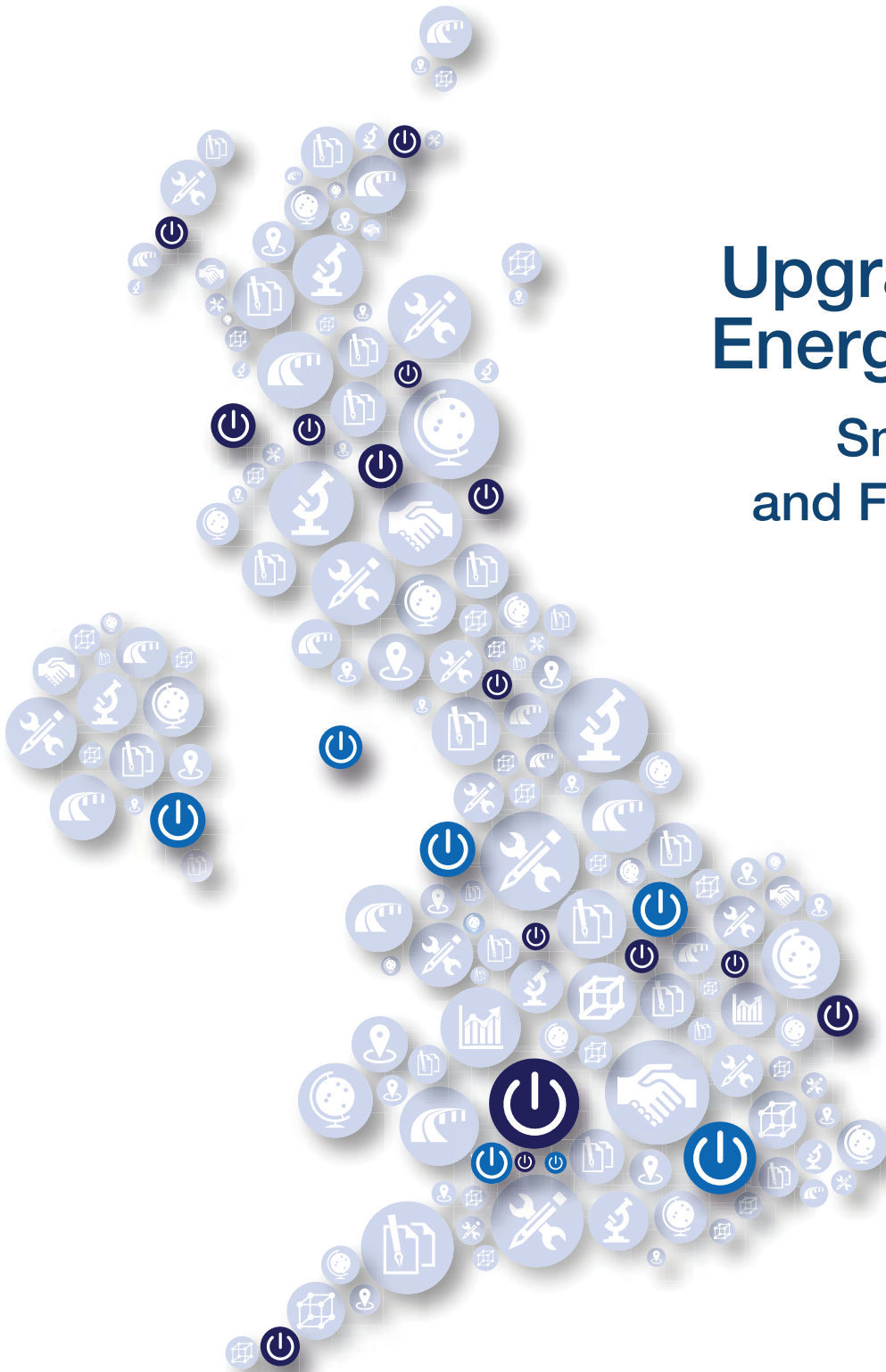




HM Government

ofgem

Making a positive difference
for energy consumers



Upgrading Our Energy System

Smart Systems and Flexibility Plan

July 2017

**Building our
Industrial Strategy**

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Executive summary

Our energy system is changing. There is more low carbon generation, much of it located close to people's homes and businesses, and it produces different amounts of electricity depending on factors like the time of day or the weather. New technologies such as storage are emerging and the costs of many of these technologies are falling rapidly. If we take advantage of the opportunities this provides, we can create new businesses and jobs, empower consumers and help people save up to £40bn¹ off their energy bills in the coming decades.

This Plan is an important part of the Government's Industrial Strategy, the forthcoming Clean Growth Plan, and a core component of Ofgem's future-facing work to enable the energy system transition. It is supported by the Government's significant increase in public research and innovation spending, including on new storage technologies.

We asked for views on what changes the Government and Ofgem should make through our Call for Evidence last year. We have engaged throughout this process with innovators from across the energy industry. This Plan shows how the Government and Ofgem are taking action alongside industry to deliver a smarter, more flexible energy system by:

- removing barriers to smart technologies, including storage;
- enabling smart homes and businesses; and
- making markets work for flexibility.

We have heard consistent calls to modernise the regulatory environment for electricity storage. Storage can open up many possibilities, helping to integrate low carbon generation, reduce the costs of operating the system, and help avoid or defer costly reinforcements to the network. But it needs a level playing field to compete. Our plan delivers that through **clarity on licensing, planning, connections and charging for storage**, and by **enabling storage to locate on the same site as renewable generation**. This is just one of the new smart technologies that will help to keep bills low.

We are empowering consumers by ensuring households and businesses can use energy when it is cheapest, and reward them for being flexible on when they use energy. By rolling out **smart meters**, enabling suppliers to offer **smart tariffs**, and harnessing the power of **data communications in our home appliances and gadgets**, we will make it easier for consumers to lower their bills.

There are also fundamental changes taking place within the energy markets, which will see new sectors, technologies, and services flourish. Changes that improve access to these markets for smart businesses will enable them to compete fairly and reduce costs for consumers. We want to **open up new markets, improve coordination across the system**, and enable these businesses to **realise the true value of their services**. Taken together, these measures will reduce the costs of the energy system and work to keep energy bills as low as possible for consumers.

¹https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/568982/An_analysis_of_electricity_flexibility_for_Great_Britain.pdf

Introduction

Our energy system is changing. There is more low carbon generation. There are many more distributed and localised resources. New technologies such as storage are emerging, and the costs of many of these technologies are falling rapidly.

Some consumers are interacting differently with our energy system. Close to 1 million homes now have solar panels on their roofs. Smart meters are rolling out, providing the basis for new services to benefit consumers, and smart thermostats are increasingly common. In the future, we are likely to see more electric vehicles and more electrification of heat.

These are big changes driven by new technology. Information technology can help us minimise the costs of our future low carbon energy system, whilst ensuring that the system continues to function securely. The Government, and the energy regulator, Ofgem, want to ensure there is the right framework for these changes to take place.

