

District Heating UK Local Authorities' Vanguard Network – response to DECC Heat Strategy Consultation 2012

PERSONAL DETAILS

Respondent Name: David Hawkey

Email Address: dave.hawkey@ed.ac.uk

Contact Address: Chisholm House
University of Edinburgh
High School Yards
Edinburgh
EH1 1LZ

Contact Telephone: 0131 650 2841

Are you responding as an individual or on behalf of an organisation? Organisation

Organisation Name: District Heating UK Local Authorities' Vanguard Network and RC-UK Energy Programme *Heat and the City* Research Project (Universities of Edinburgh and Strathclyde).

How were members' views assembled: Input from members of the network, both at our most recent workshop (27th April 2012) and email correspondence.

Would you like this response to remain confidential? No

Introduction

The District Heating Vanguard Local Authority Network is a network of local authority and housing association officers actively engaged in the development of district heating (DH). The *Heat and the City* Project is a 4-year research project, at the Universities of Edinburgh and Strathclyde, funded by the UK Research Councils' (RC-UK) Energy Programme. The research team work collaboratively with the network, as well as community and commercial practitioners and policy makers. The Vanguard Network represents 39 local authorities (LAs) and housing associations (HAs). It facilitates communication between members, shares good practice, addresses common problems, and holds biannual workshops which bring core members together with representatives of central and devolved government, industry, universities and third sector organisations.

The Vanguard Network is open to other UK local authorities and housing associations who are exploring opportunities for DH or have more advanced initiatives. For more information, please contact dave.hawkey@ed.ac.uk.

This consultation response draws on input from members of the network, both at our recent workshop (27th April 2012) and email correspondence. As the network's focus is on DH this response deals only with questions in chapter 3 of the consultation.

Q15: Do you agree with the barriers and opportunities set out in relation to heat networks?

The consultation identifies a range of barriers and opportunities which can be grouped into the following categories:

Opportunities

- *Buildings.* Electrically heated high-rise, high heat demand public and commercial buildings, new developments, and high-density areas adjacent to established heat networks or sources.
- *Technical components.* Daily and seasonal heat storage, excess industrial heat, cooling, a range of low carbon and renewable heat sources (box 12), and flexibility in future reconfiguration of heat supply
- *Benefits.* Low carbon, affordable heat, long term stability in income generation and consumer prices, energy security, local economic development and integration with waste management strategies.

Barriers

- *Technical components.* Advantages of gas CHP in early network development and uncertainty around future transition to lower carbon and renewable sources; disruption during construction; relatively high costs of trenchwork in the UK,
- *Business model challenges.* Large upfront capital investment, long payback periods, investment/revenue time lag, heat off-take risk, commercial and contractual complications, complexity, and significant planning required.
- *Subscriber challenges.* Lack of switching opportunity, long term contracts, unregulated market and poor reputation in the UK.

These barriers and opportunities are reflected in the experience of the Vanguard's network (though the consultation's assertion that DH has a poor reputation in the UK does not reflect either any systematic evidence we are aware of, or the experience of members of the network – DH appears to be a largely unknown technology in the UK rather than a poorly regarded one).

However, there are several important challenges which the consultation either does not identify, or mentions only briefly.

Local Authority Capacity

The consultation notes the strategically important role of local authorities in the development of district heating networks. The development of DH in Scandinavian countries was undertaken by local authorities (often acting through municipal energy companies), and the experience of UK cities where DH has been established reflect the same key strengths of local government in establishing networks. However important differences exist between UK local authorities and their Scandinavian counterparts. Under current centralised control by government, and centralised energy markets, local authorities lack the necessary capacity, expertise, financial resources and motivation to play the demanding roles attributed to them. Energy services are not core statutory activities and the *ultra vires* restrictions contrast with the more general freedom of local government in countries where DH is established. Development of DH competes with other local authority priorities, and pressures on budgets make a strategic approach uncommon. Hence where DH projects have been developed by members of the Vanguard's network, this has relied on extremely determined, very able, local champions willing to work far beyond their formal remit, and contracted working

hours, in order to tackle problems of regeneration, poor housing and climate change, through local energy services.

