Visit us
geotogether.com

Give us a call
+44 (0)1223 850 210

Drop us an email
info@geotogether.com

11 January 2017

DBEIS/Ofgem Call for Evidence

A Smart, Flexible Energy System

Introduction

Green Energy Options (**geo**) is a leading provider of consumer energy engagement products and services. For ten years we have focused on empowering consumers in this field, have carried out a considerable amount of practical research and development and sold over 3m energy management devices. Over this time we have built up extensive experience about what domestic consumers require and are interested in, as well as having an appreciation of the vital role they increasingly hold in the overall energy system.

The opportunity to comment on this consultation is welcomed as it is one of the most fundamental elements of the 21st century energy system. There are a lot of detailed proposals in this consultation all of which will make a valuable contribution to building a flexible energy system. However, we believe they could go further, especially with regard to the active role of the consumer. It is the consumers' own demand that is to be managed and the key question must be: who does this management, the system or the consumer?

The answer may well be a mix of both but with the consumer being ultimately in control of their demand. The Secretary of State in his Foreword recognises this in stating that "the age of exclusive control by big energy companies and central government is over…". We fully agree: demand management must be a service that consumers opt for, not something that is done to them. Consequently, our response is in two parts: in this letter we make proposals about how we believe the Secretary of State's call for an active role for consumers could be enhanced and at the Appendix we comment on specific consultation questions.

A complementary approach

Two of the issues that a flexible *electricity* system can address are managing growing peak demand and minimising conversion, transmission & distribution losses.

Domestic consumption makes up a third of overall UK consumption[1], but is responsible for 50% of peak demand, whilst SME peak consumption contributes another 30% making a total of 80%[2]. The Digest of UK Energy Statistics (DUKES) also shows that the combination of energy industry

[1] Digest of United Kingdom Energy Statistics 2016, July 2016 Para 5.2

[2] GB Electricity Demand – Context and 2010 Baseline Data Table 7 and Ofgem Demand Side Response. July 2010. Appendix 2. P. 50

usage and conversion, transmission and distribution costs accounts for a staggering 62% of fuel inputs.

Furthermore, with electricity usage expected to rise with the push to electrify transport and heating both issues are likely to grow: it is vital that we find ways to address both challenges.

This all points to the need for a more comprehensive solution than is being proposed. Whilst the argument for addressing today's problem first is easily made, as with centralised managed charging, it is not the answer; it only "kicks the can down the road". There is a natural resistance to change and the risks it entails. Often the consequence is to take things slowly, step by step. This takes longer and may not ever achieve any significant degree of change as stages are watered down and "business as usual" carries on regardless.

One place where this is apparent is in the role of the consumer. The paper quite rightly places the consumer at the fore-front of the rationale for change – The Secretary of State's Foreword states "we must maximise the ability of consumers to play an *active role* in managing their energy needs" (our emphasis). However, it is not clear that this has been carried through in the consultation itself. Chapter 4 specifically addresses the consumer but only section 4.3 addresses the role of the consumer and even then, only as "consumer engagement". For domestic consumers' paragraph 4.25 concludes that "we believe our focus for engaging domestic and smaller non-domestic consumers should be *on information provision*" (again, our emphasis). Information provision is important, but is not about giving consumers an active role.

An additional starting point

As well as starting from today and working forward with one size fits all solutions, a parallel approach could be to start by considering the consumer's role at some point in the future, say 2030, and work backwards prioritising the actions needed to reach the end goal.

Such a starting point could be "tomorrow's home", a home that has high insulation levels, low power DC circuits, LED lighting, is heated electrically, has two electric vehicles plus a range of energy storage, is connected to the smart grid and is actively managed by a home energy management system. The same could apply to small businesses. Furthermore, estates could be powered by a "District Energy System" – i.e. a combination of District Heating and District Electricity – to deliver maximum efficiencies and to act on consumers' behalf delivering flexibility to the grid.

This solution could be introduced progressively by focusing on new build opportunities. It is an evolution not a revolution and allows time and experience to be built progressively and commercial solutions to evolve. This is similar to the approach being taken with transport where regulations and incentives are being introduced progressively to evolve the market in the correct direction. What is being proposed therefore is not a new risky strategy, rather it is applying best practice in a related market.

The following sections suggest how this strategy might look.

Tomorrow's homes (and small business premises)

At **geo** we monitor thousands of homes' energy consumption in 15 minute demand profiles and, where fitted, their solar generation import and export. Averaging these figures and applying them to a 200-home estate we can show that:

- Using today's average consumption of 11KWh/home/day the estate's peak demand would be 144KW.

- Adding solar generation makes no difference to this peak between September and March
- Adding a worst-case scenario with all homes using an electric vehicle and no demand management the peak demand increases to 217KW and the average consumption rises to 20KWh/home/day
- Adding in-home demand management using 16KWh of behind-the-meter energy storage flattens the peak demand to 74KW – half the original peak leaving plenty of scope to add electric heating
- Applying implicit demand management[3] using off-peak tariffs we can demonstrate how such a home's annual energy bill could be halved.

What is more, the only changes to the electricity system needed to achieve this is the introduction of smart meters (underway), the introduction of smart tariffs (being trialled by some Retailers) and half hourly settlement for such estates. Such a solution delivers significant benefits to the local network *and* the consumer: it makes for affordable living.

Such an approach would be in-step with the developing European approach to demand management as laid out in the recent "Winter Package". Two components of this package are the "Smart Building Indicator" called for by the Energy Performance of Buildings Directive[4] and "Smart Labelling" for appliances called for by the Energy Efficiency Directive. The Smart Energy Demand Coalition is recommending that this becomes an "active" building/appliance certificate that defines the active demand capacity of a building or appliance in terms of KWp and KWh. This would complement the passive energy efficiency certificates.

This approach could be taken further by:

- implementing explicit demand management through a third party Aggregator, or
- introducing a "District Electricity System" which would operate in a similar way to District Heating Systems. This would encompass models such as Community Energy, Virtual Power Plants and major city redevelopments.

Thus, a starting point would be to address the new build market now, encourage "active" demand management technology to be built into new homes and follow best practice from the

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[3] Demand Management is increasingly categorised as implicit and explicit: i.e. non-contracted and contracted. Implicit DM requires load signals to be passed to the consumer, often in terms of tariffs, the role of an energy retailer whilst explicit DM requires a contractual relationship with the consumer, the role of the Aggregator (which could be a Retailer).

