Smarter Protection

Potential risks for consumers in a smart energy future: Closing report

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1. Introduction

Citizens Advice want to understand how to protect consumers from risks created as decarbonisation, digitalisation and decentralisation change the energy system. Both the Energy Systems Catapult and Citizens Advice have recently done pioneering work to understand how consumers may experience emerging smart energy products and services.

To develop this understanding, Citizens Advice commissioned Energy Systems Catapult to explore the consumer issues through a short six week activity of desk based research, a workshop between Citizens Advice and the Energy Systems Catapult and some feedback from industry and policy stakeholders in the sector. This document summarises the key findings from these activities. The ten consumer risks identified span across consumer experiences.

2. Exploring the consumer's journey in a world of smart energy products and services

A transition to smarter domestic energy products and services could bring opportunities for richer, more tailored consumer experiences but there are also threats that may prevent these benefits from being realised. This section walks through the stages of a journey that consumers may take in this future world.

In a collaborative workshop between the Energy Systems Catapult and Citizens Advice we identified the possible activities consumers might undertake and the data that might be exchanged. These are summarised in Figure 1.

	AWARENESS / SELECTION	PURCHASE	INSTALL	FIRST USE	GENERAL USE	SWITCHING / UPGRADE	REMOVE / END SERVICE
ACTIVITY	How might people become aware or select new energy products/services? • Links to other tech already in the home • See it online in news/advert • Smart meter provider/operator recommends it • Sees display of tech in a local shop • Part of a package/bundle • Recommended by Citizens Advice • A service or package/bundle recommended by Citizens Advice • Recommended by a price comparison website • Sees it on the App Store • Sees an advert • Visits a hi-tech show home • Automated switching site • Sees it in high street shops	How might people purchase them? • Bundles of home services • Appliances and energy consumption included • Buys a new home and it comes with products/services • Free to consumer but they must provide their data to use it • Through Energy as a service • Pay as you save • Pay through a regular service (contract)	How might they be installed? • An energy supplier or supplier-approved installer physically installs them in the house • Luxury customer experience e.g. apple genius bar • Pairs with other devices in the home • Self-install, either very simply (plug and play), or some expertise required • Smart installer comes to the house	How might people first use them? • Logging in • Changing user • Removing data from previous owner • Notification to home insurance/other companies/warranties • Connecting to another device • Create password or set up other security features • Set up preferences • Learning or training • Entering the home owner's details (e.g. the landlord) • Reading instructions	What might people be doing when they are generally using them? • Changing the way they pay • Choosing a new tariff • Changing their personal circumstances e.g. develop an illness, change jobs etc • Changing their preferences or settings • People moving in and out of the household • Software updates • Tracking how it is used • Knowing how it performed • Link and unlink to other products and services	What might it mean to switch or upgrade? • Buy another product or service that changes functionality • Negotiate a better deal on price • Move to a new tariff or payment structure • Replace dead battery • Change device(s) • Energy supplier/service provider goes out of business • Product or service is time limited and the time ends • Difficulty moving away from one device to another because of interoperability issues	What might be happening when people remove or end a service? • They decide they want to return a product • Pay a final bill • Sell or leave the home • Ask for a refund because unhappy with quality • Current service replaced/taken over by a new service • Moving the service to a new home
DATA	• Browser/search history	• Address/contact information • Eligibility data • Socio-demographic data	• Who is in the house • Detailed condition of the house e.g. if doors or windows are well secured	• Payment history • Energy usage/consumption history • Data portability • Income information • Room by room occupancy • House occupancy • Products the consumer doesn't have • Shower habits • Hacked data • Conversations (i.e. voice recordings) • Preferences of what products and devices are used at what times • Bank details • Environmental data that may suggest a health risk • Purchasing cycles/when a subscription/service is due to be renewed • Spending history or purchases • Health conditions • Work status			

cATAPULT

Figure 1: A summary diagram of the collaborative workshop activity between Energy Systems Catapult and Citizens Advice to identify possible activities and data that a consumer might undertake and exchange.

Awareness and selection

Smart phones and smart energy meters are beginning to enter homes, but smart domestic energy products and services are not yet common place for UK consumers. To be aware and select a product or service that works, consumers may use a variety of ways to understand the offers available to them, from price comparison websites to recommendations from service providers in the sector. If this is their first purchase of a specific smart energy product or service, they may use existing data from other sources that they do have available such as their smart phone or smart energy meter or they may be asked to estimate their needs through a set of questions designed to help them understand what they might need and want. The market may include new types of organisations such as those providing a smart home service as a package that brings different services and products together.