In many cases officers working on DH feel they are starting from scratch. Through forums such as the Vanguards network, officers regularly highlight the importance of learning from each others' experience, and cross-fertilisation of ideas. While authorities do not generally see themselves in competition with each other with regard to DH, knowledge and expertise developed and held within particular local authorities, remains fragmented.

Local authorities are however critical to development of the full potential for urban heat networks:

- They control large heat loads which can provide long term confidence over heat off-take;
- They can identify key opportunities through heat mapping and energy planning;
- They can use planning powers to ensure:
 - co-location of heat sources and demand
 - network connection
 - confidence in contractual basis for fair long term supply agreements between heat suppliers and subscribers
- They are critical intermediaries in multi-party negotiation to establish the viability of first stage infrastructure investment.

These features of local government are interrelated, because opportunities exist only where relationships can be brokered, and are important for establishing a strategic approach to heat network development.

The consultation mentions only very briefly the role of local authorities at a project level. This fails to recognise both the significance of the project management role and its resource demands. Vanguard local authorities have found that project development costs are typically around 10% of capital costs, with significant time, expertise and resources required. While some development funding for large programmes is available (in particular, ELENA technical assistance funding from the European Investment Bank), the application procedure for this funding is in itself a significant burden, requiring up to 18 months investment in officer resources. Many authorities are unwilling to risk failure to achieve the level of investment required as a condition of such funding, and lack the necessary project development and finance expertise to make an informed decision.

An important additional issue is identifying the optimum ownership and governance structure for district heating, in different places in the UK. These currently include: in-house local authority initiatives (such as the Bunhill project in Islington or Cables Wynd in Edinburgh), arms-length ESCos led by the public sector (such as Aberdeen Heat and Power), joint venture structures (such as Thameswey Energy Limited, a partnership between Woking Borough Council and Xergi), and partnership models led by the private sector (such as Cofely subsidiaries Birmingham District Energy Company and Southampton Geothermal Heating Company). A range of factors condition what kind of model may be suitable to local circumstances and opportunities, including:

- The associated risks and the appetite of the local authority to take them on;

- The projected cash flow, key metrics such as payback period and internal rate of return, and the fit between these and the investment criteria of the public and private sector investors;
- Consequences for local authority achievement of its long term goals, such as extending a network, based around high value public and commercial heat loads, to areas of fuel poverty where costs and business risks may be higher.

Coordination

1. Local Authority internal coordination

As DH development and implementation requires a range of legal, commercial and technical skills, and places demand on different local authority departments, internal coordination is crucial. Where different local authority specialisms have successfully coordinated DH, this has been underpinned by analysis of how it contributes to solving the combined problems of estate management, local economic development and regeneration, and poor housing. Where DH is framed narrowly, for example solely in terms of climate change mitigation, it is difficult to get cross-authority buy-in.

In a context of limited guidance and support, coordination around an unfamiliar technology, with (initially) a high degree of uncertainty and complex business case development, is highly challenging. Such coordination requires political and/or senior executive support. Establishing local political support is difficult given the necessary length of DH business models in relation to electoral cycles.

2. Coordination across local authorities

The consultation describes the development of DH as following a “city-by-city” approach. This should not obscure the potential for coordination across cities. In addition to the sharing of information and ideas, local authorities could pool staff and resources, and coordinate planning measures (to reduce risk that developers will move to nearby areas where planning requirements are less demanding). Some authorities are exploring the establishment of regional Green Deal funds or (in England) Low Carbon Funds to manage revenues from the Allowable Solutions framework. However, regional coordination is weak/lacking due to restructuring, and withdrawal of relevant institutions.

