

30 July 2010

Review of Proposed Decision on Transmission Losses in the Irish Electricity Market Expert Report for Viridian Energy Ltd



NERA
Economic Consulting

Author

Graham Shuttleworth

NERA Economic Consulting
15 Stratford Place
London W1C 1BE
United Kingdom
Tel: +44 20 7659 8500
Fax: +44 20 7659 8501
www.nera.com

Contents

Glossary*i*

Executive Summary	ii
1. Introduction	1
1.1. Background on Expert	1
1.2. Topics Covered in This Report	1
1.3. Documents Relied Upon	1
2. Background	2
3. Criteria for Assessment of Options	4
3.1. Regulatory Authorities' Criteria for Market Design (2005)	4
3.2. Regulatory Authorities' Criteria for the New TLAF Regime (2010)	5
3.3. Comparison of Decision Criteria	7
3.4. Conclusion	9
4. Proposals for Reform of TLAFs	11
4.1. Options Considered by Regulatory Authorities	11
4.2. Evaluation of Options by Regulatory Authorities	11
4.3. Conclusion	15
5. Discussion of Locational Loss Factors	16
5.1. Economic Dispatch	16
5.2. Signals to Generators	17
5.3. Conclusion	21
6. Conclusions and Closing Statements	22
6.1. Conclusions	22
6.2. Closing Statements	23

Appendix A. Bibliography	24
Appendix B. System Operators' Evaluation of Options	25
B.1. SO Objectives for TLAFs	25
B.2. Options Considered by System Operators	26
Appendix C. Criteria in Proposed High Level Design Paper	29

Glossary

- FTR** Financial Transmission Right, i.e. a contract that entitles the holder to receive the market *value* of a transmission right in return for paying a contractual *price* for that transmission right. If the holder is required to pay the market value for using a transmission right in the first instance, this contract replaces the (potentially volatile) market value with a fixed contractual price, for the volume of electricity defined in the contract.
- RAs** Regulatory Authorities, i.e. the bodies responsible for regulating the rules of the SEM – namely the Commission for Energy Regulation and the Northern Ireland Authority for Utility Regulation.
- SEM** Single Electricity Market, i.e. the common electricity market rules that apply throughout the island of Ireland.
- TLAF** Transmission Loss Adjustment Factor, i.e. a factor used to adjust the metered output of a generator to take account of losses incurred in transmitting electricity from the generator into the transmission network and onward to consumers.

Executive Summary

The Regulatory Authorities (RAs) in Northern Ireland and the Republic of Ireland published their proposed decision for the reform of TLAFs on 18 June 2010. The RAs propose to abandon the system of calculating TLAFs based on estimates of marginal transmission losses and to replace it with uniform TLAFs from 1 October 2010.

In this report, I review a number of documents published by the RAs that relate to this proposed decision. The purpose of the report is to:

1. identify the criteria that the RAs have used in the past for the “high level” design of the electricity market and most recently for the decision to adopt uniform TLAFs;
2. assess whether these criteria are consistent, objective, transparent, and take due account of economic costs and benefits; and
3. examine whether the RAs have applied these criteria thoroughly and consistently to the full range of options, using objective evidence.

My main conclusions can be summarised as follows (see chapter 6):

- § Although the different documents I reviewed used different terms to describe criteria, the criteria they propose have common elements, showing a commitment to (1) efficiency and (2) predictability. However, the RAs appear to have misinterpreted the definition of predictability. References to the desire to avoid volatility place undue emphasis on the stability of the value of TLAFs, as opposed to stability and transparency in the method of calculation (which makes the values of TLAFs predictable).
- § The RAs have not carried out a consistent or thorough evaluation of the various options under consideration by reference to a single set of criteria. For example, they reject “compression” for failing by one criterion, but do not reject uniform tariffs for failing to meet the same criterion, even though uniform tariffs represent an extreme form of “compression”.
- § The RAs provide no objective evidence for their conclusions and thereby run the risk of discouraging investment by imposing a poorly justified decision, which increases regulatory risk.

Overall, I conclude that the RAs do not provide an objective justification for their decision to adopt uniform TLAFs and that the RAs’ decision-making process does not meet the standard of best regulatory practice.

1. Introduction

1.1. Background on Expert

1. My name is Graham Shuttleworth, of 15 Stratford Place, London, W1C 1BE. I am a professional economist at NERA Economic Consulting ('NERA'). I have been asked by Viridian Energy Ltd ('Viridian') to provide a report commenting on the Proposed Decision Paper SEM-10-039 of 18 June 2010, entitled "Proposed RAs option for all-island harmonised Transmission Loss Adjustment Factors (TLAFs)". I am acting as an expert witness on matters within my expertise.
2. I have experience in the economics of utility regulation and of the markets for electricity and gas. I began working at NERA in 1988. At that time, I worked on the design of the Electricity Pool of England and Wales and the associated electricity contracts between generators and retail suppliers of electricity. Since then, I have been involved in several rounds of discussions about the allocation of transmission losses within the electricity markets of England and Wales (until 2001) and Great Britain (from 2001). I have a First Class degree in Economics from Cambridge University and a masters (M.Phil) degree in Economics from Oxford University. My curriculum vitae is available on request.
3. I was assisted by research staff at NERA's London office, but the opinions and interpretations of data stated in this report are my own.

1.2. Topics Covered in This Report

4. **Transmission Loss Adjustment Factor:** Viridian has asked me to give my opinion as to whether the proposal to harmonise Transmission Loss Adjustment Factors ("TLAFs") across the Single Electricity Market ("SEM") is in line with regulatory criteria for evaluating options for market design.

1.3. Documents Relied Upon

5. I have reviewed the "Proposed Decision Paper" issued by the Regulatory Authorities (RAs) and dated the 18 June 2010,¹ which gives the RA's preferred option for TLAFs as well as the "High Level Design" decision paper of 10 June 2005.² The full details of these and the other documents to which I have referred in compiling this report are available in Appendix A.

¹ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *Single Electricity Market Proposed RAs option for all-island harmonised Transmission Loss Adjustment Factors (TLAFs) - Proposed Decision Paper*, 18 June 2010 (SEM-10-039)

² Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), High Level Design Decision Paper*, 10 June 2005 (AIP/SEM/42/05)

2. Background

6. The Commission for Energy Regulation (CER) introduced locational Transmission Loss Adjustment Factors following the introduction of competition to the electricity market in the Republic of Ireland on 19 February 2000. At the time, the CER set out two “key principles” for the treatment of transmission losses, namely that:
 - § “the costs of transmission and distribution losses are borne by market participants, not by the system as a whole.
 - § All settlement is assumed to take place at the interface between the transmission and distribution grids”³
7. Commenting in 2003, ESB offered a further clarification, that these principles require the costs of transmission and distribution losses to be “borne by the individual market participants who cause them, and not spread equally across generators and customers as a whole.”⁴
8. In June 2005, the Regulatory Authorities (RAs) issued a paper setting out the “High Level Design” of the Single Electricity Market. That paper stated that transmission losses would be handled “by applying locational loss factors to the outputs of each generator” and that these loss factors would be calculated annually, but might vary by season and time of day.⁵
9. In August 2006, the RAs confirmed that the treatment of losses in the Single Electricity Market (SEM) would be based on the TLAF methodology then applied within the Republic of Ireland.⁶ At the time of this decision the RAs noted the following issues surrounding TLAFs, relevant to current proposals for reform:
 1. transparency in the TLAF calculation has “merit”,⁷ but annual changes in the TLAFs “reflect changes either in the transmission network or generation pattern” and are cost reflective;⁸
 2. TLAFs based on marginal costs represent “the fair cost of the generator not reducing its output.”⁹

³ Commission for Energy Regulation, *Treatment of Transmission and Distribution Losses*, 5 April 2000, page 1

