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Material participation and the smart grid: Exploring different modes of articulation

William Throndsen *, Marianne Ryghaug

Department of Interdisciplinary Studies of Culture, Norwegian University of Science and Technology, 7941 Trondheim, Norway

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ABSTRACT

Many experts are concerned about the would-be character of smart grid users—specifically, that they will not engage with smart grid technologies out of disinterest or a lack of knowledge. This has been considered problematic because users are considered key to unlocking the full potential of the smart grid. This paper studied smart grid users from the Norwegian demo Steinkjer pilot and, through focus group interviews, collected articulations of everyday smart grid enactments. Eliciting little lack in knowledge or interest, users were able to articulate relevant smart grid enactments through a spectrum of skepticism, pragmatism and enthusiasm. Utilizing the concept of *material publics* [22], this paper argued that smart meters can bridge the green political economy of climate challenge issues with the user context of everyday energy consumption. The paper found evidence that user articulations, whether skeptical or enthusiastic, are rooted in political engagement as opposed to purely economic interest. This suggests a case for involving material publics in the smart grid and indicates that explanations for user disengagement can be found in active, subversive co-articulations among users rather than passive disinterest or a lack of knowledge. This paper suggests acknowledging smart grid users as politically engaged material publics.

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1. Introduction

Smart meters are designed by experts as an enabling integration of Information and Communications Technology (ICTs) into the existing energy system. They are framed as the first stepping stone on the path to creating the "energy networks of the future" [10]. Such a transition first involves being able to manage peak loads and make the grid more efficient, thereby reducing some of the urgency for costly expansions of our current grid. Second, it promises to decrease carbon emissions by enabling the grid to include more renewable resources. Finally, it is believed to enable price incentives that will be brought to the consumer in real time because consumers are construed as being responsive to an increase in technology-transmitted penalties and rewards [11,23]. An important task for experts has thus been to understand how to encourage household consumers to actively interact with smart meters.

Among other things, the smart meter is believed to be able to bring "prices to devices" [7], whereby the energy cost of running a specific appliance at any given moment may become a piece of information that can be acted upon by autonomous appliances. Users are expected to actively enter into a feedback configuration with the meter regarding the supply and demand situation of energy between the market and household, aided by the capabilities of the new meter [35]. For instance, as [30] also noted in this special issue, although energy technology such as the smart meter is becoming more pervasive, many questions pertaining to the user experience of these objects are still not being addressed. Furthermore, studies have found that encouraging users to change their energy consumption habits can be difficult [19], [12]. Without the participation of an active user, the main concerns are that the potential benefits of household smart metering may not be fully realized [30]. Thus, it is appropriate to ask the following: will consumers get involved? In what way will the smart meter engage the public? Will households change their energy consumption practices in response to using the smart meter and in what ways?

In this paper, we provide new evidence—drawing on focus group interviews with participants in one of Norway's smart grid demo projects—that sheds more light on these questions. More specifically, we discuss how an *object-centered* perspective [1,18] may provide a better understanding of the ways in which *material publics* [21] are constructed in relation to smart metering technologies. Given the widespread implementation of similar technologies and the growing number of demo sites elsewhere

* Corresponding author.
  E-mail addresses: William.throndsen@ntnu.no, william.throndsen@gmail.com (W. Throndsen).

in the developed world, providing cases for comparison appears relevant. Learning from different pilot projects that are currently taking place is believed to be invaluable for undertaking a full-scale rollout, as is envisioned in most European countries—including Norway—especially as the significant interpretative flexibility of basic smart grid concepts has been recently shown to exist, even among relatively local initiatives [30].

2. The smart grid and the user – earlier findings

Many studies over the last several decades have underlined that demand side management (DSM) interventions require changing the role that electricity plays for users and that DSM targeting the "energy consumer" will struggle to achieve its potential because this framing is far from how people see their relationship to the grid and their energy use [13,12]. In parallel, studies on aggregate scales of the effects of DSM have uncovered modest results. A recent analysis of the large-scale Energy Demand Research Project—which involved some 60,000 UK households, including 18,000 with smart meters—observed no statistically significant savings from standalone Smart Energy Monitors (SEM) and saw only 3% savings from SEMs when they were accompanied by smart meters [26]. A smaller German pilot study that incorporated a field test of smart meters in 288 households reported reductions in the range of 2.5–10.9% [27], and a similar German study of a demo project pilot found savings in the range of 5–10% [3]: 17). These kinds of results add to the increasing awareness among experts (not just social scientists; c.f. [28] in this volume) that the early enthusiasm for smart meter technologies as a type of "silver bullet" or the "missing link" [25] between users and the energy market is probably exaggerated.

