November 2002

INITIAL ASSESSMENT OF MODIFICATION PROPOSAL P109 – 'A Hedging Scheme for changes to TLF in Section T of the code'

Prepared by ELEXON Limited

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I DOCUMENT CONTROL

a Authorities

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0.1	05/11/02	Richard Clarke		Initial Draft
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0.1	05/11/02	R Salomone		Peer Review
0.2	06/11/02	Justin Andrews		Internal Review
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b Distribution

Name	Organisation
Each BSC Party	Various
Each BSC Agent	Various
The Gas and Electricity Markets Authority	Ofgem
Each BSC Panel Member	Various
energywatch	energywatch
Core Industry Document Owners	Various

c Intellectual Property Rights and Copyright

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1 SUMMARY

Modification Proposal P109 'A Hedging Scheme for changes to TLF in Section T of the Code' (P109), included in Annex 1, was submitted on 4 November 2002 by British Energy, in accordance with Section F 2.1.1 of the Balancing and Settlement Code ('the Code').

Currently the Code provides for each Balancing Mechanism Unit (BMU) to be allocated a specific Transmission Loss Factor (TLF) that may be used to vary the relative weighting of transmission losses allocated to that individual BM Unit. The TLFs have initially all been set to zero, and hence there is no differential allocation of losses on a BM Unit by BM Unit basis. As these initial values are written into the Code, any change to TLFs would require a modification to the Code to be approved by the Authority.

P109 proposes that, if at any time in future, the TLFs are set to anything other than zero, transitional arrangements should be put in place to mitigate the effect of such changes. P109 also proposes that these transitional arrangements be phased out linearly over a 15-year period.

An initial assessment of the P109 has identified the following potential areas of impact and issues to be considered:

- The matter of phasing in the effect of any changes to TLFs has already been discussed by the Transmission Loss Factor Modification Group (TLFMG) during the progression of Modification Proposals P75 – 'Introduction Of Zonal Transmission Losses' (P75) and P82 – 'Introduction Of Zonal Transmission Losses on an Average Basis' (P82). The TLFMG has already discussed the specific mechanism for phasing (F-Factor) described by P109 and concluded that no F-Factor phasing should be incorporated into either the Proposed Modifications for P75 or P82 or any Alternative Modifications that have arisen. It is difficult therefore, to see how this view might change without any new evidence being introduced.
- The proposed transitional scheme would have to be drafted into Section T of the Code. Whilst the proposal contains some suggested legal text, this would need to be further validated by ELEXON's legal advisors.
- The SAA will have to assume additional calculations entailed by phased implementation scheme (i.e. uniform allocation of losses to a fixed portion of a BM Unit's metered volume (ie TLF equal to zero) and application of the relevant TLF to the remainder). Therefore, the necessary system and process changes would need to be specified as part of the progression of this Modification Proposal and, were the change to the Code to be made, implemented to meet the eventuality of a change to the TLF value.
- The compilation of historic metering data for each BMU on a Half-Hourly basis over the Baseline Period would also be required.
- The provision of a system or process to allow Generators to register whether they wish to participate in the hedging scheme described by P109.
- Whether the "option" of participation in the hedging scheme should also be extended to existing Demand BMUs.
- Settlement reporting may need to include a breakdown, by BMU, between uniform allocation of losses and allocation by TLF.

- The Panel would need to make decisions regarding the initial level of the 'fixed quantity' element to which uniform transmission losses would be applied. The decision-making process to be followed by the Panel might need to be drafted into the Code. Alternatively, both the initial quantity and the scaling schedule could be drafted directly into the Code.

Given the discussions on the content of P109 that have already occurred in relation to Pending Modification Proposals, P75 and P82, it is recommended that the Panel:

- **AGREE that P109 be submitted to the Report Phase in accordance with section F2.7 of the Code;**
- **AGREE that the draft Modification Report contain a provisional recommendation that P109 should not be made;**
- **NOTE that no Legal Text has been prepared with respect to the Proposed Modification; and**
- **CONSULT with the Authority to determine if they would like the draft Modification Report to contain such text.**

However, if the Panel or Authority were to determine that legal text is required, it is proposed that P109 be submitted to a 1-month Assessment Procedure (assessed by the Transmission Loss Factor Modification Group). This is due the complexity of P109. The Assessment Report would be presented to the Panel at their meeting on 12 December 2002.

2 INTRODUCTION

This Report has been prepared by ELEXON Ltd. on behalf of the Balancing and Settlement Code Panel ('the Panel'), in accordance with the terms of the Code. The Code is the legal document containing the rules of the balancing mechanism and imbalance settlement process and related governance provisions. ELEXON is the company that performs the role and functions of the BSCCo, as defined in the Code.

An electronic copy of this document can be found on the BSC Website, at www.elexon.co.uk

3 DESCRIPTION OF THE MODIFICATION PROPOSAL

3.1 P109 Description

P109 seeks to address a perceived lack of stable signals for long-term investment and the potential stranding of sunk costs were the TLF value in the Code to change from its current value of zero. To this end, P109 recommends embedding a transition scheme for the TLF value in the Code. Under the scheme, any future change to the value of TLF would be phased-in progressively over a 15-year period.

According to the Proposer, changes to TLFs could create risks that are impossible to hedge against. It is argued that implementation of P109 would facilitate competition in generation and supply by providing a transitional scheme that would avoid or diminish the distortions created by such risks. It is further proposed that participation in such a scheme is optional on the part of generators. The Proposer asserts that the introduction of such a transitional scheme would protect consumers from the effect of a 'sudden large change in their charges'.

The proposed transition scheme, applicable to both generation and consumption, is based on allocating transmission losses to BM Units on a mixed basis – firstly a fixed quantity, F, of production/consumption would be allocated losses as at present (i.e. a pro-rata allocation equal to 45%

or 55% of average losses respectively with a TLF of zero) and the remainder (i.e. the difference between that fixed quantity and actual production/consumption) would be allocated losses in accordance with the relevant new TLF. It is proposed that over a uniform reduction to zero of the value of F will occur over a 15-year period thereby exposing a BM Unit's entire output/consumption to the effect of the TLF. The result of this F-Factor phasing is to gradually increase the amount of metered output that is exposed to the effect of TLFs. This is illustrated in the following series of diagrams which show a BM Unit whose historic metered output would lead the Panel to assign an F value shown in Figure 1.

Figure 1– Panel have determined a fixed value F MW based on historic plant output.

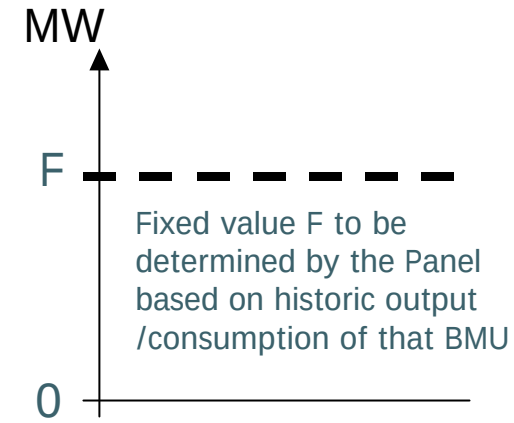


Figure 2 – Generator increases output of plant above value F. The metered output is shown in the diagram as QM.

