

17 August 2007

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SUBMISSION ON THE CALCULATION OF LOSS FACTORS AND THE USE OF LOSS FACTORS FOR RECONCILIATION PURPOSES CONSULTATION PAPER

- 1 Orion welcomes the opportunity to submit on the calculation of loss factors and the use of loss factors for reconciliation purposes consultation paper (*the paper*).
- 2 Our submission is in five parts:
 - 2.1 recommendations on a process to calculate loss factors and use them for reconciliation purposes;
 - 2.2 reasons for our recommendation;
 - 2.3 general comments;
 - 2.4 our response to the specific questions raised in the paper, which we set out in the schedule to this submission; and
 - 2.5 redrafted guidelines.
- 3 At a practical level distributors should be responsible for technical losses only, as distributors only have control over these physical losses. The balance of unaccounted for energy (UFE) is the retailer/purchaser responsibility.
- 4 We therefore consider that a methodology and guidelines should be formulated broadly consistent with Option Four as presented by Commission, but with significant modifications, to substantially improve on the existing regime.

Our recommended process – modified version of Option Four

- 5 We recommend the following process to calculate loss factors and use them for reconciliation purposes.
- 5.1 Distributors should derive and publish technical loss factors. These should meet minimum requirements, such as different factors for LV and HV metering and be reviewed at least within 5 years. Any further differentiation of technical loss factors should occur only as a result of a preference expressed by all retailers involved.
 - 5.2 The technical loss factors should apply to a distributor's complete network with multiple GXPs although, if there are significantly different loading patterns (e.g. summer vs winter loading) or significantly different network architectures (e.g. overhead vs underground reticulation), then the distributor may publish further factor differentiation, subject to consultation with the retailers. We would expect their accuracy to align with a loss ratio uncertainty of the order of $\pm 1\%$. For example, a distributor could determine its network loss ratio as $5 \pm 1\%$.
 - 5.3 Technical losses should account for the standing losses of the zone substation and distribution transformers and the variable heating effects of the resistance in the delivery conductors. The resistive losses are proportional to the square of the current and occur in the high voltage (HV) and low voltage (LV) network conductors, the zone substations and distribution transformers and a small component representing the energy used in substations/kiosks to maintain the appropriate environmental conditions for the network equipment and to maintain the correct functioning of protection and other equipment.
 - 5.4 Distributors must publish and justify their derivation, which must be transparent. In due course, this derivation will most likely be based on network modelling.
 - 5.5 The Reconciliation Manager (RM) should determine the UFE on the basis of the difference between the GXP volumes and the adjusted sales volumes reported by retailers (i.e. after application of the technical loss factors). The RM scales-up the reported volumes per GXP across all retailers to allocate the UFE equitably amongst all retailers.
 - 5.6 The RM should report routinely on the UFE proportion¹ to the Commission for its monitoring and review. The Commission could investigate with retailers any concerns it has over the results. As part of this investigation, the Commission may also consider the distributor's technical loss factors and include the distributor in this investigation if its factors appear to contribute towards the Commission's concerns.

¹ 'UFE proportion' is the ratio of UFE to input energy volume, expressed as a percentage

- 5.7 The Commission should publish a summary of all technical loss factors and UFE proportion annually for public review.
- 6 In our view, this process appropriately involves the various parties according to their responsibilities and their ability to influence the result. We do not believe that there has been a case established for absolute standardisation of methodologies.

Reasons for our recommendation

- 7 Our key reasons for our recommendation are:
 - 7.1 Distributors are only responsible for their distribution network, and as a consequence, can only influence the physical technical losses through network design and operation. Distributors understand that loss levels vary for many reasons. We single out the variation that results from the voltage of metering because the difference in loss level is significant at typically 1.5% - 2.5% in overall network losses typically ranging 4.5% - 6.5% and because customers are directly affected as their metering is implemented at LV or HV. Any further differentiation of factors causes more work, particularly for retailers, and consequently retailers need to decide whether it is worth their while to have a greater degree of accuracy.
 - 7.2 Average loss levels on distribution networks are very stable over time. They will not vary much from year to year unless there is a radical change in the network configuration, such as the introduction of a new voltage or possibly a new GXP. Hence, we recommend infrequent reviews, but a minimum of five yearly. Even after five years, there may not be any case to change the factors.
 - 7.3 The derivation of technical loss factors for distributors is quite difficult in the absence of reliable input and output metered data. Consequently, they will have to model their networks in some credible but simple way to estimate the technical loss factors. The intricacies such as fixed power (no-load) losses versus load-dependent power losses will need to be incorporated in any model. Orion will have to develop or procure such a model. We would expect distributors to employ varying degrees of complexity, according to their resources and situation. However, we consider that distributors must manage this aspect of the process so that the Commission can reliably understand the results of the subsequent steps, particularly the level of UFE.
 - 7.4 The level of technical losses in a distribution network results from its design and operation. In limited situations (e.g. transformer purchase and urban overhead line design), there is an economic trade-off between technical loss level and the cost of capital and we can optimise accordingly. Otherwise, other constraints determine our network configuration. In general, a distributor is not able to "minimise" technical losses and would be irresponsible to do so if this is achieved via unnecessary capital expenditure. In an economic sense, we already have this distortion in our practice by using underground reticulation in cities, which results

in much lower losses than can be justified on a pure economic basis. Local authority planning requirements dictate our use of cables that are more expensive than overhead lines. If we used the economically optimum configuration of overhead lines in urban areas, our technical losses would be higher. Given this position, there is no case for the monitoring of technical loss levels over time.

