May 2003

Modification Proposal P125 Consultation/Requirements Document

Modification Proposal P125 'Apportionment of the Scottish Interconnector Flows to the Northern and North Western GSP Groups for the Purpose of Calculating Losses.'

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I DOCUMENT CONTROL

a Authorities

Version	Date	Author	Change Reference
0.1	28.04.03	Roger Salomone	Initial Draft
0.2	06.05.03	Roger Salomone	Revised Draft
1.0	08.05.03	Roger Salomone	Final Version

Version	Date	Reviewer	Responsibility
0.1	30.04.03	TLFMG	Modification Group Review
0.2	07.05.03	TLFMG	Modification Group Review
1.0	08.05.03	Change Delivery	Final Review

b Distribution

Name	Organisation
Various	ALL BSC Parties

c Change History

0.1 Initial draft for Modification Group review

0.2 Revised Draft based on Modification Group review

1.0 Final version incorporating all Modification Group suggested amendments

d Related Documents

Reference 1 Modification Proposal P125 'Apportionment of the Scottish Interconnector Flows to the Northern and North Western GSP Groups for the Purposes of Calculating Loses' (www.elexon.co.uk)

Reference 2 Initial Assessment of P125 'Apportionment of the Scottish Interconnector Flows to the Northern and North Western GSP Groups for the Purposes of Calculating Loses' (www.elexon.co.uk)

e Intellectual Property Rights and Copyright

II CONTENTS TABLE

1 INTRODUCTION

This document provides background information on Modification Proposal P125 'Appointment of the Scottish Interconnector Flows to the Northern and North Western GSP Groups for the Purposes of Calculating Losses' (P125)[1] and a consultation questionnaire. The background information provided is as follows:

- History of P125
- Description of P125
- Details of the Modification Group
- Initial Assessment of P125
- Requirements Specification
- Proposed Code Text

Responses to the consultation questionnaire attached as Annex 1 and impact assessment of the Requirements Specification contained Section 6 should be sent to modifications@elexon.co.uk by 12.00 on Thursday 22 May 2002.

2 HISTORY OF THE PROPOSAL

P125 was raised on 31 March 2003 by Scottish and Southern Energy. ELEXON presented an Initial Written Assessment (IWA)[2] to the Balancing & Settlement Code Panel ('the Panel') on 10 April 2003. The Panel agreed with the recommendation in the IWA that P125 be submitted to a two-month Assessment Procedure – with an Assessment Report to be presented at the June 12 2003 Panel meeting.

The Panel noted the following issues brought to its attention in the IWA:

- the argument put forward by the Proposer that the current arrangements are 'discriminatory' and that the implications of that argument, if any, need to be assessed;
- historic data on power flows across the Scottish Interconnector needs to be analysed to enable an informed decision to be made as to the most appropriate apportionment of metered volumes between the two terminal zones;
- the 'Apportionment' options available need to be identified, assessed and costed (e.g. one end of the spectrum of options could be an even split between the two zones and the other a split based on an accurate reflection of historic metered volumes);
- a legal opinion on the change procedure for the Scottish Interconnector zone is required. The Proposer raises a concern that the Code is ambiguous as to whether or not the Panel has the power to change the Scottish Interconnector zone in the same way that it does vis-à-vis the zones based on GSP Groups; and
- the implementation of Modification Proposal P82 'Introduction of Zonal Transmission Losses on an Average Basis' (P82) is scheduled for 1 April 2004. P82 requires that zonal TLFs be published on 1 December 2003. Therefore, the Transmission Loss Factor

[1] Reference 1
[2] Reference 2

Agent (TLFA) needs appropriate time to calculate the zonal TLFs beforehand. As a consequence the potential impact of implementing P125 on that timetable needs to be assessed.

The Panel also noted that no modelling would be undertaken to support the assessment and decided that the issues raised in the IWA form the Terms of Reference for the Modification Group charged with progressing P125. However, the Panel reminded that Group that discrimination is not, in itself an assessment criterion, the merit or otherwise of P125 needs to be established through reference to the Applicable BSC Objectives.

3 MODIFICATION GROUP

The Panel agreed with the recommendation in the IWA that the Transmission Loss Factor Group (TLFMG) be re-convened to progress P125, given that Group's expertise and experience in the area of zonal Transmission Loss Factors (TLFs). The table below indicates the membership of the TLFMG:

MEMBER	ORGANISATION
Justin Andrews (Chairman)	ELEXON
Roger Salomone (Lead Analyst)	ELEXON
Neil Cohen (Technical Advisor)	ELEXON
Garth Graham (Proposer)	Scottish and Southern Energy
Bill Reed	Innogy
Cathy McClay	First Hydro
Danielle Lane	British Gas Trading
Martin Mate	British Energy
Peter Bolitho	Powergen
Mike Harrison	ScottishPower
Richard Lavender	National Grid Transco

4 DESCRIPTION OF THE PROPOSAL

P125 proposes an alternative methodology for generating the TLF applicable to BM Units associated with the Scottish Interconnector, on the basis that the existing methodology is believed to discriminate unnecessarily against such BM Units and undermine competition.