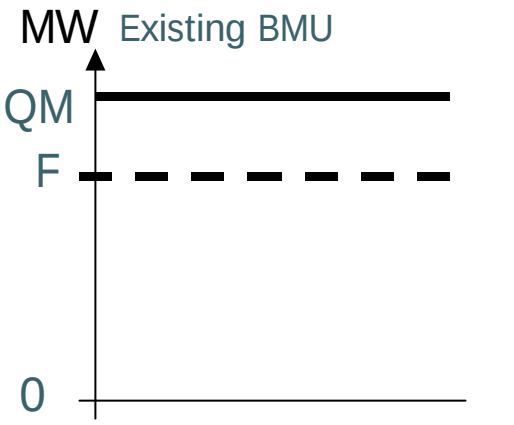
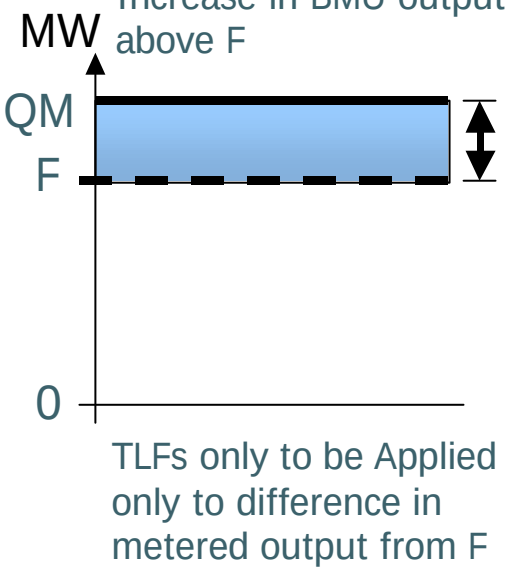


Figure 3 – Transmission Loss Factors will be applied to difference between Metered Output (QM) and the Fixed value F.



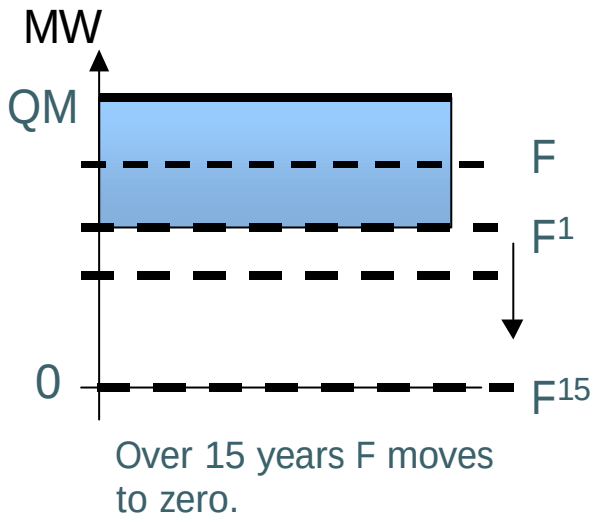


Figure 4 – The value F tends to zero over a 15-year period thereby exposing more of the Metered output of the BMU to the effect of TLFs

It is proposed that efficient cost recovery would be ensured by spreading residual losses not accounted for in the above allocation arrangements over all BM Units in proportion to the designated fixed quantity and adjusting TLFs using via the TLMO and TLMO terms already in Section T of the Code.

3.2 Background to P109 and Interaction with Modification Proposal P75, P82 and P85

P109 has been raised as a result of the discussions on transmission losses by the TLFMG during progression of Modification Proposals P75 and P82. Both proposals P75 and P82 have been the subject of a 6-month Assessment Procedure with an Assessment Report being presented to the Panel meeting of 14 November 2002. Following the commencement of the Assessment Procedure for Modification Proposals P75 and P82, a new Modification Proposal was raised by British Energy, P85 'A Phased Implementation Scheme for changes to TLF in Section T of the code' (P85) which dealt with the phased implementation of any changes to TLFs. The Proposer of P85 subsequently withdrew the proposal as the subject of a phased implementation of changes to TLFs was being discussed during the Assessment Procedure for P75 and P82.

The discussions on both P75 and P82 included discussions of whether a phased implementation approach was appropriate. It should be noted that two mechanisms for phasing the implementation of changes to TLFs were discussed which included the mechanism suggested by P109.

The TLFMG concluded however that a phased implementation using the F-Factor approach described within P109 was not appropriate to be introduced as it did not better facilitate the achievement of the Applicable BSC objectives over the Proposed Modifications for P75 and P82 and their respective Alternative Modifications.

It is important to note however, that the phasing mechanism adopted by the TLFMG differs significantly from that proposed by P109. Whilst each Modification Proposal should be treated separately in its own right, it should therefore be noted that any introduction of a hedging scheme as described by P109 would alter the legal drafting prepared for P75, P82 and any Alternative Modifications.

4 IMPACT ON BSC SYSTEMS AND PROCESSES

Implementation of P109 would have an impact on both the Settlement Systems and Settlement Reporting Systems.

The Settlement Administration Agent (SAA) may have to assume additional calculations entailed by phased implementation scheme (i.e. uniform allocation of losses to a fixed portion of a BM Unit's metered volume and application of the relevant TLF to the remainder). Therefore, the necessary system and process changes need to be in place to meet the eventuality of a change to the TLF value.

Settlement reporting may need to include a breakdown, by BMU, between uniform allocation of losses and allocation by TLF. In addition, were the fixed factor ('F') referred to in the Modification Proposal considered to be a percentage rather than a MWh value then a register of the fixed quantity allocated to each BM Unit might need to be reported.

5 IMPACT ON OTHER SYSTEMS AND PROCESSES USED BY PARTIES

There would be an impact on BSC Parties in deciding whether or not they needed to opt into the scheme proposed by P109 and applying to opt into the scheme.

6 IMPACT ON DOCUMENTATION

6.1 Impact on Balancing and Settlement Code

Paragraph 2 of Section T 'Settlement and Trading Charges' would need amendment to include the phased implementation scheme identified by P109. In addition, the decision-making process to be followed by the Panel whilst setting the value of the fixed quantity ('F') might need to be drafted into the Code.

Annex X-1 'General Glossary' and Annex X-2 ' Technical Glossary' would need amending to take into account any new terms introduced under P109.

6.2 Impact on Code Subsidiary Documents

Possible changes to Balancing and Settlement Code Procedure, BSCP15 'BM Unit Registration' would be required to incorporate a Party opting into the scheme proposal by P109.