3. Coordination of local stakeholders

Heat networks are community-level systems: their viability depends on securing heat off take agreements with key anchor loads without which it would be very difficult to extend supply to other buildings. Local authorities rarely have sufficient heat demand to justify investment, and other heat loads are likely to be required to make a project viable. A central challenge is the identification of the value of DH connection to each subscriber, particularly as many UK organisations are unfamiliar with, and hence wary of, DH.

Success is likely to depend on:

- Building confidence in a technology and energy provider which may have limited or no local track record;
- Cooperation of potential subscribers are, for example, in sharing data for feasibility analyses;
- Timing issues for different stakeholders, such as boiler replacement schedules, existing energy contracts, and the phasing of new-build development;

- Building owners' relationships to the facilities: commercial property is frequently part of an investment portfolio, where investors have limited motivation to vary existing energy supply. Similarly, PFI investors avoid unfamiliar energy supply arrangements or require onerous due diligence evaluation for simple heat connections.
- Public sector interpretations of procurement rules for energy contracts. Procurement issues are not insurmountable (for example, public sector organisations can jointly procure an ESCo provider) but they create a coordination challenge which must be addressed early in the project development process when the benefits to each stakeholder may be difficult to quantify.

In some instances, incentive programmes may reduce the value of DH to key loads. For example, a project seeking to build a network anchored by new developments and feeding into existing buildings must compete with the developers' options for onsite solutions to energy-related building regulations, which are supported by government subsidy schemes (such as the RHI or FiT). A spatial approach to government support mechanisms, with scope for identification of zones in which subsidies are unavailable, would help project developers recruit important heat loads. This would also prevent the perverse outcome that building-based incentive programmes make community scale deployment of low carbon and renewable heat more difficult to achieve.

4. Coordination between levels of government.

While UK central and devolved government commitments to greater local autonomy increase the scope for local government to engage with district heating, central government has an important role to play. In the experience of some local authorities, a determination to cut red tape (particularly by reducing reporting requirements which thereby reduces inter-authority visibility) and to reduce directive guidance to local authorities has the effect of cutting them adrift, both from each other and from other levels of government. There is scope for central and devolved governments to work with experienced local authorities to develop shared resources, general guidance and methodologies (for example, on the evaluation of different DH options from technical, policy and business case perspectives) in order to reduce the degree to which different authorities "re-invent the wheel". As the consultation notes, DECC's Community Energy Online portal is a potentially valuable information resource in this respect (which has been considerably improved since its launch). The determination to "improve the evidence base" for the portal should be undertaken in conjunction with local authorities to ensure its use value.

5. Policy coordination

DH is affected by a range of policy mechanisms which have recently seen much uncertainty and change, reflecting an uncoordinated approach to DH (see *Finance* below). Yet coordination is important within and across local, regional, devolved and central governments. This is because district heating cuts across policy areas and mechanisms including regeneration and local economic strategies, fuel poverty, spatial planning, building standards, waste management, climate change mitigation and energy security. These are typically treated as distinct policy domains (by each level of government), reducing the visibility of DH as a means of addressing multiple issues, and preventing coordinated policy action. The economies of scale associated with network technologies mean, where appropriate, each of these policy areas can be addressed effectively through a common DH solution.

Business model

Scale

The consultation notes that large networks are usually developed incrementally from small networks, that larger networks bring additional efficiency, stability and market benefits, but that the highest barriers and greatest risks in building a heat network are at the outset. This has important consequences for the business case for district heating, because the net cash flows of “starter” networks (as judged by their internal rate of return) are much poorer than larger networks. In addition to the risk that opportunities for DH are not exploited, because of the initially high hurdles for low returns, **an emphasis on small networks could create an undue perception among policy makers and financiers that DH is not financially attractive** or even viable.

A second scale issue relates to sources of finance. The cash flow profile of heat networks implies a long payback period and a time lag between investment and revenue flows. It is consequently suited to investors with long time horizons, such as pension funds and sovereign wealth funds; in a context of limited liquidity these represent particularly deep pools of capital. However, **the minimum scale of investment these funders require is usually considerably greater than the scale of DH networks**, particularly the “starter” networks around which larger networks could grow. Similarly, commercial providers of DH services (utilities and ESCos) often require projects to be above a minimum size in order to trigger their investment financing.