4.1 Current Treatment of Scottish Interconnector

Under Approved Modification Proposal P82 'Introduction of Zonal Transmission Losses on an Average Basis', the TLF applicable to BM Units associated with the Scottish Interconnector is generated as follows:

- **Step 1: Generate Half-Hourly Nodal TLFs**

A Load Flow Model (LFM) is run to generate half-hourly nodal TLFs for each node[3] on the transmission network. The power flow across the Scottish Interconnector is apportioned between the nodes at which the Scottish Interconnector is connected to the England & Wales transmission network (i.e. the 'Stella West' node in the Northern GSP Group and the three 'Harker' nodes in the North Western GSP Group). This apportionment is required because the CDCA only holds aggregate metered volumes for the Scottish Interconnector, rather than metered volumes flowing across the Scottish Interconnector into the Northern GSP Group and North Western GSPG Group respectively.

- **Step 2: Generate Half-Hourly Zonal TLFs**

  To generate zonal TLFs for the 'Thirteenth Zone', nodal TLFs for Stella West and Harker are weighted according to an apportionment of the Interconnector flow at each such node, summed and then divided by the total flow across the Scottish Interconnector to produce a half-hourly TLF applicable to all BM Units associated with that Scottish Interconnector.

- **Step 3: Generate Annual Zonal TLF**

  The half-hourly zonal TLFs for the 'Thirteenth Zone' are time-weighted (as are all zonal TLFs) and averaged to generate a single, annual, zonal TLF for the 'Thirteenth Zone'.

- **Step 4: Generate Adjusted Annual Zonal TLF**

  The 'Thirteenth Zone' TLF is multiplied by 0.5 in order to reflect heating losses alone (as are all other annual zonal TLFs). The resulting TLF, known as the 'Adjusted Annual Zonal TLF', is the one applied in Settlement.

4.2 Proposed Treatment of Scottish Interconnector

According to the Proposer of P125, the methodology outlined in Section 4.1 is 'discriminatory' on two counts. First, BM Units associated with the Scottish Interconnector are treated differently from all other BM Units. Second, unlike other transmission loss zones, the Code text for Approved Modification P82 suggests that the Scottish Interconnector TLF Zone cannot be altered by the Panel and that a Modification Proposal would be required to change it. Moreover, a practical alternative methodology, which avoids such 'discrimination', is believed to exist.

The methodology proposed in P125 is based on the principle of 'apportioning' the power flows across the Scottish Interconnector between the Northern and North Western GSP Groups and then applying a composite of the two zonal TLFs generated for those two GSP Groups to Scottish Interconnector BM Units. The apportionment would be based on the historical power flows across the two sets of circuits (i.e. those feeding into the Northern and North Western TLF Zones) that comprise the Scottish Interconnector.

5 TLFMG INITIAL ASSESSMENT

The TLFMG has made the following initial assessment of P125, subject to consultation responses and impact assessments.

[3] A 'node' is a point on an electrical network at which (a) a power flow onto or off the network can occur or (b) two or more circuits (forming part of the network) meet.

5.1 Current Methodology

To begin, the TLFMG considered, in detail, the arrangements for loss allocation anticipated under the current baseline (i.e. the implementation of Approved Modification P82) and noted the following:

- **Load Flow Model Input Processing:** under Approved Modification P82 the aggregate metered volume across the Scottish Interconnector must be apportioned between the relevant nodes (i.e. the Stella West and Harker nodes)[4] whilst loading the data into the Load Flow Model, for each sample Settlement Period.
- **Treatment of Scottish Interconnector Boundary Point Nodes:** once the Load Flow Model has been run, the nodal TLFs that are produced must be averaged across the relevant zones. In order to do this for the 'Thirteenth Zone' in which Scottish Interconnector BM Units are deemed to lie, the TLFs at the Interconnector Boundary Point nodes would be weighted by the apportioned Interconnector flow at each node, summed and divided by the total Interconnector flow:

  $TLF_{13} = (\Sigma_N P_N . TLF_N) / QM_I$

  where Σ_N *is sum across all Scottish Interconnector Boundary Point nodes*

  P_N *is proportion of Scottish Interconnector flow associated with given Boundary Point node*

  TLF_N *is half-hourly TLF at given Scottish Interconnector Boundary Point node*

  QM_I *is total flow across Scottish Interconnector for given Settlement Period*

- **Generating Zonal TLFs:** for the geographical zones in which the Scottish Interconnector's terminal nodes lie, zonal TLFs would be calculated by weighting all nodal TLFs within those zones. For the Stella West and Harker nodes the weighting would be net of any apportioned Interconnector flow.
- **Time-weighting and Adjustment:** half-hourly TLFs for the all zones would then be time weighted and adjusted (i.e. factored by 0.5 in order to convert marginal TLFs into average TLFs) to produce 'Annual Adjusted' zonal TLFs.

5.2 Need for 'Apportionment'

The TLFMG considered that, under P125, the need for apportionment of the Scottish Interconnector power flows between Stella West and Harker nodes at the input stage would remain. However, in addition, apportionment would be required during the output processing. First, all nodes would be weighted by the overall flow at the node and then averaged by geographic zones, such that 12 zonal TLFs per sample Settlement Period would be produced. A thirteenth TLF would then be derived by weighted average of the two relevant zonal TLFs (Northern and North Western). The weighting would reflect the apportionment of Scottish Interconnector flow between the two relevant zones that comprise the terminal nodes of that Interconnector (i.e. the Stella West and Harker nodes) – and should be identical to the apportionment used at the input processing stage.