A smart, more flexible energy future can bring significant benefits for consumers, the system and the wider economy. A study for the Government estimates the benefits of a smart energy system to be £17-40bn to 2050.² These benefits come from avoided or deferred network reinforcements, avoided generation build, avoided curtailment of low carbon generation, and better operation of the system. The potential for significant benefits was also reiterated in the Committee on Climate Change's recent annual progress report to Parliament.³

Case study - Home batteries that benefit consumers and the grid

British company Moixa offers residential battery systems which provide grid support services as an energy aggregator, in turn delivering cost savings for the consumer. Moixa's Gridshare platform helps the System Operator to manage energy demands across the electricity network, and the consumer receives extra income in return. The battery can also make better use of energy generated by solar panels on the consumer's rooftop, and enable suppliers to reward consumers who charge their batteries during periods of low demand, when prices are lower. These systems have been deployed in nearly 1,000 homes across the UK, and Moixa calculate that they could help consumers save up to 60% on their electricity bills.



²https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/568982/An_analysis_of_electricity_flexibility_for_Great_Britain.pdf

³<https://www.theccc.org.uk/publication/2017-report-to-parliament-meeting-carbon-budgets-closing-the-policy-gap/>

For consumers, smart energy technologies and processes can deliver new services that give people more control over how they use energy, and help lower bills. For the energy system, greater flexibility will help deliver reliable power at lower cost. In line with the Government's Industrial Strategy, it will enable new, disruptive technologies and services to compete, and new sectors to flourish, enabling growth across the country.

We have already seen early signs of change. This is driven by:

- an increasing need for greater flexibility across the power system, as we see more low carbon generation deploy and a market-led response with about 3GW of new flexibility contracted since 2016;
- rapidly falling technology costs, e.g. average lithium-ion battery prices have fallen by over 50% since 2012;
- new IT-enabled business models which are cheaper than traditional engineering solutions, e.g. enabling greater aggregation of distributed resources across the system, and active management of distribution networks; and
- new offers for consumers on home energy management, smart tariffs, smart appliances and electric vehicles.

By harnessing the potential of energy storage, demand-side response and smarter business models, we have an opportunity to upgrade to one of the most efficient, productive energy systems in the world. This is central to how we deliver secure, affordable and clean energy now and in the future.

This upgrade of our energy system is an important part of the Government's Industrial Strategy. Energy is an essential input to all economic activity. Bringing down energy costs, through the efficient integration of new technologies, can contribute to raising productivity throughout our economy. Further, the transition towards clean and flexible energy systems is a global trend, presenting a significant industrial opportunity. More than half of all new power capacity installed globally is now renewable, and the global market for electric vehicles grew by 60% in the last year. All countries adopting these new technologies will need systems that integrate them efficiently. The regulatory framework for a smart and flexible system that the Government and Ofgem are putting in place will strengthen market incentives for innovation, and pave the way for UK businesses to take the lead in meeting global demand for the energy systems of the future.

We set out in this Plan, first, the guiding principles of our approach to a smart, flexible system and, second, the specific actions that the Government and Ofgem will undertake or are undertaking already.

🔌 Guiding principles for a smart, flexible system

At the centre of our approach is ensuring effective markets and competition. Markets can allow the best flexible solutions to flourish and help deliver a secure, affordable and clean energy system. We want to see competition that is as far reaching as possible to make sure consumers benefit from a more efficient system. This means facilitating competition between:

- new types of flexibility, such as storage and demand-side response (including through aggregators); and
- new types of flexibility and other solutions, including interconnection, generation, energy efficiency or network infrastructure.

The policy ambition is for providers of flexible solutions to be able to realise the true value of their flexibility. In the current context, this means maximising access to the existing range of markets (capacity, wholesale, balancing and ancillary services), alongside new markets or revenue streams (e.g. for services at distribution network level, or for new services) and being able to stack value across them wherever appropriate. In the future, it could mean more fundamental changes to market structures or signals, to make it simpler for providers to combine value streams.

Case study - National Grid changing the way it buys services

National Grid, as System Operator, has launched an initiative to reform its strategy on the way it buys services that the system needs – the ‘System Needs and Product Strategy’.

The services that the System Operator procures are complex to navigate and have meant that new players in the energy space can find it hard to sell into these markets, despite their potential to offer savings. Through close consultation and engagement with industry, for example through its Power Responsive campaign, the System Operator has been able to begin to address these challenges. Their work is expected to remove barriers to participation, providing greater access to smart solutions and distributed resources, in turn bringing costs down throughout the electricity system.



Achieving this increased level of competition and a market-led system will require improved visibility and transparency between buyers and sellers of flexibility. This is needed to give buyers and sellers of flexibility improved understanding of the markets, and market signals which inform their long- and short-term investment and operational decision making.

We want to help energy consumers gain control of their bills and how much energy they use. Smart technologies have a central role to play in this and can provide consumers with greater control and choice. We want it to be easy for consumers to access the benefits of a smart system in whatever way works for them. So we want to enable innovative businesses to be able to offer new technologies and new services to consumers, many of which could build upon the smart meter infrastructure.

Security of supply is vital. A smart system can deliver energy security at a lower cost than would otherwise be the case. As new smart technologies and solutions emerge, the System Operator and the energy market will have a more diverse range of options for balancing supply and demand. At the same time, it is essential that a smart system remains a secure system. A smart system will need to mitigate new risks, such as cyber risks, because it will be more complex and more driven by data and communication technologies.

We want to encourage innovation. A key role for the Government and Ofgem is to create the environment for new ideas to flourish by removing barriers to innovation. Our energy system needs technologies and infrastructure that are both cheap and clean, but it also needs innovation in processes, transactions and consumer offerings. This is a fundamental part of the Government's Industrial Strategy and Ofgem's approach to regulation.

Case study - Time of Use tariff trials

Recent trials have demonstrated consumer interest in Time of Use (ToU) tariffs. For example, the "Customer-Led Network Revolution" project (led by Northern Powergrid) found that ToU tariffs were popular with domestic customers and were easily understood. The majority of the customers taking part in the trial saved money and used up to around 10% less electricity in the peak period than customers on a regular tariff. Separately, the "Low Carbon London" project (led by UK Power Networks) trialled a residential dynamic ToU tariff and also found strong acceptance, with a 91% rate of endorsement for the tariff. 79% stated that the tariff was not experienced as complex, and 77% stated that they would want to stay on the tariff.



Our approach is deliberately adaptive.

We recognise the uncertainties inherent in long-term and fundamental changes in our energy system. That is why our approach is so firmly rooted in markets and competition where investment choices which offer the best value for flexibility providers, and ultimately consumers, will win out. The approach set out in this plan is adaptive: we will work with industry and consumers to increase investor confidence, monitor progress and maximise benefits.

We want to work in partnership with others to deliver change at the required pace.

Other countries around the world are facing similar challenges. We are looking at different approaches, with the Government working with other governments and Ofgem working with other regulators. In GB, the System Operator, transmission owners, distribution network operators, generators, suppliers, aggregators, tech companies, Local Enterprise Partnerships, local authorities, community energy groups, and consumer groups, amongst others, are already considering the challenges and opportunities smart technologies bring. This Plan maps out how we want to work together on this transition.

More widely, we recognise that smart energy is central to many other changes in our energy system and the wider economy. It is an important part of the Industrial Strategy, given its potential to reduce energy costs, increase productivity, and put UK businesses in a leading position to export smart energy technology and services to the rest of the world. It is a central part of how we decarbonise our power sector, as will be set out in the Government's forthcoming Clean Growth Plan.

The actions proposed here are designed to work together with different potential approaches to long-term heat decarbonisation, including greater electrification. Finally, a smart energy system is part of the Government's wider Digital Strategy⁴, as it uses digital technology and data, improving the energy system's integration with related systems, e.g. heat, transport, utilities and buildings.

