REQUIREMENTS SPECIFICATION for Modification Proposal P198 'Introduction of a Zonal Transmission Losses Scheme'

Prepared by: P198 Modification Group

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Losses from the Transmission System ('transmission losses') can be considered to comprise two elements: fixed losses and variable losses. Currently, the costs of both fixed and variable losses are recovered from BSC Parties on a non-locational basis.

Proposed Modification P198 seeks to allocate the costs of variable losses to Parties on a 'zonal' locational basis, according to the extent to which each Party is estimated to give rise to them. The solution for Proposed Modification P198 is based closely on previous Modification Proposal P82.

BACKGROUND AND PURPOSE OF IMPACT ASSESSMENT

The BSC Panel considered P198 at its meeting on 12 January 2006 and submitted the Modification Proposal to a 4-month Assessment Procedure. The P198 Modification Group has met twice to date on 18 January and 26 January 2006, and has agreed the detailed solution requirements for the Proposed Modification.

This document sets out the requirements agreed by the Group, and supports impact assessments of the Proposed Modification by BSC Agents, BSC Parties, Party Agents, the Transmission Company and BSCCo.[1] Respondents to the impact assessment are requested to provide details of the lead time and effort which they would require to implement the Proposed Modification, the required development activities (e.g. changes to systems, processes and documentation), and any ongoing operational activities which would also be required as a consequence of implementation.

Parties are invited to provide cost information to support their impact assessments. Where requested this information can be treated as confidential, although all information will be provided to the Authority. Respondents should therefore clearly indicate if any aspect of their response is confidential.

This impact assessment is concerned only with the activities and lead time which would be required to implement the Proposed Modification. Please note that a separate document has been issued by the Group for industry consultation (Reference 1), seeking views on whether various potential options for an Alternative Modification should receive detailed evaluation during the Assessment Procedure. The Group has not yet developed an initial view of the merits of the Proposed Modification or these potential options for an Alternative Modification.

Modelling of the magnitude and variability of the zonal transmission losses scheme proposed by P198 is also currently being undertaken, and the results of the modelling, impact assessment and consultation will form part of a subsequent cost-benefit analysis. The Group's assessment of the Proposed Modification and any Alternative Modification against the Applicable BSC Objectives – including the results of the cost-benefit analysis – will be the subject of a separate industry consultation.

Any queries regarding the impact assessment requirements should be addressed to Kathryn Coffin (020 7380 4030), e-mail address kathryn.coffin@elexon.co.uk.

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SUMMARY OF IMPACTED PARTIES AND DOCUMENTS

As far as BSCCo has been able to assess, the following parties/documents are potentially impacted by Modification Proposal P198.

Please note that this table represents a summary of the full initial assessment results contained in Section 5.

Parties		Sections of the BSC		Code Subsidiary Documents	
Distribution System Operators	☒	A	☐	BSC Procedures	☒
Generators	☒	B	☐	Codes of Practice	☐
Interconnectors	☒	C	☐	BSC Service Descriptions	☒
Licence Exemptable Generators	☒	D	☐	Party Service Lines	☐
Non-Physical Traders	☒	E	☒	Data Catalogues	☒
Suppliers	☒	F	☐	Communication Requirements Documents	☒
Transmission Company	☒	G	☐	Reporting Catalogue	☒
Party Agents		H	☒	Load Flow Model Specification*	☒
Data Aggregators	☐	I	☐	**Core Industry Documents**	
Data Collectors	☐	J	☐	Ancillary Services Agreement	☐
Meter Administrators	☐	K	☐	British Grid Systems Agreement	☐
Meter Operator Agents	☐	L	☐	Data Transfer Services Agreement	☐
ECVNA	☐	M	☐	Distribution Codes	☐
MVRNA	☐	N	☐	Distribution Connection Agreements	☐
BSC Agents		O	☐	Distribution Use of System Agreements	☐
SAA	☒	P	☐	Grid Code	☐
FAA	☐	Q	☐	Master Registration Agreement	☐
BMRA	☒	R	☐	Supplemental Agreements	☐
ECVAA	☐	S	☐	Use of Interconnector Agreement	☐
CDCA	☒	T	☒	**BSCCo**	
TAA	☐	U	☐	Internal Working Procedures	☒
CRA	☒	V	☒	**BSC Panel/Panel Committees**	
SVAA	☐	W	☐	Working Practices	☒
Teleswitch Agent	☐	X	☒	**Other**	
BSC Auditor	☒			Market Index Data Provider	☐
Profile Administrator	☐			Market Index Definition Statement	☐
Certification Agent	☐			System Operator-Transmission Owner Code	☐
Transmission Loss Factor Agent*	☒			Transmission Licence	☐
Other Agents				Network Mapping Statement*	☒
Supplier Meter Registration Agent	☐			Load Flow Model Reviewer*	☒
Data Transfer Service Provider	☐				

*New document/role introduced by P198

1 BACKGROUND

1.1 Types of Transmission Losses

The total metered energy which can be drawn from the Transmission System to meet demand will always be less than that delivered onto the Transmission System by generation, since some energy is used up in the process of transporting electricity. The energy 'lost' from the Transmission System is commonly referred to as '**transmission losses**'. Transmission losses can be considered to comprise two main elements: 'fixed' losses and 'variable' losses.

Fixed losses are those which do not vary significantly with the power flow. In transformers, the losses arise from magnetising the iron core. In overhead lines, they include losses dependent on the voltage levels, length of line and climatic conditions.

Variable losses arise through the heat caused by current flowing through the transformers and lines. Variable losses increase with the current (and associated power flow) and the length of line in which it flows.

References to 'fixed' and 'variable' losses throughout this document have the meaning given above, whilst the term **'total' transmission losses** is used to represent the sum of fixed and variable losses (i.e. the total energy lost from the Transmission System at any given point in time, calculated as the difference between total generation and demand).

1.2 Existing Allocation Mechanism for Transmission Losses

The rules and calculations for allocating transmission losses to Parties are set out in Section T2 of the Balancing and Settlement Code ('the Code'). These involve the adjustment of individual BM Unit Metered Volumes in Settlement to allocate transmission losses, whilst ensuring that total adjusted generation matches total adjusted demand in any given Settlement Period. Transmission losses are therefore allocated to Parties as part of their Trading Charges.

Under the existing Code provisions, both fixed and variable transmission losses in each Settlement Period are allocated to Parties on a 'uniform' (non-locational) basis in proportion to each Party's metered energy. The current allocation of transmission losses therefore does not take account of the extent to which individual Parties give rise to such losses. Although a parameter for a 'locational' allocation of some or all transmission losses is included in the Code, this is currently set to zero so has no practical effect. In the Section T calculation, this parameter is represented by the **Transmission Loss Factor** (TLF=0). This value can only be amended through a modification to the Code.

The formula below represents a simplified version of the Section T calculation for each BM Unit's share of total transmission losses in any given Settlement Period:

$$TLM = 1 + TLF + TLMO$$

A **Transmission Loss Multiplier** (TLM) is generated for each individual BM Unit, and represents a factor used to scale the BM Unit's Metered Volumes in Settlement. The purpose of the **Transmission Losses Adjustment** (TLMO) is to uniformly adjust all generation delivery or all demand offtake, in order to allocate the proportion of transmission losses which has not already been allocated through the TLF. Metered Volumes for BM Units in 'delivering' (exporting) Trading Units are multiplied by $1+TLF+TLMO^{+}$ (with TLF=0 this is a scaling down), whilst Metered Volumes for BM Units in 'offtaking' (importing) Trading Units are multiplied by $1+TLF+TLMO^{-}$ (with TLF=0 this is a scaling up).

The value of $TLMO^{+/-}$ is produced by a separate calculation in Section T. This includes the application of an '**alpha (α) factor**' of 0.45, which adjusts the total transmission losses for the Settlement Period such that 45% of losses are allocated across all delivering Trading Units in aggregate whilst 55% are allocated across all offtaking Trading Units in aggregate.[2]

The formulae below represent simplified versions of the $TLMO^{+}$ and $TLMO^{-}$ calculations:

> *$TLMO^{+}$ = (0.45*(total transmission losses in Settlement Period) – generators' share of transmission losses already allocated through TLF in Settlement Period) / total volume of generation in Settlement Period*
>
> *$TLMO^{-}$ = (0.55*(total transmission losses in Settlement Period) – Suppliers' share of transmission losses already allocated through TLF in Settlement Period) / total volume of demand in Settlement Period*

The value of $TLMO^{+}$ is the same in each Settlement Period for every BM Unit in all delivering Trading Units. The value of $TLMO^{-}$ is the same for every BM Unit in all offtaking Trading Units.

