Department for
Business, Energy
& Industrial Strategy

SMART APPLIANCES

Government Response to Consultation on Proposals regarding Smart Appliances

October 2018

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The consultation and Impact Assessment can be found on the BEIS section of GOV.UK: https://www.gov.uk/government/consultations/proposals-regarding-setting-standards-for-smart-appliances

smart appliances

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General information

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Executive Summary

Introduction

The Government has a challenging and critical set of objectives in the energy sector: ensuring security of energy supply, keeping bills as low as possible for households and businesses, and decarbonising both cost-effectively and in a way that enables us to reap the economic benefits of this transition through our Industrial Strategy. As part of this, the Government's Clean Growth Strategy set out a suite of policies to decarbonise the economy, of which smart energy is a key element.

Smart, flexible energy can help drive the transition towards a future low carbon energy system, whilst bringing significant benefits for consumers, the energy network and the wider economy. A study for the Government estimates the benefits of a smart energy system to be £17-40 billion to 2050[1]. These benefits come from avoided or deferred network reinforcements and generation build, avoided curtailment of low-carbon generation, and more efficient use of the energy system.

In November 2016, the Government and Ofgem launched a joint Call for Evidence to seek stakeholders' views on the transition to a smarter, flexible energy system[2]. In response to this, the Smart Systems and Flexibility Plan[3][4] was published. The Smart Homes and Businesses section outlined a series of actions relating to demand-side response (DSR). This included consulting on regulating smart appliances, which was supported by respondents to the Call for Evidence.

DSR is a way in which consumers can engage with the energy system, turning up or down their consumption, in response to signals, such as price. This benefits the overall system by helping to balance supply and demand, and helps consumers to manage their bills in combination with smart offers, such as time of use tariffs.

Smart appliances are key enablers of DSR for consumers. There are currently barriers to the deployment of smart appliances and potential risks to consider; this document seeks to address some of those barriers. In addition, the Government has launched a Clean Growth Buildings Mission to at least halve the energy use of new buildings by 2030, which will involve giving consumers more control over their energy through utilising the latest smart technologies.

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[1] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/568982/An_analysis_of_electricity_flexibility_for_Great_Britain.pdf
[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/576367/Smart_Flexibility_Energy_-_Call_for_Evidence1.pdf
[3] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/633442/upgrading-our-energy-system-july-2017.pdf

For the purposes of this document, we use the term ‘smart appliances’ to mean those which are connected and are able to modulate their electricity consumption in response to signals, such as price[5].

Smart Appliances Consultation

The Government launched a Consultation on Proposals regarding Smart Appliances[6] on 16 March 2018, which closed on 8 June 2018. This set out the Government’s proposals to mandate standards for smart appliances, based on the principles of interoperability, data protection, grid-stability and cyber-security, with additional appropriate consumer protection provisions.

Feedback in consultation responses demonstrated some uncertainty about the phrase “mandating standards” as our proposals were to require that smart appliances comply with certain principles and functionalities. To reflect this feedback and to avoid any confusion with ‘technical standards’, we now refer to ‘regulatory requirements’. This wording is used throughout the remainder of this document and refers to the principles, and associated functionalities, that we currently intend to set through secondary legislation. This is different to voluntary technical standards, usually developed by industry, by which compliance with those principles and functionalities could be demonstrated. The Government is working with industry, including the British Standards Institution, to identify and, as necessary, develop technical standards to indicate compliance with the principles currently intended to be set out by Government.

The consultation proposed to take primary powers (when Parliamentary time allows) to set regulatory requirements for certain smart appliances. The consultation sought stakeholder views on this proposal and on the principles and functionalities on which these regulatory requirements should be based. We also asked for evidence and views on how to put this policy into practice.

The consultation set out the smart appliances we proposed to focus on. These were those with the greatest opportunity for DSR, i.e. which consume high levels of electricity and are most suitable for flexible consumer use. We considered these to include cold and wet appliances, heating systems, ventilation, air conditioning and battery storage. For the purposes of this consultation we did not include electric vehicle DSR opportunities because powers to require and define smart electric vehicle chargepoints are in the Automated and Electric Vehicles Act 2018. The Office for Low Emission Vehicles are taking forward these regulations and will be consulting on them separately.

The consultation also sought views on whether labelling should be used to engage consumers with smart appliances and, potentially, as a method of indicating compliance with regulatory requirements.

Finally, the consultation asked whether we had correctly outlined the risks associated with smart appliances; whether there were major principles of consumer protection which had not been covered;

[5] We recognise that there are other types of consumer appliance that are often called ‘smart’, such as heating controls which regulate temperature based on occupancy, however, these were not the focus of this consultation.
[6] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/690805/Consultation_on_Proposals_regarding_Smart_Appliances-.pdf

and whether stakeholders agreed with applying regulatory requirements as uniformly as possible to applicable smart appliances, catered to individual appliances only where necessary.

Decisions taken following this Consultation

The Government is committed to ensuring there is appropriate regulation for smart appliances in the UK. This is to encourage the uptake of smart appliances, to ensure there is adequate protection against potential risks associated with smart appliances and, as regulatory approaches are planned internationally, to avoid the UK becoming a dumping ground for sub-standard smart appliances. Our key decisions are below. Additional decisions are set out in our response to each of the consultation questions.

1) **The Government intends to take powers to set regulatory requirements for smart appliances.**

The Government believes that there is a strong case for there to be regulatory requirements for smart appliances. Therefore, we will prepare proposals to take powers (when Parliamentary time allows) to set regulatory requirements for smart appliances. Depending on the outcome of the EU Exit negotiations, in certain circumstances, these powers might be taken through secondary legislation. If that is not feasible, then the Government intends to take these powers through primary legislation, when Parliamentary time allows. The UK's relationship with EU regulation, including in this area, is a matter for ongoing negotiations and these proposals are without prejudice to the UK's future relationship with the EU, after the UK has left in March 2019.

