Responses from P105 Draft Report Consultation
Consultation issued 22 November 2002

Representations were received from the following parties:

No	Company	File Number	No. BSC Parties Represented	No. Non-Parties Represented
1.	Major Energy Users Council	P105_DR_001		1
2.	Corus Group	P105_DR_002		1
3.	Edf Trading and Edf Generation	P105_DR_003	2	
4.	Chemical Industries Association	P105_DR_004		1
5.	energywatch	P105_DR_005	0	1
6.	Innogy	P105_DR_006	9	
7.	Aquila Networks	P105_DR_007	1	
8.	LE Group	P105_DR_008	4	
9.	SEEBOARD	P105_DR_009	1	
10.	Scottish and Southern	P105_DR_010	4	
11.	British Energy	P105_DR_011	3	
12.	Scottish Power	P105_DR_012	6	
13.	Immingham CHP	P105_DR_013	1	
14.	Centrica	P105_DR_014	5	
15.	Powergen	P105_DR_015	15	
16.	NGC	P105_DR_016	1	

P105_DR_001 – MEUC

The Major Energy Users Council (MEUC) which responded to the consultation on P75 and P82 agrees with the Panel recommendation that P105 should not be adopted.

It also notes that the Panel has recommended that modifications proposed for P75 and P82 should not be adopted, a view it strongly concurs with for the reasons it set out in response to the initial consultation.

Yours sincerely
H.R.G. Conway
MEUC
--

P105_DR_002 – Corus Group

Corus very much supports the recommendations of the Panel not to proceed with P105 together with the rationale for the recommendation. Our response to the consultation of the Modification Group that looked at P75 and P82 sets out our views on why the proposed introduction of zonal losses should rejected, so we will not repeat them here as they will be included in annexes to the reports on P75 and P82.

P105_DR_003 – EdF Trading & EdF Generation

On behalf of EdF Trading Ltd and EdF (Generation), please note that we agree with the recommendations from the BSC Panel and that P105 should be rejected.

We support many of the features of the proposal, but we also accept that phased implementation is a necessary feature to better facilitate achievement of the Applicable BSC Objectives. In our view, competition would be promoted by a smooth transition to zonal TLFs, as well as the protection of forward contracts already in existence. Since P105 does not allow for this we cannot give it our support.

Kind regards

Steve Drummond
Market Adviser to EdFT

P105_DR_004 – Chemical Industries Association

Thank you for the correspondence on Modification P105. We are pleased to note that, in addition to the rejection of modifications P75 and P82, the panel has chosen also to reject P105. We support this decision. Our concern about recent losses modifications is, principally, whether supply chain costs would increase and whether competition would be better served by modifications such as these.

Yours sincerely.
Rob Siddall.
UTILITIES POLICY MANAGER
CHEMICAL INDUSTRIES ASSOCIATION

P105_DR_005 – Energywatch

P105 report comments

energywatch fully supports the Panel's recommendation to and rationale for rejecting P105 as set out in section 5 of the report.

P105_DR_006 – Innogy

Modification Proposal P105 – Introduction of Zonal Transmission Losses on a Marginal Basis without Phased Implementation
Innogy Comments

The following comments are made on behalf of Innogy plc, Npower Limited, Innogy Cogen Trading Limited, Innogy Cogen Limited, Npower Direct Limited, Npower Northern Limited, Npower Yorkshire Limited, Npower Northern Supply Limited, Npower Yorkshire Supply Limited.

We note that the BSC Panel are recommending that Modification Proposal P105 is rejected by the Authority.

We do not support the Panel's recommendation with respect to P105. We believe that this proposal could better achieve the applicable objectives when compared to the current baseline, particularly in relation to improving efficiency and competition, as well as removing the current cross subsidy in the allocation of losses.

P105_DR_007 – Aquila Networks

Please find that Aquila Networks Plc response to P105 Consultation on draft Modification Report is 'No Comment'.

regards
Rachael Gardener

Deregulation Control Group &
Distribution Support Office
AQUILA NETWORKS

P105_DR_008 – LE Group

Please note the following comments in response to the P105 Modification Report on behalf of LE Group (representing London Electricity Plc, Jade Power Generation Ltd, Sutton Bridge Power, West Burton Ltd).

The elements of Modification P105 were considered by the Transmission Loss Factor Modification Group (TLFMG) as a potential alternative to Modification P75. However, the TLFMG felt that the BSC Objectives would be better achieved if this proposal included a phased implementation over 4 years and this was recommended as P75 Alternative. We therefore believe that this proposal had already been adequately assessed by the Modification Group and should not have been subsequently raised as a new Modification Proposal.

We do not believe that P105 better facilitates the BSC objectives for two main reasons as detailed below.

* The fully marginal method of calculating TLFs, as proposed by P105, allocates both the variable and fixed elements of transmission losses on a zonal basis. Since fixed losses are not related to the pattern of generation or demand, and therefore will not be affected by any locational shift in generation or demand, we do not believe that these losses should be allocated on a zonal basis. This modification proposal would result in some participants paying more than their fair share of transmission losses and would be detrimental to the achievement of BSC Objective (c).

* We believe that it is appropriate to phase in any changes to Transmission Loss factors over 4 years. This would promote competition and better facilitate BSC Objective (c) by providing protection for existing forward contracts and a smooth transition to the new TLFs. P105 does not include any phased implementation and therefore we believe that it creates new short term risks for participants and does not better achieve the BSC Objectives.

We agree with the recommendation of the BSC Panel that modification P105 be rejected.

Best regards

Rupert Judson on behalf of Liz Anderson
LE Group Plc

P105_DR_009 – SEEBOARD

With respect to draft modification report dated 22nd November on proposal P105 (Introduction of Zonal Transmission Losses on a Marginal Basis without Phased Implementation). We agree with conclusions of that report that this modification be rejected.

Dave Morton
SEEBOARD Energy Limited

P105_DR_010 – Scottish and Southern

This response is sent on behalf of Scottish and Southern Energy, Southern Electric, Keadby Generation Ltd. and SSE Energy Supply Ltd.

Further to your note of 22nd November 2002, and the associated Draft Modification Report for P105, we agree with the proposed BSC Panel recommendation to the Authority that the Proposed Modification P105 should not be made.

In respect of Zonal Losses, we wish to reiterate our comments made in respect of P75, which as the P105 Draft Modification report makes clear, forms the basis of P105. Accordingly, we wish the BSC Panel and the Authority to note:-

1. Despite some 6 months of development through the TLFMG, there is as yet no cost benefit analysis associated with P75 or P82, and certainly not for P105.

2. There can be no meaningful locational signal given to either demand, or to new developing generation, such as wind generation that will site where the resource is.

