nationalgrid

PRE-CONSULTATION DOCUMENT

GB ECM-19

Charging for Large Loss Frequency Response

December 2009

Table of Contents

1 Executive Summary 3
2 Introduction 4
3 Background 5
4 Consideration of Response Charging Options 6
4.1 Socialise Response Costs 6
4.2 Target All Response Costs 6
4.3 General Issues for Further Discussion 7
4.3.1 Consideration of Demand Users 7
4.3.2 Pricing of Targeted Costs 7
4.3.3 Charging of Transmission Spurs and Interconnectors 8
4.3.4 Charging Volume 8
5 Responses to the Pre-Consultation 9
6 Appendix 1 – Example Ex-Ante Charge 10

1 Executive Summary

The extant NETS SQSS (National Electricity Transmission System Security and Quality of Supply Standards) requires[1] that the transmission system is planned on the basis of accepting a normal (i.e. relatively frequent) loss of power infeed of up to 1000MW, and an infrequent (i.e. in the region of up to four occurrences per year) loss of power infeed of up to 1320MW. The level of Response contracted by the System Operator is based on these levels of loss of power infeed. At present there are several new developments being considered that could result in frequent losses in excess of 1000MW and infrequent losses in excess of 1320MW.

The SQSS Review Group concluded in report GSR007 that the current SQSS planning criteria were not designed for the connection of large units (or large groups) with a total capacity in excess of 1320MW. In the event of new large units of capacity in excess of 1320MW being connected to the system, the Group recommended that the normal and infrequent loss limits in the NETS SQSS should be raised to 1320MW and 1800MW respectively so as to remove a barrier to the timely connection and access of large generating units. It was identified by the SQSS Review Group that if a number of these large new generation units connect to the system, the estimated operational cost to the System Operator could rise from £160M per year to a level of £300M per year reflecting an increase in primary frequency response held. Primary frequency response is required to contain an instantaneous loss within 10 seconds, whilst secondary frequency response is required to recover such a loss after 10 seconds.

National Grid is obliged to keep the charging methodology under review at all times. Given the magnitude of this potential increase in operational costs, National Grid considers it appropriate to review the Use of System Charging Methodology and the charging arrangements for the recovery of Response services in particular.

The purpose of this consultation document is therefore to invite industry views on:

1. the current charging arrangements and whether they continue to facilitate the achievement of the relevant objectives in light of the increase in threshold limits proposed by the SQSS Review Group and the consequential operational costs that may be incurred to accommodate larger units onto the transmission system;

2. what are the potential options for apportioning the extra operational costs that may arise from the proposed increase in threshold limits;

3. what, if any, further analysis should be undertaken to inform National Grid's assessment of the impact of any change to the charging arrangements.

Responses and queries should be sent to adam.sims@uk.ngrid.com no later than Friday 29th January 2010.

This report has been published on the National Grid charging website:
http://www.nationalgrid.com/uk/Electricity/Charges/modifications/uscmc/

[1] Sections 2 and 7 of the NETS SQSS: http://www.nationalgrid.com/uk/Electricity/Codes/gbsqsscode/DocLibrary/

2 Introduction

As the National Electricity Transmission System Operator (NETSO), authorised to co-ordinate and direct the flow of electricity onto and over the transmission system within Great Britain, National Grid has duties under the Electricity Act to develop and maintain an efficient, co-ordinated and economical transmission system and to facilitate competition in generation and supply.

Along with these high level duties, National Grid is obliged under its transmission licence:

- to keep the Use of System Charging and Connection Charging Methodologies at all times under review

- to make such modifications of the Use of System Charging Methodology as may be requisite for the purpose of better achieving the relevant objectives, which are:

    a. to facilitate effective competition in generation and supply;

    b. to result in charges which reflect, as far as reasonably practicable, the costs incurred by transmission licensees in their transmission businesses;

    c. in so far as is consistent with a) and b) above, as far as reasonably practicable, to properly take account of the developments in transmission licensees' transmission businesses.

In addition to the relevant objectives above, condition C7 of the transmission licence also prohibits National Grid from discriminating against any User or class of Users unless such different treatment reasonably reflects differences in the costs of providing a service.