The Service Description for the SAA would have to be amended to include additional calculations entailed by the phased implementation scheme.

The relevant Settlement report entry would need to be amended within the Data Catalogues and Reporting Catalogue, if it is deemed necessary to include reporting break-down, by BMU, between uniform allocation of losses and allocation by TLF.

6.3 Impact on Core Industry Documents

No impact has been identified on the Core Industry Documents:

7 IMPACT ON OTHER CONFIGURABLE ITEMS

No impact has been identified to other configurable items

8 IMPACT ON ELEXON

ELEXON might need to support the Panel in setting the initial level of the 'fixed quantity' element to which uniform transmission losses would be applied.

9 IMPACT ON FINANCIAL ARRANGEMENTS AND BUDGET

None identified.

10 IMPACT ON BSC AGENT CONTRACTUAL ARRANGEMENTS

SAA contract might need to be changed to reflect the extra transmission loss calculations that would have to be performed.

11 PROCESS AND TIMETABLE FOR PROGRESSING THE PROPOSAL

Subject to the Authority agreeing that no legal text is required to be prepared, it is proposed that a draft Modification Report be issued for consultation by 22 November 2002. The draft Modification Report, together with any consultation responses, will then be presented to the Panel at their meeting on 12 December 2002. In making this recommendation it is recognised that the issues associated with P109 have already been discussed by the TLFMG and has been included within a consultation on P75 and P82.

12 ISSUES

In summary, an initial assessment of the Modification has identified the following potential areas of impact:

- The matter of phasing in the effect of any changes to TLFs, has already been discussed by the TLFMG during the progression of Modification Proposals P75 and P82. The TLFMG has already discussed the specific mechanism for phasing (F-Factor) described by P109 and did not conclude that any F-Factor phasing should be incorporated into either the Proposed Modifications for P75 or P82 or any Alternative Modifications that have arisen. It is difficult therefore, to see how this view might change without any new evidence being introduced.
- The proposed transitional scheme would have to be drafted into Section T of the Code. Whilst the proposal contains some suggested legal text, this would need to be further validated by ELEXON's legal advisors.
- The SAA will have to assume additional calculations entailed by phased implementation scheme (i.e. uniform allocation of losses to a fixed portion of a BM Unit's metered volume and application of the relevant TLF to the remainder). Therefore, the necessary system and process changes would need to be specified as part of the Modification Proposal and, were a change to the Code to be made, implemented to meet the eventuality of a change to the TLF value.
- The compilation of historic metering data for each BMU on a Half-Hourly basis over the Baseline Period would also be required.
- The provision of a system or process to allow Generators to register whether they wish to participate in the hedging scheme described by P109.

- Whether the “option” of participation in the hedging scheme should also be extended to existing Demand BMUs.
- Settlement reporting may need to include a breakdown, by BMU, between uniform allocation of losses and allocation by TLF.
- The Panel would need to make decisions regarding the initial level of the ‘fixed quantity’ element to which uniform transmission losses would be applied for each BMU. The decision-making process to be followed by the Panel might need to be drafted into the Code. Alternatively, both the initial quantity and the scaling schedule could be drafted directly into the Code.

ANNEX 1 – MODIFICATION PROPOSAL AND ATTACHMENTS

Modification Proposal	**MP No: 109** *(mandatory by BSCCo)*

Title of Modification Proposal *(mandatory by proposer)***:**

A Hedging Scheme for changes to TLF in Section T of the code

Submission Date *(mandatory by proposer)***:**

1 November 2002

Description of Proposed Modification *(mandatory by proposer)***:**

Section T of the BSC contains the term "transmission loss factor" (TLF), currently set to zero. In the future, the TLF value could be changed from zero via a modification to the code. Any change in TLF will impact on overall costs for all generators and consumers. This modification seeks to implement a hedging scheme to mitigate the risk that the BSC TLF will in future be set to any value except zero. The current arrangements allocate losses on a uniform basis across the grid system, with 45 percent of losses being allocated to generators and 55 percent of losses being allocated to consumers. Losses amounted to around 1.47 percent of all electricity generated in 2001/2, a decline from 1.99 percent in 1995/6.

Changes to TLFs may improve short term efficiency signals, but would not improve long-term efficiency signals if the new values (and the transition to them) create windfall gains and losses against which participants cannot hedge efficiently. This proposal is intended to enhance long-term efficiency (and hence competition in generation and supply), by providing a transitional scheme offering a way to mitigate the risk of changes in TLFs, that will avoid or diminish the distortions created by unhedgeable risks.

We propose a hedging scheme for generation and consumption which can be used with any future losses scheme. The F-factor hedging scheme retains any short-term incentives associated with new transmission loss factors. Other forms of risk mitigation, involving scaling or phasing in TLFs, would diminish any short-term economic benefit from adopting new TLFs. Under the F-factor proposal, each BMU would be allocated losses on the following basis:

- in relation to a fixed quantity of output or consumption (F), the BMU would receive an allocation at a rate equal to 45% or 55% of average losses, as at present;
- in the case of new BM units, in relation to a fixed quantity of output or consumption (F), the BM unit would be charged losses based on the transmission loss factor (TLF) applicable to a typical generator in the same zone over a twelve month period prior to the date on which it commissions;
- for the difference between the fixed quantity (F) and actual metered production or consumption (QM), the BMU would receive an allocation equal to the future loss factor (i.e., TLF * (QM-F));
- any remaining balance of losses (positive or negative) would be allocated to each BMU as a uniform additive shift in a 45/55 split between generation and suppliers, as at present.
- F-factors would last for 15 years, a typical financing period for investments in generation and sufficient to provide equivalent protection for consumers' investments as well. Use of this period will reduce investors' exposure to risks that are currently unhedgeable and which discourage efficient investment.

F-factors would be based on metered volumes in a Baseline Period, which we propose to define as the last four whole quarters ending at least one month before the BSC Panel's approval of any modification affecting TLFs. (For any BSC Panel decision in November or December 2002, for instance, this period would be October 2001 to September 2002, which avoids the untypical period just after NETA was introduced.) This

Modification Proposal	MP No: 109 *(mandatory by BSCCo)*

proposal should be interpreted as allowing a longer duration for the Baseline Period (involving an average over several years), if it is feasible to combine Pool data with BSC data.

F-factors are defined on a monthly basis for each BM unit in order to average out any untypical variation in output (such as forced outages) on some days in a month. Smoothing out daily fluctuations provides more scope for individual participants to remain in balance with their F-factor within the balancing mechanism, if they wish to do so. A monthly approach may also allow some simplification of the BSC payments, which are settled monthly in arrears.

The F-factor hedging scheme will be voluntary for generation. Existing generators will have a one-off option to participate in the F-factor hedging scheme or to be exposed fully to the new transmission loss factors. Likewise new generators will have an opportunity, when they register on the system, to opt into a hedging scheme. For new generators, it provides the opportunity to "lock in" the transmission loss factors applicable in the period just before the time of their connection. For example, a new generator, encouraged to locate in the south by the new transmission loss factors, would receive some benefits defined by southern loss factors over the previous year, even if the presence of the new generator reduced the benefit from that time onwards.

