

January 2017

A smart, flexible energy system: call for evidence

Response to BEIS and Ofgem

Introduction

We welcome the publication by BEIS and Ofgem of this Call for Evidence. It represents a meaningful exploration of the wide range of issues, challenges and opportunities involved in transforming our electricity system so that it has the smart functionality required to decarbonise the system efficiently, securely and at least cost.

The Centre for Sustainable Energy is a national charity with more than 35 years' experience of working to achieve sustainable energy with energy consumers (particularly those with vulnerabilities), local authorities and community energy actors as well as mainstream energy suppliers and network operators. We have been extensively involved in the development of policy around the smart meter rollout and, through our long-term membership of Ofgem's Consumer Challenge Group, the development of regulatory frameworks (specifically RIIO-T1 and RIIO-ED1 and prior to these the Low Carbon Network Fund) designed to stimulate the TOs, the SO and the DNO to change their approach and play their full part in the necessary transition to a low carbon electricity system.

We have chosen to respond in a separate document rather than using the on-line portal because we have found that there are number of issues we wish to address which did not fit easily with the nature and structure of questions presented. These address how to create the conditions which we believe are necessary for the smart, flexible energy system to emerge cost-effectively and promptly. They relate to:

- a. the need to **develop meaningful public understanding of, engagement with, and, particularly, consent** for the transformation of our electricity system and the changes that will create for how people are expecting to engage with it and how they will be charged for it.
- b. the need to consider **what needs to change within existing governance arrangements** for making prompt and appropriate changes in the rules and charging methodologies which determine allowable behaviours on the system and how they are costed and/or rewarded.
- c. the importance of ensuring that **public interest considerations** dominate in determining how smart energy data is accessed and used so that its potential value to system operation and planning and to technology and service innovation is fully realised.

We have also answered some of the specific consultations questions and addressed other particular issues raised by the Call for Evidence where we felt we could make a useful contribution. Please do make contact if you wish to discuss any aspect of this response in more detail.

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a. No truly smart system without establishing meaningful public consent

The scale and nature of the transformation required in the GB electricity system to meet carbon emission goals is unprecedented. While there is broad public support for these carbon emission goals and for 'being smart', there is little understanding of the implications of these objectives for how in future we need to design, operate and pay for our electricity system and the behaviours that will be required of all system users within it. For reasons explained below, this creates significant risk for the success of that transformation on the timescales required.

The Call for Evidence covers many technical, regulatory and commercial issues which are relevant and important to resolve. But it is silent on this fundamental need to create the socio-cultural conditions in which the transition to a smart, flexible, low carbon electricity system will be possible. Instead, it frames 'the public' (whose engagement and consent is required) purely as consumers, responding (or not) largely for individual convenience and/or price-based reasons to offers made by market players. This frame is also typically adopted in market research about consumer interest in smart tariffs (e.g. no one is asked if they would be interested in participating in a smart tariff so as to make better use of wind and solar power and enable more of it on the system).

There is a naivety to this framing and approach which is embedded in the Call for Evidence. It assumes that public consent for the changes is a given. And it assumes that market players will have sufficient motivation to overcome the distrust and inertia witnessed to date in the energy market and stimulate the required consumer engagement and response. Making this assumption carries a high risk that 'success' will either (a) require excessive rewards to market players to persuade them to strive to overcome that inertia and distrust and/or (b) arrive far later than needed (within our carbon emission reduction obligations) because markets will take longer to develop (if they ever do).

We have written elsewhere on this subject.¹ To summarise here, we need to establish the meaningful public consent of people as consumers, citizens and members of many communities (from neighbourhoods to workplaces to networks of shared interests) because the shift to a low carbon electricity system ultimately requires everyone:

- to alter their individual and collective energy using behaviours and habits
- to invest, purchase and spend differently in relation to energy and energy using equipment
- to give consent for changes in the buildings and landscapes where they live and work and in the markets in which they participate and in the services they receive
- to pay for many aspects of this transition through their bills (mainly) and taxes.