3. Significant windfall gains and losses will be made for no good reason, thereby creating investment uncertainty, as well as impacting on the viability of ongoing generation and customer load.

4. In practical terms, these proposals will impact on renewable development and is therefore inconsistent with the Government's objectives and indeed Ofgem's statutory duties with respect to the environment.

5. Even the most benign of the proposals will add to the complexity of an already complex and risky market place.

6. There would appear to be no consistency between these proposals and Ofgem's desire for shallow connections.

7. The relationship between Ofgem's consultation process on this issue and their ultimate power to approve or not any Modification proposal on this issue is, in our view, an abuse of the regulatory process.

8. There is significant turmoil in the market place at present. We would therefore respectfully suggest that there are more fundamentally important issues than zonal losses which should be considered by Ofgem and the industry.

9. Finally there should be no significant reform of NETA ahead of BETTA.

For the avoidance of doubt, as the BSC Panel has voted to reject P105 we wish to reaffirm our views on zonal losses and state that an implementation date is not relevant. Accordingly, we do not agree with the proposed BSC Panel recommendation on the timing for the Implementation Date, as outlined in Section

1.1 of the Modification Report.

Regards

Garth Graham
Scottish & Southern Energy plc

P105_DR_011 – British Energy

To: Modifications Secretary
Elexon

From: Rachel Ace

Date: 2nd December 2002

British Energy strongly agrees with the recommendation in the modification report that P105 should be rejected. British Energy agrees that the issues associated with P105 have already been discussed by the TLFMG and that a phased implementation would better facilitate the BSC objectives.

Regards

Rachel Ace

On behalf of

British Energy Generation
British Energy Power and Energy Trading
Eggborough Power Ltd

P105_DR_012 – Scottish Power

P105 Draft Modification Report Comments

With reference to the above, ScottishPower regret that Modification Proposal P105 was submitted given that its features had been thoroughly addressed by the TLFMG during its consideration of P75 and P82.

In this consultation, we support the Panel in its provisional recommendation to the Authority that the modification should not be made. The sudden introduction of geographically differentiated loss factors calculated on a fully marginal basis would cause large transfers of costs and benefits between BSC Parties. The effect of such a change would be to increase the perceived regulatory risk associated with the electricity supply industry and would increase the costs of both its players and its customers to the overall detriment of economic efficiency. Consequently the Modification Proposal does not better achieve the Applicable BSC Objectives and should not be made.

I trust that you will find these comments helpful. Nonetheless, should you require further clarification of any of the above, please do not hesitate to contact me.

Yours sincerely,

Man Kwong Liu
Calanais Ltd.
For and on behalf of: - *Scottish Power plc; ScottishPower Energy Trading Ltd.; Scottish Power Generation plc; ScottishPower Energy Retail Ltd.; SP Transmission plc; SP Manweb plc*

P105_DR_013 – Immingham CHP

P105 Draft Modification Report

Thank you for the opportunity to comment on the P105 Draft Modification Report. Immingham CHP agrees with the proposed recommendations that the Modification Proposal should be rejected.

Regards

Andrew Murray

Operations Lead, Power Trading

P105_DR_014 – Centrica

RE: Modification Proposal P75: Introduction of zonal transmission losses
Modification Proposal P82: Introduction of zonal transmission losses on an average basis
Modification Proposal P105: Introduction of zonal Transmission Losses on a marginal bases without phased implementation

Thank you for the opportunity of responding to the above named consultations. This response is made on behalf of British Gas Trading Ltd, Accord Energy Ltd, Centrica King's Lynn Ltd, Centrica Peterborough Ltd and Regional Power Generators Ltd.

We support changes that would improve the efficiency of the wholesale electricity market and the improved allocation of costs to those that cause them. However, before any change is embarked upon it should be demonstrated that benefits outweigh the costs and that any risks can be satisfactorily managed and are clearly offset by other benefits. In the case of Transmission Losses, the main benefits arise as a result of the targeting of costs on those that cause them and the production of long term signals for siting of generation and demand.

We agree these are appropriate aims and believe a scheme could be devised to achieve these targets. However, we have some concerns relating to the above named proposals and their alternatives which we do not believe have been fully addressed by the work of the Modification Group. We hope that in the following letter we have clearly identified those concerns, albeit some of which fall outside the vires of the BSC, and explained our lack of support for these proposals.

In summary we do not support the introduction of any of the above modifications in their present form.

Long term signals
All of these proposals purport to provide appropriate long term signals that will influence the investment decisions of current and future market participants. We agree this will be true to an extent but are concerned about short term impact on the existing generation and demand who will have a limited ability to respond to any signals.

Furthermore, given the many factors (economic and physical) involved in siting the location of a new factory or power station, the signals provided by any losses scheme will be of minor importance. In the case of some developments, renewables generation for example, the choice of site is limited by the availability of the renewable resource such as wind. In our opinion the efficiency of any losses scheme would be compromised if it were to seek to account for these factors.

Volatility of Signals
The signals provided by the losses schemes are only efficient if they are consistent. We are concerned that the schemes proposed, particularly P75 with half hourly calculation of losses, will be highly volatile. For example, if a power plant trips off the system it will have a large impact under P75 but this is only a short term incident and

it would be inappropriate and inefficient for any investment decisions to be made on the basis of such transient events.

The impact of this volatility is partially mitigated by P72 Alternative and P105 but is still present. A monthly change in losses signals is still too short to provide efficient, stable signals to the market. In our view the annual approach taken by P82 would provide effective, stable and usable signals for market participants. However, it would still suffer from the drawback (that exists with the present zonal use of system charges) that as soon as new plant is located to respond to the signal then the benefit is mitigated. Thus, in effect such 'signals' only work as penalties on plant and demand which has already fixed its location. They can never be 'captured' as a reward!

We are also concerned that the ex post calculation of losses increases the risk to Parties and makes it more difficult to calculate the actual losses a Party would face pre Gate Closure.

Allocation of Costs

Correct allocation of costs to those that cause them should improve the efficiency of the market. We do not believe P75 and P105 will improve efficiency. The volatility in the pricing signals and the marginal approach taken by these proposals will overstate the level of losses recorded and as such will not correctly allocate costs and will penalise existing demand and generation for investment decisions taken prior to these discussions. The point made above over the inability to reward also undermines the apparent fairness of this type of implementation.

Interaction with TNUoS and access

Currently there is locational pricing in transmission charges. We are concerned that the combined impact of these proposals and the transmission charges have not been assessed in any forum.

In addition to the interaction with TNUoS we note that the Transmission Access Standing Group under CUSC is making progress towards the introduction of revised Access arrangements. These are also intended to provide locational signals to NGC and participants. It is our belief that there is a significant risk of confusing and conflicting signals arising from these different elements of the market arrangements.