The F-factor hedging scheme allows generators to capture the benefit they bring to the system by fixing the loss factors over the financing period for the plant. Thus the F-factor hedging scheme enhances locational signals for generators. Allowing generation to have firm rights and long term stable signals, which the F-factor provides, also underpins Ofgem's recent proposals on transmission access arrangements.

For demand, the F-factor hedging will be applied based on GSP group, but will be phased out linearly over a 15-year period. The scheme will offer consumers protection against the risk of a sudden large change in their charges (know elsewhere as "rate shock").

The proposal and the necessary modifications to the BSC are set out in more detail in the Attachment "Implementation of F-factors".

Description of Issue or Defect that Modification Proposal Seeks to Address *(mandatory by proposer)***:**

The proposal seeks to address the lack of stable signals for long-term investment, and the potential stranding of sunk costs, through a voluntary hedging scheme for any change in TLF value envisaged under Section T of the BSC. By doing so, the amendment will reduce unnecessary risks, lower the cost of capital for investment in facilities to generate and consume electricity, and improve the efficiency of investment.

Impact on Code *(optional by proposer)***:**

Changes to Section T2 of the BSC

Impact on Core Industry Documents *(optional by proposer)***:**

Not known

Impact on BSC Systems and Other Relevant Systems and Processes Used by Parties *(optional by proposer)***:**

Not known

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Impact on other Configurable Items *(optional by proposer)***:**

Not known

Justification for Proposed Modification with Reference to Applicable BSC Objectives *(mandatory by proposer)***:**

The scheme will improve the efficient operation of the code and will promote effective competition in generation and supply by protecting market participants from windfall gains and losses on sunk investments and enhancing long term efficiency. New entrants to the market will be able to "lock in" the new transmission loss factors over 15 years, providing a more stable investment environment. A stable regime lowers risks to participants, thereby reducing the overall cost of producing electricity and the overall market price.

Details of Proposer:

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Attachments: YES

If Yes, Title and No. of Pages of Each Attachment:

Title: "Possible BSC Rules for F-Factors" 14 pages

Title: "Economic Reasons to Favour F-Factors" 4 pages

POSSIBLE BSC RULES FOR F-FACTORS

A Report for A Consortium of UK Generators

Prepared by NERA

1 November 2002
London

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Introduction and Definitions

This report[1] spells out the changes that would be needed in the BSC to implement "F-factors" as a hedging mechanism against the introduction of modification P75, P82 or any other modification that would change the value of TLF_{ij} under the current BSC.

Under the F-factor proposal, each BMU would be allocated losses on the following basis:

- in the case of existing BMUs, in relation to a fixed quantity of output or consumption (F), the BMU would receive an allocation equal to 45% or 55% of average losses, as at present;
- in the case of new BMUs, in relation to a fixed quantity of output or consumption (F), the BMU would be charged losses based on the transmission loss factor (TLF) applicable to it in the year when it commissions;
- for the difference between the fixed quantity (F) and actual production or consumption (QM), the BMU would receive an allocation equal to the future TLF_{ij} loss factor applicable to it (i.e., TLF_{ij} * (QM-F));
- any remaining balance of losses (positive or negative) would be allocated to each BMU as a uniform additive shift in a 45/55 split between generation and suppliers, as at present.

In our proposal we base F-factors on metered volumes in the four whole quarters ending at least a month prior to a BSC Panel decision to introduce non-zero TLFs. For a BSC Panel decision in November or December 2002 or in January 2003, this period would cover October 2001 to September 2002, which avoids the untypical period just after NETA was introduced, and also prevents results from being biased by behaviour during the months when the decision is known. F-factors are defined on a monthly basis in order to average out any unexpected variation in output or consumption (such as outages) from particular days in a month. A monthly approach may also allow some simplification of the BSC payments, which are settled monthly in arrears.

The F-factor scheme provides hedging for a 15-year period as this reflects the typical bank financing timescales for generation. There is a differential treatment of generation (injections) and demand (withdrawals); as generators are in general more vulnerable to stranding issues as a result of changes in loss factors. Demand F-factors are scaled down over 15 years and demand may not opt out of the scheme. Generation F-factors are fixed for 15 years and participants must notify the relevant BSC Agent if they wish to be covered by the F-factor scheme for a 15-year period.

[1] This report has been sponsored by AES Drax, AEP, British Energy, Humber Power Ltd, Teesside Power Ltd and Scottish Power.

changes to the BSC for P75 or P82

In the following we assume that P75 or P82 or any other modification that would change the value of TLF_{ij} under the current BSC, would be implemented in the BSC code by modifying Schedule T, Section T2.2.1 of the BSC, to the following (amendment in ***bold italics***):

> *2.2.1 For the purposes of the Code, the Transmission Loss Factor for each BM Unit, and factor* á*, shall be as follows:*
>
> *(a)* TLF_{ij} *for all BM Units* ***defined in accordance with the BSC***
>
> *(b)* á *= 0.45.*

The F-factor scheme is implemented by modifying section T2.3 of the BSC, which we transcribe below as it currently stands in V6.0 of the code:

> *2.3.1 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:*
>
> $$TLM_{ij} = 1 + TLF_{ij} + TLMO_j^+$$
>
> *(b) for all BM Units belonging to Trading Units which in the Settlement Period are offtaking Trading Units:*
>
> $$TLM_{ij} = 1 + TLF_{ij} + TLMO_j^-$$

where:

$$TLMO_j^+ = \frac{-\left\{\boldsymbol{a}\left(\sum^+ QM_{ij} + \sum^- QM_{ij}\right) + \sum^+ \left(QM_{ij} * TLF_{ij}\right)\right\}}{\sum^+ QM_{ij}}$$ *; and*

$$TLMO_j^- = \frac{\left(\left\{\left(\boldsymbol{a} - 1\right)\left(\sum^+ QM_{ij} + \sum^- QM_{ij}\right) - \sum^- \left(QM_{ij} * TLF_{ij}\right)\right\}\right.}{\sum^- QM_{ij}}$$ *; and*

$\sum^+$ *represents the sum over all BM Units belonging to Trading Units that are delivering Trading Units in the Settlement Period;*

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

Implementation of F-factorS

We implement F-factors by:

- modifying T2.3.1 of the current BSC (which defines the TLMs); and

- adding an extra section (T2.3.2) in which F-factors and applicable loss factors are defined.

For ease of exposition, we describe these sections in reverse order.

