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1 July 2013

'Creating the right environment for demand side response'

Thank you for the opportunity to respond to this consultation. We are very supportive of the work that Ofgem is progressing within the Smarter Markets programme and welcome the opportunity to provide our views on demand side response, a topic that is closely interlinked with the three other strands of Smarter Markets.

We agree with Ofgem's consultation that demand side response (DSR) has the potential to reduce customer bills, enhance security of supply and avoid unnecessary network reinforcement. But we have serious concerns that many of the discussions around DSR in industry forums and Smart Grid workgroups to date have focussed on the role of DNOs. Equal focus should be given to the role of other industry parties who have proven critical to the development of DSR in other markets. In the U.S., for example, suppliers and third party aggregators have responded to intra-day price differentials by creating innovative customer propositions that have successfully shifted demand from peak to off peak.

The lack of cost reflective price signals in the UK is a barrier preventing a similar market developing in the UK. For DSR to flourish, the focus should be on creating a regulatory framework which ensures that cost reflective price signals are passed through to customers.

In this letter and the attached response to the consultation specific questions, we set out our views on how DSR may benefit customers, why only a competitive market can deliver the full benefits of DSR to customers and what barriers need to be removed for a DSR market to flourish.

Consumer benefits

Consumers will ultimately bear the costs of Britain's transition to a low carbon future and they should be able to reap the benefits of that through technological advancements in the way they can use energy.

With customer bills forecast to rise in the future it is important that any and all methods of reducing energy costs should be made available to them. Environmental programmes such as Green Deal and the Energy Company Obligation will allow customers to benefit from demand reduction measures but at present there is no incentive for customers to shift peak demand or reduce demand at times of peak network capacity, even though such behaviour would reduce stress on an energy system designed to supply maximum peak electricity.

Our research¹ has shown that customers are able to easily grasp the concept of electricity prices varying throughout the day and are willing to actively respond when placed on time of use tariffs that have a higher rate at peak times - our trials have shown reductions in peak demand of 14%. This

¹ Based on preliminary data from the Customer Led Network Revolution

has been largely down to the time and effort we have put into ensuring a clear and concise message is conveyed to customers so that they are both informed and engaged.

Mandating DSR products on customers is likely to provoke significant push back and the best way to engage with customers is to offer attractive propositions to encourage active consumer participation. Time of use tariffs are proving appealing to customers in the United States, Direct Energy has experienced success with their 'free power days' proposition - shifting demand by up to 14% to off peak days. Though not designed with any penalties at peak times, consumers are rewarded for moving high consumption activities that are not time sensitive, such as washing, drying and dishwashing to off-peak times.

Competitive market

We note that the Ofgem consultation document states that the roles of market participants within DSR is for future consideration but we feel it would be useful to set out our initial thoughts on this topic.

The energy supply market has been entrusted with the rollout of Smart meters in GB and this competitive market will also be able to deliver cost-effective and innovative DSR products that will benefit customers.

There have been discussions in Smart Grid Forum meetings about distribution network operators (DNOs) engaging with customers to offer DSR products. This will only lead to customer confusion as DNOs do not have an existing relationship with the customer nor do they have the skills or necessary infrastructure in place to actively engage with consumers.

Offering commercial products to customers does not logically fit within a DNO's core business. Moreover DNO draft business plans suggest that over £1bn of investment will be needed for them to establish a customer contact infrastructure to offer DSR products. This is a significant amount of customers' money being wasted in duplicating systems, processes and an infrastructure that already exists within supplier businesses.

A competitive market will ensure cost effective solutions are delivered and once the forecast differential in peak and off-peak prices emerges in the future, DSR products will naturally come to market.

Barriers to DSR

At present DSR is only commercially viable in certain markets such as Short Term Operating Reserve (STOR), but as the GB generation mix transitions towards renewable energy, it's likely that generating margins will fall and the cost of electricity at certain times will increase.

