



The role of intermediaries in low carbon transitions – Empowering innovations to unlock district heating in the UK



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ABSTRACT

The literature on socio-technical transitions considers how technological innovations can be established within the context of an incumbent regime that is often resistant or inflexible to change. Strategic niche management is an approach to catalysing a transition to a new regime using protected 'niche' spaces to enable development and experimentation with an innovation. Intermediary actors play an important role in establishing these niches as they facilitate knowledge sharing and build the wider networks and systems needed to support an innovation.

The influence of intermediaries within socio-technical transitions and strategic niche management is still an under-researched area. In this paper, we use a decision theatre research process to collect empirical evidence from a range of local stakeholders involved in establishing new district heating projects in the United Kingdom (UK). This method, carried out in a group workshop format, enables understanding of the interactions between stakeholders throughout the stages of the district heating development process.

The study suggests that intermediaries can play a role in supporting niche empowering processes. The existing institutional framework surrounding intermediary actors, and the geographical scale at which they work within that framework, are shown to be influential on actors' agency to choose their approach to empowering an innovation. The work highlights the potential for intermediaries to support the restructuring of this institutional framework to enable more radical 'stretch and transform' empowering activities.

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1. Introduction

The challenge of mitigating climate change has brought with it various visions and scenarios for how to decarbonise a world currently reliant on fossil fuels (Connolly et al., 2014; IEA, 2013). Arguably, the challenge is no longer about finding plausible scenarios for how a decarbonised future could look, but instead setting in motion a process for delivering that decarbonisation. Low carbon innovations can be locked-out of incumbent regimes in the context of a complex socio-technical system that is often resistant to radical changes (van der Vleuten and Raven, 2006).

Socio-technical transitions theories seek to understand how new innovations can be established and become widespread within a new regime (Foxon, 2011; Geels, 2002; Rip and Kemp, 1998). The concept of a niche is used to describe a protected space where an innovation can develop away from the pressures of the incumbent regime. Strategic niche management provides one framework for understanding how niches can be created and developed to catalyse a wider transition (Kemp et al., 1998; Schot and Geels, 2008). Emphasis is placed on the importance of supporting development of an innovation within a niche through facilitating learning processes, establishing shared visions of the future between niche actors, and forming supportive networks of actors (Hamann and April 2013; Kivimaa, 2014; Küçüksayraç et al., 2015; Lovell, 2007). These processes are seen as nurturing an innovation. However, niche processes must go beyond nurturing for a transition to take

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place. They must also empower it to diffuse beyond the niche space (Smith and Raven, 2012). The theoretical understanding of niche empowering processes is still developing and it is to this area of the socio-technical transitions literature that this paper seeks to contribute.

In particular, it explores the role of intermediaries within socio-technical transitions for supporting niche nurturing and empowering processes. Intermediaries are actors and institutions who enable exchange of knowledge, skills development, and perform connecting and mediating functions to support an innovation (Geels and Deuten, 2006; Kivimaa, 2014). We use an empirical case study of district heating development within the United Kingdom (UK) to explore the role and characteristics of intermediary activities for shaping transitions, considering their role over different geographical scales.

The following research question is addressed: How do intermediary activities across different geographical scales support niche nurturing and empowering processes for district heating innovations in the UK?

The rest of this paper is structured as follows: First, the theoretical approach is set out in more detail. The case study is introduced, along with the method of data collection where a decision theatre workshop was used to simulate the district heating development process and collect in-depth data on stakeholder interactions. The results of the analysis are presented and discussed for the empirical case. Finally, lessons are drawn on the role of intermediaries in empowering processes.

2. Theoretical approach

The need to transition to a more sustainable regime has stimulated interest in how socio-technical transitions could be actively shaped and facilitated. For example, Kemp et al. (1998) first outlined the idea of strategic niche management in 1998, defining it as “the creation, development and controlled phase-out of protected spaces for the development and use of promising technologies by means of experimentation, with the aim of (1) learning about the desirability of the new technology and (2) enhancing the further development and the rate of application of the new technology” (p.186, Kemp et al., 1998).