Since under the existing Code baseline the value of TLF is set to zero, the TLMO is currently the only determining factor in the calculation of each BM Unit's TLM. Two uniform TLM values are therefore currently applied: one to all BM Units in delivering Trading Units, and one to all BM Units in offtaking Trading Units. Each Party's overall allocation of transmission losses is dependent on the Metered Volumes of the BM Units to which this TLM is applied.

1.3 Previous Modification Proposal P82

Modification Proposal P82 'Introduction of Zonal Transmission Losses on an Average Basis' was raised by First Hydro in May 2002, and was considered by the Transmission Loss Factor Modification Group (TLFMG). Proposed Modification P82 was approved by the Authority in January 2003 for implementation in April 2004. However, this decision was quashed by the High Court in January 2004 following a judicial review, and P82 was remitted to the Authority for redecision where it was subsequently rejected. As a result, the value of TLF remains set to zero within the Code.

Although P82 was never fully implemented, all of the development work had already been completed prior to the conclusion of the judicial review. Much of the original P82 functionality (legal text, system development, Code Subsidiary Document changes and BSCCo working procedures) therefore remains re-usable and under the ownership of BSCCo. However, a key exception is the Load Flow Model developed by the **Transmission Loss Factor Agent** (TLFA), the new BSC Agent which would have been created by P82 to operationally calculate non-zero TLFs. Although an organisation was initially procured by BSCCo to fulfil the TLFA role, the subsequent P82 judicial review ruling meant that it was no longer required. The TLFA contract was consequently terminated, and the Intellectual Property Rights to the P82 Load Flow Model remain with the organisation concerned.

The scope and assessment of P82 was limited to transmission losses occurring on the England and Wales Transmission System. Following the Authority's approval of P82, a defect was identified in the P82 legal text relating to the application of a zonal TLF to the Scottish Interconnector. Modification Proposal P125 'Apportionment of the Scottish Interconnector flows to the Northern and North Western GSP Groups for the purposes of calculating losses' was raised by Scottish and Southern Energy in March 2003 to correct this defect, and was approved by the Authority in August 2003. Following the P82 judicial review ruling, the P125 changes served no practical purpose and were 'backed out' of the Code by Modification Proposal P165 'Housekeeping Modification – Removal of Approved Modification P125' in April 2004. Since then the

[2] In practice, this is designed to be equivalent to a 50:50 allocation, but with allowance for the fact that metering for generation connections is on the high voltage side of the supergrid transformer, whereas that for demand is on the low voltage side. The 45:55 allocation of transmission losses is intended to allow for supergrid transformer losses for demand connections which are in addition to the metered flow.

introduction of the British Electricity Trading and Transmission Arrangements (BETTA) in April 2005 has extended the scope of the Code to incorporate Scotland, such that it now covers the GB-wide Transmission System. It should be noted that the defect identified by P125 could therefore no longer arise under a GB transmission losses scheme, since the Scottish Interconnector no longer exists under BETTA.

Further detail regarding P82 can be found in the P82 Business Requirements Specification (Reference 2).

2 SUMMARY OF PROPOSED MODIFICATION SOLUTION

P198 seeks to allocate variable losses to Parties on a 'zonal' locational basis, according to the extent to which each Party gives rise to them. The remaining fixed losses would continue to be allocated to Parties on a non-locational basis, and the overall 45:55 allocation of total transmission losses to generation and demand would be retained. The Group has not yet developed a view of the Proposed Modification against the Applicable BSC Objectives.

The solution proposed by the Modification Proposal is based closely on Proposed Modification P82, and involves the following methodology for calculating non-zero TLFs:

- An electrical model of the Transmission System (a '**Load Flow Model'**) would be built, containing '**Nodes**' to represent points where energy flows on or off the Transmission System. Each Node would be allocated to a specific **Zone** on the transmission network. These TLF Zones would be set by the Panel, based on the geographical areas covered by existing GSP Groups.
- TLFs would be calculated on an ex-ante basis (i.e. forecasted) for each BSC Year, through a 'marginal' methodology to be applied using Metered Volumes and **Network Data** for **Sample Settlement Periods** from a preceding '**Reference Year**'. Prior to the start of each BSC Year (1 April – 31 March), the Load Flow Model would be run by a TLF agent/service provider to calculate how a variation in generation or demand at each individual Node would affect the total transmission losses from the Transmission System. The output of the Load Flow Model would be a TLF value for each Node in each of the Sample Settlement Periods. Positive TLF values would be produced for Nodes where an increase in generation (or reduction in demand) had the effect of decreasing total transmission losses. Negative TLF values would be produced for Nodes where an increase in generation (or reduction in demand) had the effect of increasing total transmission losses.
- These raw **Nodal TLFs** would be averaged across all the Nodes in each TLF Zone by 'volume-weighted' averaging, to give a **Zonal TLF** for each Sample Settlement Period. These would then be converted to **Annual Zonal TLFs** by 'time-weighted' averaging.
- The Annual Zonal TLFs would be adjusted by an appropriate scaling factor such that the volume of energy allocated via the TLFs was comparable to the volume of variable losses calculated by the Load Flow Model. These **Adjusted Annual Zonal TLFs** would be endorsed by the Panel before being used in the TLM calculation for the applicable BSC Year. A positive TLF value would increase the value of TLM used to scale a BM Unit's Metered Volume (a benefit to generators and disadvantage to Suppliers), whilst a negative TLF value would decrease the value of TLM (a benefit to Suppliers and disadvantage to generators).
- The remaining transmission losses not allocated via the TLF would continue to be allocated under the Code's existing non-locational calculation of $TLMO^{+/-}$. The existing overall 45% production / 55% consumption allocation of total transmission losses would also be retained within the TLMO calculation.

For a full description of the Modification Proposal as submitted by the Proposer, please refer to the P198 Initial Written Assessment (Reference 3).

3 SCOPE OF PROPOSED MODIFICATION SOLUTION

As P198 proposes a transmission losses scheme similar to that which was developed for P82, the intention of the Group is to base the detailed P198 requirements on the P82 solution unless a specific reason has been identified for diverging from that solution. Except where clearly indicated in this Requirements Specification, the P198 solution requirements are therefore identical to those contained in the P82 legal text and/or BRS.

Under P82, although the legal text referred to communications directly between the TLFA and other BSC Agents/the Transmission Company, in practice BSCCo was to act as an interface between the TLFA and these participants in order to minimise implementation costs. With the exception of communications between the TLFA and the BSC Auditor or Load Flow Model Reviewer, it has been assumed that this approach would also be adopted for P198 – and this Requirements Specification therefore refers to all other communications to and from the TLFA being sent via BSCCo.

4 DETAIL OF PROPOSED MODIFICATION SOLUTION REQUIREMENTS

This section sets out the detailed solution requirements for the Proposed Modification as developed by the Group.

4.1 Transmission Loss Factor Agent

4.1.1 Procurement

P198 requires TLF values to be calculated by a TLF agent or service provider. For the purpose of this impact assessment, it should be assumed that this role would be established as a new BSC Agent (the TLFA) as under the P82 solution.

BSCCo would be required to procure the new agent in accordance with the existing BSC Agent procurement process set out in Section E of the Code, and to establish the appropriate documentation to procure against (including a Service Description and Tender Framework Statement). In line with Section E, the Tender Framework Statement and the new BSC Agent contract would require Panel approval. The contract would contain the ability for its terms to be varied as a result of Approved Modifications and Change Proposals, and a requirement for the TLFA to provide impact assessments of proposed changes to the BSC arrangements in accordance with Section F of the Code.

As part of the BSCCo impact assessment, estimates are sought regarding the lead time and effort which would be required to procure the TLFA as part of the P198 development, and to maintain the TLFA contract on an ongoing operational basis.

4.1.2 Service Description

BSCCo would be required to produce a TLFA Service Description, which would become a new Code Subsidiary Document. The Panel would be required to approve the new Service Description, and any subsequent changes to it, in accordance with the existing processes set out in Section F3 of the Code and Balancing and Settlement Code Procedure (BSCP) 40 'Change Management'.

