Sheona Mackenzie
Transmission and Governance, Ofgem
Cornerstone
107 West Regent Street
Glasgow
G2 2QZ

26 November 2010

Dear Sheona,

Proposal to modify the Security and Quality of Supply Standard by increasing the infeed loss limits (GSR007)

EDF Energy is one of the UK's largest energy companies and we provide 50% of the UK's low carbon generation. Our interests include nuclear, coal and gas-fired electricity generation, renewables, combined heat and power plants, and energy supply to end users. We have over 5 million electricity and gas customer accounts in the UK, including both residential and business users.

EDF Energy welcomes the opportunity to respond to this consultation. The key points of our response are as follows:

- We fully support these proposals and believe that Ofgem should decide in favour of the changes to the SQSS for the following reasons:
  - The current infeed loss limits are a barrier to the development of new generation technologies.
  - Government targets for carbon reduction will be at risk without this change to the SQSS.
  - The change will create a level playing field for investors in low carbon generation.
  - The proposals are a key facilitator towards creating a balanced mix of low carbon generation technologies in the UK.
- We welcome the updated analysis from Ofgem on the carbon benefits to be gained from this proposal.
- We continue to question the materiality of the potential cost impacts as a result of the SQSS change.
- We fully support Ofgem's intended decision timescale as it is imperative that investors receive early certainty on this issue.
- We would support an earlier implementation date provided that robust evidence of the benefits is provided and that a timely decision on this proposal can still be made

Investment in low carbon generation

EDF Energy agrees with the SQSS working group's conclusions, which recommended a change in frequent and infrequent loss limits to remove a barrier to the timely connection and access of large generating units and other infeeds. We believe that the current limit is an unnecessary barrier to the development of new generation technologies and that, without a change to infeed loss limits, the achievement of the UK carbon reduction

EDF Energy
40 Grosvenor Place, Victoria
London SW1X 7EN
Tel +44 (0) 020 7752 2200

edfenergy.com
EDF Energy plc.
Registered in England and Wales.
Registered No. 2366852.
Registered office: 40 Grosvenor Place, Victoria, London SW1X 7EN

targets will be at risk. Specifically, we note that both the AP1000 and EPR have been Justified[1] by the Secretary of State, thereby allowing the generation of low carbon electricity from both these reactor designs. However, the current limits on infeed loss in the SQSS will prevent the development of the EPR within the UK, with the consequential impact of limiting the feasible amounts of new nuclear investment that can be brought forward in the timescales necessary to meet UK carbon reduction targets. The impact on a competitive market of being able to connect more than one nuclear technology in the UK should not be discounted. This change will also remove a barrier to the development of larger interconnectors with the continent, offshore arrays and other forms of low carbon generation (such as Carbon Capture and Storage plants). The UK Government is committed to the removal of barriers to the transition to a low carbon economy and this change to the SQSS is clearly a facilitative step in achieving Government aims.

The Government report on their 2050 pathways analysis demonstrated that there are technological uncertainties around many low carbon electricity generation technologies. These uncertainties highlight the need for a portfolio approach in decarbonising energy by 2050. A change to infeed loss limits will ensure that new generation technologies are treated in a non-discriminatory manner and allow investors to contribute to the development of a balanced low carbon generation mix for the UK.

Carbon benefits of the proposals
Ofgem's updated analysis on the possible carbon benefits arising from this change to the SQSS is welcomed. The analysis is summarised by comparing the cost benefits with the number of larger units which would need to be built to ensure that the benefits are equal to or greater than the costs. Scenario 4 assumes that incremental low carbon generation displaces a mix of conventional and existing generation volumes and, using a central carbon price forecast, the number of units required to breakeven is five. This scenario represents the lower end of carbon benefits from the proposal and as such can be considered to be a conservative approach to the analysis.

EDF Energy has plans for the development of more than four large generating units, i.e. two nuclear reactors at Hinkley Point in Somerset, two more at Sizewell in Suffolk and a further three plants contracted to connect with National Grid. It is worth noting that within National Grid's register of transmission entry capacity there are a further five large new nuclear units not owned by EDF Energy, a large clean coal unit and a number of large offshore arrays. We also believe that the number of sites suitable for the construction of new nuclear generation can be a constraint[2] and that most effective use of the available sites depends on maximising the installed capacity at each location. Therefore, with the appropriate signals for investment there will no doubt be further investment in large generating units in the UK.

[1] Under the Justification of Practices Involving Ionising Radiation Regulations 2004.

[2] See the Energy Technology Institute's ESME model assumptions for 2050.