- 7.5 We consider that the calculation and assignment of UFE is entirely the role and responsibility of the RM because the RM is contracted to reconcile the volumes purchased by retailers at each GXP on the basis of the information provided by retailers (sales volumes) and distributors (technical loss factors). As explained above, we consider that distributors are responsible for the technical loss factors and clearly, retailers are responsible for reporting their sales volumes. Further, retailers are responsible for the downstream processes of providing and reading meters and compiling metering data, not distributors.
- 7.6 We recommend that the RM reports on the UFE proportion routinely to the Commission for their monitoring and review because this is the volatile quantity in the process and provides a sensitive indicator of the data's integrity. Experience in recent years has shown that the UFE proportion can be at least as great as the actual technical loss proportion mainly as a result of errors in the sales volumes. We advocate that, if concerned, the Commission primarily investigates the retailer's data because the errors in the sales data volumes arise mainly from missing volumes – consumption not reported, meters not read, theft and incorrect multipliers. It is the retailers' responsibility to manage these. As explained above, the distributor's loss factors are stable and are likely to be accurate to within the limits of modelling accuracies. However, we recognise that distributors are responsible for recording ICPs and their loss factors in the registry and that any omissions will contribute towards UFE, but the proposed audits of distributors will address this issue.
- 7.7 We recommend public disclosure of all technical loss factors and UFE proportion by the Commission because there are many parties who are interested in the performance of our industry. Consumers, (mainly large) want assurance that they are not paying for the consumption of others that retailers fail to report in the reconciliation process. Further, outside parties want confidence that distributors are properly managing their networks including the technical loss levels.
- 7.8 How technical losses are managed (rather than measured) is properly the domain of distributors as expressed in their AMP which is overseen by the Commerce Commission and outlines the distributor's plans for the management of all network assets.

General comments

- 8 The purpose of the paper is to obtain industry feedback on guidelines on the calculation of loss factors and the use of loss factors for reconciliation purposes².
- 9 Orion agrees that the use of guidelines rather than mandatory rules or regulations is appropriate in relation to the calculation of loss factors and the use of loss factors for reconciliation purposes.
- 10 The use of guidelines is also in line with the requirements, under the Government Policy Statement on Electricity Governance, that the Commission should, whenever possible, use its powers of persuasion and promotion, and provision of information to achieve its objectives rather than recommending regulations and rules.
- 11 We consider that the guidelines must reflect not only guidance for distributors on estimating technical loss factors but also provide guidance to retailers/purchasers as they have control over the factors that cause “non-technical losses” or unaccounted for energy (UFE). We consider that there needs to be a level of transparency via reporting by retailers/purchasers on issues such as the amount they spend on revenue protection measures, the amounts recovered and the number of cases prosecuted. We consider that retailers should also report on metering errors and data errors i.e. the number of metering or data errors found, the volume of energy that these errors represented, and the cause of the errors.

The paper goes beyond a consultation on guidelines

- 12 The paper effectively goes far beyond its stated purpose of consulting on guidelines on the calculation of loss factors and the use of loss factors for reconciliation purposes. The paper is actually consulting on whether new definitions relating to losses and UFE should be introduced, together with the proposal to introduce mandatory requirements on distributors to estimate technical and non-technical losses. We object to this departure.
- 13 The paper has produced a set of guidelines titled “Guidelines on the calculation of loss factors and the use of loss factors for reconciliation purposes v1.0” (the *guidelines*)³. We note that these guidelines do not relate to the requirements of the current rules and nor do they relate to the requirements of the new reconciliation rules (effective 1 May 2008).
- 14 The guidelines are drafted to support the third of the four options for future loss factor arrangements considered by the project team i.e. “Option Three: Disaggregation of loss factor components – estimation of both technical and non-technical losses”. Orion **does**

² Paragraph 1 of the paper.

³ Appendix Four of the paper.

not agree with the project team's recommendation that Option Three be implemented⁴ and nor do we agree with the proposed guidelines.

- 15 The project team has based its selection of Option Three on analysis of the four options that the project team considered against criteria⁵ which the project team also developed. We consider that the criteria against which the option considered are flawed and consequently so is the project team's recommendation.
- 16 The option recommended by the project team would make it **mandatory**⁶ for distributors to estimate technical and non-technical losses. It would also require new definitions to be included in the Rules.
- 17 This mandatory approach is not consistent with the Commission's intentions to use guidelines.