2) **The Government expects industry to develop technical standards for smart appliances, as necessary, and Government will work with industry to this end.**

We have been working with the British Standards Institution (BSI) to review the current landscape of technical standards relating to smart appliances[7]. Following this, we expect industry to develop appropriate future technical standards, as necessary, in relation to the principles and functionalities under consideration.

3) **The Government intends to base any regulatory requirements on the principles of interoperability, data privacy, grid-stability and cyber-security, and consumer protection.**

Regardless of whether primary powers are needed, the Government currently intends to set out detail on the regulatory requirements for smart appliances in secondary legislation. The

[7] BSI will soon be publishing a report of this landscape review.

Government also currently intends to refer to specific technical standards, potentially in policy guidance, which indicate compliance with these requirements.

We intend to proceed with basing any regulatory requirements on the principles of interoperability, data privacy, grid-stability and cyber-security. There are several consumer risks not directly related to these principles and we intend to include a consumer protection principle to capture these. As the Government further develops its plans for secondary legislation, we intend to consult stakeholders again, to allow them to give their views on the detail of secondary legislation setting out these principles and the associated functionalities.

4) **The Government expects to proceed with many of the functionalities proposed and will develop these further with stakeholders.**

We expect to proceed with many of the functionalities proposed in the consultation, though, as stated in the consultation, the intention is to develop the list of functionalities further in conjunction with stakeholders and through the development of regulatory requirements. There would likely be some changes as we continue to assess how best to achieve the principles set out above. The Government Response to Question 4 in this publication sets out our position on these in more detail.

5) **The Government intends to align internationally whenever that is in the UK's interests.**

The Government will consider international approaches, including regulation currently under consideration by the European Commission through the framework of the Ecodesign Directive and Energy Labelling Regulation, and technical standards as it develops its plans, with the intention to align internationally, whenever that is in the UK's interests.

6) **The Government currently intends for any regulatory requirements to apply to cold appliances, wet appliances, heating, ventilation, air conditioning and battery storage.**

As electricity consumption and systems change in the future, we may consider extending the scope of this policy to other appliances. Our intention is to apply regulatory requirements uniformly across all relevant appliances, though, where necessary, they will cater to individual appliances.

7) **The Government will continue to consider the potential role of a labelling scheme for smart appliances in addition to regulatory requirements set out above.**

The Government will take on board the responses to this consultation and continue to engage stakeholders as we consider the potential role of a labelling scheme for smart appliances. We currently consider that a labelling scheme alongside regulatory requirements would assist consumer awareness and better enable informed consumer choices. Enabling the development of a label may therefore form part of Government policy either as a 'binary' smart appliance label (stating whether the appliance is smart) or to present degrees of functionality

(e.g. stating how smart the appliance is). We will take into consideration our intention to align (whenever that is in the UK's interests) internationally, and the development of international labelling schemes.

Summary of Consultation Response and Government Position

This section sets out a summary of the responses received to each question and the Government's response. We received 47 responses in total, from a range of stakeholders (see Annex A for a list of respondents). We have not included all the feedback we received in our summaries, but we have read all responses and will consider them when developing final policy.

	Consultation Question
1.	Do you agree that the Government should take powers to allow for regulation on standards for smart appliances?

Summary of Responses

Forty-one respondents answered: 25 of these were broadly supportive, other respondents provided responses ranging from supportive with caveats (nine in total) to explicitly opposed (two in total), with the rest expressing views in between or raising specific points.

Those who agreed cited the need to facilitate the development of a smart appliances market and consumer uptake, to help realise the benefits of a smart energy system. Respondents also highlighted the need for regulation to limit the potential risks, for instance relating to data privacy and cyber-security.

A number of respondents cited the need to align with EU and international approaches, particularly for manufacturers who operate at an international level. It was felt that divergence, by the UK, from EU and international standards could mean manufacturers would be unwilling to adopt UK-specific requirements, and complying with separate UK standards could increase costs, which would be passed onto UK consumers. Respondents also pointed out that regulation for smart appliances is being developed at an EU level, (through Ecodesign and Energy Labelling) for which there was support. Others felt alignment would avoid confusion for consumers.

Those who explicitly opposed the proposal expressed a preference for industry-led voluntary standards, without regulation. The view was given that: a voluntary approach would better suit the current pace of change; regulation could stifle innovation; and there are extant international channels for standards creation, which are preferable to the UK legislating. Some respondents

said there needs to be an improved evidence base to demonstrate the benefits of regulation in this space.

The Government Response

Action: The Government intends to take powers to set regulatory requirements for smart appliances. The Government is committed to ensuring there is appropriate regulation for smart appliances in the UK. Therefore, we will prepare proposals to take powers (when Parliamentary time allows) to set regulatory requirements for smart appliances. Depending on the outcome of the EU Exit negotiations, in certain circumstances, these powers might be taken through secondary legislation. If that is not feasible, then the Government intends to take these powers through primary legislation, when Parliamentary time allows. The UK's relationship with EU regulation, including in this area, is a matter for ongoing negotiations and these proposals are without prejudice to the UK's future relationship with the EU, after the UK has left in March 2019. The Government currently intends to set out detail on the regulatory requirements for smart appliances in secondary legislation, and to refer to specific technical standards, potentially in policy guidance, which indicate compliance with these requirements.

The Government is not convinced voluntary standards alone will provide adequately robust protections against the potential risks associated with smart appliances, set out in the consultation. The consultation stage Impact Assessment showed considerably higher benefits from a regulatory approach than relying on industry to potentially develop voluntary standards.

As stated in the consultation the Government agrees that it is currently too early to mandate appliances to be smart, but it will retain the option of doing so, should it deem it necessary in the future.

Action: The Government expects industry to develop technical standards for smart appliances, as necessary, and Government will work with industry to this end. We have been working with the British Standards Institution (BSI) to review the current landscape of technical standards relating to smart appliances[8]. Following this, we expect industry to develop appropriate future technical standards, as necessary, in relation to the principles and functionalities under consideration.