⁴ ESB (2003), *Review of Transmission Losses*, undated, page 4

⁵ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), High Level Design Decision Paper*, 10 June 2005 (AIP/SEM/42/05), page 9

⁶ All-Island-Project, *The Single Electricity Market: Treatment of Transmission Losses – Decision Paper*, August 2006, (AIP/SEM/112/06), page (i) bullet (i)

⁷ See All-Island-Project, *The Single Electricity Market: Treatment of Transmission Losses – Decision Paper*, August 2006, (AIP/SEM/112/06), page 9

⁸ See All-Island-Project, *The Single Electricity Market: Treatment of Transmission Losses – Decision Paper*, August 2006, (AIP/SEM/112/06), page A.2

⁹ See All-Island-Project, *The Single Electricity Market: Treatment of Transmission Losses – Decision Paper*, August 2006, (AIP/SEM/112/06), page A.12

3. generators would determine the location of new plant taking into account the expectation of TLAFs over the life of the project.¹⁰
10. In November 2009, at the request of the Regulatory Authorities, the System Operators (SOs) for the island of Ireland considered a range of alternatives to replace the current calculation of TLAFs.¹¹ The SOs said their review was in part motivated by the changing generation mix, and the consequent impact on the “effectiveness of TLAFs.”¹² The SOs recommended the adoption of a compression factor in the short term to reduce the range of TLAFs, “splitting” losses payments from dispatch in the medium term and a move to a system where the TSOs purchase losses in the long term (for further discussion of these issues see Appendix B).
11. I conclude that the RAs’ Proposed Decision Paper must be seen against the background of these previous discussions of transmission losses. Since the RAs are now proposing to change the system, a transparent decision-making procedure would provide some explanation of the reasons for overturning previous decisions.

¹⁰ See All-Island-Project, *The Single Electricity Market: Treatment of Transmission Losses – Decision Paper*, August 2006, (AIP/SEM/112/06), page A.2

¹¹ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009

¹² Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, page 1

3. Criteria for Assessment of Options

12. The starting point of my review of the Proposed Decision Paper is the range of criteria used for regulatory purposes within the SEM. In the following sections, I set out the criteria used in a number of documents that concern the design of the SEM.

3.1. Regulatory Authorities' Criteria for Market Design (2005)

13. I reviewed the "High Level Design" decision paper published by the RAs on 10 June 2005 in which they set out their decision to adopt the Single Electricity Market in the first place.¹³ TLAFs are an element in the design of an electricity market. In the "High Level Design" decision paper the RAs set out the criteria they used for evaluating the alternative options for overall electricity market design:

"The proposal for a Central Commitment market as set out in the HLD paper was based on the evaluation of the market design against alternatives under the following six criteria:

1. Security of Supply;
2. Stability;
3. Efficiency;
4. Practicality;
5. Equity; and
6. Competitiveness."¹⁴

14. The RAs provide further descriptions of each of these criteria in a March 2005 document which proposed the High Level Design (see Appendix C).¹⁵ In this paper the RAs explain that:

"The evaluation criteria employed in assessing market design options are a distillation of the above fundamental market design principles into a set of attributes. These attributes were used to assess the quality and fit of each market design option and they are organised into separate criteria."¹⁶

¹³ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), High Level Design Decision Paper*, 10 June 2005 (AIP/SEM/42/05)

¹⁴ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), High Level Design Decision Paper*, 10 June 2005 (AIP/SEM/42/05), page 5

¹⁵ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed High Level Design*, 31 March 2005 (AIP/SEM/06/05), page 38-9

¹⁶ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed High Level Design*, 31 March 2005 (AIP/SEM/06/05), page 38

The RAs then list the separate criteria, including the six listed above and two further criteria – “Environmental” and “Adaptive”.¹⁷ In practice, the RAs only use the first six criteria listed above for the evaluation of market designs, for reasons that the RAs do not explain.

15. The six criteria listed above provided a basis for the RAs to evaluate options for market design. I would have expected the RAs to adopt the same criteria for the evaluation of the options for reforming TLAFs as they used to evaluate the options for market design in 2005.

3.2. Regulatory Authorities’ Criteria for the New TLAF Regime (2010)

16. I reviewed the “Proposed Decision Paper” published by the RAs on 18 June 2010, in which the RAs set out their decision for reform of the TLAFs to be implemented from 1 October 2010.¹⁸ Although the RAs do not list the criteria for assessment explicitly in this document, they do provide some guidance as to the nature of their decision-making process. Unfortunately, this guidance is ambiguous and redundant, and may even be prejudicial.

17. The RAs state that they intend to prioritise “efficient dispatch” over “cost reflectivity”, without explaining why they decide to do so:

“In this paper the RAs are proposing to place a particular weighting on the principal objective of TLAFs delivering efficient generation dispatch (in an optimal fashion) over that of allocating losses to individual generators on a cost-reflective basis.”¹⁹

18. The meaning of this guidance is not clear to me, since there is no implicit conflict in economic terms between assigning transmission losses to generators on a cost-reflective basis, and encouraging efficient dispatch. Indeed, to ensure an efficient dispatch based on prices offered by generators, it is necessary to allocate losses to them on a cost-reflective basis. In that context, this statement is redundant. The alternative is to rely on the system operator to arrange an efficient dispatch using private information on the losses caused by each generator – the option described broadly as “splitting” in the Proposed Decision Paper. Thus, even though the RAs explicitly say that the medium and long term TLAF regimes have yet to be reviewed, this guidance hints at a prejudicial decision already having been taken, to rely on “splitting”.
19. That the option of “splitting” the pricing of losses and energy will achieve efficient dispatch is by no means a foregone conclusion. To give the system operator an incentive to carry out an efficient dispatch, the regulatory arrangements must provide a reward for minimising the costs of generation. Designing such a scheme, without placing undue risk on the shoulders of the system operator, is difficult to achieve on a transparent and objective basis. Moreover,

¹⁷ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed High Level Design*, 31 March 2005 (AIP/SEM/06/05), page 39

¹⁸ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039)

¹⁹ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 1.1, [no page numbers provided in document]

basing prices on a uniform TLAF will understate the value of electricity, when the plant at the margin is situated in a disadvantageous location (with a low TLAF). Correcting the pattern of generation to achieve an efficient despatch (i.e. replacing cheap but poorly located plant with more expensive but well placed plant) will expose the system operator to additional cost that will not be reflected in market prices. Moreover, applying “pay-as-bid” rules to this stage of settlement, as opposed to the “market clearing price” used in the market as a whole, may cause generators to change the basis on which they calculate their offer prices, leading to a decline in efficiency. Thus, there is no basis for assuming that splitting will allow efficient dispatch to be divorced from cost-reflective allocation of losses. It is therefore premature to assume that “splitting” will solve any problems for efficient dispatch arising from the adoption of uniform TLAFs.

20. The RAs also state that the new TLAFs should represent an improvement by the standard of objectives set out at the start of the workstream:

“It is important to remember the objectives of the workstream, as outlined in sections 2.1 and 2.2 of AIP/09/2001, being increased **predictability and transparency and reduced volatility for market participants (as well as cost reflectivity and efficient location)**... In the short term, the critical principle that the RAs are adhering to is that reform will only be progressed if it offers progress towards a preferred long-term solution or is an improvement on the existing TLAFs from the point of view of the objectives set at the start of this workstream.”²⁰ [emphasis added]

21. I followed up the reference to the “objectives of the workstream,” and discovered that the summary provided by the RAs is not the complete set of objectives identified at the start of the work stream. The reference given in the Proposed Decision Paper leads to SEM-09-001, a document issued by the Single Electricity Market Committee, which states [second-level bullet points omitted]:

“The harmonised generator TUoS tariffs and TLAFs need to take into account seven principles. These are that the proposed methodology should be:

1. Non-discriminatory;...
2. Transparent;...
3. Cover the cost of providing the service;...
4. Cost reflective;...
5. Consistent with the shallow connection policy;...
6. Encourages efficient use of the network and efficient investments in infrastructure;...

