nationalgrid

Demand Side Balancing Reserve and Supplemental Balancing Reserve

Informal consultation on the development and procurement of two new balancing services

Proposals for additional tools to support us in balancing the transmission system against a background of narrowing capacity margins mid-decade

27th June 2013

Informal Consultation on Demand-Side Balancing Reserve and Supplemental Balancing Reserve

Summary

27 June 2013

I. On 27th June 2013, Ofgem published an open letter seeking views on the need for additional measures to address concerns over narrowing plant margins and an uncertain mid-decade security of supply outlook. In light of this, we are exploring the development and procurement of two new balancing services, which we refer to as "Demand Side Balancing Reserve" (or "DSBR") and "Supplemental Balancing Reserve" (or "SBR") as additional tools to support us in balancing the system in the face of such narrowing margins.

II. We believe that one of these new balancing services, Demand Side Balancing Reserve, offers a substantial new opportunity for the demand side to participate in providing balancing services and we hope that it will enable the participation of a much broader scope of demand side service providers than is currently the case. We would seek to procure the service not just from existing industry participants such as electricity suppliers, but essentially from anyone who is able to establish demand-reduction capability at a demand site with half-hourly settlement metering.

III. The second product, Supplemental Balancing Reserve, is aimed primarily at generators and, potentially, larger demand reducers.

IV. In each case, National Grid will look to procure these products only if approved by Ofgem and only if economic and efficient, as required by our transmission licence.

Demand Side Balancing Reserve

V. We are proposing two DSBR products. For the first, "Product One", we are proposing to procure a quantity of demand reduction capability at peak times on non-holiday weekdays in the months of November to February inclusive. A set-up payment, which we envisage could be in the region of £5/kW to £10/kW per annum, would be made in addition to utilisation payments for service delivery, which would be at a rate selected from a menu of rates ranging from £500/MWh to £15,000/MWh (subject to the Value of Lost Load). The service would be called off in order of economic precedence with other balancing services, and therefore called relatively infrequently.

VI. The second DSBR product, "Product Two", would be identical to Product One except that it would not include the set-up payment. Consequently providers of Product Two would only receive payments for service delivery when called. All valid Product Two tenders would be accepted without the need for economic assessment, with payments being entirely dependent on the amount of utilisation.

VII. In each case, the service may be offered by consumers (or their agents who may be, but do not have to be, their supplier) able to reduce demand (or increase "behind-the-meter" or embedded generation) at sites which are half-hourly metered in central settlement.

VIII. The service is intended to provide a mechanism that will facilitate much wider participation by the demand side than has previously been the case. As such the arrangements are intended to be straightforward to understand and implement, and to avoid onerous obligations which could otherwise represent a barrier to widespread participation.

Supplemental Balancing Reserve

IX. The second of the new balancing services we are proposing to procure is Supplemental Balancing Reserve.

X. We are proposing we would procure a quantity of generation or, in principle, demand reduction capability from providers that can demonstrate to our reasonable satisfaction that the plant providing the service would not be participating in wholesale energy market arrangements, for instance because it would otherwise be mothballed or decommissioned.

XI. We would despatch Supplemental Balancing Reserve, irrespective of utilisation price, only as a last resort. Thus, to the extent that dynamics and other technical considerations allow, we would despatch it only after all other relevant balancing services (including DSBR) had been exhausted and emergency actions would otherwise be required. Supplemental Balancing Reserve would be available whenever required by us, as System Operator, within availability periods consisting of 6am to 8pm on non-holiday weekdays in November to February inclusive.

XII. We would pay providers a capability fee, utilisation fees and, if necessary, warming costs. We would also provide tenderers with a menu of charges for non-delivery and corresponding reliabilities or de-rating factors that we would apply in assessing the value of the capacity and the payments made for capability.

XIII. For both Demand Side Balancing Reserve and Supplemental Balancing Reserve, we would hold tenders initially in 2013/14 for services to be provided in Winter 2014/15 and 2015/16.

Next Steps

XIV. We would appreciate your views on these proposals by Friday 26th July 2013. If, subject to the responses to this consultation and the responses Ofgem receives to its open letter, we decide to take these proposals forward, we will undertake a formal consultation with BSC parties on the changes to the relevant documents produced under our transmission licence that would be necessary to give effect to these new balancing services.

XV. We propose to hold an industry workshop in July 2013, with the aim of discussing our proposals with stakeholders and gaining feedback on stakeholders' views. Details will be posted on our website in due course.

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Section 1 - Introduction

1. On 27th June 2013, Ofgem published an open letter seeking views on the need for additional measures to address concerns over narrowing plant margins and an uncertain mid-decade security of supply outlook.

2. As a potential solution to addressing these concerns, and in accordance with our role in co-ordinating and directing the flow of electricity onto and over the national electricity transmission system, we are exploring the development and procurement of two new balancing services, which we refer to as "Demand Side Balancing Reserve" (or "DSBR") and "Supplemental Balancing Reserve" (or "SBR"). This initial consultation document, which has been developed with assistance from our consultants, Yellow Wood Energy, seeks views on the design, procurement and use of these proposed new balancing services.

3. One of these new balancing services, Demand Side Balancing Reserve, we believe will offer a substantial new opportunity for the demand side to participate in providing balancing services and we hope that it will enable the participation of a much broader scope of demand side service providers than is currently the case. As such, we believe that this service may also be a valuable precursor to demand-side participation in the EMR Capacity Market.

4. We are seeking to procure the service not just from existing industry participants such as electricity suppliers but from anyone who is able to establish a demand reduction capability at a site with half-hourly settlement metering. This could include the customer, who consumes the energy at the site, or an agent acting on their behalf who may be, but need not be, their supplier. This consultation is therefore aimed at a wider range of participants than just those currently involved directly in the electricity industry.

5. The second service, Supplemental Balancing Reserve, is aimed primarily at generators and, potentially, larger demand reducers. Consequently we think this service is likely to be of interest primarily to existing stakeholders.

6. In each case, National Grid would look to procure these services only if approved by Ofgem and only if economic and efficient, as required by our transmission licence.

7. Responses on these proposals should be sent by Friday 26th July 2013 by email to balancingservices@nationalgrid.com. Questions on specific design proposals are set out throughout this document and are summarised in Appendix E. We would welcome your broader views on any aspect of these proposals as well as responses to the more detailed questions.

8. If, in light of the responses to this consultation and Ofgem's open letter, we proceed with the development and subsequent procurement of these services, we expect that the next step will involve the publication of a further document that will set out the conclusions from this consultation and formally consult BSC parties, as required by Condition C16 of our transmission licence, on the necessary changes to the documents governing our procurement and use of balancing services.

Section 1 - Introduction

9. These documents are the Balancing Service Procurement Guidelines, Balancing Principles Statement, BSAD Methodology Statement, System Management Action Flagging Methodology Statement and the Balancing Services Volume Data Methodology ("Condition C16 Statements"). If Ofgem approves the necessary changes to the C16 Statements, we would then be in a position to procure the new services where it is economic and efficient to do so.

10. The current versions of the statements can be found on National Grid's website[1], whilst draft changes to the Condition C16 Statements required to support the proposals in this document are included in Appendix C.

11. We propose to hold an industry workshop in July 2013 with the aim of informing stakeholders of our proposals and gaining feedback on stakeholders' views. Details will be provided on our website in due course.

12. The structure of the remainder of this consultation document is as follows: Section 2 describes the background to the proposals; Section 3 describes our proposals for Demand Side Balancing Reserve; Section 4 describes our proposals for Supplemental Balancing Reserve; Section 5 discusses how we propose to determine the quantity of the proposed new services to procure and how we will decide when to call off the proposed new services, including the interaction with existing balancing services; Section 6 describes the next steps; Appendix A discusses how outrage rates and non-delivery charges may be determined for Supplemental Balancing Reserve resources; Appendix B lists historical triad periods; Appendix C identifies the changes to the C16 statements that currently we anticipate would be required; Appendix D sets out a glossary of terms used in this document; and finally Appendix E lists the consultation questions.

13. If you would like to discuss any issues raised, please contact Peter Bingham by telephone on 01926 655568, or email balancingservices@nationalgrid.com.

[1] http://www.nationalgrid.com/uk/Electricity/Balancing/transmissionlicencestatements/

Section 2 - Background

Balancing Services

14. National Grid is the holder of a licence to participate in the transmission of electricity in Great Britain. We own the onshore transmission network, comprising the network of 400kV and 275kV lines, cables and substations, in England and Wales, and operate the transmission system for the whole of Great Britain, which additionally comprises the two onshore transmission networks in Scotland, owned by Scottish Power Transmission Limited and Scottish Hydro Electric Transmission Limited, and a number of offshore networks.

15. Under the conditions of our transmission licence, we are required to co-ordinate and direct the flow of electricity onto and over the national electricity transmission system in an efficient, economic and co-ordinated manner. As part of doing this, we procure and use services known as 'balancing services' from transmission system users and other third parties in accordance with the requirements set out in Condition C16 (Procurement and use of balancing services) of the transmission licence.

16. Predominately, we use balancing services to balance differences between the quantities of electricity being put on to the transmission system by generators and taken off the transmission system by suppliers on behalf of their consumers, taking account of the transmission system's finite capability to transport electricity from generators at one location to consumers at another. We do this principally by using the 'balancing mechanism'. This mechanism, which is provided for by the Balancing and Settlement Code (BSC) and the Grid Code, enables typically generators to submit "offer" and "bid" prices to either increase or decrease their output or demand, and enables us to accept these offers and bids by instructing the generator to deviate from their preferred profile of generation that they declare beforehand.

17. In addition to correcting imbalances as they occur, an important aspect of our balancing services activity is anticipating the imbalances that could arise over various timescales, for instance as a result of the potential failures of a large power station or interconnector, or as a result of unexpected variations in demand or wind generation, and ensuring that there will be sufficient providers of balancing services to correct imbalances that could arise.

18. One such balancing service we contract for is Short Term Operating Reserve ("STOR"), where we will contract with providers to be available for up to approximately 3800 hours a year when instructed to either: in the case of the "BM Unit Service", make offers into the balancing mechanism at pre-agreed prices; or, in the case of the "Non BM Unit Service" to increase output or decrease demand without the need for a balancing mechanism offer acceptance.

19. Currently we aim to have at least 1800 MW of STOR available every day, although subject to system conditions and economics we increase this to 2300 MW. As a minimum, STOR must be available within 4 hours of being instructed although typically we contract for the service to be available within 20 minutes or less. Also we may procure either Committed or

Flexible STOR, where Committed STOR must, barring technical breakdown, be available during all specified availability windows, whereas Flexible STOR has some flexibility to declare itself unavailable to provide STOR at certain times.

20. Frequency Response is another of the balancing services, whereby typically part-loaded or fast start generators and/or demand can respond within seconds to the sudden drop in frequency that can occur after a generator fault or other loss of infeed. Immediately following such a fault part-loaded or fast start plant can be fully loaded or demand reduced. An important use of STOR, together with other balancing services, is to restore a sufficient quantity of such plant such that the system can be made secure against any second, subsequent fault.

21. In the event that we run out of balancing mechanism offers and other non-emergency balancing services, we are able to resort to a number of emergency actions, including: "MaxGen", whereby we instruct generators to generate in excess of the agreed capacity of their connection to the transmission system; and "emergency assistance", whereby we will request neighbouring system operators to provide additional support over and above that which has already been scheduled on the various interconnectors by market participants. As a last resort, we are able to instruct Demand Control from DNOs to reduce or disconnect demand connected to their systems to make good any remaining shortfall.

22. Generators providing MaxGen are paid at submitted MaxGen prices, while we pay neighbouring system operators for emergency assistance at prices that are agreed beforehand. Demand Control, however, is not costed. Nevertheless, we are acutely aware that lost load represents a cost to consumers, and hence we instruct such actions only as a last resort in order to preserve the secure operation of the transmission system and prevent the greater loss of load that would otherwise be likely to occur.

