



The British public's perception of the UK smart metering initiative: Threats and opportunities



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HIGHLIGHTS

- We examine consumer acceptance of smart metering initiatives using focus groups.
- Consumers perceive both threats and opportunities in smart metering initiatives.
- Threats include; autonomy issues, privacy concerns and mistrust of suppliers.
- Opportunities include: accurate billing and enablement of future ICT services.
- Consumers responded positively to the idea of automated energy management.

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ABSTRACT

Consumer acceptance of smart meters remains crucial in achieving the potential carbon emission reductions offered by advanced metering infrastructures. Given this, the present research used deliberative focus groups to examine what is needed to secure acceptance and engagement from domestic consumers with services, products and 'offers' in smarter power systems. Our findings suggest that consumers are able to identify not just threats relating to smart metering initiatives but opportunities as well. In particular, our focus group participants responded positively to the idea of an automated system that could be used to achieve energy savings in combination with time-of-use tariffs. We conclude by outlining suggestions for policy recommendations that may help consumer acceptance of smart meter enabled services be more readily achieved.

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1. Introduction

The installation of smart meters into millions of homes across Europe, the USA, Canada, New Zealand, and Australia is one of the biggest energy industry change programmes in history (Darby, 2010). The advanced metering infrastructure afforded by smart meters, including the proposed development of a 'smart grid', offers considerable scope for new offerings in smarter energy management services and may also help reduce environmental impact via lowering consumption and/or load shifting (Darby, 2009). However, in order for these benefits to be realised, it is crucial to secure consumer acceptance of smart meters and the

associated services that they may enable. Indeed, as Smart Energy GB, the body responsible for promoting smart meters in the UK, observes, "Smart meters aren't mandatory – consumers can choose not to opt in. This means the rollout is not something happening to us – it will only work if we all actively and enthusiastically opt in."¹ Yet, current research has predominantly focused on the technical and system configurations involved with smart metering with non-technological topics, such as consumer acceptance of 'smart services', attracting considerably less attention from researchers (Solaimani et al., 2015; Wilson et al., 2014). Moreover, the research that has examined consumer acceptance and engagement with smart meter enabled services (SMES) has tended to focus on the use of smart meters to provide feedback to consumers about their energy usage via an in-home display (IHD;

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¹ Extract taken from <http://www.smartenergygb.org/>.

Table 1
A Summary of the New Economic Foundations Five Ways to Well-Being Framework.

Ways to well-being	Descriptive Explanation
Connect	Connect with the people around you. With family, friends, colleagues and neighbours. At home, work, school or in your local community. Building these connections will support and enrich you every day.
Be Active	Go for a walk or run. Step outside. Cycle. Play a game. Garden. Dance. Exercising makes you feel good.
Take notice	<i>Take notice.</i> Be curious. Catch sight of the beautiful. Remark on the unusual. Notice the changing seasons. Savour the moment. Be aware of the world around you. Reflecting on your experiences will help you appreciate what matters to you.
Keep Learning	Try something new. Rediscover an old interest. Sign up for that course. Take on a different responsibility at work. Fix a bike. Learning new things will make you more confident as well as being fun.
Give	Do something nice for a friend, or a stranger. Thank someone. Smile. Volunteer your time. Seeing yourself, and your happiness, linked to the wider community can be incredibly rewarding and creates connections with the people around you.

e.g., Buchanan et al., 2014; Hargreaves et al., 2010; Hargreaves et al., 2013; Snow et al., 2013). While such research is needed in light of the UK government's imminent plans to provide 53 million households with an IHD as part of the smart meter roll out (DECC, 2013), there is also a need to explore consumer acceptance of SMES that may emerge in the longer-term. This is especially pertinent, given that other SMES may succeed in attracting consumers for whom the IHD alone has failed to engage.

