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Urban low-carbon transitions: cognitive barriers and opportunities

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ABSTRACT

This paper addresses the importance of the cognitive dimension in urban sustainability transition policy practice. Many and diverse actors with contrasting interests interact in urban sustainability transitions. Their perceptions and values impact the potential uptake of transition strategies in urban systems. It is thus important to understand how actors view themselves involved in such processes. A case study on low carbon transitions for the city of Bilbao (Basque Country) is presented to explore the barriers and opportunities for an energy transition using Q methodology. Results suggest that stakeholders' motivation and perceived capacity for change are mainly related to four main discourses: follower, visionary, pragmatist and sceptic. Results also indicate that information exchange, communication and participation in decision-making processes, bridging visionaries and pragmatists with decision-makers, are key for bringing about effective transition processes. This study contributes to identifying attitudes of actors who can negotiate urban low-carbon transitions and stresses the need to build a common shared cognitive vision of whether and how sustainable urban transformation can take place.

1. Introduction

The need to transform our social and economic systems in response to the challenges posed by climate change and resource scarcity is increasingly recognised both in the scientific community and in the social and political arenas. Particularly, in the urban context, a profound sustainable transformation is urgently needed (Elmqvist et al., 2013; Pickett et al., 2013). Over the next couple of decades urban management will greatly influence global energy demand (Madlener and Sunak, 2011). Although it is difficult to precisely estimate cities' contribution to global emissions (Dodman, 2009), they are widely seen as responsible for around 80% of global greenhouse gas (GHGs) emissions (see e.g. Dhakal, 2010). This share is likely to increase in the future given that 66% of the world population is expected to be urban by 2050 (UN, 2014). In the framework of sustainable urban transformation, urban low-carbon transitions are key for global mitigation and adaptation strategies and for coping with increasing energy resource scarcity problems (Rosenzweig et al., 2010).

Sustainable urban transformation processes (also known as urban sustainability transitions, hereafter USTs) are "structural transformation processes – multi-dimensional and radical change – that can effectively direct urban development towards ambitious sustainability goals" (McCormick et al., 2013: 1). UST processes start with the recognition of the need for change and of the need to deviate from currently unsustainable patterns by identifying windows of social, economic or environmental opportunities.

In this context, the idea of low-carbon transitions implies that cities move towards a new, decarbonised socioeconomic system. There are multiple opportunities for decarbonisation in cities, however, these are complex because they inevitably require combinations of technological development, infrastructure investments and behavioural change (Milner et al., 2012). Urban transition experiments are currently being used to more effectively navigate these combinations and to move cities into closer alignment with the broader global sustainability transition approach (Goldthau and Sovacool, 2012).

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Experiences in local energy transitions have come about through individual and collective actions in networks such as the C40 cities network[1] or the Covenant of Mayors[2] (CoM). Work from such networks have facilitated ambitious targets being set in some cities for low or even zero-carbon (carbon neutral) emissions (see e.g. Reckien et al., 2014 in Europe). Yet, in practice, concerns have risen regarding the means and resources that cities might draw on to achieve their carbon emission targets (Hodson and Marvin, 2012). On the one hand, the lack of local capability to directly impact energy policies or transport planning is considered a key barrier to developing local transition pathways (Westley et al., 2011). Under this assumption, cities may be seen as passive actors in sustainability transitions rather than niches of change (Geels, 2010). On the other hand, it is often argued that the role of cities as hubs of innovation, development and knowledge enables them to turn crises into opportunities (Hodson and Marvin, 2012; Romero-Lankao and Dodman, 2011; Seto and Satterthwaite, 2010). Though some conflicting opinions exist on these points, emerging literature on urban resilience, urban transformability and urban sustainability generally agrees that there is a unique opportunity for cities to become laboratories of innovation and experimental action (Ernstson et al., 2010; Evans, 2011; McCormick et al., 2013). If and how urban actors perceive this opportunity turns then critical.

Many actors interact in the governance of urban low-carbon transitions, including so-called 'intermediary actors' (Hodson et al., 2010, 2013). These actors work across multiple scales of energy systems governance seeking to accommodate their interests and coalitions. They include governmental and semi-governmental energy agencies, nongovernmental organisations, consultancy firms, researchers, and others. Additional actors in these governance processes include those working on awareness, education, training, and networking. Competing views and perceptions relating to effective needs, methods and objectives may be favourable or not to the desired low-carbon transitions (Hodson and Marvin, 2012; Hodson et al., 2010). It is recognised today though, that effective USTs require investment in collective action by the full range of community stakeholders (Pickett et al., 2011). This can take the form of innovative experiments (Castan Broto and Bulkeley, 2013) or partnerships (Frantzeskaki et al., 2014) that initiate a change under a set of common objectives (i.e. a shared cognitive base) (Antal and Hukkinen, 2010). Additionally, participatory approaches are crucial for increasing the chances of initiating transitions and for helping actors feel that they are the owners of the results of such transitions, thereby helping them engage in the process of change (Bailey et al., 2012).

