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Consultation Document

Modification Proposal P109: 'A Hedging Scheme for Changes to TLFs in Section T of the Code'

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0.1 Initial draft for review by P109 Modification Group

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d References

Reference 1 Interim Report: Modification Proposal P109 'A Hedging Scheme for Changes to TLFs in Section T of the Code' (available at www.elexon.co.uk/ta/modifications)

Reference 2 Modification Report: Modification Proposal P75 'Introduction of Zonal Transmission Losses' (available at www.elexon.co.uk/ta/modifications)

Reference 3 Modification Report: Modification Proposal P82 'Introduction of Zonal Transmission Losses on an Average Basis' (available at www.elexon.co.uk/ta/modifications)

II CONTENTS TABLE

1 INTRODUCTION

Modification Proposal P109 'A Hedging Scheme for Changes to TLFs in Section T of the Code' ('P109') is currently in the Assessment Procedure stage of the Modification Procedure.

This document is designed to facilitate the mandatory consultation process with BSC Parties to elicit their views on the proposal. The following sections provide a background to and description of the P109, the thinking of the P109 Modification Group ('P109MG') to date and a set of questions for consultees to consider and respond to (see Annex 1).

Please send responses to the questions to modifications@elexon.co.uk **by 17.00 on Friday 24 January 2003.**

2 DESCRIPTION OF PROPOSAL

Modification Proposal P109 "A Hedging Scheme for Changes to TLFs in Section T of the Code" seeks to address a perceived lack of efficient signals for long-term investment due to the risk of a centrally mandated change in Transmission Loss Factors (TLFs). The Code currently sets the value of TLFs to zero for all market participants, but the Code could be modified at any time in the future to make TLFs vary by location. Such a modification would change the value of long-term investments in the production or consumption of electricity. According to the Proposer, the resulting risk is either too costly to hedge or unhedgeable, and so reduces the efficiency of investment decisions. P109 seeks to mitigate this risk through a scheme that protects investors against the windfall effects of future changes to TLFs, whilst maintaining economic incentives at the margin, so that investors react more efficiently to current and future incentives within the Code.

The Code currently allocates 45% of total transmission losses to BM units located within Delivering Trading Units and 55% to BM Units located within Offtaking BM Units, in both cases on a uniform basis determined for each half-hour. P109 would maintain this rule for each existing CVA-registered BM Units, but only for a fixed volume known as the 'F-Factor'. There would be two F-Factors per BM Unit – one for 'Delivering' and one for 'Offtaking'. For each CVA-registered BM unit, the associated F-Factor volumes would be defined by formulae relating to the past level of its output and consumption respectively, and would remain constant for 15 years. Differences between actual output and these F-Factor volumes (whether positive or negative) would incur a TLF based on the new rules for allocating transmission losses (whatever they might be). Applying the new TLFs to marginal changes in output and consuption would preserve any desirable incentives provided by the new rules. However, applying the old TLFs to fixed (i.e. F-Factor) volumes would provide a means of hedging against the windfall effects of such a change.

CVA-registered BM units would opt to invoke this F-Factor or not (ie, to set their F-Factor to zero), depending upon whether they wished to take advantage of the scheme or not.

For SVA-registered BM Units, the scheme would offer similar hedging, subject to the following conditions:

(1) Suppliers within a GSP Group would share a single F-Factor volume defined for the GSP Group as a whole,

(2) consequently, there would be no provision for such Suppliers to opt in or out of the scheme and

(3) the F-Factor volume would decline gradually to zero over 15 years, to prevent any sudden change in costs to customers.

The scheme would be triggered by a centrally mandated change in TLFs (i.e. first notice to implement a BSC Modification in this area of the Code). At that time, F-factors would be calculated for existing CVA-registered BM Units and for all SVA-registered BM Units. From that time on, 'new' CVA-registered BM Units would also be able to opt for F-factors based on average plant characteristics. For these F-Factors, they would tie in the average TLF observed over previous months (under the new scheme) applicable at the point of their connection. This aspect would offer some protection against instability in incentives – e.g. the prospect of TLFs worsening if a second generator connected at the same place.

A worked example of the operation of P109 is contained in Annex 2, and a more detailed algebraic description is provided in Annex 3.

3 BACKGROUND TO PROPOSAL

P109 was raised following the discussions on transmission losses by the Transmission Loss Factor Modification Group (TLFMG), during progression of Modification Proposals P75 'Introduction of Transmission Losses' (P75) and P82 'Introduction of Transmission Losses on an Average basis' (P82). Both P75 and P82 were the subject of a 6-month Assessment Procedure and the Modification Reports were sent to the Authority on 16 December 2002[1]. During the Assessment Procedure for Modification Proposals P75 and P82, Modification Proposal P85 'A Phased Implementation Scheme for changes to TLF in Section T of the code' (P85), proposed by British Energy, was raised to provide phased implementation of any changes to TLFs. The Proposer of P85 subsequently withdrew the proposal as phased implementation of changes to TLFs was being considered as part of the Assessment Procedure for P75 and P82.

The assessment of P75 and P82 included discussions of whether a phased implementation approach was appropriate. Two mechanisms for phasing the implementation of changes to TLFs were discussed; the mechanism suggested by P109 (i.e. 'F-factor phasing') and so-called 'Beta' phasing. Beta phasing uses a multiplicative factor to phase-in the full effect of zonally differentiated TLFs over time and was viewed by the TLFMG as the better solution.