Electricity Market Reform and Cash-Out Review

23. In July 2011, the Government published its White Paper on Electricity Market Reform. In it, the Government described challenges facing the electricity industry over the next few years, including: the closure of a generating plant reaching the end of its economic life or as a result of emissions standards; the need to decarbonise electricity generation, leading to lower load factors for gas-fired generation which is, nevertheless, necessary to maintain security of supply in a system with a high proportion of intermittent and inflexible low-carbon plant; and increasing demand for electricity, given the need to decarbonise transport and heating.

24. The White Paper described modelling results which showed margins, being the amount by which generation exceeds demand, decreasing. It also described a number of market failures, including the so-called 'missing money' problem whereby prices at times of scarcity are not sufficiently high to allow generation to recover its fixed costs.

Section 2 - Background

25. The Government advocated the introduction of a capacity mechanism, setting out a number of different models for consultation. The proposals that have been subsequently developed include an auction for generation capacity four years ahead of delivery, with the first delivery year expected to be for Winter 2018/19. Capacity resources will be invited to tender to provide a quantity of forward capacity obligations for which they will be paid an upfront capacity payment. The Secretary of State will define the capacity demand curve which will determine the quantity of capacity obligations that will be bought, depending on price. Obligation holders will be subject to significant charges in the event that they fail to deliver during 'system stress events'.

26. The Government also intends that it will be possible to procure capacity from the demand side. Proposals include transitional arrangements that will enable the procurement of capacity from the demand side for delivery ahead of the first delivery year for generation, with the first Stage 1 DSR preparatory auctions proposed in 2015 for delivery in 2016/17.

27. Also, in November 2011, Ofgem published a paper identifying a number of issues concerning the calculation of cash-out prices, amongst which were: that cash-out prices may not fully reflect scarcity at times of system stress; and that cash-out prices may not provide the right incentives for demand side response.

28. In March 2012, Ofgem then launched a Significant Code Review of the electricity cash-out arrangements which is ongoing.

Capacity Assessment

29. Following changes brought in by the Energy Act 2011, the Electricity Act 1989 obliges Ofgem to provide the Secretary of State with a report assessing different electricity capacity margins and the risk to security of supply associated with each alternative. Ofgem's Capacity Assessment Report is due to be delivered to the Secretary of State each year, starting in 2012, by 1 September. However, this year's assessment has been published early to inform DECC's EMR delivery plan which is due to be published later in the summer.

30. In the assessment, Ofgem highlights a narrowing of plant margins mid-decade driven by amongst other things, the closure of plant under the Large Combustion Plan Directive (LCPD), and limited investment in new generation. De-rated plant margins are expected to reduce faster than expected previously, bottoming out at around 4% in 2015/16 and recovering thereafter.

31. Whilst we might expect narrowing margins to encourage the market to maximise the availability of plant by, for instance, delaying plant closure and bringing mothballed generation plant back into service, the reasons that have motivated the Government's Electricity Market Reform and Ofgem's Significant Code Review give cause for concern that this may not happen to the extent required.

Section 2 - Background

32. It is not our role to ensure there is sufficient generation capacity available to meet demand; security of supply is a function of the market which is underpinned by the energy policies under which the industry operates. The energy market has in the past delivered sufficient resources for us to be able to balance the system, and our procurement activities have merely been limited to ensuring that sufficient balancing actions are available in operational timescales. However if the market does not deliver sufficient capacity margins, our role in balancing the system will become more challenging and the risk of supply interruptions will increase.

33. Ofgem's open letter, accompanying the capacity assessment, highlights the risks and uncertainties surrounding the mid decade security of supply outlook. We have been working with Ofgem and DECC to explore options that would provide additional consumer safeguards against this uncertain outlook. All three organisations believe it prudent to consider expanding the scope of our activities to enable the procurement of additional reserves that will support us in balancing the system if margins get tight.

34. In light of these matters, we are considering the development and procurement of two new balancing services to address this emerging position, which we refer to as Demand Side Balancing Reserve and Supplemental Balancing Reserve.

Section 3 – Demand Side Balancing Reserve

35. The first of the new balancing services we propose that we might procure is Demand Side Balancing Reserve.

36. We are proposing two Demand Side Balancing Reserve products. For the first, "Product One", we are proposing:

(a) to procure a quantity of demand reduction capacity between 4pm and 8pm on non-holiday weekdays in the months of November to February inclusive;

(b) the service may be offered by consumers (or their agents who may be, but do not have to be, their supplier) able to deliver demand reduction (or "behind-the-meter" or embedded generation) at sites which are half-hourly metered in central settlement;

(c) tenders to be held in 2013/14 for demand reduction in either winter 2014/15 or in both winter 2014/15 and winter 2015/16; with a further tender to be held in 2015, as necessary, for demand reduction in winter 2015/16; and potentially with further tenders for later years being held thereafter;

(d) to help test and, where necessary, refine the scheme design, we would also be interested in entering into dialogue with persons who may be able to provide DSBR services on a trial basis ahead of winter 2014/15;

(e) a choice of one of a number of pre-determined utilisation fees ranging from £500/MWh to £15,000/MWh (subject to the Value of Lost Load) and a flat set-up payment in the region of £5/kW to £10/kW per annum being paid in respect of accepted tenders to cover set-up costs, with tenders being evaluated on the basis of the tendered rates and set-up fee;

(f) demand reduction to be available ideally between 4pm and 8pm on all non-holiday weekdays and sustainable for a continuous period of at least two hours. However, service providers would be able to indicate if they can sustain demand reduction only for less than the two hours, in which case they would receive a pro-rata proportion of the set-up payment;

(g) a system of stepped payment schedule with no payment for over-delivery (except when a maximum reduction instruction has been given) in order to give an incentive for accurate declaration of capacity and reliable delivery;

(h) payment at the nominal utilisation rate for any demand reduction in excess of the declared capacity following a maximum reduction instruction;

(i) instructed demand reduction to be measured by reference to a baseline calculated as the average of the demand in the corresponding half-hour settlement periods in each of ten preceding peak demand days during which demand reduction was not called;

(j) a system of verification, whereby tenderers provide the Meter Point Administration Numbers (MPANs) for the meters through which the demand reduction will be provided, and must declare that they have put in place arrangements and procedures that give a reasonable expectation of delivering the declared demand reduction within

two hours of being instructed, and will use reasonable endeavours achieve the demand reduction when instructed;

(k) providers of Demand Side Balancing Reserve able to group MPANs into one or more Demand Side Balancing Reserve 'resources' (although any given MPAN to appear in only one resource) and tender each resource separately;

(l) the right for National Grid to carry out spot checks to verify the relationship between the service provider and the specified MPANs;

(m) Demand Side Balancing Reserve to be called off in accordance with the Balancing Services Procurement Guidelines and Balancing Services Principles, in order of economic precedence with other balancing services;

(n) despatch of demand reduction to be made either: directly, possibly using a smart phone or PC applications using digital signatures to ensure security, integrity and authenticity of communication; or indirectly, via an aggregator or similar intermediary;

(o) despatch systems to provide for: instructions to reduce demand either without delay or at a specified time; warnings, in advance, of the likely need for demand reduction; and other messages whereby we can communicate with Demand Side Balancing Reserve providers and by monitoring the acknowledgement of such messages, ascertain that Demand Side Balancing Reserve providers are likely to take heed of any instruction to demand reduce;

(p) as much notice as possible to be given of any required demand reduction, recognising that response rates are likely to be better the more notice is given;

(q) when more than two hours notice is given, spot checks may be made on Demand Side Balancing Reserve providers that do not respond to determine whether they have taken the reasonable steps required under the terms of their declaration;

(r) payment of set-up costs to be made by 1 November each year, with a single settlement of payments for utilisation of Demand Side Balancing Reserve to be made as soon as practicable after the end of the following February;

(s) no adjustment to be made in the calculation of imbalance prices for the procurement or use of the Demand Side Balancing Reserve, pending the outcome of Ofgem's cash-out review;

(t) providers of Demand Side Balancing Reserve to be able to offer triad reduction services recognising, however, that avoiding triads is likely to be reflected in the calculated demand baseline;

(u) resources that have been contracted to provide Committed STOR cannot also provide Demand Side Balancing Reserve although our current thinking is that Flexible STOR should be permitted to do so;

(v) Demand Side Balancing Reserve can be instructed outside the 4pm-8pm period, albeit with no obligation on the service provider to respond but with payments at the nominal rate for any Demand Side Balancing Reserve that is delivered; and

(w) costs of procurement and call-off of Demand Side Balancing Reserve, as with other balancing services, to be recovered through Balancing Services Use of System (BSUoS) charges, although outside the scope of the Balancing Services Incentive Scheme.

37. The second DSR product, "Product Two", gives the opportunity for tenderers to waive the flat set-up fee. The details of the second product are the same as for the first product, except that no flat fee for set-up costs is payable, with all valid tenders being accepted without the need for economic assessment[2].

38. The rationale for these proposals is as follows.

Participation

39. We are proposing that the Demand Side Balancing Reserve balancing service is procured from demand side resources, which may include both reductions in demand and increases in 'behind the meter' or smaller embedded generation.

40. Initially we are seeking to procure services from sites which are half-hourly metered and whose half-hourly data is used in settlements, such that we can rely on the existing processes under the Balancing and Settlement Code to assure the quality of the data. Whilst we would be prepared to also consider the use of half-hourly metered data which is not used in settlements, the service provider would have to provide sufficient evidence that the data would be at least of settlements quality.

41. We are proposing to further restrict participation to resources:

(a) with a utilisation price £500/MWh or greater; and

(b) which are not BM Units subject to the requirement under the Grid Code to submit Physical Notifications.

42. We believe that it is appropriate that the resources excluded by these criteria - having either a utilisation price below £500/MWh or being typically larger generating units - should continue to use existing arrangements provided by the Grid Code and Balancing and Settlement Code for: (i) the submission of data; (ii) the receipt of despatch instructions; and (iii) for financial settlement. These existing arrangements provide high integrity mechanisms for the wide range of data and instruction types and the large financial flows that are necessary given that such resources are, and are likely to continue to be: despatched frequently; each individually have a significant impact on the system; and the principal means by which the System Operator ensures secure operation of the transmission system.

[2] The quantity of utilisation would however be dependent upon price, system conditions and the need for the service over the duration of the contract.

Section 3 – Demand Side Balancing Reserve

43. We believe that these mechanisms, which comprise EDT/EDL (used for the balancing mechanism) and Standing Reserve Despatch (used for STOR providers operating outside the balancing mechanism), may both be disproportionately expensive and not strictly required for Demand Side Balancing Reserve. Hence, we believe the low cost despatch arrangements we are proposing for DSBR are appropriate.

44. We are proposing that the parties tendering Demand Side Balancing Reserve in respect of a particular MPAN may be the consumer or a third party (including the supplier) acting on behalf of the consumer.

DSBR1: Do you agree with our proposed participation criteria?

Product

45. The incidence of triad periods[3] shows that maximum demands on the system over the last twenty years have occurred between 4:30pm and 6pm and between 17 November (in 1992 & 1998) and 8 February (in 2007). All days were non-holiday weekdays.

46. We recognise that the profile of demand has not remained constant over the last twenty years and the increasing penetration of wind-powered generation may result in time in 'stress events' occurring not only at times of peak demand but also at times of lower demand with low wind. Nevertheless, for 2014/15 and 2015/16, we envisage that any stress events will continue to be most likely to occur between early November and late February.

47. Moreover, inspection of typical demand profiles shows high demands occurring between 4pm to 8pm on non-holiday weekdays, whilst analysis we have undertaken in support of Ofgem's Capacity Assessment Report shows that stress events for all but the most extreme scenarios last for up to about 240 minutes. However, whilst stress events could last four hours, we are aware that many providers may not be capable of providing demand reductions that last for the full duration. Hence, we are proposing to ask only that demand response is available and sustainable for a continuous period of at least two hours between 4pm and 8pm on non-holiday weekdays during November to February.