The paper does not consider the economics of distribution network design

- 18 The paper does not consider the economics of distribution network design as it applies to technical losses. There is no consideration of:
- 18.1 any cost benefit analysis of the options;
 - 18.2 any consideration of the impact of the regulatory requirements on distributors by the Commerce Commission in particular the requirements around asset management;
 - 18.3 economic efficiency aspects of network design; and
 - 18.4 which of the parties have an influence on "losses" (technical and non-technical - errors and omissions).
- 19 We consider that appropriate economic consideration of technical losses should be given. Orion does this through its Asset Management Plan (AMP). It should be noted that distributors' treatment of losses will also be significantly different from the treatment of losses in a transmission network due to the different reliability considerations and the differences in network architecture. The following extract from our 2007 AMP (soon to be made public) indicates what we consider are the appropriate considerations that distributors should take into account in relation to electrical losses on their network. We believe that this extract illustrates the appropriate consideration of technical losses. We

⁴ Paragraph 63 of the paper.

⁵ Paragraph 43 and Table 2 of the paper.

⁶ Paragraph 53 of the paper.

recommend that the Commission focus its efforts on reducing non technical losses which are in the retailer's domain.

Transformer purchases

Purchases of new distribution transformers must comply with the 'Minimum Energy Performance Standards' (MEPS) as prescribed in Australian Standard 2374.1. In addition to MEPS, our equipment specification NW74.23.05 - Distribution Transformers 200 to 1000kVA, includes a "no-load loss" multiplier and a "load loss multiplier" that are used for the capitalisation of loss costs when comparing offers of distribution transformers for purchase. This may lead to the purchase of even lower loss transformers than MEPS requires.

Our equipment specifications for power transformers NW74.23.07 - Transformer 66/11kV, 7.5/10MVA, also have these loss multipliers that are used in the evaluation of tenders.

Transformer size	Present value of 'No load loss' (\$/kW)	Present value of 'load loss' (\$/kW)
Up to 150kVA	\$8,691	\$273
200-1000kVA	\$8,744	\$820
20MVA	\$8,041	\$1,754

For more detailed assessments in specific circumstances, we also use the Guide "Purchase & Operating Costs of Transformers", published by the Electricity Engineers Association of New Zealand.

These approaches ensure that proper consideration is given to the trade-offs between the costs of transformer manufacture and the future costs of energy losses. It is more expensive to manufacture a transformer with lower losses because more expensive, higher quality materials have to be used. Our loss capitalisation calculation for transformers has assumed a value of 8.5c/kWh for the future cost of energy. This leads to the capitalisation values per kW of losses shown in the table. The values are reviewed at the time of purchase of new power transformers and at the time of letting the distribution transformer supply contract for transformers up to 1000kVA.

Selection of conductor size

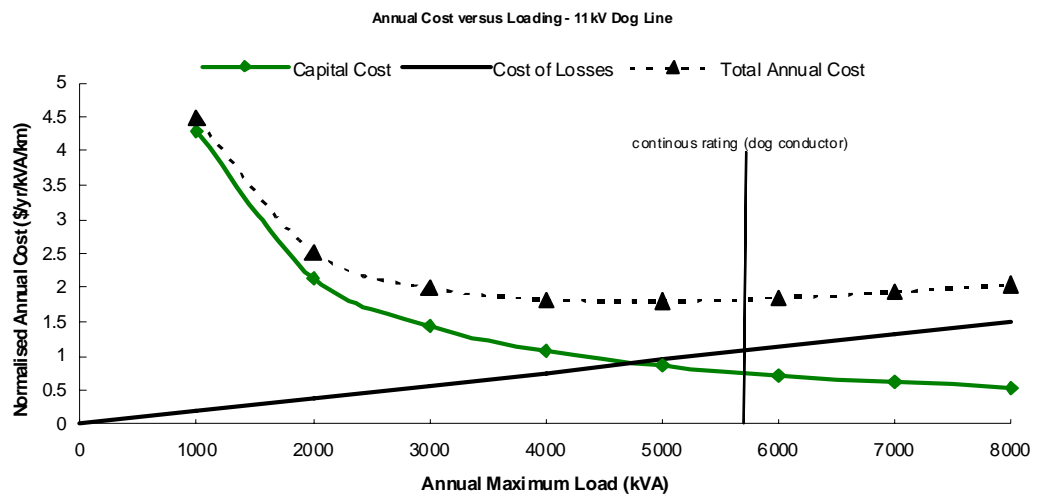
Most of the electrical losses in our network occur in lines and cables i.e. the conductors. The loss is calculated from the expression I^2R where I is the current and R is the resistance of the conductor. The connected load determines the current and

the conductor size and material determines the conductor resistance. The larger the conductor size, the lower the resistance and hence the losses will be the lower. However, larger conductors cost more and hence, again, there is a trade-off between the costs of capital and losses.

Overhead lines

There are economic optimum operating conditions for overhead lines used for delivering electricity to the reasonably substantial loads that typically occur on the fringes of cities or towns. “Kelvin’s Law” of economics applies which states that the minimum annual operating cost occurs when the annual cost of losses equals the annual capital cost. This optimum operation typically occurs when the maximum load is 75 to 85% of the conductor’s rating. The characteristic is illustrated in the diagram for the 11kV ‘Dog’ conductor that we commonly use in the higher-density loading areas.

Annual cost versus loading - 11kV (dog) overhead line



We endeavour to design and operate our overhead lines in the higher-density loading areas for use within the optimum range. However, it should be noted that the total annual cost does not vary much over the wider range of 50 to 100% of rating.