Case study - Cloud-based services

Upside Energy has used innovation funding, including a grant in 2015 from the Government's Energy Entrepreneurs Fund, to help support the development of algorithms to manage their distributed energy storage portfolio. Upside Energy has developed a cloud-based service that aggregates the energy stored in systems people and businesses already own – for example, uninterruptible power supplies (UPS) or solar PV systems (solar panels). This creates a Virtual Energy Store™ that they can sell to the grid to help it balance supply and demand. They share the revenue they generate from these services with device owners and manufacturers, which helps consumers to decrease their energy bills.



In parallel with this work, Ofgem has set out a number of complementary work streams in its Forward Work Programme⁵ which support the aims of this Plan and interact with the actions. These include the regulatory framework for the future energy system, future System Operator incentives, and a Targeted Charging Review.

⁴<https://www.gov.uk/government/publications/uk-digital-strategy>

⁵https://www.ofgem.gov.uk/system/files/docs/2017/03/ofgem_forward_work_programme_2017-18.pdf

🔌 Towards a smart, more flexible energy system

In November 2016, the Government and Ofgem published a Call for Evidence on a smart, flexible energy system.⁶ We received nearly 250 responses containing a wealth of views, evidence and analysis. We strongly welcome the degree to which stakeholders across the sector from industry to consumer representatives have engaged with us and shared their expertise.

A summary of their responses and a response to them from the Government and Ofgem is set out in an accompanying publication. The actions that the Government and Ofgem will take forward are grounded in the responses to the Call for Evidence and set out in a Summary of Actions at the end of this publication. Many of these build on the actions identified in a number of recent studies on smart energy, including the National Infrastructure Commission's 'Smart Power' report published in March 2016⁷ and the recently published Committee on Climate Change annual progress report to Parliament.⁸

There are many new forms of flexibility, and the Government and Ofgem are keen, where appropriate, to remove undue policy and regulatory barriers to their deployment. **Our approach is not to favour one type of flexibility over another, but to allow different forms of flexibility, including forms which will be developed in future, to compete against each other, and against more traditional solutions, within a market framework.** It is likely that different forms of flexibility will, at different times, represent the best value for money for consumers.

Case study - Smart storage heating

VCharge, owned by Ovo Energy, is a smart storage solution currently being applied in homes and social housing to control electric storage heating to manage resident comfort and address fuel poverty in communities. The technology also supports the widespread adoption of renewable energy by providing valuable grid balancing services. VCharge heating controls are fitted to new or existing storage heaters and can be controlled via a smartphone. When combined with a smart tariff, residents reported dramatically improved comfort and lower bills, and greater control over their heating systems.



One form of flexibility is **storage**. Until recently, there had been no new storage on the system since the pumped hydro facilities were built prior to privatisation. New storage is now being deployed, with over 550MW of battery capacity contracted in 2016 to come online by 2020. We have found that storage faces a number of specific **regulatory and policy barriers** that may place it at a disadvantage to other forms of flexibility.

⁶https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/576367/Smart_Flexibility_Energy_-_Call_for_Evidence1.pdf

⁷<https://www.gov.uk/government/publications/smart-power-a-national-infrastructure-commission-report>

⁸<https://www.theccc.org.uk/publication/2017-report-to-parliament-meeting-carbon-budgets-closing-the-policy-gap/>

Demand-side response is another form of flexibility that we want to be able to compete in the energy system. For this to happen, consumers must be able to both offer up their flexibility if they are willing to, and to see benefit from doing so. So, we want to ensure that **homes and businesses** have access to the right tools, including through smart meters and the enhanced capacity of appliances.

This also means ensuring that consumers are safe and that our energy system is secure. Then, we want to make sure that the signals and incentives within a smart, flexible energy system align to reflect the benefits of demand-side response. Independent aggregators have the potential to play a significant role in enabling the development of this form of flexibility, but we have found that at present they may be restricted from doing so, for example due to a lack of access to certain markets.

More generally, newer forms of flexibility face barriers that may inhibit their development. We believe that the key to overcoming these barriers is by ensuring there are open and transparent **markets which work for flexibility**. This includes ensuring the roles and responsibilities in the system are fit for purpose and network companies play a full role in the transition to a smarter, more flexible system.

This has led to us grouping the actions we will take into the following themes:

- removing barriers to smart technologies;
- smart homes and businesses; and
- markets which work for flexibility.

Removing barriers to smart technologies

As we move to a smarter, more flexible system, we need to ensure that the opportunities afforded by advancements in technology can be realised. The existing energy system was not designed with new forms of smart technologies in mind. These technological developments have in particular resulted in a number of policy and regulatory barriers to the further deployment of storage. In responses to the Call for Evidence, there was significant agreement between stakeholders over what needs to change and how these barriers to deployment can be removed. We want to see storage become a genuinely viable proposition in the energy system.

We will take a number of actions to address undue regulatory and policy barriers to storage. In particular:

- Ofgem has already consulted on a proposed Targeted Charging Review (TCR),⁹ which will assess whether the current system of network residual charges should be reformed, given that it has the potential to distort incentives and lead to network costs being disproportionately recovered from some groups of network users. The consultation also set out Ofgem's views on charges for storage facilities to guide industry. These views are that storage facilities should not pay the 'demand residual' element of network charges at transmission and distribution level, and that storage providers should only pay one set of balancing system charges.

⁹<https://www.ofgem.gov.uk/publications-and-updates/targeted-charging-review-consultation>

Ofgem indicated that these changes to storage charging would best be brought forward by industry, and two modifications have now been raised to address these issues. Ofgem will announce details shortly on the scope of the TCR, which is now going ahead. The Government is keen to see fair changes to the charging regime that create a level playing field for storage.

- when Parliamentary time allows, the Government intends to amend the Electricity Act 1989 to include a definition of storage, based on the Electricity Storage Network definition proposed in the Call for Evidence, as a distinct subset of the generation asset class.
- the Government will review the planning regime to look at whether it could be simplified for storage facilities. Aspects for review could include the national planning threshold for storage facilities and planning guidance associated with storage.
- Ofgem will consult on the form of a modified generation licence for storage in summer 2017.
- the licence changes will be designed to enable storage facilities to identify themselves as exempt from so-called final consumption levies, as storage facilities are not end consumers of energy.
- there are a range of additional barriers to storage that were identified in the call for evidence or in stakeholder responses. In response to these:
 - the Government and Ofgem are making clearer when storage can co-locate alongside renewable generation, without putting at risk agreements under Contracts for Difference, the Renewables Obligation or Feed-in-Tariffs schemes. These arrangements ensure that only renewable generation is rewarded, but de-risks investments that co-locate storage alongside renewables.

- Ofgem will seek to improve the connections process for storage developers by working with industry on changes such as flexible connections, holding industry to account, and using a financial incentive to encourage the distribution network operators (DNOs) to do more to meet their customers' needs.
- the Government will continue to work with industry in developing an appropriate health and safety framework for storage.

Case study - Storage alongside generation assets

Vattenfall, a Swedish energy company, is building a 22MW battery storage system at the 228MW Pen y Cymoedd wind farm in South Wales. By co-locating the storage and generation assets, it will make the most efficient use of existing renewable and grid infrastructure. The lithium-ion battery will provide network services to the System Operator to help control the electricity system's frequency, which is critical for ensuring the quality of power delivered to consumers. This type of service has existed for decades but new smart technologies mean frequency regulation can be provided even faster and more cost-effectively. In response to grid needs, these batteries can go from zero to full power output within one second.