Action: The Government intends to align internationally whenever that is in the UK's interests. We recognise the value for both manufacturers and consumers in alignment with international approaches to ensure consistency, as far as possible. We will seek to align with international approaches to smart appliances whenever that is in the UK's interests. This will help provide greater opportunities for manufacturers, greater choice for consumers and avoid the UK becoming a dumping ground for sub-standard appliances.

The Government has engaged with the Ecodesign Preparatory Study policy review process, being undertaken by consultants on behalf of the European Commission, and, whilst the UK is

[8] BSI will soon be publishing a report of this landscape review.

leaving the EU on 29 March 2019, we will continue to engage with the Commission to seek to influence and develop the Ecodesign and/or Energy Labelling smart appliance regulation. The Government's work on smart appliances and the responses to this consultation will bolster our evidence base for engaging in the development of requirements, at an international level, including by the EU.

Until the UK leaves the EU, all the rights and obligations of EU membership remain in force. During this period the Government will continue to negotiate, implement and apply EU legislation. Irrespective of EU exit, the UK remains committed to ensuring that there are appropriate protections against risks associated with smart appliances. Therefore, the Government intends to proceed with ensuring it is able to set regulatory requirements for smart appliances.

Consultation Question

2.	Do you agree that a label is a good way to engage consumers with smart appliances? Please include your views and experiences with key aspects of labels which are most effective at engaging consumers, including analysis on uptake of the relevant device.

Summary of Responses

Thirty-nine respondents answered: 34 were broadly in agreement, feeling a labelling scheme would assist consumer engagement and informed choices.

Two respondents, that supported the intent of a labelling scheme, had doubts that it would support consumer decision-making: a manufacturer felt the sector was moving too quickly for labelling to keep up; and an energy supplier felt a label was too simplistic to convey information on cyber-security. Three respondents disagreed with the introduction of a labelling scheme, citing concerns that consumers would not have the necessary understanding of the energy system for a label to be effective and uncertainty about whether a label would be used and acted upon by consumers or whether there was a need for a label at all.

There was no consensus on whether labelling should state compliance with specific requirements, or if degrees of functionality should be conveyed. Some argued a binary indication of compliance would be simplest for consumers. Others argued degrees of functionality would enable differentiation of smart appliances, incentivise innovation and avoid manufacturers only meeting a lowest common denominator required to obtain the label.

Many respondents said there is a need for education and awareness-raising activities to help inform and guide appliance purchasing decisions. Some added that this would need

coordinated activities between manufacturers, retailers and Government. A few respondents felt industry training and upskilling is needed, for instance, for installers. Others said consideration is needed for how a label could engage online consumers.

Many respondents highlighted the need for a label to be clear in its purpose and application, to help ensure it is not confusing to consumers. Others cited the need for the Government to be sure that the labelling scheme will result in the required behavioural change. Some suggesting trialling to ensure that the interests of all consumers are accounted for. There was a general sentiment that labelling must be inclusive to all consumers.

It was widely stated that labelling should be structured to remain relevant over time and keep pace with innovation, otherwise it will become obsolete. A few respondents set out some device level considerations, stating that the labelling should be technology or platform neutral and consider the range and type of devices and use cases. Several respondents raised the importance of ensuring a labelling scheme is well aligned and legally compatible with existing domestic and EU policies and initiatives on appliances and devices. Others said, there should be link up with the work the Department for Digital, Culture, Media and Sport (DCMS) are undertaking on potential labelling for Internet of Things devices.

The Government Response

Action: The Government will continue to consider the potential role of a labelling scheme for smart appliances in addition to regulatory requirements. We currently consider that a labelling scheme, alongside regulatory requirements, would assist consumer awareness and better enable informed consumer choices. Enabling the development of a label may therefore form part of Government policy either as a 'binary' smart appliance label (stating whether the appliance is smart) or to present degrees of functionality (e.g. stating how smart the appliance is). We will take on board the responses to this consultation and continue to engage with industry and stakeholders on labelling options, and work with DCMS in the development of any Internet of Things labelling scheme.

Action: The Government will engage with the development of international labelling schemes for smart appliances, these will be considered in the development of any UK labelling. Consultants on behalf of the European Commission have undertaken an Ecodesign Preparatory Study on smart appliances[9]. This includes recommendations to develop an energy smart icon to be added to existing energy labelling in respect of certain appliances in scope of the Ecodesign and Energy Labelling framework, which comply with relevant criteria for energy smart functionality and possible additional technical requirements for supporting energy efficiency at the user level. The results of this Preparatory Study are expected to be published this Autumn. The UK's relationship with EU regulations, including this area, is a matter for ongoing negotiations and these proposals are without prejudice to the UK's future relationship with the EU after the UK has left in March 2019.

[9] More detail on this project can be found at: http://www.eco-smartappliances.eu/Pages/documents.aspx

In the Smart Systems and Flexibility Plan, we committed to monitor how the smart energy market develops and, in time, assess the case for more proactive communications on smart energy. The launch of any labelling scheme for smart appliances may be an appropriate time for such communications.

Consultation Question

3.	The consultation stage Impact Assessment published alongside this consultation document explores the costs and benefits of the options considered for this policy. It indicates that mandating standards for smart appliances provides the greatest net benefits, compared to voluntary standards. Do you agree with our analysis? In particular, please consider the following, and provide analysis to back up your views: a) Likely consumer uptake of smart appliances, including which type of consumers and anticipated time frame; b) Consumer use of the smart function provided by smart appliances in relation to different types of tariffs, including fixed and variable; c) Potential financial benefits to consumers through smart appliance usage in combination with smart tariffs and offers; d) Monetised and non-monetised costs for industry to comply with standards, including consumer businesses, smart appliance manufacturing businesses, smart appliance service providers, supply chains and the electricity industry (such as Distribution Network Operators); e) Potential impact on the price of smart appliances which comply with standards compared with non-smart appliances.