²⁰ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.3, [no page numbers provided in document]

7. The charges should be predictable to allow generators to select the most appropriate locations for investment over the lifetime of the project²¹
22. The last of these “principles” is particularly significant, as it carries a lot of weight in the Proposed Decision Paper (see below). However, it is not a particularly well defined principle. The “appropriate location for investment” overlaps with principle 6 (“efficient use of the network and efficient investments in infrastructure”). The predictability of a charge depends largely on the extent to which investors can understand the method of its calculation, which overlaps with principle 2 (“transparency”).
23. In practice, as I discuss below, the RAs seem to have interpreted this principle differently, i.e. by reference to whether the TLAF for a particular location is relatively constant over time. That interpretation conflicts with or overrides considerations of efficiency (principle 6) and cost-reflectivity (principle 4). The RAs report that respondents to the TSOs’ consultation paper SEM-09-107 mention a problem with predicting TLAFs, due to their “volatility and lack of predictability”.²² However, it is not clear to me why the RAs should have adopted this form of words as an appraisal criterion, or why it is not adequately covered already by the objective of adopting a transparent method of calculating TLAFs.

3.3. Comparison of Decision Criteria

24. The decision criteria adopted by the RAs in their consideration of TLAFs are not identical to each other or to the original objectives used for the “high level” design of the SEM. However, there are significant similarities. In particular, the objectives fall under two main headings, which I shall refer to as “efficiency” and “predictability”.

3.3.1. Efficiency

25. Both the proposed decision criteria and objectives give some regard to the efficiency of the options under consideration. Efficiency has two meanings in the context of TLAFs.
26. First, there is general concern for the short term efficiency of dispatch, i.e. the minimisation of the short term (“variable”) costs of running the existing fleet of generators. This objective also appears as a component of “efficient use of the network”, although that concept would also encompass efficiency in the consumption of electricity.
27. Second, efficiency refers to long run decisions about the optimal quantity and type of generation capacity in the correct location, and the associated investment in the network. The RAs’ high level objectives for market design include only “efficiency” in general, but their decision criteria for TLAFs specifically include both types of efficiency under the heading “encourages efficient use of the network and efficient investments in infrastructure”.

²¹ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *All-Island Transmission Use of System Charging & Loss Factors – Response Paper*, 16 January 2009 (SEM-09-001), page 6

²² Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), section 2.3.

28. The RAs have defined the term “cost-reflectivity” as a requirement for charges to equal the marginal costs (in this case, the losses) that each generator imposes on the network.²³ “Cost reflectivity” appears to provide an additional objective or criterion. In practice it is a component of an overall commitment to efficiency. Setting charges (or in this case TLAFs) in a manner which reflects costs is a means to encourage efficient decisions by those paying the charges. It is not therefore a separate objective in any theoretical sense, but it provides an additional cross-check on the extent to which a proposal encourages efficient decisions by market participants.²⁴
29. Similarly, references to the need for the TLAF system to be “consistent with” other charges – in particular the shallow connection costs mentioned by the RAs – may be regarded as a statement of intent to ensure that charges reflect underlying costs and do not overlap or omit costs. Even references in the high level principles to “competition” and “non-discrimination” can be regarded as tools intended to promote efficient outcomes.
30. I therefore regard a number of these objectives as contributing to, or components of, an overall efficiency objective. I am familiar with such definitions of efficiency as an objective of regulatory (and other) decision-making. Cost-benefit analysis is intended to provide a tool for estimating the efficiency of different proposals on a consistent basis. I would therefore expect the RAs to provide a thorough and consistent review of the efficiency of each proposal, including a consideration of costs and benefits.

3.3.2. Predictability

31. Each of the documents above places some weight on “predictability” and related concepts, such as “transparency” and also “reduced volatility”. However, I believe that there is some confusion in the RAs’ documents over the definition of these terms and their proper place in regulatory decision-making procedures. In particular, the desire to avoid volatility may have unintended and undesirable consequences for the achievement of the other objectives.
32. The reference to “volatility” is not found in the high level objectives of market design, although they do refer to “stability”. The RAs’ Proposed Decision Paper of 2010 includes “predictability” as its seventh principle, but the text mentions “volatility” as a major concern and refers back to the objectives of the workstream as “increased predictability and transparency and reduced volatility for market participants (as well as cost reflectivity and efficient location).”²⁵ Volatility therefore appears as a concern to be addressed, without being stated as an explicit objective or decision criterion.

²³ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *All-Island Transmission Use of System Charging & Loss Factors – Response Paper*, 16 January 2009 (SEM-09-001), page 6, section 2.1, bullet 4.

²⁴ As noted above, it is possible to conceive of an arrangement under which the system operator has the role of ensuring an efficient dispatch and its reward depends on the costs of its decisions. Under this arrangement, responsibility for efficient dispatch is reallocated to a different party, but the incentive to achieve an efficient dispatch still relies on the responsible party facing “cost-reflective” charges.

²⁵ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), sections 1.2 and 2.4.3.

33. In practice, I would have expected this desire to address questions of volatility to be covered adequately by references to predictability and transparency, such that there is no need for any additional objective relating to volatility, or a desire for charges (and loss factors) to be stable.
34. My view of the balance between efficiency and stability of pricing is shared by several writers on regulatory decision-making. One of the most pre-eminent was James C. Bonbright, a regulatory lawyer who was active in the United States from the 1920s until his death in the 1980s. He set down his experience in a seminal work entitled “Principles of Public Utility Rates”,²⁶ in which he included criteria for setting utility tariffs. These criteria apply equally to any regulatory decisions about prices (or “rates” in US parlance), including decisions about centralised electricity markets. Among these criteria, he included “stability and predictability of rates”, on which he had the following to say:

“In rate-making, the attribute of *predictability* is more important than *stability* per se. Time-of-use rates, for example, are not stable (in a strict sense), but are predictable and, most would agree, desirable. One could certainly argue that ratepayers should be given the information they need to *predict* rates accurately. However, this does not imply a necessary need to keep rates stable at the expense of otherwise efficient pricing.”²⁷

35. This reasoning applies equally to the factors or rates used to allocate transmission losses. If transmission system conditions are volatile, the objectives of efficiency and cost reflectivity would require TLAFs to be volatile, in order to provide up-to-date pricing signals, although they should be calculated by a stable and transparent *method*. After all, the general level of energy prices is extremely volatile and yet the purpose of setting up a market like the SEM is to provide a predictable method of setting up-to-date pricing signals for energy that encourage efficient decisions. I see no reason why the same objectives should not apply to the transmission losses component of the energy price earned by a generator.
36. Market participants can hedge the risks implied by volatile energy market prices through the use of long term energy contracts. The RAs have not considered any similar mechanisms for hedging the variation in transmission losses. However, if they did, they might reach different conclusions as to the relative merits of each proposal, i.e. the extent to which they offered long term hedging, as well as promoting efficient dispatch in the short term.

3.4. Conclusion

37. Although the different documents I reviewed used different terms to describe their decision-making criteria or objectives, I conclude that they all show a commitment to efficiency and predictability. Most of the additional criteria or objectives provide further methods of checking that a proposal contributes to these wider aims. References to the desire to avoid volatility seem to place undue emphasis on the stability of prices (and TLAFs in particular), as opposed to stability and transparency in the method of calculation, as a component of

²⁶ Bonbright J C, Danielsen A L, and Kamerschen D R, (1988): “*Principles of Public Utility Rates*”, Public Utilities Reports, Inc, Arlington, VA, 1988. Many other texts on similar topics refer back to this book.