We consulted on the question of whether network companies should own or operate storage. We see storage as one form of flexibility that can be used by network operators in a number of different ways to help manage and deal with some of the issues they face. If a network company owns or operates storage it could impede the development of a competitive market for storage and flexibility services. Ofgem considers that network companies should not own or operate storage. It will ensure that network operators cannot directly operate storage. It will also introduce new reporting requirements for DNOs who own storage, and look at further action in future.

Beyond addressing these barriers, there is a question of how we catalyse innovation in the storage technologies of the future. Much of this is likely to happen in the market as a consequence of us addressing barriers and improving price signals and there have already been storage trials as a result of Government funding and Ofgem's network innovation incentives. Ofgem's recent innovation review strengthens the ability of third parties to propose potential network innovation projects.

There are also some further areas where there is a case for publicly funded innovation support. In its 2016 Budget, Government announced that there would be at least £50m for smart innovation. In this Plan, we announce that this will now increase to up to £70m. This is in addition to the Government announcement in April 2017 of initial funding of £246m from the Industrial Strategy Challenge Fund to kick-start the development of disruptive technologies, including designing and manufacturing better batteries for electric vehicles.¹⁰

The Government has launched four innovation competitions to date: a £9m challenge fund focused on cost reductions for storage, a £20m vehicle-to-grid competition, and a £7.5m competition for innovative non-domestic DSR, all projects launching in 2017. Funding is also available for feasibility studies into large scale storage to be completed by the end of 2017 which will inform a possible follow-on 'first-of-a-kind' large scale energy storage demonstrator competition.

Case study - Electric vehicle smart charging

With 500-700 participants, Electric Nation is the world's largest electric vehicle (EV) smart charging trial. Participants on the scheme will have their charging automatically managed to flex to the local grid pressures, whilst ensuring that their vehicle still has full charge for when they need it. Western Power Distribution and its partners including EA Technology are testing whether this can unlock capacity on their network for more EVs to be deployed before reinforcement is needed, and limit or defer the number of circuits which need to be upgraded, reducing costs to bill payers. The results of the project will be shared with all distribution network operators so the whole network benefits.



¹⁰This is formally known as the Faraday Challenge. See <https://www.gov.uk/government/news/business-secretary-announces-industrial-strategy-challenge-fund-investments>

Smart homes and businesses

Demand-side response (DSR) can help consumers save money as well as improve the efficiency of the system. Industrial and commercial consumers can already realise this value to an extent – with 1.4GW of DSR contracted in the December 2016 Capacity Market auction, and a further 300MW in the March 2017 Transitional Arrangements auction. The fundamental enablers are already there in this sector¹¹; the issues are more to do with how to increase the participation of these consumers in DSR and how their flexibility can be more effectively provided within the current market framework (this is discussed in the next section).

By contrast, there is currently little demand-side response from households or small businesses. Yet trials to date show that there is significant technical potential for demand-side response.¹² There also appears to be consumer appetite, given responses to a recent BEIS Consumer Panel.¹³ The Government and Ofgem cannot be certain how big a part flexibility provided by domestic consumers will play in our future energy system. However, we do know that, at present, it is not possible for this to be the case. We also expect consumers to want high levels of automation, so that it is easy for them to participate and to realise bill savings.

Therefore, the Government and Ofgem will put in place the enablers that could unlock this market. This begins with the smart meter roll-out, and the Government is committed to offering every household and small business a smart meter by the end of 2020.

Case study - Smart demand-side response services

The water company United Utilities has contracted with an energy aggregator—Open Energi—to provide demand-side response (DSR) services to the System Operator (SO). A smart box installed at United Utilities' sites allows its process equipment to “talk” to the grid and acts like a ‘virtual’ power station, allowing the SO to even out temporary peaks and troughs in demand instead of turning power stations up and down. Motors and pumps can automatically adjust their energy consumption in seconds. By 2020 United Utilities aims to provide 50MW of demand response from multiple sites, which saves turning on a power plant.



This Plan sets out further actions in the following areas:

- **half-hourly settlement** – Ofgem has been working with industry to enable elective half-hourly settlement, so it is easier for suppliers to offer customers smart tariffs. These changes came into effect in June 2017. Ofgem has also consulted on the timetable for

¹¹The enablers include meters capable of recording and submitting half-hourly consumption data, half-hourly settlement with the associated supplier and central IT systems, and time of use network charges

¹²For example, see UKPN's Low Carbon London project ([http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Low-Carbon-London-\(LCL\)](http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Low-Carbon-London-(LCL))); and Northern Powergrid's Customer-Led Network Revolution project (<http://www.networkrevolution.co.uk/customer-trials/>)

¹³https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/566230/Smart_Energy_Consumer_Panel_Research_Summary_Report.pdf

mandatory half-hourly settlement, which would encourage all suppliers to help consumers move their consumption away from peak times, for example by offering smart tariffs. Ofgem is setting out the timetable, linked to the roll-out of smart meters, for a decision on mandatory half-hourly settlement when they publish their revised plan, following consultation on their plan in November 2016.

- **smart appliances**¹⁴ – The Government will work with industry on standards to ensure smart functionality allows consumers to provide flexibility and benefit from DSR, whilst ensuring cyber security and avoiding proprietary standards which could limit interoperability and consumer choice. We recognise that standards will need to allow for innovation, and we will work with the EU, US and other countries to ensure maximum market opportunities for manufacturers and best value for consumers. Therefore the Government intends to consult on seeking powers to set standards for smart appliances, and will collaborate with industry to develop appropriate standards.
- **electric vehicle chargepoints** – The Government is seeking powers in the Automated and Electric Vehicles Bill to set standards for chargepoints. These powers would allow the Government to set standards for chargepoints that ensure they can be used for DSR and vehicle-to-grid technologies. This will make it easier and more convenient for consumers to realise the benefits from their EV battery and the flexibility it can provide. More generally, we will work with stakeholders to ensure that we have an integrated approach to electric vehicles which reflects the costs and benefits to consumers and the energy system. The involvement of electric vehicles in providing DSR and storage will help minimise the amount of new generation and network investment that will be needed,

lowering overall system costs.

- **consumer protection** – The Government and Ofgem will ensure consumer interests are respected as new services are offered and new business models emerge, building on the principles of ensuring consumers are treated fairly, understand what they are buying and have their privacy protected. In the case of independent aggregators, existing consumer protection tools already provide a level of protection for consumers. We will monitor industry's development of a code of conduct for aggregators' interaction with larger consumers. We will keep the effectiveness of the code and existing protections for consumers more broadly under review. We will consider in due course whether they provide sufficient protection for domestic consumers.

Case study - Mobile energy hubs

Nissan has been looking at ways to use electric vehicles (EVs) beyond traditional mobility including enabling them to become clean 'mobile energy hubs'. When plugged in, EV owners could provide grid services while enjoying an alternative source of income. Today's more than 20,000 Nissan EVs in the UK could represent 300MW of virtual power plant. If that was scaled up to all the vehicles on UK roads, and all of this capacity was available at the same time, it would mean up to 370GW was available.



¹⁴For example, appliances which are demand-side response-enabled.

