A Smart, Flexible Energy System

Response to call for evidence, Dec 2016

F.A.O. Electricity Systems Team
Department for Business, Energy and Industrial Strategy
4th Floor, 3 Whitehall Place
London, SW1 2AW

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Please find United Utilities (UU) response to your call for evidence relating to the transition towards a smart, flexible, energy system. UU are a FTSE50 company and a large energy consumer, using around 800GWh of electricity each year to provide essential water and wastewater services across the North West of England.

Since early 2014, we have been working hard to develop our capabilities to provide demand side response, and currently have contracted services providing frequency response, STOR and through the Capacity Market. We have, for some time, avoided TNUoS and red zone DUoS charges by reducing our demand through the daily peak period, typically with manual interventions to processes. We are now delivering fully automated processes to respond to price and other signals to ensure that we can provide our customers with the most efficient service possible. At the time of writing, we have in excess of 25MW in various DSR contracts, principally with two aggregators, and also with our local DNO.

Water companies have significant opportunities to modulate their assets to bring forward, defer or displace demand – typically through pumping or processing more or less water, or by using existing back-up generators (or other generation such as CHP) required for critical supply security. Much of this flexibility is inherent – i.e. headroom is required for storm flows and/or ensuring water supplies are robust, or CHP engines are required to provide heat to the sludge treatment process. The most significant issue we face is accessing the potential flexibility at reasonable cost. Every DSR project needs to go through detailed assessments to ensure that we are not introducing further risk to the process and that core operations are unaffected. This cost is not insubstantial and we have had mixed success in achieving a reasonable payback on investment. It is not our experience that DSR can be provided free of charge.

In summary, UU, and companies like it, could potentially offer significant volumes of flexibility to the market if the following concerns were resolved:

- More simple, transparent market places where the demand side competes on an equal footing with the supply side
- Potential for longer term contracts or underpinning of investment so that initial outlays can be recouped with more certainty
- Long term clarity on direction of travel for energy/flexibility so that we can de-risk investment

Our detailed responses to the question set follows.

Yours sincerely

Andy Pennick
Energy Manager
T: 01925 237059

A Smart, Flexible Energy System – response to call for evidence

Enabling storage

1. Have we identified and correctly assessed the main policy and regulatory barriers to the development of storage? Are there any additional barriers faced by industry?
Please provide evidence to support your views.

The main policy and regulatory barrier to the development of battery storage were identified as network connections, network charging, final consumption levies, planning and regulatory clarity. This seems to generally cover the main themes. However, in addition, a significant barrier to deployment of storage is future certainty of revenue streams. Longer term contracts and more consistent policy making could go some way to address this.

Recent changes such as DCP228 appear to undermine the direction of travel proposed by this consultation by reducing the benefit available to those who can avoid peak periods from incurring red zone DUoS charges. In recent years, United Utilities has undertaken 'load-shifting' activity by moving consumption volumes away from the 'red zone' periods of anticipated high system demand, to periods of lower demand on the system. An example of this is timing water pumping operations to occur overnight where there is sufficient storage to do so.

The benefits of under taking this initiative is two-fold, not only does it assist in managing our energy costs, but it also assists National Grid and the DNO in smoothing the demand on their networks, reducing system stress during the peak demand period. The flattening of the demand profile can also provide environmental benefits if it reduces the number of part-loaded fossil fuelled units which are kept in reserve for the peak pick-up.

Similarly, proposed changes to embedded benefits add to general unease and investor confidence in the future certainty of revenues after investment in flexibility projects has been made.

It is worth pointing out that policy should not discriminate between different types of storage – timing operations such as water pumping to assist with system balancing is equally as valid as storing electricity in batteries – the market should not discriminate between different types of storage.

To generate a reasonable return on investment in battery storage, site resilience needs to be taken into account as a viable business case cannot be generated from revenue from balancing services or DUoS avoidance alone. In addition, contract lengths are short-term so therefore, revenue is unreliable.

2. Have we identified and correctly assessed the issues regarding network connections for storage? Have we identified the correct areas where more progress is required?
Please provide evidence to support your views.

Network connections are correctly identified as a potential barrier to the development of storage. It is however worth noting that the 19GW of connection applications quoted is unlikely to be separate projects – the nature of the connections process means that developers will 'shop around' to locate the most cost effective site. Therefore, 19GW of potential storage projects is a misleading number and most likely overstates the scale.