Cost impacts of the proposals

We note that in this impact assessment Ofgem has chosen to update and revise the carbon benefits for the proposals. However, the assumed costs of the change are based on the work undertaken by the SQSS review group in 2008-09. Accordingly the estimated additional response and reserve costs of £160m are used throughout the full cost benefit assessment. We believe that the assumed costs of the change should have been re-visited for the purposes of the impact assessment. In particular, industry respondents to earlier consultations, including EDF Energy, commented that different options to provide frequency response, such as static providers on low frequency relays, might result in costs of a much smaller magnitude. This has not been considered for the purposes of this impact assessment.

We discuss later our detailed comments in respect of the cost assumptions, as we believe that a range of possible impacts might have been considered for this assessment, just as a range of benefits has been provided. The impact assessment references the work of the SQSS review group, which indicated additional costs of £160m, comprising £105m for response and £45m for reserve. We provide as an appendix some additional analysis which considers alternative assumptions for the calculation of cost impacts; this work is discussed in our responses to your questions. In summary, our analysis indicated that the additional cost of creating headroom to accommodate units > 1320MW might increase from £37m to £56.7m p.a. (compared with the £105m of response costs given in this impact assessment, which is based on a linear scaling of today's values).

Implementation and decision timescales

EDF Energy welcomes the commitment, given in this impact assessment, to an Authority decision on the proposals in December 2010. The initial review request was raised in 2008 and therefore it is now imperative that investors receive certainty on this fundamental issue, which is acting as a barrier to entry for new generation technologies.

We note that the impact assessment makes reference to the recent consultation from the SQSS review group on an earlier implementation date of April 2014, but does not explicitly consider this proposal, as the industry process has yet to be concluded. Our response to the SQSS review group's open letter provided support to the proposal for early implementation. We discussed the potential discrimination issues of generator connection dates being dependent on a third party, where a new generator must wait for the connection of the first large unit in order to receive the same terms of connection. We note that Ofgem has initially concluded that this represents due discrimination, but we still have some reservations in this respect. We continue to support early implementation, on the grounds that sufficient robust evidence is provided on the benefits of the change. We would also wish to be sure that any Authority decision on the original proposal is not delayed by consideration of the earlier change date.

Our detailed responses are set out in the attachment to this letter.

Should you wish to discuss any of the issues raised in our response or have any queries please contact my colleague Rob Rome on 01452 653170, or myself.

Yours sincerely,

Denis Linford
Corporate Policy and Regulation Director

Attachment

Proposal to modify the Security and Quality of Supply Standard by increasing the infeed loss limits (GSR007)

EDF Energy's response to your questions

Chapter One
Question 1: Are there any other relevant criteria which respondents feel should form part of our assessment?

We have not identified any further criteria however we note the reference to the ongoing industry work in respect of frequency response service requirements.

This is a significant topic incorporating issues such as generation technology, and the interactions of mandatory requirements with future market arrangements. We do not feel that it is necessary for this issue to have any impact on the timescales of the decision on this proposal. We also note that the SQSS working group report indicated that the connection of single generating units in excess of 1000MW (the normal infeed loss limit) does not appear to be 'special' in that it does not create risks for system operation that are different in character from at present.

The other most relevant criteria are of course the analysis of the potential costs of the SQSS change which we discuss below.

Chapter Three
Question 1: Do respondents feel that we have appropriately identified the impacts of the GSR007 proposals? Do respondents consider that there are any additional impacts that we have not fully considered?

Yes, we agree that the impacts have been appropriately considered. In particular, we welcome Ofgem's consideration of the security of supply benefits and the recognition that there is historic evidence the SQSS has been changed in line with technology changes.

We acknowledge the difficulty in quantifying the impact on wholesale prices and have given some indicative analysis of our own in this respect which is discussed in response to question three.

Question 2: We have presented a range of approaches in measuring these impacts. Do respondents believe that this range is appropriate? Which measures presented (or other approaches) do respondents feel should be used in our final assessment/decision?

Carbon benefits
We believe that it is unsurprising that such a wide range of potential scenarios and carbon prices used by Ofgem gives the extremely wide range of carbon benefits from £17m to £332m per annum. However, we would note that these scenarios are not necessarily plausible. For example, due to the scale of the necessary investment in new technologies we believe that the minimum number of large units considered should be two and not one. This would bound the lower limit of carbon benefits above that which is assumed in the analysis.

We also believe that in Scenarios 3 and 4 a delay in the connection of new low carbon generation should be accounted for in the analysis, this delay would have a cost associated with it which is not acknowledged by the analysis of a representative year between 2020 and 2030.

Cost impacts
As we have highlighted above we are disappointed that a range of possible cost impacts has not been considered as part of this assessment as we feel that the assumptions made to calculate the additional costs of response and reserve are very broad and only represent one possible outcome.