Government policy

Due to BSC rules, Modification Groups are unable to give due consideration to matters that lie outside the BSC, the Transmission Losses Modification Group have therefore been unable to give any consideration to issues outside the BSC beyond noting their presence. As such there has been no adequate consideration of wider Government policy such as the impact of these proposals on renewable generation and the Government's Kyoto objectives nor BETTA. We perceive this to be a major failing of these proposals and believe that with the introduction of BETTA it will be essential to revisit these arrangements to account for the impact on Scottish generation and demand. We do not believe it is an effective nor efficient way to run a process and strongly believe any decision on these proposals should be held over until after the implementation of BETTA.

Costs to consumers

We believe there is a considerable risk that under these proposals the financial burden of losses will simply be reallocated without the ability of those affected to respond in a way that makes any material difference to the level of losses, ultimately leading to increased costs to consumers. The proportion of losses that is likely to be reduced by this mechanism is going to be small thus the absolute benefit for the costs involved is highly questionable.

One of the arguments used by the proposers in support of their modification proposals is that the long term cost signals will provide efficient signals for the location of generation and demand. Whilst we accept that there may be some merit in this argument for a limited amount of new build generation we do not believe this will be the case for all demand, particularly domestic load.

Phasing

Should either of these proposals be progressed to implementation we believe phased implementation is the appropriate approach to take. It has been stated that the industry should have been prepared for the introduction of a zonal losses scheme as the intention has been widely publicised by the regulator. Whilst we accept that this has been the case it is only recently that the actual proposed scheme has been detailed and discussed. We therefore believe it is unreasonable to expect all Parties, both old and new, to have developed systems and strategies for mitigating the impact of a losses scheme.

Should you wish to discuss any of the issues further please do not hesitate to contact me in the first instance on 01753 758156.

Yours faithfully

Danielle Lane
Contracts Manager

P105_DR_015 – Powergen

P105 Introduction of Zonal Transmission Losses on a Marginal Basis without Phased Implementation

Of all the transmission loss proposals currently on the table Powergen[1] continues to believe that P105 is most likely to better facilitate the Applicable BSC objectives. Our reasons are outlined in the modification proposal itself and further detailed in the P75/P82 draft assessment report. We also believe an earlier implementation of 1 October 2003 is feasible.

We remain opposed to phasing as phasing simply delays full realisation of the benefits that are likely be obtained from the introduction of zonal transmission losses. In addition the idea that parties did not take into account the potential impact of zonal transmission losses in their investment decisions is simply not credible. We have attached a list of published documents dating back to 1990, which clearly illustrates industry participants were fully aware that the introduction of zonal transmission losses has been a distinct possibility for some time.

In addition should the BSC Panel be persuaded that some form of zonal transmission losses is nevertheless appropriate, it will be important to compare the fully marginal approach (P105 & P75) with the scaled marginal approach (P82) in greater detail. To this end we have commissioned a report from Campbell Carr Consultants, which is also attached. Key points described in this report include.

- Marginal MW provides best location signal, i.e. one that is likely to ensure the most efficient outcomes in terms of the Applicable BSC objectives. This is a point that seems to be acknowledged by NERA.
- Asserts that the argument that scaling is about an appropriate allocation of fixed losses is spurious.
- Concept of 'overrecovery' is ill defined. There cannot be an 'overrecovery' just different TLF adjustment mechanisms.
- P105/P75 TLMs are closer to the raw TLFs adjusted for fixed losses than P82 TLMs
- Scaling is simply a device to dampen the losses signal to reduce the impact on northern generators.

The diagrams below also illustrates why the uniform TLMO TLF adjustment mechanism (adjusting for so called 'fixed losses') is more appropriate in ensuring overall losses reflect actual losses than the non-uniform scaling advocated under P82.

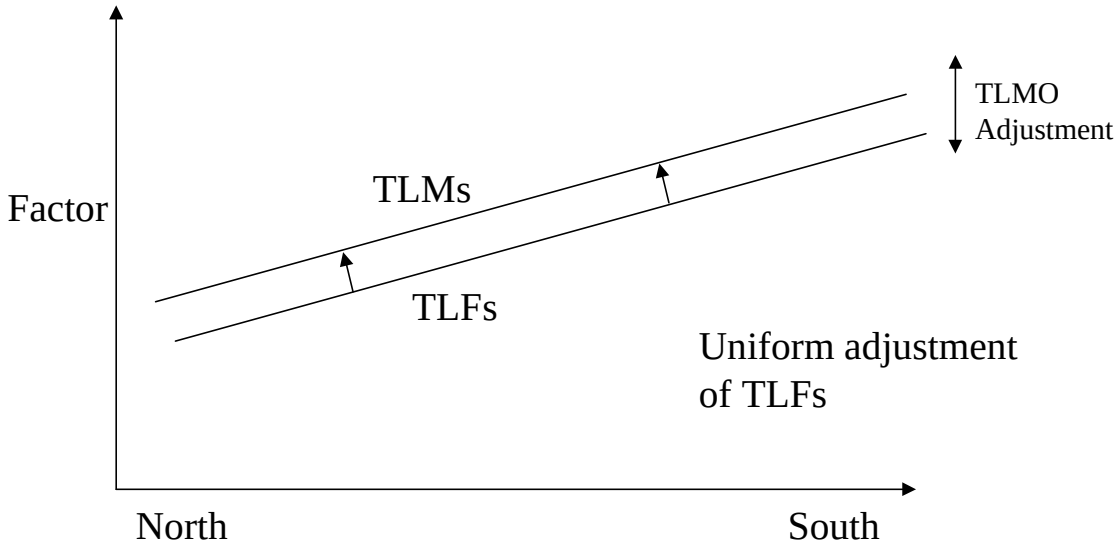
<u>P105/P75 TLF adjustment – relative loss signal not distorted</u>

