Levelling the playing field: Unlocking heat infrastructure investment

May 2016
An upshot of the 115m³ thermal store connected to Islington’s 700 home district heating network.

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Executive summary

We need low cost, low carbon heat

About 80% of a household’s energy costs are spent on heating and hot water. We need affordable, secure heating while meeting our carbon budgets. As heat accounts for a third of UK greenhouse gas emissions, the UK needs policies that will drive a step change in emissions reduction with a sharp focus on cost.

District heating networks

In areas of concentrated heat demand, such as cities, district heating is repeatedly demonstrated to be one of most cost effective ways to decarbonise heat supply and provide low cost heating to customers. A district heating scheme is a network of pipes that takes hot water from a local heat source to homes and businesses. District heating’s real value is linking local heat sources with local users. For example local power generation, industry, energy from waste, and data centres are all sources of local waste heat which can be captured. District heat networks can use heat from any source provided it is of the right temperature. As new technologies or heat sources arise they can feed into the district heating network and ensure that the network remains valuable for many decades. By capturing sources of wasted energy, district heating is central to enabling a more productive energy economy.

£300 million for the Heat Network Investment Project (HNIP)

The Government estimates that district heating has the potential to meet 20% of domestic heating and hot water needs by 2030. This level of market penetration requires a step change in investment. To ensure growth at the lowest possible cost to customers, a framework is needed to enable projects to attract infrastructure investors with a low cost of capital. The Government’s provision of £320 million for new heat network investment through to 2021 is a vital step to support a developing supply chain and demonstrate successful projects. However, following this subsidy, a long-term policy framework will be necessary to remove the need for further subsidy and to create a stable market for investment.

Toward a long-term policy and regulatory framework

In the years after 2021, industry will continue to require access to low cost capital, since cost of capital is the largest variable cost element in a network. An investment framework has the potential to reduce the investor risk that district heating undertakings face when attracting low cost capital, and to drive down the cost of heat supply. Such an investment framework has the potential to open up the market and lower the cost of heating for customers.

Major international and UK investors are interested in investing in UK district heating projects subject to long-term, stable returns. All other UK energy network infrastructure has a clear investment framework which has been successful at securing low cost capital investment. Working for over a year with the district heating industry, Local Authorities, developers and investors, we have investigated what is needed to create a level playing field for a new energy infrastructure network. This paper sets out the need for a district heating investment framework that will promote more equal investment consideration for all energy infrastructure and ensure the best solutions to customers in a given area.

The £21m BGreen Scheme is a partnership initiative to improve 1400 homes in Oldham and includes a new district heating energy centre. Image: British Gas
These key recommendations to Government will foster a step change in district heating investment while minimising the cost to the taxpayer and providing heat at the best value for customers. Three central recommendations include:

1. Treat district heating networks equally to electricity and gas in Business Rates: District heating networks do not have the same status as gas and electricity networks. Heat network customers are subject to business rates far higher than gas and power infrastructure. These costs increase heating bills by as much as 20%, up to £300 a home. These punitive costs can be particularly damaging when projects are aimed at cutting fuel poverty. This key issue is harming district heating customers and investment in networks, and could be simply addressed.

2. Provide a guarantee which reduces the future heat connection capacity risk for investors: Before a network is built, developers are often unable to secure sufficient contractual commitments to connect to the network. Potential heat users are interested but will not engage in a contact for something that is not yet operational. Investors need to be assured of future users to justify investing. The uncertainty over precise timing and scale of new heat users connecting to a network presents an unmanageable risk to infrastructure investors, which business plans must address the volume and revenue risks inherent to the project, which results in over 200 projects being explored. The Unit’s role should be continued and extended to support development all the way from securing planning agreement through to commercialisation and final investment. This recommendation is central to developing a pipeline of investor-ready projects. Investors will only invest resource in district heating if concrete investment opportunities exist. This recommendation is central to maintaining a project pipeline. These three policies will drive down the cost of capital for district heating, reduce the punitive tax burden on district heating customers and develop a mature and more competitive supply chain, further reducing cost. Vitaly, investors will be able to evaluate district heating alongside other infrastructure options when seeking to deliver low carbon heat at best value for customers and stimulate the level of investment needed to realise Government’s ambition. These recommendations work with the natural market direction. No explicit subsidy is being sought nor does the industry recommend making an uneconomic activity into an economic one.

3. Extend the role of the Heat Network Delivery Unit (HNDU) to support planning and delivery: Exploring the opportunity for district heating projects is a high risk activity due to its inevitable uncertainty. By part funding district heating feasibility studies, HNDU revealed a latent interest in projects from Local Authorities across England and Wales. A relatively small Government investment (about £10m) has resulted in over 200 projects being explored. The Unit’s role should be continued and extended to support development all the way from securing planning agreement through to commercialisation and final investment. This recommendation is central to developing a pipeline of investor-ready projects. Investors will only invest resource in district heating if concrete investment opportunities exist. This recommendation is central to maintaining a project pipeline.