This will eventually provide the commercial incentive for companies to offer DSR products to customers. To facilitate this market development, changes to the current regulatory framework are needed for capital investment savings to cascade through to customers, such that they can receive the benefits of both reducing and shifting demand away from peak periods.

Some of these regulatory changes are already underway and we are keen to support DECC and Ofgem in their development of a capacity mechanism, cash-out review and settlement reform

respectively. However, other barriers around cost-reflectivity still need to be addressed to enable a commercial DSR market to evolve.

A key regulatory barrier to creating the right environment for demand side response is the lack of transparency in network investment and how different investment choices could change use of system charges in the future – it is unclear how much the cost of network reinforcement will be for resolving any particular constraint.

Network charges continue to evolve to be more reflective of peak and off-peak usage but they are far from being truly cost-reflective with respect to time of use. We recognise there is balance that must be maintained between reflectivity and volatility. This balance would result in suppliers being incentivised to encourage active demand side participation from customers and still being able to accurately forecast network charges.

Another key barrier is that while DSR clearly has the potential to deliver carbon savings from reducing peak generation and avoiding the need to build new generation plant, there is currently no mechanism for customers or their suppliers to be rewarded for the environmental benefits DSR delivers. With ECO recognising the carbon savings from demand reduction, a similar programme could ensure customers receive the sustainability benefits of demand shifting as well. Companies could be incentivised to help customers find ways to shift demand in a way that is both measurable and verifiable.

Our final key concern is around timing with some industry parties believing that DSR will not be necessary until 2023. The GB generation mix is already transitioning towards renewable technology and with the Large Combustion Plant Directive resulting in fossil fuel plant closures in the near future, it is likely that the need for DSR tariffs and customer engagement will increase before 2020. It is important that any regulatory barriers currently preventing this market revolution are addressed so they do not hinder the development of a competitive DSR market.

If the aforementioned barriers were removed and appropriate market signals meant there was value to customers and suppliers in a DSR market, British Gas would seek to leverage our experience in Smart with our existing customer base to offer them innovative and attractive DSR propositions. This would also remove the barriers for other DSR providers to participate, whether it is suppliers, aggregators or other third parties.

This letter is a concise summary of our views around how DSR will evolve and each issue is discussed in more detail in the attached response to the consultation specific questions.

We would welcome the opportunity to discuss these views in more detail with you. For any questions on this response, please contact Tabish Khan in the first instance on 07789 575 665 / <u>Tabish.khan@britishgas.co.uk</u>.

Ian Peters Managing Director, Energy British Gas

Appendix 1: Response to Consultation Questions

Question 1: Are there any additional key challenges associated with revealing the value of demand-side response across the system? If so, please identify and explain these challenges.

- 1. The key challenge for DSR revolves around customers and ensuring that they both are informed about the need for demand side response and have the right types of DSR products available to them. DSR products will need to be both easy to use and delivering tangible benefits to consumers. They will also need to be understandable, clearly communicated and responsibly marketed.
- 2. We have serious concerns that discussions in industry forums and workgroups to date have focussed primarily on security of supply and avoiding the need for network reinforcement, to the detriment of exploring how customers will engage with DSR products and how to ensure that they can reap the benefits of participating in a DSR market.
- 3. To fully realise the benefits of DSR, there is a need to understand the value it can deliver to customers, both quantitative through financial incentives and qualitative such as avoiding the need for road works for network reinforcement and contributing to a sustainable future. Many suppliers have experienced success with 'green' tariffs and the selling point of helping the environment should also be considered as part of the value DSR offers to customers..
- 4. The Low Carbon Networks Fund (LCNF) is currently geared towards delivering network benefits yet direct consumer benefits are seldom explored. Separate funding for trials that are required to demonstrate benefits solely to customers may be one way to explore these options. This trial could be made open to all suppliers and aggregators to ensure that no particular company gains an undue competitive advantage from participating.
- 5. The Ofgem consultation makes it clear that DSR has the potential to deliver carbon savings through avoiding the need for new generation, and by shifting load away from times that would require the operation of peaking plant, which may have higher CO2 emissions. Yet there is currently no mechanism for recognising these benefits and customers who shift their demand will not be rewarded for the amount of carbon they have offset.
- 6. The energy company obligation (ECO) has been developed to reward customers via savings on their bills for demand reduction measures. A similar scheme aimed at demand shifting may be a logical step to ensure that the carbon savings of DSR are also recognised.