A lack of experience among financiers also prohibits their engagement with district heating. Establishing a “deal-flow” of de-risked projects would educate and build confidence among financiers and thereby improve the availability of capital.

Finance

Establishing and understanding financial viability requires the identification of all relevant costs and benefits (these include avoided building-level heat equipment costs). Some benefits of DH, such as the health impacts of lifting households out of fuel poverty, or the easing of electricity distribution network stress and congestion, are difficult to capture in financial models because of limited information and because they are externalities.

Local authorities vary in the degree to which they hold in-house skills for project finance. The traditional revenue/capital budget split is not well suited to DH systems which often have higher upfront capital costs than alternative solutions, but lower discounted lifetime costs.

Local authorities can purchase consultancy services from the private sector to understand and analyse DH business cases. As DH initiatives are inherently dependent on the particularities of local circumstances, private sector supply of bespoke advice can be important in establishing locally appropriate and robust models. However, where aspects of technical and business model development are transferable across local authorities, there is scope, currently untapped, for a joint approach which would avoid different parts of the public sector repeatedly procuring the same services. A joint approach could also create resources to strengthen local authorities’ capacities to understand and shape the project finances. In particular, publicly available high quality software models of DH cash flows would enable public sector organisations to explore the implications of different business models for financial viability.

Projected revenues from the sale of heat are rarely bankable, due partly to price risks but predominantly volume risks (whether identified heat loads will eventually connect,

will stay connected, and will demand estimated quantities of heat are all uncertain). These issues are less problematic where a single public sector organisation controls the heat loads for a network, but this severely constrains the number of places where a heat network could be established. Where multiple organisations control heat loads, financiers either require high returns (which DH networks, particularly “starter” networks are rarely able to achieve) or some form of underwriting. While local authorities could in principle play this underwriting role, a national approach would have the advantages of pooled risk. Similarly, national- or state-level commitments that public sector buildings will connect would reduce volume risks.

Heat revenues may also be supported through price incentives. At present, however, the balance of key incentives (particularly the Renewables Obligation and Renewable Heat Incentive) skew business models towards electricity production. This further enforces the business model preference for electricity production, where the established electricity network mitigates volume risks arising from the need to recruit subscribers to the system. However, while electricity sales are usually crucial to the financial viability of DH initiatives, limits to electricity market access (difficulties dealing with DNOs, the impact of the Citiworks case on private wire models, the slow and uncertain development of License Light opportunities, and barriers to small new entrants engaging with wholesale markets) impose significant constraints on local authorities (but less so on some other actors, particularly the incumbent energy companies).

Uncertainty over UK policy instruments for low carbon energy and energy efficiency is undermining new DH initiatives. This includes:

- Recent changes to market-based incentives particularly limited RHI support for biomass and absence of CHP or DH uplift
- government inclusion of CHP in the carbon floor price
- the end of Levy Exemption Certificates,
- removal of the CHP uplift in the Renewable Obligation,
- changes to the CRC Energy Efficiency scheme,
- changes to and on-going uncertainty in the Allowable Solutions framework for English Zero Carbon Buildings policy,
- uncertainty over programmes to support local authorities in embedding DH in a broader local energy strategy such as the application of the multi-site FiT
- uncertainties in the Green Deal and Energy Company Obligation.