48. We do, however, recognise that some providers may not be able to provide demand response sustainable for the full two hours. Accordingly, we propose to accept tenders for DSBR that is not sustainable for the full two hours although, to discourage uneconomic tenders, such resources will be subject to a pro-rata reduction in the set-up payment. Hence, DSBR that can sustain delivery for any two hours in the four hour service window would receive the full set-up payment, whereas DSBR that can sustain delivery say for only one hour anytime between 4pm and 8pm would receive only 50% of the set-up payment.

[3] See "Triad Dates 1990/91-2012/13" at http://www.nationalgrid.com/uk Electricity/Charges/usefulinfo and in Appendix B.

49. Providing this flexibility we hope will encourage participation by providers who might otherwise be deterred by being unable to meet the full requirement.

DSBR2: Do you agree with our proposed product definition?

Payments

50. With the relatively short timescales over which we are looking to develop and procure these new balancing services, we do not intend or envisage that tenderers should make significant capital investments in order to provide Demand Side Balancing Reserve. Instead, we expect that the service will be provided typically by putting in place systems and procedures to curtail the demand of existing processes or run existing generation, which hitherto have not been in a position to respond to system operator instructions.

51. Moreover, demand response tends to have high avoidable costs. For commercial users, for example, reducing demand can be disrupt activities whose value far exceeds the associated electricity costs. This is reflected in the high prices advocated for the Value of Lost Load (VoLL), with some estimates exceeding £10,000/MWh. Indeed, the ability to provide Demand Side Balancing Reserve can be seen as providing the opportunity whereby demand customers are able to express their own VoLL.

52. Thus, in contrast to proposals for the enduring EMR Capacity Market which could potentially involve relatively high upfront payments for capacity and then potentially substantial charges for non-performance, we are proposing that Demand Side Balancing Reserve is paid primarily on demonstration of performance measured by reference to metered data.

53. Demand Side Balancing Reserve providers will be able to opt for:

(a) Product One, receiving the full set-up fee of around £5-10 per kW per annum for those who make available demand reduction which is available and sustainable for at least two hours between 4pm and 8pm (or a pro rata reduction to such fee where all such criteria are not met); or

(b) Product Two, where there is no fixed fee and, subject to VoLL, valid offers are guaranteed to be accepted.

54. For Product One, we will decide on the level of set-up fee on the basis of feedback received as part of this consultation process.

55. For either product, tenderers will choose one of a number of possible utilisation rates as set out in the table below:

Section 3 – Demand Side Balancing Reserve

56. The payment of around £5-10 per kW is intended to cover set-up costs. For a demand of, say, 200kW, offering a reduction of 100kW this payment might thus be in the region of £500 - £1000 for the winter. Should domestic customers be half-hourly metered and settled, as may start to be the case with the roll-out of smart metering, a customer offering 1 kW of reduction would receive a payment of around £5 to £10. On the basis that there are

Table 1: Utilisation Rates	
Tranche	**Utilisation Rate (£/MWh)**
1	500
2	750
3	1,000
4	1,500
5	2,000
6	3,000
7	5,000
8	7,500
9	10,000
10	15,000

approximately 83 non-holiday weekdays between the beginning of November and the end of February, a flat payment of £5/kW would equate to approximately 1.5p per kW per hour (or £15 per MW per hour) for response sustainable for the full two hours.

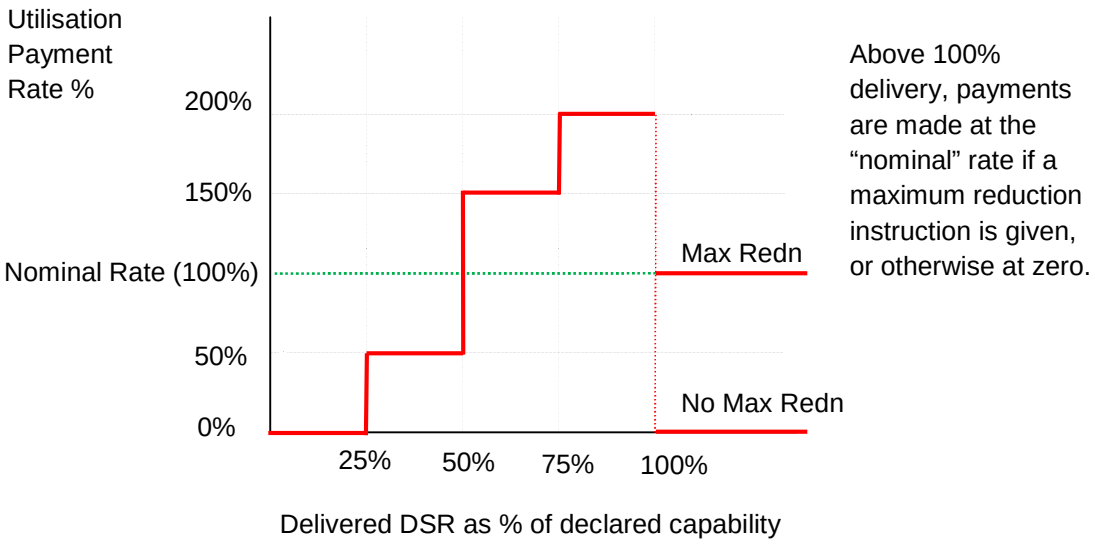
57. Tenderers may be requested to deliver Demand Side Balancing Reserve outside the standard availability periods but would not receive any additional flat fee. They would, however, receive utilisation payments for any demand reduction they delivered.

58. In addition to the set-up payment, the 200KW demand offering 100kW of demand reduction and electing to receive a utilisation payment of, say, £7,500/MWh would, if interrupted for 3 hours, receive a utilisation payment of £2,250. Even though the utilisation price is high, this payment may be not excessive for the interruption of a commercial activity and indicates how VoLL for consumers can be very high. Similarly, the domestic consumer providing a 1kW reduction at £10,000/MWh (£10/kWh) would receive £30 for a single interruption of 3 hours.

59. The emphasis on payments for utilisation rather than capability is intended to minimise the incentives to overstate the capability to reduce demand. This minimises the requirement for detailed and onerous verification procedures that would otherwise be required to ensure that the stated capability that is being paid for is deliverable.

60. In addition, payment for the delivered demand response would be "stepped" as follows: payment for the delivery of the first 25% of either the instructed demand reduction or the declared capacity (whichever is smaller) would be made at a 100% discount to the provider's utilisation price; for the second 25% at 50% discount, while payment for delivery of the third and fourth 25% would be made at premia of 50% and 100%, respectively, over the provider's utilisation price. This is shown diagrammatically in Figure 1.

Figure 1: Utilisation Payments vs. Delivered Demand Reduction



61. There would be no payment for delivering more than the instructed demand reduction, either in any one half-hour settlement period or over the full duration of the instruction, except in the event that the System Operator issues a maximum reduction instruction. When in response to such an instruction, demand reduction in excess of the declared capacity will be rewarded at the provider's nominal utilisation rate.

62. This structure of payments is designed to incentivise realistic declarations of Demand Side Balancing Reserve capacity, thus giving greater certainty as to the response that can be expected. Under-declaring capacity will result in potential revenues being foregone, while over-declaring capacity will result in more demand response being paid at the discounted rates. This applies to both the magnitude of the demand response and the length of time that it can be sustained. Capping the demand reduction that will be credited in any one Settlement Period to the declared capacity will negate any incentive to over-deliver demand response towards the end of an instruction if the provider has under-delivered earlier in the instruction.

63. The absence of any payment on the first 25% will also minimise the chance that Demand Side Balancing Reserve providers could earn payments speculatively on normal or random

deviations from baseline quantities, rather than through taking definite demand-reducing actions.

DSBR3:	Do you agree with our proposed payment arrangements? Do you have any views on the proposed level of set-up payment?

Measurement and Baselining

64. The emphasis of the Demand Side Balancing Reserve arrangements we are proposing is on minimising the costs associated with provision that could otherwise act as a barrier to participation. Accordingly, we wish to avoid the need to develop and implement specialised metering arrangements. By relying on the existing arrangements for metering in the BSC, not only will the required data be available but the tried and tested performance assurance framework for settlement metering and data collection will ensure that the data is reliable.

65. Under the arrangements set out in the BSC, data is gathered by Data Collectors acting on behalf of the Supplier. Data Collectors then provide this data to the Supplier, so that the Supplier can bill the customer, and to Elexon via a Data Aggregator, so that it can determine the quantities that the Supplier is deemed to have taken from the wholesale market in order to supply its customers. Data Collectors, on behalf of Suppliers, also provide data to the Distribution Network Operators (DNOs), so that the DNOs can levy the appropriate charges for the use of their distribution networks. We are considering whether the obligation, in BSC Section L5.2.4, will need to be extended such that the data provided to DNOs is provided to National Grid as well. National Grid proposes to raise a BSC modification in anticipation of the need for this data if we proceed with these proposals.

66. Using metered data, a baseline demand will be defined for each half hour settlement period in which demand reduction has been instructed. The baseline will be calculated as follows:

(i) at the end of the current winter, we identify the ten days, on which demand reduction was not called, with the highest peak demands;

(ii) we identify also the ten days, on which demand reduction was not called, with the highest peak demands in the previous winter; and

(iii) for any day in the current winter on which demand reduction is called, we calculate the baseline demand as the average of the demands in the corresponding Settlement Periods in each of the ten days identified in Step (i) and Step (ii) which most recently precede it.

67. As an example, if demand reduction was called between 17:00 and 17:30 on 27 January 2015, we would, after the end of February, determine the ten days of highest demand in each of Winter 2014/15 and Winter 2013/14, in each case ignoring any days on which DSBR had been called. Of these twenty days, we would then select the ten days which most recently preceded 27 January 2015. Thus, in the probable event that a number, say

four, of the peak demand days in 2014/15 occurred between 27 January and 28 February 2015 then the ten days used to calculate the demand baseline would be made up using that last four peak demand days in 2013/14 as well as the six that occurred in 2014/15. The baseline for the period 17:00-17:30 would then be the average of the demands taken by the provider in this period on those ten days.

68. Given that we are most likely to call Demand Side Balancing Reserve on days with peak demand, the baseline calculation is designed to calculate the demand that any Demand Side Balancing Reserve resource would have taken had not it been instructed to reduce demand by reference to the days which are as similar as possible. We assume that the days which are most similar are other days of peak demand rather than, say, the days immediately preceding.

69. Furthermore, given that we are proposing to settle payments for demand reduction at the end of winter, we could in principle calculate the baseline using the 10 peak demand days from the current winter even if these occurred *after* the day on which demand DSBR was called. However, this could create a perverse incentive, once DSBR has been called on a given day, to inflate demand on subsequent days in order to enhance the demand reduction as calculated relative to the baseline. Thus we propose calculating the baseline only from days *before* the demand reduction is called, taking days as necessary from the previous winter.

70. We acknowledge that various capacity mechanism designs, in which the demand side is able to participate, involve more sophisticated baselining methodologies. These seek to take account of a wide range of factors, such as ambient temperature or demand immediately prior to the any instruction to reduce demand being given, all to refine the estimate of the demand that might have been taken had not the instruction to reduce demand being given.

71. We propose not to include such features for the Demand Side Balancing Reserve service. We have concerns that such arrangements would be costly to develop and administer, particularly as many aspects have to be tailored to the individual Demand Side Balancing Reserve provider, and would be complex, when simplicity is vital to enabling ease of understanding and acceptance of the arrangements by Demand Side Balancing Reserve providers and hence to rapid uptake.

DSBR4: Do you agree with our measurement and baseline proposals?