[4] Note that 'Harker' there are three substations that equate to three nodes (i.e. Harker 400Kv, Harker 275Kv and Harker 132Kv) and each node shall be modelled as part of the Load Flow Model.

The TLFMG noted that apportionment, employing similar degrees of judgement to establish the level of apportionment, is required under both Approved Modification Proposal P82 and Modification Proposal P125.

5.3 Assessment Against Applicable BSC Objectives

The TLFMG considered the 'discrimination' argument put forward by the Proposer, and noted four points:

- Under the current baseline, the treatment of Scottish Interconnector BM Units differs to that of any other BM Units connected at the same nodes (i.e. Stella West and Harker nodes).
- The impact on losses of Scottish Interconnector flows was equivalent to that of similar flows from any other BM Units connected at the same nodes (i.e. Stella West and Harker nodes).
- An underlying feature of zonal transmission loss arrangements under Approved Modification P82 is that only England and Wales losses are being considered – there is no attempt in the arrangements to reflect losses incurred outside England & Wales.
- Lead Parties of Scottish Interconnector BM Units have no control over the GSP Group into which their generation is directed or from which their consumption is drawn. The System Operator controls into which node (i.e. Stella West or Harker nodes) Scottish Interconnector power flows are routed to or sourced from.

The above observations resulted in the TLFMG concluding that were the Scottish Interconnector associated with a single GSP Group, then it would have been treated in an identical fashion to all other BM Units and allocated a zonal TLF derived from one of the 12 geographic TLF zones.

The TLFMG recognised that, under Approved Modification P82, the TLFs applicable to Scottish Interconnector BM Units would differ from those that would apply to any other BM Units connected at the same nodes. For the Scottish Interconnector BM Units, the TLF would be a weighted average of the two relevant nodes, whilst for any other BM Units connected at those nodes, the applicable TLF would be the average of all the nodes in the GSP Group based zone in question.

In addition, the TLFMG noted that P125 would alter the value of the zonal TLFs for the Northern and North Western zones. The inclusion of the power flows across the Scottish Interconnector in the weightings for the Stella West and Harker nodes would effect the zonal averages for those zones. The TLFMG also noted the modelling undertaken to support the assessment of Approved Modification Proposal P82. The modelling results suggest that the difference in TLMs for Scottish Interconnector BM Units and any other BM Units connected at the same node would be of an order of magnitude of approximately 10%:

TLM TYPE	I/C TLM	NORTHERN TLM	NORTH WESTERN TLM
Peak (Generation)	0.97658	0.98045	0.98314
Trough (Generation)	0.97688	0.98074	0.98343
Peak (Demand)	0.99289	0.99676	0.99944
Trough (Demand)	0.9916	0.99583	0.99851

On the basis of the foregoing observations, the TLFMG concluded that P125 would avoid exposing Scottish Interconnector BM Units to TLFs that were different to those attributed to any other BM Units connected to the same node. Thus P125 would allocate similar costs (relating to transmission losses) to

all BM Units connected to the terminal nodes of the Scottish Interconnector, regardless of the type of BM Unit. As a consequence, P125 would better facilitate achievement of Applicable Objective (c):

'Promoting effective competition in the generation and supply of electricity, and (so far as consistent therewith) promoting such competition in the sale and purchase of electricity.'

The TLFMG noted that an impact assessment would need to be sought from the Transmission Loss Factor Agent (TLFA) regarding the changes to that agent's services necessitated by P125, to ascertain the impact of P125 on the implementation of Approved Modification P82. Therefore, P125 has a potential impact on Applicable BSC Objective (D):

'Promoting efficiency in the implementation and administration of the balancing and settlement arrangements.'

A minority of the TLFMG articulated a counter-argument as to why P125 might not better facilitate achievement of the Applicable BSC Objectives. The current baseline, as introduced by Approved Modification P82, effectively treats Scottish Interconnector BM Units as if they were located in a separate zone, to the North of all other zones. Therefore, given the predominantly North-South flow of power on the England and Wales transmission network, the existence of a separate zone for the Scottish Interconnector (with its associated TLF) could potentially reduce overall transmission losses by making generation from the Scottish Interconnector less attractive than generation located further South in the Northern and Northwestern zones.

However, the TLFMG concluded that a principle of zonal transmission losses arrangement under the Code ought to be that all BM Units attached to a node should receive, as far as possible, the same zonal TLF. In particular, the TLFMG recognised that a Scottish Interconnector BM Unit has the same impact on transmission losses in England and Wales as any other BM Unit connected at the same node.

Finally, the TLFMG considered whether Scottish Interconnector BM Units were the only BM Units for which apportionment would be required. The TLFMG concluded that this was the case, as it was only in respect of these BM Units that one GSP-based zone did not map onto one BM Unit (as required by the BSC). It was also noted that in respect of the mapping required at the input stage of the P82 process (where Interconnectors, GSPs and BM Units are mapped onto nodes), many to one, or one to one mapping was allowed by the BSC, but not one to many (see table below). This could be accommodated for all entities, using some judgement on the most appropriate allocation, apart from the Scottish Interconnector which could not reasonably be allocated to one node.