The purpose of this consultation document is therefore to invite industry views on:

1. the current charging arrangements and whether they continue to facilitate the achievement of the relevant objectives in light of the increase in threshold limits proposed by the SQSS Review Group and the consequential operational costs that may be incurred to accommodate larger units onto the transmission system;

2. what are the potential options for apportioning the extra operational costs that may arise from the proposed increase in threshold limits;

3. what, if any, further analysis should be undertaken to inform National Grid's assessment of the impact of any change to the charging arrangements.

3 Background

The Electricity Safety, Quality and Continuity (Amendment) Regulations 2006, Part VII, clause 27 (commonly referred to as the ESQCR)[2] requires that system frequency shall not vary more than 1% above or below the declared frequency of 50Hz save in 'exceptional circumstances'. The actual containment of frequency to within required limits is the subject of the NETS SQSS (National Electricity Transmission System Security and Quality of Supply Standards) operational criteria and the frequency containment policy. This ensures that the transmission system is planned on the basis of accepting a normal (i.e. relatively frequent) loss of power infeed of up to 1000MW, and an infrequent (i.e. in the region of up to four occurrences per year) loss of power infeed of up to 1320MW. The level of Response services contracted for by the System Operator is based on these levels of loss of power infeed.

At present there are several new developments being considered to meet the requirement for new generation in Great Britain, including large offshore wind farms, coal and nuclear units in excess of 1000MW. Should these projects progress, under the existing arrangements their connections would be treated as customer design variations and hence to ensure that the quality of supply to other Users is not reduced, they would have the cost of holding additional Response targeted at them. To address this potential barrier to new generation, the recommendation of NETS SQSS Amendment Report GSR007 issued in September 2009 was that the normal and infrequent loss limits in the NETS SQSS be raised to 1320MW and 1800MW respectively.

In order to maintain the quality of frequency on the GB system, National Grid spends around £160M per year on frequency Response services to cover sudden power infeed loss. All generating plant must be able to provide a minimum of 10% of their capacity as a frequency Response (in accordance with Grid Code requirements). National Grid selects plant on a daily basis to provide Response services based mainly on their market price. The cost of Response is currently recovered through BSUoS uniformly from all classes of demand and generation on a MWh basis.

It was identified by the SQSS Review Group that if a number of these large new generation units connect to the system, the estimated cost of Primary and Secondary Response could increase. Primary frequency response is required to contain the system frequency within 10 seconds of an instantaneous loss on the system, whilst secondary frequency response is required to recover such a loss once it has been contained. A cost/benefit analysis was undertaken by the review group which calculated the increase in Response required to cover the risk imposed by six additional 1800MW power stations on the system. This analysis estimated that the annual cost of Response could increase from £160M to £300M. Given this potential increase in costs, National Grid believes that it is appropriate to review the charging methodology for Response services.

2 http://www.statutelaw.gov.uk/content.aspx?LegType=All+Legislation&Year=2002&number=2665&searchEnacted=0&extentMatchOnly=0&confersPower=0&blanketAmendment=0&sortAlpha=0&TYPE=QS&PageNumber=1&NavFrom=0&parentActiveTextDocId=1590332&ActiveTextDocId=1590368&filesize=4590

4 Consideration of Response Charging Options

The fundamental question for this pre-consultation is whether the industry believes that extending the current methodology of charging all Users equally for covering the risk of all sizes of infeed loss or moving to a new process whereby Users are charged depending upon size better facilitates the relevant objectives. In considering a new process, it is important that the accuracy and utility of any signals created and their impact on investment decisions both past and future is accounted for.

National Grid has outlined below some of the possible options and issues and would welcome views from industry participants on these and whether there are any other options which have not been considered.

4.1 Socialise Response Costs

Maintaining the current methodology for recovery of Response costs would continue to socialise the cost of frequent loss of power infeed up to 1320MW and infrequent loss of power infeed up to 1800MW, which would provide consistency for all Users. No work would be required to implement this option and hence the cost would be minimal, however it could be considered that socialising these larger loss risks could reduce cost-reflectivity as the overall BSUoS costs to be recovered will have increased by approximately 14%[3]. There would also be no signals provided to Users to aid investment decisions, which could lead to inefficient choices and hence increased costs for consumers.