The TLFA Service Description would include the areas which are required by Section E1.3 of the Code to form part of any BSC Agent Service Description. These include the following:

- Specification of the service to be provided;
- Required performance levels;
- Disaster recovery provisions and plan;
- Contingency plan;
- Preparation and maintenance of records;

- BSC Auditor requirements and access in accordance with Section H5.5 (it is assumed that the scope of the BSC Audit would need to be extended to include TLFA systems and processes, since H5.1.3 states that the BSC Audit shall include 'the determinations and calculations made by BSC Agents for the purposes of Settlement');
- Helpdesk service requirements (it is anticipated that for the TLFA a helpdesk service would be provided on a Business Day, rather than 24-hour, basis);
- Provision for any ad-hoc services and routine services not specified in the services above; and
- Any data transfer requirements where a different organisation is appointed as the TLFA in the future.

As part of the specification of the service, the TLFA would be required to develop, maintain and run a Load Flow Model in accordance with the requirements set out in Sections 4.5 and 4.6 below. The Load Flow Model Specification would form part of the TLFA Service Description. The Service Description would include the right of the BSC Auditor and an independent Load Flow Model Reviewer to have access to the Load Flow Model, and a requirement for a copy of the Load Flow Model to be kept in escrow. It would also include the right of BSCCo to have access to the model (note that this was not a requirement for P82, but would be introduced for P198).

As part of the BSCCo impact assessment, estimates are sought regarding the lead time and effort which would be required to develop the TLFA Service Description and contract as part of the P198 development, and to manage the contract on an ongoing operational basis. In addition, an estimate is sought as to the impact of a new BSC Agent on the BSC Auditor and scope of the BSC Audit (including the interaction between the roles of the BSC Auditor and the Load Flow Model Reviewer as described in Section 4.5.2 below).

4.1.3 User Requirements Specification

The TLFA would be required to develop a User Requirements Specification (URS), based on the TLFA Service Description and Load Flow Model Specification. This would define the mechanisms by which the TLFA would meet its service requirements. As a new Configurable Item, the URS would be subject to the change process set out in BSCP40 and the new document (and any subsequent changes to it) would require approval by the Panel (or a Panel Committee under delegated authority).

Other, more detailed, documentation such as system specifications and/or design specifications might need to be developed by the TLFA. It should be noted that the BSC Auditor, the Load Flow Model Reviewer and BSCCo would have the right to access the URS and all other systems documentation.

As part of the BSCCo impact assessment, estimates are sought as to the lead time and effort which would be expended during the production of any relevant TLFA systems documentation.

4.2 Determination of Nodes

The Transmission Company would be required to identify each Node on the Transmission System, and to maintain and provide to BSCCo an up-to-date list of all Nodes identified (or capable of being identified) geographically. These would be used by BSCCo in the Network Mapping Statement (see below).

As part of the Transmission Company analysis, estimates are sought regarding the lead time and effort which would be required to (a) develop the initial list of Nodes for the P198 implementation, and (b) subsequently update the list upon any change to the identification of Nodes (e.g. following a BM Unit registration or deregistration).

4.3 Determination of TLF Zones

P198 requires the Panel to determine the constitution of the Zones to be used in the TLF calculation. The following process would be used by the Panel to arrive at this determination:

- Each Zone would represent the geographic area in which a GSP Group lies, determined by the Panel (applying such criteria as it shall decide in its discretion) such that the Zones are mutually exclusive and comprise the whole of (and nothing but) the authorised area under the Transmission Licence;
- The Panel may from time to time review (and upon reasonable notice to Parties change) its determination of any Zones, where there is any change in the GSP Groups, or upon the application of a Party, or upon its own initiative – provided that a change in the determination of any Zone(s) shall be effective only in relation to BSC Years for which (at the time the change was made) TLFs have not already been determined;
- The Panel may (but shall not be required to) consult any Party on the determination of any part of the boundary of a Zone where it considers there is material doubt as to such determination.

BSCCo would be responsible for publishing a description of the Zones as determined by the Panel (this may be as part of another document such as the Network Mapping Statement).

As part of the BSCCo impact assessment, estimates are sought regarding the lead time and effort which would be required to support the Panel in its initial determination of Zones as part of the P198 development, and any subsequent revision to the Zones on an ongoing operational basis.

4.4 Network Mapping Statement

4.4.1 Content

BSCCo would be required to prepare and maintain a '**Network Mapping Statement**' of the following:

i) For each Volume Allocation Unit (other than a GSP Group or BM Unit embedded in a Distribution System), the Node which represents or best represents that Volume Allocation Unit or (as the case may be) the Boundary Point(s) at which that Volume Allocation Unit is connected to the Transmission System (it being recognised that one Node may represent several such points);

ii) For each Node, the Zone in which the Node lies or should best be considered to lie; and

iii) For each BM Unit, the Zone in which the BM Unit lies, on the basis of the same correspondences as established under (i) and (ii) above, except that:

a) Interconnector BM Units lie in the Zone in which the Node for the relevant Interconnector lies; and

b) Supplier BM Units and other BM Units embedded in a Distribution System lie in the Zone which represents the geographical area of the corresponding GSP Group.

4.4.2 Development and Maintenance

BSCCo would be required to update the Network Mapping Statement from time to time throughout the BSC Year, to take account of any of the following:

- A determination by the Panel in relation to an appeal regarding the allocation of a Volume Allocation Unit or Node to a Zone (see below);
- Any change in the list of Nodes, as provided by the Transmission Company;
- Any change in the definition of any Zone; and

- Any change in respect of BM Units, Transmission System Boundary Points or Systems Connection Points.

Due to the need to keep the Network Mapping Statement up to date at all times, it would not be established as a Configurable Item (i.e. it would not be subject to the full change processes set out in Section F and BSCP40) but would have its own change process detailed in the Code as follows:

- BSCCo would be required to provide the initial draft of the Network Mapping Statement (and any subsequent revision thereof) to the Panel and each Party, where practicable at least one month before the statement (or revision) is to become effective;
- BSCCo would be required to submit any representations or comments received on the draft/revision to the Panel;
- Any question or appeal regarding the allocation of Volume Allocation Units or Nodes to Zones would be determined by the Panel in its discretion, after consultation with the Transmission Company and the Lead Party(ies) of the affected BM Unit(s);
- In making its determination, the Panel would be required to have regard to (so far as appears to the Panel to be relevant) the parts of the Transmission System in which power flows are typically most influenced by changes in power flows at the relevant Node or (as the case may be) the relevant BM Unit; and
- The Transmission Company, each Distribution System Operator, the Central Data Collection Agent (CDCA) and the Central Registration Agent (CRA) would be required to co-operate with (and provide any required information to) BSCCo and the Panel in connection with the preparation of the Network Mapping Statement and the determination of any question or appeal (it is assumed that this requirement on the CDCA and CRA would be subsumed within the existing BSC Agent helpdesk function).

BSCCo would be responsible for providing the TLFA with the latest version of the Network Mapping Statement, and for publishing it on the BSC Website.

The Network Mapping Statement would be kept up to date throughout the BSC Year in order to ensure that any new BM Units registered during the year could be allocated a zonal TLF value. The TLF applied to the new BM Unit would be the Adjusted Annual Zonal TLF already derived by the TLFA for that Zone. For the avoidance of doubt, TLFs would not be retrospectively recalculated for existing BM Units following a change to the Network Mapping Statement.

As part of the BSCCo impact assessment, estimates are sought regarding the lead time and effort which would be required to develop the Network Mapping Statement, and to maintain it on an ongoing operational basis. For example, BSCCo may wish to establish a guidance document containing a set of mapping rules, the detail of the process by which Parties could appeal the zonal allocation/mapping of their BM Units, and the detail of the process by which such an appeal would be determined by the Panel. Such a guidance document was previously produced for P82, based partly on the similar guidance used for appeals of Credit Assessment Load Factor values. It is also anticipated that, due to the frequency with which BM Unit registrations or deregistrations may occur, BSCCo may wish to 'batch' any changes to the Network Mapping Statement such that updates are made on a monthly basis.

The Transmission Company is also requested to provide estimates of the lead time and effort which would be required to support the Panel in its determination of any appeal.

4.5 Load Flow Model

4.5.1 Load Flow Model Specification

BSCCo would be required to establish a '**Load Flow Model Specification**' for a Load Flow Model of the Transmission System – to be developed, maintained and operated by the TLFA in accordance with the requirements set out in this section and in Section 4.6 below. The Panel would be responsible for ensuring that the Load Flow Model complied with the Load Flow Model Specification at all times. The TLFA would be required not to modify the Load Flow Model except as agreed or instructed by the Panel (such modifications to the model might or might not require a change to the Load Flow Model Specification itself).