Purchase and install

In purchasing a new smart energy product or service, there may be new types of offer and ownership models, from bundles of smart services to pay as you save energy, to paying for a range of services through a regular service contract with one provider.

There may be different ways that the products and services can be installed or initiated. They may reflect the current ways we see technology being installed, such as by specialised or approved installers, by qualified domestic service tradesmen or by the consumer themselves. Installation could be carried out by current tradesmen that might be able to expand their skills to include installation of new smart energy products, or it could require a new type of tradesperson specialised in smart home products or services.

Depending on the requirements, physical installation could happen in several different ways and give the consumer a range of different roles. Where the product or service requires certain conditions of the property, the consumer might find out that their home isn't compatible with the product. These might be conditions that can be changed (such as their broadband speed isn't quick enough) or they might not be able to be changed (such as their walls are too thick for the transmission of the signal between devices). Where a professional installer or engineer is required, it could be that a survey of the property or the use of existing information about the property could be used to assess what service or product would work in that home.

Consumers currently buy energy directly from their energy supplier. They pay other actors in the energy system, like the DNO, via their energy supplier. However, in a world of smart energy products and services, other actors may become involved. Collaborations to introduce smart home equipment for an electric car and for a new low carbon heating system for example may involve a collaboration between an engineer who installs and services a heating system, a builder who installs building insulation, a plumber who installs a new shower, an engineer who installs a charging port, a car manufacturer, or a Distribution Network Operator to name just a few. This may change the boundaries of who is responsible for different elements of future services.

First and general use

Consumers are likely to begin sharing personal data with their product or service provider when they first use it and set up their preferences for how they want their data to be treated. Potential areas of concern in the consumer journey start to become very diverse during more general use.

On first use, consumers may need to agree safety and security procedures. There may be additional activities at this stage such as adding or removing data about other household members. They may also need to remove information about previous owners if they have acquired a product or service second hand. If the landlord sets up a system, it may not suit the needs of tenants during everyday use.

The service provider may ask the consumer to share additional information such as payment details, occupancy and lifestyle habits, other products in the house, health status and income information if they need it to deliver their service.

Learning how to use the new product and service at the time of first use and beyond may be done through learning by doing, reading a set of instructions or following a tutorial. Different consumers may need different ways to understand how their product works.

Changing and ending service

Consumers may want to consider trying out alternative products and services. To do this, they will need to be able to compare different features and prices, and then either modify their product or service or move to a different provider. It may be difficult to compare services if they have very different offers and it may be easier for an existing provider to make an offer than for a competitor because they know more about the consumer.

Consumers may need to communicate with their product or service provider (or vice versa). One example might be when consumers need to change or upgrade their product or service, for instance with new batteries or software updates. Consumers may also need to communicate with another authority, for instance as we see with cars when consumers are notified that their MOT is due for annual renewal.

3. Consumer risks in a smart energy world

The previous section explains how a consumer may experience a new, smart energy product or service. This section describes the risks consumers may need protection from to ensure they have a positive experience. These risks are not only applicable to some consumer groups but may raise different problems for different consumers.

3.1. How might consumers understand what they are buying?

In paying for products and services, providers need to be transparent and clear with consumers about how they are charging for the service. Smart energy products and services may operate differently and therefore be subject to different costs for the provider that are passed on to the consumer. For instance, a service provider selling warmth to consumers could calculate a personalised price of heating a home based on the fabric of the home, how energy and the home is used and the energy costs.

Consumers may misunderstand how they are being charged for a new product or service, especially if they are not clear on what shapes the cost of this service today. Providers will need to learn how to explain their service. For instance, a provider who is selling heat as a service may need to explain why it costs more to heat a home on a cold day and why they cannot heat a home above a certain temperature.

It may be more difficult for consumers to understand what they are being charged for their energy service if it is bundled with other domestic services like water and telecommunication. Initial experiences of tariffs where smart home products are part of the tariff have found that consumers aren't always clear on what they are paying for and will receive. Citizens Advice have already seen cases where consumers have been charged for smart home products which have not yet been installed.

3.2. What happens if consumers think they are not getting the level of service they bought?

In a world of smart and data-rich energy products and services, there is a risk that consumers will struggle to diagnose and fix problems if they do not think they are getting what they bought. For instance, who will resolve a dispute if a consumer says they did not receive the level of warmth they've bought but their service provider says that they did deliver it? Consumers (and consumer groups or regulators) will struggle to know which party is right, why the product or service failed and whose fault it was.

Consumers who are unfamiliar with digitally-enabled services or new home standards may not know the standards to explore and may not raise issues that could be addressed. This risk may be further complicated if multiple parties need to be involved to deliver a service. Who should a consumer approach if there is a problem with a service that their provider controls several devices to deliver?