4.2 Target All Response Costs

Any new process would necessitate identifying the varying levels of risk and associated cost for different types and sizes of generating unit, the process for determining which sites have caused an operational requirement to purchase Response and how any charges should be apportioned. This could be through banding generators in different risk categories based on the ranges detailed below, through a proportional charge based on the size of each generators' Transmission Entry Capacity (TEC), or some other method.

- 1321MW – 1800MW: This would cover the new risks that would be caused by the new large generating units that are being proposed.
- 1001MW – 1320MW: This range would cover some of the larger Power Stations with single mode losses, such as Sizewell B.
- 661MW – 1000MW: This range would include the risks from the new stations commissioned since 1985 up to the size of the cross-channel links.
- 301MW – 660MW: This range covers arguably the lowest possible limit up to the maximum turbine size that the CEGB (Central Electricity Generating Board) would have considered until 1985.
- <300MW: The National Grid standard for Response is that variations of ±300MW can be considered to be frequent, and therefore sufficient Response should be held such that a variation of this magnitude does not breach the

[3] Total BSUoS cost for 2007/8 approximately £1bn, an increase in Response cost of £140M would be +14%.

operational limits for system frequency of 49.8-50.2Hz. Therefore it could be argued that generation or demand units below 300MW are within the general level of Response holding and should not have to pay a specific additional charge.

Alternatively no banding could be used, and Users instead could be charged for Response on a sliding scale, using their TEC as an indicator of the level of risk that they impose upon the system.

National Grid invites respondents' views on the options set out above or other options that have not heretofore been considered, bearing in mind the issues raised in the following section.

4.3 General Issues for Further Discussion

4.3.1 Consideration of Demand Users

Frequency Response costs are recouped equally from generation and demand. This is accepted as although generation Users create the majority of the risk that Response is held to cover, it is demand Users that require the uninterrupted quality of supply which the holding of Response provides. The costs recovered through BSUoS charges are therefore split 50/50 between generation and demand Users.

This pre-consultation has only considered low frequency Response requirements that are triggered by generation losses and not high frequency Response requirements that are triggered by demand losses. It is considered that there are a limited number of supply sites that are large enough on their own to have a frequency impact if tripped, and also the cost-benefit analysis presented in GSR007 estimates that the increase in cost for low frequency Response would be £140M per year, as opposed to £10M per year for high frequency Response. However as Response costs are recovered 50% from generation and 50% from demand, industry views are invited on whether a targeted cost model should include demand Users or continue to socialise that half of the costs.

4.3.2 Pricing of Targeted Costs

In the event that a targeted solution is implemented, there are a number of further options for determining the price of holding Response:

Ex-Ante Price

The accuracy of National Grid's forecast of Response costs will have a major effect on the level of cost-reflectivity of the resultant charges. To provide a level of financial certainty for developers looking to make investment decisions it is likely that Response costs would have to be forecast for a multi-year period. Whilst National Grid cannot predict when and how much Response will be required, a degree of control over price can be exercised through forward contracts with generators. This option would provide a stable price signal, however it is unlikely to be cost reflective and some form of reconciliation may be required to ensure that expenses are recovered accurately. An example of how this might work is provided in Appendix 1.

Ex-Post Price

National Grid would operate a Settlement-like process to derive the actual price of Response held above the limit, either half-hourly or daily. This charge would then be

collected on similar timescales to the existing Settlement process, i.e. D+28. This option would be the most cost-reflective on a daily basis, however there would be no assurance of what charges generating units would have to pay from day to day, and hence would expose Users to significant uncertainty. This option therefore lacks any kind of long term cost signal that could be used in decision-making for new investment, and this uncertainty would have to be factored into generators' future investment plans.