Powergen UK plc
Westwood Way
Westwood Business Park
Coventry
CV4 8LG

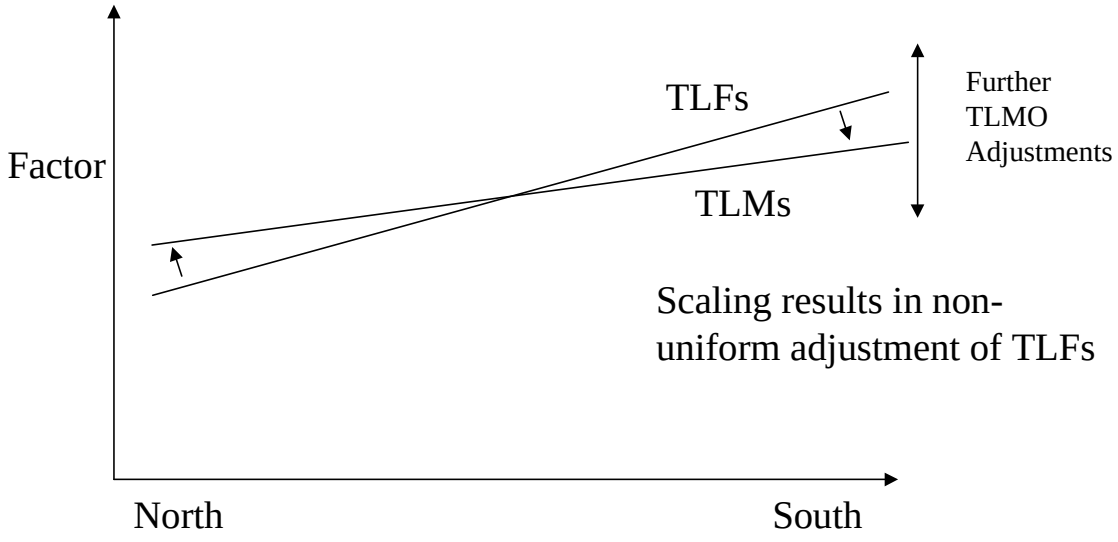
T +44 (0) 24 7642 4000

F +44 (0) 24 7642 5432

www.powergenplc.com



P82 TLF adjustment – loss signal attenuated



In considering its decisions on P105 we would urge the Panel and Ofgem to have the courage to make the right economic decisions consistent with the Applicable BSC Objectives and not be unduly swayed by some vocal opposition to these proposals.

Yours sincerely,

1. Representing the following BSC Parties, Powergen UK plc, Powergen Retail Limited, Diamond Power Generation Limited, Cottam Development Centre Limited, TXU Europe Drakelow Limited, TXU Europe Ironbridge Limited, TXU Europe High Marnham Limited, Midlands Gas Limited, Western Gas Limited, TXU Europe (AHG) Limited, TXU Europe (AH Online) Limited, Citigen (London) Limited, Severn Trent Energy Limited (known as TXU Europe (AHST) Limited), TXU Europe (AHGD) Limited and Ownlabel Energy Limited.

Why investors should have considered the introduction of a transmission losses scheme

Ofgem has set out the history of losses in Appendix 5 of its February Transmission Access proposals.

In addition there are several other documents that make it clear that investors should have taken account of the possibility of the introduction of a transmission losses scheme when planning investments.

OFFER's 1989 Annual report

OFFER's Annual Report 1989 suggested that there was scope to introduce more cost reflective charging for transmission losses.

RECs sale prospectus

1. In the Prospectus for the sale of the RECs (21 November 1900) the DGES in his policy statement (section 1, pp45, "Charges for transmission and distribution") he said.

   "The NGC have established an initial structure for use of system charges for transmission. However, they are keen to analyse their costs further and accept that in due course their charges should be more cost reflective. Their charges should also encompass all the costs of transmission including transmission losses so that decisions on the location of generating plant and of demand are properly informed. NGC are, with my support, analysing how best to achieve these changes".

2. The prospectus for the RECs also contains a description of the pooling and settlement arrangements (pp27) which includes,

   "The pool output price is paid by suppliers on the basis of their metered demand, adjusted for transmission losses on the system and taking account of the demand associated with power stations. The present Treatment of transmission losses is subject to review in accordance with the provisions of the Pooling and Settlement Agreement.'"

Powergen and National Power Prospectus

This statement is repeated (section 1 pp 47) in the Main Prospectus for the sale of Powergen and National Power, 22 February 1991

Speech by DGES

In a speech delivered as the Blackett Memorial Lecture at the University of Birmingham on 30 November 1995 and subsequently published in the Journal of the Operational Research Society (1996) 47 pp 601 Professor Littlechild said, "Transmission losses … have risen. I am sure there is scope for significant reductions in these costs and charges, and also for more cost reflective charging to encourage more efficient decisions, including on the closure of existing plant and the location of new plant".

Judicial Review

The history of the Pool's attempts is well documented. This culminated in 1997 when Humber Power and Teeside Power Limited were granted leave to apply for a Judicial Review of the DGES' decision to uphold a Pool resolution to continue work on a Zonal losses scheme.

OFFER's Annual report 1998

The DGES' Annual report 1998 (published in 1999) reported that the hearing set for 15 and 16 March 1999 was deferred "by mutual agreement" until the Autumn.

In the end, the hearing was deferred indefinitely until the advent of NETA. There was general recognition that the issue needed to be considered under the auspices of the new arrangements.

Balancing and Settlement Code

Since early drafts, the BSC has contained provision for the easy introduction of transmission losses.

NGC's Seven Year Statement

Published each year, this document describes, amongst other things, opportunities for new investment. It also describes typical load flows and patterns of losses on the transmission system. For example, Chapter 8 (para 8.23) 1999 SYS says, "it is not surprising that the ranking of transmission power losses displayed (in table 6.5) broadly follows the ranking of generation opportunities of the previous section". The previous section shows the generation investment opportunities throughout the country.

Table 6.5 shows the effect of 1000MW of new generation on losses in each of the then 16 TNUOS generation zones for 2005/06.

Conclusion

Since 1990, it has been clear that a transmission losses scheme would probably be applied within England and Wales.

The timing and application was not defined in the early part of the decade.

However, since the Pool's proposed scheme, some form of scheme based on zones, rather than zones has been envisaged.

The Pool Scheme has never been withdrawn, it was overtaken by events.

Thus, it is reasonable to conclude that;

- ever since 1990 investors were aware that there would be a transmission losses scheme put into operation;
- since the Pool's proposal, the likely form of that scheme has been known;
- the differentials in losses and the broad load flow patterns have been known and in the public domain and
- prudent investors should have taken account of the effect of a losses scheme when planning investments.

John Stewart 18 October 2002

A Study on the Merits of Marginal Transmission Loss Factors Compared With Scaled Ones –Prepared For Powergen

by
John Stewart and Rob Barnett
Campbell Carr
29 November 2002

CONTENTS

1 Summary 26
2 Introduction 26
2.1 Background 27
2.1.1 Treatment of losses 27
2.1.2 Some arguments made 28
2.1.3 The Nature of Losses 28
3 The economics of scaling 28
3.1 The mechanics for locational loss factors 29
3.2 The reasons for scaling (or otherwise) 30
4 The impact of scaling on Loss Factors 32
5 Conclusion 35