The assumptions which have to be made in order to extrapolate a cost for frequency response include a view on generator trip rates and only one such assumption is made, for an EPR nuclear generator. However, the proposed change to the SQSS is not generation type specific and the analysis therefore ignores other potential large generating units such as CCS and offshore wind and does not consider the loss of transmission spurs or interconnectors. Furthermore, four other key assumptions were made, namely: (1) that there is a constant instantaneous loss risk; (2) the dynamics of providing frequency response is ignored; (3) the level of frequency sensitivity of a load is assumed; and (4) crucially the relationship between frequency response costs and requirements is assumed to be linear.

These are broad assumptions and estimates which give us great concern that the cost of frequency response under these proposals might be wholly inaccurate. It is therefore conceivable that Ofgem's breakeven analysis for these proposals is overly conservative and that fewer large generating units would need to be built to be assured of a net cost benefit.

Question 3: Do respondents wish to present any additional analysis that they consider would be relevant to our assessment of the GSR007 proposals?

Appendix 1 describes the analysis which we presented in our response to NG's consultation on their proposed modification to the charging methodologies. It considered a single year (2020) and from these studies we have been able to draw three conclusions.

1. A delay in commissioning of new nuclear capacity, which is not filled by conventional technology (on the assumption that it will not be economic to construct a new CCGT to

take advantage of a delay of only a few years) leads to increased power prices and increased carbon emissions. Our results indicate an increase in baseload power price of £2.40 /MWh, with consumers ultimately paying an additional £1060m in 2020.

2. If conventional capacity is constructed instead of new nuclear capacity, there is a significant increase in carbon emissions of 8.6 million tonnes or 6.7 %. These cost an additional £ 261m at the assumed market price.

3. The additional cost of creating headroom to accommodate units > 1320MW rather than those below the infeed loss limit appears to be over-estimated in NG's calculations.

Our analysis indicates these costs might increase from £37m to £56.7m p.a. We believe it is a reasonable assumption that the cost of utilising reserve, i.e. response costs, will not increase due to the larger unit size; it is the cost of creating additional headroom, i.e. upward reserve costs that are expected to change. Our assumptions on how these costs are impacted by a generation mix containing larger units results from a probabilistic assessment of the distribution of generator trips which we do not believe is a linear relationship to the size of the largest unit on the system. Our statistical analysis suggests that an increase from 1000 MW to 1600 MW in the size of the largest generator units will increase the average size of in-feed loss in a single period by less than 10%.

Poyry Energy Consulting Analysis for EDF Energy

Appendix 2 provides an overview from Poyry of the analysis completed at our request using their 2009 multi-client intermittency study for GB and Ireland. Of particular note is the Poyry conclusion that the increase in infeed loss limits results in additional costs of £37m 2020 and an additional £52m in 2030. This increase is attributable to the additional cost of part loading plant.

Our internal analysis and that of Poyry's were conducted independently using two different sophisticated modelling environments. The additional costs in 2020 are £20m and £37m respectively. Neither of these figures can be associated with the assumed incremental cost of £105m for response costs given in this impact assessment, nor the figures given in the NG charging consultation[3] which had an extrapolated estimate of £110.7m.

Chapter Four

Question 1: Do respondents have any views on either the process or timetable that are proposed for the Authority making its decision on the proposed licence changes?

We recognise that while it is not optimal for Ofgem to consult on an impact assessment for a period of four weeks we agree that the issues are well understood by industry. The original proposal was raised in 2008 and subject to industry consultation in 2009. There

[3] GB ECM 19 Charging for large loss frequency response

has also been further discussion of the issues in line with the modification proposals made by National Grid to their charging methodologies. Therefore we feel that a four week consultation period is reasonable. The need for a timely decision on this topic is imperative and we welcome a decision from the Authority to approve these proposals by the end of the calendar year.

EDF Energy
November 2010

Appendix 1
EDF Energy analysis of longer term effects

We have utilised our long-term despatch model to quantify the impacts of some of the issues arising in the area of this consultation. Our model is a fundamental model with dynamic operating constraints on plants, with simultaneous least-cost optimisation for supply / demand equilibrium in the energy market and the provision of reserve. We use a Monte-Carlo approach based on historical weather (wind, temperature samples) to simulate the stochastic effects of load, gas price and wind generation. The software is provided commercially by Energy Exemplar, and called Plexos, whilst the data are long-term EDF Energy assumptions for commodity prices, plant mix and technical characteristics, and demand growth. Note that monetary figures are in real 2008 values.

We have used the model to determine the sensitivity of key system parameters to scenarios around the development of new nuclear power stations.