²⁷ Bonbright J C, Danielsen A L, and Kamerschen D R, (1988): “*Principles of Public Utility Rates*”, Public Utilities Reports, Inc, Arlington, VA, 1988, page 387.

predictability. In conditions where the underlying costs are vary from time to time, attempts to give undue weight to the stability of prices will conflict with the objectives of efficiency (both short and long term), cost-reflectivity and competition. If the RAs wish to protect long term investors against major shifts in TLAFs, they need to consider methods of “hedging” TLAFs and whether each option offers a proxy for such methods. In any case, I conclude that the RAs should apply their criteria in a thorough and consistent way to all the competing proposals, in order to provide an objective justification for their decision.

4. Proposals for Reform of TLAFs

38. In this chapter, I describe the options considered by the RAs. I then review the process by which the RAs evaluated the options considered in the Proposed Decision Paper, to see how consistently and thoroughly they applied the decision criteria discussed above.

4.1. Options Considered by Regulatory Authorities

39. The RAs' Proposed Decision Paper followed an earlier paper published the System Operators' which detailed the options for reform.²⁸ The RAs evaluate two of the options for reforming the TLAFs considered by the system operator, as well as options not evaluated by the system operator. The RAs evaluate the following short-term options for reform of the TLAFs:²⁹

- § Maintaining the current TLAF Methodology (“Status Quo”);
- § Differentiating between fixed and variable losses (“Fixed vs Variable”);
- § Uniform TLAF (as considered by the SOs) (“Uniform”);
- § Multiplicative scaling of the TLAFs (“Multiplicative”);
- § Iteration of the generation dispatch model which generates TLAFs (“Iteration”), and;
- § Compression, as defined by the SOs – see section B.2 (“Compression”).

40. The RAs also briefly consider both long term options proposed by the SOs – i.e. “splitting the uniform loss factors” (separating dispatch from payments) and the TSOs purchasing the losses (and presumably recovering them from network users).³⁰ The SOs did not specify these options in any detail so it is not clear what system the RAs have in mind for these cases. I therefore focused my review on the other options. I note only that the RAs propose to rely on cost-benefit analysis (i.e. measuring efficiency) for assessing the option of “splitting” but not for other choices, and that they reject the purchasing of losses for reasons of practicality or delay, even though such criteria were not explicitly listed in the evaluation criteria for this workstream.

4.2. Evaluation of Options by Regulatory Authorities

41. Two statements from the “Proposed Decision Paper” offer some limited insight into how the RAs made their decision. Firstly, the RAs claim that the “critical principle that the RAs are adhering to is that reform will only be progressed if it offers progress toward a preferred long

²⁸ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, page 33. I summarise the options reviewed in this paper, and the SOs' evaluation of them, in Appendix B.

²⁹ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.3, [no page numbers provided in document]

³⁰ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.2, [no page numbers provided in document]

term solution or is an improvement on the existing TLAFs from the point of view of the objectives set at the start of this workstream.”³¹ Secondly, within those objectives, “the principal objective of transmission losses arrangements is to deliver efficient generation dispatch in an optimised close to real-time fashion.”³²

42. It is not clear to me how the RAs can tell whether any short term proposal “offers progress toward a preferred long term solution”, since the RAs claim not to have settled upon a long term solution yet. This phrase therefore hints at a poorly structured (or non-transparent) decision-making process. Moreover, I find it hard to reconcile the RAs’ eventual decision to adopt uniform TLAFs with the statement that “the principal objective of *transmission losses arrangements* is to deliver efficient generation dispatch” [emphasis added], since there is no theoretical reason why adopting a uniform TLAF would deliver efficient dispatch and no empirical evidence to support the RAs’ decision.
43. Despite these claims to be relying on the “objectives set at the start of the workstream” the RAs do not explicitly use these objectives as criteria for evaluation (discussed in section 3.2). Instead, the RAs highlight advantages and disadvantages of each option in turn. The discussion of each option highlights only a limited number of such advantages and disadvantages, rather than using a consistent list of decision criteria each time. Some of these advantages and disadvantages correspond to criteria set out by the RAs in other documents, whilst others do not. I describe and comment on the evaluation of each option below.

4.2.1. Status Quo

44. The RAs state that they felt that the option of “maintaining the current approach would not be in keeping with a number of the RA’s objectives outlined in SEM-09-001” i.e. those objectives outlined in section 3.2 above.³³ The RAs provided three reasons for this decision:³⁴
- (1) “the current TLAF methodology is sensitive to changes in dispatch scenarios and changes in the generation mix/location;”
 - (2) “overly punitive losses” could be “attributed to particular generators;” and
 - (3) “in the interest of promoting fairness, stability and predictability, the RAs were focused on addressing the sensitivity issues of the current methodology”.

³¹ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.3, [no page numbers provided in document]

³² Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.1, [no page numbers provided in document]

³³ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.3, [no page numbers provided in document]

³⁴ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.3, [no page numbers provided in document]

45. The first and third of these reasons relate to the question of the predictability/stability of the TLAFs. However, the RAs do not provide any standard for judging whether losses are “overly punitive”.
46. The RAs provide no explicit evaluation of the status quo by reference to an efficiency criterion. The RAs mention in their discussion of other proposals that the current TLAFs are “the ex-ante average factors for day and night, summer and winter”,³⁵ whereby they mean that TLAFs are set equal to ex ante estimates of marginal rates averaged over a number of hours in each month. The RAs assert that “it is possible that these [averaged TLAFs] are not much more representative of real time losses than a uniform loss factor.”³⁶ However, they do not provide any estimate of the difference between the TLAFs and real time losses, or of the efficiency loss due to this inaccuracy, or any empirical standard of efficiency against which this and other proposals can be judged (such as the total costs of generation).

4.2.2. Fixed vs Variable

47. The RAs argue that because “the TSOs have not been able to provide the RAs with an exact breakdown of losses between fixed and variable on the All-Island system... differentiating between fixed and variable losses is not appropriate as a short term option.”³⁷ Since the RAs do not describe their evaluation of TLAFs with fixed and variable components in terms of the criteria they have set out, it is unclear which criteria they are applying. The RAs may mean that the difficulty of separating fixed losses from variable losses prevents the scheme from being implemented in a predictable and transparent fashion, i.e. that it could only be implemented on the basis of subjective or arbitrary judgements. Alternatively, the reference to TLAFs with fixed and variable components as “not appropriate as a short term option” might imply that the RAs accept this option as suitable in the long term, but are rejecting it as a short term solution, because it is not capable of a timely introduction, which is not a criterion they have set out for this workstream (or formally assessed).

4.2.3. Uniform

48. This option is the RAs’ preferred solution. The RAs evaluate uniform TLAFs in section 2.4.4 of the Proposed Decision Paper, but in practice most of this evaluation consists of a review of locational loss factors, with uniform TLAFs appearing as the alternative. I discuss this evaluation further below, because it relates to the appraisal of other options as well.

³⁵ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.4, [no page numbers provided in document]

³⁶ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.4, [no page numbers provided in document]

³⁷ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.3, final paragraph.

4.2.4. Multiplicative

49. The RAs write that they “are of the view that the adoption of the multiplicative approach would not significantly address the shortcomings of the current methodology”.³⁸ However, I could not find any obvious application of defined decision criteria to this option, except to the extent that it represents one variant of the “compression” option discussed elsewhere.

4.2.5. Iteration

50. The RAs state “this would not deliver a significant change in the final TLAFs” and therefore “was not the source of the problem i.e. a large range of TLAFs.”³⁹ The RAs also argued it was “impractical” as it would take too long to calculate.
51. The RAs do not define what they mean by “a large range of TLAFs”; for example, it is not clear to me whether they mean large differences between TLAFs in different locations at any one time or large variations in TLAFs in the same location over a short period (i.e. volatility) or large variations in TLAFs over a longer period (i.e. trends). Each problem is of a different nature and merits (if any) a different solution. By failing to describe the problem in unambiguous detail, the RAs make it difficult – or even impossible – to ensure that the proposed solution is an appropriate remedy.