Question 2: Can current regulatory and commercial arrangements provide the means to secure demand-side response being delivered? If not, what will regulatory and commercial arrangements need to deliver in future?

- 7. Outside of the Short term operative reserve (STOR) market, it is clear that the price signals are not yet sharp enough for a DSR market to expand beyond trial level. However, the generation mix is currently evolving, the large combustion plant directive is starting to take effect and the Electricity Market Reform is on track to deliver the first capacity auctions in 2014.
- 8. All of these changes combined are likely to deliver the price peaks and variations that are needed for DSR to become a commercially viable market. When this happens, it is important that there are no regulatory barriers in place preventing this market from emerging and growing.
- 9. Many industry participants consider that DSR products will not come to market until 2020 at the earliest. Yet it is clear from the aforementioned changes in the energy sector that they could be necessary and commercially viable for customers as early as 2016.
- 10. One key piece of necessary regulatory change is electricity settlement reform. For the cost savings delivered by a time of use tariff to be fully realised on a customer's bill requires a settlement regime that allows any customer to be settled half-hourly without incurring additional charges. Currently settling half

hourly incurs costs of agent re-qualification and requires adherence to a stricter set of performance measures. This negates the benefits of migrating time of use customers into half hourly settlement.

- 11. There is currently a methodology to reflect some of the time of use elements in the bills customers receive. This involves utilising standard settlement classes and time pattern regimes; however it is a cumbersome process and still involves a degree of profiling so is not a fully accurate representation of the cost savings delivered by load shifting. It is evident that the introduction of more sophisticated time of use tariffs will require this methodology to be revisited, together with consideration of the consumer impact of these tariffs.
- 12. 'Dynamic time of use' tariffs ideally require an accessible half hourly settlement regime to be in place so that accurate costs can be passed to consumers and the full potential for load shifting may not be realised without the development of such tariffs. Dynamic time of use tariffs have varying rates for usage of electricity dependent on the cost of delivering energy to customers at that particular time. These are more complex tariffs but have greater potential to more accurately and efficiently relieve occurrences of network stress. Such tariffs are not able to pass through accurate costs to consumers without an accessible half hourly settlement regime in place.
- 13. We recognise and support the fact that this work is being taken forward as part of the wider Smarter Markets programme and we will continue to engage with Ofgem and seek to provide valuable input to ensure this work stream is progressed and arrives at a cost-effective solution for settlement reform.
- 14. We note that any reform of electricity settlement will need to strike a balance between enabling DSR and delivering a solution that is also fit for purpose for the majority of customers who are not on time of use tariffs.
- 15. The Retail Market Review (RMR) proposes to limit the number of tariffs that suppliers can offer. Time of use tariffs are key for engaging customers on DSR and we are comforted to see that the RMR proposals allow for up to four time of use tariffs. Should dynamic time of use tariffs evolve then this may no longer be an appropriate cap.
- 16. We note that Ofgem has stated that it intends to revisit the RMR proposals in the future once they are established. At this time it would be prudent to re-assess the time of use tariff market to determine whether this particular tariff cap is still appropriate
- 17. Time of use tariffs will bring their own challenges of how to ensure customers are able to understand and compare tariffs as they will be different to existing tariffs. We foresee these products only being applicable to customers who are willing to engage with DSR. As this will be an optional product, an upfront clear explanation of how a prospective tariff will work, should minimise customer confusion.