Despatch

72. We propose that Demand Side Balancing Reserve would be instructed by the System Operator.

73. We propose also that instructions would be given via a smart phone or web-based application. This will provide a lower cost alternative to the despatch systems used for

large centrally-despatched generators and for Short Term Operating Reserve. We believe this to be appropriate given: the small size of resources that will be providing the Demand Side Balancing Reserve service; that Demand Side Balancing Reserve resources will be despatched relatively infrequently; and the relative simplicity of the communications between the System Operator and Demand Side Balancing Reserve providers.

74. A smart phone or web-based application could also offer secure communication between the System Operator and Demand Side Balancing Reserve providers by using well-established digital signature and verification techniques. The application would be provided by the System Operator to run on a smart phone or computer provided by the Demand Side Balancing Reserve provider.

75. Where DSBR is instructed via an aggregator or other similar intermediary, EDL/EDT or Standing Reserve Despatch could be used.

76. We propose to group Demand Side Balancing Reserve resources into a number of tranches of nominally 250MW. Tranches will be defined by different utilisation prices and by any other relevant operational considerations, such as location. Any tranche of more than 250 MW would be sub-divided into smaller tranches, and any tranche much smaller than 250MW would probably be amalgamated with other tranches.

77. The application would provide the basic functions of enabling the System Operator to:

(a) give notice of a possible need for demand reduction from a given tranche at a specified time for a specified duration, together with an associated probability of being called; and

(b) give a firm instruction to Demand Side Balancing Reserve providers in a given tranche to reduce demand at a specified time for a specified duration.

78. We would seek to instruct Demand Side Balancing Reserve providers to reduce demand with as much notice as possible, as it seems likely that the greater the notice we give the greater the probability that the Demand Side Balancing Reserve provider will be able to respond.

79. Nevertheless, the uncertainties of system operation mean that it is not always possible to give ample notice in an instruction. Thus we may sometimes issue instructions with little notice, recognising that not all Demand Side Balancing Reserve providers will be able to respond. By providing a warning of the possible need for demand reduction, DSBR providers could make their own decisions as to whether to put in train any actions necessary to deliver demand reduction in the event that an instruction were issued subsequently, recognising that if they reduced demand but no instruction were given then no payment would be made.

80. Instructions would be “all or nothing”, i.e. Demand Side Balancing Reserve providers in a given tranche would, if instructed, be expected to deliver their full tendered Demand Side

Balancing Reserve MW capability between two specified times. Instructions would be firm, i.e. once Demand Side Balancing Reserve providers in a tranche were instructed to reduce demand until a specified time they would not be asked to stop reducing demand earlier.

81. A maximum reduction instruction would request Demand Side Balancing Reserve providers to reduce demand as much as possible, irrespective of previously declared parameters.

82. The application would also provide the option for other communications, which could be used to ensure that Demand Side Balancing Reserve providers remained engaged with the arrangements and to provide confidence to the System Operator that providers were monitoring communications.

DSBR5: Do you agree with the proposed arrangements for despatch?

Procurement

83. We are proposing that tenders be held for the provision of Demand Side Balancing Reserve. In particular we propose at this stage that a tender be held in 2013/14 for Demand Side Balancing Reserve for delivery in Winter 2014/15 and Winter 2015/16. Tenderers would be able to elect whether to offer Demand Side Balancing Reserve in either winter or both. A further tender would be held, if required, for additional DSBR in Winter 2015/16.

84. To help test and, where necessary, refine the scheme design, we would also be interested in entering into dialogue with persons who may be able to provide DSBR services on a trial basis ahead of winter 2014/15.

85. We would keep the need for the DSBR service in the years after 2015/16 under review, particularly given DECC's proposals for transitional arrangements to be established for demand-side participation in the EMR Capacity Market in 2016/17 and 2017/18, ahead of the first delivery year for generation.

86. In addition to specifying the MW demand reduction capacity that can typically be delivered and the duration for which it can be sustained between 4pm and 8pm, tenderers will be required to specify:

(a) the MPANs of the half-hourly settled meters through which the demand reduction will be delivered;

(b) whether they are tendering for Product One (eligible for the fixed fee) or Product Two;

(c) which of the half hour settlement periods in the 4pm-8pm period their service can[4] be delivered; and

[4] We recognise that the ability of some providers to deliver on Fridays and/or between Christmas and the New Year may be reduced. However we do not propose to discount the value of the service in such circumstances and instead would like bidders to notify us of their capability on a typical winter weekday evening.

(d) the duration for which any such demand reduction can be sustained.

87. The proposed approach to tender evaluation is discussed in Section 5.

DSBR6: Do you agree with our proposals on procurement?

Verification and Other Checks

88. As discussed earlier, the emphasis on payment for performance through high utilisation payments and relatively modest fixed payments is intended to minimise the need for invasive or costly verification procedures. In addition, the system of stepped payments is intended to incentivise accurate declarations of capacity.

89. Nevertheless, we propose that potential providers will be required to sign a declaration as a condition of tendering, on which National Grid will rely, confirming that they have the right to control the demand taken through the nominated MPANs.

90. We also envisage that the contract will require the service provider to undertake that:

(a) they have taken (or will take) reasonable steps to put in place systems and procedures so as to be able to deliver any demand reductions we may instruct within two hours of the instruction;

(b) given an instruction to reduce demand with such notice they will make reasonable endeavours to deliver the instructed demand reduction; and

(c) no attempt will be, or has been, made to manipulate the baseline with the purpose of increasing any measured demand response.

91. We would be able to undertake a number of basic checks, such as: ensuring that no MPAN appears in more than once in the Demand Side Balancing Reserve resources that are being provided by any one Demand Side Balancing Reserve provider or by DSBR providers in aggregate; that the meters are all used in half-hourly settlement; and verifying that the tendered Demand Side Balancing Reserve capacity is consistent with the maximum demand (and, where relevant, the maximum export capacity) of the relevant MPANs. The arrangements will need to ensure we have access to the necessary data to perform such checks.

92. In addition, we will retain the right to conduct spot checks to confirm: that the arrangements are in place to deliver demand reduction through the nominated MPAN; and, in the event that demand reduction were not delivered following an instruction given with ample notice, that reasonable endeavours had been taken.

93. We envisage that for Product Two the frequency of checks can be lower than with Product One, principally because this service would be remunerated solely on service delivered as measured by metered data.

94. Finally, in the event that demand reduction is called, we will be able to check demand data in periods other than the baseline periods to confirm that has been no baseline manipulation. And where a demand reduction is being delivered through some but not all of the MPANs at a given site, we would retain the right to examine the data for all MPANs at the site, to determine that a genuine demand reduction has been delivered.

DSBR7: Do you agree with our proposals on verification?

De-minimis Disputes threshold

95. We propose that, in order to avoid the possibility of numerous small-value disputes, the ability for Demand Side Balancing Reserve providers to raise disputes under the contract may be subject to a de minimis limit.

DSBR8: Do you agree with that there should be a de-minimis dispute threshold?

Contractual Arrangements

96. So as not to inhibit understanding and ready acceptance by a wide range of Demand Side Balancing Reserve providers, it is important that the contract is of a standard form that is straightforward and as simple as possible. The contract should be fair and place the minimum of obligations on the Demand Side Balancing Reserve providers.

97. There would be no liabilities on the Demand Side Balancing Reserve provider other than to provide the services specified in the contract or as a result of breach of the declaration referred to in paragraph 89.

98. Our aim is that a contract of this nature would give potential Demand Side Balancing Reserve providers comfort that they were not exposed to any risks, such as onerous financial non-performance charges, as a result of entering into the contract.

DSBR9: Do you agree with our proposed approach to contracting?

Imbalance Pricing

99. Were we to adopt an approach similar to that used for STOR, we would reflect the total of the fixed payments in imbalance prices over the Settlement Periods covered by the DSBR service. Because the service covers only a small number of periods, even the relatively modest level of fixed payments could result in a significant increase in imbalance prices.

100. Nevertheless, given that Ofgem is undertaking a review of cash-out pricing, we are proposing that in the first instance contract costs of Demand Side Balancing Reserve are not reflected in imbalance prices. Should, however, Ofgem, as part of its review, determine

that adjustments should be made then we would develop the necessary changes to the Licence Condition C16 statements to implement Ofgem's proposals.

DSBR10: Do you agree with our proposals on imbalance pricing?

Interaction with Triad Avoidance

101. Transmission charges for demand are levied on the basis of the demand taken during so-called "triad periods". These are the three Settlement Periods of highest transmission system demand during the months of November to February inclusive that are separated by at least 10 days. The reason for the 10 day criterion is to ensure that the demand is averaged over three different peaks in system demand rather than three Settlement Periods, possibly adjacent, that occur during a single peak in system demand. Further, the transmission system is divided into a number of zones, with the magnitude of transmission charges varying from zone to zone.

102. In zones where transmission charges are high, some consumers seek to minimise transmission charges by reducing demand during triad periods. However, given the definition, the triad periods are not known with certainty until after the end of the triad 'season'. Nevertheless, in seeking not to miss a triad period, 'triad avoiders' are likely to reduce demand whenever they believe it is possible that a period may turn out to be a triad period.

103. Given that when Demand Side Balancing Reserve is called, system demand is likely to be at its highest, it is likely also that it will be called over a triad period. It is likely thus that triad avoiders would have reduced demand even in the absence of an instruction to reduce demand. However, it is likely that triad avoiders are likely to have reduced demand also on the other days of peak system demand.

104. Thus, by using peak days in calculating the baseline, we are likely to include in the calculation the effect of triad avoidance and hence best estimate the demand that would have been taken in the absence of a demand instruction. This, we believe, should be the objective of the baseline calculation.

105. Recognising that their ability to deliver demand response during potential triad periods is thus reduced, triad avoiders may choose to reflect this in their declared capability. Otherwise they would be likely to find their revenues reduced as a result of the stepped payment schedule. Hence, the incentives are such that the ability (of lack thereof) of triad avoiders to provide additional demand response for Demand Side Balancing Reserve will be reflected not only in utilisation payments but in any set-up payments also.

DSBR11: Do you agree with our proposals on how the service should interact with triad demand reducers?

Section 3 – Demand Side Balancing Reserve

Interaction with STOR

106. As with triad avoidance, our objective for the baseline calculation is to estimate the demand that the Demand Side Balancing Reserve provider would have taken, in the case of STOR providers, accounting for the response they would have made as a result of their STOR arrangement.

107. We regard it as highly likely that, during a system stress event, Committed STOR providers would either:

(a) be called to reduce demand (or increase generation) in which case they would be unable to provide additional response as a Demand Side Balancing Reserve service; or

(b) would be required to keep in reserve the capability to reduce demand (or increase generation), in which case they could not also be available to provide Demand Side Balancing Reserve.

108. Accordingly, we propose that Committed STOR providers should not be permitted to provide Demand Side Balancing Reserve. However, our current thinking is that Flexible STOR providers, who are able to declare themselves unavailable to provide STOR in order to provide triad avoidance services, should be able to declare themselves unavailable to provide STOR in order to provide DSBR.

DSBR12: Do you agree with our proposals in respect of Committed and Flexible STOR providers?

Procurement Options

109. We envisage that there are a number of options for the delivery of the Demand Side Balancing Reserve service. National Grid could:

(a) procure the service directly from end users, providing the appropriate low cost arrangements for despatch;

(b) procure a service, with a significant de minimis level, from aggregators, suppliers, DNOs and larger users only. With this option, we could use existing systems for despatch, i.e. EDT/EDL or STOR Despatch, and rely on aggregators to develop the necessary arrangements that will facilitate participation by a broad scope of participants;

(c) procure a service, with a significant de minimis level, from aggregators suppliers, DNOs and larger users only but, nevertheless, provide the system for despatching participants directly while leaving aggregators to manage the commercial arrangements with small users;

(d) procure the service directly from end users but sub-contract all the functions, i.e. marketing the service, administration of contracts, despatch and settlement as a whole to one or a number of agents; or

(e) procure the service directly from end users but sub-contract the individual functions to different specialist sub-contractors.

110. We believe that the approach we choose will be a commercial decision for us to take, with any of the options capable of delivering an acceptable service to end users.