[4] Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2010/31/EU on the energy performance of buildings page 17:

6. The Commission is empowered to adopt delegated acts in accordance with Article 23 supplementing this Directive with a definition of 'smartness indicator' and with the conditions under which the 'smartness indicator' would be provided as additional information to prospective new tenants or buyers.
The smartness indicator shall cover flexibility features, enhanced functionalities and capabilities resulting from more interconnected and built-in intelligent devices being integrated into the conventional technical building systems. The features shall enhance the ability of occupants and the building itself to react to comfort or operational requirements, take part in demand response and contribute to the optimum, smooth and safe operation of the various energy systems and district infrastructures to which the building is connected.';

automotive industry with a combination of regulation, tax incentives and purchase schemes. The Smart Building Indicator would take the place of a car's CO2 emissions figure in driving the application of regulations and incentives.

Peak demand

The next two sections look in more detail at the two issues, starting with peak demand.

Today, as noted in paragraph 4.22, there is little demand flexibility offered in the residential and small business sectors. Homes generally have multiple small loads with minimal potential for load-shifting, the infrastructure required to manage multiple homes is complex and many of the building blocks that would enable participation are not yet in place such as smart metering and half-hourly settlement.

However, technology is changing this rapidly. Energy storage systems offer the flexibility to both consume and supply electricity. Behind the meter battery storage aggregates a home's demand and therefore provides a single, sizable entity that can be automated and can provide a significant level of flexibility. In parallel, the Internet of Things offers a growing number of solutions that can greatly simplify the management of multiple homes.

Electric vehicles, as addressed in Section 4.2 of the consultation could also contribute as could heat pumps and heat storage, although on average, every electric vehicle will add another home's worth of electricity demand[5] whilst electric heating will more than double a home's electricity demand. Indeed, several of the drivers for a flexible energy system are due to the added demand EVs and heating will bring.

One answer to this issue being considered is mandatory managed charging of electric vehicles, which is being consulted on separately. However, given the range of energy storage systems coming to market this would be the thin end of the wedge. Tomorrow's homes may well include heat storage, battery storage as well as electric vehicles: a mandatory managed charging scheme for all these elements would cover pretty well 100% of the home's consumption and totally undermine the roles of the aggregator and the energy retailer. Managed charging is an important element of demand management but neither can it be made mandatory nor should it be limited to Network Operators. Hence the need for a more comprehensive solution.

Which brings us to the role of the consumer. Our experience shows us that whilst consumers are interested in their energy usage this interest does not extend to managing it actively. Most people, once they have started to understand what is entailed want the problem taken away from them by automation. Again, there are parallels with cars, specifically hybrid cars: people are interested in the fuel efficiency, lower running costs and better driving experience but they want to be able to buy and drive such a car in the same way as they do a normal car: so it is with homes.

However, demand management is more active and requires a direct interface with the grid. This means that there needs to be an agent that acts on behalf of the consumer: an Aggregator. The role of the Aggregator thus becomes central to the demand management proposition. In fact,

[5] Assuming 10,000miles/year, therefore 27 miles per day, at an average of 3kWh/mile this equates to 9kWh/day.

the role can be seen as one and the same as an energy retailer: buying and selling energy flexibility in the market on behalf of a consumer.

Who should be enabled to take on this vital role, arguably the pivotal role in the new smart grid? An answer could be found by studying the Australian Energy Market Commission (AEMC) Power of Choice (POC) review[6] completed in 2012 and due to be implemented on 1st December 2017. This report put forward a collection of far-reaching reforms to generate a competitive electricity market with the consumer at its centre exercising their "power of choice". It is sometimes referred to as "market-led smart metering" but its provisions are far wider than just smart metering services.

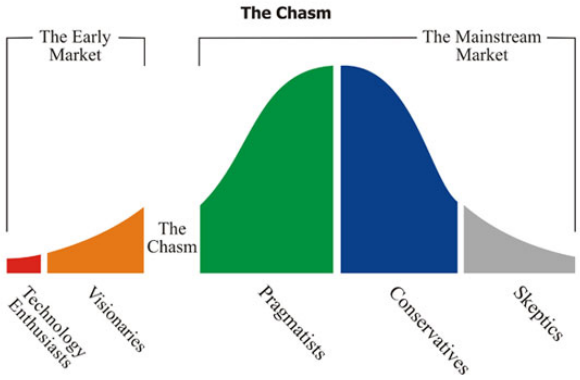
In effect the Power of Choice opens the market to any registered provider to deliver energy services. This could be existing businesses such as DNOs (Distribution Businesses in Australia), Energy Retailers, third-party Aggregators etc.

It is strongly recommended that this review be studied and taken into account in reviewing the responses to this consultation.

Technology adoption

There remains a further issue to be addressed and that is how to get consumers to adopt the technology needed to enable demand management in a home or small business premises. Whilst the technology is generally available its costs are high and pay-back periods at today's electricity costs are in the region of 15+ years. Furthermore, it is technology and therefore not that accessible to the average consumer. Both factors work against a general take-up.

The "technology adoption lifecycle" is an acknowledged model that describes these issues[7]. Several people have written about the difficulty of moving from early adopters to the initial mass market. Generally early adopters can afford and are happy to take some technology risk whereas the mainstream market is not. This is often termed "the chasm".



Solutions that appeal to early adopters do not appeal to the mass market until they have been made main-stream. This generally means the whole product experience from purchase, installation, operation, support and divestment has been professionalised. It also means in the case of energy management, purchasing the technology makes financial sense. A core element of this is how the technology is paid for.

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[6] http://www.aemc.gov.au/Major-Pages/Power-of-choice

[7] https://en.wikipedia.org/wiki/Technology_adoption_life_cycle

One solution that is being employed by some is an asset financed model where a finance company owns the assets and the consumer pays for the asset through their energy bill using regulations established for the Green Deal. As with the Green Deal, this works if the savings on the energy bill are greater than the lease payment. The initial focus for such schemes is Social Housing where tenants have no choice when they take on a rental property. It remains to be seen if purchasers in the main housing market will accept the asset finance deal as part of purchasing a property or see it as a barrier. It is a different arrangement to any other part of the home such as the boiler which is purchased as a fixture and fitting and so may take time to be accepted.

Another solution is to follow the car market and use a combination of incentives and regulation to drive adoption, focusing on the new build and refurbished buildings. In this model the Smart Building Indicator (SBI) would be used to frame regulation and determine the level of incentives provided. For example, the SBI could be used to determine access to a green mortgage, the "Help to Buy" scheme could be adapted to focus on buildings that have an active contribution to demand flexibility and/or purchase tax changes could be considered. Other taxes could be used to further incentivise adoption. A further option is to apply network charges differently; perhaps as other countries do by linking them to peak demands. The benefits of following such an approach would be:

- simplicity – consumers buy the technology as part of their home on a mortgage. It is something they understand, are used to and can compare across homes;
- flexibility: incentives can be tuned to market dynamics, as they are for many other government objectives from electric vehicles to nuclear power;
- to "normalise" market provision: the assets are treated in the same way as any other element of a home and bought on a mortgage as with other fixtures and fittings;
- to provide the consumer with choice of whether to sell their flexibility and if so, to select the most appropriate Energy Services Provider

Both options have merit: it will be the market that decides if both gain traction. To this end, consumer research could be conducted to estimate the likely take-up of each option.