Summary of Responses

Forty respondents answered: 10 agreed with the analysis set out in the Impact Assessment; 11 agreed in principle but had further recommendations and comments; 17 were not clear on their level of agreement but raised specific points and provided evidence; two disagreed.

Some of the specific points included: assumed compliance costs are too low; consumer behaviour and changing demand profiles due to an aging population and other socio-economic changes are not considered; and that infrastructure costs and costs to the supply chain are not fully considered. The was also a comment that the market data is out of date and timeframes of regulatory requirements should be shortened to lessen the number of non-compliant devices.

Regarding the future uptake of smart appliances, many respondents highlighted other factors that will impact the uptake, such as: non-smart product lifetimes (i.e. replacement times); the smart meter roll-out; implementation of half-hourly settlement; and the availability of time of use tariffs. Two respondents did not agree on the level of uptake: one respondent believed that 50% of households could have a smart appliance by the mid-2020s, whilst another respondent expressed doubt that 20% of penetration could be reached by 2030.

The Government Response

Action: The Government is preparing a final stage Impact Assessment to support any primary legislation, with analysis of the associated costs and benefits. The responses to this consultation are informing this Impact Assessment and will also be used to develop the Impact Assessment that would be published supporting any future secondary legislation setting regulatory requirements for smart appliances. We have also commissioned further research to supplement our evidence base and assessment of relevant costs and benefits ahead of any secondary legislation.

The Government and Ofgem have taken a number of steps to remove barriers and provide the commercial incentives to the development of smart offerings, which will impact the uptake of smart appliances, including the rollout of smart meters and taking forward market wide half hourly settlement.

Consultation Question	
4.	In this document, we have proposed minimum functionalities for each principle. Do you agree with these functionalities? What functionalities should be considered in addition to those listed above? Please divide your responses according to interoperability, grid-stability and cyber-security, data privacy and consumer protection.

Overarching Government Response

These questions concern our current plans for regulatory requirements, which are still in development and would be set out in secondary legislation, following a later consultation. The responses to these questions are valuable, as we continue to develop this thinking, and we will continue to engage with stakeholders during this period.

We intend to proceed with the proposed principles and expect to proceed with many of the proposed minimum functionalities, though there would likely be some changes as we continue

to assess how best to achieve the principles. We are therefore not able to address every point raised about the Government's intentions at this point; we have given a steer of our likely direction where possible. These decisions will also be made with consideration to our intention to align internationally whenever that is in the UK's interests.

Several respondents raised points that, though important and helpful, are currently outside the aims and intended scope of setting regulatory requirements for smart appliances. As such, they will be considered in the wider work the Government is undertaking on smart energy[10].

i) Interoperability

Summary of Responses

Thirty-four respondents answered: 16 agreed with the proposed approach; 11 agreed, with recommendations; six were not clear on their level of agreement but raised specific points; one disagreed.

There was broad agreement that consumers should be able to freely choose different brands of appliance without the concern that one brand of appliance cannot properly communicate with another. The respondent, who disagreed, felt the need for interoperability between devices is substantially lower than with the grid and the approach may impact certain business models, though the common data model may provide a sensible way forward, but requires further details.

Most comments were directed at the interoperability principle in a broad sense, and those that commented on the functionalities mainly focused on the open standards and common data model functionalities[11]. A few felt interoperability is intrinsic to enabling the other principles, and therefore the detail of regulatory requirements for interoperability should consider the aims of the other proposed principles. Several respondents emphasised the importance of smart appliances being able to link with other parts of the energy system. Most frequently, such comments referred to smart meters, but others highlighted interoperability with network operators' systems, virtual power plants, electric vehicles, smart energy grids, industrial and home automation protocols, and compatibility with the half hourly settlement target operating model.

One respondent felt the **open standards functionality** wording needs clarifying, as it was not clear whether the Government's intention is to set one open standard or different standards which are open.

On the **common data model functionality**, several respondents highlighted the need to limit consumer lock in and that a common data model would enable different technologies to communicate. One respondent recommended a limited number of common communication protocols to keep down communication costs. Another felt a common language between

[10] https://www.gov.uk/government/publications/upgrading-our-energy-system-smart-systems-and-flexibility-plan
[11] The third proposed functionality was: applicable to device communications to and from device.

suppliers and network operators, to describe the functions of an appliance, would limit supplier and Distribution Network Operator lock in.

The Government Response

Action: The Government intends to include interoperability as one of the principles underpinning regulatory requirements and we expect the three proposed functionalities to also be included. The Government views interoperability, including between devices, as essential for a competitive market. This would enable consumers to choose different brands of appliance without the concern that a smart appliance cannot properly communicate with another of a different brand or with market players making DSR offerings, for instance smart tariffs offered by energy suppliers or services offered by aggregators. As suggested by respondents, we will consider the interrelation of all the principles as we develop each.

By "open standards" we mean the detail of technical standards, or method(s) of compliance with the principles, would be accessible on a fair and non-discriminatory basis[12]. A common data model would enable the use of various physical communication layers whilst allowing consumer-friendly interfaces. Suppliers and networks would be able to access the common data model, and therefore this should limit the risk to a consumer of their smart appliance being locked into a specific supplier or any other actor in the energy system.

ii) Grid-stability and Cyber-security

Summary of Responses

Forty respondents answered: eight agreed with the proposed approach; seven agreed, with recommendations; 23 were not clear on their level of agreement but raised specific points; two disagreed. All who gave a direct view on the principle, rather than the functionalities, agreed that grid-stability and cyber-security is of importance. Those who agreed cited the need to limit instability of the grid, and to protect consumers from unauthorised parties taking control of appliances.