Explanation of F-factors Definition (T2.3.2)

We base F-factors (F_{ij}) on metered volumes over a "Baseline Period" – a continuous period of four whole quarters ending at least a month prior to the BSC Panel's decision to implement a modification to change TLFs. (A longer period might be desirable, to smooth out once-off variations in output and consumption, but would require a combination of Pool and BSC data.) F-factors are defined on a monthly basis in order to average out any unexpected shocks (such as outages) from particular days in a month.

Conceptually a generator will be assigned a positive F-factor and a demand point will have a negative F-factor; however some BM units may sometimes inject into the system and at other times withdraw from the system. To accommodate for this we calculate two types of average half-hourly metered quantity allowances, one applicable for a BM unit when it is delivering ($QMHA^+$) another applicable to a units when it is offtaking ($QMHA^-$). The following gives a stylised account of how this calculation is performed.

- For each BM unit in operation before the start of the Baseline Period, we calculate the average half-hourly metered delivering quantity (QMHA+) - for each settlement period *t* and each month *m* within the Baseline Period (eg October 2001 to September 2002) – taking the average of positive metered quantities in period *t* for that BM unit over each day of the month *m*. In total there are 48 * 12 values for each BM unit. These values are stored and kept as standing data for the calculations.

- For each BM unit i not in operation before the start of the Baseline Period, we calculate the average half-hourly metered delivering quantity (QMHA+) - for each settlement period *t* and each month *m* within the Baseline Period–

  - taking the average load factor for period t of all exporting BM units in existence over each day of the month m and; multiplying it by

  - the generation capacity of BM unit i (GC_i)

- For each GSP group we define average half-hourly metered offtaking quantity (QMHA-) for a period t and a month m – taking the average of period t non-positive metered quantities over each day of the month for all BM units which belong to the GSP group.

Once the QMHA standing values are defined they need to be assigned to the F-factor of each BM unit applicable in each *current* period *j*. BMUs that are delivering, and which have opted for F-factor hedging, are assigned their corresponding QMHA+ while BMUs that are taking power off the system (ie

QM_{ij}<0) are assigned a share of the QMHA- for their GSP group equal to their share of total metered consumption within their GSP group.

Section T2.3.2 of the BSC would be structured as follows

- Section T2.3.2.1 defines the standing data QMHA+ and QMHA- values

- Section T2.3.2.2 makes hedging optional for injections into the system by defining variable HED_i
- Section T2.3.2.3 matches the historic QMHA values with the F-factor of each BMU for the current settlement period (for which losses are being calculated)
- Section T2.3.2.4 defines loss factor applicable to the F-factor quantity F (ie for existing BMUs 45/55 allocation between generation and demand as at present)

Adjustment of TLMs for F-Factors (T2.3.1)

This section calculates the shift variables $TLMO^+$ and $TLMO^-$ needed to ensure that losses are split 45/55 between generators and suppliers. Since F-factors affect the amount of losses allocated to each BMU, the definition of these shift variables has to be amended accordingly.

Definition of Standing Data (T2.3.2)

Definition of Standing Data (QMHA) for Existing BMUs (T2.3.2.1)

2.3.2.1 The date on which the BSC Panel approves a modification to the BSC that changes the values of TLF_{ij} such that they no longer equal zero shall be known as the TLF Decision Date. The Baseline Period shall then be the latest period covering four successive whole quarters (January to December, March to February, June to May or October to September, as appropriate) that ends at least one month before the TLF Decision Date.[2]

For each month m in the Baseline Period, the ***monthly average half-hourly metered reference delivering quantity*** *for each BM unit i, in settlement period t of every day in month m, $QMHA^{+}_{imt}$, will be calculated as described in this section and kept as* ***standing data*** *stored in a database to be used in the calculations described in sections T2.3.2 and T2.3.1.*

For each month m in the Baseline Period the monthly ***average half-hourly metered reference offtaking quantity*** *for each GSP group g, in settlement period t of every day in month m, $QMHA^{-}_{gmt}$, will be calculated as described in this section and kept as* ***standing data*** *stored in a database to be used in the calculations described in sections T2.3.2 and T2.3.1.*

(a) For all BM Units in existence before the start of the Baseline Period, $QMHA^{+}_{imt}$, will be calculated as

$$QMHA^{+}_{imt} = \frac{\sum_{mt} \max(QM_{it}, 0)}{D^{+}_{mit}} * YY^{+}$$

where:

- *$YY+$ is an indicator, which is initially set to 1 and takes on the value of zero 15 years after a modification comes into effect that results in TLF_{ij} no longer being zero;*
- *$QMit$ is the quantity metered of BM Unit i in half hour t; and*
- *D^{+}_{mit} is the number of days in month m in which BM unit i has a positive metered quantity in settlement period t;*
- *$\sum_{mt}$ denotes the summation over all the days in month m for period t in each day;*

provided that:

- *if the value of D^{+}_{mit} is zero in any month m, $QMHA^{+}_{imt}$ shall for that month be set equal to zero.*

(b) For all GSP groups, $QMHA^{-}_{gmt}$, will be calculated as

$$QMHA^{-}_{gmt} = \frac{\sum_{gmt} \min(QM_{xt}, 0)}{D^{-}_{mit}} * YY^{-}$$

where

- *QM_{xt} is the quantity metered of BM Unit x in half hour t;*
- *D^{-}_{mit} is the number of days in month m in which BM unit i has a negative metered quantity in settlement period t;*

[2] Hence, if the BSC Panel approves a change in TLFs in December 2002, the Baseline Period would be October 2001 to September 2002.

- $\sum_{gmt}$ *denotes the summations over all BMUs in GSP group g over all the days in month m for period t in each day; and*

- *YY^- is an indicator which phases the F-factor allocation for withdrawals and takes on the value of* $\max(1-\frac{(YC-Y0)}{15},0)$*, where YC is the year in which the current financial year ends and Y0 is the end year of the financial year in which a modification comes into effect that results in TLF_{ij} no longer being zero;*

provided that:

- *if the value of D^-_{mit} is zero in any month m, $QMHA^-_{imt}$ shall for that month be set equal to zero.*

Definition of Standing Data (QMHA) for New BMUs (T2.3.2.1)

The following section devises the F-factor applicable to new BMUs, ie, those coming into existence on or after the start of the Baseline Period.[3] In practice, this rule will apply only to new generators, since it uses the term Generation Capacity which, for offtaking BMUs will equal zero.

(c) For all BM Units not in existence beforethe start of the Baseline Period, $QMHA^+_{imt}$*, will be calculated as*

$$QMHA^+_{imt} = ALDF_{mt} * GC_i * YY_i$$

where

- *YYi is an indicator, which is initially set to 1 and takes on the value of zero 15 years after the latest of the following two dates: (1) the earliest date in which BM unit i registered in the BSC a generation capacity (GC) strictly greater than zero ; and (2) the date a modification comes into effect that results in TLFij no longer being zero.*

- *GC_i is the generation capacity of BM unit i (as defined in section K3.4.8 of the BSC)*

- *$ALDF_{mt}$ is the average load factor in month m for half hour t and is defined by*

$$ALDF_{mt} = \left(\frac{\sum_x^{OLD} QMHA^+_{xmt}}{\sum_x^{OLD} GC_{xm}} \right)$$

where $\sum_x^{OLD+}$ *denotes the sum over all BM units in existence before the start of the Baseline Period for which* $QMHA^+_{xmt} > 0$ *;* $QMHA^+_{xmt}$ *is defined as in (a) above; and GC_{xm} is the generating capacity of BM unit x at the end of month m.*

[3] In the example given above, the Baseline Period starts on 1 October 2001.