Summary

- The arguments surrounding the case for scaling of losses are ill-specified and difficult to nail down. Similarly arguments in the Draft Assessment Report relating to facilitation of the BSC objectives have not all been relevant.
- The case for zonal loss factors is the signals it gives as to location of running decisions and offtake decisions. If those signals are based on the impact of the marginal MW delivered or offtaken at a point then those signals are efficient and will lead to facilitation of economic and efficient operation of the transmission system. Scaling of such loss factors will blunt the signals, which must therefore be less efficient. Therefore, the case for scaling must relate to issues of competition.
- The arguments under the heading of competition seem to relate to:
  - Misallocation of fixed losses;
  - Increased risk on trading parties due to asset stranding; and
  - Lack of cost-reflection due to over-recover.
- The adjustment factors: $TLMO^{+}_{j}$ and $TLMO^{-}_{j}$, are non-locational and fully adjust to deal with fixed losses (found to be at most 200MW or about 20% at peak in the PTI analysis). Therefore, scaling will not better allocate fixed losses – it is irrelevant.
- The case for compensation for stranded assets is an argument for phasing but not for scaling.
- Therefore the central issue relies on a concept of over-recovery. However, the existing formulae in Section T fully address over-recovery, ensuring that 45% of average losses are allocated to BMUs in Delivering Trading Units and the remainder allocated to BMUs in Offtaking Trading Units. This is done using the non-locational $TLMO^{+}_{j}$ and $TLMO^{-}_{j}$. In any case, for a Southern generator, being offered a reduce zonal benefit through scaling represents a cost and can be construed as a cross-subsidy to Northern generators.
- This analysis has demonstrated that there is no rationale for believing that scaled TLFs lead to a better net adherence to efficient locational signals than unscaled ones.
- Scaling has no effect on uncertainty as to ex post TLMs, which face a fixed variability dependent on errors in forecast of national average losses regardless of the TLF chosen (including the current case of zero TLFs).
- Finally, scaling mutes signals for locational decision and, as such, reduces the potential savings on losses, increasing the loss factors faced by all parties.

Introduction

This paper covers the issue from two aspects: the economics of scaling of Transmission Loss Factors, and the physical impact. As such, this paper does not review the case for transitional scaling, nor the issues surrounding ex ante as against ex post loss factors.

Background

In April 2002 Powergen made a proposal (P75) to the BSC Panel to introduce marginal loss factors. These were to be applied ex-post to give Transmission Loss Factors for each settlement period and hence Transmission Loss Multipliers. The zones to be used would be TNUOS generation zones for generation and GSP Groups for demand.

On 3 May 2002, Edison Mission made an alternative proposal (P82) which would introduce annual Transmission Loss Factors calculated ex-ante and applied to each settlement period to give Transmission Loss Multipliers.

During the six months assessment phase Powergen proposed an alternative to P75, (referred to as P75 A) which was monthly Transmission Loss Factors calculated ex-ante and applied to each settlement period. This was amended after the consultation to include phasing over four years. In the same vein, the Mods Group added a four year phasing period for P82 to give P82A.

Later, during the preparation of the report to the Panel, Powergen proposed P105 (the same as P75A but without the phasing). At the same time British Energy proposed P109, which would introduce a particular form of phasing into the BSC.

As part of the assessment phase, Elexon procured the services of specialist energy modellers, PTI. PTI used its models, and applied them to detailed specifications set out by Elexon to derive Zonal Transmission Loss Multipliers for zones under different conditions for the transmission system in England and Wales.

1.1.1 Treatment of losses

Present

Section T para 2 sets out the arrangements for the allocation of losses. At the moment the TLFs are set at zero, but losses are still calculated and applied to generation and demand BMUs in the ratio 45:55 by the α factor.

Proposed under P75A

In the proposed methodology (Section 7), a new agent, the Transmission Loss Factor Agent, will calculate Transmission Loss Factors for each node. It will do this by using metered volumes for each VAU provided by CDCA. It will translate the metered volume into power flows for each node by applying a network mapping statement to allocate BMUs to zones.

These would allocate the marginal losses to each zone, which would aggregated to zones. The methodology would apply to generation and demand zones.

Proposed under P82 and P82A

Under this approach the Transmission Loss Factor Agent would use sample settlement periods to derive Transmission Loss Factors for GSP Group zones. These would divided by a scaling factor of 2 to give Transmission Loss Factors and hence Transmission Loss Multipliers for each zone.

1.1.2 Some arguments made

For P75

Powergen believes that the introduction of such zonal differentiation of transmission Losses would more accurately target the cost of such losses on those market participants responsible for them, thus removing the inherent cross-subsidy that dampens cost signals in the current method of allocating losses. In the short-term, the Proposer asserts that the removal of such cross-subsidies would provide locational signals to help reduce overall transmission losses. In the long-term, the Proposer asserts that more efficient locational signals would encourage more optimal siting of generation and demand.

For P82

First Hydro Company proposed the application of zonal differentiation of transmission losses on an average, as opposed to marginal, basis to generation and demand. It argument for this was that scaled losses would not over recover the heating losses on a Zonal basis. The results of the modelling work confirmed that a scaling factor of 0.5 to marginal Transmission Loss Factors would approximately reflect the volume of heating losses.

1.1.3 The nature of losses

Losses make up 1.7% of total energy transmitted across the transmission system. They are composed from fixed and variable losses. Fixed losses are comprised of circuit shunt and transformer iron losses and are dependent on the energy required to energise the system, not from the transport of electricity on the transmission system. They may vary with the weather conditions and they comprise about one third of losses.

Variable losses are load dependent (I^2R losses) and arise from heating losses in circuit and transformers. They vary according to generation patterns of demand and generation.

The economics of scaling

This section is not intended to fully review the case for locational differentiation of loss factors but only to reference those arguments necessary to put scaling (or otherwise) into context.

In a system balanced by bilateral contract, there is no actual over- or under-recovery of total losses because such an event would simply lead to imbalances of energy. Therefore, the balancing regime ensures that average losses are exactly recovered in all circumstances. This is done using the equations in T2.3.1, which are not affected by the Proposed Modifications:
For a BM Unit "*i*" in Settlement Period "*j*",

the Delivering Trading Unit Transmission Loss Multiplier (*Formula 1*)

The mechanics for locational loss factors

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

the Offtaking Trading Unit Transmission Loss Multiplier (*Formula 2*)

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

where:

TLF_{ij}	is the Transmission Loss Factor for the BMU – the subject of the Modifications – which is currently zero;
$TLMO^{+}_{j}$	The Delivering Transmission Losses Adjustment for all delivering Trading Units;
$TLMO^{-}_{j}$	The Offtaking Transmission Losses Adjustment for all offtaking Trading Units; and
TLM_{ij}	is the Transmission Loss Multiplier applied to the BMU.