The TLFMG agreed that F-factor phasing would better achieve Applicable BSC Objective (c)[2] (because the impact of TLFs was limited to new investment and existing investment was sheltered; this concept is replicated by P109). However, the TLFMG also agreed that Applicable BSC Objective (d)[3] was not better achieved because of the severe administrative complexity of the F-factor approach. Furthermore, it was originally considered by some to be infeasible, although a smearing approach for SVA-registered BM Units removed one of the key difficulties. Many members remained sceptical, particularly in respect of the possibility of there being Panel obligations in having to set the F-factors. This has, to some extent, been addressed by the P109 proposal, although further consideration of this aspect is in progress.

[1] See References 2 and 3 cited at the beginning of this document.
[2] 'Promoting effective competition in the generation and supply of electricity, and (so far as consistent therewith) promoting such competition in the sale and purchase of electricity'
[3] 'Promoting efficiency in the implementation and administration of the balancing and settlement arrangements'

4 INTERIM REPORT ISSUES

The following sub-sections detail the issues considered and conclusions reached by the P109MG during the initial phase of the P109 Assessment Procedure, and which were reported to the Panel in an Interim Report on 12 December 2002[4].

Vires of the Assessment Procedure

The P109MG considered two aspects of 'vires':

1. whether the scope of the BSC covered hedging or risk management arrangements
2. whether there could be said to be a defect in the BSC, given the anticipatory nature of the proposal (i.e. the defect only manifests itself if a subsequent Modification is implemented).

On the first point, it was noted that the BSC already contains credit cover arrangements and these are risk management tools. A counter view was that the credit arrangements covered a risk to all BSC Parties collectively, whilst P109 relates to the risk perceived by individual Parties.

On the second point, it was suggested that the proposal is an implementation approach (especially if the scope is limited to TLFs). However, the P109MG agreed that the defect is not that unhedgeable costs might be imposed at some future time, but that it is asserted that there is a risk of such costs being imposed. It is that perceived risk which is in the current BSC and is purported to be the defect.

There was also a view that it was not an issue for the P109MG to consider matters of vires and that the Panel had invited the P109MG to undertake an Assessment of P109. The P109MG noted that this question had been explicitly agreed to in its Terms of Reference and that the issue was whether there was a need for guidance from the Panel or provisional thinking from the Authority on this question. The P109MG concluded that the issue was within the scope of the BSC and that there was a purported defect related to the risk in the current BSC that could be assessed by the P109 MG.

Anticipatory Nature of Proposal (Governance)

The P109MG considered whether the proposal was contingent on subsequent changes (i.e. that it could not be given effect in the Code until some further change had been implemented), anticipatory (i.e. that it could be given effect, but with an expectation that some subsequent change will occur) or neither (i.e. that it could be given effect, regardless of any subsequent changes). Some members of the P109MG considered that the Code already contains provisions that take effect when other changes are made (Information Imbalance charges and Transmission Loss Multipliers utilising non-zero TLFs) and that the concept of P109 'interfering with regulatory decisions' (this was a concern highlighted in the Terms of Reference) was not meaningful, in that P109 would, if accepted, be in the BSC and any subsequent proposal could take account of that fact.

Counter to this, it was suggested that the purported removal of regulatory risk would not be achieved, since a subsequent proposal could remove the arrangements proposed under P109. However, it was argued that any such subsequent proposals would have to demonstrate that the Applicable BSC Objectives would be better achieved by such a removal, recognising that, if P109 were in force, it would, presumably have been shown to better achieve the said Objectives in the first place. A majority view emerged from the P109MG that P109 could be assessed on the basis that it purports to remove a risk (that imposes a cost on investment) that exists in the current Code, regardless of future changes, albeit with a mechanism that switches on if TLFs become non-zero. However, there was a counter view

[4] See Reference 1 at the beginning of this document.

that there was a contingent element to the proposal and that provisional thinking should be sought by the Panel from the Authority on the following question:

Is it appropriate for a Modification Group to consider Modification Proposals that are contingent on one or more future or Pending Modification Proposals being approved by the Authority?

Anticipatory Nature of Proposal (Quantification of Better Achievement of Applicable BSC Objectives)

There were some views that the costs incurred due to the risk of possible future decisions could not be quantified, but some who held that view did consider that a qualitative judgement could be made. Others considered that such risks may be factored into project finance and could therefore be quantified. The P109MG concluded that the quantification could be adequately dealt with as part of the assessment.

Limitation of Hedging Scheme to TLFs

It was suggested that, if the scope of P109 was considered to extend to hedging against any changes to the Code, this could undermine subsequent Modification Proposals and render any such proposals very difficult to justify. However, it was also noted that, in any event, Applicable BSC Objectives must always be better achieved; this sometimes renders subsequent proposals more difficult (i.e. because the hurdle has been raised) and sometimes more easy (i.e. if some pre-requisites have been adequately dealt with). However, the P109MG accepted the view that the scope of P109 was limited to the hedging of changes to TLFs and could be assessed accordingly.

Interaction with Current Modification Proposals

The Panel has already considered three Modification Proposals seeking to change the value of TLFs (i.e. P75, P82 and P105) and has made recommendations in respect thereof. These recommendations have all been made with the expectation that no use of F-factors would be involved. This, potentially, may imply some degree of retrospection on this proposal. This was noted by the P109MG.

Panel Views

The Panel concluded that the Assessment Procedure could proceed and that no further guidance need be provided to the P109MG. The Panel was also satisfied that it did not need to seek provisional thinking on any of the Interim Report issues raised.

5 DEFINITION OF PROPOSAL

Trigger

The P109MG confirmed that the trigger would be the relevant NGC notice, but debated whether it was necessary to relate that notice to differential allocation of transmission losses, rather than relate it to a change in TLF methodology. Relating the trigger to change in TLFs would enable the specific algebra to be retained, but might allow subsequent Modifications to circumvent the hedging arrangement by leaving TLFs as they are and introducing some new feature that allocates transmission losses on a differential basis.