4.2.6. Compression

52. The RAs state that although this approach “would reduce volatility... in certain cases the short term efficient dispatch may be reduced.” The RAs also argued that “cost reflectivity would be diluted.”⁴⁰ The RAs uses these observations to reject the compression of TLAFs as an option. However, uniform TLAFs merely represent the most extreme form of compression, i.e. compression of differentials between TLAFs to the point where they are all equal. The RAs’ criticisms of the Compression option should therefore have caused even greater concern in relation to the Uniform option.
53. I cannot see any recognition of this relative ranking in the Proposed Decision Paper, which is surprising, given the supposed emphasis on efficient dispatch stressed at the start of the document. The failure to recognise this point implies that the RAs have not carried out a consistent or comprehensive appraisal of each option, and that their appraisal uses evaluation criteria in a selective or arbitrary manner.

³⁸ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.4.

³⁹ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.3.

⁴⁰ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.3.

4.3. Conclusion

54. According to the analysis set out in the Proposed Decision Paper, the RAs have not carried out a thorough or consistent evaluation of the various options under consideration by reference to efficiency and related criteria. They present efficiency arguments for rejecting some options which apply even more strongly to the option that they propose to select, with no objective justification for the final ranking.
55. They also define and apply criteria which do not properly apply to regulatory decision making, namely a design to narrow the range of TLAFs and/or to produce stable TLAFs. These aims conflict with efficiency and do not correspond to a proper definition of a “stable and predictable” approach, which should apply to the method of calculation, not to the results.
56. The Single Electricity Market Northern Ireland Order, requires the SEM Committee to “have regard to... any other principles appearing to it to represent the best regulatory practice.”⁴¹ I would define “best regulatory practice” as decision-making that is transparent and objective, in which the regulator evaluates all options against pre-specified criteria and the regulator designs its criteria in order to ensure it takes decisions on the basis of objective evidence, including economic costs and benefits.⁴² The RAs failed to meet this standard in their decision making.
57. I therefore conclude that the evaluation process carried out by the RAs is not thorough or consistent, does not provide an objective justification for their eventual decision and does not correspond to best regulatory practice.

⁴¹ UK Statutory Instrument, 2007 No. 913 (N.I. 7) NORTHERN IRELAND, *The Electricity (Single Wholesale Market) (Northern Ireland) Order 2007*, article 9 para 7

⁴² In June 2008, the CER stated that “A full RIA will be carried out for all major CER consultations with a less formal process applying to all other issues.” See Commission for Energy Regulation, *Review of CER Public Consultation Process – A Response and Decision Paper*, CER/08/089, 6 June 2008, page 17.

5. Discussion of Locational Loss Factors

58. The RAs do not argue the case for a uniform loss factor by evaluating uniform loss factors against the objectives set out at the start of the work stream. Instead, much of the rationale for selecting the Uniform option derives from a critique of locational loss factors set out in section 2.4.3 of the Proposed Decision Paper.⁴³ Below, I review the arguments made in that section and set out my response to them.
59. The RAs state the motivation for *locational* loss factors is:
1. “to ensure economic dispatch”, and
 2. to send a “market signal” to generators to locate where they “minimise losses” and “ensure that the transmission system is developed efficiently.”
60. The RAs then list a number of reasons why the current locational loss factors and options for reform do not satisfy these objectives. The RAs use the perceived failings in the current system to justify support for uniform loss factors, without making the case for uniform loss factors. I discuss these reasons in turn below.

5.1. Economic Dispatch

61. The RAs set out the following argument in the Proposed Decision Paper in relation to economic dispatch (i.e. the efficient operation of the existing fleet of generators):
- “...the loss factors currently used are the ex-ante average factors for day and night, summer and winter as described above. It is possible that these are not much more representative of real time losses than a uniform loss factor would be especially in future scenarios with large quantities of wind generation... As regards the possible use of real time loss factors it may be the case that the perceived difficulty and possible high associated cost (getting higher the closer to ‘real time’ one aims), the likely risk around the ability to calculate these accurately and the probably low impact on actual losses on the all-island system, that real-time loss factors may not be a feasible option...”
62. This argument is speculative, since the RAs state only that “it is possible” that the current (ex ante average day/night, summer/winter) loss factors are “not much more representative” of real time losses than a uniform factor. This argument implicitly accepts that the current factors are more representative of real time losses (i.e. more cost reflective) than a uniform factor, but also implies that the associated benefit is not enough to offset some other disadvantage. In order to make a fully informed decision as to relative efficiencies, the RAs would have needed to compare the total costs of generation (adjusted for any effects on consumption) in both scenarios, in order to gauge the size of the associated benefit. I found no consideration of any such analysis in the Proposed Decision Paper.

⁴³ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.3.

63. I also note that the RAs have changed their view since December 2009, when they were reviewing the TLAFs to be applied in 2010, without explaining why. In their December 2009 decision paper, the RAs state that the current methodology calculates TLAFs in advance but should achieve the most “cost effective” dispatch on average:

“The purpose of ex-ante TLAFs calculated by this method and that are reflected in a generator’s commercial offer data is to ensure that the System Operators make the correct dispatch decisions regarding the marginal plant on the island in any given trading period. Given the increasing volumes of wind on the system, the RAs acknowledge that there is a limit to how effective an ex-ante calculation of marginal losses can be. However **this method should produce the most cost effective dispatch for customers on average in each month.**”⁴⁴
[emphasis added]

64. In the same decision paper, the RAs explain that uniform TLAFs would not comply with the objectives for efficient dispatch without splitting the TLAFs for dispatch and for payment purposes:

“The option of uniform TLAFs is explored in the System Operators’ preferred options paper. **This would only comply with the requirement on the System Operators to dispatch at the lowest total cost, if they were able to include losses in their optimum dispatch algorithms separately from the submitted Commercial Offer Data.**”⁴⁵ [emphasis added]

65. These extracts show that, in December 2009 at least, the RAs believed that uniform TLAFs led to less cost-effective (i.e. less efficient) dispatch than the current methodology. I have not found any evidence presented by the RAs to explain why they should now take a different view. If their preference for uniform TLAFs is based on an assumption that efficient dispatch can be assured through “splitting”, the basis of their decision may be prejudicial in the current context, since they propose to consider “splitting” later, as a long term option.

5.2. Signals to Generators

66. The RAs state that “one would assume” that locational loss factors “should give a strong signal to generators to locate at sites which minimise system losses and which drive efficient system development, i.e. does not result in a wide spread system and one which is more vulnerable to losses”. They then recount several arguments made by respondents indicating that the locational signal either is not beneficial or brings greater costs than benefits. I record the arguments, as set out in section 2.4.4 of the Proposed Decision Paper, and my observations on them below.

