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Consumer engagement in energy data services: recommendations moving forward

Marnie Shaw

Battery Storage and Grid Integration Program

Research School of Electrical, Energy and Materials Engineering,
ANU College of Engineering and Computer Science

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The Australian National University, Canberra ACT 2601 Australia

www.anu.edu.au

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Executive Summary

Energy data services will become increasingly important in a future 'smart' energy system which will depend on customer participation for managing peak demand, ancillary services and distributed generation. This evolution presents a major shift from the previous centralised energy system where customers were passive consumers – the electricity system and the costs associated with providing electricity were largely invisible.

In this report, we summarise recent studies that have investigated both opportunities and challenges in consumer engagement with energy data services. We outline recommendations for successful engagement of consumers with energy data services. The overall goal of collecting and making better use of energy data is to benefit consumers, the energy system and the environment, as well as creating new business opportunities in our future energy system.

Main points:

- Energy data can be useful for consumers and may also play an important role in a future 'smart' energy system.
- Access to customer data must be safe and fair.
- To date, energy data has not resulted in expected outcomes, including customer behaviour change and innovative energy data services.
- We outline recommendations for successful customer engagement in energy data moving forward.

1 Introduction

Energy data services will play an increasingly important role as distributed energy and ‘smart grid’ concepts emerge, involving two-way communications, and thus some degree of customer participation (Darby, 2013). This evolution presents a major shift from the previous centralised energy system. To date, energy data services have largely focused on informing decisions around home energy management and increasing energy efficiency. Moving forward, however, energy data services will become increasingly important for participation in aggregation schemes for demand response and virtual power plants (VPPs), and investing in new assets like solar, battery storage or electric vehicles.

As our energy systems are evolving, a range of new energy data services have emerged and continue to emerge, including:

- Behind-the-meter (BTM) monitoring to provide information about energy consumption patterns, including reconciliation with meter readings.
- Automated management of appliances: set-and-forget scheduler controls to generate sustainable savings.
- Automated demand management (DM): consumers can opt-in to their energy provider’s dynamic load control designed to automatically respond to power outages or peak events.
- Household energy management system (EMS). Including remote monitoring control and providing secure, remote access to a home’s energy management portal from any mobile device or PC. With data-powered savings suggestions via a mobile app or website portal.
- Appliance investment decisions: identifying when appliances should be upgraded to save consumers money and how to operate appliances for longevity.
- Participation in a company offering demand response aggregation and peer-to-peer trading.
- Participation in a community-scale projects such as micro-grids or community batteries.

The European Commission recently highlighted the key and central role of consumers in the global transition to a low carbon society [1]. The first of ten priority steps proposed is “providing consumers with frequent access, including in near real-time, to partially standardised, meaningful, accurate and understandable information on consumption and related costs as well as the types of energy sources” [2].

However, although a growing number of Australians have access to their consumption data through their smart meters, the shift to engage customers in further energy data services and their benefits has been slower than expected. An Energy Consumer Sentiment Survey from 2019 found that only around half of Australians feel they have enough clear information to make energy related decisions, and even fewer feel they have tools and assistance they need to manage energy use and costs.

To some degree, this may be due to consumers not being able to share their energy data with third parties easily. Recent rule changes will soon change that. The rule change is expected to promote innovative businesses that capitalise on the opportunity to use customer data to generate insights both for the consumers themselves, and also for our energy system more generally. A similar approach was rolled-out in North America, with their Green Button Initiative.

However, the process of enabling consumers to share their energy data must be safe and fair, and consumers must be appropriately rewarded for access to their data, if they choose to make that data available. Chandrashekeran et al., recommend we look to the European Union’s General Data Protection Regulation which requires that consumer consent is explicit, confined to a specific purpose, easy to understand, freely given, and easily withdrawn i.e. no pre-ticked consent boxes [3].

An important issue is whether consumers actually want to access or share their energy data. Although a large proportion of Australians have some knowledge both of the broader system and of the energy performance of their homes, recent research found that end-users have limited knowledge of the smart grid, and the benefits and impacts it will have on them [4]. An overarching issue may be the high level of distrust in the energy sector. Australians view energy policy as politicized, highly changeable and are frustrated by the lack of a long-term energy vision and pathways [5]. Recent research has revealed that at least a proportion of Australians question the privatisation reforms around energy and do not necessarily view energy as a service which should be ‘for profit’ [6]. Therefore, engagement strategies must both take into account existing norms and householder knowledge around energy in Australia, as well as the environment of

distrust that pervades discussions of energy policy, particularly if they involve any party that seeks to make profit from energy services.