The counter view was that any such proposal would have to demonstrate that Applicable BSC Objectives were better achieved, as compared to the then BSC baseline and such a circumvention would be recognised and would have to be assessed.

It was also acknowledged that a subsequent Modification could (and should) be explicit if the P109 arrangements, if they were in force, should be removed. This was confirmed by ELEXON's legal advice.

Hence, the P109MG concluded that the trigger event (and the F-factor algebra) can be related specifically to TLFs and that if any future Modification proposal sought to circumvent the above arrangements, for example by using different algebra or terminology, this would necessarily need to be taken account of in any consideration of better achievement of Applicable BSC Objectives.

The P109MG also concluded that the arrangements above relate to the first notice from NGC relating to TLFs becoming non-zero. In so far as any future notices relating to changes in TLF are concerned, the above arrangements would continue (until fifteen years from application for a given BM Unit had expired; on a linear run-down for SVA-registered BM Units and with a 'cliff-edge' for CVA-registered BM Units).

New BM Units

For qualification as a 'new' BM Unit, there was a majority opinion that references to either Connection Agreements or planning consents might be inappropriate, as both were considered potentially too broad as definitions. Definitions similar to those relating to plant upgrades for qualification for Renewable Obligation Certificates were also considered too broad. References to changes in NGC planning data were considered potentially too narrow by the majority of the P109MG, as was a change to Generation Capacity ('GC') or Demand Capacity ('DC').

The P109MG concluded that any new registration should constitute a 'new' BM Unit for the purposes of P109. However, where there was a 'Change of BM Unit Ownership' ('COBO'), the newly registered BM Unit would retain the F-factors and 'ALFs' of the de-registered BM Unit it was replacing. For such 'new' BM Units, if CVA-registered, a 'CALF' type calculation would be used as a surrogate for historic for the purpose of calculating F-Factors. However, the P109MG concluded that unlike under the CALF methodology, there should be no Panel discretion in determining F-Factoers and no appeals process to revise such values in order to simplify the scheme. ALFs for 'new' BM Units would be based on recent history, rather than such as to remove zonal differentiation of TLFs completely.

Calculation of F – Factors and ALFs

The following table summarises the views on what F-factors and ALFs should apply for CVA BM units:

	F-factors for BMUs registered at or before the beginning of the Baseline Period.	**F-factors for BMUs not registered at the beginning of the Baseline Period (COBO instances excepted)**	**ALFs for BMUs registered at or before the trigger for the arrangements (notice from NGC re. non-zero TLFs)**	**ALFs for BMUs not registered at the trigger for the arrangements (COBO instances excepted)**
Delivering	48*12 factors, based on average delivering meter readings from Baseline Period.	As described in a methodology equivalent to CALF.	ALFs to be a uniform 45% of average transmission losses	ALFs to be the average zonal TLF for the 12 months prior to the BMU registration, as qualified in note 1.
Offtaking	48*12 factors, based on average offtaking meter readings from Baseline Period	As described in a methodology equivalent to CALF.	ALFs to be a uniform 55% of average transmission losses	ALFs to be the average zonal TLF for the 12 months prior to the BMU registration, as qualified in note 1.

The following table summarises the views on what F-factors and ALFs should apply to SVA BM Units:

	F-factors	ALFs
Delivering	48*12 factors, based on proportion of GSPG delivery for Baseline Period.	ALFs to be a uniform 45% of average transmission losses
Offtaking	48*12 factors, based on proportion of GSPG offtake for Baseline Period	ALFs to be a uniform 55% of average transmission losses

For Interconnector BM Units, treatment would be as for SVA BM Units, except that the F-factors would be based on proportions of Interconnector flow, rather than GSPG take. The P109MG also concluded that there should be an 'opt in' facility for Interconnector BM Units and this would need to be exercised (or not) for all BM Units associated with a given Interconnector. Hence, the Interconnector Administrator would need to exercise this option or not on behalf of all associated BM Units.

6 INITIAL ASSESSMENT

Impact of Proposal

At a general level, there were mixed views amongst the P109MG as to whether the proposal better achieved the Applicable BSC Objectives, or not. In so far as the perceived benefits were concerned, the P109MG are continuing to consider the extent to which the risk of potential zonal variations in Transmission Losses is mitigated by considering the value of such mitigation. For example, it was suggested that the cost of options to lay off zonal loss liabilities would be reduced, that investment planning would be more certain and that raising capital would be cheaper. These features would lead to increased efficiency and would thus better achieve Applicable Objective (c). The P019MG is seeking to quantify some of these elements and seeks views from participants via consultation. Conversely, one member of the P109MG suggested that Applicable Objective (c) would not be better achieved because P109 would result in a 'cross-subsidy', however, there was no agreement as to what constitues a 'cross-subsidy' or whether or not P109 would result in one. It was further suggested that Applicable Objective (c) would not be better achieved because of the complexity of the proposal and the likely consequence that participants would make mistakes in accommodating the arrangements (i.e. would make inappropriate decisions in optimising commercial positions). Some of the P109MG considered that this was not a significant risk. It was also suggested that Applicable Objective (d) would not be better achieved because of the cost and complexity of the proposal.