3.3. What if consumers do not understand the service being offered?

Smart energy products and services may offer the consumer something they have not bought or experienced in the same way before. This could lead to the consumer and service provider having different understandings of what the service does and does not include. The language used and

the way that the service is communicated could be central to reducing the risk of this happening. If this is not addressed, there is potential that consumers buy a service but do not get the outcome that they want.

3.4. How might consumers understand the data that they have shared and its purpose?

As with other risks, if consumers do not understand the terms and conditions of the service they may be unhappy with the experience using the system. Integration of smart energy products and services may mean that people share a great deal of information about their domestic lives. Consumers may only realise what data they have shared after using a product or service for a period of time when it is too late if they are dissatisfied. Families with young children, or households with other vulnerable residents may need stronger safety precautions around who has access to their data. It might improve trust and help to reduce this risk if consumers were able to check how their data was being collected and used.

There will be some situations where the product owner is different to the product user. For instance, a landlord might buy a product that the tenant uses every day. This creates a risk that one person has to share their data with another person to access a basic service. For instance, a tenant may have to use the landlord's 'smart heating controls' to get comfortable at home. This creates a risk that the user has to share their data with a product owner or do without a basic service.

3.5. How might safety and security mechanisms allow for flexibility for consumers?

Smart energy products and services may use technical advances to improve safety, such as augmenting a login with finger prints for user authentication. However, these precautions may inadvertently restrict access to basic domestic services if consumers cannot bypass them. This could happen if the account holder is not available to log in when another resident or a visitor wants to use the product or service. This would have particularly dire consequences during a power cut.

3.6. How might consumers feel in control?

Smart energy product and service providers may use consumers' data to tailor their offers. However, consumers may want the flexibility to tailor their own product or service, for instance how they pay for it. Services that are purely driven by data and system optimisation may struggle to give consumers the level of control that they want.

Consumers' desire to feel in control of their experience may vary for different elements of the service. For instance, people may care when their radiator is hot as well as when it reaches a target air temperature. Consumers may only realise they want control of something when they are frustrated that they do not and find this restrictive.

Providers that can give consumers experiences that they enjoy could reap huge rewards but they will need to understand consumer behaviour as well as how technical systems perform.

3.7. How might consumers compare offers when the range of offers is broad or new to them?

Consumers currently purchase kilowatt-hours of energy, often using an annual consumption figure for gas and electricity to compare the price of different suppliers and tariffs. Suppliers provide an estimate of this figure on the consumer's energy bill. Introducing smart energy products and services might mean introducing new parameters of service. There is a risk that consumers may not be able to choose the most competitive offer for their needs if they don't understand these parameters, or if they are unable to compare offers from different providers.

Providers will be able to make consumers better offers if they have more data to base their offer on. This may mean that consumers get worse offers when they enter a market, because providers have less existing data to base their (first) offer on. It also means that consumers who don't want to share their data with alternative providers will get less competitive offers when they want to switch. The risk of substantial information asymmetry between the current energy provider and alternative providers may result in the consumer being locked in to their current provider, potentially facing a higher cost.

3.8. How might consumers leave a contract without facing unreasonable barriers?

Smart energy products and services may involve significant up front financial costs, so contracts with tie-in periods may be introduced to pay for them gradually over time, as with mobile phones. These sorts of contract may be complex to leave or change, and tie consumers in for a period of time. Consumers may face a fee if they wish to end these sorts of contract early.

Improvements to the building fabric have historically led to longer lock in periods than those for current energy supply contracts because of this higher initial capital outlay. This issue could become more widespread if smart energy products and services include expensive items like cars or heating systems as they will also take longer to repay.

Consumers who are unable to sign up to a longer term contract, or who have to leave a contract early, for instance because they rent their home may need to change service in relatively short time scales, may face significantly higher costs. Consumers without savings may face higher costs because they avoid cheaper offers with higher financial penalties, even if they are relatively unlikely to happen.

3.9. Who might be responsible for addressing problems?

Smart energy products and services may involve more parties exchanging more data than energy supply does today where suppliers only need meter readings to bill their customers. For instance, a company may need to control a heating system and measure the temperature as well as the gas consumption to deliver a warm home service. Another company may need access to a vehicle's battery, charger and electricity prices to deliver a mobility service.

This means the delivery of an outcome becomes the shared responsibility of multiple parties. As a result, if the consumer faces a problem, it may not be clear to them who to contact and who is responsible. The consumer is likely to understand the issue, but not who should be held accountable, or how it should be addressed (Current consumer attitudes to smart home technology). Failure to resolve these sorts of issue could have significant impacts. For instance, if a

consumer bought a service that stored electricity in their car battery, should they contact their energy service provider, their car manufacturer, or their charge-point supplier if their battery stopped working properly? It will be hard for any independent body to support consumers without being able to access the key data and being able to use it to hold those responsible to account.

