

Organisational forms for district heating

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A key output of the Heat and the City project is a blueprint for “what works” in developing district heating (DH) networks, drawing on UK and international experience. This briefing summarises our working paper which explores the viability of different organisational forms in the UK and their consequences for various system characteristics (e.g. scope, scale, growth potential, tariff levels, etc.).

Organisational forms concern the actors involved (e.g. local authority, energy utility, DH engineers, public and private owners of anchor loads, financial institutions, household subscribers, community groups etc.) the roles they each play in developing and operating a heat network (e.g. raising investment, design, construction, heat generation, heat transport, heat retailing, heat purchasing, governance, etc.) and the relationships established between them (e.g. contracts for limited activities, more open-ended partnership arrangements, informal arrangements, etc.). The business model adopted for a DH network forms part of the organisational form, dealing with the generation of cost-covering revenues and profits and how these are distributed.

The space of possible organisational forms is large and alternative forms may be adopted to achieve different ends. For example, the risks to subscribers of a monopoly heat supply created by a DH network may be mitigated by adopting a form which separates heat generation from heat transport and retailing activities (introducing competitive pressures in heat generation).¹ Alternatively, the form adopted in Southampton, where a private company is effectively granted a concession to generate, transport and retail heat, requires an open-book accounting system to guard against exploitation of subscribers.

We will assess the viability and consequences of different organisational forms by exploring the development and operation of DH networks in several European and UK cities. We acknowledge that direct translation from other countries is likely to be inappropriate and that a one-size-fits-all model is unlikely to be realistic, but are seeking cases which illuminate the issues discussed below, and welcome comments from advisory board members on this approach.

Factors impacting the viability and suitability of organisational forms

Competing forms of heat supply. Space and water heating in the UK is dominated by network natural gas. This sets the reference point against which many potential subscribers will appraise connection and so has consequences for acceptable heat tariffs. Gas is predominantly supplied in the UK by the “big six” energy companies,

¹ This approach is common in Denmark

complicating the role they may play in DH initiatives. District heating has developed in other countries dominated by particular forms of heat supply (e.g. oil in Sweden, electricity in Norway), but to what extent can that experience translate to the UK?

The regulatory context may restrict or enable different organisational forms. Danish law, for example, requires district heating companies to operate the network on non-profit bases. In the UK, local authorities have powers to lay and maintain DH pipes – one of several factors placing UK local government in a crucial position in developing DH. Various DH activities (in particular, retailing heat) are not specifically regulated, though uncertainty as to whether they may be in future adds to uncertainty about the viability of different organisational forms. The UK government has proposed to convene a Heat Markets Forum to explore the need for regulation.

The degree of energy market liberalisation has impacts on the suitability and viability of different organisational forms. Heat networks have developed in several European countries under regulations favouring public control and ownership, though in many cases these have been liberalised over the last twenty years. These changes impact the viability (or legality) of different business models, but also the relationships between elements of a DH organisational form. Liberalisation in countries with DH offers an opportunity to observe the impacts of commercial operation (e.g. increasing private sector ownership in Sweden has been associated with higher heat tariffs).

Subsidies and incentives can be crucial to the financial viability of a DH initiative, and conditions placed on those incentives may shape the choice of organisational form. For example, the UK government's proposal that the Renewable Heat Incentive include an uplift for DH delivering renewable heat to hard-to-heat properties may shape both the heat sources and target subscribers for a DH initiative, and therefore have consequences for the attractiveness to different actors of participating in the delivery and operation of a DH network. How have subsidies and incentives shaped organisational forms elsewhere, and what, if any, attempts to shape the direction of DH initiatives in the UK would be appropriate and fruitful?

The industrial and engineering skills and knowledge available may affect the costs of various aspects of DH network development and the character of bodies able to participate (e.g. large international companies with a broad range of investment opportunities versus smaller local companies more closely tied to particular initiatives). The UK currently lacks relevant skills and knowledge, as reflected in Pöry's finding that the costs of laying DH pipes in the UK are roughly double the costs elsewhere in Europe.² What impact has the development of skills and knowledge had in other countries, how did these develop, and what lessons can be drawn for the UK?