The complexity of these processes necessitates an understanding of stakeholders' perceptions in order to identify existing barriers and potential opportunities for transformation (Olazabal and Pascual, in press). Since the late 1980s, environmental physiologists have paid growing attention to the cognitive and behavioural dimensions to understand preferences and attitudes towards the environment (Sundstrom et al., 1996), while environmental sociologists have tried to understand how individual behaviours are affected by social contexts (Norgaard, 2009). Likewise, adding a cognitive dimension to transition research can help us to better inform and report processes of adaptation and transformation in practice (Olazabal and Pascual, in press).

In line with the above, this paper intends to assess if and how 'intermediary actors' perceive an opportunity for sustainable transformation in the context of urban energy transitions. This is done through a case study centred on Bilbao, a medium-sized European city which has successfully transformed its industrial sector but as yet has failed to make meaningful progress towards a low-carbon transition. In this regard, the role of the perceptions and values of actors involved in energy planning and management is analysed. A Q methodological approach (for a review see e.g. Dziopa and Ahern, 2011; Robbins and Krueger, 2000) is used to identify the key discourses of actors in Bilbao regarding the city's energy transformability potential. Such discourses are then used to understand how the cognitive domain could potentially affect a low-carbon transition in a medium-size city such as Bilbao.

The next section describes the Bilbao case study and the methodology. The past and successful transformation experience of Bilbao is compared with the rigidity of the current urban energy model. Then, the specific step-by-step application of Q methodology in the case study is described. Section 3 presents the results and identifies the salient discourses about the transformability of the high-intensity energy system of Bilbao. Section 4 discusses the potential obstacles for sustainable urban transformation as learnt from the case study and how they might be tackled. The paper concludes with Section 5 by highlighting how UST processes might be facilitated and by identifying further research areas in this regard.

2. Case study and method

2.1. Bilbao as a case study

Bilbao[3] is a medium-sized city with a surface area of approximately 41 km^2 and a population of 349,356 as per 2013. It stands in the Basque Country in northern Spain. The city's development is conditioned by its mountainous surroundings, its high population density (8607 inhab./km^2 in 2013) and the compactness of its urban form (124 dwellings per residential hectare in 2013). The GDP per capita is about €31,054 (2013), around 85% of which is generated by the services sector (Basque Government, 2013a). The economy of Bilbao was traditionally based on steel making and shipbuilding until the major industrial crisis of the 1980s, after which it transformed itself into a service-led city. The profound transformation of its economic structure in the 1990s also included the renovation and revitalisation of its riverside waterfront. This urban development project has become an example of radical restoration (Gonzalez, 2011) as it involved river water treatment and soil decontamination resulting in significant improvements in the environmental quality of the city. Today Bilbao is seen as an important economic hub and a model of urban revitalisation in Europe (Rodriguez and Martinez, 2003).

With a well-established Local Agenda 21, the local government declares itself to be committed to sustainability through initiatives on urban green infrastructure and through policies on climate change and sustainable energy. The latter is exemplified by the Sustainable Energy Action Plan or SEAP (Bilbao City Council, 2012) approved under the CoM agreement. The local authority was

[1] C40 is an international network of megacities around the world which takes action to reduce greenhouse gas emissions and address climate risks and impacts locally and globally. URL: http://www.c40cities.org/ (Last accessed 11/03/2014).

[2] The Covenant of Mayors is a mainstream European movement involving local and regional authorities, who voluntarily commit to increasing energy efficiency and using renewable energy sources on their territories. By their commitment, Covenant signatories aim to meet and exceed the European Union 20% CO_2 reduction objective by 2020. URL: http://www.eumayors.eu/ (Last accessed 11/03/2014).

[3] Source for general socio-demographic data of Bilbao: Udalmap – Municipal level indicators of Sustainability – Public Finance and Administration Department – Basque Government. URL: http://www.ogasun.ejgv.euskadi.net/r51-t64cont/en/t64aVisorWar/t64aIndicadores.jsp?language=2 (Last accessed 15/04/2015).