3.10. How might consumers' data change providers' responsibilities?

Consumers may share information with smart product or service providers either through their data or their patterns of use. This raises questions about what responsibility this data might come with. The issues are created by what the data reveals about consumers, rather than the type, volume or temporal resolution of the data itself. For instance, if a service provider knows that a home is regularly not reaching healthy temperatures and has a resident that is vulnerable to the cold, there may be expectations on them to act on that information.

4. How might these risks raise problems for different consumer groups?

The figure below shows how the risks laid out in the previous section could result in different experiences for different types of consumers as they would raise different questions for them as they move through a potential journey with smart energy technologies and services.

	AWARENESS / SELECTION	PURCHASE	INSTALL	FIRST USE	GENERAL USE	SWITCHING / UPGRADE	REMOVE / END SERVICE
DOING	Word-of-mouth Advertising Online browsing Review sites Comparison against current View on compatibility Offer pricing	Online ordering Telephone ordering Payment and personal information share Hardware add-ons Installation timetable	Self-install by consumer Energy supplier-approved physical install at home End to end in home install and set up by provider Independent smart engineer install at home Pairing and set up with other device	Logging in Changing user Informing insurance company of install Connecting other devices Setting up security features Setting up preferences Entering personal details Learning to use it	Changing payment method Choosing a tariff Changing personal circumstances Changing preferences Software updates Tracking use and performance Pairing and unpairing with other devices	New functionality Better deal on price Change to a new tariff or payment type Supplier goes out of service Contract comes to an end	Returning a product Refund Paying a final bill Selling or leaving the property Transferring service to a new home

THINKING

"I can only afford the services where I have to agree to all my data being sold."

"There are all these plans, how do I know which one Dad can afford to use most of the day. His health depends on it."

"I cannot see well enough to work this heating controller, how do I get a better one without invalidating my service?"

"Our heating service failed and they say it's the installers fault, not theirs. How do we get it sorted urgently?"

"Dad just started a 24-month contract and now 2-months in they say he has to pay online. He never pays online."

"I worry this bundled utilities service is costing us more, how can I check I am getting a good deal?"

"I know my landlord owns the smart appliances, but I really don't want him to get the data on my consumption. What can he see?"

"Why are we getting these emails from a different firm? They know my usage – how do I check if our provider is selling our data?"

"I'm not getting the temperatures I've bought but the supplier says I am, who can help me prove it?"

Steve
Retired, owns home.
Technology confident deal-chaser but unclear on new smart services.
Nervousness about data sharing.
Attracted to cost certainty.
Has eye health issues and worries about his ability to control equipment.
Hesitant to do major works on his home as last undertaking went badly.

Laura, Alastair & Penny
Own their home. Busy family life, interested in using technology to simplify domestic admin and access best deals.
Major plans to renovate house over the next 5 years. Currently have a smart-meter.
Worry about certainty of service and breakdown risk.
Both work long hours and coordinating home access for trades-people can be hard.

Howard & Janet
Elderly man, living alone in own home.
Daughter has to assist with various domestic admin.
Needs affordable deal for all-day heating as currently paying more than can afford.
Vulnerable to mis-selling. Previous issue with door-sellers.
Daughter worried about data sharing.

Kerry
Young professional, shared privately rented house.
Might move house in the next two years.
Owns some but not all Smart kit.
Landlord involved in some decisions.
Cannot commit to long-term services or property upgrades.
Wants to be clear on billing and keep freedom to switch services.

5. Conclusions

Smarter energy products and services could deliver many consumer benefits. However, there are complex issues the sector will need to work through to deliver this value. There is a risk that consumers will suffer if products and services are designed poorly. These risks are higher at the outset, before new conventions form about how smart energy products and services work.

Some risks could even prevent a new smart energy market from forming to begin with. Firstly, consumers will need to be able to compare offers from different providers and switch between them. Secondly, it will be important to be able to diagnose what caused problems when things go wrong so it is clear what needs to change to put things right in future.

Clearly, then, we need smarter protection to avoid poor early experiences and reap the rewards. However, it may prove impossible to pre-empt and prevent all problems before they happen. Indeed, one of the lessons from digitalisation of other areas of life is that sectors discover how to design high quality experiences from failing fast.

Careful consideration needs to be taken if we are to give consumers the confidence to try new products and services out without putting innovators off taking the effort to learn what works.

Energy Systems Catapult supports
innovators in unleashing opportunities
from the transition to a clean, intelligent
energy system.

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