Local authorities' capacities, knowledge and structures crucially shape the roles they play in DH systems, from driving the development of a network forward to frustrating the attempts of others to initiate a system. Local authorities in the UK and elsewhere are well placed to play a number of roles, such as gathering data on heat demand, acting as a significant heat customer, shaping the distribution of heat sources and demand through the planning system, etc. To what extent do UK local authorities possess (or have access to) the various capacities and forms of knowledge (e.g. technical, legal, financial, commercial) required to enable them to fulfil such role(s) in DH organisation, and how do their internal structures impact their ability to coordinate such activities?

² Pöry Energy, 2009. *The potential and costs of district heating networks*, Report for DECC.

Characteristics of local heat demand, customers and potential heat suppliers affect the financial viability of a DH network and therefore the attractiveness of investment to different actors (the public sector generally being able to accept a lower rate of return). Heat density, the presence of anchor loads and heat load diversity (both daily and seasonal) are all important considerations. Local activities which produce unused heat offer opportunities for lower cost heat input to the network.

Local patterns of investment by the public and private sectors in infrastructure, buildings and other facilities can create opportunities for new energy systems – though coordinating these opportunities can be problematic.

Consequences of adopting different organisational forms

Risk: price, volume, technology, financing, regulation and governance risks are inherent to DH initiatives, though this is not an exhaustive list. Volume risk is a particular issue, given the spatial constraints in establishing a DH market and the “lumpy” expansion of attached heat sources. Different organisational forms allocate risks to different parties who may vary in their capacity and appetite for risk management. Some forms may introduce new risks (such as long-term contract risks).

Security of supply: larger systems can accommodate a larger number and greater diversity of heat sources, and usually have more robust backup systems. This means larger systems can usually offer a more secure heat supply than smaller systems (including stand-alone boilers).

Expertise and incentives: an organisation established as a partnership between several bodies may be able to access expertise and knowledge held by the partners with lower transaction costs than would be the case under a non-partnership model. By distributing risks across partners incentive structures they can, in theory, improve the use of each partners’ expertise. In addition, different organisational forms place varying demands on the parties involved (e.g. contract negotiations for a network developed and operated as a joint venture may require a greater degree of legal and financial expertise than negotiations for a network developed and operated by a single party).

Access to and cost of capital are influenced by the organisational form adopted. The public sector can generally borrow at lower interest rates than the private sector (e.g. through prudential borrowing or issuing bonds). The credit rating of an organisation seeking to raise capital is also important and affected by factors such as the equity to debt ratio of the venture. More ambitious projects (perhaps combining a number of sustainable energy initiatives) may be able to attract large institutional investors such as pension funds.

Control: different parties may see involvement in a DH network as a means to pursue different goals, and their capacity to control the development of the system to achieve these goals is in part determined by the organisational form adopted. Thus a private sector-led initiative may focus only on subscribers with the highest potential profitability while a public sector-led initiative may target other users, trading profitability off against impacts on fuel poverty or local economic development.

Transparency and commercial confidentiality: depending on the form of agreement between public and private bodies, the details may be deemed commercially confidential and so not open to public scrutiny. This can undermine the perceived legitimacy of the arrangements. Financial flows in complex organisational forms can be difficult to trace. Transparency in DH projects is important to give subscribers confidence that the tariffs they pay to their monopoly provider are not exploitative, and

is a requirement of some systems of DH regulation (such as the Southampton Joint Agreement and the Swedish Reko certification system).

Acceptability, legitimacy and trust: experience from wind farm development illustrates the importance of organisational form in securing acceptability of a project among nearby communities. The degree to which benefits are shared and the scope for local concerns to be articulated and responded to are important factors, particularly for low-carbon projects where disruptive impacts are local while climate change mitigation is a global benefit (though DH can offer local benefits to subscribers in lower cost, more secure heat supply). The degree to which subscribers trust in the competence and future pricing approach of system builders/operators is also conditioned by the organisational form adopted.

Energy prices: large systems with diverse heat sources are less vulnerable to fluctuations in fuel supply prices, and so reduce risks to investors and subscribers. The monopoly position of a DH provider makes the approach to determining long-term retail prices an important consideration in attracting subscribers. (For example, prices may be indexed to a basket of alternative heat supply options, or could reflect the costs of provision plus a reasonable return for investors.)

Procurement by the public sector is governed by EU rules to prevent discrimination and increase transparency, and the degree to which the public sector is involved in a DH initiative will determine whether these rules apply. Importantly, EU rules restrict consultation with prospective contractees, limiting the degree to which their expertise may be drawn on when putting part of the system out to tender.