



ELSEVIER

Contents lists available at [ScienceDirect](#)

Environmental Innovation and Societal Transitions

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



User-led innovation in civic energy communities

Gerben W. de Vries, Wouter P.C. Boon*, Alexander Peine

Innovation Studies, Copernicus Institute of Sustainable Development, Utrecht University, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands

ARTICLE INFO

Article history:

Received 8 June 2015

Received in revised form 24 August 2015

Accepted 3 September 2015

Available online xxx

Keywords:

User innovation

User-led technological change

User communities

Civic energy communities

Configurations

ABSTRACT

Building on user and grassroots innovation literature, we explore user innovations in five Dutch civic energy communities. Less attention has been paid to the interplay of social, symbolic and technological innovations that seems to be at the heart of many civic energy communities. In this paper, we shed light on this interplay, and explore the activities of civic energy communities as configurational user innovations, i.e. creating user-designed arrangements of loosely related sets of components. Our analysis shows that configurational work combines off-the-shelf technologies with novel technical and non-technical ideas, such as business models for local energy provision, rather than endeavor clear-cut changes to existing devices. Such configurational work is deeply entangled with learning processes at the community level, whereby an evolving technical identity as well as various community building activities provide a growing network of resources as necessary context for implementation of user innovations.

© 2015 Elsevier B.V. All rights reserved.

1. Introduction

In the context of a transition to a sustainable and environmentally-friendly society, bottom-up initiatives by end-users of energy have increasingly gained momentum (Hoffman and High-Pippert, 2005). A major example of this trend is the recent emergence of civic energy communities (CECs), where voluntary communities seek to collectively set up infrastructures in which decentralized, sustainable electricity can be produced and consumed. This has led to more than 700 registered CECs in Germany (Holstenkamp and Müller, 2012), to a wide range of small-scale community sustainability initiatives in the UK (Forrest and Wiek, 2014) and to nearly 500 initiatives in the Netherlands (HIERopgewekt, 2015). Specifically, these groups of end-users envision an energy system based on local self-supply, and attempt to realize this by implementing (collective) energy technologies that, in order to work, require connections to the grid, other technologies and a variety of non-technical actors active in the specific application environment. Frequently, these community efforts become a source of innovative energy solutions that typically consist of interconnected technical and non-technical components to make up new infrastructural arrangements (Walker and Cass, 2007). As bottom-up initiatives, CECs have also been widely recognized and studied as a significant societal movement with the potential to speed up the transition towards a sustainable system of energy provision (e.g. Seyfang et al., 2014; Seyfang and Smith, 2007). This paper aims to make a contribution to a deeper understanding of these initiatives by taking a user innovation perspective (Von Hippel, 2005) to study the various endeavors of CECs. In doing so, we bridge two gaps in the literature.

* Corresponding author.

E-mail address: w.p.c.boon@uu.nl (W.P.C. Boon).

<http://dx.doi.org/10.1016/j.eist.2015.09.001>

2210-4224/© 2015 Elsevier B.V. All rights reserved.

First, we contribute to the expanding literature on local energy initiatives that identifies these as a distinct trend in social organization and civic culture (e.g. [Bomberg and McEwen, 2012](#); [Garud and Karnøe, 2003](#); [Hoffman and High-Pippert, 2005](#); [Jamison, 2001](#); [Middlemiss and Parrish, 2010](#); [Walker et al., 2010](#)). The role of community-based initiatives in governing sustainable energy transitions has been explored using the concept of 'grassroots innovation' ([Seyfang and Haxeltine, 2012](#); [Seyfang et al., 2013](#); [Seyfang and Smith, 2007](#)). These studies have regarded local civic movements as social innovations, operating in a local niche from which 'ideas' and social practices may diffuse into society. They did not emphasize the role of technology and how users may reshape user-technology relations when collective desires for socio-technical change lead directly to creative implementation of novel technologies. A deeper knowledge of this is important as user innovation is understudied in the transition literature.