Recommendations

Development
- Manage heat demand risk through a capital guarantee.
- Support the delivery of low-carbon and renewable heat through a low carbon heat incentive.
- Extend the role of HNDU.

Construction
- Provide district heating companies with the same wayleave and access rights as other utilities.
- Facilitate long-term, strategic planning by empowering local planning authorities to adopt more stringent planning conditions for new and refurbished buildings.

Operation
- Require new heat networks to meet standards equivalent to those found in Heat Trust, ensuring quality service standards for all heat customers.
- Set the Code of Practice as the minimum standard for new heat networks, ensuring joined-up delivery of assets across the building supply chain.
- Exempt district heating from Business Rates, or create a level playing field for all energy infrastructure.

These recommendations work with the natural market direction. No explicit subsidy is being sought nor does the industry recommend making an uneconomic activity into an economic one.
CHAPTER 1
Cutting cost and carbon in heat:
The role for district heating

The need for heat in homes, businesses, the public sector and industry is fundamental. Heat accounts for around 45% of our energy consumption and in 2012 £33 billion was spent on heat across the UK economy. Heating and hot water makes up to 80% of household energy costs. Heat in the UK is dominated by natural gas; over half is imported and this proportion is growing. Heat is responsible for around a third of the UK’s greenhouse gas emissions and in cities, more. For example in London, heat accounts for 50% of total emissions.

Meeting the carbon challenge

The Climate Change Act obliges the UK to cut most of its emissions from heat by 2050, requiring us to find low carbon solutions to our heating needs. As heat is such a large proportion of energy costs, this transformation of heating also needs to be done as cost effectively as possible.

One option for low carbon heat supply is to build a network of pipes that can carry heat from local sources to homes and businesses known as district heating. The heat can be supplied from any source, provided it is delivered at the right temperature. Common heat sources include waste heat from industrial processes, biomass, solar, energy from waste, waste heat from power generation (combined heat and power), or upgrading lower temperature secondary heat sources with large heat pumps. District heating can be easily plumbed in to existing household and business water-filled radiator heating systems allowing for easy integration and minimum disruption in the building.

Waste heat: the hidden energy source

The UK has a major opportunity to unlock the value of waste heat using district heating. Power stations, the industrial sector and cities like London together waste more heat than is used by every home in the UK. Less than 10% of waste heat from thermal power stations is currently captured, just a third of the cost-effective potential. Using waste heat sources creates a more productive energy system and a more competitive economy, by providing consumers with lower cost and lower carbon heat. If we captured our waste heat more effectively we could save up to £4.2 billion in energy bills. We would also cut 14.7 Mt of CO₂, which is the same as taking 1 in 5 cars off the road.

Cost-effective carbon abatement

Greater use of district heating can deliver low cost carbon savings. A district heating network covering 250,000 houses could save between 0.25 and 1.25 Mt CO₂ (depending on fuel source) a year compared to conventional heating systems.

District heating in Europe

The benefits of district heating (and cooling) are well-established and central to the energy systems in a number of countries around the world, including Germany and the Netherlands. In some Scandinavian and Baltic countries, district heating accounts for 40-60% of the national heat market. In cities with mature district heating systems such as Copenhagen, 98% of space and water heating demand is met through a heat network.

A ‘no regrets’ option

A key benefit of heat networks is their ability to take heat from a range of sources, and therefore enable new technologies and low carbon options to be adopted over time. In London, networks such as the Pimlico District Heating Undertaking have already moved from coal to oil boilers then on to gas combined heat and power. At each stage carbon and energy waste have been cut. Across Europe, renewable energy sources are increasingly used. In 1980 91% of Swedish district heating was supplied by fossil fuels, but by 2014 this had reduced to just 8% with biofuels meeting 42% of demand. In Denmark, solar thermal is expected to supply 10% of heat network demand by 2030, further reducing reliance on coal. In the UK, heat networks could help to extract up to 6 GW of renewable heat from our waterways. Heat infrastructure is key to delivering this heat to homes and businesses. Without networks, this potential will go untapped.

Securing electricity supplies

District heating can provide a number of electricity system benefits. Efficient combined heat and power can generate power at times of electricity system stress with waste heat being captured and stored at low cost for later supply. Heat pumps on networks can be switched off at times of power system stress to reduce demand, again using heat storage to meet heat needs. As we lose energy storage such as coal heaps at power stations, district heating can be used to build in energy storage and create a more resilient electricity system.

Energy productivity: lower cost, lower carbon

Enhancing the productivity of our energy system through increased deployment of district heating could reduce energy infrastructure investment costs by around 10%. We could also reduce the overall cost of heating and cooling for buildings by 15%. Academic research shows the most cost-effective way to decarbonise heat is a combination of improving building efficiency and developing sustainable supply. The right balance can cut consumer costs, carbon emissions and increase the productivity of the wider energy system.