- **cyber security** – The Government has commissioned work on the magnitude of the smart cyber security risk up to 2030, and this is informing our approach to addressing cyber security risks in a smart energy system, for example on technical standards for smart appliances, and consideration of industry systems. The Government and Ofgem are also in discussions to further define their relative roles in the oversight and regulation of cyber security risks in different parts of the industry.

The current retail market is not working for the majority of domestic consumers. Although there are a number of suppliers with different tariff offers, not enough consumers feel able to engage in the market and around two-thirds are on poor value standard variable tariffs. Ofgem is considering options to protect vulnerable consumers including extending the current safeguard tariff in place for consumers on pre-payment meters. The Government will consider whether further action is necessary once Ofgem has set out its proposals in more detail.

Both the Government and Ofgem consider there is considerable potential for new technologies and potentially new business models to engage with consumers and deliver better value than before. The above changes, including the removal of the four tariff cap, should be sufficient for suppliers to offer smart tariffs. We will monitor new consumer offerings and consumers' response. In particular, we will monitor the distributional impacts of a smart energy system to ensure that benefits are felt by consumers who choose to engage and for others as a result of the downward pressure on system costs that a smart system should deliver. As a first step, Ofgem will shortly publish analysis they have commissioned on the distributional impacts of time of use tariffs.

In addition to consumer offerings that might emerge from market players, there are a wide range of different technologies and business models that could flourish, but many are unproven. In some instances, there is a case for public innovation support to trial new approaches. For example, we do not know what happens when people engage with certain smart technologies, or whether there are as yet unknown issues with the regulatory framework hindering new business models. So we are keen to support more research in this area. As part of this Plan, the Government will deliver innovation support on domestic demand-side response trials, and has recently announced new vehicle-to-grid trials. Ofgem has built on its consultation on non-traditional business models. It has introduced the Innovation Link, which provides informal feedback to innovative businesses on the regulatory implications of their ideas. In February 2017, it also launched a call for expressions of interest in a 'regulatory sandbox'. The sandbox aims to allow businesses to trial new ideas, subject to conditions, without incurring all the usual regulatory requirements.

Consumers will also benefit from changes in the design of the energy system. These will help deliver better value for money for consumers through the use of new markets, technologies and services.

Markets which work for flexibility

Our Call for Evidence identified the need for better and more transparent price signals that reflect the true value of flexibility actions to the system. These will enable those providing flexibility to see how they can stack value across different parts of the market and should help investment in new services and technology.

As part of this, there is a need for **roles and responsibilities** of different actors in the system to evolve so that network and system operation as a whole is managed efficiently and to remove undue barriers to new technologies or new business models. In particular, the regulated monopolies will need to plan ahead, engage with new businesses, and explore fully the use of markets to solve issues.

Case study - Peer-to-peer energy marketplace

Open Utility is rethinking the way energy markets work. Instead of buying your electricity from big traditional power stations, their Piclo® peer-to-peer energy marketplace, in partnership with Good Energy, allows you to buy it directly. Piclo matches customers with local renewable producers, using smart meters to measure how much energy has been transacted peer-to-peer over the grid. Hundreds of renewable generators across Scotland, England and Wales are selling their locally sourced electricity from the sun, wind and rain directly to customers. Piclo is currently only available to businesses but before long, once smart meters are installed in every home, it will be available to everyone.



We set out two broad types of flexibility; price flexibility (occurring when any party varies its demand or generation in response to the price of energy, and network use at a particular time and/or location); and contracted flexibility (where

parties trade and directly contract with one another to procure flexibility). There are different actions to achieve prices which reflect the value of the service to the wider system ('system value pricing') for different types of flexibility.

One component of price flexibility is ensuring that **network tariffs** appropriately signal the costs or benefits of using the network at different times and locations. As part of its forthcoming strategy for regulating the future energy system, Ofgem will set out its intention to consider how to improve forward-looking signals for network usage. Progress is being made in this area through a range of industry-led modifications and through Ofgem's Targeted Charging Review.¹⁵

To facilitate contracted flexibility, the Government and Ofgem have assessed the range of existing markets, considered whether there are any missing markets, and whether flexibility providers can stack revenue streams across the different markets. We are also keen to ensure that those procuring and/or providing flexibility are subject to the costs as well as benefits of their actions.

In relation to the **Capacity Market**, demand-side response (including through aggregators) and storage are already competing against more traditional generation in the main auction. The Transitional Arrangements auctions showed that some forms of demand-side response remain more expensive than existing generating assets, and further cost reductions will be needed for these to be competitive. To assist with this, the Government has identified a number of barriers to flexibility. As a result, the Government will simplify metering requirements for those offering demand-side response, enable asset reallocation by demand-side response providers, and allow the stacking of revenues between the Capacity Market and ancillary services.

¹⁵<https://www.ofgem.gov.uk/publications-and-updates/targeted-charging-review-consultation>

In relation to the **Balancing Mechanism**, Ofgem considers that **independent aggregators'** participation can be efficiently provided for subject to careful design arrangements. Alongside this document, Ofgem is setting out its views¹⁶ to guide industry thinking on code modifications to support this outcome.

In relation to **ancillary services**, the System Operator (SO) will simplify the number of services, pilot new ways of procuring ancillary services in 2017-2018 to trial a real time markets route such as auctions and make ancillary services more open and transparent. The SO has recently released its System Needs and Product Strategy to consult on how balancing services need to evolve.¹⁷

As part of its Power Responsive campaign, the SO has committed to making ancillary service contracts work as well for the demand side as they have historically for the supply side and to open up its procurement to new service providers. The SO is also addressing the issue of exclusivity in its contracts so flexibility providers can stack value with other markets or services wherever possible. We expect that these changes will increase the proportion of flexibility provided by the demand side.

Beyond these changes in existing markets, there appear to be a **lack of established markets in local flexibility services** to manage local network constraints.

A key change in addressing this is the continued evolution of distribution network operators (DNOs) to become more active in managing their networks as a system—implementing innovative techniques and exploring market-based solutions as alternatives to network reinforcement. This mode of operation would see the DNOs operating as distribution system operators (DSOs) and means that if storage, demand-side response,

energy efficiency, use of heat networks, or other actions can deliver better value to consumers than traditional reinforcement, the DSO should pursue these solutions.

It could also involve sending the right constraint management signals in new ways, with markets providing solutions without network companies needing to be involved, for example where a non-flexible user contracts bilaterally with a flexibility provider. Ofgem will consider this as part of its work on improving signals for network usage.

Case study - New markets for smart solutions

Distribution network operators and the System Operator (SO) are working together to improve the way they manage the system. UK Power Networks and the SO are collaborating on the 'Power Potential' project which aims to open up new markets for smart, flexible solutions and increase generation flow by decreasing constraints on the networks. The project will include the creation of a regional reactive power market—the first of its kind in GB—as well as improved procurement of other power services. It will help drive network costs down, ultimately saving consumers money by using our existing infrastructure more efficiently.



In performing their respective roles, the SO, DSOs, and the transmission owners (TOs) will all need to work together much more to

¹⁶<https://www.ofgem.gov.uk/publications-and-updates/independent-aggregators-and-access-energy-market-ofgem-s-view>

¹⁷<http://www2.nationalgrid.com/UK/Services/Balancing-services/Future-of-balancing-services/>

¹⁸<http://powerresponsive.com/>

deliver the best outcomes for the system as a whole. This includes coordinated planning and operational processes, data management, and transparency, to enable efficient system decisions; for example on whether an investment at a transmission or a distribution level is in the best interests of consumers.

