Carbon Co-op Response

BEIS/ORGEM Smart, Flexible Energy System - call for evidence

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This response is divided into three sections: Carbon Co-op's background, an outline of key energy system issues we feel are not addressed in the call and finally specific answers to specific questions from the call.

1. Carbon Co-op's Background

About Carbon Co-op
Carbon Co-op is a not-for-profit, community benefit society based in Greater Manchester. We exist to assist our domestic householder members and the wider community to make significant reductions in their domestic energy-related carbon emissions to a level commensurate with what scientific opinion suggests provides a reasonable chance of delivering less harmful future climate change.

Our work includes supporting energy efficiency and the delivery of whole house, domestic deep retrofit works and developing and testing new ICT smart grid systems.

We have delivered projects for national and local government and are project partners on the Horizon 2020 Nobel Grid project.

Incorporated into the governance of our organisation are a number of key concepts, namely that:

- Citizens should own, benefit from and democratically control the means of effecting the transition to a sustainable energy system.
- Collective action on climate change is more effective than individual action. The transition to a new, low carbon energy system should be fair and just, benefitting all equally and assisting in the re-distribution of resources from rich to poor.
- The technical solutions to avoid dangerous climate change should be published in open source formats and use open platforms, available for all to use.
- Successful models for delivering large scale reductions in domestic carbon emissions should be open, shared and replicated.

- Collaboration with local, city region and national government is essential to tackling climate change.

With this in mind, we subscribe to co-operative principles and are active members of the Co-operativesUK and Community Energy England.

2. Key issues

Energy efficiency is key

In relation to the energy transition in the UK, we believe that energy efficiency and demand reduction is the essential first step in delivering an effective and sustainable future energy system that meets ambitious carbon reduction targets.

Given the need to decarbonise domestic energy usage and the inevitable transition of transport and heating from hydrocarbon fuels to decarbonised electrical power, we believe that demand reduction and energy efficiency is key.

In a domestic housing context, this means taking a whole house and fabric first approach to retrofitting the existing stock, specifying heating systems and integrated technological (sometimes called 'smart') systems only after demand reduction has been achieved.
In the longer term this reduces the need to re-enforce or upgrade the electricity grid – a point argued recently by Electricity North West among others.

2050 targets for domestic housing demand reduction

To enable coordinated and effective action, absolute carbon emission targets need to be set for housing retrofit performance which will deliver ‘2050’ domestic carbon reduction targets, and robust monitoring and evaluation frameworks introduced in order to assess progress to achieving these.

Carbon Co-op and technical partners URBED, have proposed a '2050 Retrofit' target of 17kgCO2/m2.a and this was incorporated into the Greater Manchester Housing Retrofit Strategy Discussion Document (2013).

Carbon Co-op's Community Green Deal project (2015) demonstrated that emissions reductions to this target are achievable in standard Greater Manchester housing archetypes within reasonable budgets (around £40,000 per property), delivered by the existing the local supply chain and using well understood, simple energy efficiency measures such as solid wall insulation and triple glazed windows.

Further evidence regarding such targets and potential retrofit 2050 retrofit performance can be found in: The Retrofit Factfile, published by URBED (2015):
http://urbed.coop/projects/retrofit-factfile

A Community Energy future

In order to deliver an energy transition of this scope and scale we believe public/community partnerships are necessary: collaborations between the UK's strong and diverse voluntary sector, working under the banner of Community Energy, and government.

Only such collaborations are able to leverage the trust and local engagement necessary to deliver the huge energy transition necessary to meet carbon emission reduction targets. In practical terms this means community renewable energy generation, local supply arrangements and co-operative energy services companies (CESCOs).

We note and support Briston Energy Co-operative's submission to this call for evidence and the co-operative energy services company model they advocate.

We believe the Community Energy sector has a track record of innovative delivery and should be at the forefront of the future energy system - and not merely an adjunct performing a marketing or PR role.