Given the ongoing need for heating and hot water, long term heat infrastructure, in the right locations, is a future-proof investment which will help to enhance energy productivity whilst cutting dependence on imported fuels and emissions.

What is needed now is a policy framework to bring forward investment in a more productive energy system.
CHAPTER 2
Developing policy for district heating

The Government has clearly stated its aim for an energy policy that brings forward affordable energy while most cost-effectively meeting our aims for security and carbon abatement. All of this is set within the context of a more productive economy.

The £320 million Heat Networks Investment Project (HNIP)

Recognising the potential role that district heating can play in decarbonising the UK’s heat supply, the Government announced in its 2015 Spending Review that it would allocate £320 million in funding for new heat networks. Available through 2021, the Heat Networks Investment Project (HNIP) funding is a critical step to support a developing supply chain and demonstrate successful projects. Beyond 2021, a long-term policy framework will be needed to remove the need for subsidy and create a stable market for investment. This paper considers steps to be taken now to establish that stable market framework.

In developing policy recommendations for district heating we have divided the discussion into the three key stages of network delivery:

1. Project development
2. Network construction
3. Network operation.

In each stage we first identified areas where investment risk can be reduced. We then examined how best to reallocate the remaining risk with the aim of attracting infrastructure capital financiers to the district heating market.

A successful framework will create a similar risk profile for district heating investment as currently exists in the gas, electricity and water networks as these attract low cost finance.

Project development phase

The development phase includes feasibility studies, business model development, financial modelling and investment decision processes. If we are to see more investment in district heating, the project development risk needs to be proportional to the probability of a successful project. Support is required to overcome a critical gap between master planning and feasibility work and project financial close.

Construction phase

The construction phase includes the construction, commissioning and handover (where relevant) of the energy centre, external pipework, internal building pipework and heat transfer assets. To reduce the overall cost of heat network development, the administrative burden associated with securing rights to construct and maintain a network needs to be minimised. Current uncertainty on what access and construction rights are applicable and how they can be utilised increases project complexity, cost and risk, discouraging investors. This stage involves capital intensive infrastructure investment and can take several years.

Operational phase

The operational phase includes energy centre and network operation and maintenance, customer service and billing. It is key that customers are not disadvantaged by virtue of being connected to a heat network. Customers should receive the same or greater levels of service as those receiving heat from conventional sources. It is also important that networks operate efficiently so as to avoid customers and operating companies incurring additional costs. This is particularly important when building heat networks to support the vulnerable where energy cost control is a vital consideration.

This paper considers steps to be taken now to establish a long-term policy framework that will remove the need for subsidy and create a stable market for investment.
Chapter summary
The development stage of a district heating network is critical as it impacts the technical and economic viability of the entire project. The majority of information about the future of the project needs to be understood at this stage as this is when the final investment decisions are taken.

There are three areas of policy development proposed. Some of these take effect during the operation of the network but must be understood at the development stage so that they can be accounted for in the financial assessment of the business case:
1. Continue HNDU support for project development up to the point of investment decision. This low cost policy is needed while the market is in early development and is key to overcoming the critical gap between feasibility and project close.
2. Provide a guarantee that will reduce the future heat connection capacity risk for investors. This policy is aimed at simultaneously increasing investment and lowering the cost of capital for a project and subsequently reducing the cost of heat for customers. It seeks to level the playing field between energy networks to enable the best combination of solutions in a given location to be taken forward. This policy would create an enduring low-cost framework for district heating infrastructure investment.
3. Enable district heating assets to access a reformed Renewable Heat Incentive (RHI). Currently the RHI is aimed at individual solutions and focussed on renewable energy, rather than greenhouse gas emissions. A reformed RHI should be focussed on carbon emissions reduction and should enable district heating assets to compete with individual solutions in an equitable way to ensure best value to taxpayers and an optimal solution to energy customers.

Recommendations
• Extend the role of HNDU to provide support for heat networks through the development stage up to financial close.
• Reform the RHI to focus on the carbon content of heat displaced on a p/kWh of heat delivered and metered to the point of consumption.
• Manage heat demand risk by providing a guarantee that will lower the risk profile and capital costs of multi-phase projects.

Extension of HNDU
The ADE welcomed the creation of the Heat Networks Delivery Unit (HNDU) to help Local Authorities progress the initial development stages of a heat network project. HNDU’s role has to date been focused on the initial project development phases of heat mapping, energy master planning and feasibility studies supporting Local Authorities in the creation of an initial internal business case. Local Authorities have, however, identified further hurdles to the wider development of heat networks including capital funding but also resourcing of district heat specific expertise. The success of projects such as the Decentralised Energy Project Delivery Unit (DEPDU) in London highlight how establishing a strong framework of technical, financial and commercial assistance can help bring forward projects to market, whilst building local knowledge and expertise. To build on the success of HNDU, Local Authorities have voiced the need to continue and extend support through project development to a financial investment decision. Current HNDU support takes Local Authorities part way down the track to developing a genuinely investable proposition. Extension would enable Local Authorities to resource the full project development process which is vital for investors to have a valuable investment pipeline.