To summarise, it is recommended that the government consider three additions to this consultation to enhance the take-up of residential and small business demand management to address peak loading. These are:

1. Full consideration should be given to AEMC Power of Choice Review with a view to incorporating its conclusions into the response to this consultation.
2. Adoption and development of the EPBD Smart Building Indicator and the EED Smart Appliance Label as the means to encourage and regulate the adoption of demand flexibility in buildings.
3. Consideration be given to applying incentives similar to electric vehicles to residential and small business owners to drive adoption.

System losses

As covered in the introduction, The Digest of UK Energy Statistics (DUKES) shows that the combination of energy industry usage and conversion (by far the largest component),

transmission and distribution costs accounts for a staggering 62% of fuel inputs[8]. As electricity demand grows so will these losses and the associated increase in CO2 emissions.

The closer generation is to the usage the lower the losses and where solar, wind and CHP is used, the lower the conversion losses and CO2 generated. There is clear logic in encouraging local generation over and beyond behind the meter microgeneration. Several schemes are being trialled including community energy and Virtual Power Plants. These have identified several challenges. For example, a consumer would have no choice in who supplies their energy which challenges the precept of the competitive electricity supply market and consumer choice; secondly, the need to introduce a private network would be cost prohibitive unless ownership of the local distribution network could be transferred to the operating company.

In contrast, the concept of District Heating is well accepted and is being encouraged through planning considerations. If it is acceptable that a consumer is unable to choose their heating supplier, and heating is normally the highest element of home energy bills, then should it not be acceptable to have a "District Electricity System" (DES), especially where it can be shown that it delivers greater efficiencies and lower CO2?

On this basis, developers could be encouraged to implement a DES as part of the planning process as is currently the case for District Heating Systems; indeed, they could be combined to maximise efficiencies, such as through using CHP, and become a District Energy System.

In this model the DES Operator would fulfil the combined roles of Aggregator and Energy Retailer and could in fact represent a model for a future Energy Retailer as an Energy Services Company or ESCO.

It is therefore recommended that specific regulations that enable the emergence of District Electricity Systems/District Energy Systems and the development of a new role, the District Energy System Operator, be included in the Smart, Flexible Energy System legislation.

Conclusion and recommendations

In conclusion, it is suggested that the provisions for a Smart, Flexible Energy System could go further than is currently being consulted on. Building on Australia's Power of Choice review, the specific Smart Building Indicator and Smart Appliance Labelling elements of the EU's Winter Package, technology progression and relevant data modelling it is recommended that:

- in parallel with the measures being consulted on, provision is also made for new energy models focused on the new build and refurbishment markets to be established alongside the current model.

To this end four specific recommendations are made:

1. Full consideration should be given to **AEMC Power of Choice Review** with a view to incorporating its conclusions into the response to this consultation.
2. Adoption and development of the EPBD **Smart Building Indicator** and the EED Smart Appliance Label as the means to encourage and regulate the adoption of demand flexibility in buildings.

[8] Digest of United Kingdom Energy Statistics 2016, July 2016 Para 5.2

3. Consideration be given to introducing incentives similar to those that drive electric vehicle adoption to residential and small business owners to **drive the adoption of demand management resources**.
4. Specific regulations that enable the emergence of **District Energy Systems** and a new role of **District Energy System Operator** be included in the Smart, Flexible Energy System legislation.

This call for evidence has it right: there is a need for consumers to have an active role in the energy system. Demand management is central to a Smart Flexible Energy System and it is consumers' demand that needs to be managed. This is therefore a **consumer adoption problem**. The four recommendations above are absolutely focused on consumers and we believe answer the question: how do you give an active role to consumers?

geo | 3 St. Mary's Court | Main Street | Hardwick | Cambridge | CB23 7QS | UK

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Appendix 1

Answers to Consultation Questions

Q11: What types of enablers do you think could make accessing flexibility, and seeing a benefit from offering it, easier in future?

A key enabler is true aggregation of local demand – it is what happens in an industrial complex to provide scale. This means enabling a local aggregator who would act on behalf of the consumers in a substation or larger district. This is akin to the concept of District Heating, which is well accepted and is being encouraged through planning considerations.

If it is acceptable that a consumer's choice is limited and they are unable to choose their heating supplier - and heating is normally the highest element of home energy bills - then why should it not be acceptable to do the same with electricity? In which case a "District Electricity System" (DES) could be established in order to aggregate flexibility, manage it locally and interface with the grid for both back-up supply and the provision of available flexibility when required?

On this basis, developers could be encouraged to implement a DES as part of the planning process as is currently the case for District Heating Systems; indeed, they could be combined to maximise efficiencies, such as through using CHP, and become a District Energy System.

In this model the DES Operator would fulfil the combined roles of Aggregator and Energy Retailer and could in fact represent a model for a future Energy Retailer as an Energy Services Company or ESCO.

As this is likely to be enacted in new build and refurbishment estates it would be able to enact this alongside the current grid infrastructure enabling a new model to progressively be built and refined.

It is therefore recommended that specific regulations that enable the emergence of District Electricity Suppliers/District Energy Suppliers and the development of a new role, the District Energy System Operator, be included in the Smart, Flexible Energy System legislation.

Q12: If you are a potential or existing provider of flexibility could you provide evidence on the extent to which you are currently able to access and combine different revenue streams? Where do you see the most attractive opportunities for combining revenues and what do you see as the main barriers preventing you from doing so?

The main barrier from a residential and small business position is complexity. In an industrial complex all the loads and flexibility are aggregated on site giving scale and simplicity when dealing with the grid. For Residential and Small Businesses, each one has to do this themselves with an aggregator and the aggregator has to manage a large number of interfaces and relationships. It is just too complex to be cost efficient. On the other hand, a District Energy System Operator could act in the same way that an Industrial facility acts, simplifying the whole proposition.

Q14. Can you provide evidence to support changes to market and regulatory arrangements that would allow the efficient use of flexibility and what might be the Government's, Ofgem's, and System Operator's role in making these changes?

Two international approaches are recommended.