111. We would, nonetheless, welcome stakeholders' views of the merits of the various options.

DSBR13: Do you have any comments on our procurement options?

112. Table 2 below provides a summary of the two Demand Side Balancing Reserve products.

Table 2: Summary of Proposed Demand Side Balancing Reserve Products

	Product 1	Product 2 (where different)
Eligibility	Non-BM Participants	
Service period	4pm-8pm, non holiday weekdays, November to February.	Any
Service capability	Sustainable for 2hrs or more. Tenders from those not able to sustain 2hrs also considered	Any
Minimum Utilisation fee	£500/MWh.	
Maximum Utilisation fee	£15,000/MWh (subject to VoLL study)	
Set-up Fee	A fixed payment of around £5-£10/kW based on average capability over period.	None
Utilisation payments up to declared capacity	Stepped scheme as per Figure 1	
Utilisation payments above declared capacity	Zero, or at utilisation rate if maximum reduction instruction given	
Metering Requirements	Half-Hourly settlement metering	
Despatch mechanism	Smart phone or web-based application	
Determination of delivery quantity	Baseline less metered quantity	
Determination of baseline for each half-hourly period	Mean of metered demand in corresponding half-hour on last 10 peak days where DSR not instructed.	
Verification	Undertakings from service providers and possible spot-checks	
Despatch order	In economic order with all other balancing services, taking into account system conditions	
Payment for despatch outside 4pm-8pm	At nominal rate for energy delivered	
Economic Assessment of tender	Value-based assessment to decide assuming a disappearance ratio of 0.25 (0.75 for other assessments)[5].	No assessment required.

5 See Section 5 on tender evaluation

Section 4 – Supplemental Balancing Reserve

113. The second of the new balancing services we propose we might procure is Supplemental Balancing Reserve.

114. We are proposing that:

(a) we would contract with a quantity of generation or, in principal, demand reduction capacity that would otherwise be unavailable to the market, most likely because it would otherwise be mothballed or decommissioned;

(b) to ensure additionality and minimise market distortions, plant providing Supplemental Balancing Reserve would be prohibited from participating in the markets for energy and balancing services, in that any output from generating units providing the service would not be aggregated in the relevant Energy Imbalance account of the participant; and any BM Unit providing SBR would also be prevented from participating in the balancing mechanism or providing other balancing services;

(c) tenderers would be invited to submit evidence that can demonstrate to our reasonable satisfaction that the plant providing the service would not otherwise participate in wholesale energy market arrangements. We would reserve the right to reject tender applications where we were not reasonably satisfied by the evidence;

(d) to avoid displacing other plant from the markets for energy and balancing services, Supplemental Balancing Reserve would only be called, to the extent that dynamics and other technical considerations allow, irrespective of utilisation price, after all other relevant balancing services (including Demand Side Balancing Reserve) have been exhausted and emergency actions would otherwise be required;

(e) Supplemental Balancing Reserve to be available whenever required by the SO within the availability periods specified in the contract (6am-8pm on non-holiday weekdays during the contract period);

(f) provision of Supplemental Balancing Reserve would be only from individual resources which can be despatched to provide a capacity of 50 MW or more through a single despatch interface. Additional requirements, such as operational metering, etc. would also apply;

(g) tenders would be invited initially in 2013/14 for Supplemental Balancing Reserve to be provided in Winter 2014/15 and 2015/16 with additional tenders for later years being held thereafter, if needed;

(h) tenders for Supplemental Balancing Reserve would specify: a total quantity of capacity in MW, a capacity fee in £ per MW per year; a utilisation fee in £ per MWh; and a warming fee in £ per hour;

(i) we would provide tenderers with a menu of charges for non-delivery and corresponding reliabilities or de-rating factors that we would apply in assessing the value of the capacity and the price paid for that capacity;

(j) tenderers to declare dynamic parameters as per the Grid Code. Should service providers not be subject to the relevant Grid Code requirements, they would be required to submit equivalent parameters under the contract;

(k) Supplemental Balancing Reserve to be despatched exclusively by the System Operator. Plant providing Supplemental Balancing Reserve would not be permitted to operate (i.e. generate or demand reduce) other than in accordance with such despatch instructions;

(l) the costs of procurement and call-off of Supplemental Balancing Reserve would not be reflected in the calculation of imbalance prices, pending the outcome of Ofgem's ongoing cash-out review; and

(m) costs of procurement and call-off of Supplemental Balancing Reserve, as with other balancing services, to be recovered through Balancing Services Use of System (BSUoS) charges, although outside the scope of the Balancing Services Incentive Scheme.

115. The rationale for these proposals is as follows.

Product

116. The aim of Supplemental Balancing Reserve is to procure generation or, in principle, demand reduction to be used as a last resort after all other balancing actions (including Demand Side Balancing Reserve) have been exhausted but before emergency actions are invoked. The intention would be to procure this service from generation (or demand reduction) that would otherwise be unavailable (e.g. where generation plant would otherwise be closed or mothballed).

117. We propose that the Supplemental Balancing Reserve service should be available from 6am to 8pm on non-holiday weekdays between the beginning of November and end of February. While it is expected that the most likely times at which the service would be called would fall between 4pm and 8pm, we believe that it is likely that the additional cost of providing the service throughout the day may be relatively modest and so propose that the service window should be 6am to 8pm. We would be pleased to discuss this proposal further with any prospective service providers for whom there would be significant cost savings (and hence price reductions) for shorter periods of availability.

118. Providers would be subject to non-delivery charges in the event that they failed to respond as instructed (in accordance with their dynamic parameters) at times of system stress.

119. We anticipate that Supplemental Balancing Reserve may be provided by fossil-fuelled generators. It may be necessary to warm such generators in order that subsequently they can provide Supplemental Balancing Reserve at short notice. Where providers require warming payments as part of their service provision, the associated costs would be taken into account in the tender assessment and, if successfully selected, paid to the service provider when warming.

Section 4 – Supplemental Balancing Reserve

SBR1: Do you agree with our basic product proposals?

Participation

120. It is intended that the design of this product is such that it has a minimal impact on the wider energy market. As a consequence we are proposing arrangements to ensure that the plant is "additional" i.e. that it would not have been available for despatch had the Supplemental Balancing Reserve contract not been awarded. Plant with which we contract would not be permitted to participate in the wider markets for energy or balancing services.

121. In order to avoid contracting with plant that would in any case have been available and to minimise distortion to the energy market, we propose that plant selected to provide Supplemental Balancing Reserve should, for the duration of the Supplemental Balancing Reserve contract, be required to:

(a) submit Physical Notification of zero, unless otherwise instructed by the System Operator; and

(b) not submit any offers and bids into the balancing mechanism unless otherwise instructed by the System Operator.

122. We considered whether such arrangements should apply to plant tendering to provide Supplemental Balancing Reserve irrespective of whether or not it was successful in the tender, as this would provide greater assurance that the plant was additional. We also considered other mechanisms for achieving a similar end, including both: requiring, as a condition of tendering, the tenderer to apply to reduce its Transmission Entry Capacity (TEC) to zero; and seeking assurances from any tenderer that it does not intend to otherwise provide energy in the event that its tender is unsuccessful. We do not, however, propose to place any explicit constraints on future market participation of unsuccessful tenderers as we have concerns as to whether it would be appropriate for National Grid to do so and as to whether it would be possible to enforce.

123. Nevertheless, we do propose to require tenderers to provide evidence that plant being offered as Supplemental Balancing Reserve will not otherwise be participating in the energy market or providing other balancing services for at least the period of the contract. We are still considering the detail of what types of evidence we believe would be appropriate, but we propose to retain the right to reject any application to provide SBR if the evidence provided does not demonstrate to our reasonable satisfaction that the plant would not be participating in the energy market or in the provision of balancing services in the absence of any SBR contract.

124. We acknowledge that, in principle, demand side resources should have the opportunity to provide Supplemental Balancing Reserve. However, while we believe that a generator could provide evidence that they would not otherwise be participating in the energy market or the provision of balancing services for the period of the contract, we are unclear as to how demand side could provide similar evidence, as it would have to demonstrate that it did

not otherwise intended to reduce demand, i.e. that it intended to continue taking demand, irrespective of price or any other signal.

125. Whilst we believe such evidence would be difficult to provide, we would, nevertheless, consider proposals from demand reduction on a case-by-case basis where satisfactory evidence could be given.

126. We propose that Supplemental Balancing Reserve should be provided only from resources which can be despatched to provide a capacity of 50 MW or more through a single despatch interface. As it would be called only infrequently and then only at times of system

Table 3: Participation Requirements on SBR Tenderers and Providers

Participation Requirement	Additional Comments
Evidence of additionality	We would reserve the right to reject tender applications from potential providers that did not provide evidence to National Grid's reasonable satisfaction that they would not otherwise be participating in the energy market or in the provision of balancing services for the period of the contract.
During contract period, any output from any generating unit providing the service would not be aggregated to the energy imbalance account, and any BM Unit providing the service would also be precluded from participating in the balancing mechanism.	As above.
Supplemental Balancing Reserve to be provided only from resources which can be despatched to provide a capacity of 50 MW or more through a single despatch interface.	For reasons of practicality in despatch at times of system stress, we propose not to accept the service from a large number of smaller resources that require separate despatch.
Must have operational metering feed into National Grid control centre	In accordance with the CUSC and Grid Code
Must have half-hourly settlement metering.	In accordance with the relevant Metering Code of Practice under the BSC.
Transmission/distribution system must be reasonably capable of accommodating the service when expected to be required.	Generation in export constrained zones or demand reduction in import constrained zones may be assessed as uneconomic.
May be subject to service testing.	
Must be capable of being available 6am to 8pm on non-holiday weekdays over duration of contract.	In addition to levying non-delivery charges in the event that the service is not delivered, we will seek contractual assurances from the service provider that they will be available at the required times. The contract is likely also to place requirements on the minimum energy capable of being delivered over the contract duration, although, as the service is not expected to be called often, this quantity is unlikely to be significant. However, if the plant requires warming to be able to deliver the service within particular timescales, we might need to specify a minimum fuel holding requirement.

stress, we would like to minimise the complexity for System Operation of calling off the service. To achieve this, we consider it desirable to avoid the need to despatch large quantities of separate resources and would like clarity over precisely where on the system such resources will be delivering additional power.

127. A summary of the proposed participation rules is included in Table 3.

SBR2: Do you agree with our proposals on participation and our proposals to seek reasonably satisfactory evidence regarding additionality?

Payments and Charges

128. We propose that Supplemental Balancing Reserve providers will receive:

(a) capacity payments at an agreed rate in £ per MW per year for de-rated capacity;

(b) utilisation payments at an agreed rate in £ per MWh in the event that their Supplemental Balancing Reserve resource is called; and

(c) a warming fee at an agreed rate in £/hour in the event that their Supplemental Balancing Reserve resource follows an instruction to warm.

129. We propose also that Supplemental Balancing Reserve providers will be liable for non-delivery charges (in £ per MWh) in the event that they fail to respond to an instruction from the System Operator to generate (or demand reduce) during a system stress event.

130. A problem, as we perceive it, is that different potential service providers will have different outage rates[6]. Resources with low outage rates are reliable. In contrast, resources with high outage rates are unreliable and a greater quantity of such capacity would be needed to deliver a given overall reliability.

131. Accordingly, to maintain any given overall reliability, the system needs fewer resources if the outage rates are low than if the outage rates are high. Thus, in assessing the contribution of a particular resource to capacity adequacy, we de-rate the nominal capacity of a resource according to its outage rate, with resources with low outage rates being de-rated a little and resources with high outage rates being de-rated a lot. The value of a resource in contributing to capacity adequacy is then dependent on the de-rated capacity rather than the nominal capacity.

132. Although outage rates, and hence de-rating factors, are inherently uncertain, we consider it important nevertheless to determine these parameters as realistically as possible. Moreover, given that we anticipate Supplemental Balancing Reserve being provided by plant that is near the end of its economic life, it is possible that such plant will have had little recent running and reduced maintenance, increasing this uncertainty.

