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The role of intermediaries in the transition to district heating

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Abstract

For those countries, such as the UK, in which district heating and cooling has previously played little role in the energy system, the technology often struggles to break through the numerous and complex barriers to its introduction in the context of liberalised energy markets and competition with incumbent technologies such as natural gas networks. Progress is often slow and best practice is yet to be established.

‘Intermediaries’ are actors who facilitate knowledge sharing and build actor networks to enable the introduction of new technologies. This paper uses a case study of the UK to explore where and how the activities of these intermediary actors are currently supporting district heating development.

An innovative method called a ‘decision theatre’ was used to collect empirical evidence from a range of local stakeholders involved in district heating projects. This method, which took place in the format of a group workshop, enables understanding of the interactions between stakeholders through each stage of the district heating development process.

Lessons are drawn from this case study with regard to how intermediary activities can support the development of district heating in areas with little previous history of such systems. Three geographical scales of intermediary activity are identified (local, regional and national) as having different roles in enabling delivery of new district heating projects. Interactions between the three scales and how their roles might change as the sector develops are explored. The paper will highlight implications of the study for policymakers. In particular, a role is identified for intermediaries in creating a supportive institutional and policy environment that can enable development of large-scale, strategic networks.

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1. Introduction

A realisation about the scale of the challenge of decarbonising the heat sector has brought about an increased interest in the potential of district heating (DH) [1]. Introducing DH in countries where the technology has not previously been used brings with it a set of non-technical challenges including developing an institutional infrastructure, market and business models that unlock the technology for deployment. In this paper we refer to these countries as ‘learning countries’.

Local municipalities often seek to play a role in overcoming these non-technical barriers and enabling delivery of new schemes [2]. However, in the context of a low penetration of existing networks, they can be working with little previous experience or knowledge of what is required. The process of learning and knowledge exchange is therefore important for unlocking DH potential.

This paper will focus on the concept of ‘intermediaries’. These are actors that facilitate connections between institutions involved in delivering new innovations to enable exchange of knowledge, development of skills and standards, and development of relationships between actors to support the process of innovation. Gaining an understanding of how intermediary activities are currently taking place, and where they could be improved, is critical for policy makers in learning countries that are looking to strengthen capacity of local actors to deliver DH.

A case study from the UK is used as an example of a DH learning country. It is a country with a highly centralised energy system, a liberalised energy market, and high penetration of natural gas networks for heat supply to buildings. The heat demand currently delivered by DH is only 2% [3]. This paper will analyse data from a decision theatre workshop involving a range of local stakeholders involved in DH development at the local level. It will consider where intermediary activities are taking place; who is delivering the activities; and how they could be developed further to enable successful development of more DH projects in the UK.

2. Theoretical basis for analysis

Socio-technical theory forms the theoretical basis for analysis. The theory seeks to recognise the influence of the existing system as new technologies and innovations are introduced. It considers incumbent technologies, institutional and market set ups, policy regimes and social practices [4].

The theory considers technology innovations, such as the process of delivering DH in learning countries, to take place within ‘**niches**’. ‘Niches’ are used to describe the idea of protected spaces where technological innovations are able to develop and learn before being embedded into the wider regime [5]. Protection within the niche can come in many forms; from financial subsidies or tax breaks, to skills development programmes or transferring of decision-making powers. In practice, technological innovations might happen in multiple niches across a country, and the experiences at each local level can be collected and shared together to contribute to innovation development across the niche as a whole [6, 7].

In this work we are considering the process of DH development in learning countries as taking place in niches. Although DH is a well-established and proven technology in many countries such as Denmark, Sweden and Finland, in ‘learning countries’ such as the UK it requires non-technical innovations to take place to enable its deployment. The term DH niche will be used to describe the delivery of a new DH project in a region of low or no deployment of DH. It could take the form of an extension of an existing scheme, but is most likely to be the delivery of a stand-alone network.

2.1. Intermediaries

In socio-technical theory intermediaries can be defined as actors that facilitate exchange of knowledge, or use their own expertise to facilitate creation of niches and delivery of technologies. They are actors that span individual niches, networks and learning boundaries and they can undertake work at multiple levels; using their expertise to add value to project delivery within the niche and aggregating and sharing learning between niche spaces of activity [7-9]. Table 1 gives some examples of the types of activities intermediaries undertake. For a more comprehensive list of specific activities observed in studies to date, see Kivimaa [9].

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