There is a 'tragedy of the commons' dimension to this problem. Everyone with a relevant policy goal or regulatory obligation or business proposal gains significantly from the nourishment of public understanding and consent, but no one specifically gains enough to justify their direct investment in securing it. So no one takes it on and everyone free-rides, eroding public consent in the process. It needs direct government intervention and funding to address it in the public interest.

¹ See for example <https://www.cse.org.uk/news/view/1839>, and <https://greenallianceblog.org.uk/2014/05/29/my-big-manifesto-idea-three-great-ideas-for-local-empowerment/#more-4588>

We recognise that this issue has a wider relevance than 'smart electricity system' considerations (and therefore more properly sits within the Government's forthcoming Emissions Reduction Plan). However, the need to address this issue should be acknowledged and addressed in this sort of policy work. All such work needs to describe the initiatives/policies/programmes it is relying on to create and sustain the socio-cultural conditions for its own success.

As we have written elsewhere:

"Unless (and until) we secure a new level and quality of public consent for the transition to a low carbon society we will fail to achieve that goal. We need a different approach, which starts by trusting people to understand the challenges and opportunities and to make decent choices for their localities, framed by wider societal goals.

*Without this, an uninformed, uninvolved, disconnected population will resent having to pay for low carbon policies through their bills and taxes. And they will reject proposals to host the technologies in their landscapes, neighbourhoods, homes and businesses. And they will fail to adopt the smart and not-so-smart behaviours needed in a low carbon energy system."*²

It is worth emphasising that what we are saying is needed is very different from putting more effort into convincing people that the threat of climate change requires action (the vast majority agrees) or that renewable energy, smart meters, more energy efficiency, cleaner better public transport etc are important (again, the vast majority agree).

To address this, we believe that the Government needs to make a deliberate effort (and support specific programmes) to turn that existing (but largely latent) acceptance into active understanding of the nature of changes required, comprehension of what it might mean in our localities and in our lives, and commitment to consenting to and participating positively in those changes.

Doing so will nurture the common good of public consent for the necessary changes, thus lessening market inertia and reducing delivery costs for all players. Above all, it will significantly reduce the risk of failure and increase the likelihood that the positive transformation described in the Call for Evidence can be realised cost effectively and promptly.

This is an issue we have explored as part of the Bristol Smart Energy City Collaboration³, an ongoing initiative we are leading in Bristol to develop the use of smart energy data to manage the demand, supply and distribution of energy in the city in the interests of its citizens and businesses. This suggests that locally-led citizen and business engagement initiatives, entwined with locally co-ordinated roll-out of smart meters, could play a significant role in developing the public understanding, engagement and consent needed to create and sustain a smart energy system.

2 <https://greenallianceblog.org.uk/2014/05/29/my-big-manifesto-idea-three-great-ideas-for-local-empowerment/#more-4588>

3 See <https://www.cse.org.uk/downloads/reports-and-publications/policy/community-energy/insulation-and-heating/planning/renewables/towards-a-smart-energy-city-maping-path-for-bristol.pdf>

b. The need to address (and make changes in) system governance

The Call for Evidence correctly (in our view) identifies the need to improve significantly mechanisms for joint system planning and operation, particularly between network operators (TOs, SO, DNOs and DSOs). It also recognises that existing charging methodologies, market access rules, settlement systems and licensing regimes will need to change to incentivise/accommodate/enable/require the required developments. The Call is however silent on whether the existing governance mechanisms through which such changes are typically made are fit for the purposes outlined in the Call.

Can these current system governance arrangements:

- act with sufficient speed to sustain the rate of change required;
- take adequate account of views and needs of businesses other than existing system incumbents, or;
- establish new approaches which adequately reflect and protect the interests of existing and future consumers and society more widely?