National Grid considers that cost reflective prices are preferable in as much as they influence efficient decision-making, however it is unclear whether operating such an ex-post pricing methodology would produce long-term investment signals. Conversely, forecasting accurate costs for a sufficient number of years to provide a stable investment signal will have a commensurately high level of uncertainty as Response requirements are inherently unpredictable.

4.3.3 Charging of Transmission Spurs and Interconnectors

A further issue that arises from a targeted approach is how to treat groups of generators on a spur or interconnector with a single-fault risk. Assuming that they are collectively above the trigger level, the implications of whether to cascade the Response costs to individual generators, and if so how, should be considered.

As transmission spurs have historically had a much lower rate of instantaneous trip frequency than either large generators or interconnectors (0.01 to 0.1 trips per year compared with 0.5 to 2 trips per year, depending upon the length of spur) there is a question of whether such spurs should be charged for Response costs in the same way or whether their risk level should be pro-rated somehow. Assuming the costs are to be cascaded, it might be desirable to introduce an incentive on the TO of the spur or interconnector to mitigate the risk.

Since interconnectors experience the same fault rate as generators, at approximately 0.5 to 2 trips per year, National Grid's initial view is that interconnectors should be charged in the same way as generators. We would be interested to hear any rationale for charging interconnectors differently.

4.3.4 Charging Volume

The actual infeed loss risk for a site is likely to be different to its metered generation pre fault due to the exclusion of in-house unit loads i.e. when the unit trips the actual infeed loss on the system is the sum of the generation export and the increase in station demand due to the loss. The capacity on which National Grid should charge on is therefore uncertain. At present National Grid has limited access to this kind of data beyond the empirical information gleaned from operational experience, however it may be that an approximate approach is sufficient.

5 Responses to the Pre-Consultation

Comments and views are invited on all of the issues raised in this consultation document. To ensure that your comments and views are considered as part of National Grid's forthcoming consultation document, responses must be received by close of business on Friday 29th January 2010.

Comments are particularly welcome on the questions:

Q1. Is socialisation more appropriate and cost reflective than targeting for Response costs?

Q2. Are there other available options for the charging of Response costs that should be considered?

Q3. If targeting is progressed, what methodology should be used to target Response costs?

Q4. If targeting is progress, what arrangements should apply for demand Users?

Q5. For the pricing of targeted costs, what is the optimum balance between accuracy and stability?

Q6. Do you believe that Response costs can be forecast with sufficient accuracy and over sufficient timescales to be cost-reflective?

Q7. How should transmission spurs and interconnectors be treated?

Q8. Should a cost-reflective charge include all risk, or is metered volume sufficient?

Q9. What do you see as to the benefits and/or consequences of this proposed change (e.g. in respect of new generation connecting)?

Q10. What impact do you feel these proposals will make on frequency Response costs?

If you wish to provide comments on this consultation document, responses are preferred via email to: adam.sims@uk.ngrid.com.

Alternatively, parties can send their comments in writing, addressed to:

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If you have further queries, please contact Adam Sims on 01926 655292.

6 Appendix 1 – Example Ex-Ante Charge

Under the current arrangements, the cost of Response is recovered through BSUoS charges which are based on annual system usage. The total throughput in 2008/9 was 340.7TWh and the average annual cost of holding Response from the GSR007 report is £159M. As Response costs are split 50:50 between generation and demand, the unit cost of holding Response for generation plant would be approximately:

$$\frac{50\% * (159 \times 10^6)}{340.7 \times 10^6} = £0.23 / MWh$$

The assumption made in GSR007 was that the addition of six 1800MW nuclear generators would result in an increase in annual Response costs of £140M above the current level of £159M. Assuming that the plants would operate with a 90% load factor, the unit cost faced by these generators would be:

$$\frac{50\% * (140 \times 10^6)}{(6 * 1800 * 24 * 365 * 90\%)} + (£0.23 / MWh) = £1.05 / MWh$$

This assumes that the additional cost of Response for the 1800MW units would also be split with demand, and also that the whole of the 1800MW would be charged as it would represent a single loss. In order for this to provide a meaningful signal for future investment, this charge would have to be set for a period of several years as discussed in paragraph 4.3.2.