BEIS / Ofgem Call for Evidence on a Smart Flexible Energy System
Response from ENGIE UK & Ireland

ENGIE Profile

ENGIE, formerly known as GDF SUEZ, is a global energy company present in 70 countries worldwide operating in four key sectors of power, natural gas, renewable energy and energy services. The company puts responsible growth at the heart of all its businesses in order to address major energy and environmental challenges: responding to the demand for energy, ensuring security of supply, combating climate change and making optimum use of resources.

In the UK, ENGIE has interests in a number of activities across the energy value chain, from gas exploration and production through to services. In total, ENGIE employs approximately 17,000 people throughout the UK across all of its businesses. In generation, ENGIE is one of the country's largest independent power producers, with interests in 4,025 MW of plant. This comprises a mixed portfolio of generation assets that include gas, CHP, wind and the UK's foremost pumped storage facility. ENGIE also operates a major energy retail business supplying electricity and gas to the Industrial and Commercial sector, and is entering the domestic retail market in 2017.

ENGIE is also the UK's leading district energy company. We design, build, finance and operate district heating schemes on long term concession agreements. ENGIE's high profile district heating schemes include; the Queen Elizabeth II Olympic Park, Southampton District heating scheme, Whitehall District Heating scheme, Leicester District Heating Scheme and Birmingham District Heating Scheme.

Outside of energy, ENGIE is a leading services provider to the public and private sector in the UK, delivering a wide range of facilities management and back office services.

ENGIE – a market leader in storage and flexibility

This joint BEIS/Ofgem Call for Evidence represents one of the most significant opportunities for stakeholders to provide views on the future design and structure of the market since the introduction of the Electricity Act in 2013. Given the rapid deployment of intermittent technologies in recent years, and the drive towards introducing SMART systems across the market, ENGIE agrees that the current market framework will need to be adapted over the next ten years. This is necessary to ensure that required technologies – such as storage and DSR – deploy in a timely fashion to meet the challenges of a changing market, whilst maintaining a clear and equitable framework to ensure investor confidence.

In the UK, ENGIE is a market leader in the provision of flexibility, through ownership of pumped storage, OCGT participation in the balancing services markets, through its retail business and its gas storage business. The expert knowledge and long experience of operating flexible assets under a range of different market environments and designs places ENGIE in a unique position in responding to this call

for evidence.

Further, as a global company, ENGIE can draw on relevant experience not just from the UK but from a range of other markets in which it operates. Examples of our expertise in storage and flexibility are given below.

Flexible hydro generation

Together with our partners Mitsui[1], ENGIE owns and operates the UK's largest hydroelectric pumped storage business at First Hydro, comprising two pumped storage sites at Dinorwig (1,760MW) and Ffestiniog (363MW). Market-leading reliability and operational flexibility have allowed First Hydro to adapt to a variety of system conditions and changing market arrangements over several decades. Over this time First Hydro has continued to provide balancing services across a range of timescales both in terms of response times and delivery duration. Many of its employees have been with the business since the early days of industry privatisation, providing a wealth of knowledge and experience in both operating flexible generation and in participating in the balancing markets.

ENGIE believes First Hydro will continue to play a key role in supporting the energy transition in the UK market. To demonstrate our commitment to the future of the plant, and our view that such plant will be vital to the future market design, ENGIE recently secured long term contracts in the capacity market to refurbish Ffestiniog, maintaining operations at the plant and extending its lifetime.

Internationally, ENGIE has over 30 years of proven expertise in engineering, development and operation of flexible, hydroelectric generation. Around the world, the company has over 13GW of hydropower capacity, operating in a range of different market structures in different countries.

In Belgium, group subsidiary Electrabel operates the Coo-Trois pumped storage hydroelectric plant located in the Ardennes region with an installed capacity of 1,164MW.

Flexible peaking thermal capacity

Peaking plant can also help to manage the system through the provision of flexible bulk energy. ENGIE has worked hard to ensure our thermal assets (Deeside, Saltend and Indian Queens) are able to operate flexibly. Deeside for example can reliably stop and start and run for short periods, and at Saltend we have developed technical and commercial solutions so that this CHP plant can operate flexibly.

Demand Side Response

As well as providing flexibility on the generation side, ENGIE's UK retail business is the leading provider of STOR, Frequency Control Demand Management and Triad management. In July 2015, ENGIE took a stake in Kiwi Power, a leading UK demand response aggregator.

[1] First Hydro is owned by a 75:25 Joint Venture between ENGIE and Mitsui & Co., Ltd.

Battery Storage

ENGIE considers energy storage as an important strategic area of growth in the future that will largely contribute to energy transition. In 2016, ENGIE launched a Key Program on Grid-Scale Storage to further promote the development of new business models based on storage solutions. This Key Program supports ENGIE's business development teams around the world to evaluate investment opportunities in storage and launch the first pilot projects.

To illustrate ENGIE's commitment to this Program, ENGIE tendered for 55MW of capacity in the recent Enhanced Frequency Response Tender. Whilst contracts were not secured, the tender has provided valuable experience in understanding future requirements for this service. ENGIE offers a similar service to RTE (the French System Operator). The service is a first on the French market.

In March 2016 ENGIE and Zurich based SUSI Partners AG signed a Memorandum of Understanding ('MOU') to promote grid-scale power storage projects.

In May 2016, ENGIE announced acquisition of an 80 percent stake in Green Charge Networks, an industry-leading battery storage company based in California. Green Charge, utilizing its advanced patented software algorithms and analytics, deploys, owns, operates, and optimizes battery systems at commercial & industrial (C&I) and public sector customer sites in the United States.

Gas storage

With more than 12.2 billion m^3 of gas storage, ENGIE is the No. 1 seller of storage capacity in Europe. Through its business Storengy, it owns 14 underground storage facilities in France and further storage capacity in the United Kingdom and Germany. The Group is also engaged in storage activities in Romania, Slovakia, and the Czech Republic through partnerships or stakes owned.

Storengy UK operates the Stublach Gas Storage Project, a salt cavern storage facility in Cheshire. Storengy UK opened the first ~40 million cubic metres of natural gas in 2014 and by 2020 the total storage capacity will reach 400 million cubic metres and will be one of the main storage facilities in the country

ENGIE's operations in each of these areas demonstrates our expertise in both flexibility and storage. Utilising this experience, the company intends to fully participate in discussions on the future design of the electricity market. The following summary provides ENGIE's key views on how best to ensure the market is properly structured to meet the needs of the energy transition.

General summary points

- The Call for Evidence rightly maintains a focus on several specific issues including the treatment of storage and market aggregators. These provide some of the necessary major building blocks, but achieving a genuinely smart and flexible energy system will be a broader challenge and the potential range of measures required will necessarily impact on government, regulators, code administrators, network operators, industry participants and consumers.

- A number of relevant market design modifications are already being considered through current industry change processes, e.g. reform to embedded benefits and capacity market change proposals

relating to storage. Building on this work, from the Call for Evidence process, together with Ofgem's work on charging reform and its 'Future Insights' programme, we would expect a clearer common vision to emerge of an enduring target market framework that will best cater for a more decentralised system and ensure more efficient market operation and price formation. ENGIE sees this vision as a precursor to Government taking forward in any further detailed work on the bulk of the measures needed to deliver the smart flexible energy system.

- It is critical that in order to meet this challenge on behalf of consumers the value of flexibility in all its forms should be properly valued and signalled to market participants. This does not mean that Ofgem/BEIS should be placing emphasis on specific measures to incentivise one technology or group of technologies based on some fixed view as to its potential to contribute to a highly renewable system. The overarching consideration should be on improving market arrangements such that flexibility can be provided at lowest cost whilst also taking account of the full extent of the cost of provision.

- It is ENGIE's view that some of the challenges facing storage for instance under current market design, are common to all market participants and providers of flexibility. It should further be recognised that grid scale storage has been operating effectively under a range of privatised wholesale market arrangements since 1990.

- In other words the priority for policymakers in "removing barriers" for storage for instance, should be in ensuring that wholesale power markets continue to operate efficiently for all parties and in the interests of customers. In general there are two key areas for reform that are relevant to this task: firstly the identification and removal of market distortions that are increasingly impacting on efficient outcomes, and secondly taking a more market-led approach so that volumes from different types of flexibility are not explicitly prescribed from certain types of flexibility provider. Growing uncertainty is a key feature of the energy markets today given the pace of change in technology costs and performance, disruption in the pattern of demand growth, and the unclear impacts on system operation of an evolving fuel mix. Focussing on shaping market design aspects and allowing market actors to develop innovative new products will help preserve option value and provides the opportunity to achieve efficient market outcomes across a wide range of scenarios.