The Load Flow Model Specification would be established as a new Code Subsidiary Document, and would form part of the TLFA Service Description. The Panel would be required to approve the new document, and any subsequent changes to it, in accordance with the existing change processes set out in Section F3 of the Code and in BSCP40.

The approximations and assumptions to be used in the Load Flow Model would be specified in the Code (the exact detail of this approximations and assumptions will be determined by the Group following completion of the modelling exercise). The Load Flow Model Specification would contain the detailed requirements for operating the model (for example, the treatment of power flows).

For the avoidance of doubt, the function of the Load Flow Model would be to produce Nodal TLFs. The conversion of Nodal TLFs to Annual Adjusted Zonal TLFs would be carried out by the TLFA, using the calculations described in Section 4.6.2.

As part of the BSCCo impact assessment, estimates are sought as to the lead time and effort which would be required to develop the Load Flow Model Specification as part of the P198 implementation. The exact design of the model to meet that specification would be responsibility of the TLFA.

4.5.2 Load Flow Model Reviewer

The Panel would be required to appoint (and could from time to time reappoint or replace) an independent **Load Flow Model Reviewer** for the following purposes:

- To inspect and test the Load Flow Model and report to the Panel as to the compliance of the Load Flow Model with the Load Flow Model Specification (or any particular aspect of the Load Flow Model Specification) in the following circumstances:
  - Before the Load Flow Model is first used (i.e. after its development as part of the P198 implementation work);
  - Upon any subsequent modification to the Load Flow Model (whether upon a change to the Load Flow Model Specification or otherwise); and
  - On any other occasion on which the Panel decides to obtain such a report, and
- To verify and report to the Trading Disputes Committee (TDC) as to whether Nodal TLFs were determined in accordance with the Load Flow Model, on any occasion on which it is necessary to do so for the purposes of a Trading Dispute.

Any report produced by the Load Flow Model Reviewer on Nodal TLFs for the TDC would be final and binding on all Parties (save in the case of fraud or manifest error). If a Party referred a Trading Dispute to arbitration under Section W of the Code, the arbitrator(s) would not have the power to open up, review or in any way revise the model reviewer's report on whether nodal TLFs were determined in accordance with the Load Flow Model (save in the case of fraud or manifest error).

BSCCo would be required to procure and contract with the Load Flow Model Reviewer, including:

- The provision of terms of reference for the Load Flow Model Reviewer (either set or approved by the Panel); and
- The requirement for the Load Flow Model Reviewer to enter into a confidentiality undertaking in favour of the TLFA in such terms as the Panel shall reasonably require or approve.

The TLFA would be required to make the Load Flow Model available to the Load Flow Model Reviewer and BSC Auditor. It would also be required to make the model available to BSCCo (note that this was not a requirement for P82, but would be introduced for P198). It would not be required to make available or disclose the Load Flow Model to the Panel, any Panel Committee or Parties.

Once the Load Flow Model (or any modification to the model) had been adopted by the TLFA, Nodal TLFs which were deemed to be properly determined by the Load Flow Model would be definitive, and:

- No Party would be able to challenge or question, on any grounds, the validity of any Nodal TLF which was so determined; and
- Any modification of the Load Flow Model would only have effect prospectively – i.e. for the purpose of determining TLFs in respect of BSC Years for which (at the time the modification was made) TLFs had not already been determined.

For the purposes of this impact assessment, the key differences between the role of the Load Flow Model Reviewer and the BSC Auditor are assumed to be the following:

- The BSC Auditor would only report on the compliance of TLFA systems and processes retrospectively following the end of each Audit Period (i.e. at the end of each BSC Year once the TLFs had been calculated and used in Settlement). In contrast, the Load Flow Model Reviewer would report on the compliance of the Load Flow Model prospectively prior to its first use and following any modification to the model. In addition, the Load Flow Model Reviewer could review the compliance of the model during a BSC Year as a result of an ad-hoc request from the Panel or as part of a Trading Dispute.
- The BSC Auditor reports only on how compliance could be strengthened prospectively (i.e. in the next BSC Year). In contrast, on the basis of the Load Flow Modeller's report, the Panel could ensure retrospective compliance by determining that TLFs should be recalculated part-way through a BSC Year as the result of a Trading Dispute.

As part of the BSCCo impact assessment, estimates are sought regarding the lead time and effort which would be required to undertake the procurement of a Load Flow Model Reviewer as part of the P198 implementation, and to manage the resulting contract on an ongoing operational basis. In addition, further detail is sought as to the interaction between the roles of the BSC Auditor and Load Flow Model Reviewer with regard to the TLFA.

4.5.3 Escrow Arrangements

The TLFA would be required to deposit a copy of the Load Flow Model in escrow with an **escrow agent**, in such form and as on such terms as the Panel may approve.

The escrow agent would be required to hold, maintain and release the Load Flow Model in accordance with the terms and conditions approved by the Panel.

The TLFA would be responsible for the payment of all fees due to the escrow agent.

As part of the BSCCo impact assessment, estimates are sought regarding the lead time and effort which would be required to support the Panel in its development of the necessary terms and conditions for the escrow agent as part of the P198 implementation.

4.6 Derivation of TLFs

The TLFA would be responsible for deriving TLFs, using the Load Flow Model and new calculations to be specified in Section T of the Code. The input data to be used in the model is set out below, along with the new TLF calculation and output data requirements.

4.6.1 Input Data

a) Network Data

The Transmission Company would be responsible for providing Network Data relating to the Reference Year to BSCCo. BSCCo would be responsible for passing this data to the TLFA for use in the Load Flow Model.

The Transmission Company would determine Network Data in good faith based on its operational knowledge of the Transmission System, and in accordance with any assumptions made in the Load Flow Model Specification. The Transmission Company and the TLFA would be responsible for agreeing the most appropriate format and medium in which the data is provided, to ensure compatibility with the Load Flow Model and the BSC Agent System on which the model would operate.

In the absence of any manifest error, no Party would be able to challenge or question the validity or correctness of the Network Data determined by the Transmission Company. Other than in the case of a manifest error, there would be no ability to retrospectively amend the Network Data once TLFs had been calculated for the relevant BSC Year.

The exact components of the required Network Data would be specified in the Code, and will be determined by the Group following the completion of the modelling exercise. They will be based on the assumption of an 'intact' network (i.e. the Network Data would be a representative network over the whole of the Reference Year, rather than an individual network for each of the Sample Settlement Periods).

As part of the Transmission Company analysis, estimates are sought as to the lead time and effort which would be required to annually provide Network Data to BSCCo.

b) Metered Volumes

The CDCA would be responsible for providing BSCCo with Metered Volumes for each Volume Allocation Unit (other than GSP Groups and BM Units embedded in a Distribution System) for the Sample Settlement Periods in the Reference Year. For P82, a new data flow (CDCA-I063 'Metered Volume Data for Sample Settlement Periods') was established for the provision of this data as a .csv file. It is anticipated that this approach would also be followed for P198. BSCCo would be responsible for passing the data to the TLFA for use in the Load Flow Model.

In the absence of any manifest error, no Party would be able to challenge or question the validity or correctness of the Metered Volume data provided by the CDCA. Other than in the case of a manifest error, there would therefore be no ability to retrospectively amend this data once TLFs had been calculated for the relevant BSC Year. For the avoidance of doubt, any subsequent changes to BM Unit Metered Volume data which arose from the adjustment of metered data up until the Final Reconciliation Run would not result in the retrospective recalculation of TLF values – since such adjustments would represent a consequence of the normal Settlement process and not a Settlement error.

As part of the BSC Agent impact assessment, estimates are sought regarding the timescales and effort which would be required by the CDCA to annually submit the necessary Metered Volume data to BSCCo. Estimates are also sought as to the BSCCo lead time and effort required to obtain the data from the CDCA and pass it to the TLFA.

c) Sample Settlement Periods and Load Periods

P198 requires that, for each BSC Year, TLFs would be determined by reference to Nodal TLFs for Sample Settlement Periods in a preceding 'reference year'. The Reference Year will take the form of a consecutive 12-month period. Its exact duration would be specified in the Code, and will be determined by the Group following the impact assessment (for P82, the Reference Year was 1 October – 30 September due to the timescales required to provide the data and derive TLFs prior to the start of the BSC Year on 1 April).