Question 3: Is current work on improving clarity around interactions between industry parties sufficient? If not, what further work is needed to provide this clarity?

- 18. Confirmation is needed from Ofgem around the framework for a competitive DSR market. Competitive markets are able to deliver the innovation and cost pass through of DSR to customers. Once any regulatory barriers are removed (see response to question 2), a competitive market will develop when price signals and consumer engagement align such that DSR products become commercially viable.
- 19. If regulated network operators are given the primary role in a DSR market then this risks creating a false market where customers are being offered DSR products without the necessary commercial drivers being in place. Regulated entities also lack the customer infrastructure to communicate with end consumers, design products they will find appealing or manage customer queries and complaints. Network operators have estimated that it may cost them over £1 billion pounds² to establish the necessary assets and processes to manage this customer infrastructure, whereas it is already in place for suppliers. This

² Extrapolated from DNO draft business plans

additional DNO expenditure would be financed by end consumers with no guarantee that these costs will be offset by cheaper network charges.

- 20. A competitive market would be open to suppliers, aggregators and other third parties including new entrants. Network operators could also take part as long as it is part of a ringfenced business a part of the network company that does not receive any Ofgem determined funding but is financed by investors.
- 21. Another important aspect of a competitive market is that there must be a level playing field between all participants in terms of access to information. All companies in the market should be able to see where constraints need alleviating and the degree of demand reduction and/or shifting that is required. This concept of a level playing field does not work if you have non-ringfenced network operators operating in this market. They would have a conflict of interest as they would be both the vendor and the buyer of DSR products.
- 22. We recognise that a similar argument may be made for suppliers having access to more data from smart meters than aggregators or other third parties may have. But though we may have access to it, it is the customer's data and they are able to share it with any prospective DSR provider they choose via the Customer Identification Number process facilitated by the DCC. Network data is wholly managed by the network companies and they have no requirement to share information about the costs of network management or reinforcement at a granular level.

Question 4: Are there any additional key challenges associated with effectively signalling the value of demandside response to consumers? If so, please identify and explain these challenges.

- 23. The key challenge around consumer engagement is in both developing innovative and attractive propositions, and ensuring customers receive significant and continuing benefits from signing up to a DSR product.
- 24. Research in trials³ has shown that the peak / off-peak differential needs to be significant for customers to respond to price signals. The differential used in our trials was an estimate based on what we predict future electricity prices to be⁴. This evidence suggests that customers will engage with similar propositions in the future as long as price signals are sharp enough to offer a significant financial incentive.
- 25. Customers on our electric vehicle time of use tariff have also demonstrated the ability to shift their peak demand away from the national evening peak.
- 26. The qualitative and unquantifiable benefits of DSR also need to be explored. The potential of avoiding brownout and blackouts will appeal to customers, as will avoiding the need for road works related to network reinforcement.
- 27. Many customers also value the ability to live sustainably and the 'green' benefits of a Smart Grid will also appeal to certain customers particularly to those that are already on green tariffs.
- 28. The consultation identifies that the use of dynamic time of use tariffs is likely to require a degree of automation. Our CLNR findings suggest that most customers are willing to accept direct control of their appliance as long as they are able to override the signals if they choose to.
- 29. As evidenced by negative articles in the press about fridge frequency, customer engagement is a necessity before any kind of automation can be proposed.
- 30. The consultation alludes to a reliance on suppliers passing through price signals to customers and there have been suggestions at industry work groups that suppliers would not pass on this signal to customers. We would like to answer these comments by clarifying that any demand side response product is only

³ As part of the customer led network revolution project. Interim results:

http://www.networkrevolution.co.uk/industryzone/projectlibrary/learning-outcome-one-results

⁴ Prices that customers will see, including wholesale purchasing prices and network charges.

successful if customers are able to realise the benefits of their response. Also, DSR is likely to be a competitive market, with a number of providers developing DSR propositions. Thus DSR providers will have a strong incentive to pass any price signals through to end consumers on DSR propositions.