Energy suppliers who offer useful energy data services may see benefits in terms of lower churn rates and improved image. New business models may be able to capitalize on customers' newly built sense of empowerment and trust by cross-selling additional products and services. All of these benefits combined should lead to increased customer satisfaction. A cautionary note here is that even new energy businesses have found themselves 'tainted with the same brush' as incumbent retailers, and have found it challenging to build trust with their customers.

2 The impact of energy data services to date

Although one of the goals of energy data services is to provide consumers with useful information on consumption and related costs, a 2019 Energy Consumer Sentiment Survey highlighted that only around half of Australians feel they have enough clear information to make energy related decisions, and even fewer feel they have tools and assistance they need to manage energy use and costs.

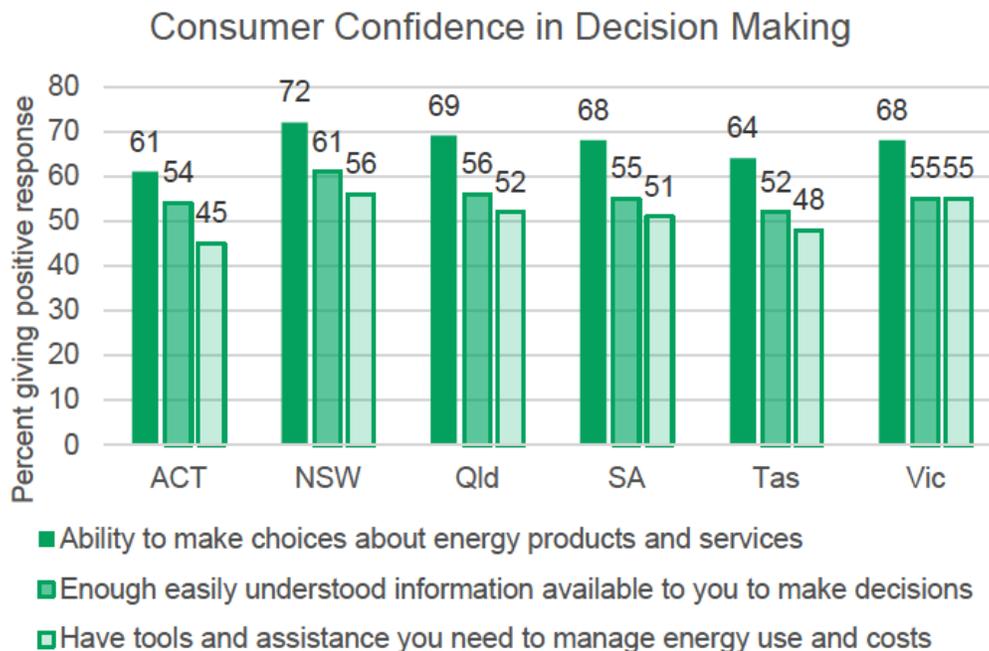


Figure 1: Source: Energy Consumer Sentiment Survey Dec 2019 [7]

A report from the Victorian Auditor General found that, overall, energy data technology has not resulted in the expected customer behaviour change and the hoped-for innovative digitisation

of energy data services [8].

3 The smart meter experience

For the design of energy data services moving forward, there are some lessons to be learned from the smart meter experience. More than half a million smart meters have been installed in Australia¹. However, to date, smart meters have only resulted in household energy savings of 3-5% [9]. Likewise in Europe, a review of the impact of electricity consumption feedback on consumers electricity consumption found that, for a total of 154 feedback trials, an average reduction of 5.4% was observed [2]. Some of the reasons for the disappointing smart meter outcome are discussed below.

First, the roll-out *lacked a comprehensive communications campaign* to encourage consumers to capitalise on the benefits of their meters [8]. As a result, most consumers are unaware they can access their data and the in-home electricity-use tools that have been developed so far are still not widely taken up [8]. A recent report highlighted that more efforts need to be made to study the best messages to deliver to consumers [10].