Given this, in the present research we examined the British public's responses to (i) smart meters and (ii) three 'smart service' concepts: automation, community rewards, and gamification.² Notably, in keeping with our emphasis on consumer acceptance the three SMES we presented to focus groups were derived from a stakeholder workshop in which participants developed service concepts using inspiration from the New Economic Foundation's 'Five Ways to Well-being framework' (Aked et al., 2009). This framework identifies five factors that past research has extensively demonstrated are related with higher quality of life (ibid, 2009): connecting with others, being active, taking notice of experiences and surroundings, learning and giving to others (see Table 1 for further details). The rationale behind applying this framework was to appeal to a wider set of motives that consumers may have (e.g., to learn, to contribute to the community, etc.) rather than narrowly targeting SMES at either consumers' financial and/or environmental motives. To the best of our knowledge, we are the first to utilise a well-being framework to derive concepts for future SMES and to examine consumer acceptance of the services that arose out of this novel approach. Accordingly, we aimed not only to contribute to the existing literature concerning consumer acceptance of future SMES but also, in placing consumer well-being at the foundation of our investigation, hoped to highlight some key facets that should be considered in the design and marketing of SMES.

In the following paper, we briefly outline how smart meters are likely to affect UK consumers in the short- and long-term, before providing an overview of existing research into consumer acceptance of smart meters and prospective SMES. We then provide an overview of the present research and explain how and why the three SMES (automation, community rewards, and gamification) we presented to focus groups were derived using a well-being framework. Finally, we present a thematic analysis of consumer responses to the three SMES and more generally to smart meters, before concluding with the implications that our findings may have for policy.

1.1. How will smart meters affect consumers?

In the short-term, it is anticipated that smart metering will put an end to estimated billing and give UK consumers control over

² Gamification refers to the process of enhancing services with (motivational) affordances to invoke gameful experiences and prompt desired behavioural outcomes (Hamari, 2013; Huotari and Hamari, 2012).

their energy bills by equipping them with an IHD that provides real-time information about their consumption, thus enabling them to switch suppliers more easily to secure better tariffs (DECC, 2014a, 2015). The installation of smart meters will also mean that consumers who fail to pay their bills could be 'remotely disconnected' or switched to a pre-payment mode³ by their energy supplier; although the UK's utility regulatory body Ofgem has introduced rules to ensure this step is taken only as a last resort (National Consumer Council, 2008).

In the longer term, smart meters provide the infrastructure needed for the development of smart grids and smart appliances, as well as other home energy management services (DECC, 2014a, 2015). It is envisioned by the government that this will "play a key role in transforming how consumers buy and use energy" (DECC, 2015). For consumers, this is likely to mean that their energy providers will introduce new time-of-use (TOU) tariffs to incentivise them to consume energy during off-peak hours. Static TOU tariffs will charge customers more for their consumption at fixed times of the day, while dynamic tariffs will see customers paying different rates at different times, which may vary from day to day. Such tariffs may be used in tandem with direct load control (DLC), which will see customers give control of their 'smart' appliances to energy providers so that they can be operated during off-peak periods. Evidently then, smart meters may have considerable impact on consumers' lives both in the short- and long-term, and there is a clear need to ascertain whether these changes are perceived by the British public as opportunities or threats and, thus, if consumer acceptance is likely.

1.2. Existing research: consumer acceptance of smart meters and associated services

While existing literature into smart meters tends to be dominated by research concerned with technicalities (Solaimani et al., 2015; Wilson et al., 2014), more recently research has started to explore consumer attitudes toward smart meters and SMES. Although much of this research has focused on the use of smart meters to provide feedback to consumers (e.g., Buchanan et al., 2014; Burchell, et al., 2016; Hargreaves et al., 2010; Hargreaves et al., 2013; Snow et al., 2013), there is some research that has used both quantitative and qualitative methodologies to explore other smart-meter related topics, including the public's perception of smart meters (DECC, 2014b; Forsa, 2010; Krishnamurti et al., 2012) and smart houses (Balta-Ozkan et al., 2013; Paetz et al., 2012), as well as consumer acceptance of various demand-side response options, including static TOU, dynamic TOU, and DLC⁴ (Annala

³ A prepayment mode will ensure that consumers are required to purchase credits for their meter before being able to consume energy. Should consumers run out of credits the meter will have a limited amount of credits to the value of £10. However, should a consumer use these emergency credits they will need to replace them when they next purchase credits.

⁴ Various referred to as remote demand control, automation or enabling "smart appliances".

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