that cannot otherwise be used cost effectively in individual buildings, such as energy from waste, deep geothermal and industrial waste heat and a wide range of water sources and urban recovered heat.

The Opportunity

Identifying opportunities – Heat Infrastructure Investment Pipeline

DECC has been engaging with the investor and supply chain community to better understand what information is needed to make decisions on growing or starting your operations in the UK. Readily available, credible and up to date information on the volume, type and timing of projects were identified as critical.

DECC is in a unique position to facilitate communication of these project metrics to investors as it has supported development of 180 heat network projects across 115 Local Authorities in England and Wales. A data collection exercise has been initiated, gathering a range of technical and financial outputs from consultant reports commissioned with DECC funding. A subset of these key metrics will make up the publically available Heat Infrastructure Investment Pipeline, to be published at regular intervals.

For each project that was awarded development support from DECC key metrics will be made available, subject to Local Authority permission, in the Heat Infrastructure Investment Pipeline. As each heat network project completes a new development stage (masterplanning, feasibility and then detailed project development; outlined on page 13) the metrics in the Heat Infrastructure Investment Pipeline will be updated ready for the next publication date. This data will have been quality assured by consultants and checked by both the Local Authority and by DECC.

The Heat Infrastructure Investment Pipeline will provide best available information on individual projects and will be available for downloaded from the UKTI website[3].

Courtesy of Islington Council

1. Project name
2. Heat network sponsor contact details
3. Local Authority
4. Current stage of project development
5. Type of project (heat, cooling, electricity)
6. Primary driver (cost reduction, local economic regeneration, carbon reduction)
7. Anticipated year of financial close
8. Anticipated year first customers supplied
9. Heat generation technologies
10. Combined system generation capacity
11. Thermal store size
12. Total length of heat network
13. Anticipated heat delivered annually
14. Capex estimate
15. Unlevered equity/prefinancing IRR
16. Project life for unlevered equity IRR
17. Would third party investment (debt or equity from entity not involved in heat network operation) be considered?
18. Tender website for development stage contracts
19. Tender website for delivery

[3] UKTI https://www.gov.uk/government/publications/energy-networks-in-the-uk-investment-opportunities

Scale of the opportunity

With over 280 heat network projects at varying stages of development across the UK, there are significant investment and supply chain opportunities anticipated over the next 10 years; up to £2 billion of capital investment and lifetime operation and maintenance contracts of £3.2 to 6.4 billion.

The potential capital investment figures set out below are modelled on early stage descriptions of heat network ambitions provided by Local Authorities when applying for support from DECC's Heat Networks Delivery Unit. Generic assumptions on network size and heat source were used where information was not yet available and investment figures estimated using cost data published by DECC[4]. The methodology used to model the Scottish heat network opportunity is set out in the 'Investment in Heat Networks in Scotland' report[5].

Whilst is it unlikely that the exact set of projects currently listed in the combined pipeline will achieve technically feasible and economically viable solutions and not stall due to external obstacles, there are other projects that could take their place or expand the pipeline. Masterplanning studies commonly identify a minimum of three possible heat networks, but sometimes this can be as many as ten. In addition, there are other public sector bodies such as hospitals and universities developing heat networks and new build projects being developed in the private sector.

Annual operation and maintenance costs (opex) vary as a percentage of initial capital investment (capex) depending on the heat source and heat network size. The 'Assessment of the Costs, Performance, and Characteristics of UK Heat Networks'[6] which gathered data from seven existing heat networks indicated that annual opex (excluding fuel) was 2-10% of capex. Anecdotal testing of this proportion by DECC suggests that 4-8% capex may be a more accurate representation of a wider variety of heat networks. Based on £2 billion capex investment, this range could represent £80-160 million of operation and maintenance contracts annually. Across a 40-year heat network lifetime, this supply chain opportunity could be valued at £3.2 to 6.4 billion.

	Count of projects in development	Potential capital investment		
		25% deployment rate	50% deployment rate	100% deployment rate
England and Wales projects supported by Heat Networks Delivery Unit[1]	180	£400 million	£800 million	£1.6 billion
Projects supported by Heat Network Partnership for Scotland[2]	103	£50 to £120 million	£100 to £240 million	£200 to £440 million
Total	283	£0.5 billion		£2 billion

1 Source: Calculations underpinning the Delivering UK Energy Investment: Networks 2014 report
2 Source: Investment in Heat Networks in Scotland

[4] Assessment of the costs, performance and characteristics of UK heat networks https://www.gov.uk/government/publications/assessment-of-the-costs-performance-and-characteristics-of-uk-heat-networks

[5] Investment in heat networks in Scotland http://www.districtheatingscotland.com/content/investment-heat-networks-scotland

[6] Assessment of the costs, performance and characteristics of UK heat networks https://www.gov.uk/government/publications/assessment-of-the-costs-performance-and-characteristics-of-uk-heat-networks

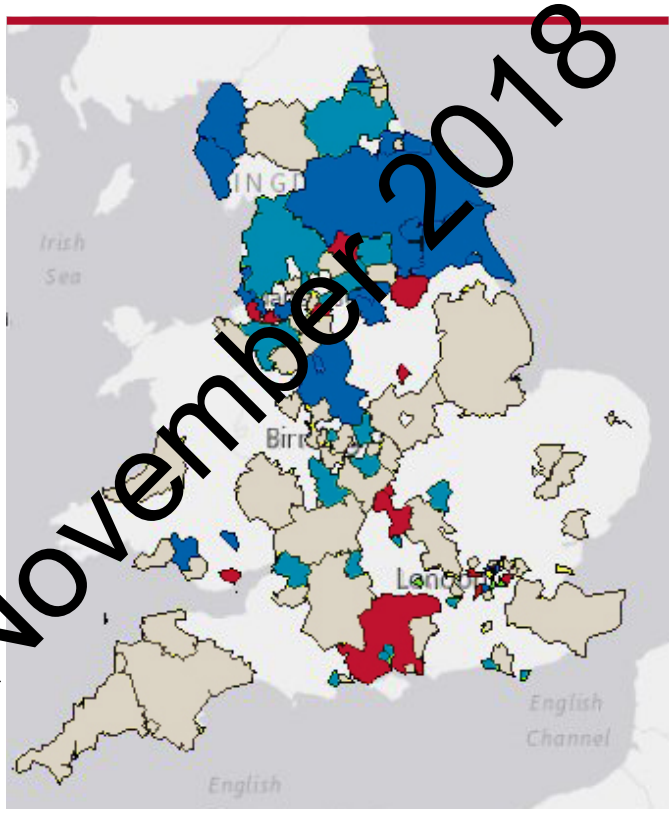
England and Wales

The work of DECC over the last two years has established beyond doubt the massive appetite for Local Authority involvement in heat network projects; £14.5 million of funding into the consultancy market for project development, 115 Local Authority stakeholders (out of a total of 381 authorities in England and Wales) supporting a pipeline of nationally significant infrastructure, and 180 projects receiving support to make sure they are technically and economically optimised in advance of an investment decision. DECC has worked with eight of the nine Core Cities[7], several Local Enterprise Partnerships[8], dozens of the large towns and cities as well as smaller rural and community-sized projects across England and Wales.

The success of DECC so far has been to unlock the latent ambitions of Local Authorities across England and Wales. Local Authorities are keen to better understand and quantify the role of heat networks in the local area and many of these Local Authorities have ambitions to take a role in the delivery of these networks in order to realise the full range of benefits they can deliver.

This portfolio has a diverse range of potential schemes ranging from £0 to £2 million up to projects in excess of £40 million. The IRR for these projects vary between 0 and 15% but with the majority sitting between 7 and 9%.

These projects are working to secure initial phase one 'anchor load' customers (i.e. large, long term, secure customers, often public sector) at the earliest opportunity. In some projects, the Local Authority brings heat demand from offices, leisure centres, schools or social housing, but in other projects key



Local Authorities awarded DECC development support in Heat Networks Delivery Unit funding rounds 1-4.[9]

heat network customers, such as other public sector bodies, are engaged in early stages to facilitate agreement of heads of terms for investment certainty. Whilst many of these schemes may be based on public sector clusters initially, many plan to take advantage of any potential private sector demand opportunities, as the network matures.

The technology and fuel agnostic nature of heat network pipe infrastructure has resulted in a number

[7] The Core Cities are: Birmingham, Bristol, Cardiff, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Nottingham, Sheffield. Their aim is to promote the role of these cities in driving economic growth and the case for city devolution. http://corecities.com/

[8] The 39 Local Enterprise Partnerships in England bring the private and public sectors together to drive local economic growth. http://www.lepnetwork.net/

[9] DECC Heat Networks Delivery Unit funding awards https://www.gov.uk/government/publications/heat-networks-funding-stream-application-and-guidance-pack

of interesting heat sources being explored across the DECC portfolio; from gas-Combined Heat and Power (cogeneration), biomass including energy-from-waste and heat pumps utilising deep geothermal, minewater, industrial waste heat and urban sources of recovered heat. Anticipated generation capacity varies between projects with most supply solutions ranging between 1-5MWth (excluding energy-from-waste ~10MWth) with many projects looking at options for multiple supply sources.

As well as exploring as many potential heat sources as possible and engaging anchor customers early, Local Authorities are also exploring a variety of commercial structures and funding sources. Central to Local Authority decisions around the balance of public and private sector involvement are the Local Authority strategic aims for the scheme, its risk appetite, desired level of control over the scheme, the availability of internal finance and attractiveness of external finance.

