Sustainable Cities and Society 10 (2014) 122–129

Contents lists available at ScienceDirect

Sustainable Cities and Society

journal homepage: www.elsevier.com/locate/scs

# Concern or compliance? Drivers of urban decentralised energy initiatives

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ARTICLE INFO

*Keywords:*
Decentralised energy
Drivers
Case study

ABSTRACT

The UK has set an ambitious plan to substantially cut its greenhouse gas (GHG) emissions. In order to meet this 2050 target of 80% reduction, the UK is facing a significant challenge of restructuring its energy system. One way to do this is via the wider use of decentralised energy (DE) systems in urban areas. A significant lack of understanding exists however, regarding the main factors that drive these energy projects. Following semi-structured interviews with key stakeholders, nine UK and four international exemplar cases have been analysed and critiqued in order to investigate the variety and inter-relationship of the drivers employed and involved encouraging their implementation. The role of regulation, and environmental awareness and concern as drivers for implementation are explored, as are the differing impacts of these drivers. Whilst academic literature commonly portrays financial incentives and the impact of policies as the main or initiating driver, many stakeholders investigated here emphasised the role of environmental awareness and concern as a prominent driver. Compliance with regulations and environmental awareness and concern seem not mutually exclusive; instead, environmental concern reinforces the willingness to comply (and over-comply) with the regulations.

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## 1. Introduction

Discussion related to a shift towards a more DE system is not new, with particular emphasis on the benefits of DE systems, including a reduction of greenhouse gas (GHG) emissions, enhanced energy security and resilience, and support of local empowerment and financial opportunities (e.g. Alanne & Saari, 2006; Bergman & Eyre, 2011; Coaffe, 2008; Leicester, Goodier, & Rowley, 2011; Walker, Hunter, Devine-Wright, Evans, & Fay, 2007). However, there is an increasing recognition that in order for this shift to be made, technological solutions, economic arguments and appropriate business solutions are not sufficient, and it is important to understand the complex set of stakeholders involved in this shift as well as their motivation and drivers to perform the shift (Cole, 2011).

As will be demonstrated in this paper, the empirical analysis of drivers and motivations employed remains scarce, and, whilst information regarding the drivers for decentralised energy (DE) is available, studies to date are not consistent and do not investigate the full spectrum of drivers, but rather focus more on common drivers such as financial incentives. Thus the aim of this paper is to contribute more towards the grey area regarding personal and community drivers that motivate the implementation of DE projects. Two sets of drivers which are typically investigated separately are considered and explored together: regulations, which contemporary literature suggests as being one of the crucial and most common drivers; and environmental awareness and concern, which as a driver is often overlooked but was raised by many of the DE stakeholders interviewed in this study.

In light of the earlier work described in Section 2, the objective of this paper is therefore to critically analyse the role of regulations as drivers behind the implementation of DE projects and to explore the role of environmental awareness and concern when regulation as a driver is either absent, or is not prominent. This paper therefore explores the hypothesis that regulations and policies, and environmental awareness and concern not only play important roles in stimulating the implementation of DE projects, but can also complement and support one another.

The research was carried out as part of the CLUES project (Challenging Lock-in Through Urban Energy Systems) (see Rydin et al., 2012), aiming to critically assess the development of decentralised energy systems in urban areas in the light of national decarbonisation targets and urban sustainability goals.

After an overview of the current policy framework and existing literature on drivers to DE is introduced, the case study methodology deployed for this research is described. The results are then

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http://dx.doi.org/10.1016/j.scs.2013.07.001

presented, starting with compliance with policies and regulations and then moving to environmental awareness and concerns. A discussion of the role of these drivers in instigating DE follows.

## 2. Literature and policy overview

In its 2003 White Paper, the UK Department of Trade and Industry (DTI) characterised future energy systems by "more local generation, in part from medium to small local/community power plants, fuelled by locally grown biomass, from locally generated waste, from local wind sources, or possibly from local wave and tidal generators. These will feed local distributed networks, which can sell excess capacity into the grid. Plant will also increasingly generate heat for local use." However, for this future vision to be achieved, the UK needs to overcome the great challenge of energy system restructuring, possibly via introducing and supporting larger numbers of DE projects.

As Vaze and Tindale (2011) argue, whilst energy problems are large-scale, small-scale solutions do exist. An emphasis on the potential benefits of a more localised and distributed pattern of energy generation and on the involvement of the community emerged in the UK in the late 1990s (Walker et al., 2007). For example, Local Agenda 21 principles were called to be applied to local energy planning in 1999 by the Local Government Association (LGA, 1999). The UK has a legally binding target of delivering 15% of all energy from renewable sources by 2020, and of reducing GHG emission by 80% by 2050, with a reduction of at least 34% by 2020 and a target to achieve 9% energy savings by 2016 (DECC, 2008). A variety of policies that may stimulate DE has been introduced in recent years ranging from financial tools such as the Low Carbon Building Programme, Feed in Tariffs (FiTs), the Renewable Heat Incentive and the Carbon Emission Reduction Target, to local innovative planning policies and subsidies for the installation of new technologies, such as the Green Deal.