Having considered Call for Evidence responses, Ofgem's view is that the existing regulatory framework, particularly its RIIO¹⁹ framework for transmission and distribution networks, already provides the necessary conditions for DNOs, the SO and TOs to evolve and deliver the changes that are needed over the next few years. Ofgem will work with industry over the remainder of the year to test its understanding of where any regulatory clarifications or changes may be needed, but largely the onus is on the network companies to respond appropriately.

The Energy Networks Association (ENA) has set up the Open Networks project²⁰ which will be a key initiative to drive progress and develop proposals in these areas. Ofgem and the Government expect these reforms to ensure that any future network investment is in the best interests of consumers. It will be important for the work of the Open Networks project to build on and leverage the wealth of thinking conducted to date.²¹ We have already set out the need for a report this year and believe that the ENA's Open Networks project is best placed to deliver this. Amongst other things, we expect the report to demonstrate how parties will deliver:

- opening up the delivery of network requirements to the market so new solutions such as storage or demand-side response can compete directly with more traditional network solutions, including as an alternative to reinforcement. These needs will also need

to be signalled well in advance.

- mechanisms for transmission and distribution coordination, which enable whole system network requirements to be identified and acted upon efficiently, in the best interests of consumers.

Alongside the changes described above, the Government, Ofgem and National Grid already set out reforms to the independence and role of the System Operator in January 2017, and Ofgem and National Grid are now taking these forward. Ofgem will consult on a new regulatory framework for the System Operator to be in place by April 2018.

Ofgem will consider what further changes might be needed to network companies' roles in the longer-term, and how this should be incentivised through the next round of RIIO price controls. At this stage the focus is on evolving the role of existing parties, but the Government and Ofgem will keep the case for further institutional changes under review.

There is also the case for further trials in this area to inform the development of policy and regulation across a number of areas. For example, there is currently no market for local flexibility trading. A local flexibility market could deliver whole system benefits. Generators, storage and demand-side response providers, and suppliers could trade energy locally to meet their needs, as well as the needs of the distribution system operator and the System Operator. The Government is commissioning a feasibility study on local flexibility trading which will look to deliver whole system benefits by optimising the use of distributed resources.

¹⁹RIIO (Revenue = Incentives + Innovation + Outputs) is Ofgem's framework for setting price controls for network companies. It is a new performance based model which lasts eight years.

²⁰<http://www.energynetworks.org/electricity/futures/open-networks-project/open-networks-project-overview/>

²¹Including the IET/Energy System Catapult's Future Power System Architecture work, amongst others <http://www.theiet.org/sectors/energy/resources/modelling-reports/fpsa-challenge-1.cfm>

Conclusion

The Government and Ofgem have set out a Plan to enable the development of a smart, flexible energy system that will reduce costs for consumers and industry, and support the growth of innovative new businesses. Through these changes, we aim to upgrade our regulatory and market framework, open up new opportunities for consumers and market participants, and provide conditions in which innovation can flourish. As a core part of the Industrial Strategy, it is an opportunity to increase productivity at home, and put the UK in a leading position to export smart energy technologies and services to the rest of the world. In making these changes, we will continue to work closely with all interested parties. As we make the changes, new issues will inevitably arise and we may need to take further action or adapt our approach. We will seek to do this in the same open and collaborative way in which we have sought to develop this Plan.

Summary of actions

Removing barriers to smart technologies

1.1

Issue: Network charges can, in some scenarios, put storage at a relative disadvantage to other network users, preventing a level playing field.

Action: Ofgem published a consultation on a Targeted Charging Review (TCR)²² on 13 March 2017, setting out Ofgem's views on network charges for storage to guide industry. These views are that storage should not face demand residual charges at transmission and distribution level, and should not face two sets of balancing system charges. Ofgem will announce details shortly on the scope of the TCR, which is now going ahead, and its views on these issues.

Ofgem expects industry to provide guidance on the treatment of storage as intermittent or non-intermittent in the distribution charging methodologies by the end of 2017. This will provide more transparency and information for connecting customers about network charges, and reduce the risk that some storage facilities may be over-charged.

1.2

Issue: Storage is not defined in primary legislation. Its regulatory status within the electricity system and planning regimes is unclear.

Action: The Government will use primary legislation, when parliamentary time allows, to amend the Electricity Act 1989 and other relevant legislation to explicitly define electricity storage as a distinct subset of generation. The Government will engage with industry, local planning authorities, the devolved administrations and other relevant bodies to review the planning framework. Aspects for review could include the national planning threshold for storage facilities and planning guidance associated with storage.

Ofgem will consult on a modified generation licence for storage with the aim of it being introduced by Summer 2018. This can proceed independently of the parliamentary timetable.

²² <https://www.ofgem.gov.uk/publications-and-updates/targeted-charging-review-consultation>

Removing barriers to smart technologies

1.3

Issue: Electricity procured by storage facilities from suppliers anomalously includes the cost of final consumption levies.

Action: Electricity supplied to generation licence holders is excluded from the supply volumes used to calculate the costs of the Renewables Obligation (RO), Contracts for Difference (CFD), Feed in Tariffs (FITs) and Capacity Market auctions. Holders of either a generation licence or the new storage licence to be consulted on by Ofgem (see 1.2) will, as a result, not be liable for such levies. The Government has clarified that the electricity received and stored by electricity storage facilities may be supplied to them free from the Climate Change Levy, where relevant conditions are met.²³

1.4

Issue: Some renewable generators receiving support under the RO, CFD, or FITs schemes are concerned they may put their accreditation at risk if they apply to install storage assets on the same site.

Action: The Government has outlined, in its response to the latest CFD consultation²⁴ and in the latest CFD contract, how storage should be treated on CFD sites.

Ofgem has updated its guidance for the RO²⁵ on the accreditation amendment process and has provided guidance on how to co-locate storage and renewables under FITs²⁶. Later this year Ofgem will publish further guidance on both the FIT and RO schemes for participants that wish to co-locate storage systems at their generating stations.

1.5

Issue: Synergies between a smart energy system and future Government policy on small-scale low-carbon generation should be realised.

Action: In developing future policy on small-scale low-carbon generation, the Government will look to ensure the system and consumer benefits of storing electricity for self-consumption and export to the grid at peak time are realised. This could potentially include the ability for existing generators to take advantage of time-of-export tariffs.

²³ As set out in HMRC's Excise Notice CCL1/3 – Reliefs and special treatments for taxable commodities.

²⁴ <https://www.gov.uk/government/consultations/consultation-on-amending-the-cfd-contract-and-regulations>

²⁵ <https://www.ofgem.gov.uk/publications-and-updates/renewables-obligation-guidance-generators>

²⁶ https://www.ofgem.gov.uk/system/files/docs/2017/05/fit_guidance_for_licensed_electricity_suppliers_v9.pdf

Removing barriers to smart technologies

1.6

Issue: Network connection rules were not designed with storage in mind, which can lead to a number of issues including a lack of understanding of how storage connections should be treated (by both network operators and connecting customers) and the cost and time of connecting.

Action: We expect network operators and industry to continue to improve network connections for storage – in particular, acting now to clarify the connection process (including for domestic and co-located storage), increasing transparency about where to connect, and implementing better queue management. Ofgem will use the Incentive on Connections Engagement,²⁷ an incentive developed under the RIIO²⁸ framework, to assess if distribution network operators are addressing these issues and ensure they are engaging with connection stakeholders and responding to their needs.