*Infrastructure is a **vital** part of **many** investment **portfolios**.*

Courtesy of Veolia

Case study: Gateshead Town Centre District Energy Scheme

Gateshead Town Centre District Energy Scheme is the first of its kind and scale in the North East. Having broken ground in summer 2015, the new District Energy Centre in the Baltic Business Quarter will house two 2MW gas combined heat and power engines and will be operational by April 2016, with public and private sector customers being fully connected by June 2016 through 3km of heat and private wire network.

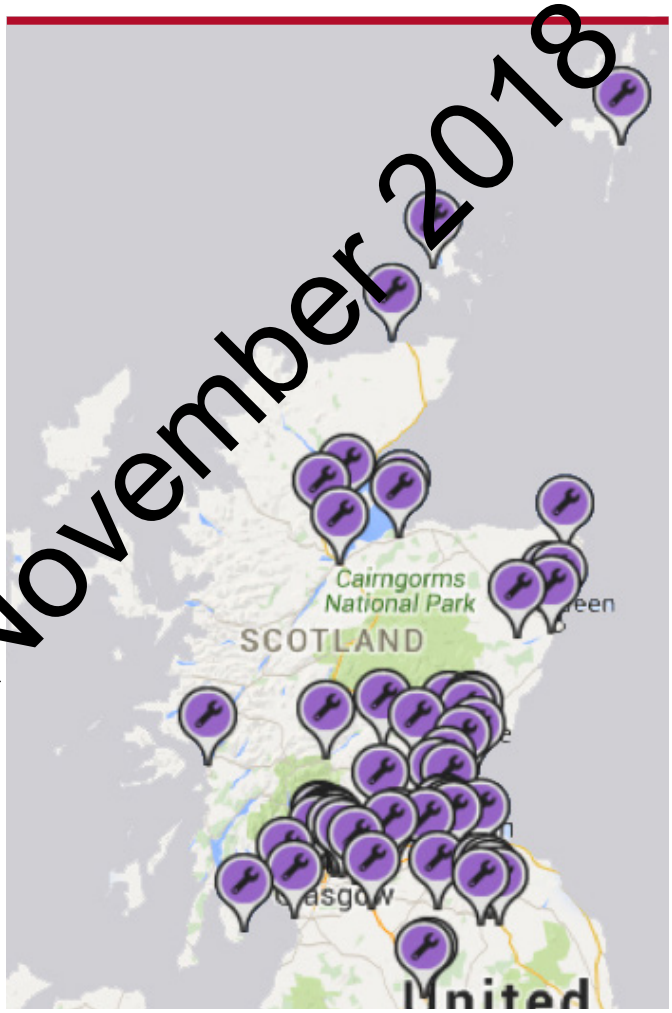
The £18.5 million scheme has been designed to serve 27 buildings, including Gateshead Civic Centre, several public sector partners and a number of large commercial buildings, hotels and offices. The scheme is expected to help attract new businesses to the area, thanks to lower energy prices and its green credentials. Local homes, businesses and public organisations will also benefit from lower energy bills and emissions.

The project has been fully financed by Gateshead Council with the design, build, operation and maintenance contracts awarded to the private sector. The project will deliver an 8% pre-financing IRR over a 40-year term (the lifetime of the pipe infrastructure) with a positive cashflow from year one. The scheme income is derived from both public and private contracts, with 70% of the revenues coming from public sector connections. Income from electricity sales has also been maximised and will provide 75% of the scheme revenue.

The Council has aspirations to see many other areas of the borough connected to similar schemes in the future. The District Energy Centre and network will be able to supply the energy needs of all the future development planned for the town centre and feasibility for future expansion is underway.

Scotland

The Heat Network Partnership for Scotland's report on heat network investment[10] identifies 103 heat network projects currently in development. This portfolio includes a range of projects including large-scale integrated heat networks in urban areas, retrofitting social housing developments, particularly multi-storey buildings, public buildings, business and industry. A number of heat networks have been built or expanded in recent years, for example in Aberdeen and Wick, with new projects based around major urban regeneration, one of the largest being the Commonwealth Games Athletes' Village in Glasgow, which built in capacity to allow it to expand to nearby housing and commercial developments. Since 2011 the Scottish District Heating Loan Fund[11] has provided over £8 million in capital to a range of projects, the largest loan to date being £1 million to Aberdeen Heat & Power. The Fund's portfolio includes a large number of small scale renewable heat networks, with loans totalling £5 million across over 30 projects, demonstrating a potentially significant investment opportunity for a widely replicable heat network model.



Heat Network Partnership for Scotland Projects map.[12]

*Masterplanning studies commonly **identify** a **minimum of three** possible heat networks, but **sometimes** this can be **as many as ten**.*

[10] Investment in heat networks in Scotland http://www.districtheatingscotland.com/content/investment-heat-networks-scotland
[11] Scottish Government's district heating loan fund http://www.energysavingtrust.org.uk/district-heating-loan
[12] Heat Network Partnership for Scotland Projects map http://www.districtheatingscotland.com/hnp-projects-map

Bunhill Heat and Power, courtesy of Islington Council

Investment timeframes

An assessment of the development stage a heat network has reached and its likely complexity can be used to provide an estimate of when the project will reach commercialisation and will therefore be seeking finance and procuring delivery.

Where a strategic area-wide approach is taken, the first two development stages are undertaken by the Local Authority heat network sponsor. **Heat mapping** and **energy masterplanning** look area-wide at current and future heat demand and heat sources, identify a range of heat network opportunities and prioritise these through a techno-economic analysis that captures the Local Authority's key drivers (predominantly energy bill reduction and/or local economic regeneration).

The next two stages are **feasibility** and **detailed project development**. These stages take the most promising single heat network opportunity and, through a series of iterations, examine the technical, financial and contractual issues in increasing granularity; as these three aspects are inter-dependant.

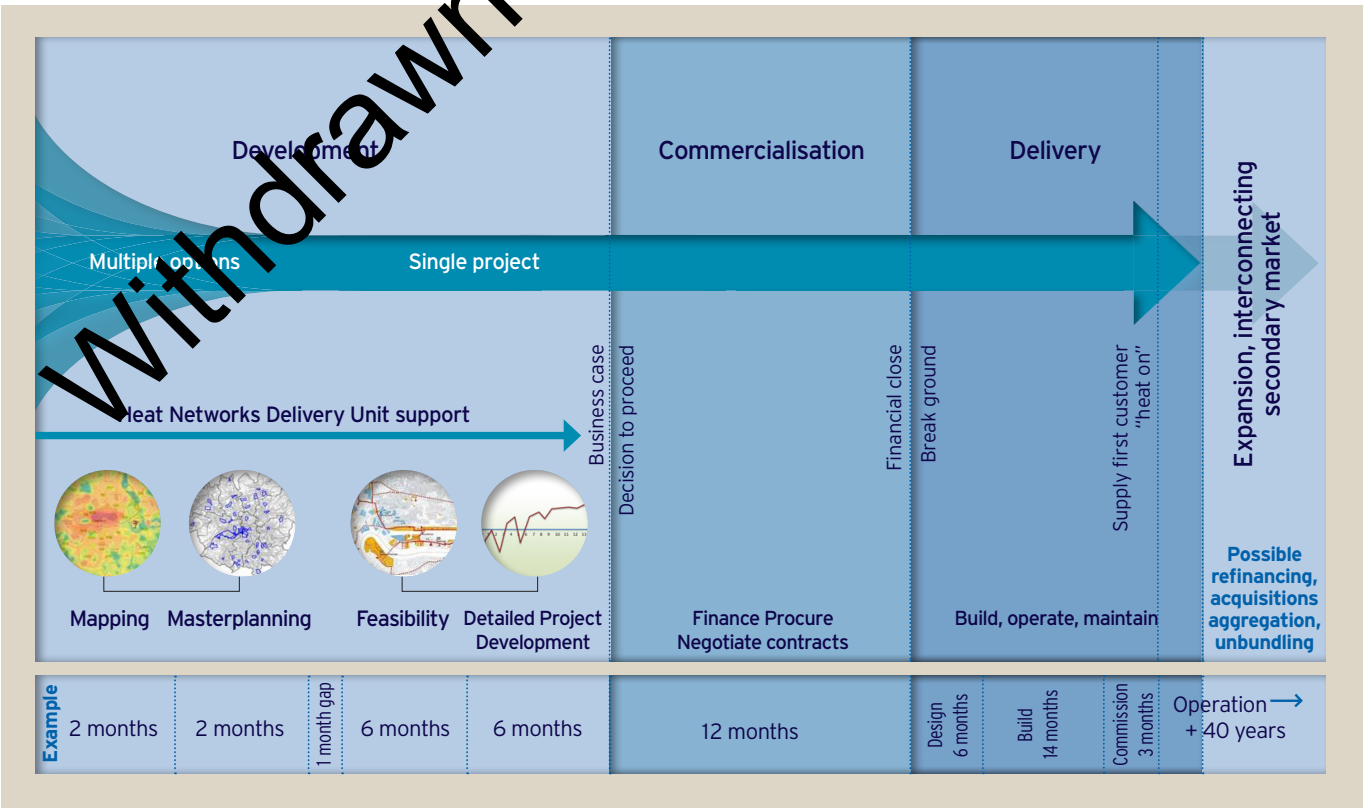
Should the local authority wish to be the majority shareholder in the heat network a business case will be submitted for internal approval recommending the commercial structure, funding sources and procurement strategy. Should the local authority decide that the optimal way to deliver the heat network is through private sector ownership and funding, development stages may stop at feasibility and a Cabinet or Committee paper or business case will seek approval for this route and the internal resources required to ensure delivery.

The commercialisation phase of projects will involve securing finance, procuring delivery and negotiating final contracts with anchor-load customers and suppliers.