The EPSRC-funded [IGov research programme](#) has explored in depth how the current governance arrangements for the GB energy system need to change to remove barriers to innovation and the realisation of environmental, security of supply and affordability goals.

Having been involved in the Advisory Board of the programme for the last 4 years, it is clear to us that current governance arrangements are not up to the task and, more to the point, they create significant obstacles to the changes required. They react slowly, favour incumbents, and obstruct innovation. Without addressing these governance arrangements, it is very likely that the changes anticipated in the Call for Evidence will be frustrated by a system unfit for the purposes it now needs to serve.

We recommend that BEIS and Ofgem consider and address these governance issues as a matter of urgency (and the IGov programme outputs can help considerably in this task).

c. Reflecting better the public interest in approaches to smart energy data (particularly for innovation)

The Call for Evidence does not explore in any depth how to ensure we (i.e. GB society) make the best possible use of the rapid growth in the quantity and granularity of real-time (and subsequently historical) data about system state and behaviours of every user of the energy system. By 'best possible use' here, we mean uses which best serve the public interest. Working in partnership with Sustainability First, we have started exploring the nature of the public interest in the use of smart energy meter data (see <https://www.cse.org.uk/projects/view/1309>), how that may be served by arrangements put in place around the Data Access and Privacy Framework, and wider consideration regarding data curation and analytics.

This work has identified that there are clear public interests in relation to realising the potential of well-curated smart energy data to support:

- a better planned, more efficient system (because more parties would be able to apply their own analytical techniques and insights on the data to optimise solutions to system challenges);
- greater stimulus for innovation (because it would be easier – and cheaper – for entrepreneurs to test their new services and offerings in simulated market conditions based on real data);
- better understanding of how people are using energy and the impact of different market and policy developments on those patterns (because an historical dataset would enable fine grain understanding of how patterns of usage are changing over time and between different types of user).

We have concluded that current arrangements are not serving these interests well; they are too restrictive and have no central 'curation' role which is crucial to avoid the need for many different parties to develop (and pay for) their own system to capture and store the data. While we recognise the need to do more work to find the right balance between serving these public interests and respecting individual interests in data privacy, we believe this issue should be featured prominently in BEIS and Ofgem's thinking on smart energy systems as it develops beyond this Call for Evidence.

Our responses to specific consultation issues and questions

We do not have the detailed technical knowledge, expertise or evidence to comment on many of the questions posed by the Call for Evidence. However, we have views on a number of issues raised in the Call and these are outlined below. Some of them relate to a specific consultation questions but in many cases we are offering our perspective on an issue described in the Call but not raised directly in specific questions (or not that we could see).

Aggregators and system value pricing (Section 2, paragraph 51 and Section 3, paragraph 3):

No compensation for out-of-balance suppliers

We recognise the risk to suppliers that demand response action 'beyond their view' by third parties will create additional balancing risk for them. We do not however believe that the initiators and/or aggregators of that demand response should have to compensate suppliers for this increase in risk – or more specifically for any additional costs to which it exposes any supplier which has failed to adapt its forecasting capabilities to reflect this new market reality. Suppliers in a smarter energy system need to get better at anticipating demand in that system; we do not believe they will have appropriate incentives to do so if they are compensated for the costs of failing to do so.

Because of this conflict of interest for suppliers, we believe it is important that aggregators are allowed to participate directly in the balancing system and would welcome a licensing regime for aggregators (provided it is streamlined) to ensure demand response customers have appropriate protections.

Smart distribution tariffs (Section 3.4 – questions 19 – 24): ***The importance of capacity-based and dynamic ToU distribution charging - but how will the consumer 'see' the price signals?***

We believe there is a strong case for transmission and distribution charges to shift significantly towards capacity-based charging from the current volumetric basis. We need to start thinking of these networks in terms of systems which all network users need (and want) to have available, even for those who make full use of it relatively modestly or rarely.