Input Mapping		Output Mapping
Volume Allocation Unit to Node	Node to Zone	Zone to BMU
Many to One or One to One*	Many to One	One to Many**

* the exception is the Scottish Interconnector which is associated with several nodes

** the exception is the Scottish Interconnector which is associated with nodes in two zones

5.4 Solution Design Issues

The TLFMG considered a number of key features of any detailed solution based on the principles proposed under P125:

- **Derivation of the Apportionment Ratio:** 'fixed ratio' (i.e. a ratio that remains unchanged) or 'flexible ratio' (i.e. one set from time to time by the Panel);

- **Role of Panel:** Panel discretion over apportionment ratio or establish via mechanistic rules; and
- **Retention of 'Thirteenth Zone':** is the retention of the concept of a thirteenth zone necessary? Or, would there just need to be a thirteenth zonal TLF?

In so far as the choice of the apportionment ratio was concerned, the TLFMG considered some analysis provided by a TLFMG member which illustrated the split of the Scottish Interconnector flows between the relevant nodes derived from the data set proposed under Approved Modification P82 (see Annex 2). Although there appeared to be some volatility, the TLFMG concluded that a 50:50 (Stella West:Harker[5]) split would be reasonable. Furthermore, the TLFMG recognised that the adoption of this ratio would be a more cost effective option than the alternative of producing an annual ratio based on data from the preceding Reference Year and with little impact on the accuracy of the resultant TLFs. If the use of Reference Year data were preferred, this would require an extra report from the CDCA to ELEXON and the aggregation of relevant raw metered data to produce the individual circuit flows. These new aggregations would be likely to result in some additional cost and time, with little enhancement of the accuracy of the resultant TLFs.

The TLFMG also recognised that, if a one off derivation of an apportionment were to be adopted, this would imply that no mechanistic calculation would be needed, but the Panel could retain some discretion to review this apportionment, from time to time, based on historic circuit flows. This further suggested that it would be appropriate to describe the apportionment required in the 'Network Mapping Statement', rather than in the Code.

Finally, the TLFMG considered that it would be efficient and prudent to implement Modification Proposal P125 at the same time as Modification Proposal P82 is to be implemented; April 2004.

As to how this apportionment would be established in the BSC, the TLFMG determined that there would be value in allowing a thirteenth zonal TLF to be published and, hence, that the retention of a 'Thirteenth Zone' might be appropriate. However, it was recognised that, in principle, since no nodes (or part nodes) were being separately averaged, no extra zone was actually required.

The TLFMG also considered the second key area addressed by P125 - the assertion that the Panel's powers to change the 'Thirteenth Zone' differed from those associated with the twelve geographic zones. The TLFMG concluded that, rather than enter into debate as to whether such a defect existed, there would be merit in clarifying any legal drafting associated with P125, thus removing any potential ambiguity and recognising the intent that the Panel's powers should be the same for all zones.

6 REQUIREMENTS SPECIFICATION

On the basis of the foregoing, the TLFMG considered that the change to the requirements for implementing the P82 arrangements would be as follows:

- Input data to the TLFA would remain as now, but the Network Mapping Statement would explicitly reflect the 50:50 apportionment of the Scottish Interconnector volumes between the three Harker and Stella West nodes.
- The Load Flow Model and the process of running the Model would remain unchanged.
- The output processing would be as now, except that no separate averaging calculation would be required for the 'Thirteenth Zone' and the averaging calculation for the Northern

[5] As noted previously, there are three nodes at 'Harker' (i.e. Harker 400Kv, Harker 275Kv and Harker 132Kv). Therefore, the actual ration would be 50:40:15:-5 (Stella West:Harker 400Kv:Harker 275Kv:Harker 132Kv).

and NorthWestern zones would not exclude weightings associated with Scottish Interconnector flows.

- The output processing would require a thirteenth zonal TLF to be produced, by use of a weighted average of the two relevant zonal TLFs as per the following equation;

  $TLF_{IC} = 0.5 . TLF_6 + 0.5 . TLF_7$

- The reporting of zonal TLFs would need to include a thirteenth value.

It should be noted that these requirements imply a change to the input processing of mapping volumes to nodes and a change to output processing, in terms of mapping zonal TLFs to BM Units. Hence, there would be an impact on the TLFA, but none on the LFM, the model reviewer and other BSC Agents. There would also be a change to the processes followed by the TLFA that would be subject to review by the BSC Auditor.

The changes to the Business Requirements Solution (BRS) (re.018RBR) for implementing Approved Modification Proposal P82 are given in Annex 3.

The TLFMG concluded that no BSC Agent, other than the TLFA, would be impacted by the requirements of P125.