Based on the timings above, it is expected that a significant number of the 280 projects in the combined pipeline will reach commercialisation in the next 10 years. After the initial prospect identified in masterplanning has been pursued, other opportunities can often be developed. This has two implications for investment. In reality, the pipeline is larger than 280 projects and opportunities contained within it may be coming to market over the next 10 years and beyond.

The following data which will be provided in the Heat Infrastructure Investment Pipeline can be utilised by investors and supply chain when considering the timings of the pipeline of heat network projects: Current stage of project development (Anticipated) Year of financial close and (Anticipated) Year first customers supplied.

Heat Networks: Development to Delivery



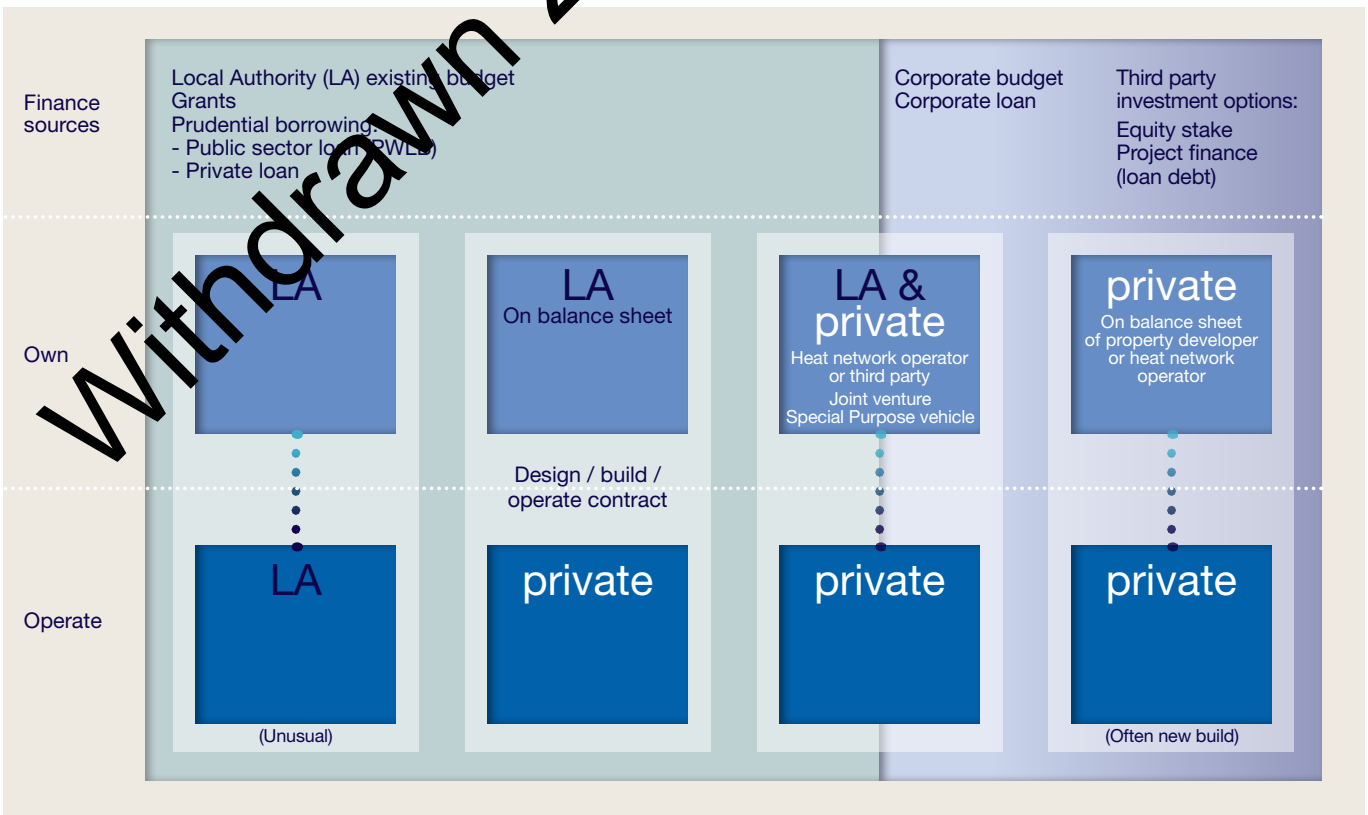
Heat infrastructure investment opportunities

Should an equivalent of the complete heat network project pipeline reach commercialisation, up to £2 billion of capital investment will be required. This presents opportunities for heat network operators, third party providers of corporate debt, project finance or equity, as illustrated below.

Local Authority sponsored heat networks financed on the Local Authority's balance sheet may use existing budget capacity, a corporate loan may be taken from the Public Works Loan Board or from a private sector investor or a particular characteristic of the project may be eligible for a grant, such as from the European Union. Whilst some Local Authorities do have available finance, there is, however, increasing competition for constrained public sector budgets with other spending priorities taking precedent over heat networks. For those Local Authorities that do have an appetite to invest but lack sufficient funds, there is an opportunity for the private third party investors to offer loan funding against the credentials of the Local Authority.

For Local Authorities with no appetite to invest, there are opportunities for private sector heat network operators. In these circumstances the heat network must align with the private sector's investment strategy, must represent a better opportunity than other potential investments and meet the investment hurdle rates and risk strategy of the heat network operator. As well as utilising existing balance sheet, private sector heat network operators may seek corporate loans to finance network investment.

Investment opportunities



To date, there is little evidence that project finance, securing debt based on the assets and projected cash flows of the heat network, has been utilised in the UK. Should appropriately priced offers become available, project finance may in future be utilised by heat networks.

Currently, equity investments are made by the heat network owner operator (i.e. the Local Authority or private sector heat network operator). In future, third party organisations not involved in the operation of the heat network may be interested in taking an equity stake.

Once the heat network has been constructed and has operated for an initial period of time, the risk profile will reduce and cheaper finance may be accessed through refinancing, or heat networks may be acquired by another operator or investor. A small number of acquisitions have occurred in recent years, but this secondary market may become more established. Consideration may be given to heat network aggregation or the unbundling of heat sources (generation) and distribution acknowledging their differing lifetimes and risk/return profiles.

Critical to any investment offers for heat networks is recognition of the revenue income. Heat networks can take up to five years to build, depending on location, scale and complexity, and may have further phased build out before full capacity, and therefore full/income potential is reached. Finance that aligns repayments with projected income in the initial years could make a significant difference to the sector.

The following data that will be set out in the Heat Infrastructure Investment Pipeline will provide investors with an idea of the volume and types of project coming forwards: Capex estimate, Unlevered equity/pre-financing IRR, Project life for unlevered equity IRR and 'Would third party investment (debt or equity from entity not involved in heat network operation) be considered?'.

Courtesy of Islington Council

Courtesy of Veolia

*Delivering pipeline of **280** heat infrastructure projects currently **in development** will require **£2 billion** capital investment over **next 10 yrs.***

Heat infrastructure supply chain opportunities

The projects in development in England, Wales and Scotland have a combined capex of £2 billion which will be let as build contracts to the private sector supply chain alongside lifetime operation and maintenance contracts of £3.2 to 6.4 billion. This covers a wide variety of products and services.

Heat network components

Like all energy systems, heat networks are comprised of generation, distribution and customer supply. The generation asset itself may be under the same ownership as the distribution infrastructure and customer connections or may be owned by a third party with a contract to supply heat, such as an energy-from-waste plant.

Heat sources can be single or multiple, with the system taking a modular approach utilising peaking plant for times of high demand and back up plant for maintenance. Most heat source lifetimes are significantly shorter than the pipe infrastructure, allowing the heat network to further decarbonise over time through the planned asset replacement program.

Buildings-side heating and hot water systems can be part of the heat network assets, or may fall under different ownership and management, but in most cases heat networks have heat interface units at the building connection and/or customer connections. In line with European legislation, all new heat networks must install heat meters for new build properties and for existing properties undergoing major renovations, but subject to a cost benefit analysis for existing properties not undergoing a major renovation, so that customers can be charged for consumption (as opposed to flat rate allocations)[13].

Heat networks vary in commercial complexity with the simplest schemes 'campus networks' with a single entity as customer, supplier and land owner, these networks are typified by hospitals and university heat networks. More complex networks, typified by 'city-wide schemes', may include heat sources owned by a third party, 'prosumers' (customers that also supply heat to the network) and a variety of public and private sector customers. District energy schemes may supply heat only or may also provide cooling and/or electricity.

*Current **£3-6 billion** heat network supply chain **opportunities** – operations and maintenance contracts over next **40 years**.*

[13] Heat networks legislation for metering and billing: compliance and guidance https://www.gov.uk/guidance/heat-networks

Engineering design consultants

Engineering design consultants undertake heat mapping, network design and are sometimes retained to supervise the installation, commissioning and operation of heat networks. DECC and the Heat Network Partnership for Scotland development funding has put a significant amount of money into this market. As a result, the supplier base has expanded and a number of new market entrants have won contracts; either UK companies with related engineering experience or heat network specialists from abroad. In recognition of the growth in this market and the specialist skills required to optimise the wide range of heat networks, CIBSE and ADE have established a Code of Practice[14] to try to bring about a consistent quality in the design, build, commissioning and operation of heat networks. These standards are being referenced in tender specifications and adopted by engineers.