6 The term, “outage rate”, refers to a measure of the probability that a resource will not be available for service when required. The terms, “forced outage rate” and “planned outage rate”, then draw the distinction between unavailability that is planned, such as for maintenance, and unavailability that is unforeseen.

133. Thus, whilst we could attempt to estimate outage rates from historic data, we think that the plant operator's view of the outage rate is likely to be more accurate. Hence, we propose instead to adopt an approach which allows the service provider to reveal their own outage rate as part of the tender process. To do this we would provide them with a menu of non-delivery charges and corresponding de-rating factors, in which high non-delivery charges correspond with low de-rating factors and low non-delivery charges correspond with high de-rating factors.

134. We think that providers with reliable resources will be prepared to accept high non-delivery charges as they will consider it unlikely that they will incur them, whilst the low de-rating factor will maximise the value their capacity. Conversely, providers with unreliable resources cannot afford the exposure to high non-delivery charges as they are likely to incur them and thus they will prefer low non-delivery charges even at the expense of their capacity being significantly de-rated.

135. Moreover, we believe that by designing the menu of options to have the appropriate trade-off between non-delivery charge and de-rating factor, the optimum choice for any provider will be to select the non-delivery charge and de-rating factor that corresponds with their own best estimate of the true outage rate.

136. We are currently developing a methodology by which we can choose the appropriate trade-off between non-delivery charge and de-rating factors. We have included our preliminary thoughts in Appendix A and would be happy to receive views on how such an approach should work and on the methodology that we might adopt for developing the appropriate trade-off.

137. We believe that the advantage of the overall approach would be that providers would not be forced to accept exposure to non-delivery charges that were not appropriate given the reliability of their generating plant or other resource, whilst we will gain an indication of the level of confidence the provider has in their own resources.

SBR3: Do you have any comments on the proposals to infer outage rates by allowing service providers to choose their non-delivery charge? Views are also invited on the approach to creating the appropriate trade-off between non-delivery charges and de-rating factors.

Verification

138. We propose that the Supplemental Balancing Reserve agreement will give us the right to call tests. These tests would have the aim of confirming that the relevant capacity resource can provide service that has been contracted. We also anticipate that the service provider themselves may wish to undertake proving runs to demonstrate the capability of the service, and this too would need to be accommodated within the arrangements.

139. Whether or not a test is undertaken might depend on the nature of the plant being contracted. For example, we might consider it prudent to test a plant that is returning from being mothballed, whereas we might consider this unnecessary for plant which had been operational until shortly beforehand. It may also be appropriate to accommodate: proving runs; commissioning tests that the generators needs; and some of the occasional running some plant may need to ensure ongoing availability.

140. It could also be appropriate to undertake some tests on prospective service providers as part of the tender assessment process.

141. We recognise that extensive testing could impact on the market and hence we propose that testing is kept to the minimum necessary to provide reasonable assurance that the service is capable of being provided.

SBR4: Do you agree with our verification proposals?

Despatch

142. We propose that all output from plant providing Supplemental Balancing Reserve would be despatched by the System Operator and that the plant would not otherwise be permitted to run (or demand reduce).

143. We are still considering whether, where Supplemental Balancing Reserve is provided by a participant in the balancing mechanism, it would be most appropriate and expedient to despatch the service through the balancing mechanism or through some other mechanism.

144. Given that we are proposing that Supplemental Balancing Reserve should only be despatched, to the extent that dynamics and other technical considerations allow, after all other non-emergency balancing services have been exhausted[7] then, if despatched through the balancing mechanism, any Offer Price would have to be either ignored or set at a level to place the plant last in the merit order rather than to reflect the utilisation payment. Ignoring the Offer Price might require modifications to our despatch systems. On the other hand, placing plant last in the merit order would require us to determine high deemed Offer Prices, taking account of other Offer Prices being submitted in the balancing mechanism. Moreover, the high Offer Prices likely to be required could give rise to large payments through the BSC which would need subsequently to be recovered under the terms of the Supplemental Balancing Reserve contract.

[7] Whilst we are proposing that the precedence of balancing services is such that we should call SBR only *after* exhausting all other non-emergency balancing services, were plant providing SBR to have poor dynamic characteristics, it could nevertheless be necessary, say, to begin ramping up SBR plant *before* other balancing services had been fully exhausted (and to be still ramping it down after the call-off of other balancing services had finished). Our intention would be that this would happen only to the extent necessary in order that SBR were generating (or demand reducing) at the required level at the required time. Moreover, this situation, whereby plant with slow dynamics may be temporarily out-of-merit, happens regularly in the course of normal economic despatch on most power systems.

Table 4: Despatch options for Supplemental Balancing Reserve		
Issue	**Despatch through the BM**	**Despatch outside the BM**
Form of despatch instruction	Specification of PNs and acceptance of Bids and Offers	Potentially specification of PNs and bespoke communications outside acceptance process
Ability to rely on existing systems	Existing systems could be used without or with little modification	May need bespoke arrangements, although these need not necessarily be complex
Impact on imbalance prices	Accepted Offers and Bids would need to be tagged out	No requirement to tag out accepted Offers and Bids
Impact on Energy Imbalance Quantity	No adjustment needed through ABSVD	ABSVD adjustment needed
Impact on providers who are not BM Participants	Requirement to become a BM Participant	No requirement
Despatch instructions consistent with dynamics	Yes	Yes
Impact on National Grid control systems	We are investigating this issue	New system may be required, although may not need to be complex
Cashflow issues	May need to require a (very) high Offer price to avoid interference with existing Offers. Cashflow would then be recouped under the contract.	No major issues

145. Despatch of the service through the balancing mechanism could also impact on imbalance prices unless further adjustments were made and so, if despatched through the balancing mechanism, we would propose to tag out any accepted Offers (or Bids) relating to BM Units providing SBR such that these acceptances did not contribute to energy imbalance pricing.

146. Despatch by a mechanism other than the balancing mechanism would be likely to involve requiring SBR providers to submit Physical Notifications for the relevant BM Units and/or deviate from those Physical Notifications, as directed by the System Operator by some means, using the existing provisions in the Grid Code.

147. Table 4 sets out a summary of the issues associated with the two options.

Section 4 – Supplemental Balancing Reserve

148. Irrespective of the mechanism for despatching SBR, despatch instructions would be consistent with the dynamic capabilities of the relevant BM Units. These dynamic capabilities, which could take account of whether the plant were warm or cold, would be declared in the tender and would be reflected in the contract.

149. Any non-delivery would thus be measured by reference to despatched quantities which would be quantities that the service provider should be capable of physically delivering. The service provider's principal obligation would thus be to ensure that its plant was available in accordance with the contract and performed in accordance with its dynamics.

SBR5: Do you agree with our proposals to despatch SBR only after other non-emergency balancing services have been exhausted and do have any views on whether SBR should be despatched through the Balancing Mechanism or outside it?

Contractual Arrangements and Settlement

150. Successful tenderers would be required not to generate (or demand reduce) from the relevant BM Units except where directed to do so by National Grid under the contract. We expect that the contractual arrangements would, amongst other things, also deal with submission of Physical Notifications, despatch, non-delivery charges, testing, minimum commitments on availability and payment arrangements.

151. We do not expect any material issues to arise in settlement of Supplemental Balancing Reserve contracts. Our current view is that 20% of the capacity payments would become due following successful demonstration of capability ahead of the winter season, with the balance net of any non-delivery charges becoming due following the winter availability period. Any utilisation and warming payments due under the contract would be calculated using settlements data and payments made accordingly. Thus, we anticipate that Supplemental Balancing Reserve contracts will be administered in a similar manner to the existing suite of balancing services contracts.

SBR6: Do you agree with our proposals for Settlement, and in particular, regarding the payment of 20% of the capacity payment up front?

Imbalance Pricing

152. As with DSBR, were we to adopt an approach similar to that used for STOR, we would reflect the fixed contract payments in imbalance prices over the Settlement Periods covered by the service which, for Supplemental Balancing Reserve, could be significant and lead to significant imbalance price increases.

153. Conversely, if Supplemental Balancing Reserve were despatched through the balancing mechanism, although with its utilisation prices ignored to ensure last resort despatch, then the acceptance of offers, unless tagged out, would reduce imbalance prices. This would be perverse given that these offers would be being accepted at a time of system stress.

154. In view of Ofgem' cash-out review, we are again proposing that these costs are not reflected in imbalance prices but that should Ofgem conclude that adjustments should be made then we would develop the necessary changes to the Licence Condition C16 statements.

SBR7: Do you agree that imbalance prices should not be affected by any SBR procurement ahead of Ofgem's Energy Balancing Significant Code Review?

Procurement

155. If we decide it is necessary and appropriate to invite tenders for this product, National Grid would invite bids from persons fulfilling the additionality criteria and apply the tender assessment process explained further in the next section.

Section 5 – Tender Evaluation and Call-Off

Demand Side Balancing Reserve Tender Assessment

156. For all tenders to provide Demand Side Balancing Reserve, which meet the participation and verification requirements, we would assess the benefit as being:

$$VoLL * \Delta EEU$$

where: VoLL is the Value of Lost Load; and

ΔEEU is the reduction in involuntary Expected Energy Unserved that would be expected to arise from instructing the Demand Side Balancing Reserve.

157. We understand that DECC and Ofgem are currently undertaking a joint study on the value of VoLL and we propose using the outcome of this work to set the VoLL in our assessments.

158. We would estimate ΔEEU using system studies. Where necessary we would take location into account, e.g. where Demand Side Balancing Reserve were located within an import constraint, such that it could not contribute to system-wide energy balancing, this would be reflected in our estimate of ΔEEU from the particular Demand Side Balancing Reserve.

159. We would assess Demand Side Balancing Reserve tenders in ascending order of cost, and accept valid tenders with all Demand Side Balancing Reserve for which the expected value exceeded the expected cost.

160. The cost of each Demand Side Balancing Reserve tender would be determined as:

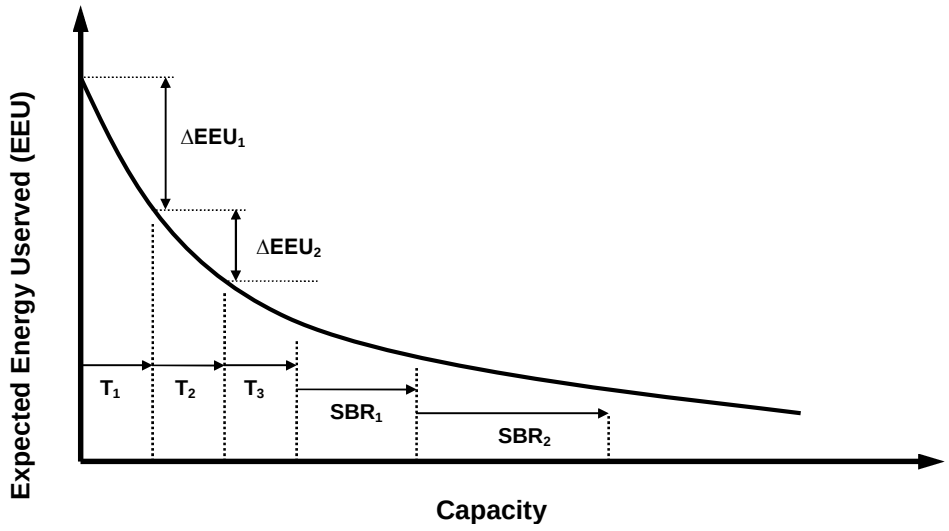
$$\text{Fixed Cost} + \text{Utilisation Cost} * \text{Expected Running Hours}^{8}$$

161. For Product One, the Fixed Cost would be the set-up payment whereas, for Product Two, the Fixed Cost would be zero. Expected Running Hours we would calculate from system studies incorporating estimates of likely demand, available generation and DSBR already accepted.