A large body of research has documented the significant difficulties involved in obtaining significant savings in domestic energy use through forms of information provision. However, these studies have traditionally focused narrowly on individual decision-making processes that depict households as "black boxes" [8] and have thus neglected to account for the ways in which feedback must be interpreted, negotiated, and acted upon (or not) amid existing domestic situations, which often involve multiple household members [15]. Following this line of critique, new modes of theorizing energy consumption have developed; one such mode stressed that the importance of the social dynamics of households reveal the way in which energy feedback must be "domesticated" [2,12] or appropriated in a wide range of households with different routines and practices [36]. For instance, one study found that smart meters, in fact, appeal mostly to men in the household as the design was data-oriented, while women found normative messages more relevant [32]. A UK study revealed that smart energy monitors can lead to both greater co-operation and greater conflict among the members of a household. Feelings of empowerment gave the participants an increased sense of control, and feelings of *disempowerment* arose as the monitors appeared to make environmental and financial challenges seem greater and more insurmountable for some householders [14]. Several studies have also shown that over time, smart energy monitors tend to become "backgrounded" by normal household routines and practices [15,24] (Fig. 1).

Research on energy cultures has made a significant progress in opening up the "black box" of household energy consumption as well as underlining the complex social topography of shared households [31]. Widening the scope further, [13] found that householders adopted two typical ways, or "personas," when dealing with household energy consumption: as either an "energy consumer" or an "energy citizen." The energy consumer persona was seen to be easier to adopt but was more prone to criticism for being unsustainable due to the passivity involved in this role. Sim-ilarly, [33] called for a stronger focus on the way in which practices are co-managed instead of merely targeting ways of managing consumable resources. The "energy citizen" is in line with [33] call – a persona interested in adjusting the household energy practices—for instance, in relation to managing local microgeneration rather than simply being a passive consumer. Goulden et al. (ibid) stated that for behavioral change to occur, smart grid development should be decentralized and co-managed with consumers as opposed to implementing the "prices to devices" scenario mentioned earlier [7], which preserves the role of the passive energy consumer. The welcome concreteness of these perspectives aside, researchers may have overlooked an even more fundamental interpretation of the significance of being an energy citizen. The following section will paint a broader picture of what energy citizenship may entail, albeit one which by no means is exclusive to the suggestions above.

3. The smart meter as green, political material engagement

The smart meter has the potential of bridging the global but abstract problems of climate change, situated as it is in a kind of new "green" economy. Smart grid efforts are occurring on a stage together with the economization [6] of energy consumption, including CO_2-emissions on the one hand and everyday energy consumption practices of the household on the other. The current emphasis on the smart grid, as with most other modern energy technologies, arguably needs to be interpreted in the light of the climate change issue. Energy efficiency measures and carbon emission reductions have become intrinsic goals of political economy, and they can be incentivized and distributed to the household level by smart meters. Thus, it could be argued that household energy practices, once viewed as belonging to the private sphere, are being re-introduced in such a manner that they are granted influence on matters of public concern, i.e., the climate. When household consumption of energy becomes a public concern, it follows that energy technologies such as smart meters are a way of locating political engagement in everyday practices and thus *materializing* public participation in such concerns [21]. Such an object-oriented perspective provides "a way of attending to the variability of enactments of engagement afforded by everyday material devices – as something that is crucial to the politics of participation these technologies enable" [21]: 527).

[20] demonstrated this by examining among other cases public messages from the Mayor of London that encouraged the public to save energy by unplugging mobile phone chargers. In doing so, Marres argued, the Mayor's office could contribute incrementally to building public awareness, knowledge, and understanding of the larger issue: "These campaigns thus attribute special affordances to domestic technologies in terms of their ability to help bridge the divide between people 'in here,' in the home, and issues 'out there.'" [20]: 179). This takes us one step further than the classic deficit model (see, [37], in which simple information input results in behavioral change. The perspective also includes active material objects with which a green (political) performativity can be enacted in the everyday setting. This constitutes a *material public*, a public that is enacted by citizens and non-humans engaging in specific political economic performances.

The smart meter, regarded as a way to materialize new political economic involvements of the citizen, can be understood in "traditional" foucauldian terms as an apparatus of security [4]. In this way, attempting to understand the smart meter becomes an effort in unmasking the political intentions inherent in the new technology, as technology operates under the surface to perform material politics. Post-foucauldian perspectives on heterogeneous assemblages of humans and non-humans underline the importance of such material politics or sub-politics that are clandestine by nature. Therefore, the effectiveness of the politics they perform depends on