- To take this forward, a work programme (or roadmap) is needed to identify the main objectives and priorities, routes for delivery and timing of when individual issues will be considered in further detail. This will assist all parties in having a shared view of how market design might be expected to evolve in order to best facilitate effective incremental change through existing routes, or where necessary to identify where more coordinated reform is required. We would anticipate the key building blocks of this vision to be as follows:

Addressing market distortions	Widening access to flexibility markets
Reform of TNUoS demand residual charge	Review of the role of aggregators
Reform of BSUoS embedded benefits	Development of the Balancing Market to allow the participation of current non-BM providers and aggregators
Review of the Triad system	Increased market transparency across flexibility markets
Addressing spill payments to non-BM STOR	Separation of the role of the System Operator
Review of charges applied to interconnector flows to create level playing field (BSUoS, carbon floor price)	Simplification of the design and specification of ancillary services products and market processes
Removal of the ability of network companies to own storage or other generation assets	Creation of a storage licence
Capacity mechanism rule change to address delivery duration	
Ability for DSR to bid for multi-year Capacity mechanism contracts	

Notwithstanding these comments, ENGIE does see the need to address the specific treatment of storage in the current market in the context of addressing market distortions. Equally the role of aggregators is highly relevant to the need to broaden access to a smarter energy market as highlighted above.

Therefore ENGIE anticipates the need for a number of more immediate changes, some of which are highlighted in the call for evidence document:

- The creation of a storage licence which could be used to address the application of final consumption levies and the double charging of certain network charges and costs.
- Revision of the TNUoS demand residual charge will remove one of other main barriers to the development of storage
- Change to the capacity mechanism rules is needed to ensure that the participation from providers with short delivery durations does not cause a deterioration in capacity adequacy through its displacement of conventional forms of energy
- To address the growing role of aggregators, aggregation must become a licenced activity with aggregators responsible for the imbalances they cause on supplier accounts.

Below we have summarised the key points from each section of the response. Detailed answers to the questions can be found in the Appendix.

Storage - Key points

- For storage, the results of the 2016 capacity auction indicate that battery storage can be built more cheaply than other types of new build capacity. This suggests that the barriers to the deployment of battery storage are low and further subsidies are, therefore, not necessary. The focus for storage should be on providing for a level playing field, fixing any market distortions that disadvantage storage and having a broader view on the need for reforms to market design to take account of the growing diversity of the market for large and small, generation and demand.

- Ofgem's "minded to" letter on embedded benefits signals an improvement in the opportunities for storage arbitrage. Revising embedded benefits will reduce the incentive to generate over Triads, increasing the differential between peak and off peak prices.

- There are some areas that do need to be addressed despite the clear market appetite for new build storage. At the transmission level, these are the double charging for network use and BSUoS, and at the distribution level the application of final consumption levies. These changes will allow for a level playing field for storage with other providers of flexibility and also between transmission and distribution connected storage.

- Reform is also needed to remove the double energy payment that non BM STOR receives as this currently gives it a competitive advantage in the STOR market. ENGIE has raised BSC modification 354 to address this.

- Separate to this Call for Evidence, DNV GL has recommended consideration of the use of a cap and floor regime to support large scale storage. ENGIE does not support this being applied to new storage. Firstly, there are long term CM contracts are available to support new build investment of all types and storage should be treated on an equitable basis and secondly, it would undermine the economics of existing storage which would not be in receipt of such a subsidy.

- ENGIE agrees that the storage licensing regime needs to be reviewed. To do this, storage should be a separately defined activity within the generation licence with a requirement to separately meter storage from any other on site generation or demand. The 'storage licence' could then be used to set out which charges were/were not applicable. This would provide the opportunity to remove the charges highlighted above.

- ENGIE does not support network companies owning storage. Aligned with this, ENGIE does not support balancing services contracts with a duration greater than two years being offered. The capacity market already provides for some term differentiation in revenue.

- Short delivery duration storage has the potential to cause a deterioration in capacity adequacy if it displaces conventional generation that can deliver energy for long periods. As more storage comes on

line, this will become an increasing problem and that cannot be ignored in the pursuit of flexibility. This should be addressed through the capacity mechanism rule change process.

Aggregators - Key points

- The overarching consideration in seeking flexibility from the demand side is whether it can be provided more cheaply and reliably than from traditional forms of flexibility and therefore provides value to the consumer. In looking at cost of provision, the full extent of costs must be considered including the need for much greater granularity in metering (or type metering).

- A major barrier to the provision of flexibility from the demand side is the duration of contracts. If Government wants to facilitate their participation in the balancing and flexibility markets, consideration should be given to allowing multi-year capacity mechanism (CM) contracts for DSR coupled with a review of CM expenditure thresholds.

- System stability is also essential. Response flexibility provision must be controllable to avoid unmanageable simultaneous load switching and also verifiable. For domestic provision, verification of flexible response does not need to take place on a half hourly basis but proof of provision is needed.

- It is of concern that many of the current demand-side response (DSR) flexibility initiatives actually result in the increased use of carbon based generation. In developing a market framework to further encourage DSR propositions, BEIS and Ofgem need to recognise that this may encourage behind the meter gas or diesel engines to provide DSR.

- ENGIE advocates that the regulator should step in and require aggregators to be licenced either in their own right or as suppliers and also be signatories to the BSC.

System Value Pricing - Key points

- Longer term revenue certainty and/or an intra-day market is a key enabler for the demand side.

- The need for more granular metering is one of the key barriers to the provision of response. However, methods of demonstrating response need to be made easier without requiring expensive metering solutions. As noted above the costs of this metering must be considered to determine whether this will provide best value to consumers.

Smart Tariffs - Key points

- Barriers to interoperability need to be addressed urgently by Government/Ofgem in order to best facilitate competition and better consumer outcomes.

- Supply licences (and licences for aggregators when introduced) must evolve at a fast rate to allow for companies to innovate and bring more modern, relevant offers quickly to market without fear of outdated restrictions in the licence.

- ENGIE strongly supports the timely implementation of half hourly (HH) settlement for both smart and advanced metering early in 2017. The company is keen to adopt voluntary HH settlement across our portfolio as soon as reasonably practicable.

- ENGIE considers that consumers and companies combined will drive the market, rather than policy makers. It is Government and Ofgem's role to ensure that the policy is fair, is principles based and keeps pace with market requirements.

- If bundled smart energy offers are presented as add-ons to bills, they may be unaffordable to the less well-off in society. Financial assistance could be provided through extending the range of qualifying measures under the existing ECO scheme.

A system for the consumer Smart Appliances – Key Points

- Smart appliances already exist and their widespread use is inevitable. ENGIE considers that consumers and companies combined will drive this 'smart' market, rather than policy makers. It is Government and Ofgem's role to ensure that the policy is fair, is principles based and keeps pace with market requirements.

- To interact with many thousands of customers in a world of smart appliances and smart charging, the System Operator (unless it becomes a customer facing business) will have to rely on aggregation services. This highlights the need for aggregation services to be regulated and for aggregators to be responsible for the imbalances they create.

A system for the consumer - Ultra Low Emission Vehicles - Key points

- Measures to encourage the uptake of ULEVs must increase due to the need to improve urban air quality and achieve carbon objectives. The development of a large network of charging infrastructure is urgently needed in most urban areas if ULEVs are to become widespread.

- Unless National Grid is developed to become a customer facing business and builds systems to interact with many thousands of customers, flexibility in this area will come from aggregation services or supplier tariff price signals that offer the end user a sufficient incentive to react. This highlights the potential for growth in aggregation services and the increasing need for it to be regulated.

- Hydrogen as a storage medium could offer potential. It could become a major transitional fuel, and work in the flexibility arena needs to encapsulate this opportunity.

Consumer Engagement with DSR questions - Key Points

- The ultimate trigger point for price responsiveness is when profile classes 1-8 are truly half hourly settled. ENGIE strongly supports the timely implementation of HH settlement for both smart and advanced metering early in 2017 and we will be keen to adopt voluntary HH settlement across our portfolio as soon as reasonably practicable. ENGIE is also supportive of Ofgem's plans to introduce mandatory Half-Hourly settlement across the market by 2019.

Appendix – Answers to questions in the Call for Evidence

Storage questions 1-6

Question 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.

1. We question whether the policy barriers are restricting the deployment of storage. In the 2016 capacity mechanism auction, 500MW of new build storage secured a contract, and of this only 104MW had the underpinning of an Enhanced Frequency Response (EFR) contract. Of the 396MW without an EFR contract, 115 MW is connected at the distribution level and will, without reform be subject to final consumption levies on its import costs. That these contracts can be considered viable by developers purely on the basis of the capacity mechanism payment and merchant revenues (and with final consumption levies for some) suggests that the barriers to the deployment of battery storage are minimal. We note also that DNOs have received over 1000 applications for the connection of 19GW of battery storage[2]. This suggests that storage is viable despite the perceived barriers.

2. However, there are aspects of the market arrangements that do warrant reform to level the playing field for storage and avoid double charging for certain costs.

3. We have provided further detail on network charging, network connections and regulatory clarity in the responses to specific questions below. Here, we discuss planning, final consumption levies, embedded benefits, the double charging for BSUoS, the treatment of non BM STOR and the differences in controllability, flexibility and predictability between transmission connected and embedded storage.

4. A number of these reforms could be more easily delivered if storage is a separately defined activity within the generation licence, and the supplier licence changed so that storage does not pay supplier levies.

