OPEN ENERGY

USING DATA TO CREATE A SMARTER, CHEAPER AND FAIRER ENERGY MARKET

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Acknowledgements

Who we are

The Federation of Small Businesses (FSB) is the UK's leading business organisation. Established over 40 years ago to help our members succeed in business, we are a non-profit making and non-party political organisation that's led by our members, for our members.

Our mission is to help smaller businesses achieve their ambitions. As experts in business, we offer our members a wide range of vital business services, including advice, financial expertise, support and a powerful voice in government.

FSB is also the UK's leading business campaigner, focused on delivering change which supports smaller businesses to grow and succeed. Our lobbying arm starts with the work of our team in Westminster which focuses on UK and English policy issues. Further to this, our expert teams in Glasgow, Cardiff and Belfast work with governments, elected members and decision-makers in Scotland, Wales and Northern Ireland.

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FOREWORD

The UK energy sector is facing unprecedented change as we seek to meet challenging carbon emissions targets and move towards a distributed energy system. This will require an extensive, and expensive, overhaul of the UK's energy infrastructure, the costs of which will fall on tax and bill payers. These costs must be shared out equitably, balancing a variety of relative and sometimes competing opportunities and risks.

However, previous research by FSB identified a number of areas where small businesses are disadvantaged in utility markets, compared to large businesses and domestic consumers. Many small firms are held back by a lack of expertise in purchasing energy, high opportunity costs of purchasing decisions, a perception that they have little to gain, and poor bargaining power. They lack market resources compared to bigger businesses, yet are provided with little market protection compared to domestic consumers.

Smart meters are a microcosm of the wider energy investment landscape. By 2020, around 30 million households and businesses across the UK will have a smart meter fitted. However, simply installing this new hardware won't automatically provide any benefits to customers. Instead, the benefits of smart meters will only be realised with the changes to the market, and the resultant changes to customer behaviours, that this technology empowers.

Going forward, then, FSB wants to see a new, smart energy market that acknowledges a diverse customer base and enables smaller businesses to make holistic decisions. Business customers must be empowered to understand and choose what services they pay for, where they can find the best deal, where they can save energy, and where and how their energy is generated.

In this context, therefore, it is absolutely critical that businesses and consumers – and those operating on their behalf – have timely and secure access to consumption and usage data.

FSB is delighted to have worked with Fingleton Associates to explore this issue. This report follows similar work that Fingleton Associates carried out in the banking sector, which heavily influenced the move to Open Banking and the subsequent benefits this has brought to customers.

This report helps to identify the necessary reforms needed in the energy sector, without which customers cannot make informed choices about their energy. Open data is the key to unlocking the potential of a smart, flexible and fair energy market.

Allen Creedy
FSB Energy & Environment Chair

INTRODUCTION

Energy is about more than just bills and heating. The sense that the energy market is broken, which many people share, is contributing to a broad sentiment that markets cannot provide basic services that people need. When people get the sense that they're being ripped off or that they're powerless in the face of big suppliers, or even that their 'loyalty' to their provider is being taken advantage of, it can undermine their faith in markets in general. If competitive markets cannot provide something as essential as energy in a simple, user-friendly way, how can we trust them to do anything else?

That leads to demands for more regulation that, if not done properly, can make the problem worse. Regulation may be necessary to ensure open access to the market, but too much can stifle competition and create a sclerotic industry that doesn't innovate, because the rewards for innovation aren't there and access to the market is too costly. That creates a vicious cycle where the answer to insufficient competition and poor customer outcomes is always more regulation, with no acknowledgement about the trade-off between regulation and efficiency.

Making the energy market work better, then, isn't just about saving people a little money. It's about enabling customer choice to be the fundamental driver of competition in the market, switching to better value of more innovative suppliers, even if that means incumbents decline or go out of business. If we can make energy a more open and dynamic market, we may be able to rescue people's perceptions of markets more generally too.

The solution proposed in this report is to give energy customers more control over their smart meter data, which will make the value of having a smart meter much greater – what we call "Open Energy".

The UK has made great strides towards low carbon methods of energy generation in the past twenty years, but we are beginning to come up against a wall – intermittency. Wind and solar power are relatively inexpensive methods of generation, but the wind isn't always blowing and the sun isn't always shining. Nuclear doesn't have these problems, but it's far more expensive and requires enormous up-front sums of money and government revenue guarantees to be economical.

But intermittency can be overcome by using price signals. When energy is plentiful and cheap to produce, it should be cheap to consume too. When demand is high and supply is relatively low, it should be more expensive. This is how we manage scarcity in other functioning markets, and without this kind of price mechanism we're doomed to be reliant on fossil fuels or expensive nuclear generation. Introducing price signals, and making the data available for smart home technology to use them, may make it possible to shift much more of our energy use to clean technology – without more subsidies.

Small businesses bear the brunt of the worst aspects of the energy market as it is. For them, even more so than for domestic customers, the market is complicated and unpleasant, rife with problems around overcharging and being stuck on the most expensive tariffs. Because of the amount of information needed to determine their tariff rates, their market suffers from information asymmetries that often prevent them from getting on the best deal – and recent evidence from Ofgem supports the claim that provision of information can be a substantial barrier to switching for many disengaged customers.[1]

This report's recommendations share some of the concepts of Open Banking, and together could form the basis for a wider set of policy steps designed to use control over data to empower consumers across a wide range of markets. It comes soon after Ofgem and BEIS's announcement that they intend to revive Midata, in a revised form, to deliver some of the benefits discussed in this report. This is a welcome step, if done right. This report argues that these reforms should be bold, to deliver benefits beyond easier switching, and should be implemented for small businesses alongside domestic customers so that they are not left behind.

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1   "Eight times as many people get a better deal in Ofgem's collective switch trial", Ofgem (August 2018). <https://www.ofgem.gov.uk/publications-and-updates/eight-times-many-people-get-better-deal-ofgem-s-collective-switch-trial>

RECOMMENDATIONS

The government should give small businesses and domestic energy customers greater control over their smart meter data and easier access to tariffs available on the market by:

a. Standardising tariffs and other relevant market information in machine-readable formats to allow automated comparisons of energy tariff offerings.

b. Making smart meter data available through a secure standardised API to approved third parties.

c. Allowing energy customers to delegate contract switching powers to third party intermediaries.

These reforms, described here as 'Open Energy', would increase switching rates and create opportunities for innovative uses of data, including for demand-management purposes that could increase the proportion of the total energy mix from renewables.

Summary of Benefits of Open Energy

- Low switching rates are one of the root causes of the dysfunctions in the energy market, including the fact that many customers remain on expensive default tariffs. Energy customers are more likely to switch if they have high levels of certainty about the savings from switching, they can easily find the best tariff for them without having to provide large amounts of information about themselves, and they can switch easily to the new tariff.

- High energy costs are a significant problem for more than half of SMEs, but according to the CMA less than half of SMEs switched tariffs during 2016. Ofgem has concluded that a lack of clarity and transparency about billing and pricing is a significant constraint on competition in the SME energy market.

- Relatively low-cost forms of renewable energy like solar and wind face intermittency constraints that, under current pricing models, will limit how much of the energy mix they can make up. Time-of-use pricing, along with data accessible by 'smart' demand-management products and software, could allow small businesses and domestic consumers to shift usage to off-peak periods or to when energy from renewable sources is plentiful, saving them money and allowing more of the energy mix to come from renewables.

- Smart meters generate a half-hourly reading of each meter's energy use, allowing for time-of-use pricing to be introduced and creating a detailed picture of each business and domestic customer's energy use. Under current rules, this data is only accessible by the customer's energy supplier, for billing purposes.

- 'Open Energy' would give business and domestic customers the power to securely authorise other parties to access this data. This would enable accurate comparisons of different tariffs, which would be particularly useful under a time-of-use tariff regime, and allow third party services to use this data for other purposes such as demand management and better monitoring of energy use.

- As well as giving energy customers control over their smart meter data, Open Energy would require many forms of public data, such as tariff deals, to be made publicly available in a standardised, open API format, to allow customers to get a better overview of the market through, for example, price comparison websites, and make more accurate comparisons between different tariff offerings.

- The final element of Open Energy would be to formalise 'Letter of Authority' powers so that energy customers can authorise third party switching services to act on their behalf in a standardised way. This could enable automatic switching to lower the cognitive burden on people who would like to switch but find the current process inconvenient.

- Introducing these reforms would make switching less difficult and time-consuming for customers, and allow effective intermediation between customers and suppliers that could enable much more frequent and widespread switching between tariffs. In the longer run, it would create the opportunity for ancillary services that allow energy customers to consume energy more efficiently and lower costs for them, and could enable a shift towards a less centralised model of energy supply.

THE CASE FOR OPEN ENERGY

Open Energy is the name we give to the reforms that can solve many of the energy market's problems — by making it more like a normal market, not by adding even more regulation to the mix. It is a set of policy reforms designed to change the terms of the energy market in favour of customers and innovators, primarily by making market information available through machine readable open APIs and giving energy customers' power over their meter and contract data.[2]

These reforms are designed to make switching easier, by eliminating information asymmetries and uncertainty about price and service quality, and to make data available to innovators to allow a new generation of technology that connects individual usage with the demands of the overall grid, and to better integrate people's energy consumption by, for example, giving electric cars the information they need to charge when electricity is cheapest, whenever that might be.

This paper will argue for three main reforms under the 'Open Energy' umbrella:

1. Access to public data - like tariffs - in a standardised, machine-readable, persistently updated format, to give a clear view of the supply side of the market.

2. Give domestic and SME customers the ability to provide third parties access to domestic and SME usage data, meter and contract information, and other characteristics used to determine how much a customer has to pay.

3. Give domestic and SME customers the right to let third parties act on their behalf and to move them between suppliers.

This model supports the "Access, Assess, Act" that is used by the CMA to model the customer choice process — businesses and domestic customers need to be able to access the possible offers available to them in the market; they need to be able to assess what tariffs and pricing offers are best for them using their own characteristics; and they need to be able to act to make a transaction, or nominate someone else to act on their behalf.

The short-term outcome of this, we argue, would be an energy market that was more responsive to price signals of efficiency, and in which domestic customers could get the best deal much more easily. The long-term outcome would be a market that unbundled many of the roles currently performed by suppliers and allowed for greater specialisation in specific types of energy service, such as demand-side response, while lowering the barriers to entry for newer service providers.

As well as improving the functioning of the energy market for consumers, these reforms would improve demand-response by making adaptation to time-of-use electricity pricing easier — through smart home technology that can shift usage to off-peak times, for instance — which would overcome the problem of intermittency that faces many renewables. This would help solve the problem that the shift towards low-carbon generation will otherwise face, and deliver significant environmental benefits.

There has never been a better time for Open Energy. The implementation of Open Banking in the UK has led to the Australian government adopting the UK model and also looking at similar reforms in energy and telecoms. Political discontent at the dysfunctions present in the energy market has never been higher. The technology needed to provide rich individual customer data is now becoming available. And across other markets, old players are being displaced by newer, more innovative rivals that use data effectively to lower costs.

Opening up data in other markets has helped to make them easier to navigate and simpler for customers overall. Transport for London's open APIs for London Bus and Underground schedules and routes have freed people from manually navigating the tube and bus maps, let alone having to remember how frequent a service is at a certain time of day. Now, they just enter a destination into apps like Citymapper, and let the app do the work. It is simple and effective, and it reduces the cognitive load on users instead of increasing it. Energy should be no different.

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2   Open APIs, discussed below, are standardised streams of data that approved third parties can access and use.

CMA ENERGY MARKET INVESTIGATION AND THE IMPORTANCE OF SWITCHING

The energy market is not a well-functioning market. One of the prime reasons for this is that shopping around is inconvenient or confusing for many customers, and so improvements in service or efficiency that would in other markets be rewarded by getting more customers are less strongly rewarded in energy. The CMA's 2016 Energy Market Investigation found that the market features low levels of domestic customer engagement – in the form of awareness of different offerings available and willingness to act by switching between them, which it concluded:

> *"gives suppliers a position of unilateral market power concerning their inactive customer base and that suppliers have the ability to exploit such a position through their pricing policies: through price discrimination by pricing their standard variable tariffs materially above a level that can be justified by cost differences from their nonstandard tariffs; and/or by pricing above a level that is justified by the costs incurred in operating an efficient domestic retail supply business."[3]*

The CMA found that millions of people were paying more than necessary for their energy, to a total detriment of £2 billion in 2015, equivalent to £75 per household.