The conductor size needed for the longer overhead lines in rural areas is principally determined by the limits on voltage drop. Hence, conductors with excess capacity are used as these have lower resistance resulting in reduced voltage drop along the line. The economic optimum is not achieved and lines typically operate with annual maximum loads of 5 to 50% of rating. Consequently, losses are lower than the economic optimum.

This extra capacity is necessary during fault contingencies and maintenance works to enable load to be transferred to alternative sources of supply.

Underground cables

For a given rating, cables cost more and have lower resistance per unit length. For example:

Conductor	Rating (amps)	Installed cost (\$/km)	Resistance (ohms/km)
Dog overhead line	300	\$40,000	0.273
185mm ² Al cable	280	\$160,000	0.164

Consequently, with much higher capital costs and much lower resistance, an economic cross-over is never achieved because losses are already low. That is, an increase in cable size cannot be justified by the small reduction in losses alone. However, the collective benefits (increased security of supply, reduced losses and reduced transmission charges) of increasing cable size justify the increased cost. This justification was proved during a review of our security standard in 2006. Analysis showed that it was economic to install an 11kV network capable of providing restoration of power for N-2 faults at district substations. Two thirds of the additional capital expenditure required for larger N-2 feeder cables was justified on the basis of reduced energy losses and reduced peak demand charges from reduced losses at peak. Our security standard drives economic investment in our 11kV network and the policy to install N-2 capacity leads to reduced losses on our network.

Selection of voltage

For the same power or energy volume delivered, losses are lower when conductors are operated at a higher voltage. Capital costs also increase for higher voltage equipment. A continuous range of voltage is not practical. We use discreet voltages of 66kV, 33kV, 11kV and 230/400V.

When extending our network, we model the development and consider all future costs, including the cost of losses. In a rural area, for example, our network may be extended at 11kV, 33kV or 66kV to supply future loading, such as large irrigation plants.

For developments at the connection level, we also consider alternatives for the voltage of supply and whether or not to extend the low or high voltage reticulation. Consideration of losses may be included in the decision making although other factors tend to dominate such as future access to plant, shared use of land and the particular preferences of customers.

- 20 It can be seen from the above that the optimum level of losses is considered by Orion. As indicated in our response to question 1 below, EECA is actively

involved in working (through the joint energy efficiency programme between New Zealand and Australia) to improve minimum energy performance standards. We consider that this approach will be far more effective to assist with an overall improvement of technical losses, than the paper's suggestion of using technical loss factor value as a means to monitor the effectiveness of changes to a distributor's network or asset management methodology.

Paper does not give enough consideration to degree of inaccuracy that is inherent in the calculation and application of loss factors

- 21 As the definition of technical losses indicates, a large proportion of technical losses depend on power loading. Orion's power loading varies over the year from a minimum of approximately 175MW to a maximum of approximately 630MW. We estimate that our loss ratio varies between 4% and 7% over this range of loading and therefore a single loss factor based on some average value will inherently have a large error at any point in time (half hour).
- 22 Thank you for the opportunity to make this submission. Orion does not consider that any part of this submission is confidential. If you have any questions, please contact Dennis Jones (Industry Developments Manager), DDI 03 363 9526, email dennis.jones@oriongroup.co.nz.

Yours sincerely



Dennis Jones
Industry Developments Manager

SCHEDULE

Responses to the Commission’s questions

Question Number	Question	Response
Question 1	Do you agree with the definitions and uses of reconciliation, technical and non-technical loss factors set out in this paper? Please give reasons for your view. (see paragraphs 18, 19 and 20)	<p>Technical loss factor definition and uses</p> <p>We agree with the definition of ‘technical loss factor’ in paragraph 3 of the “<i>Guidelines on the calculation and use of loss factors for reconciliation purposes v1.0</i>” set out in appendix four of the paper being:</p> <p>“technical loss factor” means a loss factor that represents the electricity that is consumed during the delivery to consumers’ installations. The technical loss factor represents</p> <p>There are two main technical components to the loss:</p> <ul style="list-style-type: none"> ❖ a fixed component that arises from the standing losses of the zone substation and distribution transformers; and ❖ variable components arising from the heating effects of the resistance in the delivery conductors. The resistive losses are proportional to the square of the current and occur in the high voltage (HV) and low voltage (LV) network conductors, the zone substations and distribution transformers;” <p>However, we consider that there is a third small component that should also be included – the energy used in substations/kiosks to maintain the appropriate environmental conditions for the network equipment and to maintain the correct functioning of protection and other equipment. This</p>