7 IMPACT ON BSC

The TLFMG concluded that the following changes would be required to Section T of the BSC:

- Clause 4.1 would be amended to reflect the requirement for 12 geographic zones and one non-geographic zone not comprising any nodes.
- Clause 4.3 would be amended to reflect two changes to the requirements for the Network Mapping Statement. Firstly, the Network Mapping Statement should explicitly reflect the need to apportion the Scottish Interconnector volume to the Harker and Stella West nodes, as part of the input processing for the running of the Load Flow Model. Secondly, the Network Mapping Statement should state how the Northern and North Western zonal TLFs should be apportioned to a thirteenth zone which, itself, would be allocated to the Scottish Interconnector BM Units.
- Clause 4.6 would be removed.
- A new clause would be required, providing the formula for the calculation of the thirteenth TLF embodying the following principle:

  $TLF_{13} = 0.50TLF_6 + 0.50TLF_7$

Draft Code text to give effect to P125 is attached as Annex 5. However, please note that, as a draft, this text will be refined where necessary as the Assessment Procedure progresses.

ANNEX 1 PROFORMA QUESTIONNAIRE

Please answer the following questions using the proforma provided.

QUESTION NO.	QUESTION
1	**Do you believe that Modification Proposal P125 would better facilitate achievement of the Applicable BSC Objectives? Please provide rationale.**
2	**Do you agree with the TLFMG view as to the apportionment ratio for Scottish Interconnector flows (i.e. 50:50 between Northern and North Western Zones, based on historical data)? If no, please state what is the preferred apportionment and/or method for establishing an apportionment.**
3	**Do you agree with the TLFMG view that, were Modification Proposal P125 approved, the implementation date should coincide with that of Approved Modification P82 (i.e. 1 April 2004)?**
4	**Do you have any comments on the proposed Code drafting?**
5	**Do you have any other comments on any aspect of Modification Proposal P125?**

ANNEX 2 APPORTIONMENT RATIO ANALYSIS

The following analysis of the power flow across the Scottish Interconnector was produced by a member of the TLFMG and presented to the Group.

Analysis of Historical Flows on the Scottish Interconnector over Proposed Sample Settlement Periods for Approved Modification P82 Reference Year

Introduction

BSC Modification Proposal P125 'Apportionment of the Scottish Interconnector Flows to the Northern and North Western GSP Groups for the Purposes of Calculating Losses' (P125) was raised on 31 March 2003 by Scottish and Southern Energy.

P125 proposes an alternative methodology for generating Transmission Loss Factors (TLFs) for the BM Units associated with the Scottish Interconnector, on the basis that the existing methodology, introduced under BSC Modification Proposal P82, is believed to discriminate unnecessarily against such BM Units. A methodology based on 'apportioning' the metered volumes across the Interconnector between the two terminal TLF Zones[6] and then applying a composite of the two resulting TLFs to Scottish Interconnector BM Units is proposed.

One option for apportioning these metered volumes is the application of fixed sharing factors. This paper presents analysis of historical data to support the assessment of this option and the determination of suitable values for the sharing factors.

Elexon have recently consulted[7] ("the Consultation") on proposals to base the calculation of annual ex ante zonal TLFs to apply to the year 1 April 2004 – 31 March 2005, on historical data from a specified set of Sample Settlement Periods (SSPs). Under the proposed methodology the SSTs are selected as a representative subset of all settlement periods for the Reference Year October 2002 – September 2003 with, for development purposes, 2002 equivalent dates substituting those from April 2003 onwards. The SSPs comprise 6 sample periods per Load Period, with each sample period selected from a different EFA block, and the Load Periods identified in general terms as covering Working or Non-Working days within a given calendar week.

For consistency with these proposals, the following analysis is based on the set of SSPs (the "P82 SSP (proposed) data set") identified in the Consultation, with equivalent dates used for those from April 2003 onwards. Separate analysis has shown that the results from this representative subset of sample periods are consistent with similar analysis over all settlement periods in the given year.

Data

Data was obtained from the Interconnector Administrator[8] (IA) for the Scottish Interconnector, on the half-hourly flows across each Interconnector circuit[9] for all settlement periods in the year 1 April 2002 – 31 March 2003.

[6] The two Transmission Loss Factor Zones (i.e. GSP Groups) into which the individual circuits comprising the Scottish Interconnector feed (i.e. the Northern and North Western GSP Groups).
[7] Approved Modification P82: Load Periods and Sample Settlement Periods Consultation, 11 April 2003
[8] SP Transmission Ltd
[9] STEW/ECCL 1, STEW/ECCL 2, HARK/STHA, HARK/ELVA, HARK/CHAP, HARK/CHAP-GALA

The circuit data was mapped to terminal GSP group, as indicated in Table 1, and the resulting route metered volumes for each settlement period were calculated and analysed.

This paper presents analysis based on the set of SSTs ("the P82 SSTs (proposed) data set") identified in the Consultation, with equivalent dates used for those from 1 April 2003 onwards.

Table 1

Circuit	Terminal node / Route share reference	Terminal GSP Group
STEW/ECCL 1	STEW	1 Northern
STEW/ECCL 2	STEW	1 Northern
HARK/STHA	HARK	2 North Western
HARK/ELVA	HARK	2 North Western
HARK/CHAP	HARK	2 North Western
HARK/CHAP-GALA	HARK	2 North Western

Results

1. Route shares

The relative shares of the total Interconnector metered volume along each route generally depends on the overall flows within the region, as driven by system conditions. However, consistent trends have emerged in the analysis.