Although the process of switching can be reasonably straightforward, prompting some to blame laziness for low switching rates, lack of switching may mostly be rational. Professor Amelia Fletcher's study of determinants of switching behaviour found that lack of customer awareness about the process or beliefs about the difficulty of switching can be important barriers, and uncertainty about individual savings (or the magnitude of the savings available) led the CMA to recommend mandatory participation in Midata (discussed in more detail in the appendix) to generate accurate personal projections.[4]

Similarly, Waddams-Price and Zhu (2016) conclude that "expected gain and anticipated switching time are consistently associated with search and switching".[5] In other words, people who realise that they can save substantial amounts by switching are more likely to choose to do so. They argue that:

> *"Regulators who want to stimulate activity need to emulate such confidence in potential gains, while projecting a short switching process ... such messages are often more successfully conveyed to customers by firms than regulators."*

Interestingly, Waddams-Price and Zhu find that part of the reason that older customers are less inclined to switch is these lower expectations of savings – again suggesting that better information and confidence in the process would improve switching in this group. People on lower incomes are more likely to switch if risks are low, but are disproportionately deterred by expectations of difficulty in switching, possibly since the expected savings are lower. In raw data terms, households on low incomes (below £16,000/year) were much less likely to switch than households on high incomes (above £50,000/year).[6]

This is also reflected in the CMA's finding that one cause of low customer engagement is:

> *"the role of traditional meters and bills, which give rise to a disparity between actual and estimated consumption. This can be confusing and unhelpful to customers in understanding the relationship between the energy they consume and the amount they ultimately pay."*

3   Energy market investigation: final report, (Competition and Markets Authority, June 2016). <https://assets.publishing.service.gov.uk/media/5773de34e5274a0da3000113/final-report-energy-market-investigation.pdf>

4   Fletcher, A., The role of demand-side remedies in driving effective competition: a review for Which?, (University of East Anglia, November 2016). <https://www.regulation.org.uk/library/2016-CCP-Demand_Side_Remedies.pdf>

5   Waddams Price, C. and M. Zhu, "Empirical evidence of consumer response in regulated markets", Journal of Competition Law and Economics, (March 2016). <https://academic.oup.com/jcle/article/12/1/113/1750778>

6   Energy and climate change public attitude tracker: wave 21, (Department of Business, Energy and Industrial Strategy, May 2017). <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/611985/Summary_of_key_findings_BEIS_Public_Attitudes_Tracker_-_wave_21.pdf>

This evidence suggests that remedies to improve switching are possible, and may be effective if:

1. They can give customers high levels of certainty about the savings from switching.

2. They can help energy customers to find the most appropriate tariff for them with confidence.

3. They can switch easily to the new tariff.

Low switching levels should not be seen as an inevitable feature of the market, or as exogenous to the conditions in the market. Switching rates in the domestic market will likely increase if uncertainty around the benefits is reduced.

This was demonstrated in a recent Ofgem collective switching trial in which 50,000 disengaged domestic customers (who had been on a default tariff for three years or more) were prompted to switch via a letter sent to their houses.[7] In this trial, [unlike] other collective switches, customers did not have to provide complicated information about their existing tariff to see a personalised savings calculation, making it easier to start a switch.

The results of this trial were that 22.4% of customers took part in a collective switch, eight times more than the control group (making savings of around £300/year each). Since these customers were prompted to switch it is not a perfect trial of the benefits of the sort of proposals in this report, but it is indicative that many disengaged customers need not be so if the informational barriers to switching were lower.

The SME market

The market for SMEs is less transparent and more technically sophisticated than the domestic market.[8] Switching is mostly done over the phone, as prices quoted online are typically indicative, and many providers will reduce them if customers haggle – something that is not possible in the domestic market. There is little price transparency in the market – despite the recent CMA Price Transparency measure implementation (which allows SMEs to get an indicative quote across different suppliers online), supplier solutions vary.

Previous FSB research found that high energy bills were a concern across most kinds of SME (by premises), including private workshops, retail shops and business park-based businesses, and that while 61% of SMEs as a whole said that lowering energy costs would be either 'crucial' or 'useful' for overall cost-reduction, that number rose to 81% of medium-sized firms (10-49 employees).[9]

According to Ofgem's 2017 SME engagement report, only 21% of SMEs switched supplier in 2016–17, while a further 26% switched tariff and stayed with the same supplier. Half used or were approached by a broker in that period, and half also reported negative feelings towards brokers.[10]

Ofgem concluded that there are two primary constraints on competition in the SME energy market:

1. *"Small businesses only engage with the market to a limited degree, for instance, 45% of small businesses were on 'default tariffs' in 2013 – deals which they had not negotiated and were automatically put on by their suppliers; and*

2. *"There can be a lack of clarity and transparency from suppliers in terms of billing, contracts, and information about transferring to other suppliers"*

Many of the remedies recommended in Ofgem's 2016 Retail Market Review, such as greater prominence given to contract termination dates (to help businesses avoid being rolled over onto a new contract that they cannot leave for 12 months), were designed to improve competition by lowering information asymmetries. The CMA also recommended in its Energy Market Investigation that suppliers be required to disclose tariff prices to allow SMEs to make comparisons more easily.

7   "Eight times as many people get a better deal in Ofgem's collective switch trial". <https://www.ofgem.gov.uk/publications-and-updates/eight-times-many-people-get-better-deal-ofgem-s-collective-switch-trial>

8   The CMA concluded that the SME and domestic markets were separate for the purposes of its energy market investigation. However the differences identified do not significantly change the bulk of the arguments made in this report – where they do, we make clear which market we are referring to.

9   The price of power (Federation of Small Businesses, January 2017). <https://www.fsb.org.uk/docs/default-source/fsb-org-uk/energy-report--jan-04-2017.pdf>

10 Micro and small business customer engagement in the energy market 2016,(Ofgem, April 2017). <https://www.ofgem.gov.uk/system/files/docs/2017/04/ofgem_-_micro_and_small_business_engagement_2016_-_research_report.pdf>

OPEN DATA AND OPEN API STANDARDS

Open data refers to the principle of data being made publicly available without permission, so that it can be used by third parties for their own purposes – this includes, for example, data about bus timetables or flight prices, but not about an individual bus user's movements or an airline passenger's flight purchases. Open data is machine-readable and available without permission, so anyone can use it. The move towards open data has come from the recognition that businesses and public bodies often have datasets that they cannot use to their fullest extents.

Making the data public can be self-interested or altruistic – a self-interested body may hope that making some of its data open will encourage third parties to offer ancillary services or solve some of the body's problems. The Department for the Environment, Food and Rural Affairs has opened up many of its data sets, and applications have been built on those data sets. Some examples of applications using UK government open data sets are:
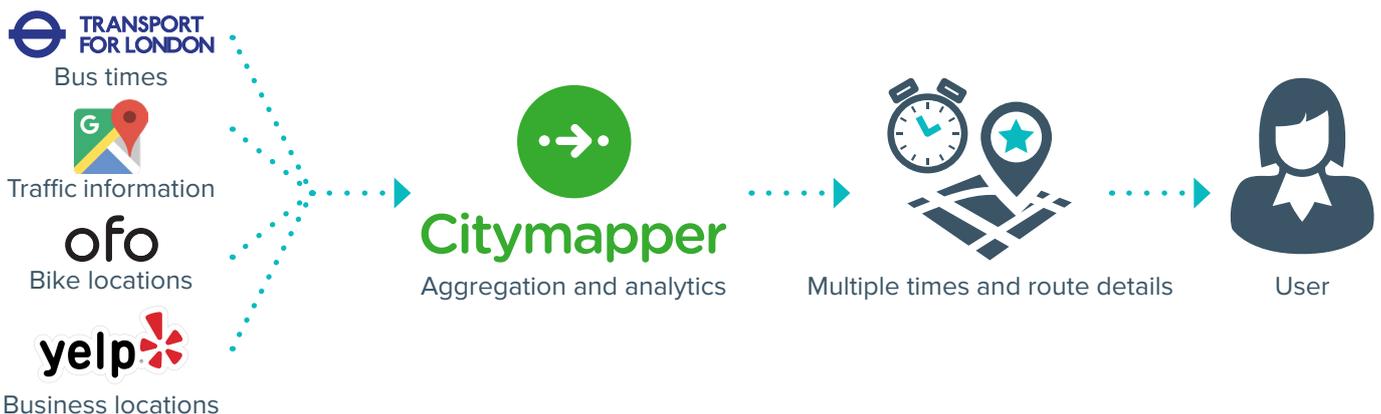
- Bathing Water Explorer gives up-to-date information about water quality at bathing water sites around England and Wales.
- Illustreet, which uses data on deprivation, crime, education, transport, environment, and census data to give people mapped information on different streets, for example for people considering buying or renting property.
- Crashmap gives information about vehicle collisions, including time, location and numbers of vehicles and casualties involved.

Open data is often delivered via Application Programming Interfaces (APIs). An API is a standard that allows different software to communicate with each other repeatedly over time without the need for repeated permission from the user. Information is made available in a standardised way that allows external applications that have permission to access that information to interpret and use that information for their own purposes. APIs are used to allow different applications to 'talk to' each other, for instance being used by most mobile apps to draw information from servers to users' devices. Open APIs (or External APIs) are used to provide access to a database to external software and developers.

Transport for London, for example, makes information on things like timetables, the location of tube and bus stops, and ongoing service information publicly available via open APIs so that third party apps like Google Maps and Citymapper can use the information for their own purposes. Citymapper uses TfL bus and tube service information to give users routes between two places based on real-time information about delays, scheduling changes and so on.

The advantage of this over TfL simply serving the information itself through its own app or web interface is that more experimentation can take place and more choice is available to users. It encourages competition between journey planner apps, allowing them to bundle the information with other service. For instance, both Google Maps and Citymapper allow people to compare travel times on TfL services with the time it would take to cycle or take an Uber, based on Uber's own API. Google Maps can display live bus and train times for much of the UK. By combining data from Uber, TfL and other services, these apps can also usefully compare the time and cost of using different modes of transport between two places. The combination of data from different sources allows far more refined insights, and so increases the value of each individual piece of data, by making it relevant in more and more different contexts.

Diagram 1: An example of an open (external) API

TRANSPORT FOR LONDON
Bus times

Traffic information

ofo
Bike locations

yelp
Business locations

Citymapper
Aggregation and analytics

Multiple times and route details

User

Services that aim to control how users use that service, for example to make sure they are seeing adverts as intended or using that company's own products, will have an interest in keeping API access restricted. This is often not in customers' interests, since it limits the choice they have of accessing services from third parties.

In Open Banking, which has been rolling out to bank customers since the start of 2018, APIs are beginning to be used by third parties for services that monitor your spending and warn you if you are going outside your budget; that track bills and allow you to automatically request part-payment from housemates; that allow lenders to assess your creditworthiness based on your transaction history. It is also used by accounting software like Xero.

One of the crucial features of these APIs is that they are standardised, so that data from one provider is structured in the same way as data from another. This makes it easier for developers to deal with data from multiple providers – they do not have to write different elements of code for each data provider's different way of presenting data – and also prevents providers from intentionally making their data difficult to access or use, thereby locking users in.

In the Open Energy section below, we will discuss how open APIs can be used to make richer use of customers' meter data and tariff data alongside information that exists in public, such as tariff options, but which is difficult for customers to access or assess.

SMART METERS, TIME-OF-USE TARIFFS AND DEMAND-RESPONSE TECHNOLOGY

Smart meters will change the data available on energy use from one manual reading every few months to an automatic reading every half hour. They are being rolled out by energy suppliers, with the aim being for every household in the UK to have a smart meter by 2020.

With a traditional meter there is no way of knowing when the energy was used, so there is no way of charging different rates to reflect differing costs over time. This is despite the variation in marginal cost of production of electricity at different times of day and year, due to differences in demand and supply. As a result, prices do not accurately reflect costs at different times of the day, and customers have no incentive to shift their use to periods where supply outstrips demand.