Legal and financial consultants

There are a number of legal and financial consultants with expertise in heat networks in the UK. This pool of consultants is growing, with some companies operating nationally and some focusing on specific regions of the UK. This pool of consultants is a mix of UK and international organisations. It is likely that this market will mature and some standardisation occur where currently, largely due to the bespoke nature of heat networks and the low deployment rates, learnings are not being readily transferred across projects. Strategic approaches to heat networks across specific geographic areas, such as in Greater Manchester and Glasgow, should bring synergies across a number of projects, thereby reducing consultant fees.

Heat network developers and operators

A small but growing number of heat network developers and operators are active in the UK. These companies include large utilities and smaller heat network specialists. These companies provide a range of different roles alone and in partnership with each other depending on the contracts offered. Contracts can include any combination of finance, design, build, operation, maintenance, metering, billing and customer service. The lead heat network developer or operator is likely to take on a coordination role and will subcontract certain aspects to some of the specialist organisations mentioned above.

Energy centre building construction and pipework civil engineering

Heat networks construction and installation works need to be delivered by specialist companies. A major part of the installation of pipes is the excavation of trenches, backfilling and surface restitution. This is a standard civil engineering activity and there is a well-established UK supplier-base. The current typical approaches are: construction and delivery by a specialist turnkey organisation or through a construction company managing and subcontracting specialist activities outside of the standard building construction. Local Authorities typically use design and build contracts and are using increasingly detailed specifications and retaining client engineers throughout the design and build process. There is increased interest in more traditional forms of procurement where design and build elements are procured separately.

[14] Chartered Institution of Building Services Engineers (CIBSE) and Association for Decentralised Energy (ADE) Heat Networks: Code of Practice for the UK http://www.cibse.org/knowledge/cibse-other-publications/cp1-heat-networks-code-of-practice-for-the-uk-new

Queen Elizabeth Olympic Park, courtesy of Cofely GDF SUEZ

Distribution infrastructure – pipe manufacturing and installation

Networked heat is distributed primarily via hot water, or steam, through pre-insulated polymer or steel pipes. A limited number of brands supply the UK currently.

Steel pipes, which have a longer lifetime than polymer, commonly have integrated leak detection systems. Steel pipes are not yet manufactured in the UK, and transportation from abroad increases the price and lead times. Critical to the integrity of steel pipe installation is jointing. This is a highly skilled activity which is under-developed in the UK and is much in demand. Steel pipes are commonly used for district-level heat network and pipework runs in roads and highways. Plastic polymer pipes can be used for shorter distances and can operate at a variety of temperatures and pressures. These are lower cost, are flexible and are supplied in large rolls and installation is simpler than for steel pipes.

The Potential & Costs of District Heating Networks[15] report identified that the capital costs of heat networks in the UK are 20% higher than in mainland Europe, a significant proportion of which is the distribution infrastructure. As deployment rates increase, the UK should benefit from the economies of scale that have seen prices fall on continental Europe.

[15] The potential and costs of district heating networks Poyry/Faber Maunsell report (2009) http://www.poyry.co.uk/news/potential-and-costs-district-heating-networks-report-decc-poyry-energy-consulting-and-faber-maunsell-aecom

Generation (heating, cooling and electricity) plant

Heat generation plant and ancillary equipment, such as boilers and CHP, are also used in building level applications as well as heat networks, and, as a consequence, is a relatively mature market. However, new sources of heat are becoming more prevalent and the mainstreaming of kit to recover and upgrade sources of industrial and urban heat cost effectively will be required. This broadening of heat sources will support the growing pipeline of heat network projects and an increase in the number of manufacturers and suppliers of such hardware will exert a downward pressure on costs through a competitive market.

Control systems

Control systems for heat networks range from building management systems to more complex SCADA systems, depending on the scale and the complexity of the system. There is scope to develop smarter system controls and metering, enhancing the interface with the customer and the heat network, and maximising opportunities for smart system optimisation. The use of smart meters, system monitoring and controls could also be developed to improve the performance of networks through enabling local diagnostics and maximising the benefit of heat networks through controlled and managed interface of the generation equipment, thermal storage and demands with other energy networks, such as the national grid and local electrical distribution networks.

Thermal storage

Efficient heat (and cooling) networks will incorporate a thermal store to flatten the heat demand profile and increase generation utilisation rates. Thermal storage can also facilitate controlled operation of heat generation assets to reflect electricity market prices and could play a role in electricity system balancing. Storage has historically utilised hot water, but innovation exploring phase change materials, for example, may increase the impact of thermal storage in future.

Retail or customer interface

The interface with the customer commonly takes place through the heat or hydraulic interface unit (HIU). Whilst some HIU's are manufactured in the UK, most are imported and there is an opportunity for more UK market participants.

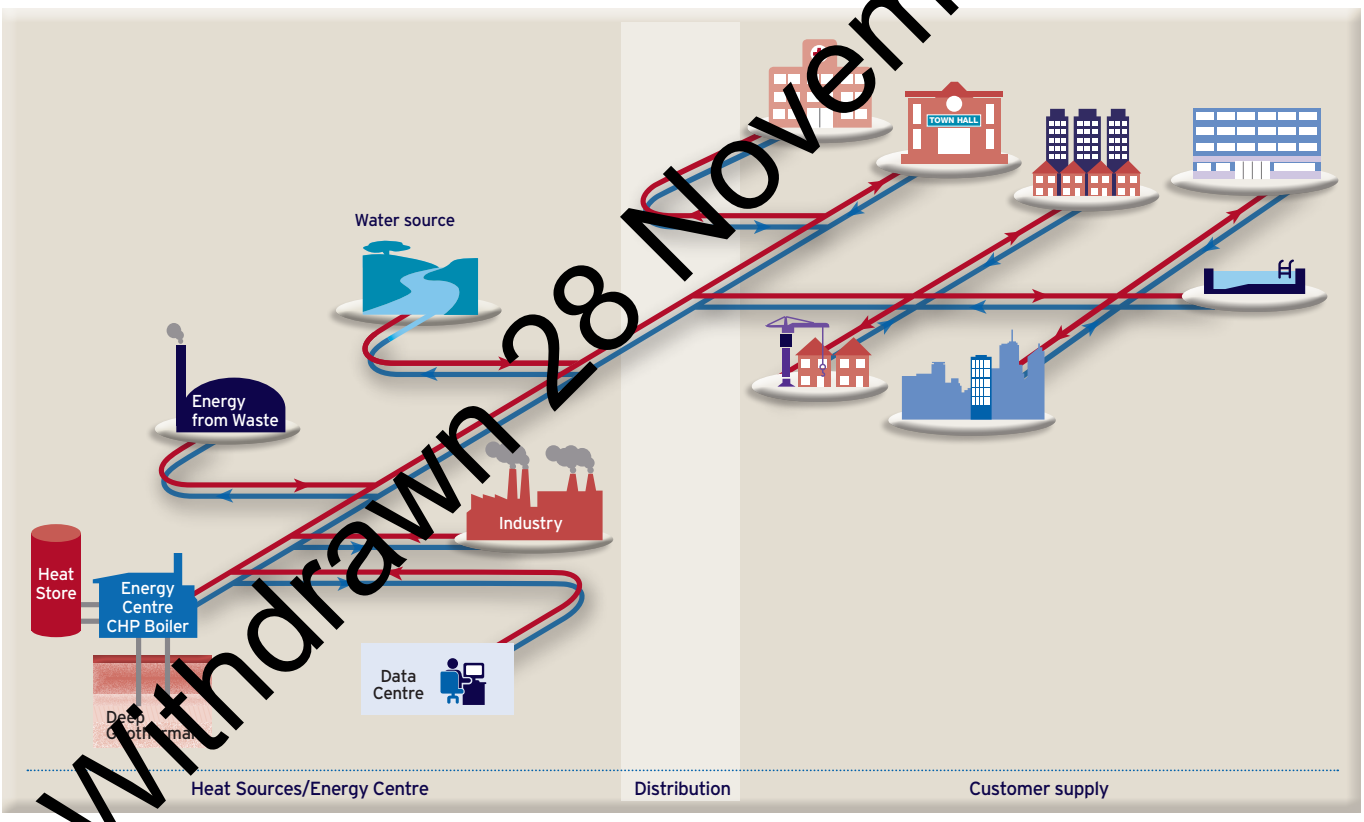
Various controls such as timers, thermostats and thermostatic radiator valves (TRV's) are the same as for standard central heating systems and there is a well-developed supply chain.

Heat metering and billing regulations have been introduced to implement the requirements of the European Energy Efficiency Directive in the UK. All new heat networks are required to install meters and controls so that customers can manage their heating. There are also requirements to provide customers with transparent billing information. Existing networks without meters must undertake a cost-benefit analysis to determine whether heat meters should be installed. In some instances, heat networks without heat meters may use heat cost allocators or a formula utilising a metric, such as floor space, as a way to assign variable heat charges. Heat meters are specific to heat networks and there are a variety of types including prepayment, remote and smart heat meters, but most are imported from Europe. Standards for metering accuracy are set through the Measuring Instruments Directive. Some meters are offered as part of a service package of metering and revenue collection by UK operators.

A small number of companies in the UK are providing specialist heat customer service. This can include contract management, customer services, metering and billing.

As well as the metrics that indicate project timings, the following Heat Infrastructure Investment Pipeline metrics will be published to provide a high level indication of the upcoming supply chain opportunities: Heat generation technologies, Combined system generation capacity, Thermal store size, Total length of heat network and Anticipated heat delivered annually.