162. Figure 2 illustrates the typical relationship between the quantity of Expected Energy Unserved on the system and capacity, and shows how, when tenders are accepted, there are reductions, ΔEEU_1 and ΔEEU_2, in the Expected Energy Unserved. T_1 represents the capacity of the first Demand Side Balancing Reserve provider multiplied by (1-DR), where DR is the forced outage rate or disappearance ratio of DSBR resources and hence (1-DR) the de-rating factor we use when assessing their contribution to capacity adequacy and calculating ΔEEU.

[8] Expected Running Hours may differ from ΔEEU, as instructions to Demand Side Balancing Reserve would be "all or nothing" and hence delivered DSBR may exceed ΔEEU.

Figure 2: Expected Energy Unserved vs. Capacity



163. Because there is no experience of the Demand Side Balancing Reserve, it is difficult to determine the appropriate de-rating factor to apply, at least initially, in its evaluation. Underestimating the DSBR reliability would tend to reduce the probability that DSBR tenders would be accepted, whilst overestimating the probability could reduce the overall quantity of DSBR and Supplemental Balancing Reserve procured, with a consequential impact on overall security of supply.

164. In the absence of any relevant data, we propose:

(a) for the purposes of assessing each DSBR tender, in particular in calculating the effect on ΔEEU, we would assume a DR of 0.25, equivalent to de-rating DSBR to 75% of its nominal capability; and

(b) for the purpose of assessing further tenders for DSBR or Supplemental Balancing Reserve, we would assume a DR of 0.75, equivalent to de-rating accepted DSBR to 25% of its nominal capability.

165. The situation may arise, for Product One, whereby the value of tenders with certain utilisation price would exceed the cost only if a proportion of the tenders were accepted. In this case, we would assess whether the best option would be to accept all of the tenders or none of them. For Product Two, with no fixed cost and hence no commitment to make any payment unless called, the value would exceed the costs for all utilisation prices less than VoLL and hence we would accept all valid tenders.

TAC1: Do you agree with the way in which we propose to assess Demand Side Balancing Reserve?

TAC2: Do you have any particular comments on the way we propose to use Disappearance Ratios (DRs) for Demand Side Balancing Reserve in the assessment process?

TAC3: Do you agree that we should enter into a contract with all Demand Side Balancing Reserve with a utilisation price of less than the Value of Lost Load (VoLL) that has no set-up fee?

Supplemental Balancing Reserve Tender Assessment

166. Supplemental Balancing Reserve tenders that meet the participation requirements would also be assessed on a value basis.

167. In line with our proposal that Supplemental Balancing Reserve would not be despatched other than as a last resort, after the despatch of all other balancing services including DSBR and prior to taking emergency action, it is appropriate that the benefit of any Supplemental Balancing Reserve tender is assessed only after taking into account the impact of any DSBR.

168. The value of any particular Supplemental Balancing Reserve tender would be determined as:

$$\text{VoLL}*\Delta\text{EEU} + \text{Expected Non-delivery Charges} - \text{Expected Contract Payments}$$

169. Further discussion on how we propose to determine the contract payments and non-delivery charges is included in Appendix A.

170. As with Demand Side Balancing Reserve, we would estimate ΔEEU from system studies, taking into account the capacity and reliability of the plant providing the service. Again, any locational effects would be taken into account in the assessment, where important.

171. We would determine the value of each tender and accept the tender with the highest value, providing the value were positive. We would then reassess the values of the remaining tenders, given the decision to accept the first, and again accept the tender with the highest value providing the value is positive. We would continue with this process until we had accepted all tenders or no tender with a positive value remained.

TAC4: Do you have any comments on our proposed assessment of Supplemental Balancing Reserve?

Call-off

172. We propose to despatch Demand Side Balancing Reserve in order of economic merit order including other balancing services and therefore called relatively infrequently. Whilst, with a minimum utilisation rate of £500/MWh, we would expect DSBR to be more expensive than

Offers in the balancing mechanism in most cases, there could be occasions when this were not the case and we would despatch the DSBR in preference to the balancing mechanism Offer.

173. This approach reflects the rationale of introducing DSBR as a means of participating in the provision of balancing services for service providers that are called relatively infrequently and for whom existing institutional arrangements and costs of full participation in the balancing mechanism are a barrier to entry.

174. Supplemental Balancing Reserve, we are proposing we should despatch only as a last resort, irrespective of utilisation price, as an alternative to taking emergency actions.

175. It is possible that this will mean that there may be times when other balancing services, for example Offers in the balancing mechanism or Demand Side Balancing Reserve, will be accepted at a price higher than the utilisation cost of plant contracted to provide Supplemental Balancing Reserve.

176. The aim of Supplemental Balancing Reserve is to procure resources that are not participating in the wholesale market, whether in backing sales of energy through bilateral contracts, the balancing mechanism and other existing balancing services markets. Supplemental Balancing Reserve may nevertheless be economic still when weighed against the expected costs imposed on consumers by involuntary demand reduction, valued at VoLL, that would otherwise occur.

177. If, however, Supplemental Balancing Reserve were called in economic merit order it would be likely to displace existing plant in the wholesale market, thereby undermining the additionality of, and hence the rationale for, the new service.

178. We therefore believe it appropriate that Supplemental Balancing Reserve should only be despatched, to the extent that dynamics and other technical considerations allow, after all other non-emergency relevant balancing services have been exhausted. Moreover, we believe that to do so would comply with our obligations in relation to efficient, economic and co-ordinated system operation and to not discriminate between balancing services not having technical differences.

TAC5: Do you agree with our proposed call-off arrangements?

Section 6 – Next Steps

179. If, in light of the responses to this consultation and Ofgem's open letter, we decide to proceed with the development and subsequent procurement of these new balancing services, we expect that the next steps will involve the publication of a further document setting out the conclusions from this consultation and formally consulting with BSC parties on the necessary changes to the Condition C16 Statements, as required by our transmission licence. Any subsequent procurement of these balancing services would then be subject to Ofgem's approval of these changes and our wider licence obligations.

180. Our provisional timetable is as follows:

July 2013	Workshop to discuss the proposals in this consultation
26th July 2013	Consultation closes
Summer 2013	Conclusions on issues raised by this consultation and formal consultation on any proposed changes to procurement guidelines and balancing principles.
Winter 2013	Development of any detailed tender process and proposed contractual arrangements for both DSBR and SBR.
Q1 2014	Tendering processes and assessment, subject to necessary approvals having been received.

Appendix A – Outage Rates and Non-Delivery Charges

1. We expect that payments for Supplemental Balancing Reserve will comprise mainly capability payments, with payments for utilisation being relatively modest in comparison.

2. This raises two related questions:

   (1) given that substantial payments are being made for capability rather than utilisation, what is the charge in the event that the capability does not deliver when required; and

   (2) how do we estimate the outage rate of any given resource such that we can determine the value of its capability and its contribution to capacity adequacy?

3. We understand that the proposals for the Government's Electricity Market Reform envisage a standardised capacity product with a single price, and that capacity resources faced with an outage will be expected to manage their exposure to non-delivery charges by trading their capacity obligations on to other providers.

4. We expect, however, that Supplemental Balancing Reserve will be a balancing service procured from a limited number of providers and we do not think it would be practicable to rely on secondary trading as the means by which providers manage their exposure to what could be a severe non-delivery charge. Instead we intend to take account of the outage rate in deciding on the economic merits of any given tender submission and to reflect the outage rate in both the amount we pay for any given resource and the total quantity of resources we procure, to take account of the probability that the resources we procure will fail to deliver.

5. Moreover, we expect that an important source of Supplemental Balancing Reserve will be plant at the end of its economic life that would otherwise be planning to retire. As such, it is possible that such plant will have had little recent running and reduced maintenance. Hence, whilst we could attempt to estimate outage rates, we think this could be both difficult, given the limited running on which to base any estimates, and potentially inaccurate given that, for potential Supplemental Balancing Reserve resources, historical data may not necessarily be a good indicator of future performance.

6. Instead, we propose to offer capacity providers a choice of non-delivery charge from a menu of non-delivery charges and corresponding de-rating factors. High non-delivery charges will be associated with low de-rating factors and low non-delivery charges will be associated with high de-rating factors. Capacity providers with reliable resources will be able to opt for high non-delivery charges, with the correspondingly low de-rating factor ensuring that their capacity is fully valued. In contrast, capacity providers with less reliable resources will be able to opt for lower non-delivery charges, albeit at the expense of the value of their capacity being correspondingly discounted.

7. Furthermore, with the appropriate trade-off between non-delivery charges and de-rating factors, the optimum choice for any provider should be to select the non-delivery charge and de-rating factor that corresponds with their best estimate of the reliability of their own resource.

8. We are currently developing a methodology for creating such a menu. Nevertheless, the underlying principle is to consider the problem of the capacity provider seeking to choose the non-delivery charges that will maximise its expected revenue.

Non-delivery Charges during System Shortfalls

9. Assuming that we levied a non-delivery charge only in the event that a resource failed *and* there was a system shortfall, the value of the capacity contract to the capacity provider could be expressed by an equation of the form,

$$\Pi = P_{cap}.Q.(1 - DDR) - p_{nd}.Q.DR.LOLE - C(DR)$$

where: π is the value to the provider of the contract;

Q is the nominal capacity (in MW);

DR is the actual disappearance ratio or outage rate of the resource;

DDR is the provider's declared estimate of the disappearance ratio or outage rate;

P_{cap} is a price for capacity (in £/MW) that the provider could command for the resource if the resource was fully reliable, such that $P_{cap}.(1 - DDR)$ is the price paid for capacity with a forced outage rate of DDR;

p_{nd} is the non-delivery charge (in £/MWh); and

LOLE is the expected duration (in hours) of system shortfall over the contract period; and

C(DR) is the cost of providing capability, which may be related to the actual disappearance ratio.

We assume that the utilisation and warming prices are cost reflective such that the profit does not depend on utilisation or warming. Note also that the cost of providing capability, whilst related to the *actual* outage rate or disappearance ratio, is not dependent on the *declared* value.

10. To find the value of DDR that maximises the profit to the capacity provider, we differentiate π with respect to DDR, giving,

$$(d\pi/dDDR) = -P_{cap}.Q - (dp_{nd}/dDDR).Q.DR.LOLE$$

11. To maximise π, $d\pi/dDDR = 0$, and so,

$$-P_{cap} = (dp_{nd}/dDDR).DR.LOLE$$

$$\therefore \quad (dp_{nd}/dDDR) = -P_{cap} / (DR.LOLE)$$

12. Moreover, we want π to be maximised when DDR = DR. Thus,

$$(dp_{nd}/dDDR) = -P_{cap} / (DDR.LOLE)$$

for which a solution is,

$$p_{nd} = -(P_{cap} / LOLE).\log_e(DDR)$$

and,

$$DDR = \exp(-p_{nd}.LOLE / P_{cap})$$

13. This solution seems to have a number of required characteristics, the most obvious being that: (a) for a resource that was totally unreliable, with a DDR of one, the corresponding non-delivery charge would be zero; and (b) non-delivery charges increase rapidly as outage rates approach zero.

14. However, we note that the non-delivery charge that a Supplemental Balancing Reserve provider would prefer will depend on the probability of a system shortfall. This is intuitively reasonable as the provider of even a highly unreliable resource would be prepared to opt for a high non-delivery charge if the probability of system shortfall was extremely low. It does, though, mean that the provider can not select the preferred non-delivery charge with out knowing the probability of system shortfall and we cannot infer the provider's best estimate of the resource's outage rate without knowing the probability that the provider has assumed.

15. Recognising that higher LOLE exposes providers to a greater risk of incurring non-delivery charges, a possible solution might be for us to declare our estimate of LOLE and cap the exposure to non-delivery charges to only that duration of running - probably not including ramping up and ramping down - of Supplemental Balancing Reserve resources.