Long-term strategic network development

With the exception of its discussion of the long-term decarbonisation of DH systems, the consultation focuses on near-term opportunities and challenges, predominantly around the establishment of new networks. While these issues are crucially important to address, it is also important that a trajectory (or at the very least, scope) for expansion, in order to maximise the benefits of economies of scale, is built in to near-term projects, both technically and organisationally. The balance between commercial operation of a DH system and the pursuit of long-term strategic policy goals is important to consider at the outset of an initiative, particularly if the latter implies cross-subsidisation of low-financial-return parts of the network by high-financial-return parts. There is a risk that commercially attractive schemes, seen as “catalysts” for further development of DH in an area, will not, unless appropriately set up, be extended to less commercially attractive heat loads. Some commercial providers may ‘cherry pick’ attractive loads but resist extending networks, unless subsidised, to less profitable areas which may have strategic importance for the local authority for

regeneration or social (fuel poverty) reasons. Some members of the Vanguards network have ensured contracts with commercial providers allow future flexibility, but note the difficulty and complexity of achieving this, particularly in the absence of template contracts.

In cities where DH is already established, the potential for a business model based around the network, with purchase and sale of heat being undertaken by other parties, is becoming apparent to local authorities. Under such an “unbundled” model, the public sector could invest in (and retain long term control over) the infrastructure while making use of private sector finance, expertise and efficiency in heat generation and/or heat sales. The viability of the unbundled model for new initiatives is unclear, but it is not without international precedent; for example, in Bergen, Norway, the DH network was developed by a separate organisation from the waste heat source.

Q 16: Do you have evidence from existing projects to demonstrate the costs and benefits of heat networks in reducing emissions, alleviating fuel poverty or reducing fuel consumption?

DH networks contribute to the three goals identified in the question, but can also lead to cost savings for public and commercial organisations, localise energy revenue streams, reduce costs associated with cold-related poor health and (in social housing) void tenancies, and strengthen local energy resilience. New DH businesses could add diversity to an energy market dominated by six large companies, and create potential for stronger local democracy through a community share ownership scheme.

The costs and benefits of heat networks, and their long-term decarbonisation potential, are not scale-independent variables to be read-off from the existing small networks in the UK, where the benefits vary greatly between differently configured projects. In addition, larger networks generally create benefits at lower average cost than smaller networks. This is due to a range of factors including better load profile balancing (i.e. more consistent aggregate demand), more scope for heat storage (CHP generators can follow electricity demand without wasting heat), the scope for using a range of renewable, waste and low-carbon heat sources, and a greater degree of business model resilience. The scale, scope and network economies of larger networks should therefore be considered in analysis of responses to this consultation, particularly where costs and benefits associated with small networks are reported.

When judging the costs and benefits of heat networks, it is important that an appropriate counterfactual scenario (i.e. a plausible alternative means of achieving these goals) is used as a comparator. If the UK is to phase out the use of gas for heating, the costs and benefits of district heating should be judged against building-scale low carbon heating systems, particularly heat pumps rather than a business-as-usual scenario. As the consultation makes clear, the advantages of each solution are linked to the density of the built environment, underscoring the need to adopt a zonal approach to technology deployment.

It is also important to consider the risks involved. The consultation document emphasises risks to the long-term decarbonisation of heat networks, noting uncertainties in transition from gas CHP and in the long-term efficiency of heat networks. These risks should also be set against an appropriate comparator, namely risks in the decarbonisation of electricity supply for heat pumps (both for their baseload and peak demands) and in building-scale heat pump performance, which is dependent on significant improvements in the thermal efficiency of buildings. Local authorities are not in a position to make this comparison without central government guidance. In

addition, from a national perspective, the consultation's strategy of pursuing both building-scale and network solutions, if implemented effectively, is a means of risk-management through diversification.

Q 17: If you have been practically involved in setting up heat networks, what lessons can you share?

As noted above, there is a strong desire among LAs engaged with DH to share experience in order to reduce transaction costs and accelerate development and diffusion of approaches to DH. The Vanguard network, through workshops held roughly every six months, contributes to that sharing.

Coordination within a local authority

Vanguard authorities have used various means to secure high-level support and to coordinate across departments. Embedding DH in a range of strategic goals for an area, broadening its local relevance beyond climate change mitigation, is crucial for local authorities to understand the value of engagement with DH.