One piece of analysis that was discussed by the P109MG suggested that the effectiveness of the F -factors as a hedge against changing TLF would be reduced, depending on the choices made by other participants. In particular, the analysis suggested that CVA BM Units would opt in to F-factors if they would otherwise face negative TLFs (i.e. with an attenuating effect on the metered volume). However, those expecting to face positive TLFs would opt out, resulting in an underallocation of the zonal component of losses that would be compensated for via the uniform loss allocation covered by the TLMO term. This constitutes an impact on volumes supposedly insulated from the TLFs, and would affect market participants without F-factors. However, one P109MG member noted that one would expect average increases in TLMO to feed through into higher electricity prices, thus offering an automatic form of stable adjustment. Consequently, although the P109MG recognised that the decision to exercise the hedging option might be difficult for some, the Group believed the impact on TLMO would be small and would not undermine the proposal.

A separate piece of analysis was also considered that sought to illustrate whether deviations from the F-factor level, on a half-hour by half-hour basis (either intentionally, if output or consumption is dynamic, or unintentionally, if the F-factor is inaccurate), would introduce additional volatility to the market. It was argued that as the extent of the hedge varied, the BM Unit in question would be exposed to varying proportions of Applicable Loss Factor (ALF) and TLF. These variations would result

in varying degrees of under or over allocation of zonal losses and, therefore, varying degrees of uniform loss allocation (in order to allocate correct volumes of losses, overall). Hence, there is a degree of volatility in half-hourly loss allocation, hedging notwithstanding. One counter view was that this feature did not reduce the benefit of the proposal, since the basis for a participant's pricing regime would relate to the marginal impact of losses; i.e. the TLF. It was also suggested that the proposal sought to mitigate a long term risk of zonal losses being imposed and affecting decisions on a fifteen year timescale. This risk was perceived to be greater than the risk associated with the half hourly volatility suggested by this analysis. The P109MG also considered a variant that would mitigate this difficulty by allowing an annual reconciliation of deviations away from the F - factor. The suggestion was that, at the year end, the F- factor profile would be factored up or down to match actual output for the year, thus leaving exposure to the TLF solely for deviations from profile. However, the P109MG considered that this would confuse the incentives in respect of losses. The P109MG did acknowledge that, particularly because of imbalance price variations, an annual average F- factor would not have sufficient granularity. However, it was noted that, for generation, fixed planned outages were not necessarily the way in which maintenance was carried out and therefore, too much granularity on the F – factor profile might also lead to inaccuracies.

Different Treatment of CVA- and SVA-registered BM Units

The differences in treatment between SVA and CVA under P109 were considered to be necessary, on practicality grounds and appropriate in that the impact of non-zero TLFs would be smeared in the same way as the hedging is proposed to be smeared.

It was also agreed that the application of the linear run-down of the hedging (as opposed to the cliff-edge approach proposed for CVA BM Units) was appropriate as the intent was to protect smaller consumers from rate-shock.

The P109MG also gave some consideration to the position for Exemptable generating plant which has the option of registering in either SVA or CVA. It was noted that if a LEG were registered in SVA, its F – factor for Delivering would be likely to be zero, since GSP Groups do not typically export. However, this was not seen to be significant since, typically, such a LEG would be in a Trading Unit with other BM Units in the GSP Group and would tend to be Offtaking.

The P109MG noted that Interconnector BM Units shared some features of other CVA BM Units and some of SVA BM Units and that the defined approach was, therefore, sensible. It was noted, however, that the need to use the IA to exercise the choice to opt in or out of the hedging arrangement was not ideal as the IA has an administrative role and not a commercial one, from the BSC perspective. However, the P109MG concluded that this was a minor issue and was acceptable as a practical solution, given that the application of F - factors would be done on an Interconnector wide basis.

New and Existing BM Units

The arrangements for new registrations were an attempt to allow new entrants to respond to the signals in any TLF scheme and benefit, thereby, thus preventing any discrimination against such new entrants.

A view was expressed that the arrangements may discriminate against existing players since new entrants would, by definition, be aware of the threats and opportunities and could respond accordingly. Hence, a potential variant would be to set F to zero for new entrants (i.e. for new registrations, as qualified above, to be fully exposed to the prevailing TLFs). It was also noted that new entrants could lock-in to advantageous loss factors, whilst existing plant could not.

This variant was thought by some to go too far and that, alternatively, an F-factor could be applied to new BM Units, but perhaps with a scaled ALF, or with an ALF based on observed TLFs (i.e. for ALF to

be fixed after say, 1 year of operation of the BM Unit). This latter approach could be extended to existing BM Units also.

The P109MG considered whether or not any special provisions were required so that plant at which major upgrades or changes had been made could be considered as 'new' BM Units. The criteria for receiving Renewable Obligation Certificates ('ROCs') were explored as a potential solution.

The Renewables Obligation Order contains a definition of 'excluded generation' which is not eligible for ROCs and a statement of the extent of plant renewal which will cause the plant to become eligible. However, it is limited to hydro and wind powered generating units.

The following extract from **"**The Renewables Obligation (Scotland) Order 2002" illustrates the point:

> **8.**—(1) Subject to article 9, electricity shall be considered to have been generated from eligible renewable sources to the extent that it has been generated from renewable sources and provided that it has not been generated by an excluded generating station as specified in paragraphs (2) to (11).
>
> (2) The following shall be excluded generating stations:
>
> (a) large hydro generating stations except those first commissioned after the date this Order comes into force;
>
> (b) subject to paragraph (5), generating stations (other than micro hydro generating stations) which were first commissioned before 1st January 1990 and where the main components have not been renewed since 31st December 1989 as described in paragraph (12);
>
> (12) The main components of a generating station shall only be regarded as having been renewed since 31st December 1989 where–
>
> (a) in the case of a hydro generating station the following parts have been installed in the generating station after 31st December 1989 and were not used for the purpose of electricity generation prior to that date:
>
> (i) either all the turbine runners or all the turbine blades or the propellor; and
>
> (ii) either all the inlet guide vanes or all the inlet guide nozzles; or
>
> (b) in the case of any other generating station all the boilers and turbines (driven by any means including wind, water, steam or gas) have been installed in the generating station after 31st December 1989 and were not used for the purpose of electricity generation prior to that date.