Second, as highlighted by the global energy think tank, Vaasa ETT, the electricity sector has channelled inadequate funding towards *understanding how socio-economic and cultural factors that might impact how consumers make use of smart meter information* [10]. It was suggested that the electricity sector might tend to emphasise technological development over and above all other factors.

Third, more research is required to understand *what information consumers need most*. Some research has found, for example, that smart meters do not provide enough information about which appliances use the most electricity and consumers tend to underestimate the electricity use of electricity-intensive appliances. In a study in Germany, providing appliance-level feedback was shown to result in a further 5% savings [11].

Finally, in Australia, third parties have not been able to easily access consumer data. This was highlighted by the Victorian Auditor General as an impediment to the development of in-home tools and expected innovation [8]. With recent rule changes that give consumers the right

¹<https://www.aemc.gov.au/news-centre/media-releases/smart-meter-installations-across-national-electricity-market-update>

to authorise third party access to their data on their behalf free of charge, this situation may change. However, enhanced access to consumption data also brings risks. For example, we must ensure that consumers benefit from the use of their data by commercial entities, and that those benefits are evenly distributed across socio-economic groups. And we must also ensure the privacy of consumers.

4 Energy data services: the consumer experience

The global energy think tank, Vaasa ETT, recently highlighted the lack of research towards understanding how socio-economic and cultural factors that might impact how consumers make use of smart meter information [10]. As outlined in Fig. 2, several trials have been carried out to investigate customer experience of energy data services. All studies identified a lack of simple, readily available information for consumers. More research needs to be done to study the best messages to deliver to consumers [10]. In a large review of 154 feedback trials, it was found that the impact of customer feedback increases with the number of feedback types and channels provided, up to 6 [2]. In-home displays were found to increase customer engagement with electricity data compared to an online portal [12].

It was also noted by two studies that engagement can only be maximised if provided in the context of different segments of consumers with different interest, norms and rationalities [2]. People (even people living under the same roof) are different and behaviour change is often triggered by different incentives and mechanisms. Greater awareness and appreciation of the context in which households make decisions about their energy is crucial to understanding their receptiveness and preferences with respect to distributed energy resources [13].

Anda et al., report on their successful customer engagement with smart metering and behavioural change in Perth [4]. Using 'community-based social marketing' which involved extensive on-going feedback including first identifying the barriers to engaging sustainable behaviours through research prior to delivery. Then they designed a strategic approach to integrate behaviour change tools, and followed-up with multiple letters and phone calls throughout the trial. Results were a reduction in peak demand (peak lopping) of 20%, peak demand shifting (load shifting) to reduce energy consumption during 'super peak' by 10% and a total energy use reduction of 10%.

Where the information was available, customers in these trials were generally satisfied (70-80%). For one trial, that satisfaction was specifically linked to customer's lower electricity bills

[14]. For one study (Smart Grid, Smart City Customer research report), 83% of participants reported that they took action to reduce or change how they used electricity [12].

| Name of Study/Trial | study details | What's important to customers? | Amount of feedback | Type of feedback | Behavioural changes? Consumers positive/satisfied? |
|--|---|--------------------------------|---|---|---|
| Alkimos Beach Energy Storage Trial Customer Insights Research 2019 | Cost main driver behind the decisions about energy appliances (including rooftop solar PV systems) and energy use, but the environment and 'doing the right thing' also important. Being a part of the community and developing community relationships not as important. | | Lack of understanding of how the product and pricing model works, and how households can maximise savings. Perception that there is a lack of simple, readily available information about the trial, and no easy access to help and advice. | | Vast majority of respondents on the trial were satisfied (mostly due to lower bills – 80% were better off on trial) |
| Institute for Sustainable Futures Smart Grid, Smart City Customer research report | 'Cost of bills' and 'maintaining a reliable supply' were rated equal-highest as the most important issues relating to energy supply by customers. Smart meter safety issues, and privacy of energy consumption data were rated to be of lower importance than other issues. | | Almost no participants said their feedback device gave them too much information, and the more information that was provided to households about their electricity use, the more they wanted. | In-home displays increased customer engagement with electricity data compared to an Online Portal. Detailed appliance tracking drove bill reductions. | 83% of participants reported that they took action to reduce or change how they used electricity 70% 'satisfied or 'very satisfied' -- 9% 'dissatisfied' or 'very dissatisfied'. |
| Bruny Island Battery Trial Project Final Report Social Science http://brunybatterytrial.org | Households are diverse, and greater awareness and appreciation of the context in which households make decisions about their energy is crucial to understanding their receptiveness to DER, and their DER preferences. | | (1) customers reported a lack of information at the time of technology installation and (2) a number of households were unsure about which tariff they were on | | |
| Smart metering for residential energy efficiency: The use of community based social marketing for behavioural change and smart grid introduction | n=40,000 Perth | | Extensive on-going feedback including letters, phone calls, delivery of requested educational materials and scorecard. | community-based social marketing | Peak demand reduction 20%. Peak demand shifting by 10%. Average total energy use reduction of 10% |
| The Role of Data for Consumer Centric Energy Markets | People (even people living under the same roof) are different and behaviour change is often triggered by different incentives and mechanisms. | | Our findings show that the impact of feedback increases with the number of feedback types and channels provided (up to 6) | Disaggregation* leads to the highest savings. Providing feedback via IHDs leads to the highest savings. | 86% of pilot participants are satisfied with the feedback programme and 85% would have liked the impact of dynamic programme to continue. tariffs by 75-172% |