The first is the developing European approach to demand management is laid out in the recent "Winter Package". Two components of this package are the "Smart Building Indicator" called for by the Energy Performance of Buildings Directive[9] and "Smart Labelling" for appliances called for by the Energy Efficiency Directive. The Smart Energy Demand Coalition is recommending that the SBI becomes an "active" building/appliance certificate that defines the active demand capacity of a building or appliance in terms of KWp and KWh. This would complement the passive energy efficiency certificates. The government's role in this would be to establish the SBI in the UK and use it to drive adoption of demand flexibility through regulation and incentives – as is done in the automotive industry with CO2 Emission figures.

The second is the Australian Energy Market Commission (AEMC) Power of Choice (POC) review[10] completed in 2012 and due to be implemented on 1st December 2017. This report put forward a collection of far-reaching reforms to generate a competitive electricity market with the consumer at its centre exercising their "power of choice". It is sometimes referred to as "market-led smart metering" but its provisions are far wider than just smart metering services.

In effect the Power of Choice opens the market to any registered provider to deliver energy services. This could be existing businesses such as DNOs (Distribution Businesses in Australia), energy Retailers, third-party Aggregators etc.

It is strongly recommended that this review be studied and taken into account in reviewing the responses to this consultation.

Q15 & 16: To what extent do you believe Government and Ofgem should play a role in promoting smart tariffs or enabling new business models in this area? Please provide a rationale for your answer, and, if you feel Government and Ofgem should play a role, examples of the sort of interventions which might be helpful.

If deemed appropriate, when would it be most sensible for Government/Ofgem to take any further action to drive the market (i.e. what are the relevant trigger points for determining whether to take action)? Please provide a rationale for your answer.

Now. It would be very valuable to frame the smart meter roll-out as a smarter energy system enabler. Smart tariffs, in-home displays to communicate with consumers and half-hourly settlements are all key elements for enabling Implicit Demand Management: i.e. non-contracted responses to demand management signals – tariffs. Government should be creating consumer awareness and thereby generating the consumer demand that Energy Retailers will have to respond to.

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[9] Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2010/31/EU on the energy performance of buildings page 17:

6. The Commission is empowered to adopt delegated acts in accordance with Article 23 supplementing this Directive with a definition of 'smartness indicator' and with the conditions under which the 'smartness indicator' would be provided as additional information to prospective new tenants or buyers.
The smartness indicator shall cover flexibility features, enhanced functionalities and capabilities resulting from more interconnected and built-in intelligent devices being integrated into the conventional technical building systems. The features shall enhance the ability of occupants and the building itself to react to comfort or operational requirements, take part in demand response and contribute to the optimum, smooth and safe operation of the various energy systems and district infrastructures to which the building is connected.';

[10] http://www.aemc.gov.au/Major-Pages/Power-of-choice

Q22: Do you anticipate that underlying network cost drivers are likely to substantively change as the use of the distribution network changes? If so, in what way and how should DUoS charges change as a result?

Yes. At its simplest, the local network will need to be strengthened in many cases. These costs will need to be covered by increased network charges. In Australia this has put severe pressure on the system and encouraged consumers to minimise their demand through microgeneration (it is much simpler to contemplate this where the sun shines so much!). The effect of this has been falling revenues for the Distribution Businesses leading to higher charges being paid by those who cannot afford microgeneration. This has led to a move in Queensland to charge on capacity rather than consumption. This has significantly impacted several business cases, perhaps rightly so, as the cost of electricity itself is the smaller element of most tariffs. We believe that a move to capacity charges based on peak load is the right approach.

A successful demand management regime should flatten peak demand. One beneficiary of this is System Operators. Network charges therefore should reflect the peak load demanded by each property to provide an added incentive to manage demand.

Q27: Do you have any evidence to support measures that would best incentivise renewable generation, but fully account for the costs and benefits of distributed generation on a smart system?

We are not sure why this question is limited to renewable generation and does not apply to energy storage and other smart appliances. We will answer on the basis that this applies to all smart appliances.

The energy market has a number of subsidies from nuclear power to electric vehicles. Some are long term as with nuclear, others are expected to be shorter term to get the market established as with EVs and Feed-in Tariffs. Where the challenge lies is the gap that has to be closed from the business model to introduce high cost early-stage technologies and the enduring mass market, subsidy-free business case. In the case of renewables, given the cost of electricity, this has always been a highly ambitious expectation.

What is required is action on several fronts:

- The financial value of the benefits the technology provide needs to be maximised. This can be achieved in this sector through maximising the financial system benefits to the end user who has to buy or lease the technology in the first place. We believe that demand management offers this opportunity and therefore incentives should be focused on the combined capacity of a building in terms of its demand flexibility rather than on individual appliances.
- Delivering the financial benefits requires the establishment of an agent who can act effectively on behalf of the consumer and can pay them reliable, realistic payments that reduce the cost of the energy they use. This means the role of the Aggregator must be placed front and centre as the key enabler.
- Sustainable incentives need to be considered. By sustainable we mean benefits that can be contained and not run out of control. The challenge with subsidies like FiT and RHI is that if they are successful they become unaffordable. One way that incentives could be contained is by focusing on a constrained segment such as new build – private and social. Incentives such as Green Mortgages, Help to Buy (efficient homes) and purchase taxes such as Stamp Duty would be simple to establish and manage, are understood by

consumers and have the added benefit that they reduce the immediate cash-flow issues for a purchaser. Such benefits can be contained: only 150,000 new homes are built each year. They could be extended if wished by making them retrospective for a period of six months following the purchase of an existing home. This would encourage new buyers to upgrade their homes and start to build the refurbishment market whilst still containing the aggregate costs of the benefits (only 5% of homes are purchased every year).

- At the same time, early stage costs can be minimised by focusing on new build properties. This would reduce the cost of installation as they are designed in at build, the cost of sales as the technology would be procured in large orders rather than sold to many individuals and component costs would be reduced faster due to the bulk orders being placed. It also means that demand flexibility would be concentrated leading to savings in infrastructure costs.

There are a number of differences to this case than Feed-in Tariffs:

- the scale of application is contained by the size of the new build market making the incentives sustainable;
- the financial returns from demand management are greater than any one technology on its own meaning that achieving a non-incentivised commercial business model is realistic;
- the combination of these measures means that the consumer is being incentivised rather than the supplier being paid a subsidy. We believe this is morally correct, complies with the objective of this consultation – to give consumers an active role – and would provide a realistic and pragmatic bridge to a fully commercial mass-market consumer proposition.

Q28: Do you agree with the 4 principles for smart appliances set out above (interoperability, data privacy, grid security, energy consumption)?

No.