		<p>small component represents approximately 3% of the technical losses.</p> <p>We do not agree with the suggestion⁷: that:</p> <p><i>“Identification and quantification of this component, facilitates investigation into improvements that are available to these components, and a subsequent reduction in the loss factor;”</i></p> <p>Nor do we agree with the suggested uses of information about technical loss factors set out in paragraph 20 of the paper:</p> <p><i>“Information about technical loss factors (given accuracy limitations) may be used to:</i></p> <ul style="list-style-type: none"><i>a. value the electricity lost during delivery;</i><i>b. allocate technical loss factors to different voltage tiers and locations; and</i><i>c. monitor the effectiveness of changes to a distributor’s network or asset management methodology.”</i><p>Orion and other distributors already consider the value of electricity lost. This forms part of our normal asset management policy in regard to the purchase of distribution transformers, other assets and network design and ensures the proper trade-off between the cost of transformer manufacture and the future costs of energy losses. Transformer manufactures around the world are working to meet increased energy efficiency targets for their transformers.</p><p>We consider that in relation to the monitoring of a distributor’s asset management arrangements that this issue is effectively being dealt with by the Commerce Commission and also in a more general sense by the work that EECA is carrying out through the joint energy efficiency programme between New Zealand and Australia. We note in particular the intention to republish the Australian standard AS 2374.1 which specifies the requirements to meet minimum energy performance standards as a</p>
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⁷ Paragraph 3 of “Guidelines on the calculation and use of loss factors for reconciliation purposes v1.0”.

		<p>joint New Zealand/Australian standard.</p> <p>The EECA website contains the following information in relation to Distribution transformers:</p> <p><i>DISTRIBUTION TRANSFORMERS</i></p> <p><i>Distribution transformers convert high voltage electricity from the national grid into usable voltage levels for home and business use.</i></p> <p><i>Single and three phase, dry and oil immersed transformers with a power rating between 10kVA and 2500kVA, that are designed for 11kV and 22kV networks, must meet minimum energy performance standards (MEPS).</i></p> <p><i>Registration*</i></p> <p><i>All high voltage models must be registered and undergo a performance test. New Zealand operates a joint energy efficiency programme with Australia, sharing standards and a website. Models registered in Australia do not need extra registration to be sold in New Zealand. It's free to register products. To check which products are registered see the Australian energy rating website.</i></p> <p><i>You can also find out which transformers are registered on the Energy Rating site - click on 'Selecting an appliance'.</i></p> <p><i>To register, click on 'Registering a product'.</i></p> <p><i>Registering in New Zealand is slightly different to Australia as we do not charge a fee and do not require a sample label or sample test report.</i></p> <p><i>Standards</i></p> <p><i>MEPS requirements are set out in AS 2374.1.2. Test specifications are set out in 2375 for dry type, and AS 2374.1 for other type transformers.</i></p> <p><i>The Standards are available from Standards Australia.</i></p> <p><i>Exemptions</i></p>
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		<p><i>and the electricity required to be injected into any other point of connection in order to supply the delivered energy”</i></p> <p>and</p> <p>technical loss factors “<i>the electricity that is consumed during delivery to consumers’ installations</i>”.</p> <p>In the terms and context of Option Three of the paper we consider that the definition of “reconciliation loss factor” would be more correctly stated as:</p> <p>Reconciliation loss factor: means a factor that represents the difference in the retailer’s data relating to their quantification of energy at customer’s metering installations and the data relating to the quantification of energy at grid exit point metering installations.</p> <p>This definition makes it clear that this is a data issue and it will incorporate not only energy losses that occur as a function of conveying energy from one point in a physical network to another but also all the errors that occur with data of this sort such as:</p> <ol style="list-style-type: none">1. normalising of data over specific time periods (i.e monthly)2. corrections for zero data in half hour metering installations (including in GXP data)3. theft4. missing data5. effect of load shifting between GXP’s6. meter reading errors7. incorrect application of multipliers8. impact of fault metering installations – blown potential fuses, fault meter etc
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		<p>9. tolerance in the estimation of technical loss factors</p> <p>Please note this is not a complete list of the possible sources' of error that may occur</p> <p>For the avoidance of doubt please note that we do not recommend or support the use of this definition of reconciliation loss factor. We consider that use of the UFE is sufficient and appropriate.</p> <p>Non technical factor definition is not needed</p> <p>Firstly, we do not consider that there is a need to define a term such as 'non technical loss factor' as we consider that a significantly modified version of Option Four, which only requires the use of "technical loss factors" is the most appropriate option.</p> <p>Nor do we consider that if it was defined it would be useful in the terms expressed in the paper in Paragraph 22 or in the guidelines. In particular we note that the paper in paragraph 22(c) appears to be confusing distribution losses with errors such as metering, data handling etc which are retail issues, not distribution issues.</p> <p>Such a definition may in fact work against the reduction of the errors as it artificially assigns what is more correctly UFE to this factor.</p> <p>Orion's recommendation in relation to definitions</p> <p>We recommend the use of only one definition:</p> <p>"technical loss factor" means a loss factor that represents the electricity that is consumed during the delivery to consumers' installations. The contributing components' are:</p> <ul style="list-style-type: none">❖ a fixed component that arises from the standing losses of the zone substation and distribution transformers; and
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		<ul style="list-style-type: none"> ❖ variable components arising from the heating effects of the resistance in the delivery conductors. The resistive losses are proportional to the square of the current and occur in the high voltage (HV) and low voltage (LV) network conductors, the zone substations and distribution transformers;” and ❖ a small component representing the energy used in substations/kiosks to maintain the appropriate environmental conditions for the network equipment and to maintain the correct functioning of protection and other equipment <p>All other apparent errors should be considered as UFE.</p>
<p>Question 2</p>	<p>Do you agree with the criteria developed by the project team against which proposed loss factors arrangements should be assessed? Should one or more criteria be added or deleted? Please give reasons for your view. (See paragraph 42)</p>	<p>No. The criteria have been used to asses a number of options relating to future loss factor arrangements</p> <p><i>Clarify the definition</i> – this is not a criterion that a consideration of future loss factor arrangements should be judged against. First it pre-supposes that the definition needs clarifying. Second, by definition the status quo could not help but fail this criterion, the criterion is therefore clearly biased against the status quo.</p> <p>Clarify the purpose of different types of loss factors – the purpose of any different types of loss factors for use in any future loss factor arrangement should be clearly defined in the first place, any arrangement should measure up against that purpose, not clarify it</p> <p><i>Clarify the application of different types of loss factor</i> – the application of different types of loss factors should be clear from the definition.</p> <p><i>Allow the Commission to effectively and efficiently monitor distribution losses</i> – this criteria is flawed. First, there is no definition of “distribution losses” so on that basis assuming that one of the four options is selected the Commission may well be able to monitor whatever loss factors are ultimately</p>