A few respondents said grid-stability and cyber-security are specific problems with separate solutions, so should not be joined. One felt security should be appended to every other principle. A few felt, given the complexity and pace of change, Government should not rush into intervening in this space. Two respondents suggested drawing from experiences around

[12] We intend to make use of the Smart Energy Code's (https://smartenergycodecompany.co.uk/the-smart-energy-code-2/) definition of open standards : *The following are the minimal characteristics that a specification and its attendant documents must have in order to be considered an open standard:*

i) The standard is adopted and will be maintained by a not-for-profit organisation, and its ongoing development occurs on the basis of an open decision-making procedure available to all interested parties (consensus or majority decision etc.);

ii) The standard has been published and the standard specification document is available either freely or at a nominal charge. It must be permissible to all to copy, distribute and use it for no fee or at a nominal fee;

iii) The intellectual property - i.e. patents possibly present - of (parts of) the standard is made available: irrevocably on a royalty free basis; or, on a reasonable and non-discriminatory (RAND) basis; and

iv) There are no constraints on the re-use of the standard.

Internet of Things devices and smart meters before progressing. One respondent claimed the proposal overlooks some of the key system stability risks associated with the interaction of multiple control systems in a future flexible and interoperable energy system, though did not say what these were.

Several respondents felt regulation should adopt a Secure by Design[13] approach. Two respondents did not think a Secure by Design approach is sufficiently robust, one suggesting the Network Information Systems Directive would be better placed to support this work.

On the **randomised offset functions functionality**, a few respondents requested more detail, as they were uncertain how it could work. Individual comments included: that it is unlikely to be a sufficient method of assuring grid-stability; staggering the load change would not stop an attacker from sending out a centrally managed signal; and, individual appliances could not be certified to respond in a staggered manner, so the approach would not support grid-stability.

On the **secure device functionality**, one respondent posited that a hacker might be able to activate (or deactivate) the proposed manual override function. A couple of respondents suggested changing the wording of “minimising exposed ports” to “minimising the attack surface”.

On the **secure device software and firmware functionality**, a few respondents noted that product updates can be an attack route and are subject to hardware technical restrictions. One respondent said manufacturers need to continuously monitor threats and vulnerabilities, with security controls and prevention measures at the ready. Individual respondents also raised: whether consumers will be able to root[14] their devices; whether there would be a security risk if and when an appliance does not have a connection; and what happens if a manufacturer goes out of business and stops producing security updates.

On the **communications and control systems functionality**, one respondent felt authentication needs to be included in this functionality. Another suggested changing the word “encrypted”, within the detail of this functionality, to “secure”, as a communications channel can be secure without it necessarily being encrypted. There was also a suggestion that allowed bandwidths should be limited to prevent denial-of-service attacks.

On the **controlled access to device and regular protection testing functionality**, one respondent felt testing would add significant costs to business and that the vulnerability disclosure principle, in the Government’s Secure by Design report, is more proportionate. Another said, testing in isolation would be insufficient as smart appliances are part of wider systems – eco-system testing is therefore required. One questioned the need for training and monitoring of employees with access to devices, when the software and hardware build process should be invisible, once it has left the manufacturer. Respondents also felt more

[13] This is the Government’s planned approach to Internet of Things devices and services. https://www.gov.uk/government/publications/national-cyber-security-strategy-2016-to-2021; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/686089/Secure_by_Design_Report_.pdf.
[14] “Rooting” is a term used to refer to process of allowing users to modify the software code or install external software on a device running the Android mobile operating system.

detail is needed on protection testing, including who would be responsible for testing, how often and who would judge this.

Other points raised included: The System Operator and Distribution Network Operators also need to have a level of responsibility, as well as or instead of manufacturers; there should be a holistic approach (with consideration to the wider system) to grid-stability standards; and requirements should consider the need for establishing local DSR markets. The was the suggest that the Government could mandate the use of the Data Communications Company for all smart appliance data traffic. Another thought the risk of hacking cannot be eliminated, so mitigating the impact of hacking needs to be a focus.

The Government Response

Action: The Government intends to include grid-stability and cyber-security as one of the principles underpinning regulatory requirements and expects to proceed with many elements of the proposed functionalities. The principle was widely recognised as being important and we intend to proceed with its inclusion. The implication of a cyber-attack to multiple smart appliances is a significant risk to grid-stability. We therefore intend to continue with this as a single principle, for the time being, due to the interdependence of the two elements, though under this principle we are also seeking to address the grid-stability and cyber-security risks which are not directly interrelated. As we further develop our plans for any regulatory requirements with industry, we will remain open to these being separate principles if we conclude this is more appropriate.

Many of the comments were very technical and will be useful as we further consider the detail and feasibility of the functionalities. We expect to proceed with many elements of the proposed functionalities and will give our updated position when consulting ahead of putting in place any regulatory requirements.

We consider that randomised offset functions, enabling a staggered response to avoid sudden spikes or dips in demand, would help minimise grid-stability risks. We are exploring the feasibility of this functionality and the points raised by respondents will be taken into account. This includes looking at the impact such a functionality could have on frequency response markets. A staggered response may not necessarily be needed at an individual appliance level, instead signals sent to appliances (for example by a third-party aggregator) could be staggered.

The intended outcome of the secure device functionality is that the consumer retains the ability to control which devices a smart appliance connects to. With the secure device software and firmware functionality, we do not expect consumers would be able to root[15] relevant appliances. The word “authentication” is not currently included in the communications and

[15] “Rooting” is a term used to refer to process of allowing users to modify the software code or install external software on a device running the Android mobile operating system.

control systems functionality, but we would expect authentication to be incorporated, as standard, within relevant communication technical standards.

We are currently of the view that limiting allowed bandwidths for consumers may limit the development and capabilities of smart appliances and therefore we do not intend to include this.

Concerning the suggested use of the word “secure” rather than “encrypted”, our intention is for any requirements to ensure communication integrity is maintained in both physical and application layers by encryption and other methods of protection.

We will take on the points raised about penetration testing and the Secure by Design vulnerability disclosure principle as we further develop these functionalities. BEIS will continue to engage with DCMS in the development of the Secure by Design work-stream. Smart appliances have the potential capacity for greater grid-stability risk than internet connected appliances, which are not able to respond automatically to signals by modulating their electricity consumption, and therefore this needs to be considered.