Smart meters have the potential to change that. A customer with a smart meter generates a profile of their electricity use that shows their actual consumption per half hour, allowing for the supplier to differentiate between use at different times of the day. This means that suppliers could offer electricity tariffs that charge different rates over time – for example, tariffs that were cheap at night-time and other off-peak periods, and more expensive during periods of peak use. This data is stored on the smart meter, and can be accessed remotely by approved parties – typically under the current framework, by the customer's energy supplier.[11]

This could impact customers directly, as they either change their time of consumption or invest in batteries to store electricity during off-peak hours for use during peak hours. Alternatively, suppliers may install batteries themselves, whether at the customer's site or elsewhere, design mechanisms to charge those batteries when it is cheap for the supplier to do so and price accordingly.[12]

In the gas market, there is still some need for more accurate monitoring of use, but the benefits of smart meters are more limited. This is because, unlike in electricity, the gas network can store some volume by increasing gas pressure (this is known as 'linepack').

Smart meters could substantially increase the amount and relative richness of data about energy use that is available. As seen in other sectors, large and rich data sets are a prerequisite to the application of machine learning, and the existence of better data for energy markets may enable the creation of AI that can anticipate demand and manage supply more efficiently than the current system.

This data, along with time-of-use tariffs, could enable quite substantial shifting of electricity consumption to off-peak periods, especially for small businesses. Electric cars and energy efficient modes of home heating are both likely to shift energy use towards electricity and away from sources like petrol and gas respectively. The same principle applies to and other smart home products like washing machines that can be charged or used at off-peak times.

For electric cars, in particular, this may be valuable. Someone arriving home from work could plug their electric car into their home and draw some of the remaining charge from its battery during peak evening demand to power, for example, their television, and then charge it overnight.

Historically, 'baseload' power has been met by nuclear power stations (which cannot flex the amount of power they produce easily), with gas and coal providing more flexible power when demand ramps up or down. Intermittency means that renewables cannot always supply power when it is needed, for example at nighttime when solar power is not available, or it supplies electricity well in excess of what is demanded. The lack of cost-effective storage of electricity means that back-up alternative generators are needed which also raise fixed costs.

There is some evidence to suggest that time-of-use tariffs could radically shift the market in favour of renewables like wind and solar, overcoming this intermittency problem by using price signals. A 2018 study based on data from Oahu, Hawaii, shows that time-of-use pricing that gave customers cheaper prices during periods of excess supply could substantially shift the calculus in favour of renewables.[13] Under a time-of-use pricing model, using estimates about shiftable energy-intensive activities like air conditioning, water pumping and water heating, that study estimates that the electricity generation portfolio could be 79% renewable energy by 2045, even without policies favouring these types of generation.

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11 Extending the smart meter framework for data access and privacy to Remote Access Meters, (Ofgem, August 2014). <https://www.ofgem.gov.uk/sites/default/files/docs/2014/08/final_proposals_ and_stat_con_-_data_privacy_0.pdf>
12 Note that half-hourly settlement refers to suppliers' costs when settling with generators, and time-of-use tariffs refer to customers' costs when settling with suppliers. In principle, either can exist independently of the other, but half-hourly settlement is necessary to ensure time-of-use tariffs can reflect costs accurately.
13 Imelda, M. Fripp and M. J. Roberts, "Variable pricing and the cost of renewable energy", (May 2018). < http://www.uhero.hawaii.edu/assets/WP_2018-2.pdf>

Commercial customers, who in this study accounted for 70% of Oahu's total load and have a large share of potentially-shiftable demand, may be the biggest beneficiaries of this kind of policy. Real-time marginal cost pricing programmes would create some winners and losers, but the effects are unlikely to be pronounced for demand-inelastic energy customers, such as restaurants or other businesses that cannot shift the bulk of their energy to different times of the day. Research from California by Severin Borenstein suggests that, even assuming no change in consumption patterns, 95% of customers would see their bills rise or fall by less than 10%.[14] Bill volatility, which might be driven by unexpectedly low generation levels, can also be hedged against without losing many of the gains from time-of-use pricing.

Time-of-use tariffs place the burden of demand response onto customers. This may be appealing to some, especially owners of 'smart home' products that can automatically respond to price changes, or owners of home batteries, but others may not change their behaviour. Instead, suppliers may offer flat rate tariffs but also install home batteries themselves, which they can charge remotely when prices are low. This would take advantage of low costs during periods of low demand on the grid, without energy customers having to bother too much about changing their own consumption patterns.

This is especially relevant when considering the extra load expected from electric vehicles and heat pumps as they are adopted more widely. For example, an electric car might add about £250 to a household's annual electricity bill, and a heat pump up to £500, together more than doubling the average household's annual electricity bill (albeit also lowering their gas bill, in the case of heat pumps, and petrol spending, in the case of the electric vehicle). If this extra load was drawn during peak hours, it could require an enormous additional investment in new infrastructure to supply (both generation and networks).

But if customers could be incentivised to charge/use these during off-peak periods like the nighttime then the marginal costs could be kept relatively low, as the additional load would still be borne by a generation and transmission infrastructure that is built for periods of peak demand.

By making tariff and usage data more easily available to, for example, smart home products and electric vehicles, Open Energy would enable energy customers to more easily adapt to time-of-use tariffs, and derive greater benefits from their smart meter. By giving customers control over their smart meter data, it will become easier for energy customers to find the supplier that offers the best prices for their temporal patterns of demand, and will allow products with demand-response technology to more effectively access data about energy pricing to intelligently shape their energy use around what is best for their owner.

The smart meter rollout

The smart meter roll-out has faced problems throughout its life. Although nine million first generation "SMETS 1" meters have been installed, the government has set out a new specification, and as of February 2018 only eighty of the second generation "SMETS 2" meters had been installed.[15] Installation rates of smart meters dropped significantly in Q1 2018, and in mid-January the government pushed back the already extended deadline for SMETS 1 meters from July to October.[16]

SMETS 2 meters will send usage data via a central data body (the DCC) to suppliers, and are interoperable by different suppliers so switching is not difficult. Currently, each SMETS 1 meter is designed to send data direct to a specific supplier at least once a day, and while solutions can be found to allow customers to change supplier and keep their existing smart meter, this is not built into the process.

Despite problems the smart meter roll-out has faced, we expect it to continue. Owning a smart meter is a prerequisite for most of the proposals in this report. Despite the problems with the roll-out, and the criticism that has been leveled at the government, it is difficult to see a modern energy system operating without smart meters, although the way in which that objective is achieved may not be optimal. Open Energy, since it should increase the benefits to individual consumers of having a smart meter – for example by making time-of-use tariffs easier to take advantage of – may make the roll-out easier, by creating stronger incentives for customers to get one and raising the overall return generated by the roll-out.

14   Borenstein, S., "Electricity pricing that reflects its real-time cost", NBER Reporter – Research Summary (NBER, 2009). <http://www.nber.org/reporter/2009number1/borenstein.html#N_2_>
15   Meadows, S., "Only 80 second generation smart meters have been installed – as rollout stalls again", The Daily Telegraph (February 2018). <https://www.telegraph.co.uk/bills-and-utilities/gas-electric/80-second-generation-smart-meters-have-installed-rollout-stalls/>
16   Smart Meters: Quarterly Report to end March 2018 (Department of Business, Energy and Industrial Strategy, May 2018). <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/712151/2018_Q1_Smart_Meters_Report_.pdf>

OPEN ENERGY: HOW TO MAKE THE ENERGY MARKET WORK

Inadequate access to data, and restrictions on how that data can be used, are the underlying causes of low customer engagement (both the SME and domestic markets), and low levels of innovation around pricing and other aspects of the energy market.

The solution, we argue, is to give SME and domestic energy customers control over their usage data and the power to outsource some of their energy decisions to others. That, along with broader open data moves across the market that make automated processing of the tariffs and other available offers easier, would substantially reduce the barriers to switching and innovation in the energy market.

Certainly, customer data from both SMEs and domestic consumers is already being used to improve outcomes in the energy market. This is stronger in the domestic market, and harms for SMEs driven by effects like information asymmetries and product bundling are often much more acute as a result.

Price comparison websites already use customer data with respect to location and existing use and charges to give estimates of the costs of tariffs from other suppliers. That allows suppliers to target different customers depending on the cost of supplying them (which might vary according to things like location). Automatic switching services monitor tariffs on offer to the customer and prompt them to switch when savings are possible, but these are not well-tailored to the customer's actual energy usage.

However, the data that these services can access, and the data available in the energy market in general, is severely limited in many ways:

- There is no information available about individual domestic customers' energy use across the day. This limits suppliers' ability to discriminate between customers whose energy use may impose very low demands on the grid (because it happens at off-peak times), and also removes any incentive for suppliers to reward customers who move their use to off-peak times.

- There is currently no straightforward mechanism available to give third parties reliable access to customers' energy usage data, either in a one-off bulk transfer process (as under the old Midata programme) or in an ongoing, persistent way, apart from the customer simply entering in their meter readings, which under time-of-use tariffs will become even more inadequate (as readings will not be able to reflect hourly usage).

- Tariff data and customer contract data are not available in a standardised way, so price comparison websites cannot compare different tariffs easily. Nor does their database automatically update when tariffs are adjusted. There are a wide range of tariffs available (as many companies have historic tariffs as well as active ones) so knowing what tariff you are on is important if you want to assess the value of switching. As tariffs become more complex, reflecting the true costs of supply, third party comparison services will become even more important for customers to make an informed decision.

The energy market suffers from many of the same problems in the banking market that led to the introduction of Open Banking. These are:

- Information asymmetries throughout the market,

- High cognitive load on customers that wish to switch in terms of information required by them,

- Low levels of customer engagement,

- Many customers going with an expensive 'default' supplier or tariff when less expensive options are available from other providers,

- Increasing variation in the product offering that causes greater complexity (In future, as time-of-use tariffs are introduced,

- Low efforts made by suppliers to provide machine-readable information about products to price comparison websites, and

- Limited access for new firms that might have different business models.

Ofgem has announced that it intends to revive the Midata programme, which was initially designed to allow customers to export their data from, for example, their bank or energy supplier via a static CSV file for the purposes of data portability and comparisons. Ofgem's Midata revival seems to intend to update this approach, hopefully along the lines suggested below. We welcome this development and urge Ofgem to take a broad view of the opportunities, including the potential for substantial innovation based on this data, as well as to include SMEs in its remedy and not focus solely on domestic customers.[17]

Open Energy would solve these problems by using a similar approach to the one taken in Open Banking, and being explored in other parts of the economy as well – by using open data and secure APIs to eliminate information asymmetries and allow customers to disaggregate services that are currently bundled together in a single offering.

New technological developments also mean that large amounts of rich data are now available for each customer – transaction history and other account details for banking customers, which they can access via their bank account website or mobile app, and smart meter reading data in the case of energy. Access to smart meter data is intended to be controlled by the DCC, though the data is stored on the smart meter itself. In conjunction with half-hourly settlement, which would give suppliers a cost incentive to offer time-of-use tariffs, this data could drive significant changes in customer demand.