Fig 1: The necessary steps towards financial close for a district heating scheme.
Many Local Authorities are not sufficiently resourced to make investment decisions relating to complex energy projects and the decision making process can be longer than for commercial projects, thus increasing costs. The gap in Local Authority resourcing can include the following elements:

- **A business case considering how the technical options can be delivered:** For most Local Authorities, a common challenge is bridging the gap between detailed project development and finance. Most notably, Local Authorities have to balance the cost of technical options against available funding and financing opportunities. Tasks may include: gathering technical advice, investigating sources of funding for project development, applying for and securing funding (potentially Public Work Loans Board, including DCLG approval, or the European Investment Bank’s ELENA fund, which has stringent requirements), due diligence and securing local political support.

- **Legal advice:** Specific legal expertise on district heating is often missing in Local Authorities. Most notably, an understanding of the risks involved and how they can be managed is a key tenet for securing internal backing.

- **Detailed invitation to tender/contract negotiation:** Tasks may include: considering different commercial models and ownership structures; and, modelling to test the business plan in terms of project size as well as costs of, and time for, construction. Finalising contracts with potential partners and establishing provisions for system maintenance and management.

To carry out these and other development activities up to financial close, sufficient expertise and resourcing is vital. Funding through HNDU would reduce Local Authority risk in developing plans for district heating.

### Capital guarantee to bring forward investment

The central and overarching barrier to increased deployment of district heating is uncertainty surrounding the timing and nature of new connections to a district heating network as it is built out. Unless this barrier is addressed, district heating investment will remain small-scale and relatively high cost.

All other utility network investments in the UK are currently financed under a regulatory investment framework that guarantees long-term revenues to the investor. This ensures regulated networks can access low cost capital from institutional investors. To achieve a similar scale of investment, district heating undertakings need to have a similar risk profile to other energy networks (although not the same regulatory framework).

### Enabling connection

When considering the development of a heat network, potential heat users can be easily identified and some or all of these will be interested in connecting to the network. Of those who are interested, very few will be willing or able to sign a heat supply contract before network construction begins. This was recently demonstrated at Gateshead where a new network was unable to contract commercial connections until after the project started.

A catch-22 situation is created in which a heat user expresses a desire to connect once the supply is available and the developer cannot develop without firm commitments in advance. The absence of contracted long-term commitments from sufficient heat demand at the point of a final investment decision can have several outcomes. The project might be abandoned completely because the number of parties willing to contract is too few to make a viable project. Alternately, the project size may be reduced to those who are willing to contract, which increases the cost of heat supply as the capital costs are shared between fewer users. Another possibility is that a measure of risk concerning future connection is accepted by the developer and it proceeds. In such cases the greater risk translates into a higher cost of capital and a higher cost of heat supply.

### Driving down the cost to consumers

The result of uncertain heat demand increases the cost per user and/or the cost of capital for heat network projects as well as the cost of deployment. It prohibits many large-scale district heating projects which often have the most promising economics and best value heat. As a result consumer bills are higher than they otherwise could be. As infrastructure costs are a significant component of energy bills (up to a fifth for gas and electricity customers), the high level of upfront capital investment required for district heating projects causes the cost of capital to be a vital factor in the heat bill. In gas and electricity networks the investment risk is shared across millions of network customers. Limited existing heat network assets prevent a similar model from emerging in the district heating sector.
Creating scale to secure value

Large scale city-wide networks have the greatest potential to reduce heating bills by exploiting economies of scale. Large multi-phased projects are developed over the long term with oversized assets invested ahead of need, raising initial capital investment. Although cost effective, the result is that initial phases of development are rarely commercially viable.

As network plans become larger (creating opportunity for efficiencies and economies of scale), complexity and risk increase significantly, with partnerships across boroughs, landowners and developers. In line with other infrastructure investments, a policy framework is needed that reallocates risk away from the investor, unlocking lower cost capital to the benefit of consumers. A guarantee linked to the amount of heat demand to be connected and the capital cost of investment would provide the necessary certainty to attract lower cost capital. Executed correctly, a guarantee has the potential to stimulate investment to meet the £2bn district heating investment opportunity highlighted recently by DECC.

Crucially, this proposal does not seek a subsidy or capital investment from Government.