⁴⁴ RAs, *Single Electricity Market Transmission Loss Adjustment Factors for 2010 – Decision Paper*, (SEM-09-113), 17 December 2009, page 14

⁴⁵ RAs, *Single Electricity Market Transmission Loss Adjustment Factors for 2010 – Decision Paper*, (SEM-09-113), 17 December 2009, page 15

5.2.1. Instability

“The current methodology is extremely sensitive to changes in dispatch scenarios and changes in the generation mix and location... The signals provided are not stable and therefore not effective in delivering the desired outcome...”⁴⁶

67. As outlined above (see list in section 3.2), stability is not an objective specified at the start of this work stream. However, predictability does feature in the list of objectives and the RAs’ High Level Design decision paper, published in 2005, lists stability as one of the six criteria for the design of the Single Electricity Market.
68. I have discussed above how calculating charges by a stable and predictable method is important, but also how the charges themselves need not be stable. The variability of pricing signals does not normally provide any reason to hide them. (The RAs do not, for instance, recommend a uniform or constant electricity price, despite the wide variations observed in recent years.) In fact, the variability of TLAFs may in itself be a useful signal, which encourages generators to invest in a more flexible or more diversified portfolio of generation capacity.
69. There is one aspect of electricity market design that the RAs do not discuss in the Proposed Decision Paper, namely contractual methods of stabilising costs for investors. The literature on “nodal spot pricing” (i.e. the general model of locational electricity pricing) contains much discussion of “financial transmission rights” or “FTRs”, i.e. a contractual device for stabilising the *total costs* of a network user, whilst leaving in place the *incentives* provided by locational signals.⁴⁷ The “PJM” electricity market in the United States offers a portfolio of FTRs so that participants can hedge the price risks associated with losses and congestion within the network.⁴⁸
70. The possibility of nodal spot pricing has already been considered and rejected for the All-Island electricity market, but the associated methods of stabilising network charges could still play a role in relation to a component of transmission costs, such as TLAFs. For example, the Iberian market operator, OMEL, does not offer a whole portfolio of financial transmission rights, but recently auctioned some for capacity on the interconnector between Spain and Portugal.⁴⁹ Because the RAs have not at least investigated these mechanisms, they have overlooked a possible remedy which would reduce market participants’ exposure to volatile TLAFs whilst retaining efficient pricing signals.

⁴⁶ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.4 [no page numbers provided].

⁴⁷ The precise form of these rights would need to be specific to the SEM. The general principle is that the contract replaces a volatile TLAF with a *fixed contractual loss factor* for a *fixed quantity* of electricity. If the generator produces exactly that quantity of electricity, its costs will be determined by the fixed contractual loss factor and therefore stable. However, if the generator decides to produce more or less than that fixed quantity, any variation in output above or below the fixed quantity attracts the current TLAF, which maintains the proper incentive for efficient dispatch.

⁴⁸ Source: PJM website, <http://pjm.com/markets-and-operations/fttr.aspx>, viewed 9 July 2010.

⁴⁹ Source: OMEL Subastas website, 24 June 2010.

5.2.2. Lack of Locational Choice

“On the Island of Ireland generators have little or no choice where to locate. However they can choose whether or not to go ahead with their projects or to exit the market...the RAs are of the view that concern should only be raised in cases where overall losses, the network costs or the wholesale market costs are higher, with one portfolio of projects as opposed to another.”⁵⁰

71. I find the first sentence in this extract hard to believe (and the RAs provide no explanation as to why parties involved in the consultation appeared to believe that generators have little or no choice over where to locate), but in any case it seems to be contradicted by the second sentence. If generators can choose whether or not to proceed with a project, locational signals may determine which generators proceed with their projects and which do not. The final sentence also implies that there is some choice over location, i.e. over “one portfolio of projects as opposed to another”, and that they differ in their effects on losses and costs. In practice, the ability to relocate will vary from project to project. Whilst renewable projects may have to accept a limited range of possible sites, new conventional thermal generation projects will still face a range of choices over their location. Therefore it will be important to preserve locational signals.

5.2.3. Locational signals through other charges

“...use of system costs need to have a locational element to reflect the cost of system development but this is a separate issue to the TLAFs.”⁵¹

72. As the RAs state, this is a separate issue. Any allocation of transmission losses needs to be consistent with the signals provided by other charges (See paragraph 29 above.), but this topic raises no new matters for consideration.

5.2.4. Grid plan already developed

“The long term system development plan has already largely been set and to a large extent generators will locate where the grid is being built, rather than vice-versa...”⁵²

73. As discussed above, it seems unlikely to me – and apparently to the RAs – that investment in generation capacity – and in networks – is completely predetermined for the foreseeable future. Some investments will have been committed, but there is always some flexibility to adapt to changing conditions, or else the electricity system could never be efficient by any standard. If future developers indicate a preference to locate new generation capacity in new areas for economic reasons, investment in the grid will follow. It therefore remains important

⁵⁰ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.4 [no page numbers provided].

⁵¹ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.4 [no page numbers provided].

⁵² Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.4 [no page numbers provided].

to give developers a signal about the economic costs of locating new plant in different locations.

5.2.5. Increased cost of capital outweighs locational signal

“The risk associated with loss factors which vary from year to year and which impact significantly on generators (sic) income, raises the cost of capital for generation projects.”⁵³

74. This argument raises a number of complex issues and I offer only summary responses.
75. First, variations in a cost or price do not necessarily raise a project’s cost of capital according to economic theories such as the Capital Asset Pricing Model (CAPM). The RAs (and many other regulators) have used this model to determine the cost of equity and also to query whether variation in TLAFs raises the cost of capital.⁵⁴ However, other theories of the cost of capital do explain how regulatory risk increases the cost of attracting capital into new projects, or provides an incentive to delay investment (which amounts to the same thing).
76. In the current context, investors must consider the impact of regulatory decisions on the profitability of individual investments. If investors see that regulators change the market rules from time to time to achieve objectives that are not completely defined, or poorly explained, they have an incentive to wait-and-see how decisions about market rules evolve in the long run. If they can discern a pattern in such decisions, they will learn how the regulator is likely to take future decisions, and they will be better able to select investments that are profitable.
77. Understanding regulatory decision-making offers a benefit to investors because investments in projects like generation capacity are *irreversible*. Once an investor has committed funds to an irreversible investment, it is impossible (or costly) to withdraw the investment when new information shows that it was a mistake (i.e. will be unprofitable – such investments are often referred to as “sunk costs”). Investors have an incentive to wait until they better understand the regulatory decision-making process (or any other source of uncertainty). This incentive to wait discourages investment and is equivalent to a rise in the cost of capital.
78. The decision to commit funds to an irreversible investment is akin to calling an option contract, so this theory is known as the “real options” theory of the cost of capital. It is important in the context of regulatory decisions like the current one on TLAFs. If the decision is not fully explained (or justified by incomplete analysis that does not offer an objective explanation), investors will fear that:

⁵³ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed RAs Option for All-Island Harmonised Transmission Loss Adjustment Factors (TLAFs) – Proposed Decision Paper*, 18 June 2010 (SEM-10-039), Section 2.4.4 [no page numbers provided].

⁵⁴ In 2006, the RAs referred to work by OXERA which described the risks associated with zonal transmission losses in Great Britain as “diversifiable” and thereby unrelated to the cost of capital under the CAPM. However, the RAs also offered to keep the issue “under review”. See All-Island Project (2006), *The Single Electricity market: Treatment of Transmission Losses – Decision Paper*, AIP/SEM/112/06, August 2006, pages A.12-A.13.

1. they do not understand what factors are really driving regulatory decisions, and;
2. they do not know what kind of investment will be profitable.

The RAs' decision to implement uniform TLAFs in the short run, with the prospect of further reforms in future, creates uncertainty about the regulatory environment over the life of any investment project. The uncertainty is compounded by the lack of a thorough and consistent evaluation to provide an objective justification for the decision (and hence a basis for predicting future decisions). The prospect of further, unpredictable reforms increases the value of waiting to see what regulatory policy emerges. These conditions drive up the cost of capital, because they mean that developers must offer investors higher returns to overcome their desire to wait. Ultimately, of course, it is the returns demanded by investors that define the actual cost of capital (not any particular calculation or model).

79. Regulators have at their disposal a number of tools to overcome the problem of regulatory risk. First, they can demonstrate that any market design is robust, by reaching decisions transparently and in accordance with a set of objectives that will remain stable in the long term. As indicated above, the Proposed Decision Paper falls short of that standard in a number of respects. Second, regulators can offer investors some kind of protection against the windfall gains and losses that arise from regulatory decisions; when changing TLAFs, the RAs could offer generators an offsetting change in network charges or a financial transmission right in which the contractual loss factor is set equal to the previous TLAF (see paragraph 69). The Proposed Decision Paper does not provide any consideration of these possibilities.