		<p>defined as a surrogate for “distribution losses”. However, that will be true for all options. This criteria therefore does not serve any useful purpose.</p> <p>Second, we consider that the example of monitoring transformer sales information by EECA as indicated in response to question 1 above is a more effective and efficient way of monitoring the improvement of energy efficient design and manufacture of transformers.</p> <p>Third, we consider that monitoring the policies of distributors outlined in their asset management plans (as currently carried out by the Commerce Commission) regarding their approach to a least cost overall solution (asset cost + capitalised loss cost) policy in relation to losses and the overall life costs of assets is of far more importance to the Commission’s principle objective:</p> <p style="text-align: center;"><i>to ensure that electricity is produced and delivered to all classes of consumers in an efficient, fair, reliable and environmentally sustainable manner. The Commission is also required to promote and facilitate the efficient use of electricity“</i></p> <p>and will be far more effective and cost efficient.</p> <p><i>Give distributors incentive to accurately determine the technical losses on their networks, using a recognised methodology, on a regular basis. - Accuracy in determination of technical losses is a contradiction in terms. It is also unclear as to whether this criterion is really about determining accurately technical loss factors or about determining accurately technical losses. If this is really about the accuracy of technical loss factors then as explained earlier in our submission, technical losses will never be correct in terms of half hourly reconciliation due to the variable nature of technical losses and the wide levels of power loadings that occur on networks. However we do consider that this is an area where the paper is sadly lacking in any consideration of the tolerance that technical losses could or should be calculated to. This is clearly an area where guidelines may be helpful but it is not an appropriate criterion that a consideration of future loss factor arrangements should be judged against. If however the criterion above is about “accurately determine the</i></p>
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		<p><i>technical losses on their networks”</i> then this is not an issue that distributors need to accurately determine. The absolute level of losses is not the issue, the real issue is the correct economic selection of assets taking into account the impact of the estimated future cost of losses over the life time of the asset. Again, this is not an appropriate criterion for a consideration of future loss factor arrangements.</p> <p><i>Provide a framework for dispute resolution between participants on the loss factors that should be used on the network.- Audits will deal with this issue</i></p> <p><i>Provide transparency of calculation and periodic review of distribution loss factors – We agree that transparency of calculation and periodic review of distribution loss factors is required.</i></p> <p><i>Identify the amount of non-technical losses on the network, and encourage minimisation of non technical losses. As discussed above, we consider that it is all UFE that should be minimised. This is a retailer/purchaser issue and best dealt with through guidelines on information disclosure of revenue protection measures and reporting on metering errors.</i></p> <p><i>Ensure that the size and influence of any embedded generation is taken into account We agree that the size and influence of any embedded generation should be taken into account</i></p>
<p>Question 3</p>	<p>Are there any options for future loss factor arrangements other than the four options identified in this paper? Please give reasons for your view.</p>	<p>Yes: modification of option Four as per Orion’s recommendation.</p>

<p>Question 4</p>	<p>Do you agree that Option Three should be implemented (mandatory estimation of both technical and non-technical loss factors)? Please give reasons for your view.</p>	<p>No. The project team has based its selection of Option Three on analysis of the four options that the project team considered against criteria⁸ which the project team also developed. We consider that the criteria against which the option was considered is flawed and consequently so is the project teams' recommendation. See our comments in our response to question 2 in regard to the criteria.</p> <p>The option recommended by the project team would make it mandatory⁹ for distributors to estimate technical and non-technical losses. It would also require new definitions to be included in the Rules. This mandatory approach is not consistent with the Commission's declared intentions to use guidelines rather than mandatory regulation.</p> <p>We do not agree with Option Three's requirement to calculate non-technical loss factors; we consider these to be just a portion of UFE. We do not believe that this option will produce the advantages claimed. On the contrary we believe that Option Three would reduce the opportunities for reduction of non technical losses by retailers as it hides part of the total UFE in the non technical loss factor. The suggestion that UFE would be more manageable is likewise flawed. The creation of a non-technical loss factor does not reduce UFE. The suggestion that this option may in some way identify opportunities for distributors to manage losses is also flawed. Distributors can and should only be responsible for technical losses as it is only these physical losses that they have any control over, as explained earlier in the submission this aspect of efficiency is dealt with in the distributor's AMP and is monitored under the Commerce Act by the Commerce Commission.</p> <p>The option is unnecessarily complicated and does not provide any practical reporting requirements on include the parties that are responsible for UFE (i.e retailers/purchasers).</p>
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⁸ Paragraph 43 and Table 2 of the paper.