Open Energy would have three main elements:

1. Open data sets
2. Smart meter data control
3. Delegated authority powers

Diagram 2: Three key elements of Open Energy
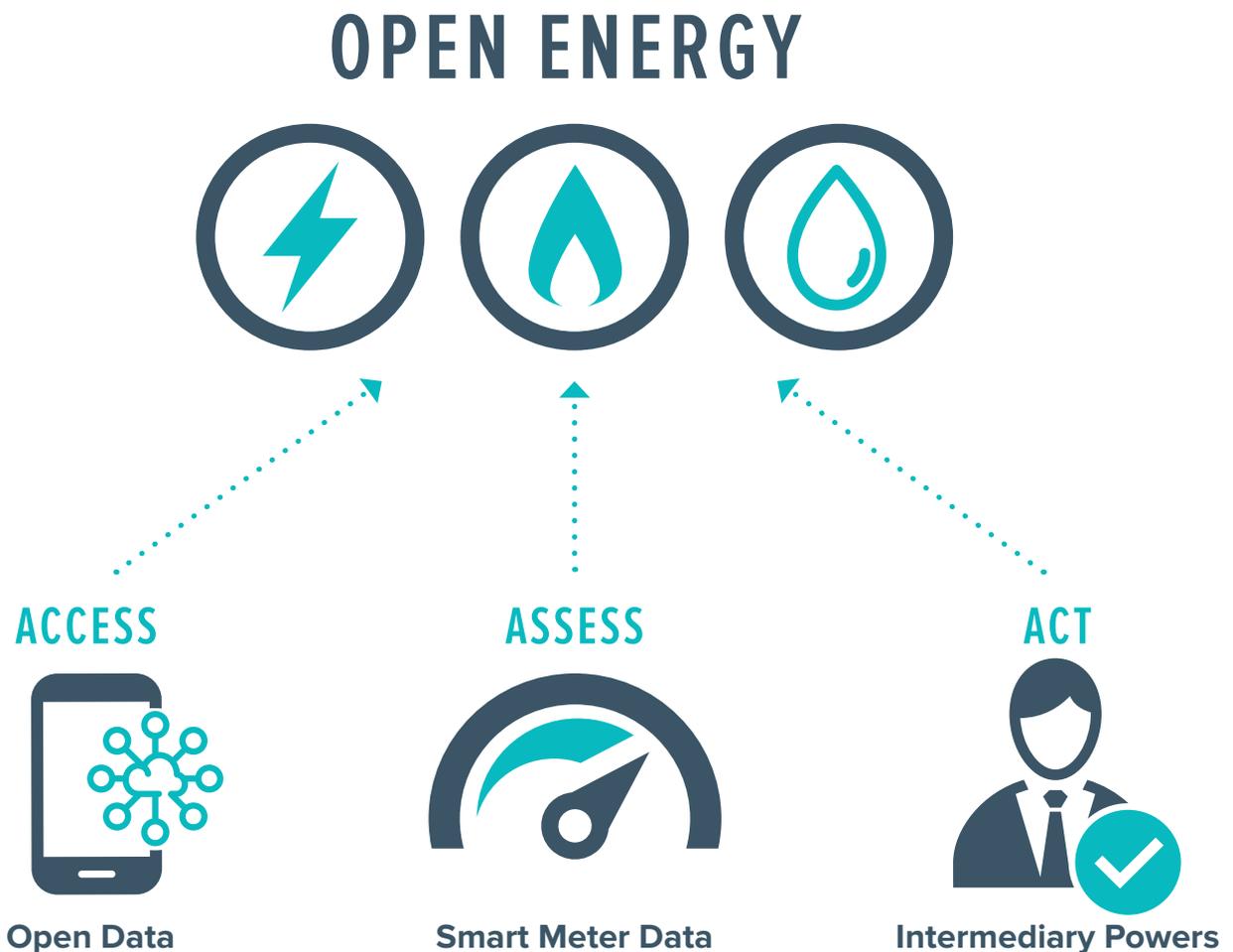
OPEN ENERGY

ACCESS
Open Data

ASSESS
Smart Meter Data

ACT
Intermediary Powers

OPEN DATA

Providers of switching services, 'smart home' demand response services and other services enabled by Open Energy would require access to data that is already public, but provided in a reliable, persistent and standardised format. This would, for example, allow a switching service to automatically detect when a new tariff has entered the market, or when the terms or price of an existing tariff have changed. (Note: this would not require all deals to be made available to all customers – just for TPIs and customers to be aware that they exist and to understand who could access them.)

In addition to sticker prices for tariffs should be the data that underlies the drivers of regulated charges, which can cause prices to vary in the SME market. Elexon (which handles balancing and settlement in the electricity market, and manages many of the data sets necessary for doing so) recently gave access to market domain data to third parties that registered with them.

However, many TPIs struggle to navigate the labyrinth of data tables that need to be connected to validate the full costs of non-half-hourly priced customers. These include distribution area tariffs and any costs of balancing the network as well as policy costs. Data comes from several different parties, each with their own systems, and can affect different customers in different ways.[18]

In the gas market, the situation is also complicated, as charges are based on usage volume, meter capacity, supply offtake quantity (the maximum amount you have agreed with your supplier you can use) and peak day demand, none of which are accessible to TPIs or energy customers.

Individual energy customers could never hope to untangle these data sets and make a judgment on price and cost-effectiveness. However, authorised third party services with access to their data are better equipped to do so (if it made commercial sense).

The consequence of opening up these data sets to anyone who wishes to use them would be to substantially lower barriers to entry for price comparison services and to brokers who could provide accurate price estimates much more easily to customers. In the longer run in a time-of-use pricing environment, standalone services may be able to use information about electricity demand and the burden on the grid to anticipate future prices and further help with efficient demand-response mechanisms.

Eventually, this data would improve incentives for decentralised and local generation schemes, or allow any player able to adjust their demand or supply to offer these services to the transmission or distribution system operator for balancing purposes. This would both make more efficient use of the system as a whole, reducing or postponing the need for rarely used 'peak' capacity, as well as providing an income stream to those who can adjust their use. Small business and domestic energy intermediaries could assess local and national demand, grid constraints and potential income, and plan their own usage and output accordingly.

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18   For example: network charges come from National Grid and distribution companies, policy charges like the Climate Change Levy from HM Revenue and Customers, and generation investment costs like the capacity mechanism and contracts for difference from the Low Carbon Contracts Company.

SMART METER DATA CONTROL

Diagram 3: How the introduction of (half-hourly) open data empowers innovative third-party services
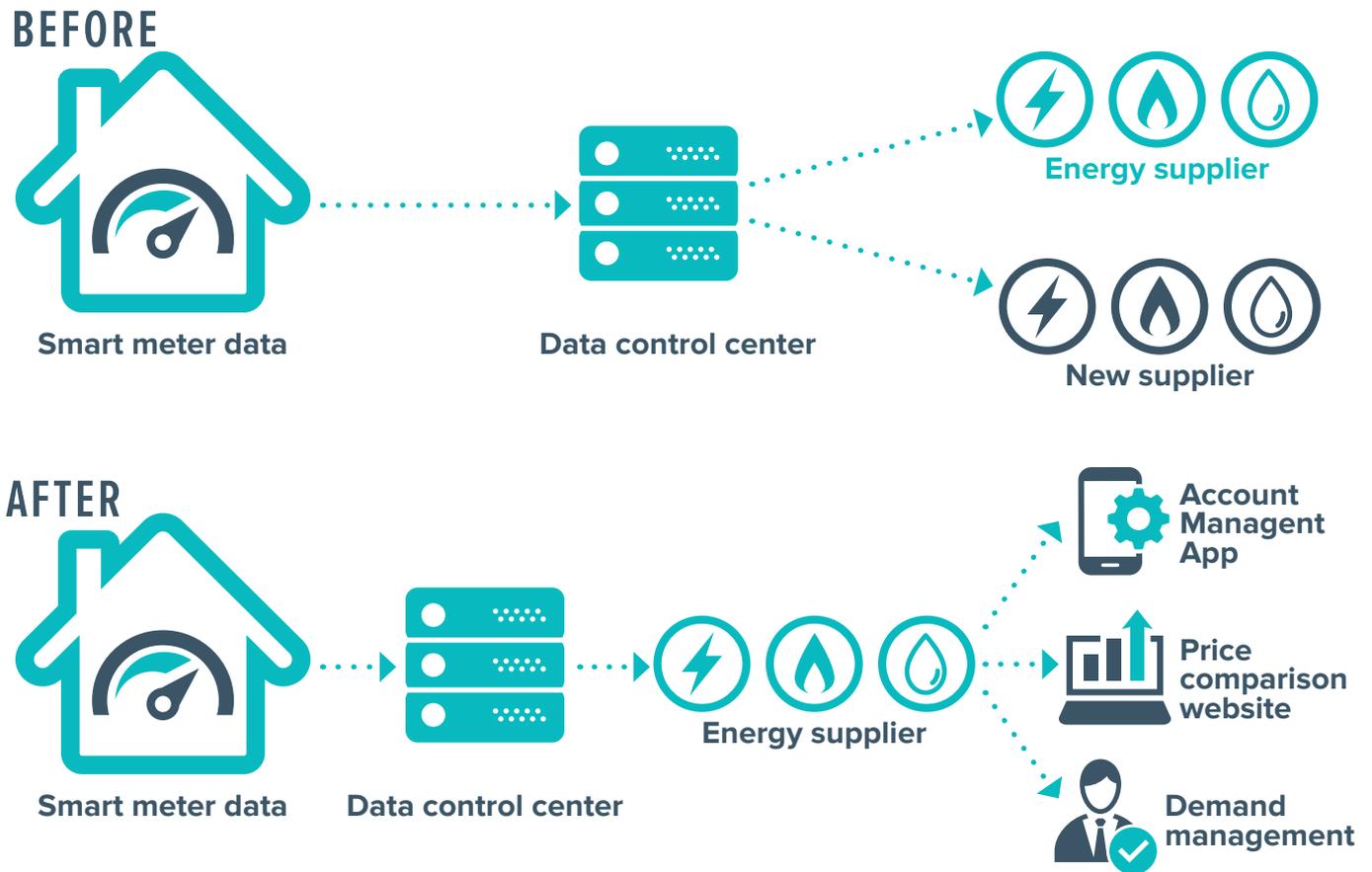
Giving SME and domestic customers a full view of their own usage will allow them to use third party services to better monitor and adjust their energy usage. In terms of switching and 'smart home' demand response it will dramatically increase in importance after half hourly settlement. This is because, as discussed above, half hourly settlement will give each customer a unique demand profile, creating in essence tens of millions of different kinds of electricity customer compared to the current system where each customer's usage over time is standardised from a billing and settlement point of view.[19]

Some use cases that would take advantage of this kind of data access are described in the next section, but the benefits broadly defined would be in three clusters:

1. **Improving oversight and understanding of a household or SME's energy use**, especially when paired with smart devices that can give their own energy usage and, when combined, their per-half-hour cost.

2. **Improved switching**, by allowing businesses and domestic customers to provide historical use data to get a more accurate projection of costs from other potential suppliers.

3. **Variable electricity pricing** that allows customers to take advantage of cheaper off-peak rates, and provides the data to smart devices that can operate or charge when prices are low, reducing the overall cost of the system with benefits for all customers.

Each meter will have its own unique data showing how much electricity and gas was used per half hour, and will send that usage information to the relevant supplier (with an up to 24 hour time lag) on an ongoing basis. In addition, each meter has a corresponding contract and/or tariff, location details, and the name and contact information of the contract holder (i.e., the business or household member responsible for the contract).

Individually, this information is what allows for accurate charging of the meter holder for their energy use. Suppliers use readings in combination with contract/tariff details to bill customers, and already use new customers' historical use data (from old bills) to estimate how much they would end up paying under a new tariff or contract with them.

19   Operations and Settlement: Profiling, (Elexon). https://www.elexon.co.uk/operations-settlement/profiling/

In the simplest form, smart meter data shared through a secure API will allow would-be suppliers to give more accurate cost projections, reducing uncertainty about the benefits of switching. This may be more important in a time-of-use pricing world, where it can give users a prediction about costs that is specific to their time-of-use profile. Equally, if half-hourly settlement means that even customers on a flat rate tariff still cost suppliers different amounts according to their time-of-use, it allows suppliers to generate a profitable flat-rate contract or tariff based on expected future use, and/or determine whether it would be worth installing battery storage at that customer's premises.

Secure API access to this data would also allow account management interfaces to show users how much energy they were using, how much it was costing them, and whether better deals were available elsewhere. For certain products this could be extremely useful, especially for SMEs – air conditioning units, for example, are energy-intensive but can be replaced with ice storage units, which create ice during low cost energy periods, and then use the ice to cool when energy is more expensive. Software that can determine the average cost of an air conditioning unit and compare it to the total cost and benefits of switching to an ice storage unit could save many businesses considerable amounts of money, while also reducing peak demand.

Historical and ongoing meter reading data, along with tariff/contract information, could also give smart home technology a fuller picture of when to operate. Most likely, this would involve electric vehicles, heat pumps and/or home storage batteries charging when prices were lowest – perhaps even using a pricing tariff that was variable even if the rest of the customer's energy contract wasn't.