   <u>Planning</u>

5. Battery Storage projects above 50MW currently fall under National Planning Policy (i.e. require Development Consent Order via the Nationally Significant Infrastructure Project process (NSIP). The NSIP process can be lengthy and costly. Given that the physical size and environmental and visual impacts of a battery storage project of this capacity are relatively insignificant, policy should be changed to allow determination up to a much higher limit (e.g. 100MW) to remain with the Local Planning Policy. Alternatively, for batteries, the point at which the project is required to go through NSIP should be measured in MWh which will more reasonably reflect the size of the project for planning considerations. Care would be needed to ensure this did not allow low load factor thermal plant to avoid NSIP.

[2] http://www.energynetworks.org/assets/files/news/publications/Reports/TDI%20Report%20v1.0.pdf

Final consumption levies

6. Final consumption levies need to be removed to level the playing field between transmission and distribution connected storage. As with network charging this could be resolved through the creation of a storage licence. Any storage provider with a licence and a meter to measure imports (and exports) would be exempt from these levies.

Embedded benefits

7. One of the biggest barriers to storage is the current embedded benefit regime as this effectively provides a subsidy to the economics of facilities such as reciprocating engines, thus disadvantaging storage in certain flexibility markets where these technologies compete.

8. Ofgem's recent open letter[3] about charging arrangements for embedded generation recognises the embedded benefits issue and states the regulator is minded to address the significant TNUoS demand residual payments – a move that is supported by ENGIE. Addressing this increasing distortion to the market may result in the peak energy prices (and the peak/off-peak differential) rising to a more appropriate level that, with other revenue streams, will start to better support storage – at current levels, winter peak prices are depressed by the running of many thousands of MW of embedded generation in response to an artificially high embedded benefit signal. In addition, embedded generators, without the certainty of support arising from the embedded benefit, can be expected to seek to replace this revenue with remuneration through the capacity mechanism on a more equitable basis with other forms of supply.

9. Loss of current demand TNUoS benefit may not be detrimental to embedded storage - in order to capture this main embedded benefit, embedded storage has to 'hit' the Triad periods and may not physically be able to do this or may be providing other services that prevent operation in the Triads

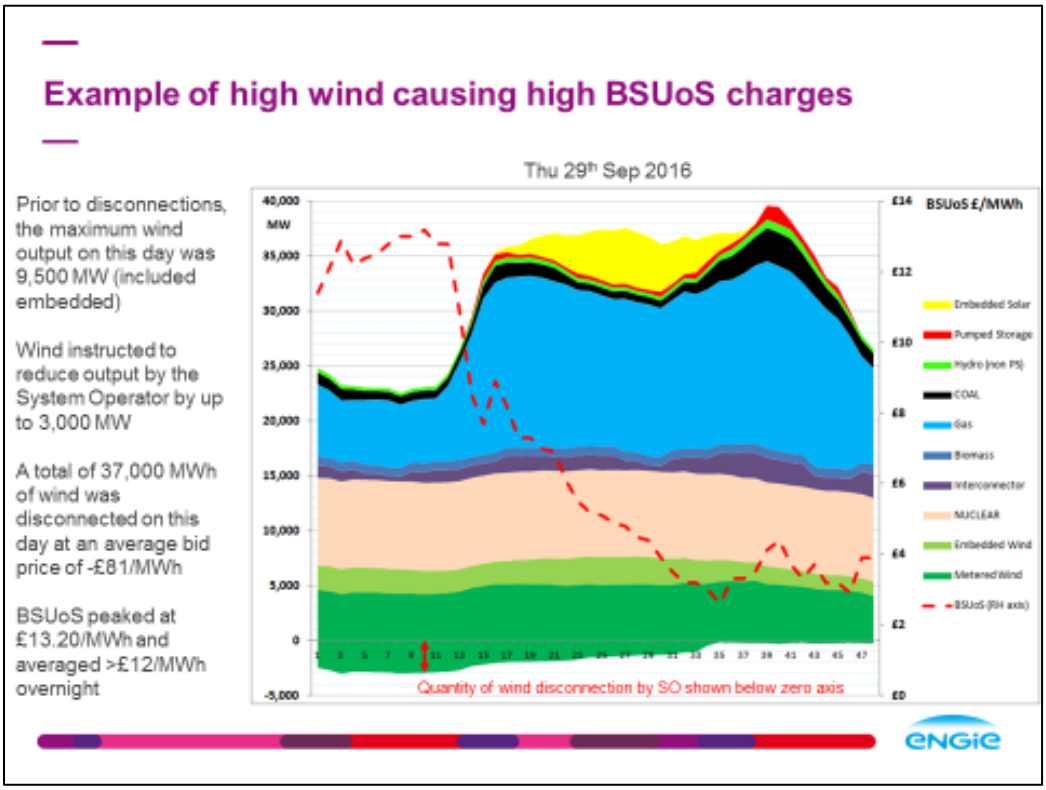
BSUoS charges

10. Transmission connected storage pays BSUoS twice – both on exports and imports. Embedded storage pays BSUoS for imports but through the supplier, can largely receive the BSUoS payment on exports. Two issues therefore need to be addressed the better facilitate storage – to only charge BSUoS once and to have equality of treatment in BSUoS charges for transmission and embedded storage.

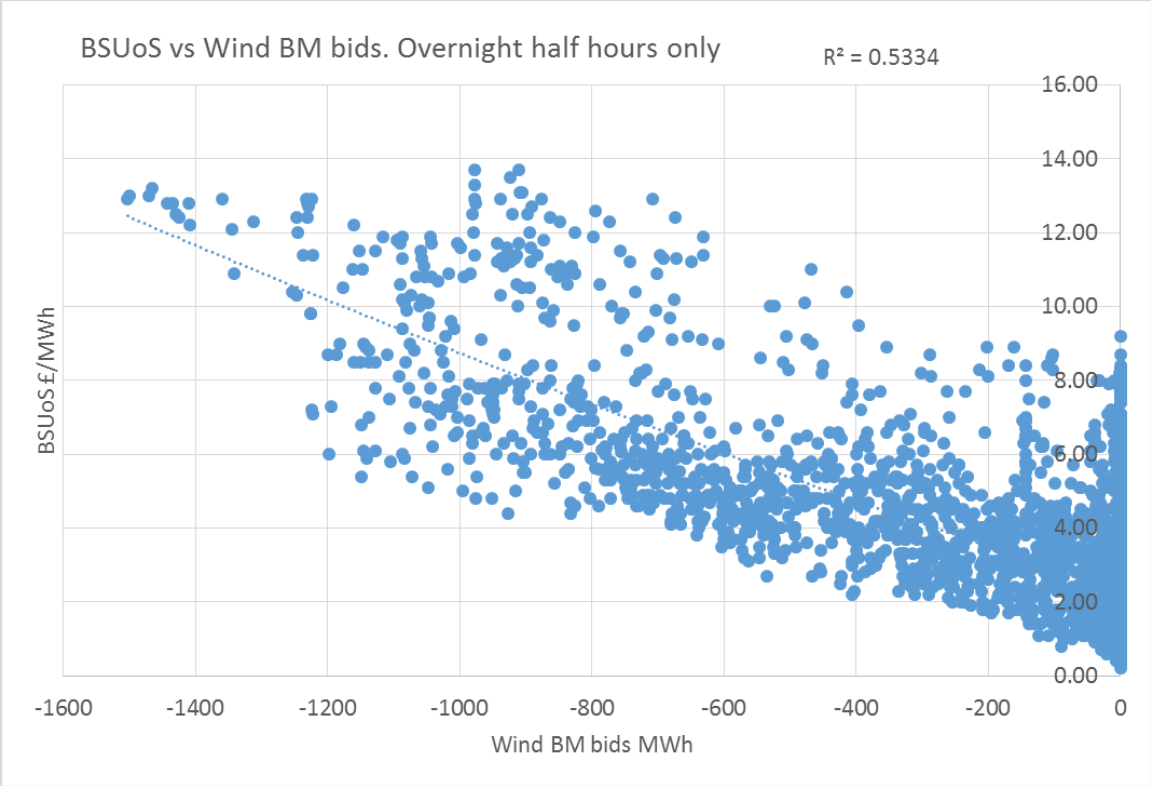
11. Storage logically will import when prices are lowest aligned with times of low demand, usually overnight. At such times, there can be relatively high amounts of wind generation compared to other sources of generation. This can result in the System Operator having to pay wind to reduce its output via negative bid prices in the Balancing Mechanism. With demand being lower, the cost of this is spread over a much smaller charging base. Since storage will be importing at this time, this leads to high £/MWh BSUoS charges being applied at the very time when storage should be seen as a benefit because it can absorb surplus wind generation. The chart below shows the impact of this for one sample day. Here, overnight BSUoS averaged £12/MWh due to wind being bid off at an average price of minus £81/MWh). Pumping efficiency of c.75% means £16/MWh would have been added to the

[3] https://www.ofgem.gov.uk/publications-and-updates/open-letter-charging-arrangements-embedded-generation

cost of generation (where BSUoS is also applied - on this day, BSUoS charges were c. £4/MWh at the peak).