1.7

Issue: The health and safety framework needs to keep pace with a rapidly changing technical and commercial landscape.

Action: The Government will work with industry on reviewing, consolidating and, where necessary, updating health and safety standards for storage. This includes work led by the British Standards Institute and the Institute of Engineering and Technology. The Home Energy Technology workstream of the Each Home Counts review²⁹ focuses on standards and consumer protection for a range of technologies including electricity storage – and is specifically considering how to incorporate domestic electricity storage within the Each Home Counts Quality Mark, Standards Framework and Information Hub.

1.8

Issue: Where flexibility assets are owned and/or operated by network operators there is potential to distort competition in markets for flexibility services or deter new entrants. More clarity on the application of existing unbundling rules to storage is required and further consideration is needed on the necessity to strengthen those rules.

Action: In order to ensure a competitive market for storage can develop, and to ensure compliance with EU law, Ofgem will clarify the regulatory position on ownership and operation of storage by network operators shortly. Ofgem will outline steps that it will take to ensure there are no regulatory gaps, and so ensure the operation of storage is sufficiently unbundled from the network business. Ofgem will also include new reporting arrangements for distribution network operators who own storage and will continue to monitor this to see whether further unbundling is necessary in the future.

²⁷ <https://www.ofgem.gov.uk/publications-and-updates/incentive-connections-engagement-ice-guidance-document-consultation>

²⁸ Revenue=Incentives+Innovation+Outputs

²⁹ <http://www.eachhomecounts.com/>

Removing barriers to smart technologies

1.9

Issue: There is a wide range of storage technologies at an early stage of development. Further innovation is needed to reduce technology costs, especially those with potential to be more cost-effective than lithium-ion batteries, and/or to operate on a large scale. Storage has been trialled through Ofgem's electricity Network Innovation Competition, through which £600m is available between 2013-2021, but further trials may be needed outside the parameters of these competitions.

Action: The Government has now made up to £70m available for innovation in smart energy technologies including storage up to 2021. In addition, as part of the Industrial Strategy Challenge Fund, the Government has announced an investment of £246m for the Faraday Challenge, which is focusing on the design and manufacture of better batteries for electric vehicles.

The Government has launched two storage-focused innovation competitions to date: a £9m challenge fund, focused on cost reductions for storage, with projects launching in 2017; and £600,000 funding for feasibility studies into large-scale storage to be completed by the end of 2017, which will inform a possible follow-on 'first-of-a-kind' large-scale energy storage demonstrator competition.

Smart homes and businesses

2.1

Issue: The participation of large non-domestic consumers in demand-side response (DSR) should be encouraged. A number of barriers have been identified, including knowledge, complexity and access to markets to increase commercial incentives.

Action: The Government and Ofgem will continue to support and engage with the System Operator's Power Responsive campaign³⁰ to increase the participation in DSR of large non-domestic consumers.³¹

2.2

Issue: The participation of public sector consumers in DSR should be supported to demonstrate the benefits of DSR alongside more established technologies, enabling it to compete in the wider market.

Action: The Crown Commercial Service facilitates the participation of public sector consumers in DSR. They provide the only national framework in Great Britain for public sector consumers to access DSR and issued a revised framework in June 2017. See also the reference to the Power Responsive work in 2.1.

³⁰ <http://powerresponsive.com/>

³¹ See also Ofgem's actions in 3.3 (Balancing Services reform). Other work by Ofgem will also deliver improved regulatory certainty in charging, see 3.4 on the Targeted Charging Review. Section 2.9 describes actions relating to consumer protection.

Smart homes and businesses

2.3

Issue: Smart meters are the foundation of an accessible smart energy system for consumers.

Action: The Government is committed to ensuring that every home and small business in the country will be offered a smart meter by the end of 2020. Smart meters are a critical building block, creating new opportunities for new services and business models which benefit consumers and the overall system.

2.4

Issue: Existing price signals through the electricity settlement arrangements do not encourage suppliers to offer smart tariffs.

Action: Ofgem will decide on the case for mandatory half-hourly settlement (HHS) for all consumers in line with its revised plan, to be outlined shortly alongside the launch of a Significant Code Review. This builds on the introduction of elective HHS for domestic and smaller non-domestic consumers earlier this year.

2.5

Issue: The limited availability of smart tariffs means consumers cannot realise bill savings by providing demand-side response, and the system and consumers as a whole cannot benefit from this.

Action: The Government and Ofgem have taken a number of steps to remove barriers to suppliers offering smart tariffs, including the roll-out of smart meters, removal of the four-tariff cap and delivery of cost-effective elective half-hourly settlement. At present, we judge this is sufficient to enable suppliers to offer smart tariffs. The Government and Ofgem will continue to consider the potential social impacts of smart tariffs, as some types of consumer may be less able to benefit from smart tariffs than others.

2.6

Issue: Limited availability of smart appliances means consumers cannot realise bill savings by providing demand response.

Action: The Government intends to consult on seeking powers to set standards for smart appliances.³² We consider that standards will ensure interoperability of appliances (and so avoid proprietary standards), maintain data privacy and provide cyber security.

The Government will work with industry to develop these standards.

2.7

Issue: The functionality of electric vehicle charge-points should be smart-enabled so that consumers are not locked out of future smart offers.

Action: The Automated and Electric Vehicles Bill, announced in the Queen's Speech, will include provisions to make regulations for smart electric vehicle charging infrastructure.

³² We will be focusing on appliances which can be comms-enabled and therefore able to modulate their energy consumption in response to signals. There is a case for considering first those appliances which have the greatest opportunity for demand-side response, i.e. those which consume high levels of energy and which are most suitable for flexible consumer use. At present, we consider these to include cold and wet appliances, heating, ventilation, air conditioning and battery storage.

Smart homes and businesses

2.8

Issue: Electric vehicle potential to provide demand-side response and storage services must be capitalised upon to ensure efficient grid integration.

Action: The Government will continue to work with the automotive and energy industries to ensure electric vehicle owners are made aware of the benefits of smart tariffs and able to take advantage of the current market offerings. The Government will apply learning from the range of smart electric vehicle trials currently ongoing, and potentially expand these by providing innovation support for a new vehicle-to-grid trial.

Ofgem will assess any regulatory, network and tariff implications that EVs represent so that risks can be mitigated and the benefits of EVs to the energy system can be optimised.

2.9

Issue: Consumers should be protected from the risks of participating in a smart energy system.

Action: Existing consumer protections, including on data protection and consumer rights, are considered broadly fit for purpose within a smart energy system. Ofgem will ensure requirements on existing players (including suppliers and switching sites) remain appropriate, and that potential impacts on consumers are considered, as we transition to a smarter energy system. The Government will work with industry to develop standards for smart appliances. The Government and Ofgem will monitor and assess the development of a voluntary code of conduct for aggregators. Alongside this, Citizens Advice has stated that they will log complaints in the event that small businesses or domestic consumers raise issues related to their interaction with aggregators. The Government and Ofgem will consider examining more formal protections should it conclude this approach is inadequate.

2.10

Issue: In the move to a smart energy system, it is essential that cyber security risks are effectively understood and acted upon.