For the purpose of determining TLFs, the Panel (after consultation with the Transmission Company and other Parties), would:

- Divide the Reference Year into a number of different **Load Periods**, representing (in the opinion of the Panel) typically different levels of load on the Transmission System – defined by time of day, day of week, season and such other factors as the Panel considers relevant, such that every Settlement Period in the Reference Year falls into one and only one Load Period;
- Specify, for each Load Period, a representative (in the opinion of the Panel) number of Sample Settlement Periods within that Load Period; and
- Revise the specification of Load Periods or Sample Settlement Periods for each subsequent BSC Year as required.

It is assumed that, following the Panel's initial determination of Load Periods and Sample Settlement Periods as part of the P198 development, the Panel would confirm whether these remained appropriate for each subsequent BSC Year (for example, changes may be required to reflect changes in the dates of public holidays). It is anticipated that this may involve an annual review and consultation, even where no change is proposed.

BSCCo would be responsible for notifying the specification of each Load Period and the Sample Settlement Periods to the TLFA (for use in the Load Flow Model) and the Transmission Company and CDCA (for use in providing Network Data and Metered Volumes to the TLFA).

As part of the BSCCo impact assessment, estimates are sought regarding the lead time and effort which would be required to (a) support the Panel in its initial determination of Load Periods and Sample Settlement Periods, (b) support the Panel in its subsequent annual review of whether these remained appropriate, and (c) notify the Panel's determination to the TLFA, Transmission Company and CDCA.

d) Default Rules for Data Estimation

BSCCo would be required to establish default rules for any circumstances where the input data required by the TLFA was incomplete.

4.6.2 TLF Calculation

a) Nodal TLFs

For each Sample Settlement Period in the Reference Year, the TLFA would be responsible for:

- Translating the Metered Volumes provided by the CDCA to power flows (on the assumption that they are constant in a Settlement Period) for each Node by applying the Network Mapping Statement;
- Inputting this nodal power flow data and the Network Data provided by the Transmission Company into the Load Flow Model; and
- Applying the Load Flow Model to derive a Nodal TLF for each Node.

The detailed requirements for the production of Nodal TLFs would be detailed in the Load Flow Model Specification.

b) Zonal TLFs

Using the Nodal TLFs generated by the Load Flow Model for each Sample Settlement Period in the Reference Year, the TLFA would be responsible for determining the Zonal TLF (TLF_{Zj}) for each Zone by 'volume-weighted' averaging in accordance with the following calculation (to be specified in the Code):

$$TLF_{Zj} = \Sigma_N (TLF_{Nj} * QM_{Nj}) / \Sigma_N QM_{Nj}$$

Where for that Settlement Period, and for each Node in that Zone (determined by the TLFA on the basis of the Network Mapping Statement):

TLF_{Nj} is the value of Nodal TLF; and

QM_{Nj} is the absolute value of the Nodal power flow;

and where Σ_N is summation by Node in a Zone.

c) Annual Zonal TLFs

For each Reference Year the TLFA would be responsible for determining the Annual Zonal TLF (TLF_{Zy}) for each Zone, by 'time-weighted' averaging in accordance with the following calculation (to be specified in the Code):

$$TLF_{Zy} = \Sigma_p ((\Sigma_s TLF_{Zj} / S_p) * J_p) / \Sigma_p J_p$$

where:

S_p is the number of Sample Settlement Periods for a Load Period

J_p is the total number of Settlement Periods falling within the Load Period

Σ_s is summation by Sample Settlement Periods within a Load Period

Σ_p is summation by Load Period within the Reference Year.

d) Adjusted Annual Zonal TLFs

For each forthcoming BSC Year, the TLFA would be responsible for determining the Adjusted Annual Zonal TLF ($ATLF_{Zy}$) for each Zone, by multiplying the Annual Zonal TLFs for the Reference Year by a scaling factor designed to ensure that the volume of energy allocated via the TLFs was comparable to the volume of variable losses calculated by the Load Flow Model.

The exact value of the scaling factor will be determined by the Group following the conclusion of the modelling exercise, and may be different to the value used for P82. Its value would be 'hard-wired' in the Code, such that it could only be amended via a Modification Proposal.

For example, if the scaling factor was 0.5 (the value used under P82) the Code's calculation for $ATLF_{Zy}$ would be:

$$ATLF_{Zy} = TLF_{Zy} * 0.5$$

4.6.3 Output Data

For each BSC Year, the value of TLF_{ij} for each BM Unit to be used in the calculation of $TLMO^{+/-}$ and TLM would be the Adjusted Annual Zonal TLF ($ATLF_{Zy}$) for the Zone in which the BM Unit is located (determined by the TLFA on the basis of the Network Mapping Statement). These values are hereafter referred to as '**BM Unit-specific TLFs'**.

The TLFA would be responsible for sending the BM Unit-specific TLF_{ij} values, Adjusted Annual TLFs ($ATLF_{Zy}$) and raw Nodal TLFs to BSCCo. The TLFA would also be required to provide BSCCo with network model output data on request, including individual nodal power flows, and circuit and transformer power flows and losses (note that this was not a requirement for P82, but would be introduced for P198).

4.7 Derivation of TLMs

a) Approval of TLFs by Panel

P198 requires the Panel to endorse the Annual Adjusted Zonal TLFs prior to their use for the BSC Year. This was not a Code requirement for P82, and the Group is therefore currently considering the criteria on which the Panel would be required to base its endorsement. Two options are being considered by the Group as follows:

i) Base Panel's endorsement on an annual high-level report produced by BSCCo, outlining the variation of TLFs for the applicable BSC Year from those used in the previous BSC Year.

Under this approach, if the Panel was concerned that any variation was unsatisfactorily explained, it could request that the Load Flow Model Reviewer undertook an 'ad-hoc' review of the calculation of Nodal TLFs. However, the Panel/model reviewer would not be required to undertake a full review of Nodal TLFs each year. Following the Panel's endorsement, any Party query over the value of its Nodal, Zonal or Annual Adjusted TLF value could be raised via a Trading Query as described in Section 4.10.

ii) Introduce an annual process (with appropriate timescales) for Parties to review Nodal TLF values prior to the endorsement of the TLFs by the Panel.

This would require the development of a process for Parties to appeal their values (possibly via an industry consultation), and a set of criteria by which the Panel would determine such an appeal (for example, obtaining an annual report from the Load Flow Model Reviewer).

Following the Panel's approval, BSCCo would be responsible for sending the BM Unit-specific TLFs to the CRA for registration in Central Systems.

As part of the BSCCo impact assessment, estimates are sought regarding the lead time and effort which would be required to support the Panel in its approval of the Annual Adjusted Zonal TLFs.

b) Registration of BM Unit-Specific TLFs for BSC Year

The CRA would be responsible for the registration of the BM Unit-specific TLFs within central systems for the forthcoming BSC Year. The CRA would also be responsible for reporting these values to BSCCo, the Transmission Company, the Balancing Mechanism Reporting Agent (BMRA) and the Settlement Administration Agent (SAA). It is assumed that the existing CRA-I020 (Operations Registration Report) and CRA-I015 (BM Unit, Interconnector and GSP Registration Data Report) flows would be utilised for this purpose, since these already contain the TLF data item (currently set to zero).

As part of the BSC Agent impact assessment, estimates are sought regarding the lead time and effort which would be required to undertake this annual registration exercise.

c) Validation of BM Unit-specific TLFs for BSC Year

There is no existing functionality within CRA Systems to cover the circumstance where a TLF value has not been allocated to a BM Unit through error. Although the TLF data item is mandatory within CRA Systems, since the default value is zero any BM Units that retained a zero value through error would not be identified. Under P82, BSCCo was to validate the TLFs recorded in CRA Systems by comparing them with those received from the TLFA (note that this was not a Code requirement). For the purposes of this impact assessment, it is assumed that the same approach would be followed for P198. An alternative approach would be to implement a level of validation within CRA Systems.

As part of the BSCCo impact assessment, estimates are sought regarding the timescales and effort which would be required to undertake this validation exercise. The validation would be required annually prior to the use of TLFs for the forthcoming BSC Year, and on an ad-hoc basis if TLFs were retrospectively recalculated as a result of a Trading Dispute.

d) Use of TLFs in Settlement for BSC Year

The SAA would be responsible for applying the BM Unit-specific TLFs in Settlement Runs for Settlement Days from (and including) 1 April in the applicable BSC Year.