As a large user with potential to add storage behind the meter, there is a lack of clarity over whether installing battery storage would constitute a material change to the original connection agreement (particularly if used simply to bring forward and defer existing demand) and therefore creates uncertainty as an investment proposition.

Our operations are across two main DNO regions and we see inconsistencies in the way network connections are assessed, awarded and managed. Flexible connection agreements are not routinely offered and any connection is usually based on an extreme situation – i.e. a site is using no power and the generator is exporting at its full value.

3. Have we identified and correctly assessed the issues regarding storage and network charging? Do you agree that flexible connection agreements could help to address issues regarding storage and network charging? Please

provide evidence to support your views, in particular on the impact of network charging on the competitiveness of storage compared to other providers of flexibility.

If the underlying economics are working correctly, storage should act as if non-intermittent i.e. it should support the system and not increase network costs; rather network costs should be reduced as storage reduces peak demands and flattens the overall demand profile. Storage and 'other providers of flexibility' should be considered as the same – if the market can function correctly to define what it needs (i.e. more or less electricity at any given point) then there is no inherent difference between storing electrons, or bringing forward an industrial operation, such as water pumping. The policy framework does not currently provide investor confidence or support the business case for investing in storage technologies.

Storage located 'behind the meter' of an existing connection should not have to pay any special or extra network costs above those already incurred.

Potential changes to embedded benefits could harm investment in flexibility projects as these benefits form a substantial proportion of the business case. Any changes to embedded benefits should be undertaken with a view to the whole system and ultimately should focus on lowest system costs.

4. Do you agree with our assessment that network operators could use storage to support their networks?
Are there sufficient existing safeguards to enable the development of a competitive market for storage?
Are there any circumstances in which network companies should own storage?
Please provide evidence to support your views.

Network operators could use storage to support their networks, although there would need to be safeguards put in place so that network owners do not use incumbent advantage to put 'ownership unbundling' requirements set out in the Electricity Act 1989. Storage services may be better bought by the DNO off a third party to ensure competition and lowest overall cost to consumers.

5. Do you agree with our assessment of the regulatory approaches available to provide greater clarity for storage? Please provide evidence to support your views, including any alternative regulatory approaches that you believe we should consider, and your views on how the capacity of a storage installation should be assessed for planning purposes.

Storage should be defined separately and licensed separately in order to provide clarity for investors. Smaller scale storage could be subject to de-minimis requirements, similar to existing generation exemptions.

Care should be taken to ensure that behind the meter storage should be able to access the same benefits is network connected storage.

6. Do you agree with any of the proposed definitions of storage? If applicable, how would you amend any of these definitions? Please provide evidence to support your views.

It is important that support for energy storage should not be limited to electrical storage and other forms of storing energy should be given equal significance in policy making.

Storage should primarily be seen as a mechanism for conserving energy, ideally generated on-site, for use as a form of balancing. It therefore does not make sense to limit support to electrical storage only, particularly if other forms of storage can provide the same service at lower cost to the consumer.

Aggregators

7. What are the impacts of the perceived barriers for aggregators and other market participants? Please provide your views on: balancing services; extracting value from the balancing mechanism and wholesale market; other market barriers; and consumer protection.
Do you have evidence of the benefits that could accrue to consumers from removing or reducing them?

As a point of principle, the demand side should have the same access to markets as the supply side. Behind the meter generation and demand could scale rapidly to provide flexibility to the system as a whole. Government, Ofgem and National Grid need to collaborate to reform the wholesale, balancing and capacity markets with the aim of reducing complexity/overlaps and improving access to these markets for flexible assets.

As a customer of aggregator services, it continues to be difficult to positively identify a reputable and transparent aggregator, which can reflect badly on National Grid.

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

Whichever approach is taken, it is essential that value accrues to the party which provides the flexibility. This is essential for transparency and correct system pricing. In the event that a demand side action is taken which affects a supplier's imbalance position, care must be taken to ensure that the party undertaking the action (e.g. the consumer) is afforded all of the value associated with that action (any costs should be netted out in a simple but transparent way).