The first principle, interoperability, is unrealistic for three reasons:

1. If you consider the efforts and testing that has had to be undertaken in the smart metering programme to achieve interoperability it is unrealistic to expect that a similar effort could be organised and funded for all smart appliances on the market.
2. Secondly, "open systems" are open to those who sign up to them: take for example the *competing* google home, Apple Home Kit and Nest's Thread "open standards". Consumers will opt into one or the other "open system" and then stick with it: i.e. be locked into that standard. Is the intention to say only one "open standard" is to be used, in which case, which one? Is the government going to select a winner? If not, how open is open?
3. What is an open system? For example, for pragmatic reasons **geo** has developed a simple reliable standard called Legato which we use in our products. We are quite happy to offer it to other parties to use under licence, however, we do not have the finances to operate an open (free?) network. What would be needed to make this an open system? If open systems are to be required there will need to be a definition of what is required to be considered an open system.

In practice, the market will decide what is acceptable. Once consumers hear and understand about a standard they will buy products that have that label. It does not require legislation to force developers to use one or other open standard, business necessities will do that.

We suggest also that there is a difference between consumer appliances and fixtures and fittings in a home. Appliances that are bought by consumers require better information as consumers are not experts, which is where the smart labelling comes in. However, appliances that are fixtures and fittings in a home such as energy storage systems, PV panels, inverters etc are fitted by specialists and the same level of protection is not required: the market itself will establish how best to ensure interoperability as part of the Every Home Counts quality mark.

The third principle, grid security, is another unrealistic ambition. How would this be achieved? In effect it requires an energy management system that manages priorities: is it being suggested that every appliance requires its own energy management system? Until it can be explained what measures would be required to meet this principle and these be studied to understand the impact on cost and efficiency this principle should not be included.

Q29: What evidence do you have in favour of or against any of the options set out to incentivise/ensure that these principles are followed?

Smart appliance labelling: supported

Regulation of smart appliances: this goes hand in hand with smart labelling. However, as addressed above, the approach to interoperability requires to be "light-touch" otherwise it could introduce significant regulatory barriers. It should be limited to stating what protocol is used such as ZigBee Smart Energy Protocol, WiFi, Legato etc.

Requirements for appliances to be smart: this too is supported as it is line with automotive regulations. However, the requirement should be output focused rather than input specifications for example, as in dictating an open system. This is where the SEDC recommended output measure for the Smart Building Indicator could be applied. An appliance would need to state the level of load that could be switched on or off in terms of KWp and the amount of consumption that could be shifted in terms of KWh. Appliances would have to meet minimum level of demand capacity to be considered a smart appliance and this could be banded in a similar way to the energy efficiency bands.

Q30: Do you have any evidence to support actions focused on any particular category of appliance?

Other: it is strongly recommended that any measures taken with regard to appliances are designed so that they can seamlessly contribute to the Smart Building Indicator recommended in the amendments to the Energy Performance of Buildings Directive. For example, in reaching a figure for the Smart Building Indicator it should be possible to simply aggregate the figures implemented in the Smart Appliance Label for appliances fitted in the building.

Q33: How might Government and industry best engage consumer electric vehicle users to promote smart charging for system benefits?

Electric vehicles are just one element of "tomorrow's home" which is likely to include heat and battery storage, electric heating and microgeneration. The limitation of the proposed approach is that it only considers one of these smart appliances and as such is impractical as it only addresses a part of the demand management challenge. To extend this approach to every smart appliance in the home would be to create a centralised monopoly that undermines the value and roles of aggregators and energy retailers.

An alternative is to encourage consumers to take an active role by ensuring that they receive full value for the services their demand flexibility can deliver. However, our experience shows us that whilst consumers are interested in their energy usage this interest does not extend to managing it actively. Most people, once they have started to understand what is entailed want the problem taken away from them by automation. There are parallels with cars, specifically hybrid cars: people are interested in the fuel efficiency, lower running costs and better driving experience but they want to be able to buy and drive such a car in the same way as they do a normal car and not actively manage it: so it is with homes.

Nevertheless, demand management is more interactive and requires a direct interface with the grid. This means that there needs to be an agent that acts on behalf of the consumer: an Aggregator. The role of the Aggregator thus becomes **central to the demand management proposition**. In fact, the role can be seen as one and the same as an energy retailer: buying and selling energy flexibility in the market on behalf of a consumer.

The key question therefore is who should be enabled to take on this vital role, arguably the pivotal role in the new smart grid? An answer could be found by studying the Australian Energy Market Commission (AEMC) Power of Choice (POC) review[11] completed in 2012 and due to be implemented on 1st December 2017. This report put forward a collection of far-reaching reforms to generate a competitive electricity market with the consumer at its centre exercising their "power of choice". It is sometimes referred to as "market-led smart metering" but its provisions are far wider than just smart metering services.

In effect the Power of Choice opens the market to any registered provider to deliver energy services. This could be existing businesses such as DNOs (Distribution Businesses in Australia), energy Retailers, third-party Aggregators etc.

It is strongly recommended that this review be studied and taken into account in reviewing the responses to this consultation.

Q34: What barriers are there for vehicle and electricity system participants (e.g. vehicle manufacturers, aggregators, energy suppliers, network and system operators) to develop consumer propositions for the:

- **control or shift of electricity consumption during vehicle charging; or**
- **utilisation of an electric vehicle battery for putting electricity back into homes, businesses or the network?**

The simple answer is consumer value: if the costs outweigh the benefits mass adoption will never take place. Thus, financial benefits for the consumer have to be maximised, guaranteed and simple to understand. This comes back to the vital role of the Aggregator. Furthermore, from our modelling we believe that it is only by combining solutions to create an integrated energy management system in the home that sufficient real value will be created: addressing solutions individually is insufficient.

Our view is that it will be Aggregators working with home energy management providers that will generate the compelling market proposition that will encourage businesses to develop components to enhance the consumer propositions. For example, look at how Apple Home Kit and google home are developing the IOT market. For some time there have been stand-alone

[11] http://www.aemc.gov.au/Major-Pages/Power-of-choice

propositions in the market that have not really developed beyond early adopters, however, now that Amazon and others have generated an integrating service there is every chance that these applications will become main stream and this encourages companies to develop systems that work with these branded systems.

Q39: When does engaging/informing domestic and smaller non-domestic consumers about the transition to a smarter energy system become a top priority and why (i.e. in terms of trigger points)?

It is regrettable that in a call for evidence that is about giving the consumer an active role this is the only question that is about the domestic consumers' engagement with DSR and it is framed very narrowly. We therefore have expanded the scope of our answer as this is the only question that many of the points we wish to make are applicable.