Remaining volumetric charging should also be adjusted to reflect more accurately the distances over which local generation is transmitted so that initiatives to link and balance local demand to local supply can recover system benefits which they are creating.

The capacity-based charging could, for domestic and SME customers, have a very simple 'bandwidth' standing charge approach representing the maximum demand for a customer. This would be linked to some meter-level constraint which reflects the maximum selected by the customer. While crude, it is relatively common and reasonably effective in countries such as France (where consumers choosing lower capacity – and paying less as a result – have to stagger their use of high demand appliances to avoid 'tripping' their maximum, in exactly the way we need consumers to do to avoid system peaks).

It also provides a very simple and tangible relationship between consumer behaviours, the costs they pay and the costs they impose on a network. It brings 'peak demand' home. That relationship needs to be more explicit to consumers so that those imposing higher demand on the system (by, for example, installing and using an electric charging point for a new EV, a hot tub a heat pump or air conditioning etc) can understand and pay the cost it imposes.

In addition, as suggested in the Call, there could be more dynamic Time of Use (ToU) based local distribution charges to send price signals based on local system states (to shift demand to meet local system pressures caused by, for example, high solar generation). We believe such dynamic localised ToU pricing represents an important development and a necessary component in securing smart, flexible behaviours on a smart, flexible electricity system. This will be particularly important for electric vehicles and associated dynamic system use price signalling to optimise (for the system locally and nationally) consumer charging strategies.

However, the Call for Evidence seems to have avoided the challenge of how these price signals will reach consumers. The Call seems to assume that the relationship with consumers is left in the hands of energy suppliers and that suppliers will inevitably pass the smart distribution price signals on to consumers directly and transparently. We believe that these are dangerous assumptions which fail to understand how suppliers shape their customer tariffs.

It is vital that BEIS and Ofgem understand and acknowledge that suppliers do not simply 'pass through' distribution costs to their customers as a discrete charge. These costs are simply some of the costs which a supplier needs to recover across its entire customer base and suite of tariffs. While suppliers do appear to reflect in their existing tariffs the current regional differences in distribution charges (as revealed by analysis we undertook for Ofgem in 2015⁴), these are simple and static

4 See https://www.ofgem.gov.uk/sites/default/files/docs/2015/10/reg_charges_final_master_version_23_october_2015.pdf

charges and such tariff-setting is for relatively large numbers of customers across entire DNO license regions. Suppliers' approaches to more dynamic and far more localised distribution charges are likely to be less straightforwardly 'cost-reflective'.

Left unaddressed (i.e. suppliers left to choose how they pass through distribution costs), the relationship between smart distribution tariffs charged by a DNO/DSO and the price signals reaching consumers on either a locational or temporal basis may be at best weak and at worst non-existent, particularly in the domestic and SME market. Thus the so-called 'smart' distribution tariffs will not be visible to the consumers whose behaviours and investment decisions they are designed and intended to influence.

This issue needs far more thorough examination by BEIS and Ofgem. We believe it potentially requires (a) a significant shift in the relationships which DNOs – in their new guise as DSOs – are entitled to establish with consumers connected to their wires and (b) an adjustment to the freedom suppliers currently enjoy in choosing how they recover distribution system costs across their customer base.

Smart Appliances (Section 4.1): mandate these key enabling technologies within 2 years

Question 28: We agree with and welcome the 4 principles for smart appliances (interoperability, data privacy, grid security and energy consumption).

Question 29: We believe the Government should both regulate smart appliances (to set common standards of interoperability and demand response capability etc) AND require that all 'high-potential' appliances must be smart (i.e. meet the regulatory standards). It should act promptly on this, securing it as one of its first post-Brexit acts.

There is an imperative to decarbonise the electricity system to meet the UK's long-term carbon emission targets. Doing so requires far greater levels of demand response capability on the system so that higher volumes of variable zero carbon electricity like wind, solar, and marine energy can be utilised. Smart appliances are a key enabling technology in this regard and, with the long replacement cycles for high potential appliances acknowledged in the Call, the sooner action is taken, the more rapidly the demand response capability will grow.