The calculations for deriving each BM Unit's TLM and TLMO for each Settlement Period in the BSC Year would be unchanged from those currently contained in Section T2.3 of the Code, which are:

For all BM Units belonging to Trading Units which in the Settlement Period were delivering Trading Units:

$TLM_{ij} = 1 + TLF_{ij} + TLMO^{+}_{j}$

For all BM Units belonging to Trading Units which in the Settlement Period were offtaking Trading Units:

$TLM_{ij} = 1 + TLF_{ij} + TLMO^{-}_{j}$

Where:

$TLMO^{+}_{j} = -\{\alpha(\Sigma^{+}QM_{ij} + \Sigma^{-}QM_{ij}) + \Sigma^{+}(QM_{ij} * TLF_{ij})\} / \Sigma^{+}QM_{ij}$; and

$TLMO^{-}_{j} = \{(\alpha-1)(\Sigma^{+}QM_{ij} + \Sigma^{-}QM_{ij}) - \Sigma^{-}(QM_{ij} * TLF_{ij})\} / \Sigma^{-}QM_{ij}$; and

Σ^{+} represents the sum over all BM Units belonging to Trading Units that are delivering Trading Units in the Settlement Period;

Σ^{-} represents the sum over all BM Units belonging to Trading Units that are offtaking Trading Units in the Settlement Period;

$\alpha = 0.45$.

The value of TLF_{ij} would no longer be zero for all BM Units as currently specified in T2.2. Instead, the value of TLF_{ij} to be used in the calculation of $TLMO^{+/-}$ and TLM would be the BM Unit-specific TLF provided by the TLFA.

It is assumed that this would have minimal impact on SAA processes and Systems since TLF values are already used in the Settlement calculations (although they are currently set to zero). As part of the BSC Agent impact assessment, confirmation is sought as to the impact of P198 on SAA Systems, documentation and processes.

4.8 Derivation of TLFs for new BM Unit Registrations

TLF values would need to be obtained and registered for any new BM Units registered part-way through a BSC Year. BSCCo would be responsible for requesting Node information for the new BM Unit from the Transmission Company, and for updating the Network Mapping Statement (in accordance with the approval process set out in Section 4.5.2) in order to allocate the BM Unit to a Zone.

The TLF applied to the new BM Unit would be the Adjusted Annual Zonal TLF already derived by the TLFA for the relevant Zone. BSCCo would be responsible for passing the TLF value for the BM Unit to the CRA via the CRA-I029 (Transmission Loss Factors) manual flow for registration in CRA Systems, and the CRA would be responsible for passing that value to the BMRA and SAA via the CRA-I015.

As part of the impact assessment, BSCCo, the BSC Agent and the Transmission Company are requested to provide estimates of the lead time and effort required to (a) include the above steps in the existing BM Unit registration process as part of the P198 development, and (b) operate the process on an ongoing operational basis.

For the avoidance of doubt, TLFs for existing BM Units would not be retrospectively recalculated (either on the BMRS or in Settlement) following a new BM Unit registration or deregistration.

4.9 BM Unit Deregistrations

Where an existing BM Unit was deregistered part-way through a BSC Year, BSCCo would be required to amend the Network Mapping Statement in accordance with the process set out in Section 4.5.2. The CRA would follow the normal BM Unit deregistration process as set out in BSCP15 'BM Unit Registration'.

There would be no requirement for the TLFA to provide end-dated TLFs for the BM Unit, as the deregistration of the BM Unit in CRA Systems would automatically end-date all the attributes of the BM Unit.

4.10 Retrospective Recalculation of TLFs

For the avoidance of doubt:

- Once the Load Flow Model Reviewer had confirmed to the Panel that the Load Flow Model is compliant with the Load Flow Model Specification, no Party would be able to raise a Trading Query or Trading Dispute against the Load Flow Model;
- Parties would therefore only be able to raise Trading Queries or Trading Disputes against the operation of the Load Flow Model (i.e. its input data and the derivation of Nodal TLFs) and not the compliance of the model design with the Load Flow Model Specification;
- The Load Flow Model Reviewer would be instructed to report to the TDC as to whether Nodal TLFs were determined in accordance with the Load Flow Model only where a Party had raised a Trading Query or Trading Dispute;
- The Load Flow Model Reviewer's report to the TDC regarding Nodal TLFs would be final and binding on all Parties (except in the case of fraud or manifest error);
- Nodal TLFs would be deemed to have been properly determined if the data inputs provided by the Transmission Company (Network Data) and CDCA (Metered Volumes) contained no manifest errors and had been correctly applied within the Load Flow Model by the TLFA in accordance with the Network Mapping Statement;[3]

[3] For the avoidance of doubt, any subsequent changes to BM Unit Metered Volume data which arose from the adjustment of metered data up until the Final Reconciliation Run would not result in the retrospective recalculation of TLF values – since such adjustments would represent a consequence of the normal Settlement process and not a Settlement error.

- A Trading Dispute would only be upheld by the TDC where:
    - The Load Flow Model Reviewer determined that Nodal TLFs had not been determined in accordance with the Load Flow Model;
    - The TDC determined that there had been an error in the TLFA's conversion of Nodal TLF values to BM Unit-specific TLF values;
    - The TDC determined that the BM Unit-specific TLF values produced by the TLFA had not been correctly registered by the CRA; and/or
    - The TDC determined that the BM Unit-specific TLF values registered by the CRA had not been correctly applied in Settlement by the SAA,
- TLF values could only be retrospectively recalculated as the result of an upheld Trading Dispute and following Panel approval; and
- Trading Queries and Trading Disputes relating to TLFs would be subject to the usual process set out in Section W of the Code and in BSCP11 'Trading Queries and Trading Disputes', including the cut-off dates for raising Trading Queries.

Where, as the result of an upheld Trading Dispute, the Panel determined that TLF values should be retrospectively recalculated, the processes set out in Sections 4.6 and 4.7 would be repeated to recalculate the BM Unit-specific TLFs, register and validate the revised values in CRA Systems, and pass the values to the SAA for rectification in Settlement. BSCCo would also be required to publish the revised TLF data on the BSC Website in accordance with Section 4.11 (the BMRA would not be required to retrospectively amend the TLF values used in the BMRS derived data calculations).

Note that the above process should not be confused with the ability for Parties to appeal the zonal allocation of their BM Units to the Panel. Such appeals would not take the form of Trading Queries, and amendments to the allocation of BM Units to Zones and the Network Mapping Statement would only be applied to BSC Years for which TLFs had not already been calculated.

4.11 Data Publication

4.11.1 BMRS

a) TLFs

The BMRA would be responsible for using the BM Unit-specific TLFs, as provided by the CRA, in the derived data calculations on the Balancing Mechanism Reporting Service (BMRS) for Settlement Periods from (and including) Settlement Period 1 on 1 April in the applicable BSC Year.

It is assumed that this would have minimal impact on BMRA processes and the BMRS since TLF values are already used in the derived data calculations (although TLFs are currently set to zero). As part of the BSC Agent impact assessment, confirmation is sought as to the impact of P198 on BMRA Systems, documentation and processes.

For the avoidance of doubt, if the TLF for any BM Unit is amended retrospectively the BMRA will not be required to recalculate the derived data for the affected Settlement Period(s).

b) ETLMOs

In accordance with Sections V2.5.2 and V2.6.3 of the Code, Estimated Transmission Losses Adjustments (ETLMOs) are used in derived data calculations on the BMRS – since the actual metered data that determines the value of $TLMO^{+/-}$ is not available until after the BMRS data must be published.

The values of $ETLMO^{+/-}$ are determined by the Panel, and are currently based on actual TLMOs from the previous year. However, if P198 was to be introduced this approach would no longer be appropriate since TLF values (one component of TLMOs) would no longer be zero. A revised methodology is therefore likely to be required for calculating the value of $ETLMO^{+/-}$. It is anticipated that the approach used would be that adopted for P82 as set out in ISG Paper 35/391, and that the new values would require the approval of the Panel (or a Panel Committee under delegated authority). BSCCo would be responsible for providing the revised ETLMOs to the BMRA for use in BMRS calculations.

Note that the revision of ETLMO values would not be a Code requirement for P198, since Section V2.6.3 of the Code already requires the Panel to periodically review and determine these values. It is therefore assumed that any effort required to revise ETLMO values as a result of P198 would be subsumed within this existing review process. It is also assumed that a revision in ETLMO values would have minimal impact on BMRA processes and the BMRS, since ETLMOs are already provided to the BMRA by BSCCo for use in the derived data calculations.

ETLMO values are currently published on the BSC Website. Although this publication is not a Code requirement, it is anticipated that it would continue under P198.