Smith and Raven (2012) elaborated on the strategic niche management literature and differentiated between three types of activities for supporting niche processes: shielding, nurturing and empowering of innovations within a niche. ‘Shielding’ may take the form of ‘passive’ shielding, where a niche is naturally created due to contextual circumstances such as an off-grid area of the energy system. ‘Active’ shielding uses active measures to shield the innovation, for example tax incentives or subsidy, which shield the technology from the market environment. Shielding can also be accompanied by ‘nurturing’ processes that enhance learning opportunities and develop institutional networks to enable experimental innovations. ‘Empowering processes’ focus on enabling innovations to transition from niche activities and become part of a regime. Understanding how actors can influence and support empowering processes is a key question within the socio-technical transitions literature (Smith and Raven, 2012; Smith et al., 2005).

Smith and Raven (2012) argue that empowering processes can either seek to ‘fit and conform’ with the incumbent regime, or seek to ‘stretch and transform’ the regime to suit the niche innovation.

A ‘fit and conform’ empowering process is where an actor is seeking to develop an innovation to a stage where it can compete within the selection environment of the incumbent regime. In this form of empowering process, activities might take the form of research and development activities, training for key stakeholders, or shielding policies such as subsidy (Kern et al., 2015). Ultimately

the activities would seek to enable the innovation to compete within the existing regime environment without on-going support.

A ‘stretch and transform’ empowering process is where an actor is seeking to transform the incumbent regime to the extent that it becomes possible for an innovation to diffuse. Activities might include creating institutional changes, the use of political narratives to advocate for the introduction or reform of regulations, or establishing a supportive and long-term policy approach that removes barriers to innovation (Smith and Raven, 2012; Verhees et al., 2015).

An actor's choice of approach and the success of different empowering activities are influenced by the wider landscape (e.g. what is considered socially and politically legitimate) and the stability of the incumbent regime (Raven et al., 2016; Verhees et al., 2015). In practice, actors' approaches to empowering processes are known to change and evolve over time, depending on the wider socio-political context or who is being addressed (Raven et al., 2016; Smith, 2007; Smith and Raven, 2012). The political narratives used by actors can also have different impacts depending on an actor's legitimacy in the eyes of policy makers or politicians, or the composition of the actor networks that are circulating the narratives (Raven et al., 2016). For example, Raven et al. (2016) explored empowering processes for solar PV in the UK and The Netherlands. Until the late 1980s, solar PV was perceived as too expensive to compete with other electricity generation options and was not given policy support. However, entry into the solar PV market of large companies such as Shell provided policy makers with greater confidence of its potential become financially competitive and it gained policy support.

Another under-developed area in the literature is whether niche actors can develop sufficient agency within a resistant incumbent regime to support more radical forms of transition. Do actors have the agency to choose between a ‘fit and conform’ or ‘stretch and transform’ empowering approach and to support that approach with action? The existing regime and institutional framework surrounding actors is influential over actors' agency to design and support empowering processes. For example, Kern et al. (2015) compared empowering activities in two contrasting case studies: the fast growing offshore wind industry in the UK and the stagnating offshore wind sector in the Netherlands. Although actors in both countries undertook many similar activities, the institutional framework in the UK involved an influential and proactive national-level facilitator of offshore wind development in the form of the Crown Estate, which ‘rented’ the seabed to offshore wind operators. In the Netherlands, no single influential advocate existed, and instead actors were divided across several smaller institutions and struggled to establish a consistent approach or to create a sufficient power-base to affect institutional reforms which favoured off-shore wind. The institutional framework in the Netherlands made it difficult for actors to successfully empower the offshore wind industry. Kern et al. (2015) recommend that future research should “consider what kind of processes enable the building of a sufficient power base to challenge dominant rules” (p.354, Kern et al., 2015). We address this question by considering the role of intermediaries in developing a supportive institutional framework for successful niche empowering processes in the case of district heating.

2.1. The role of intermediaries in low carbon transitions

Intermediaries are actors that facilitate relationships between key actors and enable sharing and pooling of knowledge. These actors can be individuals or a group of people within organisations that range from public bodies, to trade associations, non-governmental organisations (NGOs), or consultancies

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