Second, this focus on novelty creation invites us to relate to literature on 'user innovation' elaborated by [Von Hippel \(2005\)](#). While this literature has long highlighted the significant contributions of individual users to innovation, especially the last decade has witnessed the emergence of different kinds of innovative 'user communities' (von Hippel, 2007; van Oost et al., 2009), organized around common interests, normative objectives or specific technical challenges. Engaging actively not only in idea creation but also in the development and commercialization of these ideas, communities frequently give rise to innovative socio-technical solutions and are signaled as an emerging force in competitive industry trajectories ([Baldwin and von Hippel, 2011](#)) and societal change processes ([Henkel and von Hippel, 2004](#)). Prime examples are communities in open source software ([Raasch et al., 2008](#)) and extreme sports ([Franke and Shah, 2003](#)). User communities have also begun taking position as a source of innovative sustainable projects in the energy industry (e.g. [Hyysalo et al., 2013](#); [Ornetzeder and Rohrer, 2006](#)). In general however, studies of user innovation in communities have focused on situations in which creative individuals are engaged in well-delineated technical projects developing distinct products. Less attention has been paid to the interplay of social, symbolic and technological innovations that seems to be at the heart of many CECs ([Walker and Cass, 2007](#)). In this paper, we shed light on this interplay between social, symbolic and technological innovations, and explore the activities of CECs as configurational user innovations. That is, we address innovative local energy solutions as configurational technologies ([Fleck, 1993, 1994](#)), where users collectively arrange loosely related sets of components into local systems that work ([Peine et al., 2014](#); [Peine, 2009](#)).

Although studies on configurational technologies have largely focused on the ICT sector, implementation of configurational innovations in and by communities also becomes relevant in the arena of community energy. Different technological components for producing, distributing and conserving energy demand careful alignment in pre-existing local structures to become functional, with the resulting socio-technical arrangements taking shape around specific contextual requirements. Implied is a more socially-complex and user-driven innovation process of actively and collectively shaping a socio-technical environment (van Oost et al., 2009). Hence, in this paper we zoom in on the internal workings and social practices of innovative user communities and equip user innovation with the sociological concepts it needs in order to deal with configurational technologies and their dynamics.

The present study seeks to adopt a sociological micro-level perspective and broadly explores the characteristics and dynamics of a number of end-user communities who have successfully implemented collective energy facilities. The paper aims to increase our understanding of internal user-technology dynamics in civic energy communities and how they deal with new modes of energy production as locally-contextualized configurations. This would facilitate management of and policymaking on these communities, as such contributing to a societal transition to sustainable energy. To sum up, this explorative study seeks to answer the question: How do civic energy communities operate as contexts in which users pursue the development and implementation of configurational innovations?

The paper proceeds as follows. Section 2 starts with an overview of community energy in academic discourse and discusses the relevant theoretical concepts related to user innovations and technological configurations. Section 3 describes the methods, and Section 4 presents the main results from studying 5CECs by first discussing their main characteristics and then zooming in on commonalities in their trajectories towards successful implementation projects. Section 5 provides a deeper discussion of the theoretical significance of the dynamics identified, in terms of what they imply for analysis of collective user innovation in configurational settings. Finally, Section 6 summarizes the main conclusions and proposes an outlook for more inclusive social research into the dynamics of user innovation.

2. Theory: civic energy communities and their configurational endeavors

In recent years a vast body of literature has grown to describe the general trend in which groups of consumers have emerged as an active type of stakeholders in the energy field. It is observed widely how users now assume active roles in production and conservation of energy, introducing both social and technical solutions in the local environment. Emphasizing this democratization of the energy industry (cf. [Jamison, 2001](#)), bottom-up energy initiatives have been studied as a new form of social organization ([Walker and Cass, 2007](#)). Themes that have been studied include the democratic governance in these communities ([Hoffman and High-Pippert, 2005](#)), communities as networks of individuals that differ in their degree of knowledgeability and motivation ([Bomberg and McEwen, 2012](#); [Hyysalo et al., 2013](#); [Rogers et al., 2008](#)), and trust as being essential in the formation of coherent and cooperative communities ([Walker et al., 2010](#)). These studies conclude that the success of such local communities depends on their understanding of the social and technological context in which they operate.

Download English Version:

<https://daneshyari.com/en/article/6559213>

Download Persian Version:

<https://daneshyari.com/article/6559213>

[Daneshyari.com](https://daneshyari.com)