To answer the narrow question first, there are a series of points. The first is now: what would be valuable would be to frame the smart meter roll-out as a smarter energy system enabler. Smart tariffs, in-home displays to communicate with consumers and half-hourly settlements are all key elements for enabling Implicit Demand Management: i.e. non-contracted responses to demand management signals – tariffs.

The second would be at the point where Explicit Domestic Demand Management is enabled. We believe that this might be tied to the development of "District Electricity Systems" as described in below and in answer to question 43.

To broaden our answer to this question. This call for evidence has it right: there is a need for consumers to have an active role in the energy system. Demand management is central to a Smart Flexible Energy System and it is consumers' demand that needs to be managed. **This is therefore a consumer adoption problem**. The four recommendations below are absolutely focused on consumers and we believe answer the question: how do you give an active role to consumers?

A complementary approach

Two of the issues that a flexible *electricity* system can address are managing growing peak demand and minimising conversion, transmission & distribution losses.

Domestic consumption makes up a third of overall UK consumption[12], but is responsible for 50% of peak demand, whilst SME peak consumption contributes another 30% making a total of 80%[13]. The Digest of UK Energy Statistics (DUKES) also shows that the combination of energy industry usage and conversion, transmission and distribution costs accounts for a staggering 62% of fuel inputs.

Furthermore, with electricity usage expected to rise with the push to electrify transport and heating both issues are likely to grow: it is vital that we find ways to address both challenges.

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[12] Digest of United Kingdom Energy Statistics 2016, July 2016 Para 5.2

[13] GB Electricity Demand – Context and 2010 Baseline Data Table 7 and Ofgem Demand Side Response. July 2010. Appendix 2. P. 50

This all points to the need for a more comprehensive solution than is being proposed. Whilst the argument for addressing today's problem first is easily made, as with centralised managed charging, it is not the answer; it only "kicks the can down the road". There is a natural resistance to change and the risks it entails. Often the consequence is to take things slowly, step by step. This takes longer and may not ever achieve any significant degree of change as stages are watered down and "business as usual" carries on regardless.

One place where this is apparent is in the role of the consumer. The paper quite rightly places the consumer at the fore-front of the rationale for change – The Secretary of State's Foreword states "we must maximise the ability of consumers to play an *active role* in managing their energy needs" (our emphasis). However, it is not clear that this has been carried through in the consultation itself. Chapter 4 specifically addresses the consumer but only section 4.3 addresses the role of the consumer and even then, only as "consumer engagement". For domestic consumers' paragraph 4.25 concludes that "we believe our focus for engaging domestic and smaller non-domestic consumers should be *on information provision*" (again, our emphasis). Information provision is important, but is not about giving consumers an active role.

An additional starting point

As well as starting from today and working forward with one size fits all solutions, a parallel approach could be to start by considering the consumer's role at some point in the future, say 2030, and work backwards prioritising the actions needed to reach the end goal.

Such a starting point could be "tomorrow's home", a home that has high insulation levels, low power DC circuits, LED lighting, is heated electrically, has two electric vehicles plus a range of energy storage, is connected to the smart grid and is actively managed by a home energy management system. The same could apply to small businesses. Furthermore, estates could be powered by a "District Energy System" – i.e. a combination of District Heating and District Electricity – to deliver maximum efficiencies and to act on consumers' behalf delivering flexibility to the grid.

This solution could be introduced progressively by focusing on new build opportunities. It is an evolution not a revolution and allows time and experience to be built progressively and commercial solutions to evolve. This is similar to the approach being taken with transport where regulations and incentives are being introduced progressively to evolve the market in the correct direction. What is being proposed therefore is not a new risky strategy, rather it is applying best practice in a related market.

The following sections suggest how this strategy might look.

Tomorrow's homes (and small business premises)

At **geo** we monitor thousands of homes' energy consumption in 15 minute demand profiles and, where fitted, their solar generation import and export. Averaging these figures and applying them to a 200-home estate we can show that:

- Using today's average consumption of 11KWh/home/day the estate's peak demand would be 144KW.
- Adding solar generation makes no difference to this peak between September and March
- Adding a worst-case scenario with all homes using an electric vehicle and no demand management the peak demand increases to 217KW and the average consumption rises to 20KWh/home/day

- Adding in-home demand management using 16KWh of behind-the-meter energy storage flattens this demand to 74KW – half the original peak and leaving plenty of scope to add electric heating
- Applying implicit demand management[14] using off-peak tariffs we can demonstrate how such a home's annual energy bill could be halved.

What is more, the only changes to the electricity system needed to achieve this is the introduction of smart meters (underway), the introduction of smart tariffs (being trialled by some Retailers) and half hourly settlement for such estates. Such a solution delivers significant benefits to the local network *and* the consumer: it makes for affordable living.

Such an approach would be in-step with the developing European approach to demand management as laid out in the recent "Winter Package". Two components of this package are the "Smart Building Indicator" called for by the Energy Performance of Buildings Directive[15] and "Smart Labelling" for appliances called for by the Energy Efficiency Directive. The Smart Energy Demand Coalition is recommending that this becomes an "active" building/appliance certificate that defines the active demand capacity of a building or appliance in terms of KWp and KWh. This would complement the passive energy efficiency certificates.

This approach could be taken further by:

- implementing explicit demand management through a third party Aggregator, or
- introducing a "District Electricity System" which would operate in a similar way to District Heating Systems. This would encompass models such as Community Energy, Virtual Power Plants and major city redevelopments.

Thus, a starting point would be to address the new build market now, encourage "active" demand management technology to be built into new homes and follow best practice from the automotive industry with a combination of regulation, tax incentives and purchase schemes. The Smart Building Indicator would take the place of a car's CO2 emissions figure in driving the application of regulations and incentives.

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[14] Demand Management is increasingly categorised as implicit and explicit: i.e. non-contracted and contracted. Implicit DM requires load signals to be passed to the consumer, often in terms of tariffs, the role of an energy retailer whilst explicit DM requires a contractual relationship with the consumer, the role of the Aggregator (which could be a Retailer).

[15] Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2010/31/EU on the energy performance of buildings page 17:

6. The Commission is empowered to adopt delegated acts in accordance with Article 23 supplementing this Directive with a definition of 'smartness indicator' and with the conditions under which the 'smartness indicator' would be provided as additional information to prospective new tenants or buyers.
The smartness indicator shall cover flexibility features, enhanced functionalities and capabilities resulting from more interconnected and built-in intelligent devices being integrated into the conventional technical building systems. The features shall enhance the ability of occupants and the building itself to react to comfort or operational requirements, take part in demand response and contribute to the optimum, smooth and safe operation of the various energy systems and district infrastructures to which the building is connected.';

Peak demand

The next two sections look in more detail at the two issues, starting with peak demand.