3. Responses to specific questions from the call

7. What are the impacts of the perceived barriers for aggregators and other market participants?

(b) extracting value from the balancing mechanism and wholesale market

It is hard to see in the current system how aggregators can extract the full value they can provide without also having a supply license or having a strong commercial or other relationship with a supplier. This is a costly barrier to entry into the market for many new types of aggregator services, particularly in the domestic sector where margins can be expected to be much tighter and where regulation around supply is more stringent. The best way to unlock the potential of aggregators is to make it easier for them to undertake supply activities either by making supplier licenses easier to obtain or making supply up to a certain level properly exempt from license requirements (we note that exemptions are already in place however operating under these seems legally complicated and generally unclear).

(d) consumer protection

Whilst the sale and marketing of aggregator services to domestic consumers has definite implications for consumer protection these are mitigated partly by the nature of services and likely customers. Many services aimed at domestic consumers already operating in Europe operate on the basis of fixed payments being made to consumers in exchange for control of flexibility resources. Those participating are likely to have a higher level of knowledge due to

the need to own flexibility assets in the first place and these consumers are much better placed to assess the costs and benefits of these services.

There is an imbalance in the significant consumer protection attention currently given to supplier activity and that given to aggregator services and products which we believe are more complex and therefore should have more implications and attract more attention all other things being equal. However, this imbalance is in our opinion due to consumer protection around supply activities being mis-focussed and largely ineffective with consumer confidence in energy suppliers remaining low as evidenced by multiple surveys over recent years. On balance we believe it would therefore be a mistake to

8. What are your views on these different approaches to dealing with the barriers set out above?

Further to our response in question 7 we believe a combination of 'monitor' and 'industry-led changes' would be appropriate. At this stage we do not believe the aggregator role should become a new licensed activity as this would on balance represent a barrier to the development of new and innovative services. Instead the focus should be on opening up aspects of supply activity to aggregators without requiring a supply license, such as more direct access to the wholesale market and balancing mechanism. This is compatible with the first two approaches which would continue to fulfil the obligation to consumer protection and a consumer focussed system.

10.1. Do you agree with our assessment of the risks to system stability if aggregators' systems are not robust and secure?

Where there are large aggregators there is the possibility of impacts on system stability as has already been identified. However there should be parity in treatment of aggregators and generators in respect of their potential impact on system stability. Large non-domestic aggregators should be subject to a level of attention consistent with that given to large generators.

10.2. Do you have views on the tools outlined to mitigate this risk?

The tools alluded to seem appropriate. For domestic consumers it may be appropriate for the SO to exert more control by requiring that requests are peered (somehow) through the smart meter system using accepted standards such as OpenADR or Zigbee SEP which also allow for some transparency in assessing the size of switchable loads involved and allow the SO to intervene if there is a serious threat to system stability. This also offers certain benefits to smaller providers who can maximise the use of existing infrastructure whilst not having to assume full responsibility for the potential impact on system stability (and thus reducing their costs). Allowing the development of large aggregators in the domestic sector (managing large numbers of flexibility resources) with separate control systems may present threats to system stability.

22. Do you anticipate that underlying network cost drivers are likely to substantively change as the use of the distribution network changes?

Yes. Embedded micro generation in the low voltage distribution network as well as new storage technology offers potentials for cost savings in avoiding certain network infrastructure costs by reducing current and future peak power transmission on parts of the network. There are some circumstances where embedded generation could increase network load and create constraints however these could be offset by other storage and demand response technologies. More work is needed to evaluate the balance of these costs and benefits. We recognise that there are underlying fixed cost components to running the network which are unlikely to change.

If so, in what way and how should DUoS charges change as a result?

DUoS charges need to better reflect the benefits of local balancing of supply and demand to the local distribution network. Virtual MPAN/BMU proposals go some way to address this

23. Network charges can send both short term signals to support efficient operation and flexibility needs in close to real time as well as longer term signals relating to new investments, and connections to, the distribution network. Can DUoS charges send both short term and long term signals at the same time effectively?

Maybe. If the DNO is to assume more responsibility for balancing locally then potentially this could be achieved by changes

28. Do you agree with the 4 principles for smart appliances set out above (interoperability, data privacy, grid security, energy consumption)?

Yes.