As mentioned in the introductory section, despite the increasing amount of literature on DE, the empirical analysis of drivers employed remains scarce. Building on the Oxford dictionary's (2010) definition of driver – "a factor which causes a particular phenomenon to happen or develop" – the authors of this paper understand drivers as factors that potentially contribute to the development of DE projects, can be specific to a particular location, or general to the context; and can also be internal (personal or organisational) or external (related to society or policy).

Marques, Fuinhas, & Pires Manso (2010) and Marques and Fuinhas (2011) investigated drivers promoting renewable energy (RE) in the European Union (EU) and suggested that both the lobby of the traditional energy sources and $CO_2$ emissions restrain deployment of RE, whereas the objective of reducing energy dependency stimulates RE use. Watson and Devine-Wright (2011) discuss five drivers for moving to DE (climate change, energy security, technology trend, the governance of energy markets, and social change) in order to understand their impact on energy system scale. Many of those discussing drivers argue that financial drivers such as financial policy instruments and procurement mechanisms play the most crucial role in promoting DE (e.g. Alagappan, Orans, & Woo, 2011; Foxon et al., 2005). However, others have argued that the drivers behind DE project instigation are more diverse: Allen, Sheate, & Diaz-Chavez (2012) interviewed 16 public, private and third/community sector stakeholders in community RE projects in the Lake District National Park aiming to reveal drivers, enablers and barriers to community energy projects. The interviews suggested that stakeholders disagreed on the main drivers for community energy; public sector stakeholders saw national and local top-down policies as key drivers, while community stakeholders were driven more by the bottom-up nature of such initiatives, which relates to aspects of self-sufficiency, trust and participation.

There is a considerable literature suggesting that legal drivers, such as regulations and policies, are an effective tool in encouraging energy efficiency and environmental performance (e.g. Marques et al., 2010; Testa, Styles, & Iraldo, 2012). The role of regulations is to provide the enabling environment for the DE, i.e. provide support that will establish a system for the market development of DE (White, Lunnan, Nybakk, & Kulisic, 2013). Several studies (e.g. Carley, 2009; Menz & Vachon, 2006) emphasise that political motivation demonstrated via implementation of regulations is the best way of promoting DE, and that the promotion and use of DE through price regulations are the most favourable for DE use. Regulations are thus seen as a set of rules that should lead DE users towards achieving the governments' aims for DE, regardless of the differences of the DE projects (e.g. energy, sustainability, climate change, employment) that fall under the jurisdiction of various governmental bodies (White et al., 2013). Lund (2007) evaluated the effectiveness of the policies and concludes that, while their effectiveness may vary considerably depending on the context, policies are an effective tool for deploying RE.

There is a variety of policies available for promoting DE; not all of them, however, are directly aimed at the deployment of RE – efficient use of energy is also an area of such policies. The International Energy Agency (IEA) database lists more than 30 different policies and measures, most of which can be summarised in five categories: legislative and regulatory policies; research and technology development, fiscal measures, information dissemination and awareness raising; and other assisting or voluntary measures (IEA, 2005). National energy policies have common objectives such as GHG mitigation and energy security.

In order to reduce their dependency on imported fossil fuels and to be in line with Kyoto targets, the European Commission (EC) proposed Directive 2009/28/EC (EP and Council, 2009), which sets mandatory national targets for integrating energy from renewable sources into the gross final energy consumption. It encourages not only energy consumption from renewable sources but also technical development, economic stimulation and efficient energy use. The tools for reaching the targets set by the Directive varies between member states, but most of them use a variety of policies. For example, Germany widely uses Feed-in Tariffs (FiTs) as well as supporting Public–Private Partnerships (PPP). Buildings standards have also been tightened and integrated more with the use of RE (e.g. the Barcelona Solar ordinance).

In the USA, national energy policy has been introduced under the Bush administration: it was mainly aimed at alleviating problems with oil imports, but also encourages increasing energy supply from renewables. The implementation of RE is mainly supported through financial policies, namely Renewable Portfolio Standards (RPS), adopted by state governments. An RPS is a state-mandated program in which a percentage (or share) of a state's overall electricity generation must come from RE. Under an RPS program, utilities are required to invest in RE systems in order to meet their percentage requirement (Carley, 2009).

By setting the targets, the national policies provide the framework that has to be implemented then on a local level. This can be done via a variety of instruments, as discussed in the cases presented here, from subsidies to RE developers (e.g. the Morris Model), to city carbon targets (e.g. the BESP), to strict regulations (e.g. Riverside Dene).

However, despite the great variety of policies and regulations encouraging implementation of DE, some projects find that regulations are not the only driver (if at all), and they are still implemented regardless of the lack of regulations, as will be discussed further in this paper. Literature mainly focuses on incentives as non-regulatory motivations (e.g. Feige, Wallbaum, & Krank, 2011;

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