The choice of "*TLFs*" will impact on the sizes of "$TLMO^{+}_{j}$" and "$TLMO^{-}_{j}$" (see below).
The two variables: "$TLMO^{+}_{j}$" and "$TLMO^{-}_{j}$" are therefore adjusted each Settlement Period to ensure the balance between delivery and offtake for the Settlement Period such that each "*TLM*" only represents losses. They are necessarily fixed for each Settlement Period ex post and represent a principal uncertainty in the actual delivery or offtake going to any party's imbalance. The variability of these variables is tested below under scaled and unscaled conditions against the current baseline.
The calculations of "$TLMO^{+}_{j}$" (*Formula 3*) and "$TLMO^{-}_{j}$" (*Formula 4*) are as follows:

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

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

where:

α	is a fixed scaling variable designed to allocate losses between delivery and offtake and is set to 0.45 (for delivering Trading Units); and
QM_{ij}	is the metered volume at the BMU "*i*" in period "*j*", which is treated as negative where the relevant Trading Unit is offtaking.

As can be seen from these equations, the Adjusters are dependent on both the distribution of

The reasons for scaling (or otherwise)

metered volumes and the Loss Factors applied and so cannot be predetermined.

The Transmission Loss Factors Modification Group (TLFMG) has looked at various aspects of the Proposals (P75, P82 and their potential Alternatives) from various angles. Not all of these angles can be interpreted, from an economic perspective, as being relevant to the objectives being addressed. In particular, they have looked at the BSC Objectives (b) and (c).

1. **Efficiency**

   Objective (b) is essentially about the efficient and economic operation of the transmission system. Some additional interpretation of this can be added by the fact that transmission losses are included within the System Operator Incentive package such that there is an explicit incentive on the Transmission Company to minimise losses overall. This falls into two parts: reduction of fixed losses and reduction of variable losses. NGC may be able to address both fixed and variable losses by investment and research (both outside the BSC), but variable losses can also be reduced if electricity effectively travels shorter distances (the loss being effectively related to the square of the current, which is, in turn dependent on distance) – i.e. there is an incentive on trading parties to more closely match supply and demand locationally.

   From this aspect of the analysis, NGC (through the BSC) must seek to ensure that there are strong incentives for operational decisions by participants to be based on matching supply and demand locationally. These incentives do not necessarily need to be cost-reflective provided charges for provision of the network itself are. This incentive is offset by another BSC Objective:

2. **Competition**

   Objective (c) is essentially about competition in generation and supply. Within this aspect, a key component must be the ability of a particular generator to fully capture the rewards and costs of locational decisions in order to make efficient decisions. This is not necessarily just about future

investment decisions but about decisions to run or otherwise based on the true costs of operation. It follows from this that such locational signals should be cost reflective.

There is a less strong case for locational decisions in terms of supply because consumers will rarely make locational decisions based on electricity costs. However, a supplier seeking to procure generation should be able to avail itself of the locational benefits from its specific demand portfolio in competing for that generation and so should fully capture the locational benefits (or otherwise) of that supply portfolio.

From this point of view, decisions on whether scaling should be applied to loss factors must rest on the degree to which the scaled or unscaled figures give more correct cost signals.

The residual argument relating to competition is that historic investment decisions under the current losses regime will lead to unforeseen stranded costs, which raise current and future risks for all participants in making investment decisions. Given the 40% fall in wholesale prices, the impact of a change to the losses regime must surely be dwarfed by other factors. However, this remains an argument for phasing but not for scaling.

These considerations lead to the central issue, which is the extent to which scaling or otherwise misallocates fixed losses.

3. Fixed losses allocation

No clear evaluation of the nature of fixed losses has been presented. They represent losses at transformers and other fixed points and are not directly related to load flow. In reality, some form of approximation to usage of system nodes seems the most appropriate method of collection of such losses. Therefore, some form of allocation in proportion to metered volume seems not inappropriate.

Based on these criteria, the fixed element of losses is effectively and fully incorporated into the TLMO terms in the calculations, which are not locational and are strictly apportioned to metered volumes. Nothing in scaling changes this and so allocation of fixed losses is an irrelevance.

4. Over-recovery in the variable loss element

In the end, the case for a scaling factor of 0.5 seems to be based on a belief that marginal loss factors will over-recover average heating losses. Heating losses are a function of the square of the current but the case for halving the loss factor because of this seems not to be based on any empirical logic. It just seems to give mostly the right answer from the viewpoint of its proponents.

The PTI report tests 0.5 against scaling factors required to precisely recover heating losses but does not make explicit what the correct heating losses should be, and only tests the results relative to a scaling factor that does not “over-recover”. Also, given the adjustment factors applied, there is no justification as to why this method of adjustment is better than the absolute adjustment already built into the current methodology. We are therefore making the assumption that the PTI “correct” answer relates to TLMOs that are closest to the base case (i.e. TLFs of zero).

What is missing is a definition of "over-recovery". The difficulty is that locational signals offer "gains" as well as losses and so will inevitably over- or under-recover in aggregate – this is a function of the mathematics and does not, by itself prove over- or under-recovery.

The marginal loss factor seeks to approximate to the loss caused by the last MW of energy delivered or offtaken at the node. This is an efficient economic signal to all parties at the node about the impact of their activities at that node. The concept of a zonal average loss factor cannot claim the same economic purity. It fails to fully reward any action taken to respond to the economic signal.

Scaling has the same impact. It reduces the economic signal below the marginal level. Its justification must be found in alternative rationales such as stability and predictability of the resultant loss factors. This means that the predictability of TLMs under different scenarios is crucial. This is reviewed in the next section.

However, the inevitable conclusion of this sub-section is the essential difficulty of proving or disproving over-recovery because the concept itself is never clearly defined. Even where losses are made to sum to average losses, a particular adjusted loss factor at a node is under-recovering for a participant if that participant would anticipate being allocated more energy if the full marginal rate at the node had been applied.

Therefore, for want of any objective definition of over-recovery, we are working on the assumption that it is defined as TLMOs more extreme than the base case, which is set as TLFs of zero. It must be remembered that this is not strictly a valid definition of over- or under-recovery because it pre-supposes that the base case is correctly allocating losses, which is clearly not the case in terms of marginal losses.

The impact of scaling on Loss Factors

The primary data used in this analysis is that published in SYS and relates to 2002-3. This shows forecast peak demand and supply by generation zone. This is used in preference to the PTI data because the necessary load details are available. The average loss factor calculated is 1.68%.

The following notes apply:

- Demand (column (1)) corresponds to QM_{ij} for Offtaking Trading Units.
- Generation (column (3)) corresponds to QM_{ij} for Delivering Trading Units and is calculated by adding average losses (1.68%) to column (2), the published generation schedule. This represents generation delivered at the generator meter, whereas the figures published in SYS represent generation delivered to suppliers at the offtake node of the transmission system.
- Column (4) represents TLF_{ij} for both Delivering and Offtaking Trading Units.
- Column (5) is calculated by applying a factor of 0.5 to Column 4.

This (plus α at 0.45) is sufficient information to calculate $TLMO^{+}_{j}$ and $TLMO^{-}_{j}$, using the formulae labelled 3 and 4 above.