Smart meter data should be made available by suppliers through a secure API, accessible with a password and/or authentication code sent to the account holder's email or online account control panel, and shareable with third parties through an OAuth login.

Customers should be able to have granular control over what data is revealed and for how long – so that, for example, customers would have control over only giving away the past six months worth of meter data, and ongoing meter readings data for the next three months, but not contract information. In practice, customers who wish to give their data to a third party would be brought to their supplier's website and asked to sign in there, and then to approve the third party for access. This will minimise security risks involved when customers have to sign in with their password to each third party site.

AGENCY AND SWITCHING POWERS

For the benefits of Open Energy to be felt widely, and not just by the most engaged customers, the active work of searching and switching should be delegable to third party intermediaries. This is already possible in principle in the SME market, where Letters of Authority (LoAs) can be written to give brokers the power to switch on the business's behalf, but the system is not formalised. FSB has previously made the case that the current LoA system represents a major barrier to switching for small businesses and having a trusted intermediary would be the number one driver of increased engagement in the market.[20]

To solve this problem, Open Energy should include provisions for SME and domestic customers to be able to nominate an agent to act on their behalf for a discrete period of time to switch supplier or carry out other defined contractual actions on their behalf – for example, committing to provide a given amount of energy within a given period, in a decentralised network. Though this can happen, in principle, already, there is no straightforward process for a customer to do so easily. This kind of delegation is only valuable with the kind of rich data that Open Energy provides for – but that data will go unused by the majority of customers if they cannot easily allow other firms to use it.

With this power, a customer would find a switching service and give it access to their smart meter data and relevant information like contract details and location, and grant it the power of agency to switch on the customer's behalf. That service can then monitor the market and switch the customer if a better tariff or contract for them becomes available (notifying them with the option to stop the switch if they wish). This power will become more valuable under a half hourly settlement and time-of-use pricing regimes where different patterns of use could produce savings even if the volume of use is the same (remember that at the moment, only volume of use differentiates customers).
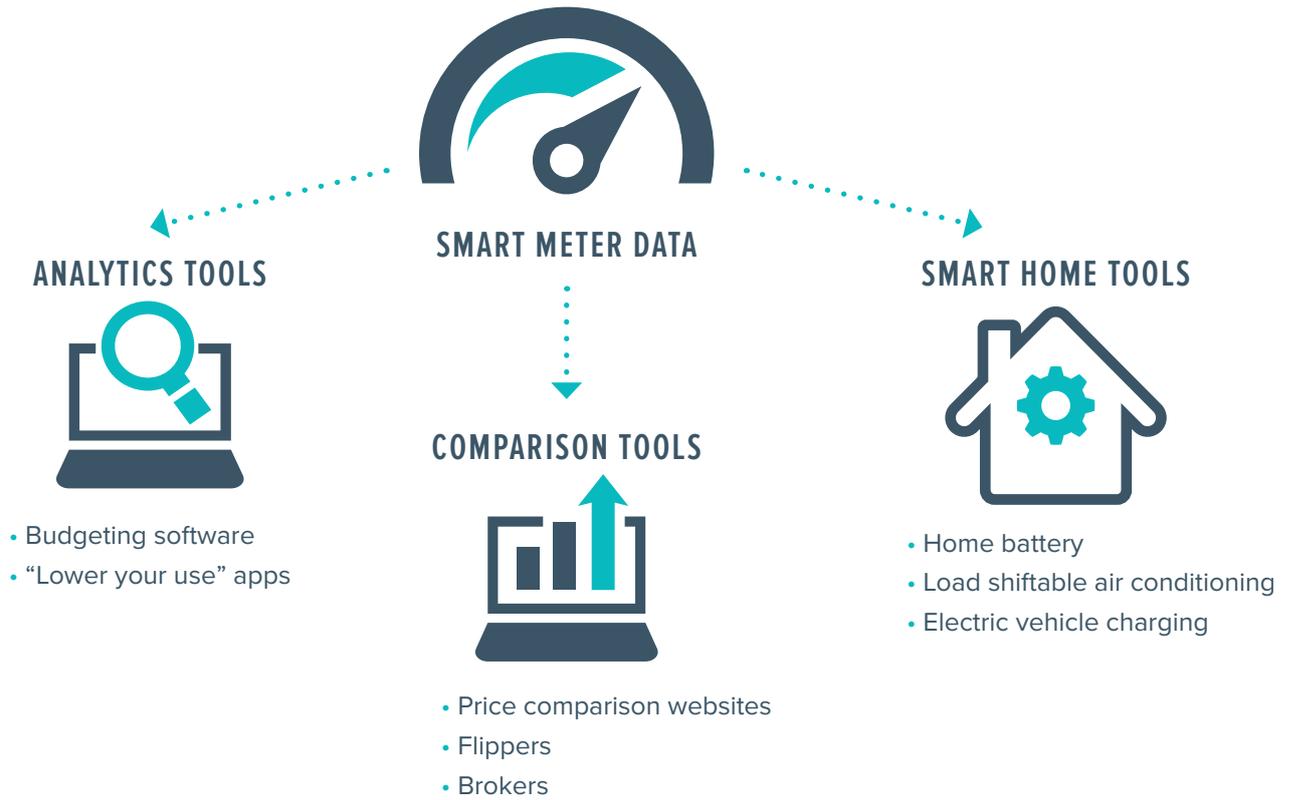
The biggest challenge here would be to ensure that automatic switching services do actually work in the customer's interest. If a provider finds that it has thousands of inert customers who will not switch away from them even if they are not being put on to the best deals, it may exploit those customers' inactivity just as suppliers face the same incentives today. However this need not be the case: it may be that services evolve that align the incentives of the intermediary with the end customer. For example, a service could make its revenue model to take a percentage of the difference between the market average and the tariff their customer is switched onto, so the cheapest tariff is always best for them. Or competition may mean that those intermediaries do better that always put customers onto the best deal for them. Other services may wish to charge a flat fee, transparent to the end customer (as Flipper does now). Allowing experimentation to test alternative models will enhance the likelihood that a reliable, customer-centric alternative is found.

In any case, pre-emptive regulation to avoid a problem that does not yet exist is not advisable. If a market in automatic switching services does arise, and the problem of inert customers being put onto sub-optimal deals does arise, then regulation may become appropriate. However, in advance of that, regulation risks preventing productive and welfare-enhancing business models from being set up, with no clear evidence of harm in favour of regulation.

Overall, these three facets of Open Energy complement each other and make it easier for customers to access the relevant information about the market, assess which product is best for them, and act on that through an intermediary if necessary. Open Energy would change what is meant by customer engagement in the energy market, because it would allow technology to engage on behalf of customers, and substantially reduce the work involved in finding the best deal. This is true whether that engagement takes the form of an intermediary acting as an agent on behalf of the customer, or if it still allows the customer to make the decisions but allows the information to be presented in a much clearer and simpler way (akin to someone finding a train or airfare on a price comparison site).

20   The price of power.

USE CASES

Diagram 4: Open Energy use-cases

SMART METER DATA

ANALYTICS TOOLS

- Budgeting software
- "Lower your use" apps

COMPARISON TOOLS

- Price comparison websites
- Flippers
- Brokers

SMART HOME TOOLS

- Home battery
- Load shiftable air conditioning
- Electric vehicle charging

Open Energy should be driven by practical use cases. The key is to enable potentially valuable business models, but not determine which ones will come. Here we define some illustrative scenarios, and the data they need to work best. The list is not comprehensive but shows some of the potential for this reform.

Example 1: Account management services

I am the manager of a small shop and want to monitor my energy usage easily, particularly across the day so that I can determine the cost of running air conditioning during slow periods when it may not be needed. At home, I want to be able to split my bills with my housemate in a fair way so that she does not have to pay when I charge my electric vehicle at home.

The most simple use of someone's smart meter data would be an app that allows them to monitor their usage and cost according to the tariff they're on. Being able to incorporate meter readings and prices into, say, a budgeting app could be extremely useful to SMEs that face cash flow constraints or to domestic customers on tight budgets who need to ration their use of energy and have an accurate forecast of their next energy bill.

Bill-splitting services like Acasa and One Utility Bill, which combine utility bills to allow for bill splitting in shared accommodation, would also be able to work more accurately and, for people in shared accommodation, give them more control over who pays what. For example, in a shared workspace, an app could combine location data with smart meter data to give customised bills to individual businesses, according to who was at the workspace during each period of energy use. Equally, they could combine location data with charging information from an electric vehicle to 'tie' the cost of charging that vehicle to one user.

Requirements:

- Smart meter readings
- Current contract details
- Persistent access
- Smart home / 'behind the meter' data

Example 2: Price comparison websites and brokers

As a domestic or SME customer, I want to be able to see all prices available to me on the market and compare the total costs or savings from switching to a new arrangement based on my own usage. If half-hourly settlement exists, I want to see a range of possible prices based on different usage, and the cost of buying a home or office battery under different arrangements. If the savings are worth it, I want to be able to switch quickly and easily.

Price comparison websites will grow in importance as changes to pricing mean that energy becomes less and less of a homogeneous good (whether from the perspective of the customer or the supplier). As it does, and businesses in particular face possible savings from shifting their energy use to off-peak periods, a detailed picture of the offers available and the customer's unique needs and characteristics will be essential to find the best deal for them.

Requirements:

- Current contract details
- Historical meter reading data
- Details of tariffs available
- Other customer usage datasets
- One time access

Example 3: Automatic switching services

As a domestic or SME customer, I want to be able to nominate a service to compare prices on an ongoing basis and switch on my behalf when a contract becomes available and the total costs and savings of switching make switching worthwhile. I want my smart meter data to update the account switching service so that if, for example, my use patterns change, the service will automatically move me to a more appropriate tariff.

Many domestic and business customers believe the hassle of searching and switching regularly is not worth the savings. For many of these customers, switching just once to an intermediary that will search and switch on their behalf could substantially improve the value proposition of engaging with the market at all.

Requirements:

- Current contract details
- Historical meter reading data
- Ongoing meter reading data
- Details of tariffs available
- Other customer usage datasets
- Persistent access
- The power to change contracts on customers' behalf

Example 4: Utilities platform software

I manage my business account through an accounting and financial management app for small businesses that offers a service to manage all my utilities contracts for me, prompting me to switch when relevant or flagging usage patterns that are costing me money.

Rather than managing energy and other utilities separately, many customers may choose to merge them and manage them through a single app that manages their accounts and provides them with a more useful control interface, or with more useful prompts about changing supplier or behaviour than other services can. This new generation of intermediaries may have an advantage over sector-specific intermediaries by better handling certain functions that cut across many utilities – cost-cutting during periods of lower income, or moving house and changing address in one go. It may also allow identification of changes that would have benefits across multiple costs, e.g. using less hot water saves both water and heating costs.

Requirements:
- Current contract details
- Historical meter reading data
- Ongoing meter reading data
- Details of tariffs available
- Other customer usage datasets
- Persistent access
- The power to change contracts on customers' behalf

Example 5: Demand-management applications

I am on a tariff that charges me substantially less for electricity used during off-peak times, and some of the devices in my home, like my electric car, can be charged or run at any time from when I get home from work to when I need to leave again in the morning. I want my car's software to only draw power for charging when my electricity tariff is cheapest, but also ensuring that I have enough power for my journey to work in the morning.

Right now, few tariffs are available to customers who are willing to shift their energy use to periods of low demand (when the marginal cost to suppliers is low), even though incentivising this with lower prices would be an efficient win/win for both users and suppliers.

Since these tariffs are relatively obscure, and – unless a smart meter is installed – require a new meter to be fitted, price competition is weak and few users are better off on them. Another problem here is that the peak hours of renewable generation, being variable, are very difficult to plan around so may require greater smart home technology development to become useable to customers.

Smart meters within an Open Energy framework should address both these problems and, combined with greater take-up of home-level energy storage (either through home-stored battery units or by using electric vehicles as batteries), could allow for a reduction in the average customer cost of electricity generation. This kind of demand management would also encourage the take-up of smart-home devices, like washing machines and dryers, that can be programmed or instructed by another piece of software to operate at night or other periods of low demand. It could also enable heat pumps to heat people's homes extremely cheaply by drawing heat in at night when demand is very low. As well as this, a "smart city" system would be able to coordinate usage across homes across the city to balance out system load.