Figure 1 shows a scatter plot of route share against total metered volume, with each data point based on a given representative settlement period in the P82 SSP (proposed) data set. The STEW:HARK ratio is fairly stable for moderate to large total volumes, averaging overall at 50:50, but is more volatile for lower volumes and for northern flows. Indeed, at times of low transfer in particular, it is possible for the flows at STEW and HARK to be in opposite directions, leading to extreme percentage shares of the total flow[10].

The STEW:HARK ratio is most volatile at times of circuit and plant outages, during which time the relative dominance of the two routes can reverse. In particular, the Scottish nuclear stations experienced a number of problems over the summer of 2002, and much of the volatility seen in Figure 1 can be attributed to the extensive outages on these stations.

Figure 2 shows the average within-day variation of the STEW share (the HARK share is its complement), based on averages over each EFA block for the settlement periods in the P82 SSP (proposed) data set. This shows that despite the above effects, the average daily profile is close to the overall average throughout the day.

2. Voltage level shares at HARK

The above results confirm that the overall average STEW:HARK ratio of 50:50 is representative of the given data set. As such it seems reasonable to use this ratio to apportion the metered volumes of the Scottish Interconnector to the two terminal zones under P125, for use in the average annual zonal loss factor methodology proposed under P82.

[10] There are also a small number of outliers which are out of range on Figure 1, corresponding to instances where the total metered volume is close to zero.

Under P82/P125, the given STEW:HARK apportionment would apply to the Scottish Interconnector metered volumes in:

- the calculation, by the TLFA, of the annual ex ante zonal TLFs for each GSP group, based on analysis of all BMU metered volumes over the P82 SSTs
- the derivation and application of the composite zonal TLF to Scottish Interconnector BMU metered volumes in settlement periods in the year 1 April 2004 – 31 March 2005

In the former case, assumptions are also required by the TLFA as to the proportional shares of the different circuits comprising the HARK route, such that the resulting HARK share can be allocated between the three different voltage nodes in the load flow model.

As such, the analysis in section 1 is extended to more detailed consideration of the transfer along the HARK route, in terms of the proportional shares of the circuit(s) at each voltage, as indicated in **Table 2**.

Table 2

Circuit	Circuit share reference	Voltage
HARK/STHA	STHA	400kV
HARK/ELVA	ELVA	275kV
HARK/CHAP	CHAP	132kV
HARK/CHAP-GALA		

Figure 3 shows a scatter plot of circuit share against total metered volume on the HARK route, with each data point based on a given representative settlement period in the P82 SSP (proposed) data set. The STHA:ELVA:CHAP ratio is fairly stable for moderate to large total volumes on the HARK route[11], averaging overall at 81:29:-10.

Figure 4 shows the average within-day variation of each circuit share, based on averages over each EFA block for the settlement periods in the P82 SSP (proposed) data set. This shows that the average daily profiles of the circuit shares for each voltage are close to their respective overall averages throughout the day.

Conclusions

Based on the above analysis, it would appear to be reasonable to use a pre-defined ratio to apportion the metered volumes of the Scottish Interconnector between the two terminal zones, for application in the average annual zonal loss factor methodology proposed under P82. A simple uniform ratio may be appropriate, based on the average STEW:HARK ratio of 50:50.

Under P125, this apportionment factor would be used in the calculation of the zonal TLFs, as well as in the application of those TLFs. In the former case, assumptions are also required as to the proportional shares of the different circuits comprising the HARK route, such that the resulting HARK share can be allocated between the various voltages.

Based on the above analysis, it would appear reasonable to apply the calculated average proportions of 81:29:-10 in allocating the resulting HARK share between the STHA:ELVA:CHAP circuits, with respective voltages 400:275:132 kV.

[11] There are also a small number of outliers which are out of range on Figure 3, corresponding to instances where the total metered volume on the HARK route is close to zero.