Based on our experience with trying to control and manage smart appliances amongst our members and clients - which includes remote controlled plugs, smart washing machines, and a variety of HVAC systems (primarily immersion heaters and heat pumps in this context) - one of the biggest continuing issues is interoperability of systems. We have accumulated a large amount of equipment over several years of participation in various projects which is now largely redundant because they have proprietary or no open interfaces which do not continue to work after services are withdrawn and cannot be upgraded or maintained.

There is scope for the government to regulate to ensure equipment has open and documented software and hardware interfaces which comply with existing international standards for smart appliances such as Zigbee SE, Thread, and OpenADR which will ensure their continuing operation and mean they do not need to be replaced more frequently than is necessary (or at least within the normal lifetime of the appliance) . One way this could be done is by extending the SMETs standard to include smart appliances and defining their interaction with the Communications Hub acting as a 'broker' for the provision of energy services (as part of future development of the system).

Mandating compliance with such standards can also mitigate many potential risks to data privacy and grid security and reduce the attack surface for smart appliances and systems. Many recent reported attacks on smart home and internet of things devices (which share many of characteristics with smart appliances) were due to low quality or non-standard implementations which could have been prevented by compliance with existing standards and best practice. These problems will continue whilst there are no clear incentives for companies to undertake compliance in the development of products and services.

29. What evidence do you have in favour of or against any of the options set out to incentivise/ensure that these principles are followed?

Option A: Smart appliance labelling
It is important that smart appliances are clearly marked by which systems they are compatible with and if they adhere to a certain standard such as SG-Ready so that consumers are able to make informed decisions at time of purchase.

Option B: Regulate smart appliances
Given the potential security and privacy implications of smart appliances there is some scope for regulation to ensure that they comply with existing accepted industry standards, particularly around information security.

Option C: Require appliances to be smart
Where making appliances smart has little or no impact on their desired usage and does not significantly add to the cost and offers enough benefit to the wider system then a case could be made for requiring appliances to be smart. This can be compared with requiring appliances to meet certain energy efficiency standards and similar cost/benefit analyses can be undertaken.

30. Do you have any evidence to support actions focused on any particular category of appliance? Please use the text boxes/attachments to provide your evidence for the different categories:

Wet appliances (dishwashers, washing machines, washer-dryers, tumble dryers)
Trials to date have shown that there may be resistance to disrupting washing/drying activities amongst domestic consumers which could lead to them not engaging in demand response. Generally activities which are very time localised (such as washing/drying and cooking) will require better systems and communication with the consumer over their purpose, benefits, and operation. More research also needs to be done to quantify the likely benefits to the consumer and the rest of the system to be able to judge when smart appliances will be ready for wide scale deployment.

Cold appliances (refrigeration units, freezers)
Cold appliances seem to offer the most overall benefits given their number and because their operation can be changed with little or no effect on their performance (as determined by their ability to preserve food stuffs) but with large potential benefits to the system when

aggregated across a population. A low cost national roll out of smart cold appliances aided by recent developments in communication over the grid infrastructure itself for control purposes could be a valuable asset to the SO and help to increase the flexibility and aid increases in renewable penetration in the system. It is possible that this activity would lead to an increase in the overall amount of energy used and thus cost of operation of these devices. This could be offset by mandated efficiency improvements or a cash back programme (for example).

Heating, ventilation and air conditioning
Our own experience with controlling HVAC systems has shown that this is a complex area. HVAC needs to be understood as a whole system rather than an appliance category with its performance being determined by a much wider range of factors including more subjective criteria such as individual comfort. Actions which promote standards based approaches such as ‘SG-Ready’ and their inclusion by manufacturers in their products will aid further research and development of smart HVAC in the short term and accelerate the development of widespread effective and commercially viable solutions in the long term.

Battery storage systems
Battery storage systems offer the most technical potential for participation in demand response and are therefore likely to attract the most interest and participation by early adopters. However, they are likely to remain small in number in the domestic sector in the near to mid term. Battery storage is already being aggregated by manufacturers with examples such as Sonnen Community and Moixa Grid Share.

31. Are there any other barriers or risks to the uptake of smart appliances in addition to those already identified?

There is a risk that consumer confidence in smart appliances could be undermined before they are even market ready by security and privacy concerns