Designing a guarantee to attract low cost capital investment in district heating

The principle of a capital guarantee would be to ensure that the number of heat network connections (capacity) aligns with the strategic long-term business plan, so that scheme revenues would always cover the cost of capital. The guarantee would be designed to cover the cost of the capital investment, which accounts for the operation and expansion of the scheme to deliver additional income or profit. This would ensure that district heating operators had a strong driver to expand and develop new connections as well as minimising any cost of the guarantee.

Reforming the Renewable Heat Incentive

The Government’s main heat policy is the Renewable Heat Incentive (RHI). This supports the deployment of renewable heat technologies by providing a per kWh tariff for renewable heat generated.

The Government announced in the Comprehensive Spending Review that the RHI will continue to 2021, with funding rising from £430m to £1.15bn. The incentive will be reformed to deliver greater value for money and will be subject to annual budget caps providing a backstop on expenditure. DECC issued a consultation in Q1 2016, with reforms expected to take effect from April 2017.

The current RHI framework is not aimed at decarbonising heat at lowest cost and the ADE has proposed a refocus to achieve better results for the taxpayer, climate change and future decarbonisation.

A level playing field for heat incentives

The RHI’s focus on meeting the renewable target has caused it to miss lower-cost decarbonisation opportunities, such as waste heat recovery from industry, power stations or other local sources of heat such as data centres or the London Underground. In addition, the RHI aims to provide the same financial return for all technologies. As a result the RHI actively works against the market, aiming to make the most expensive technologies as cost-effective to the purchaser as the least expensive approaches.

Many of the opportunities for lower cost carbon abatement in heat require a heat network to link the source of waste heat to the point of heat demand. To date the RHI’s design has not enabled lower cost (per unit of heat generated) larger scale network options to come forward.

To ensure long-term success beyond 2021, the RHI should be redesigned as a low carbon heating incentive, targeting a specific cost per tonne of carbon abated. This allows individual and networked solutions to compete equally rather than current policy which actively works against networked deployment. The detail of how a low carbon heat incentive could work for district heating is set out in Appendix B.
CHAPTER 4
Reducing and reallocating risk | Construction

Chapter summary
As with other utilities, the construction of district heating networks requires access to land and rights to install pipes under highways. Regulated utilities have a combination of statutory powers, planning permissions, wayleave and easement rights to enable them to lay and maintain infrastructure.11 These rights reduce the overall cost of a project by reducing the bureaucracy and risk associated with securing these permissions. To ensure heat networks can compete fairly with other energy infrastructure, district heating companies should be provided with the same wayleave and access rights as other utilities.

Wayleave and access rights to install, repair and maintain
When running network assets across private land it is important to agree in advance the wayleave and/or access rights necessary to provide a clear legal position for access in the instance of installation, maintenance and repair. The current lack of clarity on the status of heat network infrastructure, compared to other utilities, creates confusion for planning officers and costs time and money for developers, pushing up project costs.

Unlike other energy utilities there is currently no authorised right of wayleave or easement for district heating infrastructure. While most wayleaves and easements are agreed voluntarily, a heat network developer is unable to apply for a compulsory right in the instance when access is refused. In addition, there is no automatic right to install or maintain infrastructure in the adopted highway.

The lack of access rights for heat infrastructure also causes subsequent issues for repair and maintenance. Gas transporters and electricity distributors have a statutory right to access property to carry out essential works. Because this statutory right does not exist for heat network operators, other formal arrangements for access need to be made. These arrangements can be costly and complex due to their bespoke nature and the number of different parties involved. An absence of access rights to their infrastructure exposes a network operator to the risk that they may face challenges in maintaining the asset. This is particularly critical in the case of a failure such as a leak.

Finally, energy utilities have statutory access rights to end user meters. District heating companies do not benefit from the same right and must instead ensure contractual obligations are imposed on property owners. This can cause potential issues when seeking to install a prepayment meter in the event of customer default. The result is an unmanageable credit risk exposure that raises investor concerns.

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Table 1: A comparison of the rights and powers afforded to gas, electricity and district heating infrastructure owners. These rights should be equalised across all energy utilities.
Planning and building control

With the passing of the Deregulation Act in March 2015 the ability of local planning authorities to set energy performance standards exceeding the requirements of Building Regulations for domestic properties under the Planning and Energy Act 2008 has become unclear. One amendment appears to limit local authority planning discretion over the construction, adaptation or carrying out of any work on dwellings in England. Since the government halted plans for a Zero Carbon Homes policy last year, future changes to UK building regulations remain uncertain. As a result, many planning authorities are now unclear as to what standards can be applied to new building developments regarding the deployment of district heating infrastructure. Since many Local Authorities have used the planning process to promote the installation of cost-effective, low-carbon heat networks, further reliance on local planning powers for this purpose will require clarity on the applicable standards.

Strengthening UK planning policy

New building developments are a significant driver of new district heating schemes in the UK, with many schemes directly resulting from planning requirements at the local level. Given the strong potential to expand district heating through local planning provisions, it is essential that local authorities have clear powers, supported by Government, to require that new developments consider district heating as a low-carbon heating solution, whether a new-build scheme or a connection to an existing neighbouring scheme.