⁹ Paragraph 53 of the paper.

Question 5	Are one year (for non-technical loss factors) and five years (for technical loss factors) the appropriate timeframes within which to review loss factors? Please give reasons for your view.	No. We consider that 5 year intervals or after significant network changes would be reasonable for reviewing the technical loss factors (as defined by Orion not as per the paper's definition). We do not consider that it is meaningful or useful to define "non technical loss factors". We note however that the UFE is likely to change with each wash up in the reconciliation process.
Question 6	Do you think that the loss category code needs to be standardised? Please give reasons for your view.	No. We do not consider that the loss category code needs to be standardised. The guidelines could cover a suggested form of loss category code. If participants deviated from the guidelines reasons for this deviation should be given. The Commission should review the guidelines periodically and where appropriate update the guidelines to reflect developing practice.
Question 7	Do you agree with the methodology for the derivation of loss factors in the draft guidelines? Please give reasons for your view.	No. As indicated above Orion considers that the guidelines have been formulated on the basis of Option Three. We believe that Option Four is more appropriate for the reasons explained elsewhere in our submission.
Question 8	Are there any other comments or concerns you wish to raise about the draft guidelines?	The guidelines suggest that the Commission sets up a Loss Factor review panel. We do not consider that it is necessary to set up such a panel and that it would impose additional unnecessary costs on the industry. As discussed above we consider that distributors should disclose their methodology for calculating technical losses. This provides the Commission and others the opportunity to review the methodology and that retailers should disclose aspects of their management of UFE.
Question 9	The calculation of reconciliation loss factors, and hence non-technical loss factors, relies on the availability of retailers' records of how much electricity has been consumed. Do distributors have access to this information	We consider that access to records is not the question that the Commission should be asking. Clearly this information could be made available if it is not already available. We believe the question that the Commission should be asking is who is in the best position to calculate these values (note we do not consider that there is a need to calculate a reconciliation loss

	<p>from retailers.</p>	<p>factor or a non-technical loss factors) and if a commercial provider is available (i.e a service provider for which a competitive tender process can be carried out) then this should be the first solution. We therefore recommend that the reconciliation manager should calculate all UFE. The Commission should consider that as the reconciliation information is subject to wash-ups during this period the information will change, possibly substantially. Thus UFE is a constantly changing amount and the reconciliation manager who receives the updated wash-up information is in a position to re-calculate the UFE.</p> <p>We also understand that information is provided by retailers to the distributor and the reconciliation manager. We consider that as this process is concerned with reconciliation, then the information supplied to the reconciliation manager is the relevant information to consider.</p>
	<p>Other general concerns with the paper</p>	<p>Paragraph 30 of the paper uses the justification of interviews to support a focus on reconciliation loss factors to stray into (technical) losses. We expect a more disciplined approach to papers recommending regulation.</p> <p>Paragraphs 35 to 44 of the paper discuss Australian loss factor practices without providing adequate context in regard to:</p> <ul style="list-style-type: none">• Meter ownership history;• Reconciliation responsibilities in Australia;• Any regulatory 'compact' between regulators and the regulated. <p>Paragraph 35 of the paper compounds this by commencing "in order to understand what best practice may be for the treatment of losses and loss factors." The selective use of an overseas methodology must be informed by all elements of regulatory practice – and a cost benefit analysis, not assertions such as "best practice".</p>

		<p>Paragraph 39 of the paper fails to highlight key difference in the regulatory regimes in Australia and New Zealand. Australian States require approval for a large number of decisions in the electricity sector – that is their regime. A reader of this paper would be unaware that “approval of the relevant state regulator for the distribution loss factors for their electricity networks” is only relevant within the broader context of regulation in Australia and is not an argument for such regulation in New Zealand.</p>
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Orion's suggested Guidelines on the loss factors and unaccounted for energy in the reconciliation process

These guidelines have been produced to promote understanding and encourage consistency in the calculation methodologies and processes surrounding distribution loss factors.

The general approach set out in this information guide in no way reduces the requirement upon participants and comply with their obligations under the Electricity Governance Rules 2003 (Rules). These guidelines do not necessarily reflect the Electricity Commission's (Commission) views about the Rules.

Background

As required under the Government Policy Statement on Electricity Governance, the Commission should, whenever possible, use its powers of persuasion and promotion, and provision of information to achieve its objectives rather than recommending regulations and rules.

These guidelines are therefore recommended for use by distributors when determining and publishing technical loss factors for the purposes of reconciliation and by retailers to assist in the reduction of Unaccounted for Energy (UFE).