An alternative to this approach was that of regarding a re-registration as being new if the GC and/or DC had changed. However, the P109MG concluded that the complexity of trying to distinguish between new registrations and existing registrations was not merited and that any registration after the relevant key dates should constitute a new BM Unit, unless that registration was co-incident with a de-registration as part of a Change of BM Unit Ownership process (see Definition section).

Trading of F – factors

It was suggested that a potential element of the proposal could be the trading of F – factors. This would involve the re-allocation of a particular F – factor, along with its associated ALF, to another BM

Unit. The suggestion is that this would remove any perceived issue with the transfer of history on COBO and would allow trading of the hedge that a particular BM Unit had established. The P109MG are continuing to consider this suggestion.

7 IMPLEMENTATION

Implementation should be set to be prior to any notice from NGC in respect of a decision by the Authority to approve any Modification relating to non-zero TLFs. However, the P109 noted that the changes to Central Systems to support P109 could either be made following a positive Determination from the Authority on P109 or at the point at which the hedging scheme itself is triggered. Further deliberation will be required to establish which would be the most appropriate and efficient.

ANNEX 1 CONSULTATION QUESTIONS

Respondents to this consultation exercise are invited to respond to the following questions to assist the P109MG in its task of assessing P109:

1. *Would implementation of P109 better facilitate achievement of the Applicable BSC Objectives compared to the current baseline? Please explain your answer.*
2. *Would implementation of P109 have an impact on project finance within the electricity industry? In particular, would it have an impact on the cost of capital? Please explain your answer.*
3. *What would be the impact of P109 on your organisation in term of systems and processes? What lead-time would you require to any changes that such an impact would require?*
4. *Which of the following should be the sample period from which half-hourly F-factors are calculated:*
   - *a month of the Settlement Period in question?*
   - *a BSC Season of the Settlement Period in question?*
   - *a BSC Year of the Settlement Period in question?*
   - *another period (please specify)?*

Please explain your answer.

5. *Do you support the following treatment of 'new' BM Units established by the Modification Group:*
   - *the definition of what constitutes a 'new' BM Unit?*
   - *the use of CALF-type values as default 'F-factors' for 'new' BM Units for which the relevant historical data set does not exist?*
   - *the option for 'new' CVA-registered BM Units to participate in the hedging scheme?*
   - *that the 'F-factor' portion of energy has a loss factor based on the historic Transmission Loss Factor (TLF) applicable to a typical generator/supplier in the given zone applied to it?*
   - *that 'new' CVA-registered BM Units are covered by the hedging scheme for 15 years from the moment they join?*

Please explain your answers.

6. *Should the process for the setting of 'F' factors be entirely 'mechanistic' (i.e. include no opportunity for the Panel to exercise its discretion in this process)?*

Please explain your answer.

7. *Is the different treatment of BM Units proposed in the following areas appropriate:*
   - *Interconnector BM Units?*
   - *SVA-registered BM Units?*
   - *CVA-registered BM Units?*
8. *Should 'F-factors' be tradable?*
9. *Any other comments?*

ANNEX 2 WORKED EXAMPLE OF P109

In this example, the application of the P109 risk mitigation scheme in a particular case in a particular case is described - i.e. for a single generator located in the northern half of England).

Such a generator currently incurs transmission losses at the same rate as all other generators, ie, 45% of the average rate. The average rate of transmission losses is currently running around 2%, so that generators normally incur losses of about 0.9% of their metered output. For this example, we assume that the average loss factor (ALF) is 1%. At present, the BSC implements this scheme by setting to zero the variables known as Transmission Loss Factors (TLFs).

According to work carried out for P72 and P85, a zonal allocation of transmission losses would reset the TLF for a northern generator to a new value between roughly 2% and 5% of metered output. (TLFs for generators and consumers in other locations would have different values.) For this example, we assume that the generator faces a new TLF of 3%.

P109 offers a way to mitigate the risk of this change, by invoking a fixed volume adjustment when the new method of allocating losses comes into operation.

Triggering P109 and Setting F-Factors

The risk mitigation scheme described in P109 would remain dormant until a modification set different TLFs for different locations. At that "trigger date", any existing BMU would be assigned an "F-Factor" representing its MWh amount of risk mitigation.[5] The definition of an existing BMU need not concern us here, but would require careful specification of a threshold date (which might be earlier than the trigger date).

The formula for the F-Factor looks at the generator's output in the twelve months prior to the trigger date. For each month, the formula calculates the generator's average metered output in each of the 48 settlement periods that make up a day.

Suppose the generator concerned has a capacity of 800 MW, giving maximum production in a half-hour settlement period of 400 MWh. The following table shows the generator's MWh F-Factors for each period for *one* of the twelve months, say March. (The Modification Group is still considering whether a table such as this would apply to a month, a quarter, or a year.)

Period	F-Factor	Period	F-Factor	Period	F-Factor	Period	F-Factor
1	153	13	377	25	353	37	115
2	199	14	397	26	338	38	68
3	192	15	380	27	301	39	173
4	174	16	365	28	306	40	168
5	199	17	370	29	355	41	52
6	159	18	384	30	371	42	67
7	176	19	358	31	359	43	37
8	199	20	382	32	393	44	146
10	186	22	350	34	349	46	58
11	194	23	377	35	393	47	49
12	188	24	374	36	323	48	93

[5] The following procedure applies for any BMU with CVA metering systems. For BMUs with SVA metering, the calculation is applied at the level of the GSP Group and shared in proportion to output or offtake.