Action: Amongst a body of work engaging with stakeholders across the Government and industry, the Government commissioned work to assess the magnitude of the smart cyber security risk up to 2030, including consideration of the increasing levels of smart electric vehicle charging and electrical heating. This work is already informing the Government's work to address cyber security risks in a smart energy system, for example on technical standards for smart appliances, and consideration of industry systems, including those used by aggregators. Further work is being undertaken by the Government to systematically review the risks highlighted in the reports and learn from approaches taken in other countries to ensure risks are addressed through appropriate levers.

2.11

Issue: Further innovation is needed to test approaches to DSR for domestic and non-domestic consumers.

Action: As part of the up to £70m now available for smart technologies up to 2021, the Government launched a £7.5m non-domestic DSR innovation competition in January 2017 and a domestic DSR competition is planned for launch in Autumn 2017.

Smart homes and businesses

2.12

Issue: Domestic and smaller non-domestic consumers must be informed and engaged to participate at scale in a smart energy system.

Action: The Government and Ofgem will monitor how the market develops and, in time, assess the case for more proactive communications on smart energy, combined with strong engagement via local and community organisations.

Markets which work for flexibility

3.1

Issue: There is a need to ensure that storage and demand flexibility participate on a level playing field in the Capacity Market.

Action: The Government will simplify metering requirements for those offering DSR, enable asset reallocation by DSR providers, and allow the stacking of revenues between the Capacity Market and ancillary services.

Ofgem set out on 23 March minded-to changes to the Capacity Market rules to introduce greater flexibility for DSR providers to change the DSR component, and to better facilitate participation of providers of frequency response services. Ofgem will publish its Capacity Market rules decision document shortly.

3.2

Issue: Independent energy aggregators are currently unable to access the Balancing Mechanism (BM) directly. Aggregators could facilitate more demand-side response and increase competition in the BM.

Action: Ofgem is issuing a letter³³ that sets out its views to guide industry thinking on how to deliver efficient access for independent aggregators. Industry is developing a Balancing and Settlement Code (BSC) modification, P344, that is expected to propose creating a new BSC party with an ability to raise modifications to the BSC, which would allow aggregators to access the BM. Should P344 not deliver such access, Ofgem can designate a third party, upon request, to give it the ability to bring forward such a change proposal.

³³ <https://www.ofgem.gov.uk/publications-and-updates/independent-aggregators-and-access-energy-market-ofgem-s-view>

Markets which work for flexibility

3.3

Issue: To balance the system, the System Operator (SO) contracts for balancing services from providers, including frequency response and reserve. Balancing services can suffer from complexity, overlap and lack of transparency. They may also reflect a historical focus on generation rather than demand-side balancing solutions.

Action: The SO has released a consultation requesting industry input around how to make ancillary services more transparent, allowing fair access to new technologies and ensure that services are fairly valued. The SO has set out that it will trial alternative models, including real-time markets. We welcome these developments and the work the SO is beginning to undertake with Distribution Network Owners (DNOs) to consider how these services can be designed to support coordinated and efficient access to flexibility across the transmission and distribution interface. Ofgem and the Government expect to see further swift progress in these areas.

Ofgem will consult on a new regulatory framework for the SO to be in place by April 2018.

3.4

Issue: There are concerns that the existing network charging and wider market arrangements do not create the right incentives for those connecting to the network, including that they do not reflect the costs and benefits they can create for the network and system as a whole.

Action: As part of its forthcoming strategy for regulating the future energy system, Ofgem will set out its intention to consider how to provide users with improved signals for the incremental costs or benefits of their network usage. Signals can be provided through a variety of mechanisms, from charging signals to market design and network access reforms (e.g. making pricing for network access reflect system constraints in a more dynamic way). Ofgem will publish a working paper in the autumn and work with industry on developing the options. Ofgem has also launched a Targeted Charging Review.³⁴ In addition to storage charging (mentioned above), this covers how residual network charges are allocated.

³⁴ <https://www.ofgem.gov.uk/publications-and-updates/targeted-charging-review-consultation>

Markets which work for flexibility

3.5

Issue: As the system changes, network and system operation need to evolve to ensure that the system as whole is managed efficiently. There are a range of areas where opportunities for efficiency savings are expected, including through active use of new technologies, providers and solutions and through greater coordination across the transmission and distribution boundary.

Action: DNOs must make more efficient use of new technologies, providers and solutions, as part of their evolution to distribution system operators (DSOs). It is critical that DSOs, transmission owners (TOs) and the SO develop timely and appropriate reforms to the way they plan, operate and engage with one another and customers, in order to manage the networks more efficiently and minimise whole system costs. RIIO³⁵, and the broader regulatory regime, contain incentives to do this, and we are seeing progress now (such as growth in active network management and greater coordination), but further demonstrable progress must be made. Efficient decisions must be facilitated by informed consideration of the full range of solutions available. The Energy Network Association has set up an Open Networks project³⁶ which will be a key initiative to drive progress in these areas. We have already set out the need for a report this year. We believe that the ENA's Open Network project is best placed to deliver this. Amongst other things, we expect the report to demonstrate how parties will deliver:

- opening up the delivery of network requirements to the market so new solutions such as storage or demand-side response can compete directly with more traditional network solutions, including as an alternative to reinforcement. These needs will also need to be signalled well in advance; and
- mechanisms for transmission and distribution coordination which enable whole system network requirements to be identified and acted upon efficiently, in the best interests of the consumer.

Ofgem and the Government expect swift progress in these areas.

Ofgem will work with industry over the remainder of this year to test its understanding of where regulatory clarifications and changes are needed to facilitate industry progress in the immediate term. For example, Ofgem expect to take action to clarify what is expected of parties in relation to existing obligations for maintaining economic, efficient and coordinated networks.

Ofgem will also actively consider what further evolution of parties' roles may be required in order to feed into its development of the next round of price control arrangements (RIIO 2), including regulatory arrangements for the SO.

³⁵ Revenue=Incentives+Innovation+Outputs

³⁶ <http://www.energynetworks.org/electricity/futures/open-networks-project/open-networks-project-overview/>. Formally known as the TSO-DSO project.

Markets which work for flexibility

3.6

Issue: There is a need to catalyse innovation by trialling ways in which energy markets may evolve.

Action: The Government is allocating £0.6 million to local flexibility trading, launching a competition for a feasibility study, with a view to launching an innovation competition to trial such an approach. Ofgem has made changes to Network Innovation Competition (NIC) funding to require network companies to issue calls for ideas from third parties with the view that this will help increase the pool of technologies and ideas.

3.7

Issue: Engineering recommendation P2/6 (originally conceived in the 1950s) dictates the minimum level of security of supply DNOs must provide for demand on their networks. To reflect system and technology changes and greater flexibility, changes could potentially be made to the standard that could improve its efficiency.

Action: DNOs will progress a review in a timely manner; Ofgem has written to DNOs stressing this. As a priority, DNOs will provide a clear and coherent plan for reviewing the standard and codifying any appropriate and necessary changes. DNOs also need to set out project and stakeholder engagement plans. Ofgem and the Government will continue to monitor progress in this area and ensure that industry makes any appropriate changes.

3.8

Issue: There is a need to maximise our stakeholder engagement on smart energy systems, building on the strong engagement we have had so far.

Action: To help implement and steer this Plan, the Government and Ofgem have established a co-chaired stakeholder group, the Smart Systems Forum. This replaces the existing Smart Grid Forum and Electricity Networks Strategy Group.



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