Action: The Government is publishing its Code of Practice for Consumer Internet of Things Security[16]**.** The Government advocates a Secure by Design approach to internet-connected appliances including smart appliances. The Code of Practice for Consumer Internet of Things Security, published earlier this month, brings together what is widely considered good security practice for internet-connected consumer products and appliances. The Code has been developed by DCMS, in conjunction with the NCSC and input from BEIS, and follows engagement with industry as part of the DCMS Secure by Design Programme. The Government recommends all internet-connected consumer devices (including relevant smart appliances, as defined in this consultation response) sold in the UK to adhere to this Code of Practice.

We will continue to work with industry partners, the System Operator and Distribution Network Operators, and the National Cyber Security Centre (NCSC), as the UK’s technical authority on cyber-security, to mitigate the risks posed by internet-connected products and associated services. Outside of this work on smart appliances, the Government is working to systematically review the wider cyber risks associated with a smart energy system, and we are working with industry and stakeholders to ensure these are addressed through appropriate levers.

iii) Data Privacy

[16] https://www.gov.uk/government/publications/secure-by-design

Summary of Responses

Twenty-eight respondents answered: six agreed with the proposed approach; eight agreed, with recommendations; 11 were not clear on their level of agreement but raised specific points; three disagreed.

There was general agreement that data privacy is of importance, though there was a mixture of views on how far protection should go. One respondent felt existing protections are overly burdensome and may limit a consumer's ability to benefit from allowing access to their data; two felt the General Data Protection Regulation (GDPR) and the Data Protection Act 2018 is sufficient on its own; and a few others felt any requirements should help support compliance with data protection legislation. One respondent recommended aligning requirements with the approach to data access taken under Ofgem's half-hourly settlement Significant Code Review, and another with the smart metering Data Access and Privacy Framework. Another said our proposal lacked sufficient detail.

There was a focus, particularly from consumer groups, on ensuring consumer trust and informed choices. Specific points included enabling data portability and ensuring there is an understanding of where data is stored, what will be shared and what the consumer will be asked to share to use certain features of smart appliances.

Several respondents raised concerns about appliance end-of-life and how this could be approached. One pointed out that electronic data stored in a device is difficult to destroy. Others highlighted the need for consumer education and ensuring any removal mechanism is one which will actually be used, or will trigger automatically at the appropriate time.

Other points included: the need for consumer consent for third party access; an adequately resourced enforcing body should review if data collected is necessary for a product's purposes; and requirements should be less stringent for SME manufacturers. One respondent commented, as multiple data sources can create a broader picture of a consumer's behaviour, the proposals missed the risks of aggregated data.

The Government Response

Action: The Government intends to include data privacy as one of the principles underpinning regulatory requirements and the functionality that data must be securely stored when on the device or with any controlling party. Appropriate data privacy controls are important to protect consumers and for consumers to have confidence in choosing to participate in a smart energy system. We would like to see these outcomes achieved and therefore we intend to include a data privacy principle.

We currently intend to include the functionality that data must be securely stored when on the device or with any controlling party. Whether and how functionalities go beyond existing data protection legislation, for instance in relation to consent procedures, will take into consideration the concerns of, and potential risks to, consumers, alongside our aims of minimising restrictions on innovation, our intention to align internationally whenever that is in the UK's interests, and enabling data portability and the creation of smart energy markets. We will also

take into consideration data privacy requirements in related policy areas including Ofgem's half-hourly settlement Significant Code Review[17].

There are engineering solutions that would prevent unauthorised data access after disposal and these are being considered by the technical standards bodies working in this area.

Action: The Government is taking cross-departmental action to produce consumer guidance on the re-use, recycling and disposal of internet connected smart devices, which includes smart appliances. Government will conduct a review and update the relevant guidance for stakeholders involved in the recycling process, to help ensure they are adhering to data protection regulation and preventing the unauthorised access or seizure of devices during the recycling process or from a recycling centre. We will also work with consumer groups, industry and academia to consider what consumer behaviours should be targeted through an awareness campaign.

iv) Consumer Protection

Summary of Responses

Thirty respondents answered: seven agreed with the proposed approach; three agreed, with recommendations; 16 were not clear on their level of agreement but raised specific points; four disagreed. Consumer protection was widely recognised as being important, though some made the case for limited intervention.

Two respondents felt safety needed to be included within the requirements. One made the case for built-in hardware protection from repeated remote activation, to limit overheating. Two respondents thought liability may become unclear in a complex smart home energy system and therefore clear enforcement rules, consumer guidance and redress routes are required. A few respondents said accessibility requirements are necessary, with consideration given to consumers in vulnerable situations. One respondent felt the consultation stage impact assessment did not sufficiently explore distributional impacts. Another felt there will be distributional impacts for those not participating in a smart energy system, for example consumers who refuse a smart meter.

Several respondents said consumer engagement needs consideration, with more research and consideration on how and who delivers engagement to consumers. Respondents highlighted that a focus should be on the "hard to reach consumers", second hand owners, and how to increase confidence, understanding and uptake of smart appliances.

Other points included: that Government should consider the risks to consumers from letting others control their consumption; existing arrangements from the renewable energy industry could be applied to smart appliances, such as the Renewable Energy Consumer Code (RECC), to protect consumers from mis-selling; and consumer protections can constrain

[17] More information about Ofgem's half-hourly settlement Significant Code Review can be found here: https://www.ofgem.gov.uk/publications-and-updates/consultation-access-half-hourly-electricity-data-settlement-purposes

innovation with firms only meeting minimum requirements. There was also a request for clarity on “uniform minimum functionality”, with concerns that this could disproportionately impact consumers who typically benefit from budget products.

Respondents raised a few points relating to the proposed plug and play mode. Some thought it would not be suitable for all appliance types, so plug and play requirements should be developed with industry and only used where benefits can be demonstrated; some appliances require specialist installation or programming once plugged in; enabling plug and play will be dependent on interoperability, data frameworks and Wi-Fi connection.

