



# The values of electricity saving for consumers<sup>☆</sup>

Morgane Innocent<sup>\*</sup>, Agnès Francois-Lecompte

Université de Bretagne Sud, Laboratoire LEGO, Campus de Tohannic, BP 57356017 Vannes Cedex, France



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## ABSTRACT

This study aims at understanding the perceived value to consumers of practicing electricity saving. Based on an exploratory qualitative investigation and on two quantitative surveys, our study seeks to identify the values of electricity saving and model their relation with the intensity of electricity-saving behaviours. The results point to seven components of positive or negative assessments linked to the practice of electricity saving. These can be described in terms of environmental and citizen aspects, household management, feelings of well-being, secondary benefits, daily efforts, social consequences and lack of knowledge. Our results suggest that the main value lever of electricity-saving for consumers is more closely linked to well-being rather than environmental or money-saving concerns. These findings lead us to formulate new recommendations for public authorities to support their efforts in reducing residential electricity consumption.

## 1. Introduction

In its 2030 Framework for climate and energy, the European Union (EU) has set a number of important goals to address climate change issues, which involve reducing greenhouse gas emissions, developing renewable energies and increasing energy efficiency. This Framework, adopted in October 2014, calls on EU member states to reduce their energy consumption and targets a 27% reduction with respect to the 1990 level to be achieved by the year 2030.

In this context, reducing electricity consumption appears to be essential because of its importance in the primary energy demand. For example, the Observation and Statistics Department of the Commission on sustainable development of the French Government indicates that electricity accounts for over 40% of the energy consumption in France (Service de l'Observation et des Statistiques [SOeS], 2016), with households being the largest consumers, representing 35% of the national electricity consumption (RTE, 2015). Reducing household electricity demand is thus one of the key challenges for public energy policies in Europe and most developed countries.

As far as electricity savings (ES) are concerned, the virtuous behaviours that private households need to adopt have been identified and investigated. Thus, electricity consumption could be substantially reduced if individuals paid more attention to the unnecessary use of electricity (e.g., Nakamura, 2016, Urban and Ščasný, 2016). For example, this would involve being more careful to switch off unnecessary

lights and electrical appliances and not leaving unused devices on standby (Amann et al., 2007; Clift and Cuthbert, 2007; Wang et al., 2017). Recommended actions include more effective maintenance of electrical appliances (e.g., regularly defrosting the freezer) and replacing devices that use too much energy (e.g., switching over to energy-saving light bulbs and replacing fridges, freezers, etc., in a more timely manner) (Thøgersen and Grønhoj, 2010, Nakamura, 2016).

Studies have focused mainly on identifying the drivers as well as the impediments to adopting these virtuous behaviours (Stephenson et al., 2010; Sweeney et al., 2013). It is generally assumed that consumers act rationally, and that their behaviour is driven by a broad range of factors related not only to personality traits, dwelling characteristics, household attributes and climate but also electricity price and the disclosure of information to consumers (Delmas and Lessem, 2014; Pothitou et al., 2016; Belaïd, 2017; Kendel et al., 2017; Loi and Ng, 2018; Zhang et al., 2018). In addition, it is worth considering this behaviour by putting yourself in the place of the consumer, and exploring how electricity savings are experienced in daily life. Hence, it is necessary to explore the relationships of individuals with other family members (Naus et al., 2014), their feelings of control (Hargreaves et al., 2010), comfort and safety in the home (Mills and Rosenfeld, 1996), the difficulties of changing habits (Maréchal and Holzemer, 2015), etc. Taking into account these different impacts of ES practice allows us to identify the actual experience of consumers who are seeking to control their electricity consumption; we can then develop leverage strategies in line with these lived experiences.

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<sup>\*</sup> Corresponding author.

E-mail addresses: [morgane.innocent@univ-brest.fr](mailto:morgane.innocent@univ-brest.fr) (M. Innocent), [agnes.lecompte@univ-ubs.fr](mailto:agnes.lecompte@univ-ubs.fr) (A. Francois-Lecompte).

The present study falls within this new perspective and places the practice of ES at the centre of the analysis through the framework of practice-based theory. More precisely, we investigate the meanings of ES practice for consumers and explore their experience through the notion of consumer values (Holbrook, 1999; Sánchez-Fernández et al., 2009; Rivière and Mencarelli, 2012; Gonçalves, Lourenço and Silva, 2016). The purpose is twofold: (1) to establish ex-post values that emerge from the practice of ES through an exploratory investigation, and (2) to test a model predicting ES intentions based on ES values through a quantitative survey. Based on a literature review, the first part of this article presents the theoretical framework at the core of the research project. Using the results of an empirical phase based on a qualitative investigation, we then present a first quantitative survey which leads to the identification of seven main values arising from ES. Next, a theoretical model is developed and tested on a sample of 375 households participating in a French smart-grid experiment.<sup>1</sup> Finally, the results suggest new leverage elements that can be used by public authorities in energy transition programmes.

## 2. Research background and theoretical framework

### 2.1. Research on electricity savings

ES behaviours involve the whole set of choices and actions of consumers who aim to minimize their domestic electricity consumption. These behaviours include everyday eco-friendly gestures in various domains (e.g., heating, cooking, lighting, electrical appliances) and the choice of installations and devices (e.g., home appliances, insulation, heating system, use of renewable energy) (Abrahamse, 2007; Urban and Ščasný, 2016). The determining factors are usually classified into two sets of antecedents: those related to the context and those related to psychological variables (Thøgersen & Grønhøj, 2010; Zhang et al., 2018).