16. If, notwithstanding our cap of LOLE, the provider's estimate of LOLE were lower than ours, the provider might opt for a higher non-delivery charge, so as to enhance the capability payment. As a result we might over-estimate the reliability of the resource, albeit the provider would pay more in non-delivery charges should it subsequently fail to deliver. This is no different to what would happen were the provider simply to over-estimate the reliability of its own resource.

17. Conversely, if the provider's estimate of LOLE were higher than the cap, the provider should choose a non-delivery charge that is optimum given our, rather than its, estimate of LOLE. We may then be able to infer the provider's best estimate of its resource's outage rate. Clearly, though, in the event that the resource were run for longer than the estimated LOLE, it would be no longer exposed to non-delivery charges thereby undermining the incentive to deliver.

18. Nevertheless if we assume, say, that LOLE were 10 hours and P_{cap} were £25/kW then using the above relationship we would get a value of almost £7,500/MWh for p_{nd} for a DDR of 5%. By using a range of values for DDR, we could calculate a menu of DDR / p_{nd} choices.

19. Whist, it seems plausible that a hypothetical resource with a zero outage rate should be prepared to accept an infinite non-delivery charge, it also seems counter-intuitive that non-delivery charges should exceed the Value of Lost Load (VoLL) as, in excess of VoLL, consumers should prefer the resource to fail and receive the non-delivery payment. Although the VoLL implied in our example by the LOLE of 10 hours will depend on a number of factors, our calculated non-delivery charge is higher than might be expected for a modest outage rate, and hence we intend to investigate whether this solution is giving the most appropriate trade-off.

Other Approaches

20. A variant of the above approach could be to levy non-delivery charges on a resource in the event that it failed irrespective of whether this led to a system shortfall.

21. If Supplemental Balancing Reserve were provided by a large number of small resources then this would imply that non-delivery charges would be levied on any one resource, notwithstanding that a system shortfall had been averted by calling on a second resource. Indeed, we procure a margin of plant precisely to enable the failure if any one (or multiple) resource(s) to be covered by other resources. However, if we were to procure Supplemental Balancing Reserve from a single large resource then failure of the single resource would be expected to lead to a system shortfall and hence this approach would not differ from the first.

22. Nevertheless, in this approach, the risk of exposure to non-delivery charges would cease to be dependent on a system-wide parameter, LOLE, but would become a parameter specific to each individual resource, i.e. its running hours. That said, the parameter would be one which it were still difficult for the Supplemental Balancing Reserve provider to estimate.

23. It does, however, suggest the possibility that Supplemental Balancing Reserve providers could be paid, in addition to the fixed capacity payment, an additional 'insurance payment', being an amount per hour of running to reflect the additional exposure to non-delivery charges[9]. The aim would be to make providers indifferent to running hours and, indeed, to any other factors that were outside their control.

24. This would, however, have to be done in such a manner that we did not create an incentive to overstate resource reliability, knowing that fixed capacity payments would be enhanced whilst the increased non-delivery charge exposure would be covered by the hourly insurance payment.

25. Possible solutions might be to taking the increased insurance payment into account in evaluating the Supplemental Balancing reserve tender, such that overstating resource

[9] This payment would be in addition to the utilisation payment covering fuel costs, maintenance, etc.

reliability would tend to drive up the cost. Indeed, this might be the situation if, rather than having an explicit insurance payment, Supplemental Balancing Reserve providers priced the risk into the utilisation price.

26. Alternatively, there may be some way to compensate providers for additional running hours but not inflated non-delivery charges. Whilst this could be achieved by setting a fixed rate per hour for the insurance payment, an appropriate rate would need to be determined. Ideally this would be related to the actual (as opposed to the declared) outage rate but, of course, the rationale for the whole approach is that we may not have an accurate estimate of this quantity.

Appendix B –Triad Periods 1990/1 to 2012/3

Financial Year	Triad Leg 1			Triad Leg 2			Triad Leg 3		
	Date	Time (HH ending)	Demand (GW)	Date	Time (HH ending)	Demand (GW)	Date	Time (HH ending)	Demand (GW)
2012/13	12-Dec-12	17:30	55.3	16-Jan-13	17:30	54.8	29-Nov-12	17:30	52.4
2011/12	02-Feb-12	18:00	54.5	16-Jan-12	17:30	53.3	05-Dec-11	17:30	52.5
2010/11	07-Dec-10	17:30	58.9	20-Dec-10	17:30	58.8	06-Jan-11	17:30	54.7
2009/10	07-Jan-10	17:30	58.1	25-Jan-10	17:30	55.4	15-Dec-09	17:30	55.2
2008/09	06-Jan-09	17:30	8.0	01-Dec-08	17:30	56.4	15-Dec-08	17:30	55.8
2007/08	17-Dec-07	17:30	59.5	03-Jan-08	17:30	57.0	26-Nov-07	17:30	56.4
2006/07	23-Jan-07	17:30	57.4	20-Dec-06	17:30	57.0	08-Feb-07	18:00	56.7
2005/06	28-Nov-05	17:30	59.4	05-Jan-06	17:30	58.5	02-Feb-06	18:00	58.7
2004/05	13-Dec-04	17:30	53.3	24-Jan-05	17:30	52.6	01-Dec-04	17:30	51.7
2003/04	08-Dec-03	17:30	53.1	28-Jan-04	17:30	52.4	14-Jan-04	17:30	51.6
2002/03	10-Dec-02	17:30	53.8	08-Jan-03	17:30	53.8	30-Jan-03	18:00	51.6
2001/02	17-Dec-01	17:30	52.3	03-Jan-02	17:30	51.5	16-Jan-02	17:30	50.0
2000/01	16-Jan-01	17:30	51.1	01-Feb-01	17:30	49.9	18-Dec-00	17:30	49.5
1999/00	20-Dec-99	17:30	50.6	20-Jan-00	17:30	48.8	08-Dec-99	17:30	48.2
1998/99	07-Dec-98	17:30	9.0	11-Jan-99	17:30	48.5	17-Nov-98	17:30	48.1
1997/98	17-Dec-97	17:00	49.3	02-Dec-97	17:30	48.1	20-Jan-98	17:30	47.5
1996/97	07-Jan-97	17:00	49.5	27-Nov-96	17:30	47.8	10-Dec-96	17:00	47.7
1995/96	25-Jan-96	17:30	48.4	05-Feb-96	17:30	47.7	11-Dec-95	17:30	47.3
1994/95	04-Jan-95	17:30	45.6	14-Dec-94	17:30	45.1	19-Jan-95	17:30	45.0
1993/94	29-Nov-93	17:00	47.3	14-Dec-93	17:00	46.2	18-Jan-94	17:30	45.1
1992/93	17-Nov-92	17:30	44.6	09-Dec-92	17:00	44.3	04-Jan-93	17:30	44.3
1991/92	11-Dec-91	17:30	47.3	23-Jan-92	17:30	45.8	21-Nov-91	17:30	45.2
1990/91	07-Feb-91	17:30	47.0	18-Dec-90	17:00	46.6	15-Jan-91	17:30	46.6

Appendix C – Indicative Changes to C16 Statements

Appendix C is published as a separate document.

Appendix D – Glossary

Term	Description
Balancing Mechanism	The mechanism, provided for under the BSC and the Grid Code, being the principal means by which National Grid balances generation and demand at a local and national level.
Balancing Services	Services that National Grid uses to balance generation and demand on a local and system-wide basis, and which includes reserve, reactive power, frequency response, etc. Formally defined in the transmission licence.
Behind-the-meter generation	Generation that is netted off demand for the purposes of determining the demand at a particular site.
Cash-out	Under the Balancing and Settlement Code, the calculation of quantities of energy imbalance and the determination of prices to be paid or charged for such quantities.
DECC	Department of Energy and Climate Change
Demand Control	Grid Code term, including any or all of the following methods of achieving demand reduction: (a) voltage reduction initiated by Network Operators (other than following an instruction from NGET); (b) customer disconnection initiated by Network Operators (other than following an instruction from NGET); (c) demand reduction instructed by NGET; (d) automatic low frequency demand disconnection; (e) emergency manual demand disconnection.
DSBR	Demand Side Balancing Reserve
EMR	Electricity Market Reform.
Forced Outage Rate	A measure of the probability that a generating unit (or demand reducer) will fail to deliver when called upon to do so. Forced Outage Rate does not include a failure to deliver when on planned outage.
Half Hourly Settlements Metering	As defined in the Balancing and Settlement Code, a metering system which provides half-hourly measurement for settlements. (Note that in some instances half-hourly demand data may be measured but not used for settlement.)
Margin	The amount by which aggregate generation capacity exceeds peak demand.
MaxGen	An emergency service under which National Grid pays generation or demand reducers to deliver energy over and above their nominal capability.
MPAN	Meter Point Administration Number, which uniquely identifies a metering point.
Ofgem	Office of Gas and Electricity Markets

Appendix D – Glossary

Term	Description
SBR	Supplemental Balancing Reserve
STOR	Short Term Operating Reserve, being an existing balancing service procured by National Grid. Two STOR services are procured: Committed STOR is required to be available at all times during defined availability windows; whilst Flexible STOR has scope to declare itself to be unavailable.
System stress event	An event during which the System Operator exhausts relevant balancing services and has to resort to emergency actions
Triad	The three periods of highest transmission system demand between November and February separated from system peak demand and each other by at least 10 days. Demand taken during triads is used to calculate charges for use of the transmission system
Triad avoidance	Steps taken to reduce demand at times of triad in order to minimise charges for use of the transmission system.

Appendix E – Consultation Questions

Demand Side Balancing Reserve

Number	Question
DSBR1	Do you agree with our proposed participation criteria?
DSBR2	Do you agree with our proposed product definition?
DSBR3	Do you agree with our proposed payment arrangements? Do you have any views on the proposed level of set-up payment?
DSBR4	Do you agree with our measurement and baseline proposals?
DSBR5	Do you agree with the proposed arrangements for despatch?
DSBR6	Do you agree with our proposals on procurement?
DSBR7	Do you agree with our proposals on verification?
DSBR8	Do you agree with that there should be a de-minimis dispute threshold?
DSBR9	Do you agree with our proposed approach to contracting?
DSBR10	Do you agree with our proposals on imbalance pricing?
DSBR11	Do you agree with our proposals on how the service should interact with triad demand reducers?
DSBR12	Do you agree with our proposals in respect of Committed and Flexible STOR providers?
DSBR13	Do you have any comments on our procurement options?

Appendix E – Consultation Questions

Supplemental Balancing Reserve

Number	Question
SBR1	Do you agree with our basic product proposals?
SBR2	Do you agree with our proposals on participation and our proposals to seek reasonably satisfactory evidence regarding additionality?
SBR3	Do you have any comments on the proposals to infer outage rates by allowing service providers to choose their non-delivery charge? Views are also invited on the approach to creating the appropriate trade-off between non-delivery charges and de-rating factors.
SBR4	Do you agree with our verification proposals?
SBR5	Do you agree with our proposals to despatch SBR only after other non-emergency balancing services have been exhausted and do have any views on whether SBR should be despatched through the Balancing Mechanism or outside it?
SBR6	Do you agree with our proposals for Settlement, and in particular, regarding the payment of 20% of the capacity payment up front?
SBR7	Do you agree that imbalance prices should not be affected by any SBR procurement ahead of Ofgem's Energy Balancing Significant Code Review?

Tender Assessment and Call-Off

Number	Question
TAC1	Do you agree with the way in which we propose to assess Demand Side Balancing Reserve?
TAC2	Do you have any particular comments on the way we propose to use Disappearance Ratios (DRs) for Demand Side Balancing Reserve in the assessment process?
TAC3	Do you agree that we should enter into a contract with all Demand Side Balancing Reserve with a utilisation price of less than the Value of Lost Load (VoLL) that has no set-up fee?
TAC4	Do you have any comments on our proposed assessment of Supplemental Balancing Reserve?
TAC5	Do you agree with our proposed call-off arrangements?