Figure 1

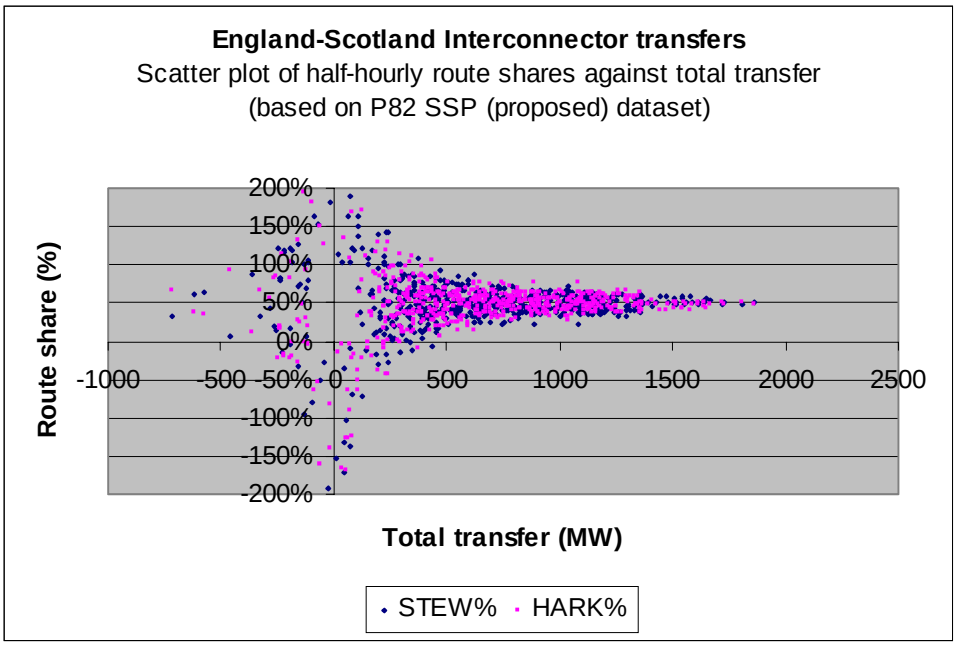


Figure 2

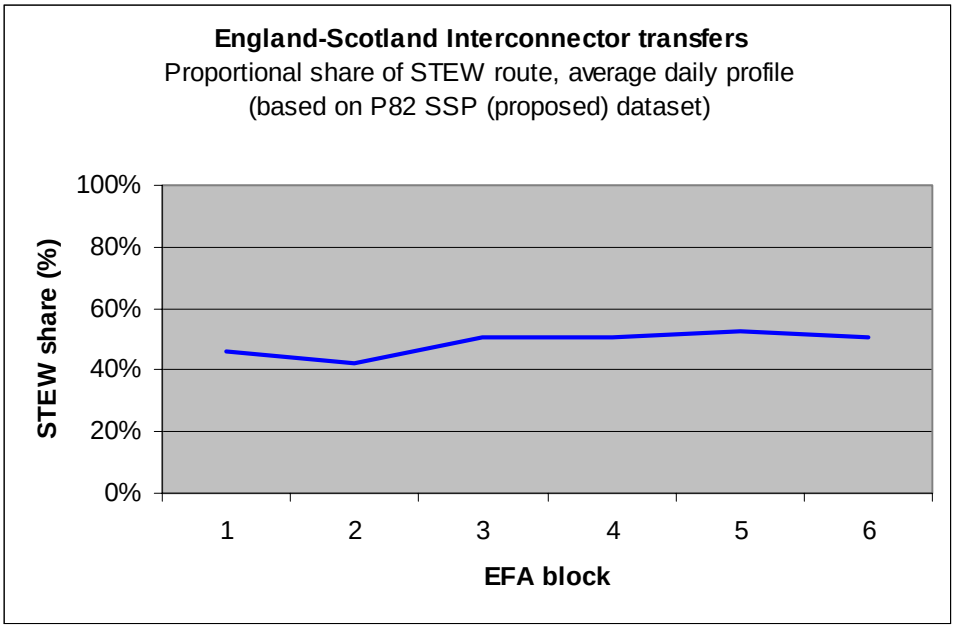


Figure 3

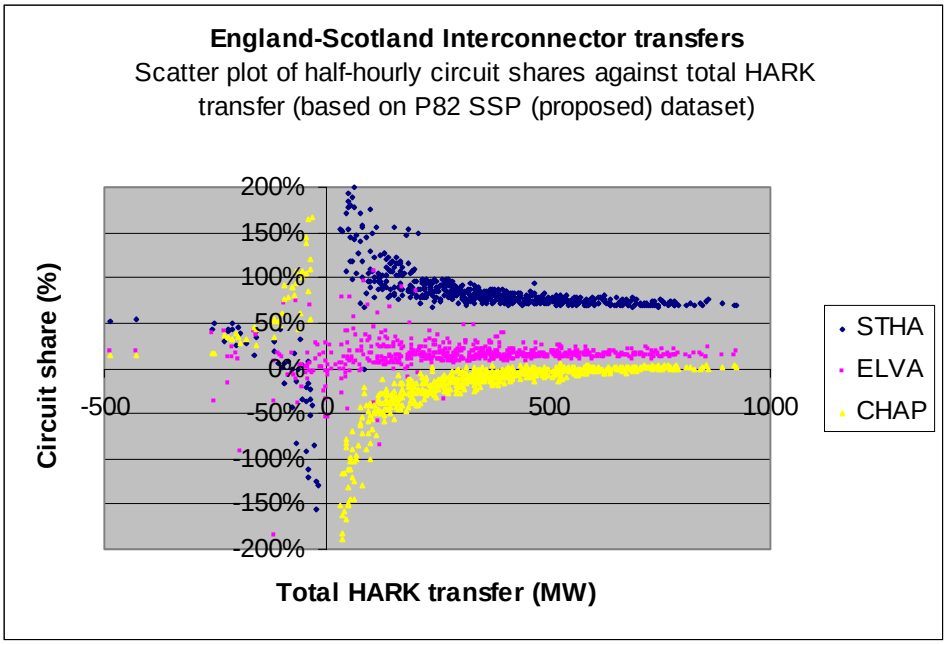
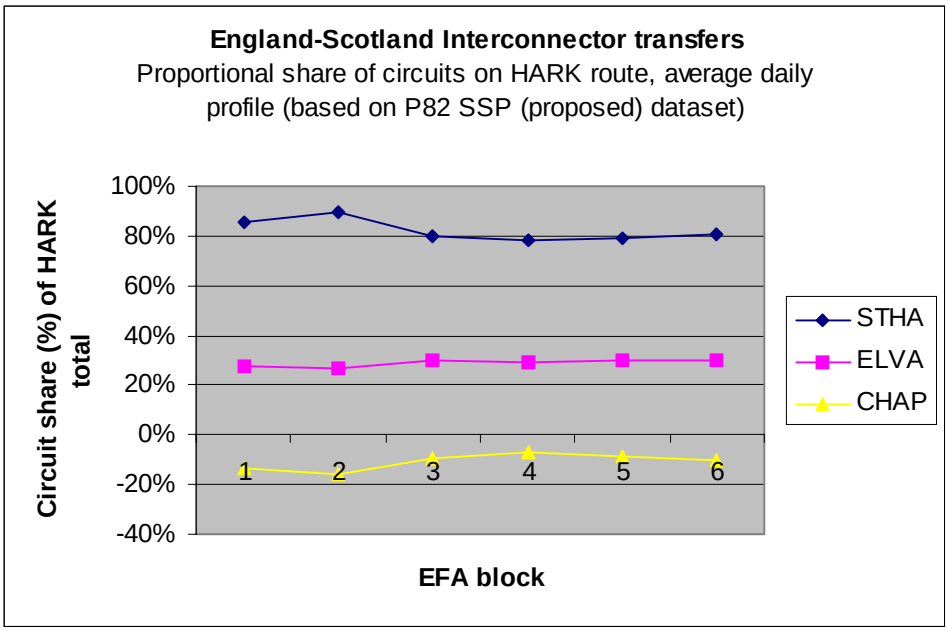