Table 1: Raw Loss Factor data

		Demand	Generation		Loss Factor	Scaled Loss Factor
			Delivered	Contracted		
		MW			*%*	
		(1)	(2)	(3)	(4)	(5)
0.1	**SCOTLAND**	0	1,200	1,220	5.52	2.76
0.2	**NORWAY**	0	0	0	5.52	2.76
1	**NORTH**	-3,349	3,056	3,107	5.52	2.76
2	**HUMBERSIDE**	-2,315	10,418	10,593	3.01	1.50
3	**N YORKS & N LANCS**	-773	2,403	2,444	2.70	1.35
4	**S YORKS & S LANCS**	-10,632	8,493	8,635	0.62	0.31
5	**NORTH WALES**	-663	2,011	2,045	0.98	0.49
6	**WEST MIDLANDS**	-7,428	4,334	4,407	-2.14	-1.07
7	**REST OF MIDS & ANGLIA**	-3,552	4,001	4,068	-1.04	-0.52
8	**SOUTH WALES**	-2,788	2,598	2,642	-5.78	-2.89
9	**WILTSHIRE**	-1,721	1,028	1,046	-5.05	-2.52
10	**GREATER LONDON**	-7,946	5,098	5,184	-3.86	-1.93
11	**ESTUARY**	-3,085	6,631	6,742	-1.88	-0.94
11.1	**FRANCE**	0	1,976	2,009	-1.88	-0.94
12	**INNER LONDON**	-4,396	0	0	-4.42	-2.21
13	**SOUTH COAST**	-3,649	862	876	-5.59	-2.80
14	**WESSEX**	-1,894	1,081	1,099	-5.76	-2.88
15	**PENINSULA**	-1,113	117	119	-5.42	-2.71
	TOTALS	-55,306	**55,306**	**56,237**		

The following are the results for the relevant variables:

	Current	**Unscaled**	**Scaled**
$TLMO^{+}_{j}$	- 0.00745	- 0.00517	- 0.00631
$TLMO^{-}_{j}$	0.00926	0.02786	0.01856

It should be noted that using the current formulation (TLFs set to zero), the only thing that TLMOs do is to allocate the actual transmission losses (1.68%) 45% on generation meters and 55% onto demand meters. The sign on $TLMO^{-}_{j}$ is positive because metered volumes are negative for offtake.

On the defined basis of "over-recovery" the TLMOs are closer to the base case when scaling is applied. This can be seen from Table 2, which applies the formulae 1 and 2 to produce the resultant TLMs. These essentially show that the impact of scaling is to blunt locational signals. This means that Northern generators do not lose so much but Northern demand does not gain as much. There is no real issue of over-recovery because the TLMO adjustments ensure that the correct total losses apply. The only issue is who wins or loses.

Table 2: Transmission Loss Multipliers

		Delivering TLMs			Offtaking TLMs		
		Current	Unscaled	Scaled	Current	Unscaled	Scaled
0.1	SCOTLAND	0.993	1.050	1.021	1.009	1.083	1.046
0.2	NORWAY	0.993	1.050	1.021	1.009	1.083	1.046
1	NORTH	0.993	1.050	1.021	1.009	1.083	1.046
2	HUMBERSIDE	0.993	1.025	1.009	1.009	1.058	1.034
3	N YORKS & N LANCS	0.993	1.022	1.007	1.009	1.055	1.032
4	S YORKS & S LANCS	0.993	1.001	0.997	1.009	1.034	1.022
5	NORTH WALES	0.993	1.005	0.999	1.009	1.038	1.023
6	WEST MIDLANDS	0.993	0.973	0.983	1.009	1.006	1.008
7	REST OF MIDS & ANGLIA	0.993	0.984	0.989	1.009	1.017	1.013
8	SOUTH WALES	0.993	0.937	0.965	1.009	0.970	0.990
9	WILTSHIRE	0.993	0.944	0.968	1.009	0.977	0.993
10	GREATER LONDON	0.993	0.956	0.974	1.009	0.989	0.999
11	ESTUARY	0.993	0.976	0.984	1.009	1.009	1.009
11.1	FRANCE	0.993	0.976	0.984	1.009	1.009	1.009
12	INNER LONDON	0.993	0.951	0.972	1.009	0.984	0.996
13	SOUTH COAST	0.993	0.939	0.966	1.009	0.972	0.991
14	WESSEX	0.993	0.937	0.965	1.009	0.970	0.990
15	PENINSULA	0.993	0.941	0.967	1.009	0.974	0.991

This is taken one stage further in Table 3. It is definitively a straw man approach that seeks to incorporate all potential arguments in favour of scaling:

- Firstly, a fixed element of losses (200MW according to PTI) is applied to take account of fixed losses. This is applied 45% to generation and 55% to demand and is therefore -0.167% a delivery TLF and +0.1989% of an offtaking TLF.
- This is applied to the unadjusted marginal TLFs given by NGC as the correct figures (column (4) of Table 1) to give expected zonal loss factors.
- The difference between these figures and the adjusted TLFs derived from Table 2 (i.e. (TLM-1)*100, to give it in percentage terms) are compared to see which is closer the original marginal loss factors.

This approach may be considered bogus by proponents of scaling but it is based on the original concept that the marginal loss factor is the correct economic treatment of the issue and the scaled loss factor is not justified on the basis of a correct signal but rather on the issue of over-recovery.

The results on Table 3 do not seem to bear out the proposition that the scaled result is more correct overall. Both scaled and unscaled differ significantly from the original loss factors on the demand side. However, for the scaled loss factor, the net result seems to be quite extremely different in the southern half of the country.

