



Original research article

Households as change agents in a Dutch smart energy transition: On power, privacy and participation



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ABSTRACT

This paper examines the participation of Dutch households in a smart and sustainable energy transition. Particular attention is paid to new forms of cooperation that are arising between households (horizontal opening-up) and between households and service providers (vertical opening-up). Data are drawn from an online survey and a focus group discussion among householders who have some experience with sustainable energy practices. To guide the analysis we discern three energy management practices that come along with the advent of smart energy systems (energy monitoring, renewable energy production and time-shifting), and three social arrangements entailing different ways of organising these practices (private, horizontal and vertical arrangements). While survey respondents, in general, prove to be supportive of both vertically and horizontally arranged energy management practices, we also find that they run into specific privacy and autonomy problems that shape or even impede their participation. In addition, the focus group shows that shared understandings of conventional energy systems and shared experiences with alternative schemes create strong parallels between anticipated arrangements of new practices. It is concluded that decentralised systems are particularly promising for promoting household participation, as they enable the bundling of energy management practices and the renegotiation of horizontal–vertical relationships.

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1. Introduction

With the effects of climate change becoming ever more apparent and with economies that are still largely based on the use of fossil fuels, there is a pressing need for industrialized societies to reconsider the ways in which they produce, distribute and consume energy. As pressure has been mounting over the past decades, government bodies at different levels have formulated targets to promote a transition to a low-carbon economy. The European Union (EU), for instance, has put in place targets to cut greenhouse gas emissions by 20% in 2020 and by 40% in 2030 [1]. To achieve these targets the development of intelligent energy systems, or smart grids, has been endorsed as a key strategy. Smart grids are expected to promote the utilisation of renewable energy sources and to improve energy management through detailed monitoring and intensive two-way communication between sites of production and consumption [2,3].

Particularly notable is that in smart grid development, and in visions of low-carbon transitions in general, households are

increasingly positioned as active participants with a responsibility to act as ‘change agents’ [4]. Gangale et al. [5], for instance, observe a growing focus on ‘consumer engagement’ and ‘consumer empowerment’ in many European smart grid pilot projects. But also beyond smart grid pilots, scholars find a flourishing of – and at times increasing appreciation for – grassroot initiatives in which citizen-groups themselves are promoting more sustainable ways of producing and consuming energy [6,7]. It is therefore not surprising to find a rapidly developing body of literature around ‘participation methods’ [8], ‘consumer-inclusive innovation strategies’ [9], and the role of ‘smart users’ [10,11].

At the same time, these and other scholars are posing critical questions regarding the active and transformative role of households. First of all, notions of participation and engagement may feature as discursive frames, rather than being applied in actual practice. In a study on infrastructure planning Cotton and Devine-Wright [12] (p1) find that network operators, in spite of employing a “rhetoric of deliberative engagement”, are lacking “a clear rationale and effective means to incorporate citizen perspectives”. In studies on smart grid development, Wolsink [13] and Goulden et al. [10] note that opportunities for increased autonomy of householders and local groups are being negated by developments at regime

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level where established players have firmly rooted smart grids in the conventional centralised paradigm.

A second issue of concern revolves around imagined possibilities for the 'rational' and 'effective' use of smart energy technologies in households. Wallenborn [14] and Hargreaves [15] show that monitoring tools, in spite of the promise to increase householder control over the energy bill, are often of limited value in achieving significant reductions in energy consumption. Important reasons include a lack of prior experience with energy issues, a lack of sustained interest in energy-related information, and difficulties and trade-offs in changing daily routines. According to Marres [16], the observation of such barriers has given rise to the idea that domestic engagements with energy must be 'made easy'. However, this results in design choices that intentionally assign tasks and responsibilities to home automation technologies, thus requiring householders to do or change very little.

A third and final set of questions pertains to forms of public resistance against the implementation of smart meters and renewable energy technologies. Gawel et al. [17] note that Germany, with its exemplary role in the deployment of small-scale renewable energy technologies, is experiencing growing discontent with the guaranteed feed-in tariff which is argued to increase energy bills. In relation to smart meter deployment in the United States, Europe and Australia, Hess [18] lists a diversity of cases where public protest emerged around suspected health impacts of electromagnetic radiation, the potential for householder-surveillance by companies and governments, and the misuse of private information.