Generators Opting for Hedging (T2.3.2.2, T2.3.2.3)

Time for Exercising Hedging Option (T2.3.2.2)

BMUs that are injecting into the system will have a zero F-factor unless they notify the CRA that they want to set their hedging on flag HED_i to 1.

2.3.2.2 The hedging flag for BMU unit i ,HED_i, will be set to 0 unless the Lead Party of said unit notifies the CRA of its intention to set its hedging flag equal to 1. The Lead Party must submit this notification no less than 1 day before the latest of the following two dates: (1) the earliest date on which BM unit i registered in the BSC a generation capacity (GC) strictly greater than zero ; and (2) the date on which a modification comes into effect that results in TLF_{ij} no longer being zero. Once set equal to 1, HED_i will remain at that value until 15 years after a modification comes into effect that results in TLF_{ij} no longer being zero.

Opting for F-Factor Hedging (T2.3.2.3)

This section takes the standing data (QMHA) for all current BMUs and converts it into F-factors eligible for allocation of transmission losses. F-Factors are set to zero for injecting BM units that have not opted for the F-factor hedging (ie $HED_i=0$)

2.3.2.3 *Let M(j) denote the month in the Baseline Period which corresponds to the month to which period j belongs; and let T(j) denote the half-hour in the day to which period j belongs. In respect of each Settlement Period, for each BM Unit, the F-factor shall be calculated as follows:*

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

$$F_{ij}=HED_i * QMHA^{+}_{iM(j)T(j)}$$

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

$$F_{ij} = QMHA_{gM(j)T(j)} \frac{QM_{ij}}{\sum^{-}_{GSPG_i} QM_{ij}}$$

where:

- *g is the GSP Group that the BM Unit i belongs to; and*
- $\sum^{-}_{GSPG_i}$ *is the sum over all BMUs in GSP group g for which $QM_{ij}<0$.*

Definition of Applicable Loss Factors (T2.3.2.4)

This section defines the Applicable Loss Factor, ie, the average loss factor applying to the volume in the F-factor. For existing BMUs, the Applicable Loss Factor is the average factor split 45/55 as at present. For new BMUs the Applicable Loss Factor is derived from the average of TLFs in the previous year, in order to allow new entrants to secure the benefits of advantageous location.

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

(a) For BM units in existence before any modification comes into effect that results in TLF_{ij} no longer being zero, ALF^{+}_{ij} , is given by

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

(b) The average loss factor for demand, ALF^{-}_{ij} , is given by

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

(c) For any BMU not in existence before the coming into effect of any modification that results in TLF_{ij} no longer being zero let Z denote the marginal loss charging zone that is applicable to it and let TT be the set of all periods in the 12 months previous to the month in which it registers in the BSC. ALF_{ij}^{+} *for this unit is then defined as follows*

$$ALF_{ij}^{+} = \frac{\sum_{zTT} \max(QM_{xt}, 0) * TLF_{xt}}{\sum_{zTT} \max(QM_{xt}, 0)}$$

where QM_{xt} is metered quantity of unit x in period t; TLF_{xt} is the transmission loss factor applicable to unit x in period t as defined in section T2.2.1; and $\sum_{zTT}$ *denotes the sum over all BM units in zone Z over all periods in TT.*

Use of F-factors to Calculate TLMs (T2.3.1)

Once F-factors have been defined as described above, the risk mitigation scheme would then be implemented through the following modification of Section T2.3 of the BSC.

2.3.1 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 accordance with section T2.3.2*
- ALF^{+}_{ij} *is the value defined in T2.3.2.4.*
- *The adjustment factor that reconciles charges to actual losses is given by*

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

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:

- *Fij is an amount defined in accordance with section T2.3.2*
- - *ALF-ij is the value defined in T2.3.2.4.*
- *The adjustment factor that reconciles charges to actual losses is given by*

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

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

Data Requirements for F-factors under T2.3.2

In order to calculate F factors a database must be compiled with metering data for the Baseline Period (eg, October 2001 to September 2002) for each BMU on a half hourly basis.
Generating capacity for each BM unit in this period must also be compiled and kept on file to generate F-factors for generators commissioned after the start of the Baseline Period.

n/e/r/a

POSSIBLE BSC RULES FOR F-FACTORS

A Report for A Consortium of UK Generators

Prepared by NERA

1 November 2002
London

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TABLE OF CONTENTS

Introduction and Definitions

This report[4] spells out the changes that would be needed in the BSC to implement "F-factors" as a hedging mechanism against the introduction of modification P75, P82 or any other modification that would change the value of TLF_{ij} under the current BSC.

Under the F-factor proposal, each BMU would be allocated losses on the following basis:

- in the case of existing BMUs, in relation to a fixed quantity of output or consumption (F), the BMU would receive an allocation equal to 45% or 55% of average losses, as at present;
- in the case of new BMUs, in relation to a fixed quantity of output or consumption (F), the BMU would be charged losses based on the transmission loss factor (TLF) applicable to it in the year when it commissions;
- for the difference between the fixed quantity (F) and actual production or consumption (QM), the BMU would receive an allocation equal to the future TLF_{ij} loss factor applicable to it (i.e., TLF_{ij} * (QM-F));
- any remaining balance of losses (positive or negative) would be allocated to each BMU as a uniform additive shift in a 45/55 split between generation and suppliers, as at present.

In our proposal we base F-factors on metered volumes in the four whole quarters ending at least a month prior to a BSC Panel decision to introduce non-zero TLFs. For a BSC Panel decision in November or December 2002 or in January 2003, this period would cover October 2001 to September 2002, which avoids the untypical period just after NETA was introduced, and also prevents results from being biased by behaviour during the months when the decision is known. F-factors are defined on a monthly basis in order to average out any unexpected variation in output or consumption (such as outages) from particular days in a month. A monthly approach may also allow some simplification of the BSC payments, which are settled monthly in arrears.

The F-factor scheme provides hedging for a 15-year period as this reflects the typical bank financing timescales for generation. There is a differential treatment of generation (injections) and demand (withdrawals); as generators are in general more vulnerable to stranding issues as a result of changes in loss factors. Demand F-factors are scaled down over 15 years and demand may not opt out of the scheme. Generation F-factors are fixed for 15 years and participants must notify the relevant BSC Agent if they wish to be covered by the F-factor scheme for a 15-year period.