Further "visibility requirements" for the SO may add additional upfront project costs. If such costs are for the benefit of managing the system as a whole, this cost may be more appropriately paid by the SO than by the consumer/flexibility provider. If such costs are prohibitive, flexibility projects may not be brought forward.

9. What are your views on the pros and cons of the options outlined in Table 5? Please provide evidence for your answers.

Care needs to be taken not to stifle innovation in an emerging market, so any regulatory approaches should be used with caution.

10. Do you agree with our assessment of the risks to system stability if aggregators' systems are not robust and secure? Do you have views on the tools outlined to mitigate this risk?

Aggregators systems should meet agreed standards and a mandatory code of practice. However, it should be noted that today, generators could be maliciously controlled affecting system stability. Security requirements should be fair and equal between both the demand and supply side.

System Value Pricing

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

For the consumer, a single market for flexibility would go a long way in improving access to flexibility. Currently, value can be found across many different products and services, each designed for a specific requirement (i.e. capacity, frequency, reserve, wholesale, etc.). As an end user offering flexibility, there is substantial difficulty matching our flexibility with products or stacking products to develop business cases. As the overall value cycles around the various products and services, there is an ongoing management requirement to ensure that benefits are optimised.

However, from the demand side perspective, there are very few actions to make – turn assets up, turn assets down, speed of response, length of response. It is these actions which should determine the value to the energy system; any factor which affects value should be public and market participants with different services should be paid differing amounts.

12. 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?

As part of an aggregated STOR contract, we have been able to stack the same assets (standby diesel generators) into the Capacity Market. The generators have also historically been run during triad periods so perform this service as well. At one site, the same generator also provides network services to the DNO, meaning there are four separate revenue streams associated with the generator.

This is only possible through an aggregated portfolio whereby the aggregator manages the asset base to ensure that the terms of each contract are met.

Barriers to combining revenues are potential inconsistencies between different products (for example different metering requirements between e.g. STOR and capacity market) which increases upfront capital costs.

13. If you are a potential or existing provider of flexibility are there benefits of your technology which are not currently remunerated or are undervalued? What is preventing you from capturing the full value of these benefits?

Certain assets may not exactly meet National Grid requirements, and therefore do not qualify for any specific service, even though they can function flexibly. The existing NG requirements tend to be based on replicating the performance of large power plants and as such, miss out on potentially useful sources of flexibility.

14. 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?

Government, Ofgem and National Grid need to work together to reform the flexibility and balancing markets in order to reduce complexity and remove overlaps, improve transparency and efficiency, and reduce the overall cost to the consumer. Government should set out a detailed road map which gives confidence to invest in DSR measures with some certainty that initial investments will be repaid.

Smart tariffs

15. 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.

Industrial and commercial DSR should be significantly easier to scale than domestic and should be the first priority over the next five to ten years. I&C, with the right commercial incentives, will invest in, and be able to realise significant opportunities for flexibility, which could also drive further efficiency improvements. The government and OFGEM should focus on providing the right regulatory regime and clear future signals.

16. 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.

With existing sources of flexibility closing (such as coal, and few new gas plants being delivered by the Capacity Market) it may be worth considering what type of incentives can be provided to kick start the market – in much the same way as solar PV (taking lessons learned into account). The business case for this would be the alternative cost of providing system balancing in existing ways – thus a lower cost, and lower carbon method, is to incentivise flexible consumption. Perhaps upfront capex costs could be shared to bring flexibility projects inside a 1 or 2 year payback (as these are maximum contract lengths for DSR in the capacity market or direct with National Grid).

17. What relevant evidence is there from other countries that we should take into account when considering how to encourage the development of smart tariffs?

Not answered

18. Do you recognise the reasons we have identified for why suppliers may not offer or why larger non-domestic consumers may not take up, smart tariffs? If so, please provide details, especially if you have experienced them. Have we missed any?

Yes, the main reasons are correctly identified. As a large consumer with over 4000 sites each with their own metered supply, it is understandable that when a flat, simple tariff is offered by a supplier, this could be appealing as a means to reduce complexity and overhead in bill validation, and perhaps providing a simpler explanation of electricity costs to end users (site operators). Smart tariffs need to be developed in a standard way (including pass through charges) which can easily show a consumer what the potential saving could be by using electricity at off-peak times. In general, simplification and consolidation of the various pass through charges may go some way to help reduce billing complexity. Any variable or avoidable costs should be highlighted to end users.