Figure 2: Summary of social research examining consumer engagement in energy data services

5 Lessons learned and recommendations moving forward

Several organisations have outlined recommendations for successful customer engagement in energy data moving forward, including the International Smart Grid Action Network [15], Vaasa ETT [10], the CSIRO Future Grid Forum [15], the International Energy Agency (IEA) and the Monash University Emerging Technologies Lab [5]. Across these reports, key components of successful customer engagement have been identified as follows:

- Customer involvement through engagement, education, consumption feedback and supporting technology [10].
- Gaining *trust* – customer attitudes to potential benefits vary according to the level of trust customers have in their electricity supplier [16]. The levels of trust in the energy industry in Australia are suggested to be as low as 54 percent compared to the global average of 68 percent [17]. A recent study identified general mistrust of electricity retailers with participants suggesting they were sceptical about the information provided to them [18].
- Extensive pre-planning and review by stakeholders [15].
- Simple messages communicated effectively through good choice of themes and mediums, tailored to the target audience [15]. As reported by the International Energy Agency (IEA) (2011), during the roll-out of 33 million smart meters, ENEL (Italy’s largest power company) dedicated time to educating the public through town hall meetings and dedicated discussions with customer protection groups that had voiced concerns over the collection of data about customer energy habits.
- Reliable, objective information should be provided by trusted sources including research organisations (such as CSIRO in Australia) and universities. Trust is a critical element, and having multiple reputable sources from diverse positions, work together to develop advice, can help to overcome competing arguments [19].
- Community engagement that encourages two-way communication as opposed to just raising awareness or selling imposed solutions [15]. The CSIRO report highlighted the importance of *face-to-face communication* and knowledge sharing to overcome gaps in knowledge about the particular issue and associated technology, and also found that consumers often enjoy working in groups of like-minded individuals [18]. The review by [5] also found that community/local energy projects are pathways to engage and build trust with households.
- Appropriate and appropriately priced products and services to complement a product campaign [15]. Some stakeholders point towards (stronger) price signals as the main

path to greater household engagement, however research has also found that households have a price threshold beyond which they are unresponsive. Indeed, habits and the needs of the household trump price. [5].

- Understanding social and cultural factors. Research from CSIRO found that consumers are strongly motivated by the idea of being good citizens [18]. Work from Monash University found that households engage with ideas of community benefit, protecting vulnerable others, and helping the electricity system [5]. Finally, the CONSORT Project found that households are diverse, and greater awareness and appreciation of the context in which households make decisions about their energy is crucial to understanding their receptiveness and preferences with respect to distributed energy resources [13].

6 Conclusion

The overall goal of collecting and making better use of energy data is to provide consumers with accurate and understandable information on energy consumption and energy sources. Further energy data services can help to manage peak demand, ancillary services and distributed generation. Energy data for these services needs to be accessed in a safe, fair and transparent way, with appropriate compensation. To ensure this, we need engagement and supporting technology. Social and cultural factors need to be considered. Trust is key – objective information should be provided by trusted sources, including research organisations and universities. Education programs should be simple and effectively communicated through tailored mediums. Engagement should be two-way as opposed to just raising awareness or selling solutions. Energy data can support consumers to continue to play a central role in the global transition to a low carbon society.

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