5.3. Conclusion

80. The RAs have justified their preference for uniform loss factors by dismissing the benefits of locational loss factors, and by highlighting the supposed difficulties caused by their volatility. In the Proposed Decision Paper, the RAs do not support their arguments with any empirical analysis. Having examined the RAs' arguments against locational loss factors, I find them to be unconvincing and even self-contradictory.
81. I note the RAs' concern over the volatility of TLAFs and I discussed above the position of such concerns in a list of objectives or criteria for regulatory decision-making. I also found that the RAs did not consider a number of alternative remedies to the problem of volatility and the desire of investors to hedge against long term variation in TLAFs.
82. Finally, I note that the RAs are running the risk of discouraging investment by making a poorly justified decision, if it causes investors to adopt a wait-and-see policy in case further, unpredictable reforms follow in the coming years.

6. Conclusions and Closing Statements

6.1. Conclusions

83. Viridian has asked me to review the Proposed Decision Paper on transmission loss factors in the Single Electricity Market for the island of Ireland. I set out my conclusions below.

6.1.1. Background (Chapter 2)

84. I conclude that the RAs' Proposed Decision Paper must be seen against the background of these previous discussions of transmission losses. Since the RAs are now proposing to change the system, so a transparent decision-making procedure would provide some explanation of the reasons for overturning previous decisions.

6.1.2. Criteria for Assessment of Options (Chapter 3)

85. Although the different documents I reviewed used different terms to describe their decision-making criteria or objectives, they all show a commitment to efficiency and predictability. Most of the additional criteria or objectives provide further methods of checking that a proposal contributes to these wider aims. References to the desire to avoid volatility seem to place undue emphasis on the stability of prices (and TLAFs in particular), as opposed to stability and transparency in the method of calculation, as a component of predictability. In conditions where the underlying costs vary from time to time, attempts to give undue weight to the stability of prices will conflict with the objectives of efficiency (both short and long term), cost-reflectivity and competition. If the RAs wish to protect long term investors against major shifts in TLAFs, they need to consider methods of "hedging" TLAFs and whether each option offers a proxy for such methods.
86. In any case, I conclude that the RAs should apply their criteria in a thorough and consistent way to all the competing proposals, in order to provide an objective justification for their decision.

6.1.3. Proposals for Reform of TLAFs (Chapter 4)

87. According to the analysis set out in the Proposed Decision Paper, the RAs have not carried out a thorough or consistent evaluation of the various options under consideration by reference to efficiency and related criteria. They present efficiency arguments for rejecting some options which apply even more strongly to the option that they propose to select, with no objective justification for the final ranking.
88. They also define and apply criteria which do not properly apply to regulatory decision making, namely a design to narrow the range of TLAFs and/or to produce stable TLAFs. These aims conflict with efficiency and do not correspond to a proper definition of a "stable and predictable" approach, which should apply to the method of calculation, not to the results.

89. The Single Electricity Market Northern Ireland Order, requires the SEM Committee to “have regard to... any other principles appearing to it to represent the best regulatory practice.”⁵⁵ I would define “best regulatory practice” as decision-making that is transparent and objective, in which the regulator evaluates all options against pre-specified criteria and the regulator designs its criteria in order to ensure it takes decisions on the basis of objective evidence, including economic costs and benefits. The RAs failed to meet this standard in their decision making.
90. I therefore conclude that the evaluation process carried out by the RAs is not objective or consistent, does not provide a convincing rationale for the eventual outcome and does not correspond to best regulatory practice.

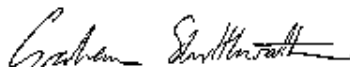
6.1.4. Discussion of Locational Loss Factors (Chapter 5)

91. The RAs have justified their preference for uniform loss factors by dismissing the benefits of locational loss factors, and by highlighting the supposed difficulties caused by their volatility. In the Proposed Decision Paper, the RAs do not support their arguments with any empirical analysis. Having examined the RAs’ arguments against locational loss factors, I find them to be unconvincing and even self-contradictory.
92. I note the RAs’ concern over the volatility of TLAFs and I discussed above the position of such concerns in a list of objectives or criteria for regulatory decision-making. I also found that the RAs did not consider a number of alternative remedies to the problem of volatility and the desire of investors to hedge against long term variation in TLAFs.
93. Finally, I note that the RAs are running the risk of discouraging investment by making a poorly justified decision, if it causes investors to adopt a wait-and-see policy in case further, unpredictable reforms follow in the coming years.

6.2. Closing Statements

94. I confirm that insofar as the facts stated in my report are within my own knowledge I have made clear which they are and I believe them to be true, and that the opinions I have expressed represent my true and complete professional opinion.

Signed



Graham Shuttleworth

⁵⁵ UK Statutory Instrument, 2007 No. 913 (N.I. 7) NORTHERN IRELAND, *The Electricity (Single Wholesale Market) (Northern Ireland) Order 2007*, article 9 para 7

Appendix A. Bibliography

All-Island-Project, *The Single Electricity Market: Treatment of Transmission Losses – Decision Paper*, August 2006, (AIP/SEM/112/06)

Bonbright J C, Danielsen A L, and Kamerschen D R, (1988): “*Principles of Public Utility Rates*”, Public Utilities Reports, Inc, Arlington, VA, 1988

Commission for Energy Regulation, *Treatment of Transmission and Distribution Losses*, 5 April 2000

Commission for Energy Regulation, *Review of CER Public Consultation Process – A Response and Decision Paper*, CER/08/089, 6 June 2008

Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, 26 November 2009, (SEM/09/107)

ESB (2003), *Review of Transmission Losses*, undated

Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed High Level Design*, 31 March 2005 (AIP/SEM/06/05)

Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), High Level Design Decision Paper*, 10th June 2005 (AIP/SEM/42/05)

Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *All-Island Transmission Use of System Charging & Loss Factors – Response Paper*, 16 January 2009 (SEM-09-001)

Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *Single Electricity Market Transmission Loss Adjustment Factors for 2010 – Decision Paper*, (SEM-09-113), 17 December 2009, page 14

Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *Single Electricity Market Proposed RAs option for all-island harmonised Transmission Loss Adjustment Factors (TLAFs) - Proposed Decision Paper*, 18 June 2010 (SEM/10/039)

UK Statutory Instrument, 2007 No. 913 (N.I. 7) NORTHERN IRELAND, *The Electricity (Single Wholesale Market) (Northern Ireland) Order 2007*

Appendix B. System Operators' Evaluation of Options

95. The consultation paper published by the System Operators (SOs) dated 26 November 2009 proposes and evaluates options for the “locational signals” in generation tariffs and losses on the island of Ireland.⁵⁶ Below I set out both the SOs’ objectives and the weights accorded to each one in their appraisal.