[4] This report has been sponsored by AES Drax, AEP, British Energy, Humber Power Ltd, Teesside Power Ltd and Scottish Power.

changes to the BSC for P75 or P82

In the following we assume that P75 or P82 or any other modification that would change the value of TLF_{ij} under the current BSC, would be implemented in the BSC code by modifying Schedule T, Section T2.2.1 of the BSC, to the following (amendment in ***bold italics***):

2.2.1 For the purposes of the Code, the Transmission Loss Factor for each BM Unit, and factor á*, shall be as follows:*

(a) TLF_{ij} *for all BM Units* ***defined in accordance with the BSC***

(b) á *= 0.45.*

The F-factor scheme is implemented by modifying section T2.3 of the BSC, which we transcribe below as it currently stands in V6.0 of the code:

2.3.1 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:

$$TLM_{ij} = 1 + TLF_{ij} + TLMO_j^+$$

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

$$TLM_{ij} = 1 + TLF_{ij} + TLMO_j^-$$

where:

$$TLMO_j^+ = \frac{-\left\{\alpha\left(\sum^+ QM_{ij} + \sum^- QM_{ij}\right) + \sum^+ \left(QM_{ij} * TLF_{ij}\right)\right\}}{\sum^+ QM_{ij}}$$ *; and*

$$TLMO_j^- = \frac{\left(\left\{(\alpha - 1)\left(\sum^+ QM_{ij} + \sum^- QM_{ij}\right) - \sum^- \left(QM_{ij} * TLF_{ij}\right)\right\}\right.}{\sum^- QM_{ij}}$$ *; and*

$\sum^+$ *represents the sum over all BM Units belonging to Trading Units that are delivering Trading Units in the Settlement Period;*

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

Implementation of F-factorS

We implement F-factors by:

- modifying T2.3.1 of the current BSC (which defines the TLMs); and

- adding an extra section (T2.3.2) in which F-factors and applicable loss factors are defined.

For ease of exposition, we describe these sections in reverse order.

Explanation of F-factors Definition (T2.3.2)

We base F-factors (F_{ij}) on metered volumes over a "Baseline Period" – a continuous period of four whole quarters ending at least a month prior to the BSC Panel's decision to implement a modification to change TLFs. (A longer period might be desirable, to smooth out once-off variations in output and consumption, but would require a combination of Pool and BSC data.) F-factors are defined on a monthly basis in order to average out any unexpected shocks (such as outages) from particular days in a month.

Conceptually a generator will be assigned a positive F-factor and a demand point will have a negative F-factor; however some BM units may sometimes inject into the system and at other times withdraw from the system. To accommodate for this we calculate two types of average half-hourly metered quantity allowances, one applicable for a BM unit when it is delivering ($QMHA^{+}$) another applicable to a units when it is offtaking ($QMHA^{-}$). The following gives a stylised account of how this calculation is performed.

- For each BM unit in operation before the start of the Baseline Period, we calculate the average half-hourly metered delivering quantity (QMHA+) - for each settlement period *t* and each month *m* within the Baseline Period (eg October 2001 to September 2002) – taking the average of positive metered quantities in period *t* for that BM unit over each day of the month *m*. In total there are 48 * 12 values for each BM unit. These values are stored and kept as standing data for the calculations.

- For each BM unit i not in operation before the start of the Baseline Period, we calculate the average half-hourly metered delivering quantity (QMHA+) - for each settlement period *t* and each month *m* within the Baseline Period–

  - taking the average load factor for period t of all exporting BM units in existence over each day of the month m and; multiplying it by

  - the generation capacity of BM unit i (GC_i)

- For each GSP group we define average half-hourly metered offtaking quantity (QMHA-) for a period t and a month m – taking the average of period t non-positive metered quantities over each day of the month for all BM units which belong to the GSP group.

Once the QMHA standing values are defined they need to be assigned to the F-factor of each BM unit applicable in each *current* period *j*. BMUs that are delivering, and which have opted for F-factor hedging, are assigned their corresponding QMHA+ while BMUs that are taking power off the system (ie

QM_{ij}<0) are assigned a share of the QMHA- for their GSP group equal to their share of total metered consumption within their GSP group.

Section T2.3.2 of the BSC would be structured as follows

- Section T2.3.2.1 defines the standing data QMHA+ and QMHA- values

- Section T2.3.2.2 makes hedging optional for injections into the system by defining variable HED_i
- Section T2.3.2.3 matches the historic QMHA values with the F-factor of each BMU for the current settlement period (for which losses are being calculated)
- Section T2.3.2.4 defines loss factor applicable to the F-factor quantity F (ie for existing BMUs 45/55 allocation between generation and demand as at present)

Adjustment of TLMs for F-Factors (T2.3.1)

This section calculates the shift variables $TLMO^+$ and $TLMO^-$ needed to ensure that losses are split 45/55 between generators and suppliers. Since F-factors affect the amount of losses allocated to each BMU, the definition of these shift variables has to be amended accordingly.

Definition of Standing Data (T2.3.2)

Definition of Standing Data (QMHA) for Existing BMUs (T2.3.2.1)

2.3.2.1 The date on which the BSC Panel approves a modification to the BSC that changes the values of TLF_{ij} such that they no longer equal zero shall be known as the TLF Decision Date. The Baseline Period shall then be the latest period covering four successive whole quarters (January to December, March to February, June to May or October to September, as appropriate) that ends at least one month before the TLF Decision Date.[5]

For each month m in the Baseline Period, the ***monthly average half-hourly metered reference delivering quantity*** *for each BM unit i, in settlement period t of every day in month m, $QMHA^{+}_{imt}$, will be calculated as described in this section and kept as* ***standing data*** *stored in a database to be used in the calculations described in sections T2.3.2 and T2.3.1.*

For each month m in the Baseline Period the monthly ***average half-hourly metered reference offtaking quantity*** *for each GSP group g, in settlement period t of every day in month m, $QMHA^{-}_{gmt}$, will be calculated as described in this section and kept as* ***standing data*** *stored in a database to be used in the calculations described in sections T2.3.2 and T2.3.1.*

(a) For all BM Units in existence before the start of the Baseline Period, $QMHA^{+}_{imt}$, will be calculated as

$$QMHA^{+}_{imt} = \frac{\sum_{mt} \max(QM_{it}, 0)}{D^{+}_{mit}} * YY^{+}$$

where:

- *$YY+$ is an indicator, which is initially set to 1 and takes on the value of zero 15 years after a modification comes into effect that results in TLF_{ij} no longer being zero;*
- *$QMit$ is the quantity metered of BM Unit i in half hour t; and*
- *D^{+}_{mit} is the number of days in month m in which BM unit i has a positive metered quantity in settlement period t;*
- *$\sum_{mt}$ denotes the summation over all the days in month m for period t in each day;*

provided that:

- *if the value of D^{+}_{mit} is zero in any month m, $QMHA^{+}_{imt}$ shall for that month be set equal to zero.*

(b) For all GSP groups, $QMHA^{-}_{gmt}$, will be calculated as

$$QMHA^{-}_{gmt} = \frac{\sum_{gmt} \min(QM_{xt}, 0)}{D^{-}_{mit}} * YY^{-}$$

where

- *QM_{xt} is the quantity metered of BM Unit x in half hour t;*
- *D^{-}_{mit} is the number of days in month m in which BM unit i has a negative metered quantity in settlement period t;*

[5] Hence, if the BSC Panel approves a change in TLFs in December 2002, the Baseline Period would be October 2001 to September 2002.