Today, as noted in paragraph 4.22, there is little demand flexibility offered in the residential and small business sectors. Homes generally have multiple small loads with minimal potential for load-shifting, the infrastructure required to manage multiple homes is complex and many of the building blocks that would enable participation are not yet in place such as smart metering and half-hourly settlement.

However, technology is changing this rapidly. Energy storage systems offer the flexibility to both consume and supply electricity. Behind the meter battery storage aggregates a home's demand and therefore provides a single, sizable entity that can be automated and can provide a significant level of flexibility. In parallel, the Internet of Things offers a growing number of solutions that can greatly simplify the management of multiple homes.

Electric vehicles, as addressed in Section 4.2 of the consultation could also contribute as could heat pumps and heat storage, although on average, every electric vehicle will add another home's worth of electricity demand[16] whilst electric heating will more than double a home's electricity demand. Indeed, several of the drivers for a flexible energy system are due to the added demand EVs and heating will bring.

One answer to this issue being considered is mandatory managed charging of electric vehicles, which is being consulted on separately. However, given the range of energy storage systems coming to market this would be the thin end of the wedge. Tomorrow's homes may well include heat storage, battery storage as well as electric vehicles: a mandatory managed charging scheme for all these elements would cover pretty well 100% of the home's consumption and totally undermine the roles of the aggregator and the energy retailer. Managed charging is an important element of demand management but neither can it be made mandatory nor should it be limited to Network Operators. Hence the need for a more comprehensive solution.

Which brings us to the role of the consumer. Our experience shows us that whilst consumers are interested in their energy usage this interest does not extend to managing it actively. Most people, once they have started to understand what is entailed want the problem taken away from them by automation. Again, there are parallels with cars, specifically hybrid cars: people are interested in the fuel efficiency, lower running costs and better driving experience but they want to be able to buy and drive such a car in the same way as they do a normal car: so it is with homes.

However, demand management is more active and requires a direct interface with the grid. This means that there needs to be an agent that acts on behalf of the consumer: an Aggregator. The role of the Aggregator thus becomes central to the demand management proposition. In fact, the role can be seen as one and the same as an energy retailer: buying and selling energy flexibility in the market on behalf of a consumer.

Who should be enabled to take on this vital role, arguably the pivotal role in the new smart grid? An answer could be found by studying the Australian Energy Market Commission (AEMC) Power of Choice (POC) review[17] completed in 2012 and due to be implemented on 1st December 2017.

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[16] Assuming 10,000miles/year, therefore 37 miles per day, at an average of 3kWh/mile this equates to 9kWh/day.

[17] http://www.aemc.gov.au/Major-Pages/Power-of-choice

This report put forward a collection of far-reaching reforms to generate a competitive electricity market with the consumer at its centre exercising their "power of choice". It is sometimes referred to as "market-led smart metering" but its provisions are far wider than just smart metering services.

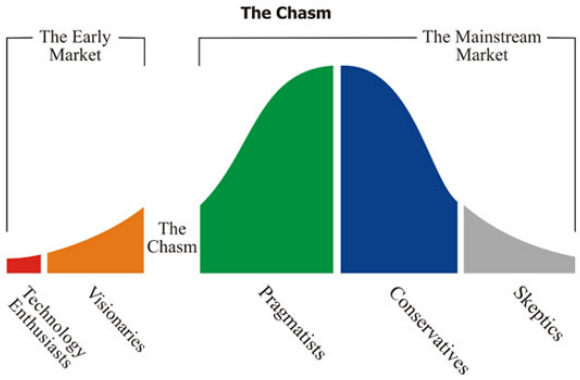
In effect the Power of Choice opens the market to any registered provider to deliver energy services. This could be existing businesses such as DNOs (Distribution Businesses in Australia), Energy Retailers, third-party Aggregators etc.

It is strongly recommended that this review be studied and taken into account in reviewing the responses to this consultation.

Technology adoption

There remains a further issue to be addressed and that is how to get consumers to adopt the technology needed to enable demand management in a home or small business premises. Whilst the technology is generally available its costs are high and pay-back periods at today's electricity costs are in the region of 15+ years. Furthermore, it is technology and therefore not that accessible to the average consumer. Both factors work against a general take-up.

The "technology adoption lifecycle" is an acknowledged model that describes these issues[18]. Several people have written about the difficulty of moving from early adopters to the initial mass market. Generally early adopters can afford and are happy to take some technology risk whereas the mainstream market is not. This is often termed "the chasm".



Solutions that appeal to early adopters do not appeal to the mass market until they have been made main-stream. This generally means the whole product experience from purchase, installation, operation, support and divestment has been professionalised. It also means in the case of energy management, purchasing the technology makes financial sense. A core element of this is how the technology is paid for.

One solution that is being employed by some is an asset financed model where a finance company owns the assets and the consumer pays for the asset through their energy bill using regulations established for the Green Deal. As with the Green Deal, this works if the savings on the energy bill are greater than the lease payment. The initial focus for such schemes is Social Housing where tenants have no choice when they take on a rental property. It remains to be seen if purchasers in the main housing market will accept the asset finance deal as part of purchasing a property or see it as a barrier. It is a different arrangement to any other part of the

[18] https://en.wikipedia.org/wiki/Technology_adoption_life_cycle

home such as the boiler which is purchased as a fixture and fitting and so may take time to be accepted.

Another solution is to follow the car market and use a combination of incentives and regulation to drive adoption, focusing on the new build and refurbished buildings. In this model the Smart Building Indicator (SBI) would be used to frame regulation and determine the level of incentives provided. For example, the SBI could be used to determine access to a green mortgage, the "Help to Buy" scheme could be adapted to focus on buildings that have an active contribution to demand flexibility and/or purchase tax changes could be considered. Other taxes could be used to further incentivise adoption. A further option is to apply network charges differently; perhaps as other countries do by linking them to peak demands. The benefits of following such an approach would be:

- simplicity – consumers buy the technology as part of their home on a mortgage. It is something they understand, are used to and can compare across homes;
- flexibility: incentives can be tuned to market dynamics, as they are for many other government objectives from electric vehicles to nuclear power;
- to "normalise" market provision: the assets are treated in the same way as any other element of a home and bought on a mortgage as with other fixtures and fittings;
- to provide the consumer with choice of whether to sell their flexibility and if so, to select the most appropriate Energy Services Provider

Both options have merit: it will be the market that decides if both gain traction. To this end, consumer research could be conducted to estimate the likely take-up of each option.