Question 5: Do you agree that signals to customers need to improve in order for customers to realise the full value of demand-side response? Does improving these signals require incremental adaptation of current arrangements, or a new set of arrangements?

- 31. Thanks to the reliability of the GB system operator and transmission and distribution networks to date, blackouts and brownouts are not a common occurrence. This is unquestionably a positive outcome for customers but it does mean that they are less aware of the risks of having small margins between demand and available generation. They are also largely unaware of local constraints customers do not have to worry about causing a local blackout when switching on a new appliance.
- 32. There is a question around whether customers need to understand the security of supply risk. If demand side response products are attractive enough to encourage significant customer uptake then arguably the need to educate consumers on this risk becomes less of a priority as it will be addressed by those customers who choose to engage with DSR products.
- 33. With the exception of customers on Economy 7 and Economy 10 tariffs, most people are not used to having two rates for electricity consumption at different times of the day. However, our CLNR trials have shown that it is a simple concept for most customers to grasp. Peak and off peak charges are familiar to everyone, through experiences with train fares and telephone contracts so the concept of electricity being expensive at times of high demand is not difficult to convey.
- 34. A successful rollout of smart meters is an essential step towards the take up of DSR products and customer interviews⁵ have shown that some customers are of the view that the in-home display and time of use are part of the same offering. Smart meter data can be used to help model scenarios for customers, explaining how their activity might fit a DSR proposition and demonstrating expected savings on their bills.
- 35. The average age of a CLNR participant is over 60, thus proving that it is not only the younger more techsavvy customers that will engage with time of use tariffs, but that these products are attractive to a wider demographic.
- 36. CLNR findings also indicate very little push back on automating load management as long as customers have the ability to override centrally controlled demand management. These findings suggest that automation of DSR is an area worth exploring as long as the customer remains informed and ultimately in control of any services that they, or their household, provides.
- 37. Another element of load control where greater consumer research would be valuable is recognising which appliances customers are comfortable with remote management. We should avoid instances of load control whereby customers no longer feel like they are ultimately in control of their appliance usage and have to change their lives in a manner they find unacceptable, just to meet load limiting requirements.
- 38. As suppliers already have an existing relationship with our customers we are equipped to ensure any messages delivered to them are clear and concise. We have had a similar experience in our 'go early' rollout of smart meters where we have had to explain the new concept of a smart meter to many customers. This has been a successful campaign and we would be able to leverage these learnings to ensure we develop an equally engaging dialogue with our customers around DSR.
- 39. In the United States, demand side propositions are proving successful at reducing consumption and shifting load. Direct Energy's 'free power days' tariff is able to shift consumption away from peak to Saturdays (traditionally an off-peak day) by up to 14%.

⁵Conducted by Durham University as part of the CLNR project

Question 6: To what extent can current or new arrangements better accommodate cross-party impacts resulting from the use of demand-side response?

- 40. Any market for DSR will need to be designed so that there is transparency between parties as to the relationships that DSR suppliers have with customers. Currently customers have one contract with a licensed electricity supplier, but in the future this could evolve into two contracts with the DSR provider having a separate relationship with the customer that the energy supplier may not be aware of.
- 41. As Ofgem has correctly identified in the consultation document, this could result in the energy supplier being unable to forecast a customer's usage as they have no sight of the price signal incentives the customer is receiving from their DSR provider. The resulting imbalance costs may be significant if the supplier has a large portfolio of customers who are engaged with other DSR providers.
- 42. This unpredictability can be countered by ensuring that all DNO and system operator DSR requirements are made openly available. This will enable the energy supplier to note the price signals in the market and an estimated adjustment in forecasted demand, even if they are not the provider.
- 43. One other risk is that price signals from the system operator (SO), DNO and supplier to conflict. E.g. a supplier may receive an instruction from the SO to increase demand at a national level, but the only customers able to respond are in a specific geographical area. This may result in stress on the local network thereby negatively impacting the DNO. This example of conflicting requirements should be modelled to determine if a purely economic process (i.e. highest bid wins) will resolve such issues or whether a different method should be used. It will be important to ensure these conflicts do not result in customers losing out in terms of the benefits they are entitled to.