B.1. SO Objectives for TLAFs

96. The SOs outline six new options for tariffs, six new options for TLAFs and six “objectives” for the options assessed. They provide a brief description of each of these objectives:

1. “Efficiency: To encourage efficient use of the network and efficient investment in infrastructure in the long term. This means making decisions that take into account the total cost to the network and infrastructure. This is of interest to all stakeholders as it addresses the long term sustainability of the system;
2. Transparency: The provision of information and models to ensure full transparency of all methodologies. The publication of indicative tariffs and losses for a number of years;
3. Predictability: The methodologies should enable the prediction of tariffs and losses to within a reasonable level. This predictability should be for a number of years, however it would not extend to the full investment horizon;
4. Volatility: Where possible the methodologies should avoid dramatic year on year fluctuations, so as to give contradictory signals;
5. Short term efficient dispatch (applies to losses methodologies): Any losses method should ensure that the dispatch is as efficient as possible including efficient use of energy and minimization of unnecessary dispatches. In order to achieve this objective, it will be necessary to study the effectiveness of any proposal in line with suggestions from the wider industry; and
6. Cost Reflectivity: Any tariff methodology & losses methodology should be cost reflective in order to provide the correct economic signals and to facilitate competition”⁵⁷

The SOs also state that “In addition to the six objectives outlined above, all tariff and losses methodologies should seek to recover the allowed TUoS revenue and forecast quantity of losses.”⁵⁸

⁵⁶ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Location Signals on the Island of Ireland*, Version 1.0 Release, 26 November 2009 (SEM-09-17)

⁵⁷ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Location Signals on the Island of Ireland*, Version 1.0 Release, 26 November 2009 (SEM-09-17), page 12

B.1.1. SO Weights for Objectives

97. The SOs also provide weightings for these objectives used in their evaluation of the options for reforming “locational signals”. The SOs claim that these weightings “reflect the relative importance placed on each objective by a combination of industry, regulatory and SO input.”⁵⁹ The SOs do not provide further details about how they obtain these weightings from stakeholder input. The weightings for the six objectives for loss factors are:

Table B.1
Weightings for Objectives for Evaluating Loss Factors

Objectives	Weighting
Efficient Dispatch	0.25
Efficiency	0.20
Cost Reflectivity	0.20
Volatility	0.15
Predictability	0.15
Transparency	0.05

Source: Eirgid⁶⁰

B.2. Options Considered by System Operators

98. In their consultation paper dated 26 November 2009, the SOs propose the following alternative losses regimes:
1. **Rolling Average:** This is a simple rolling average of the existing TLAFs over 3 years.⁶¹
 2. **Banding:** The TLAF is “calculated as before” with addition of a further step.⁶² “Each value is normalised to fall into one of 5 different bands (0.96, 0.98, 1, 1.02 and 1.04).”⁶³
 3. **Compression:** The TLAF is calculated as before and then the SOs use an algorithm to retain the relative order of the TLAFs, whilst reducing the range of the highest and lowest TLAF.⁶⁴

⁵⁸ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Location Signals on the Island of Ireland*, Version 1.0 Release, 26 November 2009 (SEM-09-17), page 13

⁵⁹ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Location Signals on the Island of Ireland*, Version 1.0 Release, 26 November 2009 (SEM-09-17), page 12

⁶⁰ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, page 14, table 2

⁶¹ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, page 25

⁶² Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, page 27

⁶³ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, page 27

4. **Pure Uniform Loss Adjustment Factors:** The SOs socialise the transmission losses and allocate a single TLAF to all market participants.⁶⁵
 5. **Split Uniform Loss Adjustment Factors:** This method would separate the locational signal and loss recovery. It would operate by “removing the locational signal for losses from the market, introducing a uniform loss factor and modifying the systems which run the physical dispatch. Alternative means, which are not incorporated in the market should be devised to charge locationally for the losses e.g. through an additional component in the TUoS charge.”⁶⁶
 6. **Zonal Losses Adjustment Factors:** SOs define zones across which TLAFs would not vary.⁶⁷
 7. **Purchase of Losses:** SOs purchase the MW gap at the System Marginal Price.⁶⁸
99. The SOs state that not all of these options may be implemented in the short term. According to the SOs, option 5 “is appropriate to implement in the medium term” whilst option 7 “is a long term option and due to infrastructural changes cannot be completed in the short term.”⁶⁹
100. The SOs evaluate each of the options presented using their six criteria. For each criterion they award each option a score between one and five. They multiply each of these scores by the weighting they assign to each criterion to produce a weighted average score for each option (see scores for all seven options and the status quo, labelled “TLAF”, in Table B.2). This process awards the highest score to the option of “Compression”.

⁶⁴ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, page 28

⁶⁵ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, page 33

⁶⁶ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, page 34

⁶⁷ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, page 35

⁶⁸ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, page 37

⁶⁹ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, pages 34 & 37

**Table B.2:
SOs Evaluation of Losses Options**

Objective	Weighting	Losses Options							
		Short Term						Medium/Long Term	
		TLAF	Rolling Av	Banding	Compression	Zonal	Uniform	Splitting	Purchase
Efficient Dispatch	0.25	4	2	2	3	2	1	5	5
Efficiency	0.20	2	3	4	4	2	3	3 - 5 ³³	3 - 5
Cost Reflectivity	0.20	4	2	2	3	1	1	1 - 5	1 - 5
Volatility	0.15	1	3	3	3	3	5	1 - 5	1 - 5
Predictability	0.15	1	3	3	2	3	5	1 - 5	1 - 5
Transparency	0.05	3	3	3	3	2	4	1 - 5	1 - 5
Total		2.65	2.55	2.75	3.05	2.1	2.75	2.4 - 5	2.4 - 5

Source: System Operators⁷⁰

⁷⁰ Eirgrid & SONI, *Preferred Options to be considered for the Implementation of Locational Signals on the Island of Ireland – Consultation Paper*, Version 1.0 – Release, (SEM-09-107), 26 November 2009, page 68

Appendix C. Criteria in Proposed High Level Design Paper

The Regulatory Authorities describe their criteria for assessment in greater detail in the High Level Design Decision Paper published on 31 March 2005. We reproduce here the relevant description:

“Security of Supply

The chosen market design should facilitate the operation of the system in a secure manner. The market should meet the reasonable demands of final customers.

Stability

It is important for reasons of investor confidence that the trading arrangements should be stable and predictable throughout the lifetime of the market. Stability may also refer to the extent that a design should result in prices that are efficient and sustainable in the longer term.

Efficiency

Efficiency is the extent to which the market design encourages economic dispatch leading to the appropriate amount of electricity being produced/consumed by the appropriate producers/consumers. Market design should in so far as it is practical to do so, the most economic dispatch of available plant.

Practicality

The practicality of the market refers to the cost of implementing and participating in the wholesale market arrangements. This also refers to the extent to which the market design lends itself to an implementation that is well defined, timely and reasonably priced.

Equity

This criterion refers to the degree that the market design allocates the costs and benefits associated with the production, transportation and consumption of electricity in a fair and reasonable manner.

Competition

Competition refers to the extent to which the trading arrangements incentivise appropriate investment and operation within the market and more specifically the extent to which the market does not provide barriers to entry or exit. A key determinant of this conduciveness to competition is an assessment of the extent to which the market outcomes and allocation of the costs and benefits associated with the production, transportation and consumption of electricity is

clear and can be seen objectively. From a participants perspective it relates to seeking dispatch at the most opportune time and to the optimal capacity in order to maximise profits.

Environmental

It cannot be assumed that every market design will facilitate renewable generation. Though the Regulatory Authorities accept that a market cannot be designed specifically around renewable generation, any trading arrangements introduced should have due regard to generation from renewable sources. This criterion refers to whether or not the selected all-island wholesale market design model is conducive to renewable energy generation involvement. It also refers to whether or not the design supports CHP and demand side participation.

Adaptive

It is also important that the trading arrangements implemented allow for slight changes to be made in order for the market to develop. For these reasons the evaluation framework includes this further criterion. This criterion refers to whether or not a market design provides an appropriate basis for the development and modification of the arrangements in a straightforward and cost effective manner.”⁷¹

⁷¹ Northern Ireland Authority for Utility Regulation and Commission for Energy Regulation, *The Single Electricity Market (SEM), Proposed High Level Design*, 31 March 2005 (AIP/SEM/06/05), pages 38-39

NERA

Economic Consulting

NERA Economic Consulting
15 Stratford Place
London W1C 1BE
United Kingdom
Tel: +44 20 7659 8500
Fax: +44 20 7659 8501
www.nera.com