Table 3: Impact of scaling on Loss Factor error adjustment

		Delivering Trading Units					Offtaking Trading Units				
		Raw TLF adjusted for fixed losses	Un-scaled "TLF"	Differ-ence	Scaled "TLF"	Differ-ence	Raw TLF adjusted for fixed losses	Un-scaled "TLF"	Differ-ence	Scaled "TLF"	Differ-ence
		%									
0.1	SCOTLAND	5.355	5.001	-0.354	2.128	-3.227	5.319	8.304	2.985	4.615	-0.704
0.2	NORWAY	5.355	5.001	-0.354	2.128	-3.227	5.319	8.304	2.985	4.615	-0.704
1	NORTH	5.355	5.001	-0.354	2.128	-3.227	5.319	8.304	2.985	4.615	-0.704
2	HUMBERSIDE	2.846	2.491	-0.354	0.873	-1.972	2.810	5.795	2.985	3.360	0.551
3	N YORKS & N LANCS	2.541	2.187	-0.354	0.721	-1.820	2.505	5.490	2.985	3.208	0.703
4	S YORKS & S LANCS	0.455	0.101	-0.354	-0.322	-0.777	0.419	3.404	2.985	2.165	1.746
5	NORTH WALES	0.819	0.465	-0.354	-0.140	-0.959	0.783	3.768	2.985	2.347	1.564
6	WEST MIDLANDS	-2.305	-2.659	-0.354	-1.702	0.603	-2.341	0.644	2.985	0.785	3.126
7	REST OF MIDS & ANGLIA	-1.200	-1.554	-0.354	-1.150	0.050	-1.236	1.749	2.985	1.337	2.573
8	SOUTH WALES	-5.945	-6.299	-0.354	-3.522	2.423	-5.981	-2.996	2.985	-1.035	4.946
9	WILTSHIRE	-5.212	-5.567	-0.354	-3.156	2.057	-5.249	-2.263	2.985	-0.669	4.580
10	GREATER LONDON	-4.022	-4.376	-0.354	-2.560	1.461	-4.058	-1.073	2.985	-0.073	3.984
11	ESTUARY	-2.040	-2.394	-0.354	-1.569	0.470	-2.076	0.909	2.985	0.918	2.993
11.1	FRANCE	-2.040	-2.394	-0.354	-1.569	0.470	-2.076	0.909	2.985	0.918	2.993
12	INNER LONDON	-4.586	-4.940	-0.354	-2.843	1.744	-4.622	-1.637	2.985	-0.356	4.267
13	SOUTH COAST	-5.753	-6.108	-0.354	-3.426	2.327	-5.790	-2.804	2.985	-0.939	4.850
14	WESSEX	-5.922	-6.277	-0.354	-3.511	2.412	-5.959	-2.974	2.985	-1.024	4.935
15	PENINSULA	-5.579	-5.933	-0.354	-3.339	2.240	-5.615	-2.630	2.985	-0.852	4.763

A final important factor with regard to the effect of scaling is the variability of these figures with respect to changes in average losses. To do this we assume that the differential loss factors are held constant (as would happen if they were set ex ante) but the actual outcome changes: i.e. average losses are adjusted. We assume a 10% increase in average losses and a 10% reduction.

Table 4: Effect of error in loss forecast on TLMO

Change from forecast				Current	Unscaled	Scaled
Zero	TLMO+	(1)		-0.00745	-0.00517	-0.00631
	TLMO-	(2)		0.00926	0.02786	0.01856
10%	TLMO+	(3)		-0.00818	-0.00590	-0.00704
	change	(4)	(3) - (1)	-0.00073	-0.00073	-0.00073
	TLMO-	(5)		0.01018	0.02879	0.01949
	change	(6)	(5) - (2)	0.00093	0.00093	0.00093
-10%	**TLMO+**	(7)		-0.00672	-0.00444	-0.00558
	change	(8)	(7) - (1)	0.00073	0.00073	0.00073
	TLMO-	(9)		0.00833	0.02694	0.01763
	change	(10)	(9) - (2)	-0.00093	-0.00093	-0.00093

Table 4 shows that a losses forecast error with ex ante loss factors has a fully proportionate effect on imbalances regardless of scaling. In other words, if any party mis-forecasts total average losses, they will be out of balance by exactly the same MWh regardless of scaling.

Conclusion

Scaling is applied on a theory about over-recovery of heating losses if marginal loss factors are used. However, over-recovery is not defined and neither is it proved other than noting

that TLMOs are more extreme. However, this proves nothing of itself and is not a problem for those benefiting from the calculation.

Issues of over-recovery are dealt with using the TLMO adjustment factors and these adjust stably to changes in average losses. Therefore, scaling only addresses the differential between North and South and is a means of blunting locational loss signals and not one for adjusting over-recovery.

A final point to note is the original over-riding purpose of zonal loss factors. That they incentivise a relocation of load flows that will reduce losses overall. This is expected to come primarily from an increase in generation delivered in the south. If the NERA cost-benefit analysis paper assumptions on demand elasticity are correct, there will also be a change in demand pattern with more demand in the North and less in the South. On this basis, the likely change will be a reduction in average losses, which is a net benefit to all.

John Stewart
Rob Barnett
29 November 2002

P105_DR_016 – NGC

Comments on P105 Legal Text

1. Section 1.3c) says that a nodal TLF is the rate of change of losses with respect to the change of power flow at that node. This is **misleading**, since it perpetuates the common misconception that a TLF is a one-sided parameter. Because a loadflow must always balance, a TLF describes the rate of change of losses with an injection at one node *and* a balancing extraction at another node (or set of nodes). This is why TLFs can be sensitive to the choice of slack node, since normally it is the slack node that picks up the mismatch. This is sufficiently important that I think the text should be amended here. Suggest

"…with respect to change of power flow at that node, with network balance being maintained by the slack node."

2. Section 2 uses the acronym LFM that needs to be defined.

3. Section 2.2a) says that only heating losses are considered. This usually means I^2R losses rather but iron losses that also cause heating (iron losses considered as being fixed losses). Therefore "heating losses" could be ambiguous. It might be clearer to refer to losses associated with the flow of current in network branches.

4. Section 2.2b)iii) "the sine of the phase angle is equal to the phase angle" – may be clearer to specify:

   *"the sine of the **voltage** phase angle…"*

5. Section 2.2b)iv) "the power flow is equal to the ratio between the difference in the phase angles divided by the reactance." It may be better to say:

*"the power flow **in a branch** is equal to the ~~ratio between the~~ difference in the **voltage** phase angles **across the branch** multiplied by the branch **susceptance**."*

   The branch susceptance (the imaginary part of the branch admittance) is not just the reciprocal of the branch reactance; it is also affected by the branch resistance.
   Does PTI's DC loadflow take this into account? If so, PTI LFM would not match the definition given in the sentence as written.

6. Section 4.6 - Don't understand how TLFs for Scottish transfers would be calculated. Does this section cover for both import and export across the Scottish interconnector?

7. Section 5.1a) – As section 2.2 defines a DC loadflow there is no need for information to be provided for static voltage compensators and shunt reactances. It would be better for 5.1a)ii) to read

"for each such pair of nodes, values of the resistance and reactance between such nodes."

8. Section 5.3 – This puts quiet an onus on the Transmission Company to supply information in an unspecified format. If systems are required to extract the relevant data into a format that may regularly change, there could be considerable time and expense in updating the systems depending on what format is required.

We supplied data to PTI in an agreed format and I believe that this is the best way to codify the requirement. I would suggest:

"…cooperate so as to ensure that the Network Data provided by the Transmission Company is sufficient for the TLFA to operate the LoadFlow Model. The data will be provided in an electronic form."

9. *Section 7.5 – In the $ATLF_{ZY}$ formula, why is there the TLF_{ZY} divided by 2?*