A risk register, which identifies all risks to a project's delivery, establishes ownership of those risks, and strategies for mitigating them, enables the different local authority functions to understand how their work contributes to the wider effort, builds confidence at officer, senior and political levels, and enables the local authority to negotiate effectively with commercial delivery partners.

Relatedly, business model sensitivity analysis is a useful tool in:

- quantifying and managing risks effectively
- communicating the costs and benefits of a particular initiative
- establishing buy-in within a local authority and across local stakeholders.

Optimising financial models

Experienced local authority officers emphasise the importance of "thinking big, but starting small," taking a long-term view of the potential benefits of district heating, but recognising the large amount of work required to get "starter" networks off the ground. A long-term view is important when considering different governance and ownership models:

- the relatively long lag between investment and return (upwards of five years) is challenging for local authorities
- the ability of the local authority to shape the long term development of the network is constrained by some commercial arrangements
- investors (including the local authority) may require the business model to give them an effective exit strategy (i.e. refinancing).

As heat networks have long-paybacks and "starter" networks have less attractive cash-flow profiles than larger networks, the economics may be marginal, even when they offer the most attractive means of achieving policy goals. There are three general ways in which marginal financial models may be improved:

1. Reduce the Internal Rate of Return the project is required to achieve by using public borrowing (e.g. Public Works Loan Board).
2. Reduce the Internal Rate of Return the project is required to achieve by underwriting commercial finance.

3. Make the cash flow profile more attractive by granting a capital contribution, justified by the public benefits and avoided costs of a viable project.

Each of these approaches implies risks for the public sector. At present these are often borne by local authorities; however, national or devolved government could pool the risks across initiatives and underwrite them in order to create a step change in investment.

Practical challenges

The practicalities of establishing heat network supply in relation to the connection of a large number of social housing tenants, present further challenges. Where new heating systems are installed alongside DH connection (e.g. when electric heating is being replaced) each home must be accessed several times, requiring skilled local officers who know how to manage the interface with tenants. Members of the Vanguard network have also found much care and detail is needed in structuring commercial contracts, particularly where access to domestic property is required (for example, if furniture has to be moved, whether the contractor is required to replace it afterwards, and the degree of control by each party over household layout of heating equipment and pipework).

Q 18: What policies should the Government pursue to promote or facilitate heat networks?

In comparison with the wide range of policies around electricity systems, heat policy is relatively undeveloped. This means there is a broad range of policy options available, and much untapped potential for Government policy to have a transformational impact on the deployment of heat technologies. However, none of the policies mentioned here represents a silver bullet due to the variety of challenges mentioned in our response to Q15 and because of the complexity of the development process for DH.

Principles

If policy is to achieve a step-change in the deployment of DH in the UK it should follow these principles.

1. **Take a strategic approach to DH support.** Policy should aim to strengthen skills and capacity within the UK. A steady “deal flow” is important for investors to become familiar with DH, to incentivise development of commercial skills and supply chains, and to build capacity within the public sector. Opportunities for learning and coordination across local authorities and across levels of government should be identified and exploited.
2. **Ensure policy consistency and stability** as essential elements of a strategic approach. Long development and lead times for DH initiatives and their long investment horizons, make stability particularly important. Recent turbulence and uncertainty in the wide range of policies which impact DH business models has been damaging to the development of projects.
3. **Reflect the strengths, limitations and complementarities in action at national, devolved, regional and local levels.** DH is an inherently local infrastructure, but it is embedded in resource flows, environmental issues and markets with a range of scalar dimensions up to a global level. Therefore while some aspects of development and operation are best handled at a local level, action at larger territorial scales is also crucial.
4. **Balance direction with facilitation.** Facilitative policy which allows flexibility is important because DH must be stitched into unique local circumstances, and because exploration of approaches to DH (particularly around business, governance and finance models) is important to broadening the opportunity space, provided

learning mechanisms are in place. However, a directive approach can reduce uncertainty and risk, and reduce transaction costs. Since DH development, implementation and expansion are complex processes facilitation and direction can be applied to different aspects.