Allocation of Losses

To show how losses are allocated to the generator, we consider only one settlement period, ie, a period 22 on a day in the March. For that period, the generator's F-Factor is 350 MWh. (See table above.) Assume that the following parameters also hold:

- Average transmission losses = 2.22%
- Generators' share at 45% = ALF = 1%
- Location-specific TLF (for this generator) = 3%
- Actual metered output in this period = 380 MWh.

The first step in allocating losses to the generator is to multiply its metered output by its TLF:

*(1) Location-specific losses = Metered Output * TLF = 380 MWh * 3% = 11.4 MWh*

The next step is to calculate a surcharge (or rebate) associated with the F-Factor, to ensure that the generator pays for a fixed volume of losses at the prior rate (ALF):

*(2) F-Factor Surcharge/Rebate = F-Factor * (ALF-TLF)* *= 350 MWh * (1%-3%)*

= minus 7.0 MWh.

At this stage, the generator's liability for losses is item (1) plus item (2), ie, 11.4 MWh – 7.0 MWh = 4.4 MWh. This formula is equivalent to allocating losses at the ALF for the F-Factor and the TLF for additional output above the F-Factor:

(F-Factor * ALF) + [(Metered Output-F-Factor) * TLF] = 350*1% + 30*3%

= 3.5+0.9 = 4.4 MWh

The sum of all losses allocated in this way may add up to more or less than total actual transmission losses. Suppose that total generation in this period is 20,000 MWh. Transmission losses (at 2.22%) are 444 MWh, of which generators are liable in total for 45% = 200 MWh. If items (1) and (2) allocate only 180 MWh in total to generators, there remain 20 MWh to be recovered. The term TLMO+ is intended to perform this reconciliation, by spreading the shortfall (or over-recovery) over all generation at a flat rate. (Variable TLMO- performs a similar role for offtake.) In this case, Each delivered MWh is allocated an additional 0.1 MWh (=20/20,000), giving our case study generator a further allocation of losses as follows:

*(3) Metered output * shortfall/(total generation) = 380 * 20/20,000 MWh = 3.8 MWh.*

Total losses allocated to the generator are the sum of items (1), (2) and (3):

(1) Location-specific losses	11.4 MWh
(2) F-Factor surcharge/(rebate)	-7.0 MWh
(3) Allocated shortfall/(over-recovery)	3.8 MWh
Total	8.2 MWh

Diagrammatic Explanation

The diagrams overleaf may help readers to understand how the formulas work for items (1) and (2). (Item (3) represents an additional allocation in proportion to metered output.)

In the top diagram, metered output exceeds the F-Factor. Item (1) is the product of Metered Output and the TLF, ie the rectangle consisting of three blocks: A (dark shaded), B (cross-hatched) and C (light-shaded). Item (2), the F-Factor rebate, is the product of the F-Factor and the *difference* between the TLF and the ALF, ie block B. Hence, the generator's remaining allocation of losses is:

block A (F-Factor volume at ALF)

plus block C (output above F-Factor at TLF).

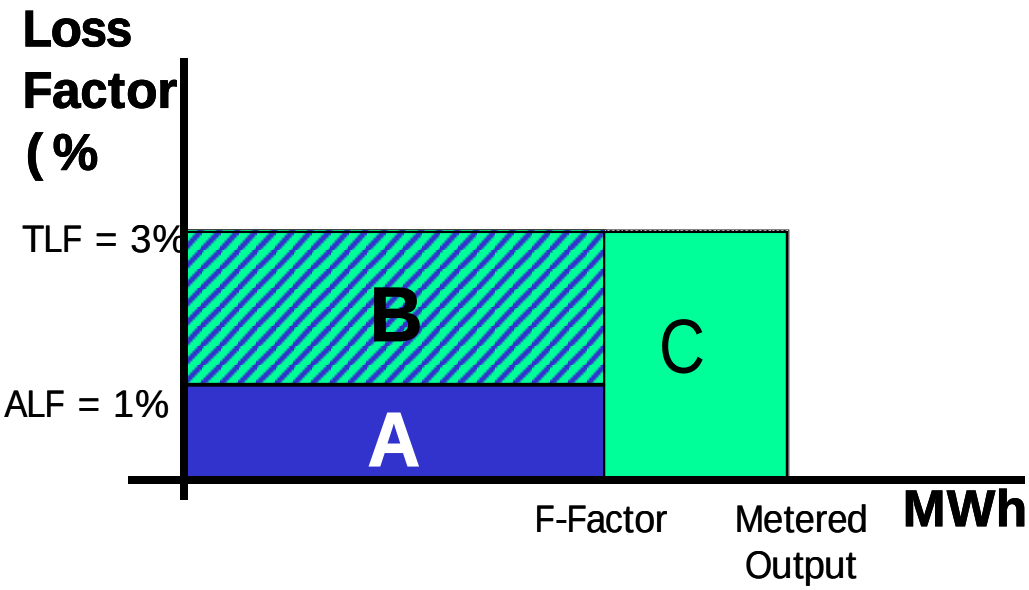
In the bottom diagram, metered output is less than the F-Factor. The F-Factor rebate is exactly the same as before, ie, the cross-hatched block B. However, metered output incurs losses at the TLF for the smaller (light-shaded) block marked X. The generator's allocation of losses is therefore the difference between these two areas. One way to view this difference is as:

block A (F-Factor volume at ALF, outlined in dots)