4.11.2 BSC Website

BSCCo would be required to publish Annual Adjusted Zonal TLFs, and the Load Periods and Sample Settlement Periods used in the Load Flow Model, on the BSC Website at least one month prior to the start of the applicable BSC Year (note that this was not a Code requirement under P82, but would be detailed in the Code for P198).

BSCCo may also wish to develop and publish an information sheet describing the new P198 TLF calculation, although this would not be a Code requirement.

As part of the BSCCo impact assessment, estimates are sought regarding the timescales and man effort which would be required to publish this information (including any required changes to BSC Website content and functionality).

BSCCo is already required by Section V4.2.3 of the Code to publish BM Unit-specific TLF values (all currently zero) on the BSC Website.[4] This requirement would continue to apply to the non-zero TLFs generated under P198.

4.11.3 Ad-Hoc Data Requests

BSCCo would be required to provide any Party with raw Nodal TLF data for a particular BSC Year on request, where the Party requested the data in accordance with the existing process set out in BSCP41 'Report Requests and Authorisations'. The format of this report would not be specified in the Code; however, it is anticipated that it would be provided on a CD-ROM.

In addition, BSCCo would be required to provide any Party with the following data, where the Party requested the data in accordance with BSCP41:

- The Network Data and/or nodal power flow data used in the Load Flow Model for a particular BSC Year; and/or
- The circuit and transformer power flows and losses produced by the Load Flow Model in individual snapshots.

Note that this was not a requirement under P82, but would be detailed in the Code for P198.

[4] See http://www.elexon.co.uk/documents/Market_Data/Market_Data_-_Static_Data_-_CRS_Registration_Data/bm_units.csv

4.12 Implementation Options

The Proposer of P198 suggests a potential Implementation Date for the Proposed Modification of 1 April 2007 (i.e. non-zero TLF values would come into effect from 1 April onwards, requiring the actual calculation of TLF values to take place prior to the Implementation Date). This is in line with previous Modification Proposal P82, where the TLFMG considered that a 1 April implementation was essential in order to coincide with Parties' contractual rounds. Following this impact assessment, the P198 Modification Group will discuss whether a 1 April implementation remains the most appropriate approach and – if it believes this to be the case – will use the lead times provided by the impact assessment to determine the feasibility of a 1 April 2007 Implementation Date.

There would be no 'phased' implementation of the Proposed Modification (i.e. there would be no gradual linear introduction of non-zero TLFs, or 'grandfathering' scheme limiting their application to above a certain volume of energy).

5 ESTIMATED IMPACT OF PROPOSED MODIFICATION ON SYSTEMS, PROCESSES AND DOCUMENTATION

An initial assessment of the impact of the Proposed Modification has been undertaken by BSCCo in respect of all BSC systems, documentation and processes. The precise impacts of the Proposed Modification, and the implementation timescales which they would require (including the extent to which previous P82 functionality could be reused), will be established by the Group using the results of the impact assessment.

a) Impact on BSC Systems and Processes

BSC System / Process	Potential Impact of Proposed Modification
BM Unit Registration	The CRA would be required to amend its BM Unit registration process so that a TLF value is obtained from the TLFA (via BSCCo). It is assumed that these values would be reported using existing data flows.
Central Data Collection	The CDCA would be required to provide the TLFA (via BSCCo) with Metered Volume data for the Sample Settlement Periods used in the Load Flow Model.
BMRS	The BMRA would be required to receive BM Unit-specific TLF values from the CRA and use these in BMRS reporting.
Settlement Administration	The SAA would be required to receive BM Unit-specific TLFs from the CRA and apply these in Settlement calculations.
Derivation of Zonal TLFs	A new BSC process, with supporting systems, would need to be introduced for the TLFA to derive TLFs through the application of a Load Flow Model in accordance with a Network Mapping Statement, Load Flow Model Specification, and new calculations in Section T of the Code.

All of the above processes would need to contain the flexibility to handle the following activities:

- Ad-hoc prospective registration of TLFs for new BM Units;
- Ad-hoc retrospective recalculation of TLF values following a Trading Dispute; and
- Estimation of data where the input data required by the Load Flow Model is incomplete.

BSC Agent documentation (e.g. Interface Definition and Design, Design Specifications, System Specifications, Manual System Specifications and Operating System Manuals) may need to be amended/developed to reflect the changes outlined above.

b) Impact on BSC Agent Contractual Arrangements

BSC Agent Contract	Potential Impact of Proposed Modification
Transmission Loss Factor Agent	A procurement exercise would need to be undertaken, and appropriate contractual arrangements created, for the new BSC Agent.
BSC Auditor	The creation of the TLFA as a new BSC Agent would extend the scope of the BSC Audit.

c) Impact on BSC Parties and Party Agents

It is anticipated that Parties may wish to verify the allocation of their BM Units to TLF Zones. Parties that have developed their own systems to monitor the Settlement calculations may also need to amend these to take account of the existence of non-zero TLF values.

It is not anticipated that the Proposed Modification would impact any Party Agents.

d) Impact on BSC Panel

It is estimated that the Proposed Modification would have the following impact on the Panel:

- The Panel would be responsible for approving the Load Flow Model, the Load Flow Model Specification, the TLFA Service Description and the Network Mapping Statement for use by the TLFA;
- The Panel would be responsible for establishing the definitive list of TLF Zones for use in the Network Mapping Statement and Load Flow Model, including the resolution of any appeal over the mapping of BM Units to Zones;
- The Panel would be responsible for establishing, for use in the Load Flow Model, a number of different Load Periods to represent varying levels of load on the Transmission System;
- The Panel would be responsible for establishing, for use in the Load Flow Model, the number of Sample Settlement Periods to be used in each Load Period;
- The Panel (aided by an independent Load Flow Model Reviewer) would be responsible for ensuring that the Load Flow Model complies with the Load Flow Model Specification – including retrospectively, where the calculation or use of TLFs is the subject of a Trading Dispute; and
- The Panel would be responsible for endorsing the Annual Adjusted Zonal TLF values produced by the TLFA.

e) Impact on Transmission Company

It is estimated that the Proposed Modification would have the following impact on the Transmission Company:

- The Transmission Company would be required to support BSCCo and the Panel in establishing and maintaining the Network Mapping Statement – including the maintenance of an up-to-date list of all nodes on the Transmission System, and assistance in resolving any appeal over the allocation of BM Units to TLF Zones; and

- The Transmission Company would be required to support the TLFA and the Panel in maintaining the Load Flow Model, including the provision of relevant Network Data and any necessary information to aid the Panel in its determination of Load Periods.

f) Impact on BSCCo

Area of Business	Potential Impact of Proposed Modification
BSC Website	BSCCo would be required to publish certain TLF data and documents on the BSC Website. Any existing website references to TLF=0 would also need to be amended.
Communications	BSCCo may wish to produce an information sheet describing the new process and calculation for deriving TLFs.
Trading Operations Monitoring and Analysis System (TOMAS)	Amendments to BSCCo's TOMAS system may be necessary if BSCCo is required to load non-zero TLF values from CRA data flows.
Working Procedures	BSCCo would need to put in place appropriate working practices to support its Code obligations regarding the derivation and use of TLFs. These would include processes for requesting Node information and Network Data from the Transmission Company, requesting Metered Volume data from the CDCA, assigning new BM Units to TLF Zones, and validating the TLF values registered in CRA Systems.
BSC Panel/Panel Committee Support	BSCCo would be required to assist the Panel in its determination of TLF Zones, Load Periods and Sample Settlement Periods. BSCCo would be required to support the Panel in its determination of any appeal over the mapping of BM Units to TLF Zones (potentially including the development of appeal guidelines). BSCCo would be required to support the Panel in its endorsement of the TLF values produced by the TLFA. Any potential incorrect calculation or use of TLF values in Settlement would form the subject of a Trading Dispute, under the normal process administered by BSCCo on behalf of the TDC. The progression of such a Trading Dispute may require additional steps for the TDC to obtain a report from the Load Flow Model Reviewer on the compliance of the Load Flow Model with its specification, and for the Panel to determine whether TLFs should be recalculated.
Change and Configuration Management	BSCCo would be required to maintain the Network Mapping Statement on behalf of the Panel, under a specific change process to be detailed in the Code.
Procurement and Contract Management	BSCCo would be required to procure the TLFA and Load Flow Model Reviewer, and to manage the resulting contracts. BSCCo would also be required to support the Panel in its determination of the terms and conditions for the escrow agent.
Performance Assurance	BSCCo would be required to provide any necessary additional support to the BSC Auditor in the incorporation of the TLFA within the scope of the BSC Audit.