12. The second chart correlates the amount of wind bid off overnight with BSUoS for 2016. It can be seen that when more than 1200MW of wind is bid off in a settlement period, BSUoS is always above £6/MWh. It is very hard for pumped storage to avoid these unpredictable charges whilst also delivering on its daytime ancillary service commitments.



13. As well as failing to recognise the system benefit of having storage, the application of BSUoS costs on imports is not consistent with the most relevant competitors in the flexibility and wholesale markets who are exposed to one set of BSUOS costs. Charging BSUoS only on storage exports would allow it to better compete in these generation markets.

14. Again this could be achieved through a storage licence that ensures that "demand BSUoS" is not charged to those with a storage licence. Such a change would also lower the cost of generation from storage as it would not have to take account of demand BSUoS costs in its export price. This could lead to lower peak wholesale prices when storage is the marginal generator.

15. From the above, both embedded and transmission connected storage would be better facilitated through the removal of BSUoS charges on imports. For exports, the BSUoS charging treatment is currently different. Whilst transmission connected storage pays BSUoS on exports, embedded storage typically receives BSUoS as a payment via the supplier - subject to some sharing of this value with the supplier.

16. Ofgem, in its "minded to" letter on embedded benefits recognises the distortion caused by the BSUoS embedded benefit. Addressing this wider distortion through charging BSUoS on the basis of gross demand would also address misalignment of charges for storage exports and ensure that transmission and distribution storage both pay BSUoS on the same basis (on their exports).

Non BM STOR

17. This is a balancing service similar to Short Term Operating Reserve but providers do not participate in the Balancing Mechanism (BM). As with STOR, an option fee and a utilisation fee are paid. For STOR, the utilisation fee is paid as an offer accepted in the BM. For non BM STOR the utilisation payment is made through the contract with National Grid. On top of this utilisation payment, when the non BM STOR provider generates, the energy metering goes into the supplier's account with the supplier receiving the imbalance cashout price on this energy which is then typically passed to the non BM STOR provider. Whilst this embedded benefit has been in existence as part of non BM STOR contracts for some time, it only became apparent when National Grid started publishing details on non BM STOR use when the P305 cashout modification was implemented – this issue would have been raised sooner had industry been aware of it.

18. National Grid does not take account of what is effectively a double utilisation payment when contracting with non BM STOR. This has two effects. Firstly, it gives Non BM STOR an advantage compared to BM STOR providers in the tender process, and thereby has contributed to a rapid rise in non BM STOR. Secondly, the double payment also pushes up costs for consumers. Without resolution, this is another barrier to the development of storage in the BM as it cannot compete on an equitable basis with non BM providers. It is also a barrier to the development of demand turn up as the supplier is left 'short' and paying the imbalance cashout price.

19. ENGIE (which tenders its pumped storage units into the STOR market) has been seeking to resolve this inequity in order to place Non BM STOR on an equal footing with BM STOR and has raised BSC modification 354[4] to address this.

Controllability, visibility and predictability

20. Clearly, storage has a value to the operation of the system and that is likely to increase as more intermittent generation enters the system. However, not all storage is similar, particularly when it comes to controllability, visibility and predictability.

21. Learning how to manage this intermittency has been challenging - we have seen large plant being bid off in the middle of the day or very high cashout prices where the solar output has been below forecast. The ability for the market to clearly see how much capacity there is and for the SO to control this capacity is important in gaining the maximum system benefit from a storage facility. Transmission connected storage has the advantage that its output can effectively be controlled by the SO, it is clearly visible to the SO/market and its output and availability (OC2, REMIT) can be predicted. In the current market arrangements, embedded storage brings a number of uncertainties for the SO, and unless they are metered in a different way or managed by the DSO locally, then the value of this type of storage is not quite the same.

22. Similar to the points above, part of being flexible is being available when required. Local, embedded storage systems might not react to the needs of the whole grid. For example, it might be sunny in

[4] https://www.elexon.co.uk/mod-proposal/p354/

Manchester (so solar panels are charging batteries) but it could be cloudy in the South East, meaning there is a transmission system shortfall nationally. How and when this storage reacts to localised versus national system conditions will be important in determining the overall value to the end consumer.

Other observations

23. Around half of the battery projects that won contracts under the recent EFR tender issued by National Grid obtained contracts in the 2016 T-4 capacity mechanism auction. They were designed to meet a specification set down by National Grid that required the capability to deliver energy for 30 minutes. Whilst the delivery duration of batteries will undoubtedly increase, in removing barriers to storage, thought does need to be given to the displacement of conventional generation that has the capability to deliver energy for long periods. Various change proposals have been raised to the capacity mechanism rules to address this issue (ENGIE raised the first change[5] which precipitated others of a similar nature). There is clearly a widely held recognition that there is an issue that needs to be addressed if security of supply is to be ensured. Whilst battery storage can help to manage intermittency through its innate flexibility, currently large scale pumped hydro is the only storage technology that can economically deliver energy for the likely duration of a stress event.

24. Whilst it is recognised that investor confidence is a key issue in the deployment of additional storage, with the exception of seeding niche, dedicated services such as EFR, ENGIE does not in general support long duration balancing services contracts being offered - operating in the markets on a commercial basis is greatly preferable. Longer term balancing services contracts are in general poor value economically as they lock out competition for the service for many years despite potentially falling cost[6]. Those that do successfully tender for these long term contracts may be placed at an advantage compared to new entrants when their tender comes up for renewal.

25. Long term balancing services contracts effectively result in the undesirable outcome of 'shadow' ownership and operation of storage by the TSO. The current maximum contact duration of two years is more appropriate as it ensures that fair and equitable market arrangements are in place. In addition, network operators should not create services that can only be delivered by a single technology type – the only exception should be to solve very specific issues.

26. At some point, the growth in storage will lead to peak/off peak arbitrage opportunities being removed and the value of services reducing. Investment in storage should therefore be self-limiting. We welcome that Government is not advocating an amount of storage – it should be up to the market to decide how much storage is needed.

27. The consultation focusses on electricity storage. Gas can also be stored and provides flexibility. The economics of gas storage in the GB market are being severely compromised by the high level of

[5] https://www.ofgem.gov.uk/publications-and-updates/engie-capacity-market-rules-cp163 and also 164

[6] In 2010, the System Operator contracted for long term STOR for an £11/MWh option fee. Some of these contracts had a duration of 15 years. STOR prices subsequently fell to a low point of less than £1/MWh in January 2015, and more recently have increased slightly to zz/kW

business rates. Whilst rateable values for cavern storage will fall by 60% (in ENGIE's view to a level that is still too high) in the next business rates revaluation, transitional relief phases in the reduction. The rate of transitional relief for large ratepayers is such that cavern storage won't reach the correct level of business rates in the next 5 year period. For ENGIE's Storengy facility in Cheshire, it will take 18 years to reach the correct level.

28. The resultant business rates costs for gas storage are currently equivalent to the revenues achieved from injecting gas into storage in summer and taking it out again in winter (the seasonal spread), which is the major share of storage operator's revenue. The high levels of business rates mean that there is little revenue to cover other business costs resulting in operating losses. With storage operators being price takers rather than price makers there is no way to pass on these additional costs to the end customers. The high level of business rates is not just a barrier for existing gas storage, it is simply not sustainable. Consideration must be given to the impact on national security of supply and energy affordability were these critical parts of infrastructure to close.

Question 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.

29. A number of DNOs have been overwhelmed with connection applications for storage projects, leading to delays, increased costs and inefficiency. DNOs should be obliged to produce heat maps for generation and demand for their areas, or otherwise indicate the most suitable locations for storage projects. This would avoid lots of speculative grid connection applications.

30. The introduction of a non-refundable grid assessment fee for connection applications should be considered. Currently the lack of such a fee can result in spurious connection applications, increased work load for DNO engineers for assessment and low acceptance ratio of issued grid connection offers.

Question 3 - Have we identified and correctly assessed the 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.

31. ENGIE agrees with Ofgem/BEIS that network charges should represent a cost reflective and fair recovery of costs. Storage pays the network charge twice yet it only has one connection. We do not therefore agree with the view expressed in the Call for Evidence that storage should pay network charges for both import and export.

32. Demand TNUoS has two elements: a locational charge (for the avoided network cost) and a residual cost recovery element, both of which are recovered over the Triad. Transmission connected storage also pays generation charges for these two elements on a capacity basis. There is thus the potential for transmission-connected storage to be double charged for the use of the transmission system, even though it only has one physical connection.

33. Currently whilst double charging is possible, storage does not typically take demand over the TRIAD so is unlikely to be double charged. However if the Demand TNUoS collection moves away from a Triad based approach to a capacity or commoditised based approach, it is likely that storage will pick up significant cost that will undermine the economics of storage.

34. The solution to this is to ensure that storage is not charged for the demand residual on either a capacity or a commoditised approach. This could be achieved by either exempting storage from this element of demand charge (as recommended above) or only charging the residual element of demand charges on energy that is supplied by a supplier and through the creation of a storage licence that would exempt storage from paying these charges. This would be similar to changes to the application of supplier final consumption levies.