5. **Reflect the value of diversity.** The consultation asserts that “for individual buildings, heat pumps are favoured strongly by all models”¹ but the results of modelling exercises are notoriously sensitive to input assumptions (particularly for highly coupled energy systems with significant price/performance uncertainties). This is particularly so for estimates of the “cost effective” potential for DH in the UK. Diversity is therefore valuable as a means of mitigating risk and reducing lock-in. The consultation notes efficiency, cost and carbon lock-in risks associated with DH, but these are general issues which are also relevant to building-scale technologies.
6. **Recognise the spatial character of heat policy.** Rolling out heat networks, strengthening electricity networks to accommodate heat pumps and (in the long run) phasing out gas distribution networks (as indicated in figure 6 of the consultation) require coordination which a spatially undifferentiated market-led approach cannot achieve. Building-level decision makers are simply not in a position to make system-level optimal decisions. Spatially undifferentiated policies which pick low hanging fruit will reduce short term costs but increase overall costs of decarbonisation and ensuring energy security by locking out network economies.
7. **Think big, start small.** Policy should address the near-term challenges associated with establishing networks, but also be mindful of the increased efficiency of larger networks and ensure barriers to expansion of networks are not erected (for example, by network governance arrangements). Routes to larger networks are an important component of ensuring diversity in heat sources and preventing lock-in to gas CHP.

Policies

The range of policies is wide, and different policy measures lend themselves to a greater or lesser extent to different models of DH (for example, commercial- versus public sector-led). Here we list ideas from the Vanguards network, some of which overlap, and some of which are suitable to different models.

Finance and business model

Many DH initiatives in the UK over the last decade have depended on an element of grant funding (the Community Energy Programme, the Low Carbon Infrastructure Fund and the Community Energy Saving Programme). This support has been crucial to the establishment of exemplary projects, and has built expertise, notably within particular local authorities. However, intermittent grant funding, imposing short programme horizons and tight deadlines on projects, creates coordinated spikes in demand for commercial services, pushing up costs and lengthening lead times, without establishing reliable incentives for investment in skills and supply chains. There is a range of alternative interventions that could improve the financial and business models for DH, and different options have different implications for government finance.

- Various mechanisms could **support the revenue streams for district heating projects**. In particular, the next stage of the RHI should include an uplift for DH.

¹ Though see §3.2 of Pöyry Faber Maunsell/ Aecom’s 2009 report, *The potential costs of District Heating networks*, which finds DH solutions to be more cost effective decarbonisation technologies than heat pumps in dense areas for a wide range of price and grid carbon intensity assumptions.

As gas CHP is an important technology for stabilising the build out of heat networks, a price support mechanism for gas CHP should also be considered.

- **Invest in project development** to reduce development costs borne by individual local authorities. Development grants, strategically used, could also cover the additional cost of generating shared public domain resources (as described below), bringing down development costs to other local authorities.
- **Invest in DH capital costs** following international examples where grants matching the value of external benefits generated by networks are contributed from public finances to correct market failure. Local (e.g. NO_x) and global (CO₂) pollution are externalities which could be valued, as could the health impacts (NHS cost savings) associated with lifting households out of fuel poverty.
- **Ensure electricity plays an appropriate role in DH business models** by correcting the imbalance in incentives which currently favour electricity generation, while improving conditions for small generators to capture the value of the electricity they do generate (for example, by tackling barriers to connection to distribution networks, and making netting-off agreements and light licence options straightforward).
- **Reduce project level heat off-take risks.** The public estate represents a significant heat load both in terms of aggregate scale and in terms of anchor loads. A commitment that public sector buildings will connect to viable heat networks would significantly reduce risks and stimulate development of catalyst networks which could then expand to draw on more heat load.
- Heat off-take risks could be further reduced by offering **low cost finance to subscribers to cover connection costs.**
- **Underwrite heat off-take and bad debt risk.** A national approach to underwriting DH is more appropriate than the current approach where funders look to local authorities to underwrite investments, as a multi-project approach would pool risk.