Electrical losses are natural phenomena that cannot be avoided completely and result in retailers having to purchase more energy than is delivered to their consumers. Distributors have a degree of control over the level of these technical losses as a result of their overall network design.

When considering losses in network design and asset purchase, distributors should consider the lifetime annual cost of losses. These should be converted to a net present capital value which can be added to the capital value of the asset concerned. The distributor should implement the least cost overall (asset cost + capitalised loss cost) solution. This approach provides for the lowest economic level of losses and will result in the lowest overall cost of delivery.

UFE losses are the difference between the energy that enters the distribution network and the sum of the energy that the retailers recorded as consumed by their customers and technical losses. This unaccounted for energy comes from many sources' such as theft, metering errors, and data errors. Retailers have a degree of control over these losses through their revenue protection systems, metering and data handling systems.

Defined terms

Where the guidelines refer to defined terms these are terms as defined in the EGR's

"loss category code" means the relevant code in the schedule published by the registry which identifies the relevant loss factors that apply to submission information;

"loss factor" means the factor applied to consumption information at the ICP or NSP (for an embedded network) to allow for losses within the local network or embedded network to produce equivalent consumption information at the relevant NSP;

"technical loss factor"¹⁰ means a loss factor that represents the electricity that is consumed during the delivery to consumers' installations. The contributing components' are:

- ❖ a fixed component that arises from the standing losses of the zone substation and distribution transformers; and

¹⁰ Note a definition of technical loss factor will need to be included in the EGRs

- ❖ variable components arising from the heating effects of the resistance in the delivery conductors. The resistive losses are proportional to the square of the current and occur in the high voltage (HV) and low voltage (LV) network conductors, the zone substations and distribution transformers;" and
- ❖ a small component representing the energy used in substations/kiosks to maintain the appropriate environmental conditions for the network equipment and to maintain the correct functioning of protection and other equipment

Distributor's obligations with respect to loss factors

There are a number of obligations that distributors have to comply with under the EGRs. These are: rule 5 of schedule E1 of part E, which relates to loss factors on the registry and provides:

5.1 Distributors advise loss factors

*Distributors must advise the **registry** of the **loss factors** for each **loss category** code on the **registry**.*

5.2 Two loss factors per month

*A **loss category** code may have a maximum of two **loss factors** per calendar month. Each **loss factor** must cover a range of **trading periods** within that month such that all **trading periods** have a single applicable **loss factor**.*

5.3 Distributors to advise market administrator

***Distributors** must advise the **market administrator** of their intention to add new **loss category** codes or to change the value or applicable time period of any **loss factor**, at least three months before the change is to take effect, or new code being added.*

5.4 Distributors maintain loss factors

***Distributors** must advise the **registry** of any change to any **loss factor** on the **registry** at least two calendar months before the change is to take effect.*

For distributors to meet these obligations

Distributors should derive and publish on their website (technical) loss factors for each loss factor code that they have used in the registry.

Distributors should publish their methodology for deriving loss factors together with an explanation of their methodology.

As part of the methodology distributor should consider aspects of the network architecture, metering location (HV of LV), and retailer requests when considering the number of different loss factors that should be determined.

Distributors may use load flow analysis to assist as part of their methodology

Technical loss factors should be reviewed every five years (unless there is a significant change in network configuration and/or load in which case the review should be re-run), although they will still need to be reported each year to the Commission.

The distributor will determine the most appropriate loading profile to be used in their derivation of technical loss factors. Distributors will provide an explanation of their method for determining the most appropriate load profile.

Reconciliation manager obligations

There are a number of obligations that reconciliation manager must comply with under the EGRs. These are:

The Reconciliation Manager (RM) should determine the Unaccounted for Energy (UFE) on the basis of the difference between the GXP volumes and the adjusted sales volumes reported by retailers (ie after application of the technical loss factors).

The RM scales-up the reported volumes per GXP across all retailers to allocate the UFE equitably amongst all retailers.

The RM should report routinely on the UFE proportion to the Commission for their monitoring and review.

Retailers' obligations to assist the reconciliation manager to meet its obligations under the EGRs

Retailers should develop and publish programmes that they will undertake to actively decrease the level of UFE.

Retailers should provide the following information to the reconciliation manager and make available on their websites:

Retailer revenue protection policy

Retailers should provide for inclusion in the wash-up process an estimate of the UFE volume that their revenue protection has detected

Retailers should report annually on:

1. the cost of revenue protection
2. revenue recovered by their revenue protection
3. estimate of the energy volume involved
4. Number of cases investigated
5. Number of cases prosecuted

Retailers should provide for inclusion in the wash up process an estimate of the unaccounted for energy volume that has been detected as metering or data errors.

Retailers should report annually:

1. an estimate of the energy volume resulting from Metering/data errors that have been detected
2. the cause of the metering /data errors

Commission's obligations

The Commission should investigate with retailers any concerns they have over the results. As part of this investigation, the Commission may also consider the distributor's technical loss factors and include the distributor in this investigation if its factors appear to contribute towards the Commission's concerns.

The Commission should publish a summary of all technical loss factors and UFE proportion annually for public review.