A think tank made the case for including an Inclusivity Principle or some other way of ensuring smart appliance benefits are available to all consumers and the needs of consumers in vulnerable circumstances are properly recognised. They noted that in home devices, which connect to smart meters, have accessibility requirements, relating to display for consumers with impaired sight, memory and learning ability, and dexterity.

A few respondents highlighted the importance of smart appliances being simple and accessible. One felt requirements in this area, beyond seeking to ensure suitability for those in vulnerable circumstances, would be a step too far and should be left to the market. Another considered that regulatory requirements would be insufficient, as without clear and understandable DSR offers, consumers will not have an incentive to adopt smart appliances.

The Government Response

Action: The Government intends to include consumer protection as one of the principles underpinning regulatory requirements to address relevant consumer risks with appropriate functionalities. The requirements relating to grid-stability and cyber-security, data privacy and interoperability discussed above are important consumer protections. There are additional consumer risks, including some of those detailed in the consultation and raised by respondents to questions 4 (iv), 5 and 6, which are unrelated to these other principles, and therefore we may develop further functionalities under a consumer protection principle where appropriate[18].

We will take into account the views on plug and play as we further consider the functionalities for this principle. We were asked to clarify on our use of “uniform minimum functionality”, the intention is that all smart appliances subject to the regulatory requirements would enable consumers to easily and effectively engage with DSR offerings. Beyond this there would be scope for market differentiation to accommodate the various demands and budgets of consumers.

As part of developing our policy in relation to smart appliances, proper regard has been had to equality considerations and we will continue to think about how smart appliances can meet different consumers’ needs. As we develop our plans for regulatory requirements in secondary

[18] Such functionalities would be intended to complement existing consumer protection laws.

legislation, we will consider the implications and feasibility of potentially including an inclusivity principle, or alternative measures, to assist the usability and accessibility of smart appliances.

Action: The Government will take forward work on consumer protection in a smart energy system, beyond regulation for smart appliances. We will work with stakeholders to ensure appropriate protections are in place. Some consumer protection risks raised by respondents were broader in nature and will be considered as part of our wider work on consumer protection. Our progress update to the Smart Systems and Flexibility Plan[19], published alongside this document, sets out how we intend to take forward work on consumer protection in a smart energy system, beyond regulation for smart appliances.

The Government 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.

Action: The Government is investigating consumer safety for smart appliances. The Office for Product Safety and Standards is commissioning research to investigate possible consumer safety aspects of certain internet connected domestic appliances, this includes specifically looking at those relating to smart appliances.

v) Further Comments

Summary of Responses

There was agreement with the decision to remove the energy consumption principle, which the Government was previously considering.

There were several comments around the role of network operators. This included: requirements should support network operator modelling of DSR capabilities; network operators need smart appliance location visibility to optimise the utilisation of flexibility and the demands and constraints of the network, whilst data protection should not limit such roles for network operators. Others said that requirements need to capture situations where a network operator could be giving actions to smart appliances, for instance to facilitate trading platforms for third parties to participate in electricity markets. And, that further consideration is needed to enable network operators to operate smart appliances, for instance for emergency restoration.

The Government Response

The Government agrees that there could be system benefits from greater access to, and transparency of, system asset data, potentially including smart appliances. For example, network companies may be able to run their networks more efficiently if they had visibility of smart appliance locations, for example to improve their forecasting capabilities and send the right price signals for flexibility needs on their networks. Consumers could benefit from lower

[19] https://www.gov.uk/government/publications/upgrading-our-energy-system-smart-systems-and-flexibility-plan

costs – and indeed may want networks to be able to give actions to smart appliances so that they can participate in local energy markets. Such benefits would, of course, need to be considered alongside cyber security and data protection considerations.

Action: The Government will establish an Energy Data Taskforce with Ofgem. The Taskforce will look across the energy sector, identify gaps where data can be used more efficiently and make clear, actionable, recommendations for Government, Ofgem and members of the energy industry. Better use of data can help key players, such as network companies, operate and manage the energy system in the most effective way. Improved data flows between parties will support competitive markets, innovation and new business models, and enable technologies to know where they can deliver value on the system and provide benefits to consumers.

Consultation Question

5.	Do you consider that we have correctly outlined above the risks associated with smart appliances? Are there any that are missing and need to be addressed? Please provide evidence.

Summary of Responses

Thirty respondents answered. Respondents tended to agree with our identified risks and highlighted some others.

Several network risks were highlighted, these included: without co-ordination the response from smart appliances to market signals could cause system oscillations and if the Government intends smart appliances to receive signals from network operators then it should ensure there is compliance with the Distribution Code and Grid Code. Another highlighted that smart appliances may receive signals from network operators and suppliers that could conflict. Another said without auto-responsive smart functions built into smart appliances, cyber-attacks may exceed the ability of the System Operator to balance the system.

Consumer risks raised included: regulating smart appliances could raise the cost of manufacturing, in order to comply, and therefore raise prices and reduce consumer access; and consumers may disengage from smart appliances and offerings, for instance when they switch supplier, move house or if a smart meter is not installed in their home. Another respondent thought requirements would create more complexity, so Government should set timescales for manufacturers to develop their own simple standards.

Other risks included: that compliance and governance of requirements needs to be considered; that creating regulatory requirements will result in premature appliance replacement,

increasing the carbon footprint impact of appliances; and existing smart meter security architecture should not be overlooked to avoid duplicated effort and investment. A respondent also felt that data quantity may become difficult to manage and slow interfaces, which would jeopardise the needs of rapid DSR required for certain business models.

The Government Response

The points raised above will be considered as we develop regulatory requirements for smart appliances. Several respondents raised points that, though important and helpful, are currently outside the aims and intended scope of setting regulatory requirements for smart appliances. As such, they will be considered in the wider work the Government is undertaking on smart energy[20].

Please also refer to our response to question 4 v) on consumer protection, where we highlighted our wider work on consumer protection.