Figure 4



ANNEX 3 IMPACT ANALYSIS

The following impact analysis of Modification Proposal P125 was produced by a member of the TLFMG and presented to the Group.

Illustrative Impact of P125

		P82 Zone 0 (13) TLM	P125 Zone 1	P125 Zone 2	Total P125 for Zone 0 Nodes	Difference between P82 and P125
P82 Methodology						
PTI Winter Peak TLM	Factor	0.97658	0.98045	0.98314		
Total Generation	MWh	6,329,442				
Loss Adjusted Generation	MWh	6,181,206				
Losses Volume	MWh	- 148,236				
Cost of Losses	£	- 2,520,004				
P125 Illustration						
Zone 1: Zone 2 50:50 Weighted Average TLM	Factor		0.981795	0.981795		
P125 Apportionment of Generation	MWh		3,164,721	3,164,721	6,329,442	
Loss Adjusted Generation	MWh		3,107,107	3,107,107	6,214,215	
Losses Volume	MWh		-57,614	-57,614	-115,227	
Cost of Losses	£		-979,434	-979,434	-1,958,867	
Difference P82 - P125						
Cost Reduction for Zone 0	£					- 561,137
% of Unadjusted Losses	%					22.3%
Cost increase in Zone 1	£					280,568
Cost increase in Zone 2	£					280,568

Note - Based on Average Generation for 2002/03, Winter Peak TLMs

Reference Price	£/MWh	17.00
Zone 1	%	50%
Zone 2	%	50%

Notes and Assumptions

Provides an illustration of the potential impact of P125
Based on Scottish interconnector BMU generation April 2002 - March 2003
Assumes PTI Winter Peak TLMs apply for the entire year
P125 apportionment of Interconnector generation to Zones 1 and Zone 2
Single weighted average TLM for Scottish BMUs derived from Zone 1 and Zone 2

ANNEX 4 CHANGES REQUIRED TO P82 BRS

The following changes to the P82 BRS (ref. 018RBR) would be required:

- Clause 3.1.3 (Impact on BSCCo), 10th. bullet; remove and replace with

'In relation to the Scottish Interconnector, the flow should be deemed to be split between the Harker and Stella West nodes, in the ratio 50:50[12]. Furthermore, the TLF applicable to the Scottish Interconnector BM Units should be equal to 0.5 of the Northern TLF and 0.5 of the North Western TLF.'

- Clause 4.1.5 (BSCCo Establishment of the Network Mapping Statement), 6th. paragraph, last bullet point; remove and replace with

In relation to the Scottish Interconnector, the flow should be deemed to be split between the Harker and Stella West nodes, in the ratio 50:50[13]. Furthermore, the TLF applicable to the Scottish Interconnector BM Units should be equal to 0.5 of the Northern TLF and 0.5 of the North Western TLF.'

- Clause 4.1.6.2 (Load Flow Model Requirements), point 5; add an extra bullet point:

' Interconnector to node mapping'

- Clause 4.2.5 (Derivation of the Transmission Loss Factors); add an extra equation

'$TLF_{13} = 0.5 . TLF_6 + 0.5 . TLF_7$'

[12] As noted previously, there are three nodes at 'Harker' (i.e. Harker 400Kv, Harker 275Kv and Harker 132Kv). Therefore, the actual ration would be 50:40:15:-5 (Stella West:Harker 400Kv:Harker 275Kv:Harker 132Kv).
[13] As noted previously, there are three nodes at 'Harker' (i.e. Harker 400Kv, Harker 275Kv and Harker 132Kv). Therefore, the actual ration would be 50:40:15:-5 (Stella West:Harker 400Kv:Harker 275Kv:Harker 132Kv).

ANNEX 5 DRAFT CODE TEXT

See separate attachment.