Local authority roles and capacity building

- Work together with local authorities to **establish a common view on where responsibility for investigating and initiating DH schemes lies**, and on the roles of different levels of government are.
- Development of local authority capacity will require **investment in local authority officers.** As a minimum requirement, a dedicated post should be established, through new investment, in urban authorities where heat demand is high. The officer should be located in the office of the chief executive, and have strategic responsibility for project management and finance. Regional strategies and resources could then be developed through the resulting local authority network. This would raise the level of informed debate and strategic engagement in developing technical, legal and commercial knowledge and expertise for a UK low carbon urban heat system.
- Local authority members of the Vanguard network often pursue DH as one element in a broader approach to local energy. A diverse portfolio of energy initiatives mitigates risk, and can be combined under an overarching revolving local low carbon energy fund. A central emphasis on urban energy in the English City Deals and Scottish Agenda for Cities could be used to **ensure that local authorities' take a strategic area-wide view of local energy development.** This could take many forms, including powers for local authorities to raise their own finance for energy investment, or making higher levels of FiT or RHI available to local authorities (or at least, exempting them from multi-site discounts) in return

for a commitment to recycle these revenues into further sustainable local energy initiatives.

- Another, complementary approach, is for **local authorities to take responsibility for strategic regional planning of sustainable energy development**, and in exchange for central government to allow these local authorities to keep the tax receipts (including, but not necessarily limited to business rates) generated by local energy initiatives.

Information

- There is scope for reduction in transaction costs and prevention of different parts of the public sector replicating each others' work through **development of shared resources**. These should include guidance on project appraisal, template heat supply contracts, risk registers and financial modelling software. Members of the Vanguards network consider some issues are best addressed by bespoke resources, and suggest government undertakes **research into which issues are best addressed by templates and other shared resources and which by bespoke resources**, paying attention to the different legislative context across the UK's countries. This should include identifying state-level issues which local actors are unable to address, such as the value to the UK's decarbonisation strategy of ensuring a range of heat supply technologies are developed and in appropriate contexts.

Spatial Coordination

- Heat networks are an inherently spatial technology. In countries where DH is widespread, **the use of heat zoning** has been an important tool in planning and de-risking expansion. There is a spectrum of uses of zoning, from making visible to local heat users where a local authority would prefer specific technologies to be used, through to mandating the use (or exclusion) of certain technologies in particular zones. Mid-way along the spectrum, government could confer on local authorities the power to use zoning for incentive mechanisms to ensure on-site solutions are not supported at the expense of community-level schemes which provide greater aggregate benefit.

Leadership

- **Committing government (or wider public sector) heat loads** to DH would, in addition to reducing investment risk, demonstrate leadership on heat decarbonisation with the practical impact of increasing confidence of other potential subscribers.
- UK Government, in partnership with other levels of government and a wider community of stakeholders, should **establish a long term vision for network ownership and operating conditions** to ensure appropriate levels of expansion and interconnection, and to ensure networks accommodate a range of heat sources. This would feed into guidance to local authorities as to how to structure commercial contracts in such a way as to ensure long term ambitions are not locked out.

Q 19: Do you see the need to regulate the supply of heat through heat networks and, if so, how?

Regulation of heat is important for protecting consumers and building confidence. Individual schemes undertake measures to achieve these goals, but central regulation could reduce transaction costs and eliminate some forms of uncertainty. To ensure a means of transition from gas CHP to low carbon heat networks, investment will be

required in standards to ensure the quality, reliability, pricing formulae and sustainability of supply chains. Regulation could take various forms: at the easier end of the spectrum this could involve, for example, a consistent and transparent method for representing heat tariffs to consumers, while at the more exacting end regulation could determine overarching aspects of a DH business model (such as the Danish requirement that heat retail must be organised as a non-profit business). Appropriate regulation in the UK needs to balance consumer and investor confidence against flexibility and innovation in DH business models.