Question 7: Are there any additional key challenges associated with customer awareness and access to opportunities around demand-side response? If so please identify and explain these challenges.

- 44. An additional consideration for customer awareness, which has been picked up in the consultation document, is how to interact with different customer types. The level of knowledge and the time that a large business customer is able to dedicate to selecting the right DSR product will be different from that of a domestic or micro-business customer.
- 45. Domestic customers may also be further sub-divided into categories based on level of engagement with DSR and the number of low carbon and other technologies they have in the home that are able to respond to market signals.
- 46. Therefore any work that looks at how best to engage with customers should recognise the different requirements of each customer sector.
- 47. Within industry working groups there have also been discussions around requiring participation from customers in DSR. This is likely to receive some push back from customers who are not willing to engage and the case for mandating participation in DSR has not been made. It is likely that up to 10% of active customers in a DSR market may be sufficient to avoid the need for network investment, at both a regional and national scale.

Question 8: Is any additional work needed to explore the role of third parties in helping customers to access and assess demand-side response offerings?

- 48. It is unknown what types of service providers and suppliers will choose to operate in a future DSR market. For this reason, we recognise the need for light touch regulation so that there are no set rules that prevent innovative new entrants from offering DSR products to customers either directly of via an energy supplier.
- 49. However, we have a concern that if there is no form of accreditation then a potentially unscrupulous DSR provider may enter the market resulting in significant consumer detriment. To prevent this we suggest

that there should be some basic checks in place for any new entrants, potentially in line with how Green Deal accreditation is managed.

- 50. As smart meters and DSR are interlinked, any negative coverage on DSR products is likely to impact the reputation of smart meters as well. The suggestions above may go some way towards addressing this risk.
- 51. In line with our previous comments around ensuring a level playing field, it is important that third parties and aggregators be held to the relevant marketing conditions in supply licence condition 25 if they choose to engage with domestic customers. Suppliers will also be active in this market and to ensure open competition and customer protection, all DSR market participants should be beholden to the same regulatory requirements.
- 52. Data privacy obligations will also come into effect as part of the Government's Smart metering programme⁶ and it is important that any third parties should only be provided with half-hourly data if they have the permission from the customer.
- 53. Smart appliances may provide a means for customers to receive DSR services but there is currently little dialogue between manufacturers and the relevant Smart Grid forums. Standardisation of smart appliance is likely to be a necessary step before this market can develop and customers are able to integrate these appliances with the home area network.

Question 9: Are there additional preconditions for delivering the right environment for demand-side response? If so, please explain what these are and why they are important, as well as attaching a priority relative to those challenges we have already identified.

54. We consider that Ofgem has identified the correct preconditions.

Question 10: Do you agree with the priority and timing we have attached to addressing each of the key challenges identified above?

- 55. We agree with the priority of exploring the value of DSR first. The consultation notes that there has already been a significant amount of reports and analysis on this topic. We recommend an analysis of existing literature to determine what evidence and data is still required to establish the full value of DSR in GB.
- 56. As this work progresses into designing potential market models, party interactions will come to the forefront. British Gas, with the input of other suppliers, has done some thinking on what a future DSR market model may be. This ideas paper was presented to the Smart Grid Forum work stream 6 and though still an evolving document, we consider that it will prove to be valuable as part of Ofgem's ongoing work on DSR.
- 57. As expressed in our covering letter, we have some concerns around the estimated timing of implementation of a DSR market model. The energy market is already transitioning towards a world of intermittent generation and higher peak prices. Coupled with the LCPD and the Ofgem cash-out review, the differential in price between peak and off-peak is likely rise sharply over the next three to four years. This could result in a need for a DSR market several years before 2020.