As far as the contextual determining factors are concerned, studies have shown the influence of the specific features of housing, appliances, heating and hot water-producing devices (Ehrhardt-Martinez et al., 2010; Mills and Schleich, 2012; Jones and Lomas, 2016; Belaïd, 2017), along with variables such as electricity pricing and the way consumption feedback is provided (Kendel et al., 2017; Loi and Ng, 2018). In addition, studies have highlighted the role of sociodemographic factors such as age, gender, income, education level, housing tenure status and lifestyle (Barr et al., 2005; Carlsson et al., 2007; Abrahamse and Steg, 2009; Ehrhardt-Martinez et al., 2010; Thøgersen and Grønhøj, 2010; Chen et al., 2013; Belaïd, 2016; Wallis et al., 2016; Loi and Ng, 2018).

As regards the psychological antecedents of ES, a first set of variables relates to personality traits, values (Schwartz, 1977) and personal norms (Zhang et al., 2018). These are rather stable for given individuals, but do not really account for ES behaviours (Abrahamse, 2007; Pothitou et al., 2016). The second set is related more directly to ES behaviours and includes ES drivers, deterrents, attitudes (Black et al., 1985; Paço and Lavrador, 2017), and ES-related notions of self-efficacy (Lindenberg and Steg, 2007; Thøgersen and Grønhøj, 2010). Factors such as financial, comfort and convenience issues, as well as aspects related to knowledge, have various effects upon behaviours (Abrahamse, 2007; Abrahamse and Steg, 2009; Sweeney et al., 2013; Ohler and Billger, 2014). Another category involves multiple moral issues: preserving the environment, global warming, citizens' responsibility, or even cutting waste (Stern, 2000; Barr et al., 2005; Sweeney et al., 2013).

All these studies deal with the variables involved upstream of behaviours and help identify elements of leverage for behavioural change.

<sup>1</sup> A smart grid is a distribution network (of electricity, gas, etc.) that is said to be “intelligent”, designed to make the network links more efficient, from producers to end users.

However, arguing in terms of motivations and deterrents presupposes that rational human beings take decisions based upon their attitudes. However, this perspective does not account for the routine character of ES behaviours. For actions repeated on a daily basis, an individual's behaviour at a given moment, or time *t*, is strongly influenced by past experiences (Bandura, 2001; Phipps et al., 2013). To understand and predict a behaviour, it is thus necessary to focus on the lived experience of the consumer when adopting this behaviour. Hence, the theory of ES practice places practical experience at the centre of the analysis.

### 2.2. Practice-based theory: a new perspective on consumer studies in the field of ES

Drawing on theories of practice (see Bourdieu, 1977; Schatzki, 1996; Shove et al., 2012; Warde, 2005), social practice theory is now shifting the focus from individual behaviours and choices to the practices themselves and their emergent dynamics. Individuals are no longer merely seen as rational agents free to make their own choices or who are governed by social structures. Instead, people are seen as knowledgeable and competent “practice carriers”. On the one hand, people tend to follow the rules and social norms that guide practice; on the other hand, through their personal experiences, they improvise, adapt and contribute to changes in these rules and norms (Seyfang, 2010).

Reckwitz (2002) defines a practice as “a routinized type of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, ‘things’ and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge” (Reckwitz, 2002: 249). Shove et al. (2012) identify three types of elements that can be used to classify social practices: competences, materials and meanings (Fig. 1). A practice entails various competences, namely knowledge, know-how, understanding, or the ability to assess performance. The materials being manipulated include infrastructures, tools, and sometimes digital devices and the human body itself. Finally, a practice carries various cultural meanings, namely mental activities, emotions and motivations (Shove et al., 2012).

Shove and Pantzar (2005) use the example of Nordic walking to show how people actively combine the elements making up a practice. In this case, equipment, know-how and the meanings conveyed differ from one culture to another, while nevertheless forming a coherent whole that carries notions of well-being, beauty, leisure and connection to nature.

It is the very existence of the practice itself that fosters understanding of the origin of the expectations, needs, know-how and value judgements (Warde, 2005). It is established that the more widespread the practice, the stronger the links between the various elements (competences, meanings and materials).

Several studies invoke practice theory to increase understanding of environment-friendly behaviours, including ES actions. These studies show that such behaviours embody meanings that are more complex and varied than was first thought. Hargreaves (2011) shows that, in a work environment, adopting environment-friendly behaviours has induced the emergence of new forms of social interaction between employees. Gram-Hanssen (2009) shows how a straightforward measure of domestic consumption or a home visit from an energy counsellor may prompt people to change their routines, which in turn modifies the meanings ascribed to the notion of ES. In the domestic context, the use of a smart meter appears to strengthen people's sense of control (Hargreaves et al., 2010), but it may also generate new power interrelations, as some parents transform the device into a child-monitoring tool (Naus et al., 2014).

Consequently, examining ES behaviours from a practice-based theory perspective helps understand the set of meanings related to eco-friendly gestures, going beyond the usually investigated factors. This approach, based upon the analysis of consumers' lived experience, also

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