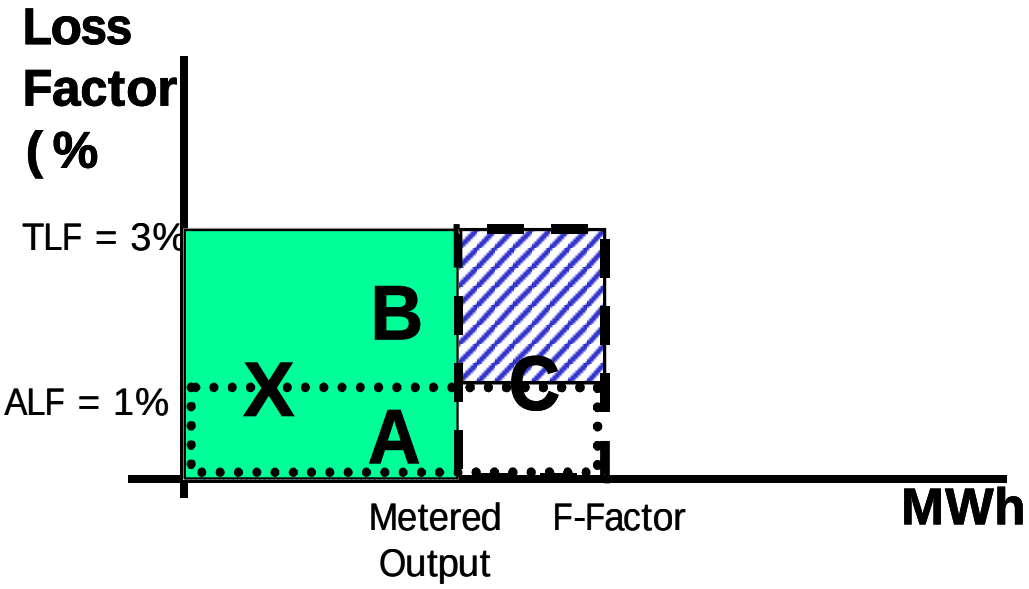
less block C (drop in output below F-Factor at TLF, outlined in dashes).

Hence, the allocation of losses at ALF for F-Factors is common to both cases (ie, it is independent of output), whilst any variation in output results in a further variation in allocated losses at the rate of TLF.

Metered Output >Factor



Metered Output ≤Factor



ANNEX 3 ALGEBRAIC DESCRIPTION OF P109

1. Modified TLM Calculations

In respect of each Settlement Period, for each BM Unit, the Transmission Loss Multiplier shall be calculated as follows:

(a) for all BM Units belonging to Trading Units which in the Settlement Period are delivering Trading Units:

$$TLM_{ij} = 1 + TLF_{ij} + (ALF_{ij}^{+} - TLF_{ij})\frac{F+_{ij}}{QM_{ij}} + TLMO_{j}^{+}$$

where

- F^{+}_{ij} is an amount defined in section 4 of this annex
- ALF^{+}_{ij} is the value defined in section 2 of this annex

(Note that where QM_{ij} =0, alternative algebra will be required)

- The adjustment factor that reconciles charges to actual losses is given by:

$$TLMO_{j}^{+} = \frac{-\left\{\alpha(\sum^{+} QM_{ij} + \sum^{-} QM_{ij}) + \sum^{+}((QM_{ij} - F+_{ij}) * TLF_{ij} + F+_{ij}\ ALF_{ij}^{+})\right\}}{\sum^{+} QM_{ij}}$$

where $\sum^{+}$ represents the sum over all BM Units belonging to Trading Units that are delivering Trading Units in the Settlement Period.

(b) for all BM Units belonging to Trading Units which in the Settlement Period are offtaking Trading Units:

$$TLM_{ij} = 1 + TLF_{ij} + (ALF_{ij}^{-} - TLF_{ij})\frac{F-_{ij}}{QM_{ij}} + TLMO_{j}^{-}$$

where:

- F-ij is an amount defined in section 4 of this annex
- ALF-ij is the value defined in section 2 of this annex

(Note that where QM_{ij} =0, alternative algebra will be required)

- The adjustment factor that reconciles charges to actual losses is given by:

$$TLMO_{j}^{-} = \frac{(\left\{(\alpha - 1)(\sum^{+} QM_{ij} + \sum^{-} QM_{ij}) - \sum^{-}((QM_{ij} - F-_{ij}) * TLF_{ij} + F-_{ij}\ ALF_{ij}^{-})\right\}}{\sum^{-} QM_{ij}}$$

where $\sum^{-}$ represents the sum over all BM Units belonging to Trading Units that are offtaking Trading Units in the Settlement Period.

2. Calculation of Applicable Loss Factors ('ALFs')

The values of ALF_{ij} are defined as follows:

(a) For CVA-registered BM units in existence before notice from NGC to amend the BSC such that TLF_{ij} no longer being zero and for all SVA-registered BM Units, ALF^{+}_{ij} , is given by:

$$ALF_{ij}^{+} = \frac{-\left\{\alpha(\sum^{+} QM_{ij} + \sum^{-} QM_{ij})\right\}}{\sum^{+} QM_{ij}}$$

and ALF^{-}_{ij} , is given by:

$$ALF_{ij}^{-} = \frac{\left\{(\alpha - 1)(\sum^{+} QM_{ij} + \sum^{-} QM_{ij})\right\}}{\sum^{-} QM_{ij}}$$

For any CVA-registered BM Units not in existence before the relevant notice from NGC, ALF^{+}_{ij} and ALF^{-}_{ij} are defined as follows:

ALF^{+}_{ij} = average TLF for the zone in which the BM Unit is located for the 12 month period previous to the month in which the BM Unit was registered (where the average is weighted by the total 'Delivering Volume' in the zone)

ALF^{-}_{ij} = average TLF for the zone in which the BM Unit is located for the 12 month period previous to the month in which the BM Unit was registered (where the average is weighted by the total 'Offtaking Volume' in the zone)

3. Hedging Flag (HED_i)

CVA-registered BMUs opting into the hedging scheme will have F-factors set by the equations in the following section (i.e. $HED_i = 1$). For those CVA-registered BM Units which opt not to hedge, F-factors will be set to zero (i.e. through $HED_I = 0$).