Investment opportunity



Capital investment £1 billion £1 billion

£3.2 to 6.4 billion of operations and maintenance contracts across the 40 year lifetime of these low-carbon energy infrastructure assets

Investing in the UK

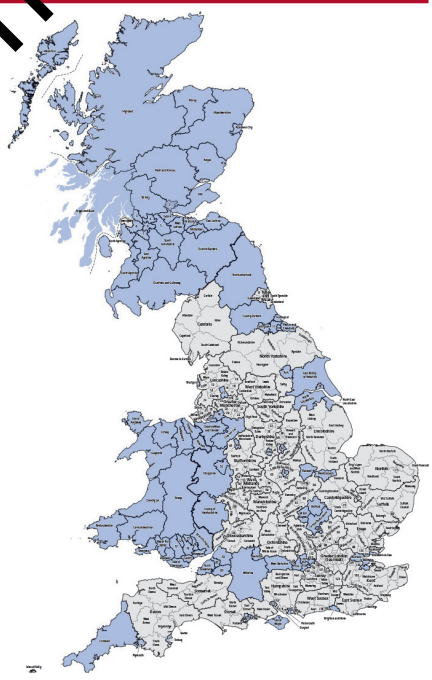
Key features of the UK

Local authorities (municipalities)

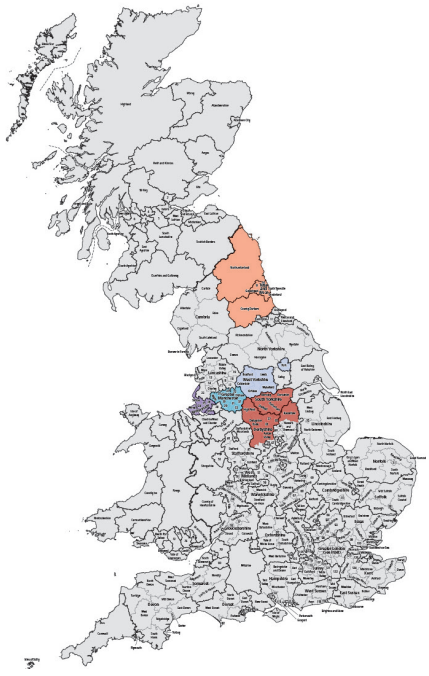
Heat networks in the UK are sponsored (initiated) by either Local Authorities/municipalities or private property developers. Local Authorities have a number of critical roles in heat networks including financing or operating heat networks; providing critical initial 'anchor-load' customers (for example council offices, education facilities, social housing) or land, but also as a coordinator, a honest broker between key stakeholders, and giving planning permissions and wayleave rights to site heat networks pipes in roads. As the owner of the Local Plan and decision-makers on planning permissions, Local Authorities are therefore instrumental in helping to shape heat networks, including those developed by the private sector and serving new build properties.

There are a variety of types of Local Authorities in the UK. Defined in the Local Government Act 2003 section 33, these include county councils, district councils, borough councils, city councils, London boroughs, metropolitan boroughs or unitary authorities and this list also now includes combined authorities. Unitary councils are single-tier, as are metropolitan borough councils. County councils sit above district/borough councils and the Greater London Authority sits above London borough councils as top-tier administrative bodies. In these two-tier scenarios responsibilities are split. Combined authorities are voluntary groupings of local authorities who negotiate to undertake certain functions jointly, some delegated from central Government. Five Combined Authorities have been set up so far in England; Greater Manchester Combined Authority being the first in 2011, followed by Sheffield, Leeds, Liverpool and the North-East in 2014.

County councils



Unitary authorities



Combined authorities

Where district and borough councils bring detailed knowledge of their geographic area, relationships with key stakeholders and strategic vision; unitary councils, top-tier and combined authorities are natural aggregators working across a larger area and could coordinate projects across council boundaries. Local Authorities and Combined Authorities have increasingly been developing their role in local delivery of energy, setting up energy companies and seeking more local decision making.

Local Authorities work closely with consultants through the development stages of heat networks and require the input of their technical, financial and contractual expertise. They look to consultants to work with them to assess the different commercial structures through which the project could be delivered and have open conversations (through best practice lean procurement 'pre-market engagement days') with the investor and supply chain market to identify which commercial structures could best support the desired benefit realisation. Once this has been carried out, the Local Authority will be in a good position to understand the role of private finance and appropriate procurement routes. Where the Local Authority intends to own the heat network, during commercialisation the Local Authority will run a competitive tendering exercise and so the interaction with investors and supply chain is likely to be through a formal bidding process.

Public procurement

Public procurement opportunities will be advertised by Local Authorities in the Official Journal of the European Union (OJEU)[16] and must be State Aid compliant. Guidance on public procurement is available on the Government website[17] and specific information regarding procuring heat networks in Scotland is available from the Heat Network Partnership for Scotland website[18]. HM Treasury guidance for public sector bodies on how to appraise proposals before committing funds to a policy, programme or project is set out in the 'Green Book'[19]. From April 2016, depending on eligibility, heat networks could be procured under Public Contracts Regulations 2015[20], Utilities Contracts Regulations 2016[21] or Concession Contracts Regulations 2016[22].

Other characteristics of the UK market

As well as a national electricity network, the UK also has a national gas network. The counterfactual against which the viability of a heat network is assessed is predominantly individual gas boilers or electric heating. This provides a number of opportunities for heat networks:

- Use gas resources as efficiently as possible through a heat network
- Use heat sources that would otherwise be wasted as unsuitable for building scale
- Improve energy security through diversification of sources
- Delay or avoid gas or electricity grid reinforcement
- Approximately 18% of homes are not connected to the national gas grid. For these 4 million properties heating can be expensive as fuel has to be delivered by road or new connection to the gas grid is costly.

[16] Official Journal of the European Union (OJEU) http://www.ojeu.eu/

[17] Tendering for public sector contracts https://www.gov.uk/tendering-for-public-sector-contracts/overview

[18] Heat Network Partnership for Scotland procurement guidance http://www.districtheatingscotland.com/content/procurement

[19] HM Treasury Green Book https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent and https://www.gov.uk/government/collections/the-green-book-supplementary-guidance

[20] Public Contracts Regulations 2015 http://www.legislation.gov.uk/uksi/2015/102/pdfs/uksi_20150102_en.pdf

[21] Utilities Contracts Regulations 2016 https://www.gov.uk/government/consultations/transposing-the-eu-procurement-directives-utilities-contracts-regulations

[22] Concession Contracts Regulations 2016 https://www.gov.uk/government/consultations/transposing-the-eu-procurement-directives-concessions-contracts-regulations

- The UK has a high proportion of old housing stock over 50 years old which is not built to modern insulation standards. Some of these period properties are hard to insulate due to practicalities, cost or conservation orders. Heat networks may be the most effective way of decarbonising and reducing bills for these properties.
- Most existing properties have a wet radiator heating system which could be retrofit for supply by a heat network. Over 1.6 million individual boilers are replaced in the UK every year and this could be an appropriate trigger to join a heat network.
- The UK is more densely populated than many European countries, with many urban areas able to support economically viable heat networks. Urbanisation is predicted to continue and this densification will bring forward additional heat network opportunities.

Common heat network commercial structures and funding sources

To date, heat networks in the UK have commonly utilised one of the following ownership models:

1. **Local Authority ownership** – the Local Authority finances and owns the heat network. The network could be undertaken in-house by the Local Authority or through a public sector wholly owned company established to manage the network (e.g. Arms-Length Management Organisation, Special Purpose Vehicle, Limited Liability Partnership). A number of local Authorities are currently exploring development of municipal energy companies to deliver a range of local services including heat networks. The Local Authority may utilise grant funding or raise money through prudential borrowing; from public sources such as the Public Works Loan Board or corporate loans from private sources. A heat network operator would typically be procured to operate the network under contract. Heat networks can also be developed by other parts of the public sector, such as hospitals and universities.
2. **Private ownership** – may arise from a heat network originated by a Local Authority or by a private property developer.
    a. Where a property developer seeks to meet carbon reduction planning requirements (which could be informed by Local Authority mapping and masterplanning work) in new build properties through a heat network. The property developer may own the heat network but lease, possibly through a concession, the network long term to a specialist heat network operator, or award various specialist subcontracts for design, build, operation and maintenance of the heat network. A 'developer contribution' may be made, this is a payment from the heat network developer to the property developer.
    b. A Local Authority may identify a technically feasible and economically viable heat network opportunity, but may not have the available finance or the risk appetite to develop the heat network themselves, in these circumstances the heat network opportunity could be developed by a private sector heat network operator.

The capital for privately owned heat networks may derive from various private sector sources including the developer's own corporate budget through to money raised through corporate loans or the bond market.

3. **Public/Private** –
    a. A public (Local Authority) and private sector joint venture where both parties hold an equity stake. This would require the establishment of a 'Special Purpose Vehicle' (SPV). The funding sources listed above could be utilised to secure each party's equity stake, but the Local Authority could secure

an equity stake on a non-cash basis through contribution of land for the plant room, guaranteed anchor-load customer, value of concession agreements or wayleaves.