Smart distribution tariffs

19. Are distribution charges currently acting as a barrier to the development of a more flexible system? Please provide details, including experiences/case studies where relevant.

Currently, network distribution charges promote flexibility against the predictable daily peaks and troughs of consumption. To avoid the highest network charges (red zone) United Utilities has installed timers, developed software and changed manual processes at sites around the north west of England.

As the consultation notes, fixed distribution charges may not accurately reflect real world congestion. However, investment by the consumer has been made to avoid such charges, and some stability is required to allow initial investments to be recouped. Changes such as DCP228 and the review of embedded benefits do not help in this regard, and potentially undermine confidence in enabling more efficient and flexible modes of consumption, as revenue/benefits streams are not viewed as sustainable. Clarity of long-term policy approach would help support forward budgeting and preparation of business cases.

In the longer term, and if more dynamic distribution charges are developed, a framework must be developed which allows for open publication of such charges so that automatic demand responses can be developed based on prevailing network conditions, whilst taking into account our operational requirements.

20. What are the incremental changes that could be made to distribution charges to overcome any barriers you have identified, and to better enable flexibility?

A clear statement for the direction of travel for network charge recovery needs to be made to increase investor confidence in this area – what exactly is the government trying to achieve through network charging? Is the primary goal energy flexibility or energy efficiency? In a future low-carbon system, it is likely that flexibility will be more valuable to the system as a whole than efficiency.

Business cases stack red zone DUoS avoidance and potentially also GDUoS revenues so the long term sustainability of these revenue streams, and the preferred method of recovering distribution network charges needs to be confirmed to enable a clear business case to be made for investing in flexibility projects.

21. How problematic and urgent are any disparities between the treatment of different types of distribution connected users? An example could be that that in the Common Distribution Charging Methodology generators are paid ‘charges’ which would suggest they add no network cost and only net demand.

If network charges move from predominantly volumetric to capacity, it is likely that more ‘non-critical’ demand may disconnect completely to avoid charges which would appear to be a very large component of the overall bill. Remaining users, including critical users such as water companies, would then shoulder a much larger proportion of network costs, increasing costs to our customers.

Distribution connected generators which use the network should pay charges associated with their costs to that network (which could be dynamic based on prevailing network conditions). Embedded, behind the meter

generation, where this is used without exporting onto distribution network should not have to pay network charges, as the network is not used as a 'route to market'.

22. 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?

Network cost drivers may change substantially as the proportion of renewables increases and the DNO transition to DSO gathers pace.

Generation which is not located behind the meter (thus generally avoiding network use) will require much greater management by the DSO to match supply/demand at a distribution level. Costs associated with distribution connected generation should not fall to consumers, instead the distribution connected generators should pay reflective costs to access the distribution network.

In order to support development of flexibility projects, locational pricing should be carefully structured so as not to disadvantage certain geographical regions. The reason for such an approach is understood, but it is important that developers located within a region are not given competitive advantage or disadvantage based purely on their location. This is not to suggest that local agreements (e.g. flexible connection arrangements or contracts with the DNO) should not be allowed.

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? Should they do so? And if so, how?

For DUoS charges to signal close to real time congestion, volumetric charges (cost per kWh consumed) are likely to need to be a significantly higher proportion of the total DUoS charge than capacity (cost per kW connected) charges. Our experience is that price variation between peak and off peak times needs to be in the order of 2 to 3 times higher to develop a business case which has a chance of success against other projects.

In terms of longer term investment signals, these are primarily useful for the DNO and, to a lesser extent, developers of energy projects. As such, this requirement should be considered separately, as this consultation deals primarily with developing short term flexibility. It is difficult to see how both short and long term signals can be derived from DUoS charging.

It is important for a flexible energy system for any pass through charges to reflect the costs of generating and distributing energy at any given time of day, and from an end-users perspective, an increased complexity in how energy is charged at different times of day needs to be balanced by a simplification in the manner in which charges are levied.

24. In the context of the DSO transition and the models set out in Chapter 5 we would be interested to understand your views of the interaction between potential distribution charges and this thinking.

It would seem reasonable that the DSO transition would require a rethink on distribution charging. This could be done alongside a substantial review of TNUoS charging with an opportunity to simplify all network charges for the end user.