Clearly, requiring appliances to be smart does not, in itself, require consumers to choose to use them (or allow them to be used by third parties) smartly. But, like the installation of smart meters, it creates the potential for this which, in turn, creates the potential for a vibrant market in services to encourage and reward consumers for making use of the new smartness in their new appliances.

Consumer engagement with Demand Side Response (Section 4.3): start engaging all consumers now

Question 39: Further to our comment on meaningful public consent in our Section a above, we believe we need to start now engaging domestic and SMEs about the transition to a smarter energy system. As mentioned above, we believe this should be part of a wider programme of citizen engagement on the transition to a low carbon society on which we are embarked.

In our experience, this starts not with national information and marketing campaigns about specific smart features (a la Smart Energy GB) but with carefully structured and facilitated local

conversations. These start with consideration of people's current lives and the places they live and how energy features in them. They then explore what will change (and why) and the potential opportunities the system transformation can provide for greater personal and collective control over such an essential service. In our experience, such local conversations can have a transformative effect on attitudes and willingness to engage with sustainable energy initiatives.

Consumer protection (Section 4.4): establish clear principles for managing identified social impacts

Question 40: Our comments in our Sections a. and c. are relevant here. In addition, we believe that it is vital that there is a shared and open understanding of the likely social/distributional impacts of the potential shifts in the distribution of system costs and benefits associated with a smarter energy system. This should include assessing the scale and nature of different influences on these social impacts (such as variations in consumer capacity and capability for smart response and how suppliers segment and target their markets and establish their service pricing strategies).

These changes – direct consequences of the introduction of ToU tariffs and associated half-hourly settlement (HHS) – will affect different customers differently. The impact will be as a result of their current patterns of electricity consumption, their ability to change those patterns (technically, financially, intellectually and socio-culturally)⁵ and their willingness to (i) accept a ToU tariff from a supplier and (ii) change the pattern of their energy consumption in response.⁶

However, rather than just understand how new approaches like HHS will distribute system costs and potential to benefit from changed behaviour, we should also seek to understand the distributional impacts of current charging practices. The current profile-class-based settlement system (and associated non-smart tariffs) has embedded within it a range of cost transfers between customer groups as a result of the system's current inability to provide fully cost-reflective pricing. Different customers make different contributions to system costs, by virtue of their differing patterns of use (e.g. some customers contribute less than average to peak demand). The non-smart tariffs currently in operation smear these costs across the whole customer base. In order to understand fully the distributional implications of a shift to smart tariffs, it is important to understand the distributional implications of the current 'non-smart' system.

It is possible to envisage a customer – for example a pensioner household mainly using electricity outside peaks – whose current demand pattern creates less cost to the system than their tariffs impose. Similarly, some households will be contributing more than average to peak demand (and are thus enjoying electricity costs which are effectively subsidised by other customers). The distributional impact of a new approach will depend not only on the socio-demographic characteristics of households in the second category and whether they start to face their 'real' ToU costs. It will also depend on the socio-demographic characteristics of households in the first category and whether they are offered and take up a rewarding tariff (or whether their supplier will take advantage of market inertia and fail to pass on these benefits).

5 To respond you need electricity-using equipment whose use can be adjusted at key times (technical), the money to spend on whatever services/equipment is needed to take advantage of available services (financial), the understanding of what responses are required and how to achieve them (intellectual) and the opportunities in their household patterns of life and behaviour to shift electricity use (socio-cultural).

6 This assumes that ToU tariffs will not be introduced for all customers over night so participation will be dependent, at least for a time, on customer acceptance and adoption.

We welcome the fact that Ofgem is assessing the potential distributional impacts of the shift to HHS but we would like reassurance that the issues raised above are being (or will be) considered within that analysis.