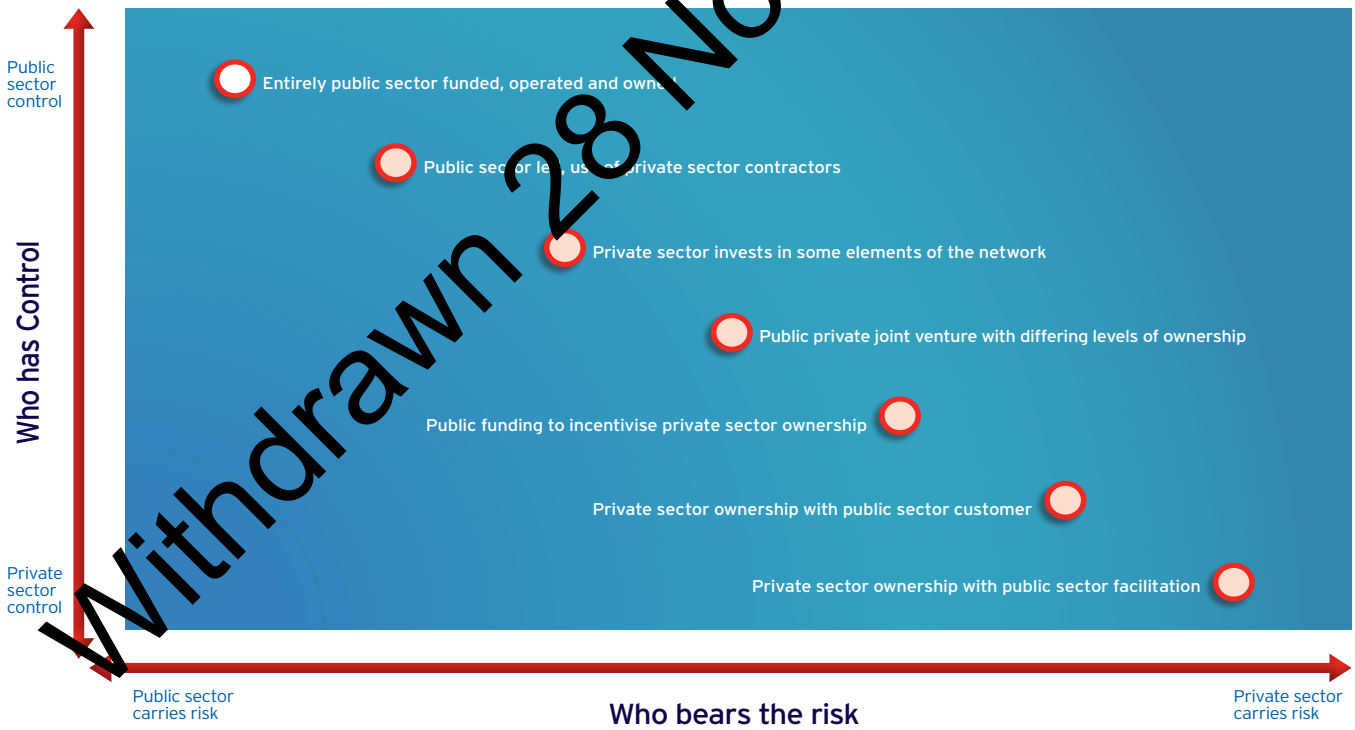
b. A profit-share agreement that recognises the non-cash contribution the Local Authority has made to the project.

The graph below maps the differing levels of control and risk balanced between the public and private sector for a variety of heat network commercial structures.

Detailed descriptions of the range of commercial structures represented in the diagram below are set out in the Scottish Futures Trust's document, 'Guidance on Delivery Structures for Heat Networks'[23].

There are a wide range of contractual arrangements that arise from the common funding/ownership models combining elements of finance, design, build, operation and maintenance, customer service and billing.

Commercial structure options for heat networks



[23] Scottish Futures Trust: Guidance on Delivery Structures for Heat Networks http://www.districtheatingscotland.com/content/procurement

Characteristics of commercially viable heat networks

In common with most infrastructure investment opportunities, heat networks demonstrate the following characteristics:

- **Stable and predictable cash flows:** Due to inelastic steady demand for the product, infrastructure delivers stable and predictable cash flow streams.
- **Long-term predictable income streams:** Long asset life of 40+ years and a natural monopoly lead to long-term predictable income streams. Operating costs are low compared to the initial capital investment.

Heat networks also have:

- **Expansion potential:** Potential for value enhancement through active management of the assets.

Economically viable and commercially investable heat networks will exhibit some of the following characteristics:

Characteristics	Key factors/consideration for supply chain and investors
Size and returns	• Typical heat network **capex ranges between £4 and £40 million** in the UK, but initial phases are frequently at the lower end of this range as key anchor-load customers must be secured for initial build-out. • A strategic approach to heat networks is common with **phased build out** planned over a number of years as additional customers are contracted. • **Long-term stable returns** are achieved with anchor-load contracts (which minimise demand risk).
Heat demand	• Heat networks can accommodate a variety of customers; however, individual domestic connections are less common. A **larger, diverse, customer base** will provide a more stable and robust income base. • **Demand is usually aggregated** via, for example, larger heat users such as local authorities, social landlords and hospitals or private property managers of multi-tenanted buildings. • '**Anchor-loads**', the initial aggregated customers contracted to deliver sufficient revenue for phase one build out, are commonly secured from the public sector or through carbon reduction requirements of planning permissions. • **Integrated into long-term Local Authority infrastructure planning, demand is expected to grow over time**, enabling the system to expand to take on additional heat loads and other cost-effective sources of heat over time, including in the private sector. Potential for upside by active business development and expansion.

Income and contracts	• **Long-term contracts** are established with anchor-load customers, commonly over 20 years in duration, aligned with the long lifetimes of the infrastructure. • Customer heat tariffs are commonly comprised of a fixed 'standing charge' and a variable charge. The **standing charge will be structured to cover the capex of the heat network** and variable charges will cover the opex and profit. • Customer heat tariffs are commonly **index linked** to protect operating margins. • Contractual structures vary and heat network operators may bill end users directly or may sell bulk heat to an **intermediary**, such as a Local Authority, property manager or supply company, who takes **credit risk** and on-bills end users standing behind this revenue steam with their credit. • **Electricity sales** are also a common feature of heat networks, employing combined heat and power. Electricity could be used by a Local Authority heat network operator to reduce bills, could be sold by the heat network operator to local customers (private wire) or exported to the electricity grid. Additional electricity system balancing income, such as the Short Term Operating Reserve (STOR), may also be accessible. • The **Heat Trust**[24] has been established by industry to provide a common standard in the quality and level of protection for domestic end user customers on heat networks.
Technology	• Heat networks are **proven energy infrastructure systems** with over 2,000 networks operating in the UK and many more across Europe. • Like the national gas and electricity grid, the heat network **pipe infrastructure is technology-agnostic** and can accommodate multiple heat sources. This allows the heat network to take heat from the most suitable/cost-effective local sources. • **Flexibility to change heat sources**, which should further decarbonise the heat networks over time is important given that the pipe infrastructure has a lifetime of over 40 years, longer than most heat sources, which are typically 15 to 30 years. Over the pipe infrastructure's long lifetime, a range of heat source technologies are likely to mature and become cost effective. In future, an increasing amount of water-source and recovered-heat sources could be commonplace on heat networks. Whilst these are not yet widely exploited in the UK, there is significant availability of canals, rivers, lakes, minewater, sewage systems, data centres, chillers, and industry that can be utilised with or without a heat pump. • **Technology innovations** can also provide significant opportunity for cost reductions in networks, such as low temperature networks which have the advantage of lower maintenance costs and the ability to incorporate lower temperature sources of recovered heat. • Boilers, Combined Heat and Power (CHP) and heat pumps all have a proven track record in the UK, with appropriate manufacturers' performance **warrantees**.

[24] Heat Trust http://www.heattrust.org/index.php

Design, construction and operating contracts	• In common with all infrastructure projects, maintaining **design integrity** against construction costs and deadlines can be addressed through careful selection and management of primary contractor and subcontracts. • **Appropriate operations and maintenance regimes** can reduce risk profiles and maintain returns. Operational costs should be minimised with appropriate planned maintenance, monitoring, leak detection and control systems. • **Contract terms**, taking elements from JCT (building) and NEC (civils) contracts are utilised for design, build and operation of heat networks, providing effective risk management. • The CIBSE ADE Code of Practice[25] sets out **minimum technical standards** required through design, construction, commissioning and operation to deliver an efficient heat network. • Two key principles combine to deliver **optimum return on investment**: a varied customer base, for example residential and non-residential that spread heat demand through the day and through the year combined with a modular approach to heat sources on the network i.e. baseload running all year + shoulder from autumn to spring + peakload during winter, will allow maximise utilisation rates.
Procurement	• Most projects where there is a significant Local Authority role will be **publically procured**. The scope of any public or private procurement will vary, depending on the funding/ ownership model selected. • **Public procurement** opportunities will be advertised in the Official Journal of the European Union (OJEU), although a procurement framework is in development (DEPA) to encourage standardisation of approaches to the market. • The **Heat Infrastructure Investment Pipeline** database of opportunities will provide clear signposting for investors and supply chain, but the standard set of metrics and definitions will enhance the quality of development stage studies.

[25] Chartered Institution of Building Services Engineers (CIBSE) and Association for Decentralised Energy (ADE) Heat Networks: Code of Practice for the UK http://www.cibse.org/knowledge/cibse-other-publications/cp1-heat-networks-code-of-practice-for-the-uk-new

Improving the climate for investment

Drivers

Heat networks are recognised nationally and internationally as a cost effective way of decarbonising heat in denser urban areas.

At **global level**, United Nations Environment Programme (UNEP) research has concluded that district energy systems have emerged as a best practice approach for providing a local, affordable and low-carbon energy supply, representing a significant opportunity for cities to move towards climate-resilient, resource-efficient and low-carbon pathways[26].

The potential for heat networks is recognised in a number of important **European Directives** that flow into national legislation and policy making. For example, the 2012 Energy Efficiency Directive[27] directs Member States to develop policies up to 2030 to deliver the socially cost effective potential for District Heating and Cooling. In the shorter term, heat networks provide a cost effective means to meeting the minimum energy performance standards set out in national Building Regulations, on a path towards the EU Near Zero Energy Buildings (nZEB) requirement from 2021[28].