35. With storage having its own metering, ENGIE does not see the need for separate intermittent or non-intermittent charging classifications for battery storage. On the basis that storage is working on a standalone basis and is metered separately, it should be treated as non-intermittent given that its generation can be made available as required (excluding any scheduled/unscheduled outages).

Do you agree that flexible connection agreements could help to address issues regarding storage and network charging?

36. ENGIE agrees that flexible connection agreements that reflect actual operation would be beneficial albeit for all network users not just storage. Thought needs to be given to those that remain reliant on network supplied electricity to ensure that they do not pay for the entirety of network costs. Network charges will therefore need to provide a clear forward signal of the cost of using the network, and will need to adapt as network use changes.

Question 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? Please provide evidence to support your view. Are there any circumstances in which network companies should own storage?

37. We agree that network operators should use storage to support their networks. ENGIE does not however support network companies owning storage for the following reasons:

- Storage ownership by any network operator (this applies to both the regulated and unregulated parts of their business) creates a conflict of interest (perceived or otherwise) where there are other owners of storage connected to that network.

- It places network owners in an advantageous position compared to other providers in that they have an informational advantage in terms of network needs.

- It can stifle innovation in developing new technologies and competition.

- Allowing such activity may be the 'thin end of the wedge' to greater participation in the energy market

38. The current licensing regime allows storage ownership by DNOs in restricted circumstances. ENGIE believes that this ability to own storage should be removed. The only exception on network ownership should be where it is clear no commercial party is interested in delivering the solution but storage is found to be the most cost effective solution.

39. It should be noted that where network operators have issued to tenders for storage third parties there have been issues with the process that have concerned potential investors. For example, the specifications in the NGET EFR and SSE CMZ tenders changed during the process, creating additional difficulties for investors to deploy energy storage. To allow the use of all the potential of energy storage including stacking of multiple services, clarity and objective information needs to be given earlier.

40. More widely, ENGIE also has concerns over the growing remit for National Grid and how it can be ensured that there is no conflict of interest in National Grid's having the roles of Transmission Operator, System Operator and also EMR Delivery Body. Whilst mechanisms are in place to provide business separation, only an independent ISO would remove any conflict of interest.

41. ENGIE notes the very recent statement of the future role of the Electricity System Operator and supports a move to an independent SO. The scope for conflicts of interest with National Grid's role as Transmission Operator is only going to increase as flexibility and balancing markets grow in size and complexity. In specifying the activities of the SO in this new role, it must be made clear unless an independent SO is created, the new SO role of National Grid should be to manage the system and facilitate competition in the provision of balancing services. The statement does however suggest an expansion of the role of the SO – to a more holistic role in promoting competition, to promoting whole system solutions, to facilitating competition in networks, and in helping Government to meet the security of supply standard.

42. If the role of an independent SO is not to be created, ENGIE's considers it would be better if the first three areas above were given to a body entirely separate from any of the current network operators. Without this, National Grid's remit will increase rather than reduce. On helping Government to meet the security standard, it should be for BEIS to set the market framework and for the market to respond to the incentives and signals within that framework. The SO should not be "taking advantage of new technologies and approaches and the potential of competition and flexibility to achieve better value for consumers" other than where they are presented by market actors.

43. Within this new role, it must also be made clear that ownership of any type of generation or balancing service must not form part of the remit of the independent SO.

44. ENGIE therefore cautiously welcomes this move and will contribute to the debate in the coming months and years.

Question 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.

45. There is a need for consistency in the treatment of charges that apply to storage. The CfE correctly identifies the significant impact that final consumption levies have on distribution connected storage. ENGIE has, in question 1, identified other charges that impact on the viability of storage. This could be resolved through changes that create a storage class in the generation licence and ensure that these levies are not charged where the supply is to licenced storage. To ensure early deployment of new storage, Government should avoid the use of primary legislation to create the new licence (as this would be time consuming) mand instead create a storage class within the generation licence.

46. How far this regulatory approach extends should be self-determined. The benefits of avoided costs such as network charges, final consumption levies and BSUoS would only apply to those with storage licences and it would be up to storage providers to decide whether they would benefit from having a licence.

47. For planning purposes, if storage is defined as generation then its export capacity should be considered. As noted in the response to Q1, capacity could be measured in MWh rather than MW to recognise the footprint size of storage compared to other types of electricity generation.

Question 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

48. ENGIE largely agrees with the definitions. They should make clear that where a site has a storage licence then the imports/exports from the storage facility must be separately metered. This will allow allocation of costs to be correctly targeted and avoid the metering being mixed up with other technologies or regulatory regimes.

49. The definition needs to exclude thermal energy stores that shift heat or refrigeration load over time. Both of the suggested definitions given in the CfE would work to exclude this type of storage because they specifically require the ability to reinject electricity back into the grid.

Aggregators questions 7-10

Question 7 - What are the impacts of the perceived barriers for aggregators and other market participants? Please provide your views on:

Balancing services

50. BEIS/Ofgem have painted a vision for the demand side to increasingly provide flexibility to balance voltage and frequency deviations, including being explicitly referenced in the Fifth Governmental Carbon Budget statement. ENGIE has identified a number of barriers that apply to both aggregators and other market participants that prevent this vision from being realised.

Short term contracts do not facilitate investment

- The short term contracting of services such as FFR, STOR and the capacity market creates an inherent risk for Demand Side Providers in the large non-domestic energy user sector in providing services to National Grid when investment is required. These shorter term contracts do not support the business case or provide the long term contractual certainty for any form of technological investment required in this sector.

- Consequently, provision will more be more likely to come from energy market participants with carbon based technologies such as diesel generators, who are closer to the market and understand the risk profile of the shorter term contracts on offer. Whilst the proposal to introduce Emissions Limit Values (ELVs) for sub 50MW generators will go some way to address this, it may not apply to existing plant until 2025 and does not prevent further provision of balancing services from existing diesel generation in the meantime.

- In the response to question 1, ENGIE has provided reasons why the duration of balancing services contracts should not be extended. One immediate improvement that Government may wish to consider to address the lack of contractual certainty to justify investments would be to allow new DSR to seek multi-year contracts in the Capacity Mechanism. The CM multi-year expenditure thresholds may need to be reviewed if they are unachievable for DSR.

Contractual complexity and liability caps

- The National Grid framework contracts are complex, lengthy and require significant legal work for participants. They increasingly contain an unpalatable liability cap which for the commercial value associated with the contract is not equitable. A recent example of this was the Demand Turn-up contract.

- To facilitate a smart and flexible energy system some refinement of such contracts would be helpful. An online portal for tendering, settlements and analysis would also simplify participation. A useful improvement to this would be an industry standard proforma (such as is used for STOR) that is rolled out across the demand side. A differential clearly needs to be drawn between carbon based solutions (gas and diesel engines) and Demand Side Response.

Complexity of metering and National Grid settlement requirements

- For some balancing services, National Grid requires very complex metering and highly granular data to settle against. All BM generation performs type testing at its own cost. In addition NG meter their own substations at these BM units for sub minute MW metering that can use for analysis on an incident based basis. A similar process needs to be developed for demand side with type testing of basics design plus incident based monitoring available on a bespoke basis.

Specification changes by National Grid

- A consistent approach is required with regard to all balancing services, testing, metering and settlement processes, including a standardisation of injection testing and the metering requirements and specifications for Frequency services.

- When implementing a new service, processes should be well thought out and documented in advance to avoid any variations during the commencement of the trial service. Such events create issues for providers and they typically incur additional unforeseen costs and delays.

High minimum MW thresholds

- Bridging contracts have been well received and helpful across the aggregator landscape. To facilitate more flexibility coming to market, the thresholds need to continue to reduce. The terms of these contracts need to be visible to all to ensure equitable treatment across the class of providers.

Technology barriers

- Building management systems offer the greatest opportunity to reduce kWs on the system from industrial and commercial building operators. Across most commercial and industrial buildings these systems need retrofitting and upgrading if they are to provide balancing services. The lack of guaranteed long term revenues creates too much risk to support the necessary investment. Alternatively support could be provided through (for example) enhanced capital allowances.

- It is of concern that many of the flexibility initiatives may actually result in the increased use of carbon based generation that reduces the effectiveness of DSR. Absent any support there will be reduced available capacity for National Grid and over the long term cheaper, less environmentally sustainable solutions will be prioritised rather than load shedding demand.

Extracting value from the balancing mechanism and wholesale market

51. To extract value from these markets as opposed to ancillary services markets, prices need to be high enough for long enough. The inability to take part in both markets simultaneously creates a preference for balancing services which offer lower risk revenue certainty. Participation in the BM currently requires the party to be a signatory to the BSC, pay variable amounts of BSC credit, and potentially high levels of imbalance exposure for non-delivery. A contractual relationship with National Grid is much simpler.

52. The consultation suggests one route for aggregator participation by which the supplier bids into the BM on behalf of the aggregator and passes on some of the payments received. The supplier would still be left exposed to non- delivery by the aggregator. This does not therefore address who is the balancing responsible party (BRP). In ENGIE's view, if aggregators do want to access the BM they should be bound by the BSC and by extension become BRPs.