Some customers may opt for real-time demand management, along with smart-home technology that takes advantage of unplanned moments of cheap electricity supply to store energy for later or perform energy-intensive tasks. Smoothing demand in these ways could substantially reduce the average cost of electricity generation by making better use of generators throughout the day, and reduce the problem of renewables' intermittency.

Requirements:
- Current contract details
- Ongoing meter reading data
- Persistent access
- Smart device data

Example 6: Portable energy charging

My delivery business uses electric vehicles that often need to be charged on the go or at drivers' homes. Rather than set up a system of expenses, which would be costly to manage, I would like charging of our vehicles to be covered by my business's energy contract.

One charge of an average electric car uses as much electricity as an average household uses every five days. For longer-distance trips, and for smaller vehicles, remote charging will be essential, something recognised by Government in its plans to roll out charging stations across the country. Paying for charging away from home may become an important issue for drivers, and may be something that can be addressed by making a customer's energy account 'portable', with access granted to remote charging points by users through an Open Energy system. This could be app-based, with a customer's smartphone giving authorisation to a charging point. Or it could be automatic, based on a digital signature from a smart plug socket in the car.

Requirements:

- Current contract details

- Ongoing meter reading data

- Persistent access

- Smart device data

Example7: Decentralised balancing and supply functions

My business has an ice storage air conditioner that can run at any time outside of working hours to be able to store ice and operate at low electrical load during working hours. My supplier offers me connectivity that will allow my air conditioner to run for free, or nearly free, when the grid needs to discharge to maintain balance. Similarly, the solar panels on my business's roof, or the storage batteries in my basement, can come online and supply electricity to the grid when there is a supply shortfall locally. All of this can take place without my active involvement.

Decentralised energy generation has the advantage of having lower overheads in terms of infrastructure, and with Open Energy individual energy users can participate in the balancing and supply functions needed to keep the electricity grid balanced. Given the necessity of these functions and the costs they currently impose on the network operators, customers who participate in these schemes may be offered a payment or extremely cheap or even free energy, making some activities viable for firms and domestic customers where use of the energy are not time-sensitive.

Requirements:

- Current contract details

- Ongoing meter reading data

- Persistent access

- Smart device data

- Grid-level open data (this may require further work)

IMPLEMENTATION AND OPEN DATA IN THE WIDER ECONOMY

Technical standards

The principles behind Open Banking can inform elements of Open Energy, and indeed "Open Everything" in the longer run. These include ensuring that data protection and security is at the core of data sharing through four design principles:

    a) The user is fully informed about what is happening to their data, and consent is informed, specific, freely given and explicit.

    b) The user has on-going visibility and control over the terms of access to their data.

    c) Third party access to the API should be governed by a vetting process.

    d) Security standards are "appropriate" as guided by recent technological developments and the Financial Conduct Authority (FCA).[21]

The technical standards established in Open Banking may also be appropriate for energy and other areas, including the use of HTTPS for API transactions, simple and human-readable data interchange formats, OAuth 2.0 encryption, and REST APIs.

REST APIs

Well-designed modern APIs make use of the REST (REpresentational State Transfer) architecture. REST APIs represent resources in the system as separate URLs, and use standard HTTP methods to perform operations on those objects. For instance, a customer would have the URL /customers/1234, while an account belonging to a customer would have the URL /customers/1234/accounts/98765432. Transactions, transfers etc., would be similarly nested. The human-readable web is an example of REST architecture in practice.

Domain
All API resources for a service should be grouped under a single domain; for instance https://api.bankname.co.uk.

Statelessness
An important aspect of REST design is that network transactions are stateless. Persistent sessions are handled with OAuth access tokens provided by the client (see below).

Error reporting
Errors that occur in handling a request should be reported using standard HTTP error codes, and may include data in the response body (for instance, in JSON) providing more detail.

Content Type
It is good practice for APIs to use a vendor-defined content type when delivering content to clients. The content type is a header that tells the client what sort of data is being sent; for instance, HTML content is sent with the content type text/html. We recommend defining a custom content type, such as application/vnd.uk-bank-account-data (this name is only illustrative, we would suggest deciding on something shorter). Exact encoding type (see the JSON section below) is specified as an addition to the content type, e.g. application/vnd.uk-bank-account-data+json.

API versioning
APIs change over time, as new capabilities are added and old ones deprecated. There are many ways to specify which version of an API should be used, but we recommend specifying the version in the Accept header of the request made by the client. This accept header specifies which content types the client can accept. Content types should be defined for each version, with the generic content type referring to the latest version. For example, application/vnd.uk-bankaccount-data-v1-0-2+json.

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21   Data sharing and open data for banks, (Fingleton Associates and Open Data Institute, September 2014). <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/382273/141202_API_Report_FINAL.PDF>

OAuth security

Sharing data creates security risks that can be cumbersome to mitigate. Applications need to know that the person they're dealing with is who they say they are. A solution to this is the OAuth system, which allows users to authorise applications to provide data securely to others on their behalf.[22] The most common and familiar use of OAuth is to login with a Facebook or Google profile to third party websites, removing the need for users to create and remember passwords for every site (eliminating one point of weakness) and, at the user's discretion, authorising the third party website to access certain information about themselves from their Google or Facebook profiles.

 OAuth effectively allows a secure connection to be created between a user's data in one application and requests for that data from another, without the need for additional passwords or login details. Because it is secure and convenient, it is attractive to the sites that use it, and OAuth systems typically give users granular controls over how much information they are allowing to be shown. Spotify, which has used OAuth to allow people to log in with their Facebook profiles for years, has recently introduced its own OAuth service so that people can authorise websites like Last.fm to track their listening history API – without the need for passwords.

This was a problem with banking apps until recently, most of which required users to input their login details for the third party app to then manually read account information by subsequently logging in themselves ('screen scraping'). These details included additional security information that banks use to protect against data breaches of commonly used passwords. This meant that a third party banking app, for example one that gave an overview of accounts at different banks, had full login details for every bank account of every user. Staff at that app could, in theory, make payments without permission or sell the user's data illegally, enabling fraud to take place. If that app was hacked – and security is often much less robust than we imagine, even at newer, smaller firms – access to customers' finances could be available to almost anyone.

The use of OAuth and APIs improves security and controls over who has access to what, allowing users to authorise third party services to access their banking details, and even to initiate payments from their bank on their behalf. Not only is it more secure, but it also provides richer data access, allowing users to do things and request data that might be impossible with screenscraping, and allows for persistent sharing of private data to take place.[23]

Another issue with screen scraping is that it is costly to set up. You have to do it differently for every bank because every bank's website is different, and you have to redo it every time any bank redoes its website. A standardised API solves this. If you set your app up to talk to one bank, it can talk to them all.

22   Data sharing and open data for banks.
23   For a discussion of the technical standards of restful APIs, see Data Sharing and Open Data for Banks (2014).

IMPLEMENTATION CHALLENGES

There are a number of different types of information that Open Energy will need, both customer-specific and public. The previous section identifies some of the key data needed but further work is required by Ofgem or another implementation entity to ensure that sufficient data is opened up. Where the data is customer-specific we suggest that access to the data be granted granularly and in a time-limited way using an authorization system like OAuth.

A significant technical challenge may be how to identify the owner of a particular meter if they, for example, use as a PCW. Currently, many of these customers will not be as used to logging in to their energy account online compared to banking customers, so this may end up being a friction point that deters some users from accessing Open Energy services. The more difficult it is, the less switching will take place and fewer customers will adopt this new approach.

Rolling out these steps will inevitably take time and, based on the experience of Open Banking, there may be delays. There will likely be a need for a regulator like Ofgem to force all energy suppliers to sign up to this and, judging from the experience with Open Banking, to act quickly and in spite of protests from energy companies who are likely to try to resist these steps on cost grounds. Large suppliers will have little incentive to cooperate and will need to agree on industry-wide data standards.

A further challenge will be overcoming security concerns from members of the public, many of whom have already objected to smart meters being installed in case insecure data allows criminals to see when, for example, they are out of their homes for extended periods of time. Apart from data security, this may be an issue if phishing causes some people to give their details to rogue services that misuse their data.

The solutions to this are (a) to ensure that industry-standard data security protocols are followed for data sharing — again, we suggest the OAuth 2.0 protocol for data sharing to minimise on passwords being held by anyone except the meter administrator or supplier — and (b) to whitelist authorised third party services that need to access users' smart meter data. Both of these approaches have proved to be a good start in Open Banking.

MARKET POWER AND TPIS

What if all this works and a large number of customers do switch to an automatic switching intermediary – and then stop looking? What is to stop these intermediaries taking advantage of their market power and failing to put their customers on the best tariffs, either because they are shielded from competition or because they are less efficient than their rivals?

At the margin we are currently at, where a minority of domestic energy customers regularly use conventional price comparison websites, let alone automatic intermediaries, it would be premature to pre-judge these questions. They may prove to be problems down the line if people do take a 'set and forget' approach, and if effective incentives models have not emerged that keep intermediaries 'honest'. But even if this does become a problem in future, easier access to energy data and easier ability to switch between intermediaries and suppliers may make it less of an issue than customers' relationships with their suppliers are today. Still, it is a danger to be aware of if Open Energy is implemented.

WHAT OPEN ENERGY WILL ACHIEVE

Diagram 5: Benefits of Open Energy over time
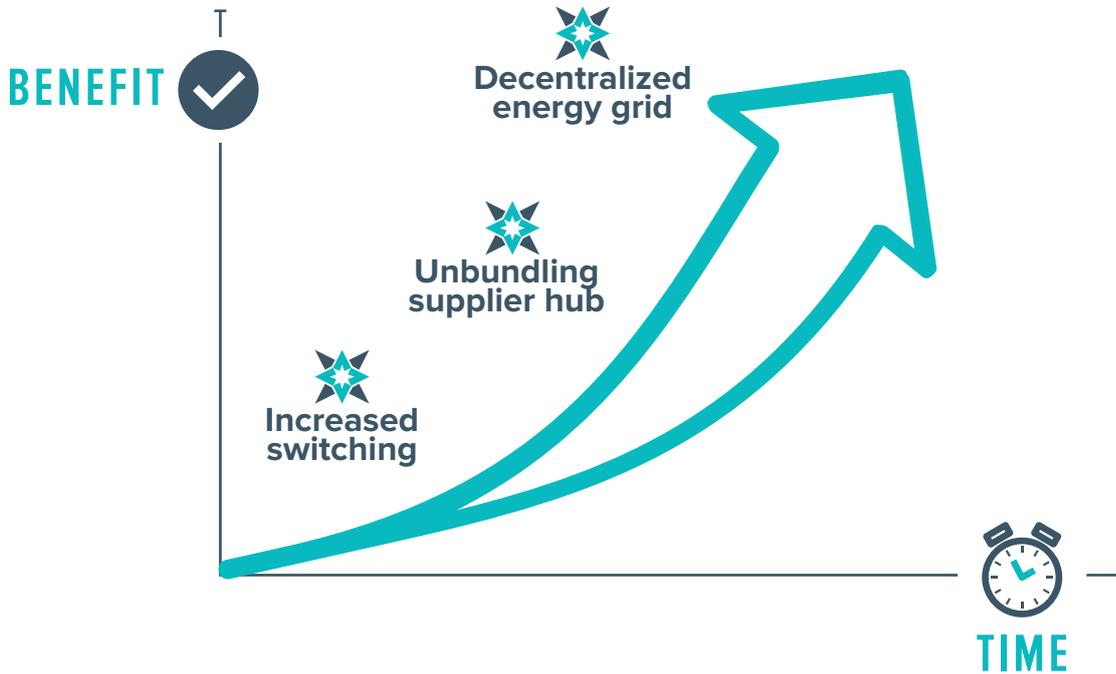
Short-run: An intermediary-friendly market

Intermediaries are central to the short-run success of Open Energy. Time, search costs, uncertainty and sheer inertia are important barriers to people switching to better deals, because of the cognitive load they impose onto customers. Proper price signals, that reflect the true cost of supply, will make the market more complex but also allow it to operate more efficiently – so regulation to simplify the market comes at a price. At the moment, some services will prompt a domestic customer if a better tariff becomes available, but the act of still rests on the customer. For many, the benefits are just not worth the bother.