We have a base case, where two EPRs are operating in 2020 with a given set of commodity price assumptions, plant mix etc. In the base case, 2.5 GW of headroom is held on operating plant. (This is held to provide frequency response, but due to the perfect foresight of the model in the short-term optimisation, the response is never required. Hence we model the costs of creating the headroom, but not the costs of despatching it to counter deviations in frequency.)

Case 1: Remove the two EPRs all else remaining constant. Baseload power price increases by 2.4 £/MWh, and load pays an additional £ 1060M. Carbon emissions increase by 13.4 Mt or 10.4 %. These cost additional £ 409M at the assumed market price.

Case 2: Remove the two EPRs and replace with 3.2 GW of new CCGT capacity. Baseload power price is unchanged from base case. Carbon emissions increase by 8.6 Mt or 6.7 %. These cost additional £ 261M at the assumed market price.

Case 3: Remove the two EPRs and replace with 3.2 GW of alternative nuclear capacity, which is assumed not to require an increase in headroom from the present assumption of 2.0 GW. The cost of creating headroom falls from £ 56.7M to £ 38.0M. Note that the cost of reserve is the compensation paid to plants to hold headroom, so that plants are indifferent between providing energy and headroom, and that plants can provide up to 10 % of their maximum capacity as headroom, only whilst they are generating.

We believe it is a reasonable assumption that the cost of utilising reserve, i.e. response costs, will not increase due to the larger unit size; it is the cost of creating additional headroom, i.e. upward reserve costs that are expected to change. This assumption differs from the consultation calculations, which show a linear increase in both costs.

For comparison, when our model is run for 2010, the cost of creating headroom is £ 56.0M. This is very close to the figure provided in the consultation document for the actual incurred cost of reserve provision (£ 55.0 M). The decrease between 2010 and

2020 is most likely due to the closure of the oldest, least efficient plants, which reduces the difference in efficiency between the plant that is marginal for energy and the plant that is marginal for reserve provision.

We draw three conclusions from these studies:

1. A delay in commissioning of new nuclear capacity, which is not filled by conventional technology – perhaps since it will not be economic to construct a new CCGT to take advantage of a delay of only a few years – leads to huge costs in increased power prices and increased carbon emissions.
2. If conventional capacity is constructed instead of new nuclear capacity, there is a significant increase in carbon emissions.
3. The additional cost of creating headroom to accommodate EPRs rather then AP1000 appears to be over-estimated in National Grid's calculations.

EDF Energy
November 2010

Appendix 2
Poyry analysis[4]

Pöyry modelling of impact

Frequency response requirements in BETTA are based on the largest potential infeed loss, adjusted for demand response. In our 2009 multi–client intermittency study for Great Britain and Ireland, Pöyry worked with National Grid – who were a founder member and the key contributor of network related modelling assumptions – to formulate frequency response requirements[5].

Of relevance to this modelling, the maximum infeed parameter was set to 1260MW in the early years of the study, and 1660MW (i.e. an additional 400MW) once the first EPR was assumed to be commissioned (by 2020). These settings were based on specific advice provided by National Grid on the parameters we should use in the GB Intermittency study modelling to be consistent with largest unit sizes of 1320MW and 1800MW respectively[6].

EDF Energy is interested in the cost implications of varying the maximum infeed loss, as they affect the relative economics of generation units above 1320MW compared with those below. EDF Energy asked Pöyry to examine the impact on costs, and also CO_2 emissions, of varying the infeed parameter in our Zephyr model. In this analysis, we have considered the effect of keeping the infeed parameter constant, i.e. not increasing it by 400MW in 2020. This reflects the scenario where new nuclear capacity is provided using AP1000 units rather than the larger EPR units currently assumed to be the basis for new nuclear plant build in the UK.

We have run a revised scenario (with no infeed increase) in Zephyr; and compared the results for total variable costs and CO_2 emissions with the results from our Core scenario in the original 2009 intermittency study. This note presents the output of the modelling for the years 2020 and 2030. We find that the larger frequency response requirement in the Core scenario means that total variable costs are around £37m higher in 2020 rising to £52m by 2030 due to the additional cost of part loading plant.

4 Extracted 'Review of National Grid charging proposal for largest loss frequency response' a note from Poyry Energy Consulting to EDF Energy 23 July 2010

5 We also formulated a 4–hour reserve requirement, although in our modelling this constraint was non–binding. The cost impact of varying the maximum infeed is therefore limited to the implications for the provision of frequency response in this analysis.

6 This reflects the fact large generating plant have sizeable on–site loads which reduce the net export of power onto the transmission system; and thus in the event of a trip, the transmission system 'sees' the loss of the generation export not the full unit capacity.