Other market barriers and consumer protection.

Do you have evidence of the benefits that could accrue to consumers from removing or reducing them?

53. ENGIE has observed a degree of misinformation and also disinformation in the aggregator marketplace. This has led to expectations being raised as to the revenues that can be made from participating in DSR via an aggregator, investment in technology to deliver demand reductions which cannot be monetised and a lack of trust of the aggregator community. Whilst the ADE is developing a code of conduct which may help to dissuade this type of behaviour, this might not have sufficient 'teeth'. Aggregators should be licenced with fines applied for inappropriate behaviour as is the case with a supply licence.

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

54. Please see the response to question 7.

55. Aggregators play an increasing important role within the market place; they are typically new entrants who are technology biased and Venture Capital backed. They have access to capital and customers and bring flexibility to National Grid from non-typical non-BM assets.

56. This market place needs to be fostered but to ensure consumer protection, regulation needs to be introduced to ensure fairness and transparency.

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

57. ENGIE supports an approach where the regulator steps in and requires licensing. Licensing is the only route to ensure consistency and provide consumer protection. This could either be an aggregator specific licence or a 'lite' supplier licence. To participate in the BSC, aggregators would also have to become BSC signatories.

Question 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?

58. Currently the system is secured to protect against the largest in feed loss. If the simultaneous action of aggregators (or 'smart' consumers acting in unison in response to a half hourly signal) is greater than the current largest single in feed loss, then it should be set at a higher level.

59. We have addressed questions on cyber security in our response to questions 40-42.

System Value Pricing questions 11-14

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

<u>Timely price signals</u>

60. Flexibility on the demand side is typically in the order of kWs that are attached to a process. In order for this flexibility to be utilised, the known value needs to be at a point above breakeven. One current issue is that flexible DSR cannot be certain of the price it can get either because any contracts are too short term to justify making associated investment or because the bilateral nature of the wholesale traded market does not provide suitable place to trade (other than through "imbalance"). ENGIE accepts that long term ancillary service contracts are not the solution but an enduring market is needed to encourage the participation of demand side half hourly energy.

61. The market for flexibility is solely based on the supply contract type being flexible, those consumers who are on fixed price contracts may be excluded from the market. The lack of HH metering and

settlement across domestic and 1-4 meter classifications will stifle any activity in this area until resolved.

Metering

62. Methods of demonstrating response need to be made easier without requiring expensive metering solutions. Transponders on fridges have been trialled with second by second metering of response on a small sample which could then be applied to all that are providing the service. This does not solve the issue of simultaneous switching - the amount of response also has to be controllable but could be achieved through a staged response to increasing frequency. Response also needs to be verifiable (real time would not be needed but a check is needed that the fridge exists and has appropriately responded to the signal).

Question 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?

63. The provision of flexibility correctly sterilises the provider from concurrent participation in the energy markets other than for 'spill' payments and utilisation payments if the service is delivered via the BM. A provider can only provide one service at any one time and quite rightly, services need to be mutually exclusive as otherwise providers will migrate to the service that offers the highest price at any point in time. Different services can be provided at different times of the day. Currently the size of the Triad avoidance payment discourages provision of other services over potential peak periods.

Questions 13 and 14

No Comment

Smart Tariffs – questions 15-19

Question 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 believe government and Ofgem should play a role, examples of the sort of interventions which might be helpful.

64. ENGIE believes that both Government and Ofgem should play their part to set the regulatory environment which allows the market for smart tariffs and connected home offers to thrive. A number of regulatory areas are relevant here including:

- Smart Metering and the DCC
- Half-Hourly settlement both voluntary and mandatory
- Support innovative offers by reducing prescription in the supply licence
- Deliver positive messaging to help educate consumers of the benefits of smart tariffs

Smart Metering and the DCC

65. Both the roll out of smart metering and the adoption of foundation phase smart meters into the DCC should be encouraged. The existence of smart meters in the home underpins whether smart tariffs can be enabled and how quickly they can be offered. It is likely that newer entrants into the domestic market are more likely to be able to offer more innovative and nimble solutions in relation to smart tariffs for consumers but there appear to be barriers emerging around the interoperability of foundation phase smart meters. These barriers need to be addressed urgently by Government/Ofgem in order to best facilitate competition and better consumer outcomes. The single most important factor is to ensure that everyone with a foundation smart meter (SMETS1) can be adopted cleanly into the DCC such that change of supplier is not detrimental to the consumer experience in respect of either access to data or access to smart tariffs with a new supplier.

Half Hourly Settlement

66. Half Hourly settlement is another important enabler in relation to improving supplier's ability to offer smart HH tariffs to consumers. It is only when true individual cost differentials can be realised that consumers can be properly incentivised to better control their energy use throughout the day. ENGIE strongly supports the timely implementation of HH settlement for both smart and advanced metering early in 2017 and we will be keen to adopt voluntary HH settlement across our portfolio as soon as reasonably practicable. ENGIE is also supportive of Ofgem's plans to introduce mandatory Half-Hourly settlement across the market by 2019. Even for early adopters (to voluntary HH) a mandatory HH settlement process is beneficial as it eases the change of supplier process. Under a mandatory world every (smart) meter is pre-enrolled in the HH settlement process and hence avoids the complication of re-nominating measurement/metering classes during change of supplier. This removes unnecessary burdens on challenger suppliers and reduces the inertia from legacy suppliers who may wish to frustrate the process.

Simplify the licence

67. Bundled offers for smart devices, controls and appliances are likely to become commonplace in the energy supply offers of the future and these will be helpful to achieve better level of comfort, energy efficiency and affordability for consumers. The licence must therefore evolve at a fast rate to allow for companies to innovate and bring more modern, relevant offers quickly to market without fear of outdated restrictions in the licence. We welcome the move by Ofgem to do this (prompted by the CMA) by moving to a principles based regulation environment. We recognise that the licence must continue to protect the best interests of consumers but it must also recognise that the consumer market is changing quickly and the regulation must allow for this change in pace.

Positive messaging

68. It is imperative that a "trusted voice" is able to re-inforce the messages from energy suppliers relating the benefits of smart tariffs. Both Ofgem and/or Citizens Advice seem well placed to be able to offer reassurance and advice to consumers on this topic. Such an approach is likely to be a positive step towards restoring trust and consumer confidence in the energy market.

Question 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.

69. As a broad point we consider that consumers and companies combined will drive the market, rather than policy makers. It is Government and Ofgem's role to ensure that the policy is fair, is principles based and keeps pace with market requirements.

70. One possible area for Government/Ofgem to consider around fairness is the accessibility/affordability of smart tariffs and connected homes for the less well-off in society. Such consumer groups may find it difficult to access bundled smart energy offers which may be unaffordable where they are presented as an add-on to the bills. Given that such measures as smart devices, controls and appliances are designed to achieve a better level of health and comfort, Government may wish to consider how these measures can be made more accessible to all consumers. Without intervention it is likely that these benefits will only be accessible by more affluent consumers and hence a degree of policy intervention here may be deemed necessary.

71. Two possible approaches seem equally feasible and both have the advantage of utilising the current policy structure:

- Firstly, the pay as you save type infrastructure introduced by the Green Deal may be a useful route to achieve the take-up for many people to achieve a combination of energy efficiency measures and connected home benefits using smart tariffs. Lessons learned in the application of the Green Deal would need to be applied to ensure a pay as you save option was attractive to consumers.

- Secondly, if further financial assistance is needed for some groups, then it is possible that extending the range of qualifying measures under the existing ECO scheme could be effective. Measures such as smart controls, energy storage and smart appliances could be included as complimentary measures under ECO.

Question 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?

72. ENGIE operates in the Spanish market where it is expected that, by the end of 2018, all meters will be smart. Additionally, under the Voluntary Price for the Small Consumer (PVPC in Spanish), customers with smart meters are exposed directly to spot prices.

73. From ENGIE's observations, there has not been a clear response of customers to these spot prices. Whilst there is not a specific report on the current situation the lack of response could be explained by:

    - If the meter is outside the house, real time consumption information is not visible unless the customer has some kind of app provided by the supplier. Up to now, only a few suppliers offer these apps.

    - Access to customers' data (in real time and as a load profile) is difficult for suppliers because of data protection laws. Ways to improve this situation are being debated.

- The customer cannot see in a single place both consumption and price information - the information related to applicable energy prices at each hourly period is only available on the TSO's webpage.

- There is not a common protocol for all smart meters - each distributor decided on its own platform.

- There is no platform to allow remote access to the smart meters (for demand side management, for example).

- Recent technology developments such at the Internet of Things coupled with the rapid pace of new developments may make smart meters obsolete. Consumers may therefore be reluctant to invest time and/or money in extracting value from their smart meters.

Question 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?

74. Our experience has been mixed.

75. The uptake of smarter Time of Use type pricing structures in the Industrial and Commercial market has been very strong. The majority of consumers here are exposed to time of day differentials, index based pricing and pass through type arrangements for policy and network costs. This sector is mostly served by experienced in-house energy buyers on behalf of large corporations or bespoke brokers.