For SMEs, the costs of switching can be even greater. Monitoring the market and knowing when to change provider is more complex. Automating and standardising letters of authority would be an easy way to solve this problem and make delegation much easier for customers.

Open Energy's provisions will make it possible for a domestic or SME energy customer to nominate an intermediary to constantly search the market on their behalf and give them the power to switch on their behalf if the savings make it worthwhile. This would minimise the costs of switching. If the intermediary has the right incentive structure, a customer would only have to opt-in once for a given period of time to be guaranteed a good deal on the market. And it would mean that the problem of excess cognitive load would no longer be a significant barrier to regular switching.

For small businesses in particular, where the 'hassle factor' appears to be a significant barrier to shopping around, it may help many shift away from sporadic switching prompted by cold calling towards a more formalised and regular move to cheaper tariffs. Collective switching, where energy customers' bargaining power is strengthened relative to suppliers', would also be greatly helped by this kind of shift.

This should be one of the core elements of Open Energy that makes energy simple and removes the burden to shop around from energy customers. As energy becomes less homogeneous and time-of-use pricing is introduced, with adequate data and agency powers, navigating an increasingly complex market can still become a simpler, pain-free task.

Medium-run: Demand-shifting and the unbundling of the supplier hub

Apart from increased switching, the medium-run effect of Open Energy would be to allow businesses to offer services outside the supplier hub model. Without Open Energy, many of the ideas presented in this report could only be offered by a supplier that had exclusive access to users' usage data. It is not inconceivable that a few suppliers might offer, for example, account management platforms or the ability to send meter data to smart home devices, as a way of differentiating themselves from their competitors. But these would be (a) limited to the customers of those suppliers and people willing to switch to them, potentially for a more expensive contract than they could otherwise get and (b) limited to whatever technology the supplier itself contracted or developed.

That would most likely mean, in practice, that the uses of customer data were highly limited. This would make it much harder for customers to capture the benefits of, say, switching services or demand-response applications that allowed them to automatically shift electricity consumption to times when electricity was cheapest.

Under Open Energy, there would be no implicit bundling of a customer's energy use and contract data with their supplier, and the rights over that data would sit with the customer themselves – in line with the General Data Protection Regulation, but going further.

That would give the customer the power to access third party apps that were offering a huge range of services – along with the switching, demand-management and ancillary balancing services described here, there is a potential for services that we have not been able to imagine, emerging through the normal market process of trial and error.

This would require further changes to the regulatory model, and particularly to the codes system on which the industry runs. The system is meant to allow adaptation and innovation. Ensuring that it can do so, rather than protecting the established way of operating, will be important as Open Energy evolves.

As time-of-use pricing shifts the market to a place where different contracts effectively make energy a different product for different types of customer, a significant challenge will be to help customers to navigate this increasingly complex market, and to minimise the amount of work and cognitive load imposed on them to make savings. Unbundling of their data from their supplier is key to that, and potentially allows for them to interact with and manage their energy consumption through an entirely different interface to the one offered by their supplier.

This shift towards an 'unbundled' model of energy consumption would allow customers to take advantage of time-of-use tariffs much more effectively and rapidly than if the data was controlled by their supplier. But it would also erode the supplier's market power, creating the opportunity for entirely different business models built around creative demand-management techniques.

Long-run: A decentralised energy network

Despite much talk of a decentralised energy network, most countries continue to have a national approach based on some form of centralised planning of the system as a whole. Indeed, the introduction in the UK of the capacity market has made this central control even more important. This is inevitable when the only solution to meet demand at a particular point in time is to have already invested in large, capital-intensive generation capacity.

In the longer term, a system built on APIs could allow different solutions, and may not even require a central system operator. This was essential when security of supply depended on having enough capacity to meet peak demand - once there are multiple solutions to both manage supply and demand, and these can operate without a single, central overseer, its need becomes less obvious. System resilience would be driven by prices and behavioural responses to those prices, rather than by capacity margins.

A whole area of people using Open Energy could have decentralised, dynamic prices that reflected local network costs and local changes in supply and demand, with automatic responses from people's domestic generators (e.g., rooftop solar panels) and storage (e.g., home batteries or electric vehicles).

FROM OPEN ENERGY TO OPEN EVERYTHING

The model outlined in this report is similar in principle to that introduced in Open Banking, and could in principle be applied to much of the rest of the economy as well – with energy and banking forming individual modules in a broader programme. Banking may act as a lynchpin, given the importance of customers' finances to other decisions they can make.

This sort of approach could have dramatic effects in markets where consumers are locked in to their existing providers because those providers have large amounts of their data and they cannot migrate or share that data with other providers. This incumbency lock-in raises barriers to entry for newer, more innovative firms and makes switching more costly. In markets with complex products it may also be difficult to compare offerings (as may happen in energy under a time-of-use tariff pricing regime).

Effective data sharing could deliver benefits in three broad ways, as discussed by John Fingleton in his case for "Open Everything":

1. Enabling easier comparison between services and easier supply of complex products with costs that vary between consumers. For example, in energy and telecoms, where tariffs proliferate and vary between customers, or in insurance and borrowing, where costs depend on consumer characteristics, and historic personal data can get consumers better offers.

2. Allowing consumers and workers to transfer information between suppliers and employers. In the gig economy, this could allow workers to port their reputation between different services such as Uber or Taskrabbit, lowering uncertainty for potential customers and employers. With many digital service providers, losing data built up over many years can stop people from moving to a better product, and this could correct that.

3. Making it easier for consumers to disaggregate bundled product offerings and opt for third party suppliers of single products alongside a main product offering. In energy, half-hourly smart meter data could allow demand management to take advantage of off-peak rates. In healthcare, access to health records could lead to innovative combinations of existing data (e.g. lifestyle, genetic or health history). In education, standardised access to grades and timetabling could allow third parties to offer bespoke degrees for students, mixing online modules from other universities with traditional degree courses.[24]

A further development would be the combination and analysis of data sets in new ways. Banking and energy usage data is a straightforward example – some challenger banks are already trialling services that prompt people to switch when their bank payments appear to indicate that they are on a more expensive tariff than they need to be. But more unexpected combinations may be useful too – combining, for example, exercise and location data with users' healthcare data and public air quality data to identify the source of a jogger's chronic cough, and plan out a new route. It is difficult to predict which combinations would be most valuable, but 'opening up' the economy along these lines may deliver increasing returns to scale.

All of this will make platforms more powerful and valuable, especially platforms built around financial services and intermediation. China's payments giants, Tencent (Wechat) and Ant Financial (Alipay), are already leading the world on this, with increasing numbers of services being marketed and delivered inside apps like Wechat, with improvements that are partially driven by relatively unrestrained power over their users' data. But open data creates a tantalizing possibility for the UK here. If Britain takes the global lead in designing secure methods of data sharing that give users control, and can design effective frameworks for sharing data in areas like healthcare, telecoms and information technology as well as banking and energy, it could create the resources necessary for new data and intermediation platforms to emerge, which could compete with the emerging giants from China. Open data in this sense would be not just a way of delivering consumer benefits but creating the conditions necessary for a new kind of platform to develop.

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24   Fingleton, J., "From Open Banking to Open Everything" (Fingleton Associates, May 2018). <https://medium.com/fingleton-associates/from-open-banking-to-open-everything-3072079b7c58>

CONCLUSION

There is no need for trade-offs between simplicity and efficiency in the energy market. Competition and innovation do not need to impose greater cognitive loads on customers, and their benefits do not need to be limited to the most engaged customers. But many of the technological changes that will take place over the next ten years – the rich data coming from smart meters, the introduction of half-hourly settlement and time-of-use pricing, and the rise of electricity storage – will not be made the most of without a radical change in how energy customers' data is treated.

The Open Energy model outlined in this paper seeks to shift power over data from incumbent suppliers to their customers, empowering those customers to re-bundle energy market services to their own benefit. Empowering businesses and domestic customers to delegate their switching to a third party would make the process of shopping around virtually costless, and rich data could make the savings that switching could provide much more certain for dubious customers. Opening meter and contract data up to third parties, including smart home technology, would allow businesses and households to take serious advantage of data analytics and time-of-use pricing to shift and change their energy use in order to lower costs, perhaps substantially. It could also allow a step forward in the innovation that has been so long anticipated in energy use.

The wider benefits of these changes would be to make renewables much more economically viable by overcoming the intermittency problem, and to drive much stronger levels of competition in the energy market on fundamental efficiency grounds. In the longer term, the current national-level supplier hub model may prove to be less efficient than smaller, decentralised, unbundled offerings.

Implementing Open Energy would also help to rescue the smart meter rollout, by giving customers much clearer benefits from installation and much greater clarity about who controls the data they are producing. It would show how smart meters can work for customers instead of suppliers by giving them greater opportunities, rather than just saving the energy supplier the cost of collecting meter readings.

If Open Energy is a success in Britain, it could follow Open Banking in being adopted around the world, helping to build the UK's reputation as a world leader in efficient regulation. It could also, along with Open Banking, form the cornerstone of a suite of demand-side reforms designed to drive competition and innovation in a broad range of markets that are currently dysfunctional, at best.

Most importantly, making energy work could help to restore people's trust in competition and markets as a way of delivering essential resources efficiently and fairly. To the extent that Open Energy works, it could prove to be an anti-regulation – a step that makes much of the existing body of regulation redundant because it has made the market much more like one where normal economic effects hold. The key is to put energy customers in control of the data they have generated, and lower the cognitive burden on them at the same time. With a few simple steps, the benefits to households, businesses and the public's perception of markets in general could be enormous.

APPENDIX: CONCEPTS IN ENERGY AND DATA

Price discrimination and price caps

Pricing in the domestic energy market has become extremely controversial. Prices can reflect differences in efficiency between suppliers – for example, the costs of procured wholesale energy or the administration costs of running the business – or differences in willingness to pay between customers.

This latter kind of pricing is known as price discrimination, and allows businesses to increase yields by offering lower prices to customers who will shop around more, without offering such prices to customers who will pay higher rates without looking for alternatives. This is particularly suited in markets like energy where fixed costs are often high, many customers are sticky or 'loyal' to their existing supplier, and the cost of supplying an additional customer may be below the average cost of supplying a customer. If you are an engaged customer willing to switch, you can pay substantially less than disengaged customers. This pricing model has led many politicians and consumer groups to accuse suppliers of overcharging and punishing 'loyal' customers.

Ofgem has introduced a series of regulations intended to make the domestic market simpler, including banning price discrimination on the basis of location and restricting suppliers to offering only four different tariffs (now scrapped).

Following the CMA's recommendation for a transitional price cap for pre-payment meters until the end of 2020, the regulator has broadened the price cap to cover all 'vulnerable' customers. Now the government says it will impose price caps to curb the perceived overcharging of inactive customers, in line with one dissenter on the CMA panel, Martin Cave, who argued that a temporary price cap would work in tandem with the CMA's recommendations.[25]

Price caps may not be an effective long-term solution to problems with the energy market, since they do not increase competition or efficiency, and dampen the incentive to switch suppliers, diminishing the efficiency gains caused by customer switching (to cheaper, more efficient suppliers). In line with Martin Cave's arguments, we believe that price caps should not be seen as an alternative to structural reforms to the market designed to improve its functioning in the longer run. As a temporary measure, they may complement Open Energy, but they are not a substitute for it.

The Supplier Hub

The market rests on a 'supplier hub' model, where licensed suppliers (whether the traditional 'big six' or newer entrants like Ovo, Co-op or First Utility) act as the main points of contact between customers and the rest of the energy market. Regulation and industry standards are heavily influenced by incumbent suppliers. According to the UK Energy Research Centre's Professor Nick Eyre and Dr Matthew Lockwood,

> *"The supplier hub principle has strengthened the position of supplier companies, who have then also used the principle to [lobby] for retaining a degree of control over energy policy processes."*

The incumbent companies (suppliers and others) jointly determine the 'codes' on which the system is run:

> *"Another example of institutional veto opportunity is the energy industry codes system, the governance of which is dominated by large incumbents with assets in centralised generation and in gas and electricity networks, and the core content of which is still designed for a centralised supply model".*

All companies seeking an energy supply licence have to agree to comply with the codes. Licensees (and some other parties like Citizen's Advice) can propose changes to codes, and the code panel, made up of licensee representatives, will decide if that change is accepted. Some changes require consent from Ofgem.