• Spatial & Local Development Plans

Local Authorities should be supported in developing spatial and development plans that integrate the current and future needs of the area, for example assessing existing and future heat loads to determine the suitability of constructing new heat networks or extending or retrofitting existing ones. Similarly, waste heat is an important resource and development plans should encourage the recovery of waste heat via district heating networks. Such infrastructure could be linked to an extended HNDU that provides greater support and/or training for planning authorities.

• Scottish planning policy

Planning policy in Scotland currently includes multiple provisions to encourage district heating, including in Spatial and Development Plans. This valuable work should continue and be extended to other areas, including mandatory consideration of district heating and recovery of waste heat.

CHAPTER 5
Reducing and reallocating risk | Operation

Chapter summary

The key risk associated with the operation of district heating networks is loss of demand. The main reason for this is poor customer satisfaction – either in terms of reliability or cost. As the scale of deployment of district heating increases, it is essential that heat customers are adequately protected, receiving high levels of service and cost-effective energy. The industry is already leading in this area and has solutions for Government that can build trust in the sector.

In 2015 the industry, with the support of Government, launched two initiatives that seek to address issues across the supply chain from contractor, to supplier, to operator through to customer. Firstly, the joint ADE/CIBSE Heat Networks Code of Practice aims to improve decision-making, planning and prioritisation up to delivery to ensure good quality networks. Secondly, the industry has worked collaboratively to establish Heat Trust: a set of common standards and principles to ensure customers are treated fairly and in line with expectations for other utilities. The Heat Trust scheme, launched in November 2015, already protects thousands of households and continues to grow.

Both of these initiatives are vital to the future of the sector, ensuring high quality infrastructure and building consumer value and trust through better design, build and operation of networks, and driving down costs. The industry work on district heating standards and customer protection provide Government with a low-cost route to ensuring quality in new projects. The ADE would like to work with Government to ensure that policies to enable investment are accompanied by appropriate requirements to ensure that the industry standards are being applied.

Creating a level playing field for network taxation

To allow heat networks to compete effectively with gas and electricity infrastructure and offer customers a cost-effective alternative, taxation on infrastructure assets should be comparable. The current Business Rate structure results in a kilometre of heat network paying over four times as much Business Rates tax as a kilometre of gas pipework. This discriminatory tax regime disadvantages district heating network companies and undermines or even removes any potential customer bill savings from network efficiencies. Whilst heat network investment policy is under development, a complete exemption for district heating from Business Rates taxation would help to remove the disadvantages faced by those seeking to invest in infrastructure. However, at a minimum, a level playing field with other energy infrastructure is required for the sector’s long-term success.

Recommendations

• Require new heat networks to meet customer protection standards such as those found in Heat Trust.

• Continue to work with industry to develop the Code of Practice into an enforceable standard, with the aim of creating a minimum standard for the joined up delivery of assets across the building supply chain.

• Exempt district heating from Business Rates.
Industry initiatives

The district heating industry and other key stakeholders have worked together over the past two years to create tools to help ensure that increased uptake of district heating is accompanied by improved quality and customer value. The industry has developed two key programmes:

1. ADE-CIBSE Code of Practice for Heat Networks
2. Heat Trust

The ADE-CIBSE Code of Practice for Heat Networks aims to establish minimum quality standards for heat network-related products, covering all stages of project delivery, from pre-feasibility studies to design, construction, operation and maintenance. The standards will help those procuring schemes to choose the right products to ensure end-consumers receive reliable and efficient heat.

The Code of Practice should also help to reduce the costs of heat networks and associated products. The ADE is currently considering options for developing the Code into a set of enforceable standards applicable as a minimum for all new heat networks.

Heat Trust provides heat customers with a level of protection comparable to those who heat their homes with mains gas and electricity. Heat Trust sets service performance standards and provides an independent dispute resolution mechanism through the Energy Ombudsman. All new district heating schemes, including extensions, should be required to meet customer protection standards such as those found in Heat Trust. Pre-existing schemes should also be encouraged to join to improve customer protection standards.

Both of these tools show industry’s efforts to bring heat networks forward as a mainstream utility, providing increased certainty for both consumers and investors. Government can use these initiatives to embed design and performance standards within district heating for the benefit of customers.

It is important that all heat customers receive a good level of service and are not disadvantaged based on the network they are connected to. It is therefore important that Government works with industry to understand appropriate timescales for the widespread adoption of Heat Trust and Code of Practice standards.

Business Rates

District heating schemes are subject to business rate charges significantly higher than those applicable to gas and power infrastructure. These costs can penalise customers with business rates being over 20% of the heating bill.