76. In the SME sector our experience has been different, and less successful. On the back of our success in the I&C market, in 2014 we tried to offer a three rate tariff (day/night/peak) to the SME sector but this was not launched due to a number of barriers we identified in our research. Our route to market in this sector is primarily via energy brokers and we identified the following barriers:

<u>Tenders (from brokers/customers) are mainly restricted to 2 rate price structure requirements (day/night)</u>

77. This could be viewed as a legacy problem relating to the traditional pricing structures which have been prevalent for many years in this sector and it may be that a concerted education programme could make a difference to contracting attitudes over time. Such an approach would benefit from Government/Ofgem/media promotion of the benefits of smarter tariffs for the SME sector. An education programme could well be achieved efficiently as part of the Smart Energy GB education programme relating to the Smart Meter rollout.

<u>Misaligned DUoS red rates</u>

78. Our three rate tariff structure was envisaged to reflect the DUoS charging structure time bands and help SME consumers to achieve savings in the most expensive peak charging periods. However it has proved impossible to launch a national product on this basis due to the fact that each DNO is able to

define its own peak charging periods. In reality many of these charging periods are misaligned and this causes additional confusion for customers as a "best fit" type national approach would miss some regionally diverse periods. A fix to this anomaly, by aligning the DUoS red periods, would be beneficial and is within Ofgem's gift to review for the next distribution price control review.

Load management is not a priority for SME businesses

79. Our research identified a low propensity to consider or undertake load management in the SME sector mainly due to existing behaviours or a perceived lack of worthwhile savings over and above any savings already realised on a two rate price structure. It is possible that a combination of improved information and more advanced technology such as energy storage and more advanced automated control systems could change perceptions in the SME market over time.

Questions 19 – 20 Smart Distribution Tariffs

Question 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.

80. The current DUoS charging methodology has a unit pricing mechanism that pre-determines what the price of electricity will be at certain time periods of the day (i.e. the red, amber and green time periods). This could act as barrier to a more flexible distribution charging system required to underpin a smart distribution charging system. It offers very limited incentive to be more dynamic and flexible in how one consumes, produces or stores energy- as the only price signals to change consumption or production patterns are limited to those of the 3 time periods (red, amber, green).

81. However this certainty in pricing and period is more beneficial to CHP and district energy schemes as it enables them to better manage loads and thermal storage to operate against these differently priced periods. This is important as CHP systems have a natural lag, meaning that plant cannot be switched on/off as easily to match the instantaneous price signalling likely to result from a change to a smarter distribution charging regime, which would require swifter responses to changes in price signals. If the distribution charging regime was to change to facilitate more flexible generation, adaptation for CHP would be challenging.

Question 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?

82. ENGIE believes that any changes to distribution charging should as far as possible include sufficient advance warning on prices to allow time to respond to the price signal. This is important for operators of generating systems with a natural lag, such as CHP systems, which cannot be switched on/off as easily to match the instantaneous changes to price signals likely to occur under a smarter distribution charging regime.

Questions 21-24

No comment.

Providing price signals for flexibility questions 25-27

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

83. We have provided thoughts on this topic in response to the other consultation questions. See for instance Q1, 3, 7, 11, 15, 26 and 27.

Question 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?

84. Currently in the CM Rules, an Agent can only act on behalf of one Applicant. Navigating through the CM Rules is not easy. Participation in the CM could be improved if Agents were able to help more than one Applicant to pre-qualify: as it is there are not enough "experts" to go round. Two CM rule changes have been raised to address this. We recognise that BEIS introduced the one Agent per Applicant to ensure confidentiality and also protect against market manipulation. Limiting the role of the Agent only to pre-qualification would avoid concerns about market manipulation. Alternatively the role of Agent could be extended to bidding into the auction but with a limit on CMU size of for example 50MW and also a limit on the number of Applicants that an Agent can act for.

85. As noted in the response to Q7, one immediate improvement to address the lack of contractual certainty to justify investments in DSR would be to allow new DSR to seek multi-year contracts in the Capacity Mechanism. The CM multi-year expenditure thresholds may need to be reviewed if they are unachievable for DSR.

Question 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?

86. ENGIE supports the removal of the demand TNUoS residual benefit. As noted in response to earlier questions, further work is needed to address non BM STOR spill payments and BSUoS charging. The removal of the embedded benefit will result in higher peak prices as embedded generators will not be 'chasing Triads'. This will be beneficial to all generators including renewables.

87. ENGIE welcome's Ofgem's review of BSUoS in their recently published draft forward workplan. Since balancing actions need to be taken to manage the intermittency of renewable generation, BSUoS charges should be levied across all metered generation and (non-storage) demand, not just transmission connected.

A system for the consumer Smart Appliances – questions 28-32

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

88. ENGIE broadly agrees. However, it is unlikely that simultaneous activation of loads following price signals will be something that can be controlled. The whole essence of smart technology is it reacts in a smart manner and we question whether it would be possible to avoid demand spikes when prices fall or rise. Smart appliances already exist and most experts believe nearly all kitchen and home appliances not smart today will be in the next two years.

Question 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

89. ENGIE believes that Option B is unrealistic. Over the next couple of years most appliances in the home will be smart based. Many are already smart today. The driver for this is control/automation, not price savings. In ENGIE's view, smart metering will not be in place fully until c 2025, partially from 2018. This is too late for the smart appliance market which has already happened. It will not be something that can be regulated to stop users following prices should they seek to do so.

90. As soon as the market moves to HH prices, we envisage that there will be smart price apps on the market that will be available to customers seeking to track prices and react.

91. For Option C, there are different levels of "Smart appliances" which require different considerations and different levels of customer engagement.

- Fully automatic Smart Appliances where the appliance is designed in such a way that the consumer cannot modify or switch off the smart operation mode. (for example, the controls of compressors in refrigerators and freezers)
- Customer set appliances where the consumer is asked to select the smart operation of the appliance, e.g. during a setup procedure when installing the appliance.
- Appliances that require Customer decisions at each usage point.eg A smart cycle on a washing machine

92. Depending on the appliance in question one or other of these options will be available and will determine the potential for load movement of that appliance.

93. In all cases, understanding of the price impacts of decisions will be key to customer engagement. In the case of customers purchasing fully automatic smart appliances, the manufacturers need to be able to effectively sell the advantages to the customer. Again, understanding the potential savings possible by smart use will be a key element in their promotion.

Question 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)**

94. Electric heating and water heaters provide the potential for large shifting of demand, but these potentials are already used in many cases by simple night time operation of storage units. Home electric heating could be used more effectively with smart control. There is a huge amount of Electric Heating (Storage heating) installed in city centre housing. Estimates vary but it could be between 10-15GWs. This offers an opportunity simply from the scale of the load.

95. Dishwashers provide quite long time spans of load shifting and their smart use (through timer delays) already seems acceptable to many users. Cold appliances such as refrigerators and freezers allow for a fully automatic smart operation, but have a low power consumption per appliance and are only able to deliver relatively short durations of load reduction. Washing machines and tumble dryers are attractive options for Demand Response, but they require a closer interaction with the user compared to other appliances. Ovens are not really suitable for load management as they are used on demand, and air conditioners and circulation pumps are only partly suitable.

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

96. Smart appliances already exist and their widespread use is inevitable. The amount they follow price signals to reduce costs depends on the ease of doing so and the extent of the potential gain. The amount of automated or customer initiated response of smart appliances to prices will therefore be a function of these two features.

Question 32 - Are there any other options that we should be considering with regards to mitigating potential risks, in particular with relation to vulnerable consumers?

97. There are potential areas that the public need to be given confidence will not be abused. The privacy of an individual's data is one such area. The other relates to the Landlord/ Tenant relationship relating to automated control of a tenants appliances by a landlord/owner and the rights of the tenant. This could impact vulnerable customers. Government should work with and consult local authorities and housing associations to ensure a tenants rights are clearly communicated regarding Smart appliances. This forms a key part of building trust with customers over the future use of smart metering.

A system for the consumer - Ultra Low Emission Vehicles

Question 33 - How might Government and industry best engage electric vehicle users to promote smart charging for system benefit?

98. Smart Charging will be facilitated in the same way as smart appliances. Smart charging needs to be simple and meet the challenge of not impacting on the customer experience. The ease by which customers can take advantage of price signals, via supplier tariffs and offers and the potential gain from doing so will determine the potential. If the incentives are significant then this could offer potential due to the size of the numbers of charging points and connected load potentially available.

99. Incentives to install smart charging that reduce the maximum demand of an installation at a site and therefore the impact on the local grid need to recognise that the person/entity investing in the charging infrastructure and the user of the facility are often different and have different motivations. Both need to be met.

100. Synchronising charging to the lower cost periods by intelligent apps will reduce costs to customers in exchange for taking their charge at times that help the grid. Optimising large numbers of users to minimise overall demand will reduce fleet/company owners over charges.

101. How this can work on a large scale needs to be trialled to understand what options there actually are for incentives and what restrictions to charging regimes may be needed.