In the **UK**, the statutory carbon targets set out under the 2008 Climate Change Act effectively requires some 21% to 45% of heat supply to buildings needs to be low-carbon by 2030, with heat supply almost totally decarbonised by 2050[29]. A range of economic models have concluded that there is cost effective potential for heat networks to supply between 14% and 43% of total UK building heat by 2050, particularly in denser urban areas[30]. Heat networks currently supply 2% of building heat demand (some 9TWh per year)[31] so a compound growth rate of around 8% per annum would be needed to achieve even the lowest end of the cost effective carbon reduction pathways. This would help provide the economies of scale that have benefitted the sector in continental Europe, where the capital cost of heat network equipment is some 20% lower than in the UK[32].

At a **local level**, the drivers to build local heat infrastructure are as varied as the heat networks themselves, but can broadly be categorised as: energy bill reduction, local economic regeneration or a means to meet carbon reduction requirements in new build developments. These drivers are likely to continue to be critical as Local Authorities (municipalities) seek to use their resources as effectively as possible in order to be able to deliver a broad range of frontline services to their residents.

As a result, a number of industry-led initiatives supported by Government are in place to reduce costs of deployment, increase efficiency of systems and to improve consumer protections and therefore attractiveness of the sector to new customers.

[26] District Energy in Cities: Unlocking the Potential of Energy Efficiency and Renewable Energy (2015) http://www.unep.org/energy/districtenergyincities

[27] National Comprehensive Assessment: Article 14 of the 2012 Energy Efficiency Directive obligates member states to undertake a cost benefit analysis to identify the socially cost effective potential for CHP and District Heating & Cooling and to develop policies up to 2030 to deliver this potential, including by encouraging the use of recovered waste heat or renewable heat and connection of heat sources and heat demands to District Heat networks http://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive

[28] 2010 EU Energy Performance of Buildings Directive requires all new buildings to be Near Zero Energy Buildings (nZEB) from 2021 and all existing buildings undergoing major renovation are to meet minimum 'cost optimal' energy performance requirements, where feasible. http://www.epbd-ca.eu/themes/nearly-zero-energy

[29] 2011 UK Carbon Plan https://www.gov.uk/government/publications/the-carbon-plan-reducing-greenhouse-gas-emissions--2

[30] March 2013 Heat Strategy The Future of Heating: Meeting the Challenge https://www.gov.uk/government/publications/the-future-of-heating-meeting-the-challenge

[31] March 2013 Heat Strategy The Future of Heating: Meeting the Challenge https://www.gov.uk/government/publications/the-future-of-heating-meeting-the-challenge

[32] The potential and costs of district heating networks Poyry/Faber Maunsell report (2009) identified that the capital cost of heat networks in the UK are 20% higher than in mainland Europe http://www.poyry.co.uk/news/potential-and-costs-district-heating-networks-report-decc-poyry-energy-consulting-and-faber-maunsell-aecom

Promoting high technical standards

The Heat Network **Code of Practice**[33] is an industry-led initiative that comprises a set of technical standards developed for use by project sponsors, specifiers and engineers through heat network design, construction, commissioning and operation. The Code of Practice aims to ensure high quality heat networks installations that:

- Deliver energy efficiency and environmental benefits;
- Provide a good level of customer service; and
- Promote long-lasting heat networks in which customers and investors can have confidence.

The Code was launched in July 2015 and is supported by a training and registration programme for those delivering projects under the Code.

Improving consumer protections

Heat Trust[34] is a voluntary scheme that is being set up to establish a common standard in the quality and level of protection for customers on heat networks. It sets out, amongst other things, heat supplier obligations and performance standards, support for vulnerable customers and introduces an independent dispute resolution service. Heat Trust has been developed with industry, consumer groups, national and devolved administrations. The scheme will launch in late 2015.

District Energy Procurement Agency

A membership based procurement framework for Local Authorities is currently in development. The District Energy Procurement Agency (DEPA) will benefit suppliers and manufacturers of district energy goods and services by acting as a competent negotiating partner, standardising procedures and thus reducing their transaction costs. For companies wishing to join the UK market, it will provide a single point of entry.

Promoting innovation to lower deployment costs

Small Business Research Initiative (SBRI) Heat Networks Demonstrator: A £7 million heat network innovation and demonstration programme is being managed by DECC to stimulate innovation that will bring down heat networks costs and improve performance[35].

There is a broad range of innovative projects being supported. Some are focussed on improving network efficiency by developing smart heating controls to manage domestic demand on the heat network, to reduce peak load or diagnose network performance issues. Smart technology is also being used to develop a heat network monitoring and billing application to make the full extent of metering data openly available to operators.

[33] Chartered Institution of Building Services Engineers (CIBSE) and Association for Decentralised Energy (ADE) Heat Networks: Code of Practice for the UK http://www.cibse.org/knowledge/cibse-other-publications/cp1-heat-networks-code-of-practice-for-the-uk-new

[34] Heat Trust http://www.heattrust.org/index.php

[35] Cost reducing innovation - SBRI Heat Networks Demonstrator https://sbri.innovateuk.org/competition-display-page/-/asset_publisher/E809e7RZ5ZTz/content/heat-networks-demonstrator/1524978 and https://www.gov.uk/guidance/innovation-funding-for-low-carbon-technologies-opportunities-for-bidders

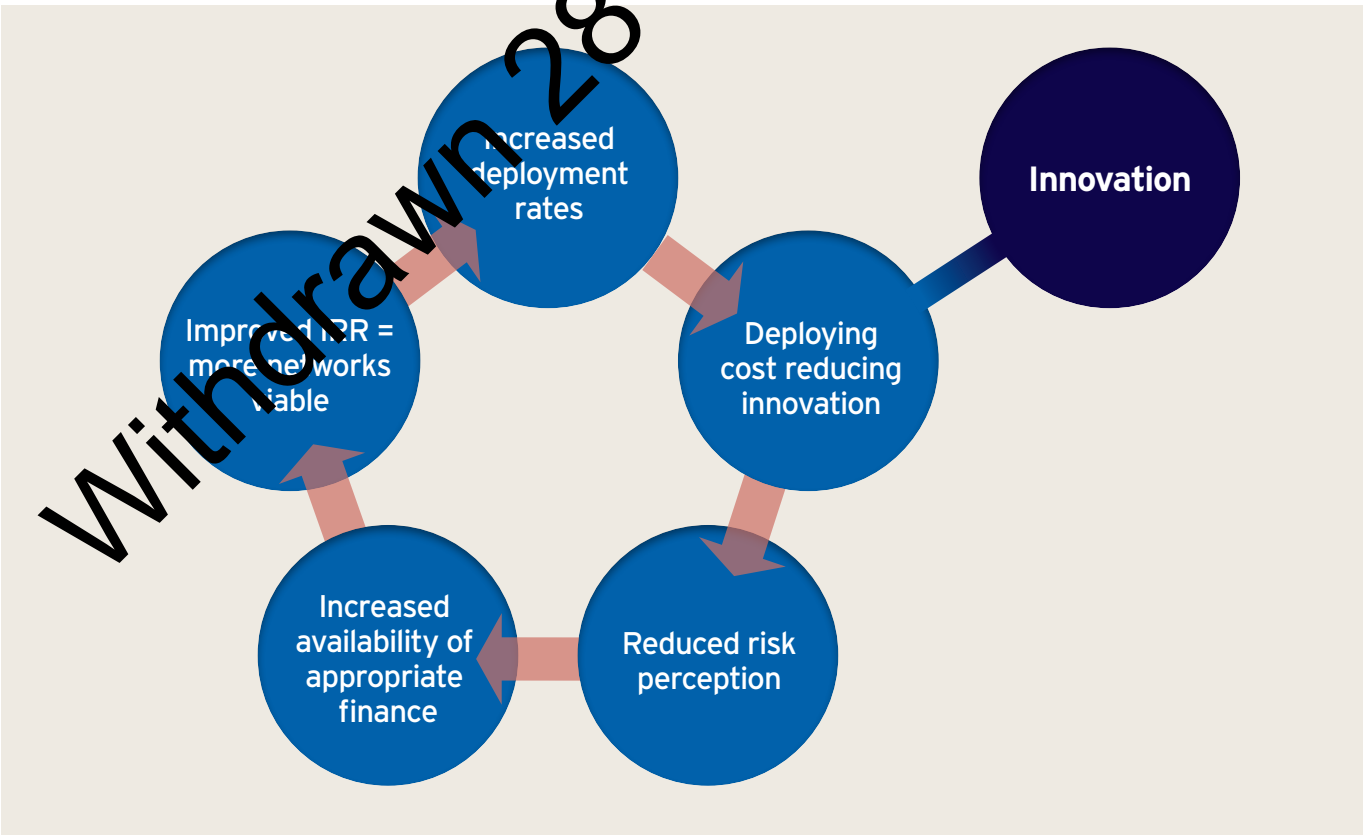
At the other end of the scale, another project aims to deliver deep geothermal heat projects in under 12 months. The demonstration project will be the first connected deep geothermal single well system in the UK and the first deep geothermal heat project for 25 years. Similarly, one project will see the first large-scale solar thermal heat pump being deployed on a heat network in the UK.

Smart Systems & Heat Programme (SS&H): This joint Government and industry-funded programme, run by the Energy Technology Institute (ETI), is developing the models and plans required for a significant system-level demonstration to decarbonise heating in three Local Authority areas, comprising some 3,000 to 10,000 properties[36].