To summarise, it is recommended that the government consider three additions to this consultation to enhance the take-up of residential and small business demand management to address peak loading. These are:

1. Full consideration should be given to AEMC Power of Choice Review with a view to incorporating its conclusions into the response to this consultation.
2. Adoption and development of the EPBD Smart Building Indicator and the EED Smart Appliance Label as the means to encourage and regulate the adoption of demand flexibility in buildings.
3. Consideration be given to applying incentives similar to electric vehicles to residential and small business owners to drive adoption.

System losses

As covered in the introduction, The Digest of UK Energy Statistics (DUKES) shows that the combination of energy industry usage and conversion (by far the largest component), transmission and distribution costs accounts for a staggering 62% of fuel inputs[19]. As electricity demand grows so will these losses and the associated increase in CO2 emissions.

The closer generation is to the usage the lower the losses and where solar, wind and CHP is used, the lower the conversion losses and CO2 generated. There is clear logic in encouraging local generation over and beyond behind the meter microgeneration. Several schemes are being

[19] Digest of United Kingdom Energy Statistics 2016, July 2016 Para 5.2

trialled including community energy and Virtual Power Plants. These have identified several challenges. For example, a consumer would have no choice in who supplies their energy which challenges the precept of the competitive electricity supply market and consumer choice; secondly, the need to introduce a private network would be cost prohibitive unless ownership of the local distribution network could be transferred to the operating company.

In contrast, the concept of District Heating is well accepted and is being encouraged through planning considerations. If it is acceptable that a consumer is unable to choose their heating supplier, and heating is normally the highest element of home energy bills, then should it not be acceptable to have a "District Electricity System" (DES), especially where it can be shown that it delivers greater efficiencies and lower CO2?

On this basis, developers could be encouraged to implement a DES as part of the planning process as is currently the case for District Heating Systems; indeed, they could be combined to maximise efficiencies, such as through using CHP, and become a District Energy System.

In this model the DES Operator would fulfil the combined roles of Aggregator and Energy Retailer and could in fact represent a model for a future Energy Retailer as an Energy Services Company or ESCO.

It is therefore recommended that specific regulations that enable the emergence of District Electricity Systems/District Energy Systems and the development of a new role, the District Energy System Operator, be included in the Smart, Flexible Energy System legislation.

Conclusion and recommendations

In conclusion, it is suggested that the provisions for a Smart, Flexible Energy System could go further than is currently being consulted on. Building on Australia's Power of Choice review, the specific Smart Building Indicator and Smart Appliance Labelling elements of the EU's Winter Package, technology progression and relevant data modelling it is recommended that:

- in parallel with the measures being consulted on, provision is also made for new energy models focused on the new build and refurbishment markets to be established alongside the current model.

To this end four specific recommendations are made:

1. Full consideration should be given to **AEMC Power of Choice Review** with a view to incorporating its conclusions into the response to this consultation.
2. Adoption and development of the EPBD **Smart Building Indicator** and the EED Smart Appliance Label as the means to encourage and regulate the adoption of demand flexibility in buildings.
3. Consideration be given to introducing incentives similar to those that drive electric vehicle adoption to residential and small business owners to **drive the adoption of demand management resources**.
4. Specific regulations that enable the emergence of **District Energy Systems** and a new role of **District Energy System Operator** be included in the Smart, Flexible Energy System legislation.

Q43: Do you agree with the emerging system requirements we have identified (set out in Figure 1)? Are any missing?

We suggest two major drivers for change are missing:

- The expected growth in peak load driven by the electrification of transport and heating
- The drive to de-carbonise electricity supply and the major contribution local or community energy systems could have on this objective

This could and should have a major impact on "the roles of different parties in system and network operation" as detailed below. In summary, we are proposing the introduction of a new role of District Energy System Operator which interfaces with the "system and network" on behalf of consumers. This could and should be introduced alongside the current structure as adapted by this consultation and initially is expected to only have relevance to new build and refurbishment estates. It therefore could be operated in parallel with the existing system without any disruptive impact.

Q47: Can you give specific examples of types of support that would be most effective in bringing forward innovation in these areas?

The trouble with many trials is that they are just that – trials. It costs us a considerable amount of investment to build a system that can be trialled and this is only viable for a business of our size if there is a commercial order at the end. Our experience is that this is rarely the case, and if there is, our solution is often used as the basis for a competitive specification "can you build something similar for less?". Thus, companies like ours take the risk but others gain the potential benefit.

What we would like to see more of is funding to support experimental development and market entry. For example, we are planning to supply 12 new houses with a first integrated energy management system that brings together smart meters, storage, PV and appliance controls – it will also include EV charging if the consumers own an EV. This will demonstrate the value to the developers involved and show how it can be adopted: tomorrow's home today. We have applied to the EEF and are delighted to see at para 50.1 the following priority:

> In order to catalyse innovative DSR services for residential and SME customers, Government thinks it would be valuable to explore approaches involving intelligent automation of flexible loads e.g. electric vehicles, electric heating/cooling, smart appliances, storage devices, etc;

It is this type of funding that encourages innovative companies to innovate: it defrays some of the initial development costs making the investment decision less dependent on the certainty of a follow-on order on completion of a successful trial.

Q48: Do you think these are the right areas for innovation funding support? Please state reasons or, if possible, provide evidence to support your answer.

Innovation is different to research and development. We suggest innovation occurs when the results of R&D are implemented in the field. Without innovation we only get a number of findings from R&D trials which go to the knowledge bank but aren't always commercialised in the time scale smaller businesses require.

The key challenges here are procurement and risk: how to encourage innovation focused procurement and how to cover risk premiums.

Procurement

Procurement competitions are almost exclusively based on price: the procurer writes a spec and suppliers bid against this spec and are judged on price/best value. This processes is designed to procure commodities and known solutions: it does not procure innovation. What is required is a process where the procurer sets out an objective and a budget and suppliers put forward what they can do within the budget. In this way, the procurer receives several different, hopefully innovative solutions. This is the way that InnovateUK operates most of their R&D competitions.

Furthermore, one element of such competitions should be an agreement by the procurer for a follow-on order based on successful meeting of the objectives.

It is strongly recommended that trialling this process becomes an important area for focus with a view to making it a standard innovation enabler.

Risk

Clearly this approach entails a perception of higher risk. In fact, it is a different type of risk: under commodity/price competitions the risks are that the spec is wrong and the bidder may have underbid to win the competition. In innovation competition, the risk is that the solution does not meet the objectives. This can be covered by phasing the development and/or backing more than one solution at the initial stage. However, to encourage businesses to experiment with this form of procurement it is suggested that support is given to Experimental Development that meet this form of procurement criteria and funded as a collaborative project to the established levels.