This paper seeks to contribute to these discussions by drawing up a framework for analysing householder participation and by examining how Dutch householders see themselves participating in a future smart energy system. More specifically, we investigate how the decisions of householders to participate in new production and consumption practices are shaped by social and power relations that come along with smart grid development: In what socio-technical arrangements do householders feel confident to act as change agents? And, on the other hand, in what arrangements do they run into privacy and autonomy problems that can thwart such engagements?

The outline of the paper is as follows: Section 2 presents the background, theoretical orientation and analytical framework. The framework discerns three energy management practices that come along with smart grid development and three social arrangements which involve different ways of distributing control over the conduct of these practices. Section 3 provides methodological details about the online survey and the focus group discussion that were conducted for this study. We selected a group of householders from the Netherlands who have some experience with – and understanding of – renewable energy generation, smart meters and new energy initiatives. The data analysis, presented in Section 4, revolves around the three energy management practices specified in the framework: energy monitoring, renewable energy production and time-shifting. Finally, Section 5 assembles and discusses the main outcomes.

2. Background and theory

This section develops the analytical framework that guides our analysis of householder participation in smart energy systems. Particular emphasis is placed upon the distribution of control between householders and other actors. In the construction of this framework, we first consider in more detail how households have come into the position of being seen as change agents (Section 2.1) and then show how a social practice approach informs our study of householder participation (Section 2.2).

2.1. From 'passive' consumption towards 'active' participation?

In the period after World-War II many industrialised countries invested heavily in the deployment of large-scale electricity grids. These state-owned networks were designed to transport fossil-fuel based electricity from centralised production plants to decentralised energy consumers, including households, thereby changing the existing paradigm in which self-provisioning was the dominant form. Over time, this has created a state of play in which governments and large-scale energy producers are responsible for system maintenance and change [19]. Households, on the other hand, were typically configured as 'passive end-users' or 'captive consumers' who are dependent on monolithic and distant energy providers [20]. Energy consumption got institutionalised as a largely taken-for-granted and inconspicuous aspect of everyday life [21,22].

Though the centralised design of energy networks and the taken-for-granted status of energy consumption still characterise much of the present-day situation, there have also been significant changes from the 1980s onwards. Processes of liberalisation, privatisation and environmental activism have given rise to more fragmented, competitive energy networks with a diversity of energy providers, new intermediary organisations and new roles for households [23,24]. Households were given a choice between different energy providers and between different energy sources, and some started to produce energy on their own. Arguably, such developments yield new and more active roles for householders in systems of energy provision [25].

More recently, ideas around a low-carbon energy transition have inspired further change processes. For the purpose of this paper, we want to mention two here. First, in several Western European countries there has been a sharp increase in the number of citizen-led initiatives around renewable energy generation and conservation [7,26]. In the Netherlands, more specifically, estimates for civil-society based renewable energy initiatives range from a few dozen in 2007 up to nearly 500 in 2014 [27,28]. Second, as a largely parallel trajectory, governments and businesses in these countries have been preparing the ground for the development of smart energy systems. In the EU over 450 smart grid pilots are registered by 2014, with a particularly high spatial concentration in the UK, Denmark, Belgium and the Netherlands [29]. Also the roll-out of smart meters has been ongoing, with an EU mandate to have 80% of European households equipped by 2020 [2]. In the Netherlands, however, there was a set-back of several years after the legislative proposal for the mandatory acceptance of the new meter was rejected by the Dutch Senate on grounds of consumer privacy protection [30].

Though citizen-led energy initiatives and government or business-led smart grid development follow rather different transition pathways, they are also bound to influence each other as they encounter the home. Moreover, it is not uncommon for citizen-initiated to use information technologies (e.g. web-based communication platforms), nor are ideas around householder cooperation alien to smart grid development (e.g. in local micro-grids). Of particular importance here is the fact that both developments give rise to new forms of cooperation and control; householders acquire new opportunities to cooperate and share information with each other and, at the same time, they are provided with new possibilities to outsource tasks and disclose information to service providers. In line with the differentiation of horizontal and vertical forms of cooperation presented in Naus et al. [31], we refer to these processes as a horizontal opening-up and a vertical opening-up of the household, respectively. This will be further addressed in the next sections.

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