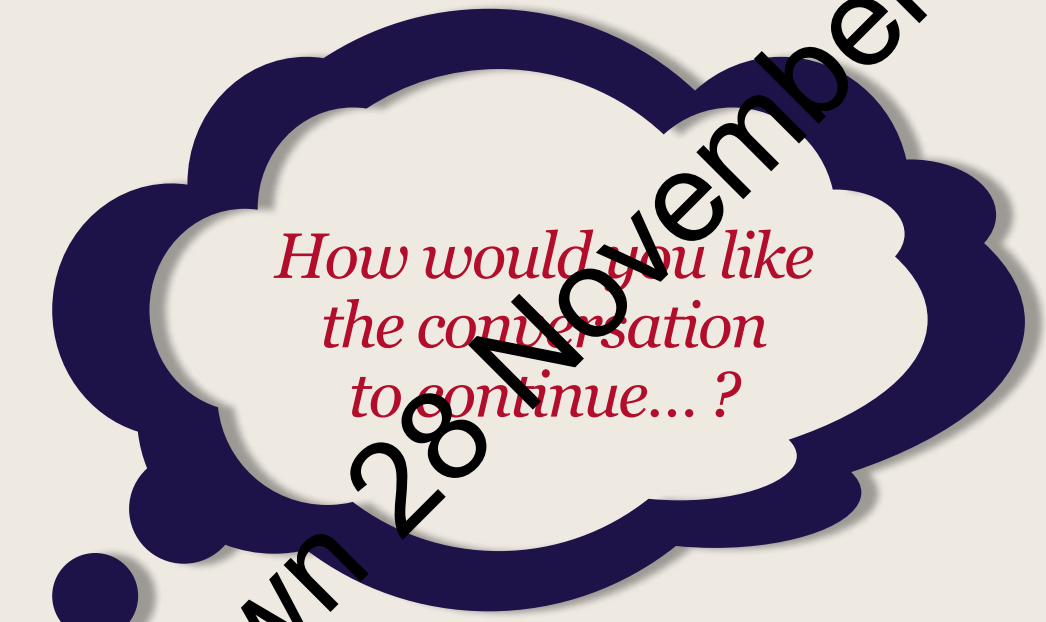
Impacts of increased heat infrastructure deployment

As this Heat Infrastructure Investment Pipeline grows and heat network deployment rates increase, there is an opportunity for current market participants to expand operations, but also for new market players to enter the UK heat network market; including through partnerships or joint ventures. This growth may bring about an evolution of the UK's heat network market over the next 10 years: – with economies of scale realised, cost reducing innovation deployed and new commercial structures, possibly centred around aggregation or unbundling of generation and distribution, emerging.

Feedback loop



[36] Energy Technologies Institute Smart Systems & Heat: Creating future-proof and economic local heating solutions for the UK http://www.eti.co.uk/programme/smart-systems/



Support for investors and supply chain

UK Trade & Investment (UKTI)

UKTI is the specialist Government department that supports foreign companies seeking to set up or expand in the UK. UKTI provides a fully integrated advisory service, delivering the latest business intelligence through a global network of commercial teams worldwide. UKTI works in close partnership with investment and economic development agencies in England, Scotland, Wales and Northern Ireland to help overseas companies to maximise their business objectives in the UK.

Enquiries for overseas companies looking to set up in the UK:

Email: enquiries@ukti-invest.com
Telephone: +44 (0)20 7333 5442

Association for Decentralised Energy (ADE)

The Association for Decentralised Energy (ADE) is the leading advocate of an integrated approach to delivering energy services from decentralised energy sources such as combined heat and power and district heating and cooling.

Association for Decentralised Energy, 6th Floor, 10 Dean Farrar Street, London, SW1H 0DX
Email: info@theade.co.uk
Telephone: +44 (0)20 3031 8740
www.theade.co.uk

The Heat Network Partnership for Scotland

The Heat Network Partnership is a collaboration of agencies in Scotland focused on the promotion and support of District Heating schemes in Scotland. This website offers experience, information and key contacts that will help boost the growth of district heating.

The Scottish project pipeline and investment report are available at: http://www.districtheatingscotland.com/content/investment-heat-networks-scotland

Procurement guidance:
http://www.districtheatingscotland.com/content/procurement

For further information, visit:
http://www.districtheatingscotland.com/form/contact-us-0

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UKTI develops bespoke programmes in support of each element of the inward investor value chain

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UKTI Services
Sirius Programme
Global Entrepreneurs Programme
Access to networks and the entrepreneur ecosystem
International trade (export) advice

UK Product offer
Seed Enterprise Investment Scheme
Enterprise Investment Scheme
R&D Tax Credit/Corporate Tax Relief
Catapult Centres

Medium and Large

UKTI Services
Relationship management
International trade (export) advice
Sector Trade & Investment Organisations
Access to industry networks and sector ecosystems

UK Product offer
Enterprise Investment Scheme
R&D Tax Credit/Corporate Tax Relief
Enterprise Zones
Catapult Centres
Innovation Gateway

Institutional Investors

UKTI Services
Relationship management
Regeneration Investment Organisation/online platform
Infrastructure and regeneration pitch books
Infrastructure and regeneration pipelines

UK Product offer
Regeneration Investment Plan
UK Infrastructure Guarantee
Enterprise Zones
National Infrastructure Plan
Innovation Gateway

UK Green Investment Bank (GIB)

The UK Green Investment Bank invests in specific areas of the low carbon economy with a specific mandate to support the creation of markets and to crowd in other forms of capital. This specifically includes heat networks. GIB's capital is highly flexible, being able to be deployed as debt, equity or mezzanine into projects with challenging structuring issues. Projects can be financed over a 30 year term and repayments sculpted to fit revenue projections. Financing available from GIB ranges from £1million to £100million. The GIB team includes, equity, debt, project finance and project development/technical specialists able to address any issue with respect to the commercial and financial structuring of a heat network project.

Enquiries should be addressed to:

Iain Watson, Director – Energy Efficiency
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Telephone: +44 (0)330 123 2136, +44 (0)7802 447 082

Alina Gheorghiu-Currie
E mail: alina.gheorghiu-currie@greeninvestmentbank.com
Telephone: +44 (0) 330 123 3042, +44 (0) 7557 089 756

Further information

Planning

England

- National Planning Policy Framework for England https://www.gov.uk/government/publications/national-planning-policy-framework--2
- Planning Practice Guidance for England http://planningguidance.planningportal.gov.uk

Scotland

- National Planning Framework for Scotland http://www.gov.scot/Topics/Built-Environment/planning/National-Planning-Framework
- Scottish Planning Policy http://www.gov.scot/Topics/Built-Environment/planning/Policy
- Planning and heat online guidance http://www.gov.scot/Topics/Built-Environment/planning/Policy/Subject-Policies/low-carbon-place/Heat-Electricity

Wales

- Planning Wales http://gov.wales/topics/planning/?lang=en

Combined heat and power Quality Assurance (CHPQA)

- Combined Heat & Power Quality Assurance Programme https://www.gov.uk/guidance/combined-heat-power-quality-assurance-programme

Renewable Heat Incentive

- Non-domestic Renewable Heat Incentive (RHI) DECC https://www.gov.uk/non-domestic-renewable-heat-incentive
- Non-Domestic Renewable Heat Incentive (RHI) Ofgem https://www.ofgem.gov.uk/environmental-programmes/non-domestic-renewable-heat-incentive-rhi

EU ETS – Large heat networks

- European Union Emissions Trading System (EU ETS) Union Registry https://www.gov.uk/guidance/eu-ets-carbon-markets
- Participating in the EU ETS https://www.gov.uk/guidance/participating-in-the-eu-ets

Energy Company Obligation (ECO)

- Energy Company Obligation (ECO) https://www.ofgem.gov.uk/environmental-programmes/energy-company-obligation-eco
- Energy Company Obligation (ECO2): Measures Table https://www.ofgem.gov.uk/publications-and-updates/energy-company-obligation-eco2-measures-table

District Heating Connections	Lifetime in years
Biomass boiler (Upgrade)	30
Gas/oil boiler (Upgrade)	25
CHP (Upgrade)	25
Energy from Waste (Upgrade)	25
Ground Source Heat Pump (Upgrade)	20
Air Source Heat Pump (Upgrade)	15
Heat network pipe infrastructure (New Connection All generator types)	40

Heat Network (Metering and Billing) Regulations 2014: guidance to compliance and enforcement of the legislation

- https://www.gov.uk/guidance/heat-networks

BSRIA UK District Energy 2013 market intelligence report

- https://www.bsria.co.uk/market-intelligence/market-reports/publication/uk-district-energy-2013/

Assessment of the costs, performance and characteristics of UK heat networks

- https://www.gov.uk/government/publications/assessment-of-the-costs-performance-and-characteristics-of-uk-heat-networks

CIBSE/ADE Heat Networks: Code of Practice for the UK

- http://www.cibse.org/Knowledge/CIBSE-other-publications/CP1-Heat-Networks-Code-of-Practice-for-the-UK

Heat Trust: independent heat customer protection scheme

- http://www.heattrust.org/index.php

Delivering UK Energy Investment: Networks 2014

- https://www.gov.uk/government/publications/delivering-uk-energy-investment-networks-2014

Heat maps

- England http://tools.decc.gov.uk/nationalheatmap/
- Water source heat map for England https://www.gov.uk/government/publications/water-source-heat-map
- Scotland www.gov.scot/heatmap

For more information, please contact the DECC Email:
hndu@decc.gsi.gov.uk
correspondence@decc.gsi.gov.uk

INVESTMENT IS GREAT BRITAIN

Department of Energy & Climate Change

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DECC

The Department of Energy & Climate Change (DECC) works to make sure the UK has secure, clean, affordable energy supplies and promote international action to mitigate climate change.

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