⁶ Smart Metering Implementation Programme: Data access and privacy Consultation

Appendix 2: Draft DSM Supplier Strawman presented to Smart Gird Forum – Workstream 6



Straw-man: How suppliers may utilise DSM

This high level document is a supplier view of how demand side response (DSR) and load shifting – collectively referred to as DSM in this paper - may be utilised by suppliers.

This is a discussion paper written by British Gas, though other suppliers have been given the opportunity to input into this draft. It has been written for presentation at Smart Grids Forum Workstream 6 for discussion with the view that it will evolve in response to feedback.

This papers sets out some options on how a future DSM market may work, and supplier views on this approach are likely to evolve and change in the future, particularly once suppliers formulate their responses to the current Ofgem Demand Side Response consultation.

There are two main reasons why suppliers may want to operate DSM:

- **Supplier Balancing:** Supplier forecasting may indicate that aggregate customer consumption is likely to be misaligned with their contracted position. Suppliers may then be able to incentivise customers to increase or decrease demand to address this imbalance.
- **Network Balancing:** Any forecast geographical or locational constraints / surplus could be notified by the DNO or TSO into a marketplace. Any participating supplier⁷ would then be able to bid to alleviate all or part of this constraint / surplus.

We explore both models in more detail below. The two models are not mutually exclusive and may operate within one market:

Supplier Balancing

How might it work?

- Suppliers will design DSM products that will be attractive to end consumers, both business and domestic.
- Customers may choose to sign up to these time of use tariffs that will reward them for helping balance the market.

⁷ This doesn't have to be a licensed energy supplier, as an aggregator or other third party could fulfil this role.



Challenges to overcome

- Unclear what the level of customer uptake is likely to be both in terms of customers having the technology available and whether they will be sufficiently engaged to want a DSM product.
- What level of home energy automation will be required? Will customers feel comfortable with relinquishing control? Or must there always be a way for the customer to override any automation?
- How will customers be notified of a need to take action or automated processes? Through a Smart meter/IHD, on their phone or another consumer access device?
 - Using existing devices and networks negates some of the need for new standards, security protocols, manufacturers and interoperability.
- How high must energy prices be to incentivise suppliers to develop DSM products and infrastructure particularly relevant to domestic and small business customers?
 - It's not just the price of electricity but the peak / off-peak differential that will drive uptake of DSM product delivery and uptake
 - We have assumed that as large users are already participating in demand side response, price is not the barrier. Though there is still room for improvement in the large user market.
- How does DSM become cheaper than buying energy from the spot or futures markets?
 - This will need to factor in how future imbalance and network charge methodologies will be applied and how much they will increase, as well as the likely market prices. We also need to consider how much more 'peaky' these charges and prices will become under future network scenarios.
- Upon significant uptake, will there be a need for suppliers to notify the DNO /TSO of any bulk customer actions? What should the notification threshold be?
 - We have assumed that small usage of DSR with small loads would be managed through the current process of daily balancing actions.
- For customer actions to be reflected in energy balancing, a simple and efficient process must be in place to move all DSM customers into half hourly settlement.

Beneficiaries

• **Customers** are rewarded for action they (or their home automation system) take and receive a reduction to their energy bill. This is a double win as they will reduce demand (cost saving on bill) and be paid for taking a DSM action.

- **Suppliers** are able to avoid buying more expensive energy from the open market by paying customers to reduce/shift demand.
- **Network operators** may benefit if supplier balancing results in a shift in usage away from peak hours. This may prevent the need for network reinforcement, particularly at a national level. Though this benefit may be less applicable to local reinforcement needs.
- **Generators** may not invest in new generating plant if market forces determine there is a more cost effective reduction in customer demand available. The benefits include avoided emissions that would have been created by the generating plant if it had been built, and if it's a subsidised form of generation then customers will ultimately benefit through lower costs to them

Network Balancing

The process and challenges faced for network balancing are similar to supplier balancing, so all of the above challenges are applicable. But network balancing has its own unique aspects and these are discussed below.