Smaller suppliers have grown to supply around 20% of the domestic market, but operate on similar models to incumbents. Laura Sandys and others have argued that the supplier hub model means that new entrants have to have the same model as incumbents, preventing meaningful competition.[26] The preoccupation with issues like security of supply and fuel poverty, they argue, has stifled diversity in the sector and made it much more difficult for alternative models, like decentralised or storage-based, to emerge.

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25   Energy market investigation, (CMA). <https://assets.publishing.service.gov.uk/media/5773de34e5274a0da3000113/final-report-energy-market-investigation.pdf>
26   Sandys, L., J. Hardy and R. Green, Reshaping regulation: powering from the future (Grantham Institute, 2018). <https://www.imperial.ac.uk/media/imperial-college/grantham-institute/public/publications/collaborative-publications/Reshaping-Regulation-Powering-from-the-future.pdf>

Third Party Intermediaries

While suppliers act as intermediaries between energy customers on one side and generators and networks on the other, their use of price discrimination and yield management to maximise profits has led to a proliferation of different tariff and contract offerings available to domestic and SME energy customers. Third Party Intermediaries have emerged to help customers find the cheapest offerings available to them, just as they have in other complex markets like insurance or flights. For domestic customers, where tariffs are not customised to individual customers, these TPIs have mostly been price comparison websites.

In the absence of price comparison websites for SMEs, the choice is usually to engage with a broker, carry out a time-consuming comparison yourself or to stick with your existing supplier.

Quotes are bespoke to the business's expected use, and only an indicative quote can be obtained online. Because the SME offer is more complex than that faced by domestic customers, brokers are a much more common feature of the SME market. However, the CMA found that brokers are not trusted by many companies, especially smaller ones, and there can be issues around the commission they charge and whether certain TPIs always acts in their customer's best interests.

Negative perceptions of brokers and bad business practices by brokers may have a harmful effect on SMEs' willingness to switch between suppliers more generally: Ofgem found that "Evidence suggests that current suppliers have an increasingly powerful role in determining business consumers' choices".

PCWs have marketed themselves to domestic customers quite extensively, with television and billboard advertising campaigns over the past decade. Still, take-up is low. According to Ofgem's State of the Energy Market 2017 report:

> *More than half of consumers (58%) have never switched supplier or have switched only once. 60% of consumers are on a default variable tariff, which can be around £300 more expensive each year than the cheapest fixed-term deals.*[27]

Price comparison websites are an important mechanism for lowering search costs for customers looking for cheaper energy – of domestic customers who 'shopped around' in a 2017 poll for the CMA, 65% reported visiting a PCW in the process.[28] Brokers are an important tool for SMEs to shop around.

But both of these lack access to information that would make switching a more reliable process:

- Information about customers' current contract, including when the tariff agreement is due to expire, how much the customer has been paying, and any exit fee specifications.

- Information about the tariffs available to customers. There are hundreds of different energy tariffs available to domestic customers – of the 69 suppliers of gas and/or electricity in the UK market, many offer dozens of different tariffs. PCWs need information about both what is available for a customer to switch to, and the details of what the customer is already on, but energy suppliers are often reluctant to provide this information in a useable way in order to have greater control over making different price offerings to different customers.

- Information about business and domestic customers' own energy usage. At the moment, a domestic customer can give their usage from a recent energy bill, or it can be estimated using information about the number of rooms in the property, while an SME can provide other details. However this data may be out of date or inaccurate. But as half-hourly settlement is introduced and smart meters begin to provide hour-by-hour use data, and more tariffs that are priced according to peak/off-peak use become available, richer and more valuable data will become available. Using accurate data can also ensure customers then do face the costs they anticipated when signing the contract.

- Information about the customers' own meter. This is more important in the business space, as there are a wider variety of meters available, but at a minimum needs to specify whether a meter is smart or dumb.

- If there are any distributed generation facilities attached, or electricity storage capabilities, the generation/use profile and any payments (e.g. feed-in-tariff) associated with that.

27   State of the energy market 2017, (Ofgem, October 2017). <https://www.ofgem.gov.uk/publications-and-updates/state-energy-market-2017>
28   Hanson, T., et al, Digital Comparison Tools: Consumer Research, (Kantar Public, 2017). <https://assets.publishing.service.gov.uk/media/58e224f5e5274a06b3000099/dcts-consumer-research-final-report.pdf>

The CMA's 2017 Digital Comparison Tools (DCTs) Market Study found that, in energy, the three biggest barriers to customers making effective comparisons between tariff offerings were the lack of:

- Customer usage data – which can be used to identify the most suitable tariff
- Tariff data – access to which currently often relies on screen-scraping and can be inaccurate or incomplete
- Switch initiation – inconsistency between suppliers' approaches can complicate the process of switching, acting as a deterrent.

Remedying these, it concluded, would mean:

"...consumers would need to enter less data and DCTs would be able to provide more accurate tariff data. DCTs could use accurate usage patterns to better identify the best tariff and prompt consumers to switch when prices or behaviours change. DCTs which are funded by consumer subscriptions could provide whole of market coverage without having to negotiate with a large number of suppliers to gain access to their API documentation to facilitate switching."

The report also highlighted the potential for smart meters to provide accurate customer usage information.

Similarly, the CMA Energy Market Investigation's Decision on AECs and remedies concluded that TPIs faced barriers to more effectively facilitating switching because of the complexity of tariff and bill information needed to make value-for-money assessments:

"(i) the complex information provided in bills and the structure of tariffs which combine to inhibit the value-for-money assessments of available options, particularly on the part of customers that lack the capability to search and consider options fully (in particular, those with low levels of education or income, the elderly and/or those without access to the internet); and

(ii) a lack of confidence in, and access to, PCWs by certain categories of customers, including the less well-educated and the less well-off. We note that alternative forms of TPIs, such as collective switching schemes, may become increasingly important for such customers."

Price comparisons in an Open Energy market where contract, tariff and usage data is easily available to PCWs at the customer's request may become substantially easier. At the moment, this information either makes the process time-consuming and uncertain for the customer. At the end of the process, they still only have a cost estimate of charges over the next year – actual bills will depend on outturn energy use, and some contracts allow price changes to take place mid-term.

Midata

Information asymmetries and poor access to data have been barriers to switching and competition in the energy market for at least ten years. One attempt to solve this problem was Midata, a cross-sector initiative that included energy, banking, mobile operators, Google, GoCompare and others and was driven by Downing Street from 2010 onwards.

Midata focused on .csv downloads from customers' bank and energy accounts (among other services), which could be uploaded to price comparison websites to give a reflection of their use to help them find better deals. It was announced on November 2011 but not formally launched until March 26th 2015; the CMA's Energy Market Investigation recommended making Midata participation mandatory for energy suppliers.

Midata has not been a success, and the technology is now outdated. Take-up has been negligible and only one price comparison website (GoCompare) offers a service built around the data that Midata provides. The fact that the CMA went ahead with Open Banking is evidence that the CMA itself regards Midata as an insufficient remedy to drive competition.

Midata is unsuitable as a vehicle for future data-centred reforms for a number of reasons:

1. It requires customers to manage data files themselves, making the process more technically difficult as well as raising security risks of people having sensitive, unencrypted data about their banking history on their computers. Only a small set of customers has the technical aptitude to download and use a .csv file.

2. It involves snapshots rather than dynamic data links.

3. Substantial data redaction means that meaningful comparisons can often not be made.

4. Because users are a crucial intermediary between two services using user data, the data is not always reliable. Anyone can in principle edit a .csv file, making it difficult to use the data for things like assessing creditworthiness, billing or anything else involving a review of a user's characteristics for making a pricing or service quality offering.

The lessons from the Midata experience were reflected in Open Banking, which avoided these pitfalls. On the CMA's recommendation, Ofgem is now investigating reviving an adapted Midata for the energy market.[29] We urge it to consider the recommendations in this report as it does so.

Open Banking

Information asymmetries have been identified as a problem in banking for years, including the 2000 Cruickshank Report,[30] the 2008 Office of Fair Trading Report on Competition in Banking,[31] and the 2011 Vickers Report on banking.[32] In 2014 HMT commissioned Fingleton Associates and the Open Data Institute to explore the possibility of using a single, open standard for APIs imposed on the banks – which would form the basis of Open Banking.[33] The report recommended:

• An open API standard across different banks for third party access to personal and business current account data,

• Independent guidance for banks on technology, security and data protection standards to be adopted – the report suggested OAuth as an authorization protocol for data-sharing,

• An industry-wide approach for vetting third-party applications wishing to connect to bank APIs,

• Standard information about current accounts, including terms and conditions, to be published by banks as machine-readable open data, and

• Credit data to be published as open data.

In effect, Open Banking in this model had two elements – open data for general information about current accounts and creditworthiness that could allow better comparisons between services, and secure APIs for customers to share their account data with third parties.

Open banking was imposed by the CMA on the nine largest banks in the UK and rolled out to their customers from the beginning of 2018. Under it, banks have to provide both a read-only and a read/write API to give access to personal current accounts and SME current account transaction sets, under a specified common standard. The read access provides access to account information at the request of a customer by a third party provider.

Write access goes a step further, in that it allows the initiation of a payment from a customer's account at the request of a customer by a third party provider. This is intended for Payment Initiation Service Providers and Account Information Service Providers – ie third party applications that make payments on behalf of users.

Third party applications wishing to access people's data are whitelisted by the FCA and publicly available on a register on the FCA's website. They also have to be insured in case of security breaches.

Alongside the roll-out of Open Banking has been the EU's Second Payment Services Directive, or PSD2, which similarly requires banks to make customer data available through APIs but does not specify the formats. It was announced in November 2017 that Open Banking will be extended to all payment account types covered by PSD2. That means that credit cards, e-wallets, flexible savings accounts and prepaid cards will all have to produce Open Banking-compliant APIs by the end of the PSD2 implementation period.[34]

In terms of costs, the initial estimate of the cost of Open Banking was around £1m per bank. Though no bank has revealed how much it has cost, it seems likely that the costs have been substantially more than this, in part because incorporating PSD2 at the same time added to the complexity.

29 Enabling customer data in the energy market, (Ofgem).
30 Cruickshank, D., Competition in UK banking, (HM Treasury, March 2000). <https://www.vocalink.com/media/1603/cruickshank_report_2000.pdf>
31 Personal current accounts in the UK, (Office for Fair Trading, July 2008). <http://webarchive.nationalarchives.gov.uk/20140402172142/http://oft.gov.uk/shared_oft/reports/financial_products/OFT1005.pdf>
32 Final report, (Independent Commission on Banking, September 2011). <http://webarchive.nationalarchives.gov.uk/20131003105424/https://hmt-sanctions.s3.amazonaws.com/icb%20final%20report/icb%2520final%2520report%5B1%5D.pdf>
33 Data sharing and open data for banks, (2014).
34 "UK's Open Banking Project Expanded", (Open Banking, November 2017). <https://www.openbanking.org.uk/about-us/news/uks-open-banking-project-expanded/>

On the other hand, the move over to open APIs was less difficult than initially feared. Banks were initially concerned that with clunky, 70s-era back office systems, it might be hard to write APIs. But it turned out that they often had a digital front end that required APIs anyway, so they could just use the same approach. And making these changes for Open Banking may have helped banks with other innovations.

Throughout the Open Banking process there has been a serious risk of trust being lost if fraud or data theft occurs, especially in the early stages. Balancing security concerns against usability has been difficult – banks that give strong security warnings to customers during the authorisation process of a third party app, or merely send them through an additional screen click, may scare customers off and prevent widespread adoption.

Open banking is an ongoing process, and requires further work to get right. However, it offers a clear model of how to use data sharing to give customers control over their own data and unbundle that data, and related services, from their main account provider.[35] This model is more powerful than the data portability right in the GDPR, which imposes more Midata-like requirements on firms and is more appropriate for switchers than customers trying to access third-party services alongside their main accounts. However, the Open Banking model needs to be implemented in a tailored way in each industry that would benefit from it.

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35   Fingleton, "From Open Banking to Open Everything".

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