Example : Living Lab Smart Charging, Netherlands

There are small-scale smart charging and vehicle to grid projects happening in the UK, the US, across Europe and around the world. However, the "Living Lab Smart Charging" project in the Netherlands is a good example of a larger scale project and is based on joined up thinking on how to organise smart charging on a large scale.

The project aims to be "smart" and offer connectivity with electric vehicle charging stations across large networks and control the charging load and match it with peak production of renewable energy. That way electric vehicles get the most out of the grid when the sun is shining and the wind is blowing, and peak demand from electric vehicle charging can be reduced.

The project is an open platform to support smart charging. EV charging station companies and network operators can join the platform. Electric vehicle owners using the stations can have access to an app to set their preferences for charging and they can earn money for being more accommodating to the grid requirements.

A press release for the 'Living Lab Smart Charging' explains its 3 steps process:

- Step 1 - make as many charging stations ready for Smart Charging. A huge upgrade operation is now taking place across the country making sure the existing charging stations will be able to technically facilitate Smart Charging. All new stations already are Smart Charging Ready, such as the 2.500 new charging points being rolled out by the Southern provinces of Noord-Brabant and Limburg.
- Step 2 - use those innovative stations for research and testing of Smart Charging. There is for example an app that allows its users to earn money by using technology to charge the car in the middle of the night when the wind is still producing power but there is little demand for it. In Utrecht 'vehicle to grid' is being tested together with Renault: charging the electric car with solar panels and using it as storage to put power back into the grid when the sun is no longer shining.
- Step 3 - putting all innovation, tests and research findings into international standards so everyone can benefit from the Dutch experience with Smart Charging.

There is significant participation in the project with over 300 municipalities (including Amsterdam, Rotterdam, Utrecht and The Hague) having joined the initiative. The municipalities represent 80% of the public chargers in the Netherlands. In addition private and semi-private charging station companies such as EV-Box have joined the project.

The 'Living Lab Smart Charging' initiative is still equipping stations with its smart charging tech. Their website says that they are about 47% done.

While the program primarily focuses on controlling the charging load to get the most out of renewable energy, it will also run tests with vehicle-to-grid technology for electric vehicle to store energy at low demand and feed it back into the grid at peak demand.

There is a video that goes with the project https://www.youtube.com/watch?v=pNsW8DitBCg

Question 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?**

102. The take up of ULEVs is still in its infancy, with under 100,000 sales this year. ENGIE believes it is likely that the number of vehicles will start to grow rapidly during 2017 and more into 2018. This growth will require a bigger range of attractive models with better range capability. There is also a need for a significant investment in EV charging infrastructure to facilitate their use in most cities.

103. Measures to encourage the uptake of ULEVs must increase due to the need to improve urban air quality and achieve carbon objectives. The development of a large network of charging infrastructure is urgently needed in most urban areas if ULEVs are to become widespread. That infrastructure will increasingly be smart charging and be capable of optimising load and provide services if the financial case to do so exists.

104. Assuming that the issues surrounding poor battery range and limited EV infrastructure are overcome, and that EV ownership grows significantly, then as demand grows there will be the need for public, business and domestic customer propositions that offer customers service and value. This should increasingly be built around “Smart Charging” if price signals facilitate it.

105. The primary use of ULEVs is transport. It is not as a provider of demand services. If they are to be used to provide such services it must not impinge on the vehicles usability.

106. Existing smart charging systems optimise load across charging points (We have developed these systems for our customers in other countries) and can reduce demand of a portfolio of charge points by circa 50%. The growth in smart charging solutions will be facilitated either by regulation or by economic benefits to the user/customer.

107. Using ULEV batteries to provide response will develop in the same way if the remuneration is clear and simple systems allow it.

108. National Grid currently deals with small numbers of counterparties for demand related services. In the world of smart charging and smart appliances there will be many thousands of potential actors. Unless National Grid is developed to become a customer facing business and builds systems to interact with many thousands of customers (which might contradict its role as SO) it will have to rely on aggregation services or via supplier tariff price signals offering the end user a sufficient incentive to react. This highlights the potential for growth in aggregation services and the increasing need for it to be regulated.

109. Either way the ability to forecast the changes in demand that will result from price movements or incentives will be much more difficult. Current demand response is provided via specific contracts by interested parties. Load response from the smart world of ULEVs and appliances will be via disinterested 3rd parties via machines for which demand response is not the primary purpose.

110. If as is likely, automated apps that take price signals and allow the owner/user to enable their appliance to respond become widely available it is likely to mean that National Grid lose the level of control they have today.

Question 35 - What barriers (regulatory or otherwise) are there to the use of hydrogen water electrolysis as a renewable energy storage medium?

111. ENGIE has huge experience around the world in renewable generation, Gas supply, networks and storage. Currently ENGIE is working on a range of Hydrogen projects (production, mobility, power to gas etc.) The production of Green hydrogen (produced from water and renewable electricity) is an area of focus. We have a number pilot projects underway and believe that Hydrogen as a storage medium could offer potential. It could even be a game changer, and work in the flexibility arena needs to encapsulate this opportunity.

Consumer Engagement with DSR questions 36-39

Question 36 - Can you provide any evidence demonstrating how large non-domestic consumers currently find out about and provide DSR services?

112. ENGIE Energy Solutions currently provide customers with tailored information such as guides and presentations and host webinars on the market opportunities for large non-domestic customers to provide DSR to the market place. Some of these events have been supported by National Grid[7].

113. Typically large non-domestic consumers receive information from Aggregators and other market participants such as MEUC, and increasingly energy suppliers.

114. National Grid have taken a more proactive stance on providing market information through the Power responsive campaign.

115. In additional to the National Grid events, there are industry events and market publications with paid for advertising from aggregators.

Question 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?

7 https://event.on24.com/eventRegistration/EventLobbyServlet?target=reg20.jsp&referrer=http%3A%2F%2Fwww.gdfsuez-energy.co.uk%2FIndustry-Information%2FWebinars&eventid=1135478&sessionid=1&key=5353DBEFE4CDE8DAE5175BD497880ADB&regTag=&sourcepage=register

116. Customers currently utilising one of the numerous DSR/Balancing services are usually of significant scale (within the traditional I&C footprint).

117. ENGIE has identified a number of reasons to explain why potential customers of smaller size are reluctant to consider DSR:

- They're confused by the different options available to them;
- They don't feel they have the specialist knowledge in house to source or manage a solution and it's not a business priority (not core business);
- They have not been presented to or do not understand the business case for deployment and perceive that there is revenue uncertainty (tendered service/short contracts/changing Grid requirements/lower prices since diesel farm influx);
- A number of the existing aggregated DSR service providers are start-up businesses and their status does not imply longevity/low credibility/poor credit due to loss making activities/hard selling services); and
- A barrier that our customers constantly iterate is that, the payments would need to be higher in order to justify reductions in process load. This is due to the technology needed to dispatch the load management to comply with National Grid's requirements (i.e. control solutions and high grade metering).

Question 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?

118. National Grid through Power Responsive has recently made great strides in improving consumer engagement with large non-domestic consumers.

119. Further engagement could be done to support the enabling technologies (controls, management systems, metering) as well as the online capability of National Grid in terms of their method of procuring services.

Question 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)?

120. The ultimate trigger point for price responsiveness is when profile classes 1-8 are truly HH settled and domestic is incentivised via time of use tariffs and the potential to truly buy flexibly. As the internet of things and connected homes markets develop within the UK, engagement with technology developers would be important to ensure potential solutions that provide frequency response are thought about in the design process.

121. Also the forward curve in electric vehicles and home car charging infrastructure to a critical mass is a further trigger point. The ability to utilise electric vehicles as a form of demand and storage is critical to ensuring an effective energy system is delivered. Engagement with consumers, automotive manufacturers and charging infrastructure providers is a critical activity to be undertaken.

A system for the consumer - Consumer Protection and Cyber Security

Question 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**

122. Data protection and data security must be paramount to ensure that hacking of customer data and the ability for third parties to take control of automated machines is minimised.

123. Today there are millions of Internet-connected devices being deployed into mission-critical systems. The potential security risks and implications have grown exponentially because anyone with a web connection has the potential to compromise these systems. Security issues must be at the heart of any development.

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

124. Recent events in Ukraine illustrate this point. The country's power system was hacked in March this year and many thousands of customers taken off line. The power blackout was caused by a cyber attack.

125. According to the reports on the incident[8], attackers worked remotely to conduct extensive monitoring of the power grid's networks, steal system operators' credentials, switch breakers and leave more than 225,000 Ukrainians without power. At the same time they flooded the call centres with spurious calls to stop customers making contact regarding the loss of power. This is a serious situation that must be avoided, both for purposes of energy security of supply and national security.

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

126. System security experts have written extensively on the aftermath of the Ukraine power system cyberattack highlighting risk areas that need to be addressed.

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

[8] http://www.nerc.com/pa/CI/ESISAC/Documents/E-ISAC_SANS_Ukraine_DUC_18Mar2016.pdf

127. Increasing the system interaction with the Gas networks in the debate about the potential deployment of Hydrogen as a replacement fuel for gas (H21 Leeds Citygate project) would seem logical from a longer term planning perspective.

Questions 44 -48

No comments

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