District heating is a specialised area of rating, which disproportionately increases costs for networks that need to compete against largely written down electricity and gas network assets. Business Rates on heat networks have a direct impact on householders’ and businesses’ heating costs. We are aware of one scheme where a recent assessment has produced a valuation which equates to a potential annual fee of £172 per connected residential customer, a fifth of an average customer’s annual heating bill. Our analysis indicates that the rateable value of heat networks amounts to £10,387 per kilometre of pipeline, against a rateable value of gas transmission and distribution networks which amounts to £2,382 per kilometre of pipeline.

The price of heat charged to customers is determined using the operational and fixed costs incurred in producing the heat, including tax costs. Consumers should not bear additional costs by virtue of connection to a heat network. In order to remain competitive, district heating companies often have to absorb the excess costs of tax liability. This can affect the profitability of district heating companies making the UK market unattractive.

Fast-rising business rates costs for heat networks

The cost of Business Rates for heat networks rose significantly between 2005 and 2010. Based on the Valuation Office Agency (VOA) statistics, the overall amount of Business Rates paid by district heating undertakings in England has increased by more than 50% to £3.8m between the 2005 Rating List and the 2010 Rating List, while the overall number of undertakings remained even.

This tax increase is due to how heat networks are valued by VOA assessors, which is not the same method used for other energy network infrastructure, like gas and electricity. The premise for the valuation of district heating networks is the ‘contractor’s basis’ method.

The VOA has confirmed to the ADE that the significant increase in the overall rateable value for district heating between 2005 and 2010 “does not appear to be because of any change in, or approach to infrastructure, it seems to arise because of higher construction costs and to some extent land values, between the two valuation dates of 2003 and 2008.”

We are aware that the approach to valuing and rating district heating schemes by VOA officers varies markedly from scheme to scheme. A review of Business Rates should result in greater consistency in valuation approaches in the long term.

District heating schemes are subject to business rates from Business Rates or a level playing field created for all energy infrastructure. An exemption would align Business Rates policy with wider Government strategy to facilitate investments in heat networks, supporting low-carbon economy transitions such as those in London.

Exempting district heating from business rates would stimulate growth, acting as an interim measure whilst Government implements a full investment support policy (as described above). The impact of this proposed relief for heat networks would be between £3.8m and £4.2m per year.
APPENDIX A
Reforming the Renewable Heat Incentive

The RHI’s current focus has caused it to miss lower-cost decarbonisation opportunities, such as waste heat recovery from industry, power stations or other local sources of heat such as data centres and the London Underground. In addition, the RHI aims to provide the same financial return for all technologies. As a result the RHI actively works against the market, aiming to make the most expensive technologies as cost-effective to the purchaser as the least expensive approaches.

Least cost decarbonisation

The current RHI framework is not aimed at decarbonising heat at lowest cost.

The Government’s 2013 impact assessment for the domestic RHI estimated that it would cost £169 per tonne of CO₂ abated. This figure accounted for both expected grid decarbonisation and off grid domestic installation displacing higher carbon fuels. The reality is somewhat mixed. Nearly a quarter of all domestic RHI installations occur in on grid households, resulting in the cost of carbon abatement being up to £879 TC02.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Cost per tonne of CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>£202</td>
</tr>
<tr>
<td>Solar thermal</td>
<td>£296</td>
</tr>
<tr>
<td>Air source heat pumps</td>
<td>£590</td>
</tr>
<tr>
<td>Ground source heat pumps</td>
<td>£879</td>
</tr>
</tbody>
</table>

This cost could however be significantly reduced if solutions to capture waste heat were included in the incentive.

Table 2: The cost of carbon abated per pound of RHI payments for new installations in on grid homes. Values are based on payments made under the RHI scheme between July 2014 and December 2014.

Waste heat potential

Across the UK there are substantial waste heat recovery opportunities which, if captured, would enable the UK to decarbonise heat for much less. Industrial heat recovery could reduce CO₂ emissions by 1.6 million tonnes per year, and with an economic recovery potential of 8 TWh could provide positive net benefits of £20-£110/tonne of CO₂ abated. The potential within urban areas is even higher. In London alone 18% of heat demand could be cost-effectively met through the recovery of waste heat.

The £25 million biomass project will see hot water pumped through the district heating network to the University of St Andrews Campus (Copyright Vital Energi).

Fig 4: Current carbon intensity against levelised cost of utilising waste heat sources in London. The grey dotted line indicates the cost and carbon counterfactual of centralised large gas boilers. (Source: Buro Happold)

The current structure of the RHI actively prevents this potential being realised, incentivising technologies to exclude waste heat from their operation. For example, an air source heat pump is prohibited from accessing the RHI if it uses a waste heat source such as a chiller unit despite improved efficiency and carbon benefits.
Realisation of networked solutions – district heating

Many of the opportunities for lower cost carbon abatement in heat require a heat network to link the source of waste heat to the point of heat demand. To date the RHI’s design has not enabled lower cost (per unit of heat generated) larger scale network options to come forward.