Other government policies

25. Can you provide evidence to show how existing Government policies can help or hinder the transition to a smart energy future?

Single year contracts for DSR in the capacity market is not usually sufficient to recoup investment costs for 'true DSR' (i.e. demand reduction as a consequence of process changes rather than embedded generation). Current capacity market auction rates are too low to implement anything other than the very largest (1MW+) DSR projects

cost effectively. We estimate that current CM auction rates will deliver access to less than 5% of our potential flexible demand.

Additionally, existing contracts we have via Open Energi for Frequency Response are not apparently open to the Capacity Market even though this is 'true DSR'(i.e. automated based on process parameters) and is currently bringing forward and deferring our demand at over ten sites across the north west.

Either underpinning investment or providing greater certainty of revenue is essential to grow this market.

26. What changes to CM application/verification processes could reduce barriers to flexibility in the near term, and what longer term evolutions within/alongside the CM might be needed to enable newer forms of flexibility (such as storage and DSR) to contribute in light of future smart system developments?

In general, consolidation of requirements across markets would be useful and would simplify participation. For example, the metering arrangements we have for STOR is apparently not appropriate for the capacity market, even though the action is identical (switching on a diesel generator on receipt of a signal). It seems extraordinary that the action and effect is the same (net demand reduction behind the meter), but the requirements for different markets differ substantially.

Longer term contracts (say up to 5 years) would help to develop investable business cases. Alternatively, other commercial mechanisms could be used to reduce investor risk, and ensure reasonable certainty of return on investments.

In the longer term, care needs to be taken to ensure that the 'demand side' has access to the same markets and opportunities as the 'supply side'.

It is also worth considering how various markets inteact, such as triad avoidance, capacity market supplier charge and DUoS red band avoidance. It is important that these various price signals do not compete, and any rationalisation from an end user perspective would be welcomed. Simplification would mean that making an investment case is easier as general understanding of the opportunity could be improved.

27. 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?

Any future incentives for renewables should prioritise developers which can provide 'firm' power – that is renewables pared with storage – or prioritise renewables with associated demand, reducing impacts on distribution networks.

Smart appliances

28. Do you agree with the 4 principles for smart appliances set out above (interoperability, data privacy, grid security, energy consumption)?
Yes
No (please explain)

Yes, however a further principle would be a requirement for ongoing support and management (either by manufacturers or potentially a role for aggregators). "Set and forget" from the factory is not likely to result in the most optimal response from the network of smart appliances.

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? Please select below which options you would like to submit evidence for, specify if these relate to a particular sector(s), and use the text box/attachments to provide your evidence.
Option A: Smart appliance labelling
Option B: Regulate smart appliances
Option C: Require appliances to be smart

Other/none of the above (please explain why)
Not answered
30. Do you have any evidence to support actions focused on any particular category of appliance? Please select below which category or categories of appliances you would like to submit evidence for, and use the text box/attachments to provide your evidence: Wet appliances (dishwashers, washing machines, washer-dryers, tumble dryers) Cold appliances (refrigeration units, freezers) Heating, ventilation and air conditioning Battery storage systems Others (please specify)
Not answered
31. Are there any other barriers or risks to the uptake of smart appliances in addition to those already identified?
Not answered
32. Are there any other options that we should be considering with regards to mitigating potential risks, in particular with relation to vulnerable consumers?
Not answered

Ultra-low emission vehicles

33. How might Government and industry best engage electric vehicle users to promote smart charging for system benefit?
Not answered
34. 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?
Not answered
35. What barriers (regulatory or otherwise) are there to the use of hydrogen water electrolysis as a renewable energy storage medium?
Not answered

Consumer engagement with DSR

36. Can you provide any evidence demonstrating how large non-domestic consumers currently find out about and provide DSR services?
Finding out about DSR is typically through aggregators (sales/business development), through industry bodies such as the MEUC, through specialist groups within industry (e.g. energy manager's forums or similar), through trade press or through conferences and events. I would suggest that awareness of DSR in large non-domestic consumers is high, (see for example the recent Energyst Media report which suggests 90%), although subsequent participation is relatively low (27% of those surveyed). This would suggest to me that the value proposition is not there, particularly if the perceived risks to

the core business are considered to be high. Upfront investment to enable a DSR project is also underestimated, both by aggregators and National Grid.