The hedging flag for a CVA-registered BMU Unit will be set to 0 (i.e. through $HED_I = 0$), unless the Lead Party of said unit notifies the CRA of its intention to set its hedging flag equal to 1 (i.e. $HED_i = 1$). The Lead Party must submit this notification no less than 1 day before the latest of the following two dates: (1) the date on which the BM unit is registered in the BSC and (2) the date on which the P109 hedging scheme is triggered. Once set equal to 1, HED_i will remain at that value for 15 years.

4. Calculation of F-factors

For CVA-registered BM Units, in respect of each Settlement Period, F-factors would be calculated as follows:

(a) for all delivering BM Units (defined as those for which $QM_{ij}>0$):

$$F^{+}_{ij} = HED_i * QMHA^{+}_{ij}$$

(b) for all offtaking BM Units (defined as those for which $QM_{ij}<=0$):

$$F^{-}_{ij} = HED_i * QMHA^{-}_{ij}$$

For SVA-registered BM Units, in respect of each Settlement Period, F-factors would be calculated as follows:

(a) for all delivering BM Units (defined as those for which $QM_{ij}>0$):

$$F+_{ij} = QMHA+_{gj} \frac{QM_{ij}}{\sum_{g}^{+} QM_{ij}}$$

where Σ^{+}_{g} *QM$_{ij}$ = GSP Group Take (exports only) for the GSP Group in which the BM Unit is located*

and *QMHA$^{+}_{gj}$* is the raw load factor for Settlement Period j and for GSP Group g

(b)for all offtaking BM Units (defined as those for which QM$_{ij}$<=0):

$$F-_{ij} = QMHA-_{gj} \frac{QM_{ij}}{\sum_{g}^{-} QM_{ij}}$$

where Σ^{-}_{g} *QM$_{ij}$ = GSP Group Take (imports only) for the GSP Group in which the BM Unit is located*

and *QMHA$^{-}_{gj}$* is the raw load factor for Settlement Period j and for GSP Group g

5. Derivation of Raw Load Factor (i.e. QMHA$^{+/-}$) for Calculation of F-Factors

The purposes of this section, the 'Baseline Period' refers to the 12 month period running from 13 months to 1 month prior to the month in which the relevant NGC notice is given. Also, 'relevant Settlement Periods' means all those Periods ending at time 'n' in the equivalent month, where 'n' is the time ending of the current Settlement Period j and the 'equivalent month' is the calendar month in the Baseline Period tat corresponds to the calendar month containing the current Settlement Period j.

(a) 'New' CVA-registered BM Units (i.e. those not registered at the beginning of the Baseline Period):

QMHA$^{+}_{ij}$ derived via a methodology, to be contained in the Code, that is equivalent to the CALF methodology (note that this will be a mechanistic process, with no Panel input or appeals process and will create MWh values that vary by half-hour)

QMHA$^{-}_{ij}$ derived via a methodology, to be contained in the Code, that is equivalent to the CALF methodology (note that this will be a mechanistic process, with no Panel input or appeals process and will create MWh values that vary by half-hour)

(b) Existing CVA-registered BM Units (i.e. registered at the beginning of the Baseline Period, including any subsequent COBO):

$$QMHA^{+}_{ij} = \frac{\Sigma_{nj} \max (QM_{ij}, 0)}{N} * Y_j$$

$$QMHA^{-}_{ij} = \frac{\Sigma_{nj} \min (QM_{ij}, 0)}{N} * Y_j$$

where:

$_{nj}$ = all relevant Settlement Periods in the equivalent month from the Baseline Period

N = number of non-zero relevant Settlement Periods in the equivalent month from the Baseline Period

Y_j = 1 from trigger of P109 hedging scheme for 15 years

= 0 thereafter

(c) All SVA-registered BM Units:

$$QMHA^{+}_{gj} = \frac{\Sigma^{+}_{g}\, QM_{ij}}{N} * Y_j$$

$$QMHA^{-}_{gj} = \frac{\Sigma^{-}_{g}\, QM_{ij}}{N} * Y_j$$

Where:

$\Sigma^{+}_{g}\, QM_{ij}$ *= GSP Group Take (exports only) for relevant Settlement Periods in equivalent month of the Baseline Period*

$\Sigma^{-}_{g}\, QM_{ij}$ *= GSP Group Take (imports only) for relevant Settlement Periods in equivalent month of the Baseline Period*

N = number of relevant Settlement Periods in the equivalent month of the Baseline Period

Y_j *= moves from 1 to 0 linearly over 15 years from point that hedging scheme is triggered*

6. Additional Notes

Note 1: Interconnector BM Units need to be developed further

Note 2: the following data flows will be required:

- *HED to provided by participants to CRA*
- *Baseline Period to be provided by ELEXON to the SAA and reported by ELEXON*
- *SAA I014 to be amended to include HED, $F^{+/-}$ and $ALF^{+/}$*