The RHI should be redesigned to target a specific cost per tonne of carbon abated. This would allow individual and networked solutions to compete equally as opposed to current policy which actively works against networked deployment.

For a district heating scheme connecting 1,000 households, with a heat demand of 5,000 kWh per dwelling per year, carbon savings achieved over 40 years by using waste heat can be between 35 thousand tonnes of CO2eq and 17 thousand tonnes of CO2eq (when compared with heat from an individual gas boiler).

By increasing the potential revenue stream of district heating projects through a carbon based mechanism, Government can unlock new low-carbon energy network investment and move towards realising its heat strategy aims.

Cost per tonne of CO2 abated

A problem also exists in the current payment structure of the RHI which increases costs by providing the same financial return for all technologies. Instead of aiming to deliver an equivalent return for all technologies, the RHI should be targeted at approaches which provide least-cost carbon abatement, such as by setting a maximum tariff on a pound per tonne of CO2 basis.

By expanding the scheme to include low carbon waste heat, it would allow the Government to use existing budget to further decarbonise heat than under the existing policy framework. Such a shift would put the RHI in line with other areas of Government policy, including the Contract for Difference scheme, which focuses on delivering low-carbon generation at least cost, rather than seeking to set the precise return for investment.

Proposed payment structure for a district heating system

\[ T = \left( H_1 - H_2 \right) \times V \]

- \( T \) is the payment received, and is scheme specific depending on the carbon content of heat in that scheme vs. the counterfactual.
- \( H_1 \) is the carbon content of the heat supplied by the counterfactual (kgCO2/kWh). For the purpose of this paper, the counterfactual is a gas boiler but could be electric heating where appropriate.
- \( H_2 \) is the carbon content of the heat supplied by the scheme (kgCO2/kWh).
- \( V \) is the subsidy rate (£/tonne CO2).

Such a mechanism encourages the minimisation of heat losses from the network as payment is made only on heat delivered to end users, not heat generated. As the customer buys the heat, there would be no unintended incentive to waste heat to gain revenue (revenue accrues to the network operator not to the customer). Please note this requires metering both at the point of generation and the point of use by the customer.

Where an existing scheme expands, the RHI would be paid on the carbon content of heat delivered to new connections on a p/kWh heat delivered basis.

By increasing the potential revenue stream of a district heating projects through a carbon based mechanism, Government can unlock new low-carbon energy network investment and move towards realising its heat strategy aims.

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14. Heat Road Map Europe Pre-Study Fig 63
15. Heat Road Map Europe Pre-Study Fig 64
16. Heat Road Map Europe
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18. Higher cost of capital is passed through to consumers in the form of a higher fixed charge element of the heat bill to recover the finance cost.
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21. Wayleave is a right-of-way granted by a landowner, generally in exchange for payment and typically for purposes such as the erection of telegraph wires or laying of pipes; an easement is a right to cross or otherwise use someone else’s land for a specified purpose.
22. Deregulation Act 2015, Section 45, Amendment of Planning and Energy Act 2008, p. 36
23. Association for Decentralised Energy; we would be pleased to run through the calculation, please contact us for more information.
24. The overall nettle value of district heating undertakings in England is £3.3m in the 2010 Rating List, against £2.4m in the 2005 Rating List, which is a 58% increase. The number of nettleable properties remains even at 60. Source: VOA Statistics, 30th September 2014.
26. The significant year-on-year cost increases for land and construction in London trigger quickly rising business rates costs for district heating, which directly impacts heat networks’ cost-effectiveness.
28. Based on a carbon content of the heat output of 0.016 kgCO2/kWh for biomass and 0 kgCO2/kWh for solar PV.
29. Based on current electricity grid CO2 factor, see DEFRA carbon factor
30. Ibid
31. The calculations for this analysis are included in Annex 1 and 2.
32. Element Energy (for DECC), The potential for recovering and using surplus heat from industry, 2014.
33. IEA World Energy Outlook 2015
35. Energy from waste provides 90% of the heat distributed by the network and the remaining 10% is supplied by geothermal heat.
36. Gas fired CHP provides 80% of the heat distributed by the network and the remaining 40% is waste heat.
ABOUT 80% OF A HOUSEHOLD’S ENERGY COSTS ARE SPENT ON HEATING AND HOT WATER. WE NEED AFFORDABLE, SECURE HEATING WHILE MEETING OUR CARBON BUDGETS. AS HEAT ACCOUNTS FOR A THIRD OF UK GREENHOUSE GAS EMISSIONS, THE UK NEEDS POLICIES THAT WILL DRIVE A STEP CHANGE IN EMISSIONS REDUCTION WITH A SHARP FOCUS ON COST.

In Solihull, district heating provides instant heat and hot water to 1,100 homes across 23 tower blocks. Image: British Gas