37. Do you recognise the barriers we have identified to large non-domestic customers providing DSR? Can you provide evidence of additional barriers that we have not identified?

The barriers are broadly accurate.

In addition, contract length/certainty is an issue in this area. Providing DSR is not without up-front cost. The average cost per install is in the region of £35k (though can vary widely from a few thousand to £500k at our largest installation so far). There is considerable uncertainty in whether any scheme will pay back as data gathering and design accounts for well over half of investment and it is only at this stage where returns are known. Install costs are a relatively small proportion.

Total project costs could include hardware upgrades (perhaps to generators, or to introduce automation), software enhancements/new software programming, design, installation, testing, commissioning… alongside ongoing management of the portfolio to ensure that benefits are realised.

Paybacks have been variable, some projects being sub 2 years but others have not generated the expected returns and have in excess of 30 year paybacks at current rates. This variability, and the fact that all of the investment risk sits with the investor, does not make this a simple business case to invest in.

In short, DSR is not necessarily the best investment available to the business, and is certainly not the least risky. The returns do not appear to reflect this fact.

38. Do you think that existing initiatives are the best way to engage large non-domestic consumers with DSR? If not, what else do you think we should be doing?

Existing initiatives such as Power Responsive campaign are welcomed. However, it may be necessary to kick start demand flexibility with incentives for automation projects ('true DSR' as specified in the consultation document). National Grid appear to be unable to drive the market commercially as currently there are other (generation) options for balancing services. However, the market will need to grow to provide more demand side response to allow renewables to flourish, and to replace existing balancing services provided by plant which is due for closure. Large non-domestic consumers will require sufficient time implement DSR projects and projects need to be demonstrably robust with no threat to core business processes. Therefore scaling the market cannot be done overnight, although with the right commercial incentives, investment in DSR could be prioritised and pace could quicken.

39. 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)?

Larger I&C customers are relatively easy to engage with compared to domestic consumers where the value proposition is not as strong. In total, there is significant value in managing domestic demand, but on an individual level, the value proposition may not be enough to change behaviours.

Consumer protection and cyber security

40. Please provide views on what interventions might be necessary to ensure consumer protection in the following areas:
Social impacts
Data and privacy
Informed consumers
Preventing abuses
Other

Not answered

41. Can you provide evidence demonstrating how smart technologies (domestic or industrial/commercial) could compromise the energy system and how likely this is?

Not answered

42. What risks would you highlight in the context of securing the energy system? Please provide evidence on the current likelihood and impact.

Not answered

Roles and responsibilities in network operation

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

Not answered

44. Do you have any data which illustrates:
a) the current scale and cost of the system impacts described in table 7, and how these might change in the future?
b) the potential efficiency savings which could be achieved, now and in the future, through a more co-ordinated approach to managing these impacts?

Not answered

45. With regard to the need for immediate action:
a) Do you agree with the proposed roles of DSOs and the need for increased coordination between DSOs, the SO and TOs in delivering efficient network planning and local/system-wide use of resources?
b) How could industry best carry these activities forward? Do you agree the further progress we describe is both necessary and possible over the coming year?
c) Are there any legal or regulatory barriers (e.g. including appropriate incentives), to the immediate actions we identify as necessary? If so, please state and prioritise them.

Not answered

46. With regard to further future changes to arrangements:
a) Do you consider that further changes to roles and arrangements are likely to be necessary? Please provide reasons. If so, when do you consider they would be needed? Why?
b) What are your views on the different models, including:
i. whether the models presented illustrate the right range of potential arrangements to act as a basis for further thinking and analysis? Are there any other models/trials we should be aware of?
ii. which other changes or arrangements might be needed to support the adoption of different models?
iii. do you have any initial thoughts on the potential benefits, costs and risks of the models?

Not answered

Innovation

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

Direct financial support for capex investment.

48. Do you think these are the right areas for innovation funding support? Please state reasons or, if possible, provide evidence to support your answer.
The key innovation which is required is a trading platform which can transparently reward all different kinds of flexibility requirements from all markets (wholesale, capacity and balancing). Such a platform needs to be sufficiently open to allow automated responses to dynamic signals and allow a route to market/value of any kind of flexibility from any type of asset. Access costs should be minimised to enable participation. All actions/payments/value should be visible to all actors.