g) Impact on Code

Code Section	Potential Impact of Proposed Modification
Section E 'BSC Agents'	The TLFA would need to be added to the list of existing BSC Agents in Section E.
Section H 'General'	The Load Flow Model Specification would need to be added to the list of Code Subsidiary Documents in Section H.
Section T 'Settlement and Trading Charges'	Section T would require amendments to detail the rights and obligations of all relevant parties regarding the derivation of zonal TLFs and their use in Settlement (including a new TLF calculation).
Section V 'Reporting'	Section V would require amendment to detail the publication of new TLF data on the BMRS and the BSC Website.
Section X 'Definitions and Reporting'	Section X would require amendment to detail any new Code-defined terms or acronyms required for P198.

h) Impact on Code Subsidiary Documents

Document	Potential Impact of Proposed Modification
BSCP01 'Overview of the Trading Arrangements'	Amendments would be required to reflect the derivation of non-zero TLFs and their use in Settlement calculations.
BSCP15 'BM Unit Registration'	Amendments would be required to include the process for allocating non-zero TLF values to BM Units.
BSCP38 'Authorisations'	Amendments would be required to include an authorisation process for Parties to request raw Nodal TLF data, Network Data and nodal power flow data from BSCCo on an ad-hoc basis.
BSCP41 'Report Requests and Authorisations'	As above.
CVA Data Catalogue	Amendments would be required to reflect the new/amended reporting requirements introduced by P198.
Reporting Catalogue	As above.
Communications Requirement Document	Amendments would be required to reflect the rules for communicating with the TLFA via BSCCo.
BSC Agent Service Descriptions	The BMRS, CDCA, CRA and SAA Service Descriptions would need to be amended to reflect the new obligations on these Agents in respect to zonal TLFs. A new Service Description would need to be developed for the TLFA.
Load Flow Model Specification	The specification for the TLFA Load Flow Model would be established as a new Code Subsidiary Document.

i) Impact on Core Industry Documents/System Operator-Transmission Owner Code

No impact anticipated.

j) Impact on Other Configurable Items

A User Requirements Specification would need to be developed for the new TLFA systems.

k) Impact on BSCCo Memorandum and Articles of Association

No impact anticipated.

l) Impact on Governance and Regulatory Framework

No impact anticipated.

6 DEVELOPMENT PROCESS

For the purposes of the impact assessment, respondents should assume that P198 would be implemented as a stand-alone development project managed by BSCCo.

BSCCo has not identified any interaction between the requirements for P198 and the current/planned implementation of any other Modification Proposal or Change Proposal.

7 TERMS USED IN THIS DOCUMENT

Other acronyms and defined terms take the meanings defined in Section X of the Code.

Term	Definition
Adjusted Annual Zonal TLFs	Annual Zonal TLFs, adjusted through a scaling factor to ensure that the volume of energy allocated via TLFs is comparable to the volume of variable losses calculated by the Load Flow Model.
'Alpha' (α) factor	The scaling factor applied to total transmission losses such that, in aggregate, 45% are allocated to delivering Trading Units and 55% are allocated to offtaking Trading Units.
Annual Zonal TLFs	Zonal TLFs for each Sample Settlement Period, converted to annual figures by 'time-weighted' averaging.
BM Unit-specific TLFs	The TLF value for each BM Unit to be used in the calculation of $TLMO^{+/-}$ and TLM, comprising the Adjusted Annual Zonal TLF for the Zone in which the BM Unit is located.
Escrow agent	An agent with whom a copy of the Load Flow Model would be deposited by the TLFA in accordance with the terms and conditions determined by the Panel, in order to ensure the integrity of the Load Flow Model.
Estimated Transmission Losses Adjustment (ETLMO)	Used in data calculations on the Balancing Mechanism Reporting Service to estimate the value of the Transmission Losses Adjustment.
Ex-ante	Based on forecast data.
Fixed losses	The element of transmission losses which occurs in overhead lines and transformers, and which depends on voltage levels and climatic conditions.
Load Flow Model	A mathematical model of an electrical network which represents power flows between pairs of adjacent Nodes on the network, and from which Nodal TLFs can be determined for each Node for given power flows.
Load Flow Model Reviewer	An independent expert appointed by the Panel for the purpose of verifying that the Load Flow Model complies with the Load Flow Model Specification.

Term	Definition
Load Flow Model Specification	The specification for the Load Flow Model of the Transmission System, providing assumptions and approximations to be made in the model.
Load Periods	Periods representing typically different levels of load on the Transmission System, to be determined by the Panel such that every Settlement Period in the Reference Year falls into one and only one Load Period.
Network Data	Data relating to the Transmission System, provided by the Transmission Company for use in the Load Flow Model.
Network Mapping Statement	A statement which maps Volume Allocation Units to Nodes, Nodes to Zones and BM Units to Zones for the purposes of the Load Flow Model.
Nodal TLFs	In relation to a Node on a network and a given power flow at the Node, a Nodal TLF is the rate of change of electrical losses on the network with respect to change of power flow at that Node (with network balance being maintained by a Slack Node).
Node	A point on an electrical network at which a power flow on to or off the network can occur, or where two or more circuits (forming part of the network) meet. For the purposes of P198, a Node on the Transmission System as identified by the Transmission Company.
Reference Year	A twelve-month period, from which data for Sample Settlement Periods is used to generate Transmission Loss Factors.
Sample Settlement Period	Representative Settlement Periods within each Load Period, to be determined by the Panel.
Slack Node (sometimes called 'slack bus')	A Node that acts (for the purposes of the Load Flow Model) as a sink for power flow surpluses or deficits arising from inaccuracies in the model, and which acts (in relation to adjacent Nodes) as the reference Node for calculating the phase angle of the power flow between the Nodes.
Total transmission losses	The sum of fixed losses and variable losses in any given period.
Transmission losses	The energy lost during the flow of power across the Transmission System (calculated as the difference between total generation and demand).
Transmission Losses Adjustment (TLMO)	The parameter for allocating the proportion of transmission losses which is not allocated through the Transmission Loss Factor, and which is applied on a uniform basis.
Transmission Loss Factor (TLF)	The parameter for allocating some or all transmission losses on a non-uniform basis, and which is currently set to zero.
Transmission Loss Factor Agent (TLFA)	A new BSC Agent, responsible for calculating Transmission Loss Factor values.
Transmission Loss Multiplier (TLM)	The factor used to scale BM Unit Metered Volumes in Settlement in order to allocate total transmission losses to Parties.
Variable Losses	The element of transmission losses which occurs through the heating of transmission lines, cables and transformers, and which increases with the current (and associated power flow) and length of line in which it flows.
Zonal TLFs	Nodal TLFs, averaged across all the Nodes in each Zone by 'volume-weighted' averaging for each Sample Settlement Period.

Term	Definition
Zone	The geographic area in which a GSP Group lies, determined by the Panel (applying such criteria as it shall decide in its discretion) but so that the Zones are mutually exclusive and comprise the whole of (and nothing but) the authorised area under the Transmission Licence.

8 DOCUMENT CONTROL

8.1 Authorities

Version	Date	Author	Reviewer	Reason for Review
0.1	03/02/06	Kathryn Coffin	Sarah Jones	For technical review
0.2	06/02/06	Kathryn Coffin	John Lucas	For technical review
0.3	07/02/06	Kathryn Coffin	P198 Modification Group	For Group review
0.4	10/02/06	Kathryn Coffin	Sarah Jones, John Lucas, P198 Modification Group	For review
1.0	13/02/06	P198 Modification Group		For impact assessment

8.2 References

Ref.	Document Title	Owner	Issue Date	Version
1	First Assessment Procedure Consultation Document for Modification Proposal P198 'Introduction of a Zonal Transmission Losses Scheme' ELEXON - Modification Proposal 198	BSCCo	13/02/06	1.0
2	Business Requirements Specification for Modification Proposal P82 'Introduction of Zonal Transmission Losses on an Average Basis' ELEXON - Modification Proposal 082	BSCCo	15/05/03	1.0
3	Initial Written Assessment for Modification Proposal P198 'Introduction of a Zonal Transmission Losses Scheme' ELEXON - Modification Proposal 198	BSCCo	06/01/06	1.0

8.3 Intellectual Property Rights, Copyright and Disclaimer