Consultation Question	
6.	Consumer protection is important to the Government, and we will continue to monitor and engage with this to ensure consumers are protected in a smart energy system. This work will include assessment of distributional impacts of smart appliances and consideration of product safety provisions. Do you consider there to be major principles of protection which have not been covered above which will be developed into standards for smart appliances?

Summary of Responses

Thirty respondents answered. Respondents generally felt the protections in the consultation were appropriate and comprehensive. Most highlighted consumer risks and gave potential solutions, quite a few of which would likely sit outside of regulatory requirements for smart appliances. Key areas of focus were distributional impacts, safety and liability and redress.

On distributional impacts responses included: that there will be inequalities in the ability to purchase smart appliances, rental tenants will be less able to install appliances and some consumers will be less engaged or less able to shift demand; there need to be smart appliances which are affordable for low income consumers; and distributional impacts should

[20] https://www.gov.uk/government/publications/upgrading-our-energy-system-smart-systems-and-flexibility-plan

be monitored, and if market failure is found, intervention considered to facilitate smart appliance adoption.

Concerning liability and redress, one respondent suggested linking smart appliance policy with the Each Home Counts Quality Mark. Another said the Government needs to ensure mis-selling is minimised. A further view was that the proposals were unclear on network operator liability, i.e. were they able to take direct or indirect actions on smart appliances.

Comments on safety included: when smart functions fail, they need to fail safely; in the event of fluctuations in mains current, smart appliances should default to a safe (dumb) mode; and some consumers have wireless transmitter allergies, smart appliances should have a wireless transmitter switch off to prevent potentially harmful attempts to remove them[21].

Other points made included: that there needs to be an awareness raising campaign; and the Government needs to consider what impacts regulatory requirements and labelling might have on energy supplier switching and on market arrangements and codes, such as the Smart Energy Code, Standard Licence Conditions, Balancing and Settlement Code, and the Distribution Connection and Use of System Agreement.

The Government Response

This question relates to our current plans for regulatory requirements, which are still in development and would be set out in secondary legislation, following a later consultation. The responses to this question are valuable, as we continue to develop this thinking, and we will continue to engage with stakeholders during this period.

Several respondents raised points that, though important and helpful, are currently outside the aims and intended scope of setting regulatory requirements for smart appliances. As such, they will be considered in the wider work the Government is undertaking on smart energy[22].

Please also refer to our response to question 4 v) on consumer protection, where we highlighted the work on products safety by the Office of Product Safety and Standards and wider work on consumer protection.

[21] Public Health England has reviewed evidence in relation to the potential health impacts of radio waves and considers that "there is no convincing evidence of harm from exposure within the internationally agreed guideline levels". More information about this review can be found here: https://www.gov.uk/government/publications/smart-meters-radio-waves-and-health/smart-meters-radio-waves-and-health

[22] https://www.gov.uk/government/publications/upgrading-our-energy-system-smart-systems-and-flexibility-plan

Consultation Question

7.	Do you agree that the standards should be applied as uniformly as possible across smart appliances, for example, horizontally, and should be catered to individual appliances only where necessary?

Summary of Responses

Thirty-nine respondents answered: 33 of these explicitly agreed with the proposed approach. A range of respondents agreed that maintaining a common approach to requirements across smart appliances, as far reasonably possible, is welcome, making it easier for both industry and consumers. Several emphasised that this levelled the playing field for smart appliances. One respondent disagreed with this, holding the view that requirements were too specific to be applied horizontally, and should be applied vertically per appliance.

There was general recognition from respondents that the right balance between horizontal and vertical needs to be found for smart appliances to reach their potential and allow flexibility and innovation in the market.

Respondents offered different views on the circumstances where it might be appropriate to apply principles for smart appliances vertically. These included where product safety standards already apply on a product-specific basis and should continue to do so, and where there were differences in the flexibility services the appliances could participate in (for instance frequency response, switch on/off or turn up/down).

Respondents supported an objective, robust analysis of appliances to identify the correct categories by which to apply requirements horizontally or vertically (as one respondent said, similar to that analysis undertaken by the Ecodesign project). Several respondents emphasised the need for future reviews of what requirements were suited for horizontal or vertical application, as this could change over time. Many respondents also felt it was important to align this approach with international regulation.

The Government response

The Government intends to proceed with the approach proposed in the consultation, adopting a horizontal approach as far as possible. We will ensure that consideration is given to where a vertical approach may be appropriate, taking into account recommendations from respondents, whilst keeping to our intention to align internationally whenever that is in the UK’s interests.

Annex A: List of Respondents

- Academic 1
- Academic 2
- The Association for Decentralised Energy (ADE)
- The Association of Manufacturers of Domestic Appliance (AMDEA)
- BEAMA
- Bristol City Council
- Centrica
- Certsure LLP
- Chameleon Technology
- Citizens Advice
- Data Communications Company (DCC)
- Dunelm Energy
- EDF Energy
- Electrosensitivity UK
- Elexon
- Energy Systems Catapult
- Energy UK
- E.ON
- Energy Utilities Alliance (EUA)
- The Future Power System Architecture (FPSA) programme
- Gemserv
- Green Alliance
- Green Energy Options (GEO)
- Ground Source Heat Pump Association
- Institution of Engineering and Technology (IET)
- Internet of Things Security Foundation (IoTSF)
- Information Systems Audit and Control Association (ISACA)
- KiWi Power
- London Fire Brigade
- Moixa
- National Grid
- NIBE Energy Systems
- Northern Powergrid
- Npower
- Panasonic Europe Ltd.
- PassivSystems Ltd.
- Private response 1
- Private response 2
- Renewable Energy Association (REA)
- Smart Energy GB
- Smart Energy Networks
- Sustainability First

- The Smart Energy Code (SEC)Technical Architecture and Business Architecture Sub-Committee (TABASC)
- Tech UK
- UKPN
- Western Power Distribution
- Which?

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