Furthermore, it is one thing to understand the potential distribution impacts of HHS and other smart system features, it is another to decide on what basis the impacts are sufficiently negative to justify market intervention. Knowing the nature and scale of the impact does not itself provide a basis for such intervention.

To address this, we believe BEIS should develop and articulate a coherent set of principles which it and Ofgem (and others) will then apply to determine: (a) what constitute acceptable and unacceptable social impacts; (b) whether those impacts thus deemed 'unacceptable' should be mitigated; (c) if so, whether that is best done directly in relation to the impacted consumers (by, for example, providing compensation or special protection for certain types of consumer) or more generally (by stopping certain developments across the whole domestic market), and; (d) whether the impact is best addressed through social policy beyond the energy system.

Without doing this, there are risks that distributional impacts are (i) understood but deemed unnecessary to address, potentially creating a long-term problem for public acceptability and/or (ii) understood and addressed in a way which significantly and potentially unnecessarily hampers the opportunities for domestic consumers to participate fully in the smarter energy system (thus constraining the system's 'smart' potential). Developing and systematically applying clear principles can mitigate these risks.

The roles of different parties (Section 5): *improve whole system planning while keeping options open to new approaches, particularly from local initiatives*

Question 45: Our comments on changes needed in system governance (our Section b. above) are relevant here.

We welcome the development of the DSO role (particularly as a development of the DNO role) and the commitment outlined in the Call for greater co-ordination of SO, TO, DNO and DSO planning. However, such whole system planning is a relatively new behaviour by these parties. The SO and DNOs only met for the first time in April 2015 to discuss such issues in relation to current and near-term system design and operational practice (as opposed to long-term 'smart grid' working groups).

This process started because some DNOs were particularly insistent about the need to do it and also, arguably, because National Grid as the SO had a distinct financial and reputational incentive to do so. The RIIO-T1 Environmental Discretionary Reward (EDR) assesses the TOs' and SO's approaches to whole system planning in general and to liaising with DNOs in particular and the EDR provides a meaningful financial incentive for good performance. As a member of Ofgem's EDR panel, it is clear that this incentive helped secure this very important behavioural shift in the SO.

As a result of our first-hand experience of how this behaviour emerged (and knowing that there would have been no penalties for not doing it), we are concerned with the statement in paragraph 12 of Section 5 that 'the onus is on industry to address these requirements'. We agree in principle but recognise that in practice, these monopoly industries still need significant 'encouragement' from Ofgem to accept this onus and act accordingly.

In this regard, we see very different levels of commitment to such whole system planning and wide variations in the quality of capabilities and thus contribution across the DNOs, the SO and the TOs. This creates a risk that some parts of the country will be effectively left behind if that region's DNO or TO is performing under par.

We believe Ofgem needs to consider carefully how it ensures that companies unable or unwilling (or both) to respond to regulatory encouragement and/or direct incentives to deliver effective whole system planning and play their full role in the transition to a smart, flexible electricity system. We would anticipate that this will require a firmer approach to set and police a minimum expectation for this behaviour.

Question 46: We believe the future changes to arrangements need to take into account and enable (and potentially actively encourage) the potential for, and importance of, effective local initiative taking in relation to smarter energy systems. The Bristol Smart Energy City Collaboration⁷ identified a wide range of opportunities potentially available at city scale to deliver smart system activities and benefits across the city. However, the ability of actors within the city to realise these opportunities will be in part dependent on them actually taking initiative within the city to so and in part of how market access rules, settlement systems, charging methodologies and licensing regimes create space and offer due reward for such initiative-taking.

We recognise that this is a chicken and egg conundrum (i.e. why change the rules if the initiative isn't forthcoming and the benefits haven't been demonstrated?). However, given the extensive review of regulatory and market arrangement which this Call for Evidence presages, we recommend that a core objective of the new arrangements should be to reflect fairly the opportunity for local-scale collective action and establish conditions in which it can thrive.

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⁷ Op cit.