- $\sum_{gmt}$ *denotes the summations over all BMUs in GSP group g over all the days in month m for period t in each day; and*

- *YY^- is an indicator which phases the F-factor allocation for withdrawals and takes on the value of* $\max(1-\frac{(YC-Y0)}{15},0)$*, where YC is the year in which the current financial year ends and Y0 is the end year of the financial year in which a modification comes into effect that results in TLF_{ij} no longer being zero;*

provided that:

- *if the value of D^-_{mit} is zero in any month m, $QMHA^-_{imt}$ shall for that month be set equal to zero.*

Definition of Standing Data (QMHA) for New BMUs (T2.3.2.1)

The following section devises the F-factor applicable to new BMUs, ie, those coming into existence on or after the start of the Baseline Period.[6] In practice, this rule will apply only to new generators, since it uses the term Generation Capacity which, for offtaking BMUs will equal zero.

(c) For all BM Units not in existence beforethe start of the Baseline Period, $QMHA^+_{imt}$*, will be calculated as*

$$QMHA^+_{imt} = ALDF_{mt} * GC_i * YY_i$$

where

- *YYi is an indicator, which is initially set to 1 and takes on the value of zero 15 years after the latest of the following two dates: (1) the earliest date in which BM unit i registered in the BSC a generation capacity (GC) strictly greater than zero ; and (2) the date a modification comes into effect that results in TLFij no longer being zero.*

- *GC_i is the generation capacity of BM unit i (as defined in section K3.4.8 of the BSC)*

- *$ALDF_{mt}$ is the average load factor in month m for half hour t and is defined by*

$$ALDF_{mt} = \left(\frac{\sum_x^{OLD} QMHA^+_{xmt}}{\sum_x^{OLD} GC_{xm}} \right)$$

where $\sum_x^{OLD+}$ *denotes the sum over all BM units in existence before the start of the Baseline Period for which* $QMHA^+_{xmt} > 0$ *;* $QMHA^+_{xmt}$ *is defined as in (a) above; and GC_{xm} is the generating capacity of BM unit x at the end of month m.*

[6] In the example given above, the Baseline Period starts on 1 October 2001.

Generators Opting for Hedging (T2.3.2.2, T2.3.2.3)

Time for Exercising Hedging Option (T2.3.2.2)

BMUs that are injecting into the system will have a zero F-factor unless they notify the CRA that they want to set their hedging on flag HED_i to 1.

2.3.2.2 The hedging flag for BMU unit i ,HED_i, will be set to 0 unless the Lead Party of said unit notifies the CRA of its intention to set its hedging flag equal to 1. The Lead Party must submit this notification no less than 1 day before the latest of the following two dates: (1) the earliest date on which BM unit i registered in the BSC a generation capacity (GC) strictly greater than zero ; and (2) the date on which a modification comes into effect that results in TLF_{ij} no longer being zero. Once set equal to 1, HED_i will remain at that value until 15 years after a modification comes into effect that results in TLF_{ij} no longer being zero.

Opting for F-Factor Hedging (T2.3.2.3)

This section takes the standing data (QMHA) for all current BMUs and converts it into F-factors eligible for allocation of transmission losses. F-Factors are set to zero for injecting BM units that have not opted for the F-factor hedging (ie $HED_i=0$)

2.3.2.3 *Let M(j) denote the month in the Baseline Period which corresponds to the month to which period j belongs; and let T(j) denote the half-hour in the day to which period j belongs. In respect of each Settlement Period, for each BM Unit, the F-factor shall be calculated as follows:*

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

$$F_{ij}=HED_i * QMHA^{+}_{iM(j)T(j)}$$

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

$$F_{ij} = QMHA_{gM(j)T(j)} \frac{QM_{ij}}{\sum^{-}_{GSPG_i} QM_{ij}}$$

where:

- *g is the GSP Group that the BM Unit i belongs to; and*
- $\sum^{-}_{GSPG_i}$ *is the sum over all BMUs in GSP group g for which $QM_{ij}<0$.*

Definition of Applicable Loss Factors (T2.3.2.4)

This section defines the Applicable Loss Factor, ie, the average loss factor applying to the volume in the F-factor. For existing BMUs, the Applicable Loss Factor is the average factor split 45/55 as at present. For new BMUs the Applicable Loss Factor is derived from the average of TLFs in the previous year, in order to allow new entrants to secure the benefits of advantageous location.

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

(a) For BM units in existence before any modification comes into effect that results in TLF_{ij} no longer being zero, ALF^{+}_{ij} , is given by

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

(b) The average loss factor for demand, ALF^{-}_{ij} , is given by

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

(c) For any BMU not in existence before the coming into effect of any modification that results in TLF_{ij} no longer being zero let Z denote the marginal loss charging zone that is applicable to it and let TT be the set of all periods in the 12 months previous to the month in which it registers in the BSC. ALF_{ij}^{+} *for this unit is then defined as follows*

$$ALF_{ij}^{+} = \frac{\sum_{zTT} \max(QM_{xt}, 0) * TLF_{xt}}{\sum_{zTT} \max(QM_{xt}, 0)}$$

where QM_{xt} is metered quantity of unit x in period t; TLF_{xt} is the transmission loss factor applicable to unit x in period t as defined in section T2.2.1; and $\sum_{zTT}$ *denotes the sum over all BM units in zone Z over all periods in TT.*

Use of F-factors to Calculate TLMs (T2.3.1)

Once F-factors have been defined as described above, the risk mitigation scheme would then be implemented through the following modification of Section T2.3 of the BSC.

2.3.1 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 accordance with section T2.3.2*
- ALF^{+}_{ij} *is the value defined in T2.3.2.4.*
- *The adjustment factor that reconciles charges to actual losses is given by*

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

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:

- *Fij is an amount defined in accordance with section T2.3.2*
- - *ALF-ij is the value defined in T2.3.2.4.*
- *The adjustment factor that reconciles charges to actual losses is given by*

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

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

Data Requirements for F-factors under T2.3.2

In order to calculate F factors a database must be compiled with metering data for the Baseline Period (eg, October 2001 to September 2002) for each BMU on a half hourly basis.
Generating capacity for each BM unit in this period must also be compiled and kept on file to generate F-factors for generators commissioned after the start of the Baseline Period.