In this example all references to 'supplier' refer to a supplier of the service. This does not necessarily need to be a licensed energy supplier and could be a third party, eg. an aggregator.

How might it work?

- DNOs and the TSO will notify a requirement for demand reduction (or increase) into the market and if there is a cheaper option than carrying out its own balancing actions, a transaction is made where the DSM supplier receives a payment for providing demand reduction or peak shifting. In a fully competitive market the ability to trade between suppliers could also be realised.
- The successful supplier must then instruct its customers (likely to be through automated remote instructions) to react accordingly.
- An independent central body is needed to act as clearing house for the DR market, in a similar role to how ELEXON manages electricity settlement. The Smart Energy Code may set a precedent for how non-licensed participants contribute to its funding.
- This central body carries out a settlement process to determine whether the supplier has met its requirements. If not, then the settlement process would compensate the DNO/TSO.



Other challenges to overcome

- The design and scope of the market solution must be determined, including the roles of a central settlement body, TSO, DNOs, suppliers, aggregators and other interested parties.
- How do we ensure a level playing field for all 'market participants' and avoid information asymmetry?
- How do we design an effective market that avoids the need for forced load limiting / brownouts by network operators in the future?
- How do we address a conflict where the supplier and network balancing needs are working in opposite directions (e.g. increased versus decreased consumption)? Will economic factors ensure these conflicts are resolved efficiently?
- A process needs to be in place to ensure suppliers aren't benefitting excessively from a combination of reduced demand and DNO/TSO payments?
- All of the challenges identified for supplier balancing are also applicable here.
- Concern that DNO/TSO could become a 'distressed buyer', but this could be mitigated by a competitive market involving multiple suppliers offering products
- Need to model how this process would work for local constraints and how seasonal variances would be accommodated.
- Risk that the possibility of an infinite number of products may make this model unworkable. But this is only an issue if either the requirements of market or the products that customers want also vary extensively.

Beneficiaries

- **Customers** are rewarded for action they (or their home automation system) take and receive a reduction to their energy bill.
- **'DSM Suppliers'** are paid for delivery of demand side management from network operators, most of which is passed through to customers.

• **DNOs/TSOs** are able to avoid balancing actions and network reinforcement by paying DSM suppliers for delivery of DSM.

This model is likely to deliver greater value to all parties in the value chain than supplier balancing, as there is greater scope for realising the full benefits of DSM as it includes both the capacity to avoid network investment and to balance a supplier's position.

Consumer Engagement

The decisive factor in whether Smart Grids are successful is getting consumers interested in Smart Grids and ensuring the right financial incentives are in place for them to want to take up a DSM product.

At present there is very little awareness amongst end consumers of smart meters and the risks of supply interruptions if demand reduction measures are not introduced. Customer education is essential and a central approach, like the approach for smart metering, would be sensible to ensure a clear message is delivered in a professional and joined up manner. The central delivery body is providing a centralised approach for the promotion of smart metering. This could provide a model for, and valuable learnings on, how messages to consumers on Smart Grids and DSR should be conveyed.

There is a shift needed from the days of E7/E10 where a product was simply landed on customers, to a world where customers are taken on an engaged journey.

The needs and concerns of domestic and business customers will be different so it is important to ensure each segment is targeted in the most effective manner.

There will be valuable learnings from LCNF projects and the central delivery body from the smart rollout that will shape how we engage with consumers on DSM. The preliminary findings from the Customer Led Network Revolution have shown that peak demand may be decreased by 14% when estimated future energy prices are used to reflect the peak, shoulder and off-peak cost of getting electricity to the consumer.