

Appendix 2: Submission Summary Table – Meridian Energy Comments on the Draft Grid Investment Test

Paragraph	Comment	Proposed amendment
Appendix 2		
2	<p>Meridian considers that rule 2 of Section III, Part F is central to both the determination of the grid investment test and to its application. Because of this Meridian considers it merits a specific reference in the preamble.</p>	<p>Meridian submits that a new paragraph 2 should be inserted after the heading "Preamble" which reads:</p> <p>Rule 2 in Section III, Part F of the rules specifies the purposes of the rules in Section III.</p>
5	<p>The definitions of "economic investment" and "reliability investment" in Part A are:</p> <p>"economic investments" means investments <i>in the grid</i> that can be justified on the basis of the grid investment test under section III of part F. (emphasis added)</p> <p>"reliability investments" means investments by Transpower in the grid, or alternative arrangements by Transpower, for the purpose of maintaining grid reliability standards to good electricity industry practice.</p> <p>The inclusion of the qualifying words "in the grid" in the definition of "proposed grid investment" implies that "alternative arrangements by Transpower", because they are not investments "in the grid", are excluded from the definition of proposed grid investment.</p> <p>The only reliability investments that do not fall within the definition of economic investments are "alternative arrangements by Transpower". Because economic investments and reliability investments must satisfy the same grid investment test, is it necessary to retain two separate definitions?</p>	<p>Meridian submits that the words "in the grid" be deleted from the definition of "proposed grid investment" to make clear that alternative arrangements by Transpower for the purpose of maintaining grid reliability standards are included within the definition.</p> <p>Meridian suggests that the Electricity Commission consider whether separate definitions are needed.</p>

7	<p>a) <u>Definition prevents consideration of mutually exclusive alternative projects</u></p> <p>For any proposed grid investment there may be a number of alternative projects, each of which individually would achieve a result similar to the proposed grid investment. However, it is likely that some alternatives would be mutually exclusive – that is, the alternative projects are such that implementation of one of the alternatives precludes the implementation of one or more of the others.</p> <p>To be considered as an “alternative project” under paragraph 7(b), a project must be “...reasonably likely to proceed if the proposed grid investment does not proceed...” This definition will not permit <u>either</u> of two competing but mutually exclusive alternative projects to be considered.</p> <p>By definition, neither of two mutually exclusive alternative projects could be considered “reasonably likely to proceed” unless it had already been decided that it was at least reasonably likely the other alternative project <u>would not</u> proceed.</p>	<p>We propose that paragraph 7(b) be replaced by 7(b) and 7(c) which would read:</p> <p>“(b) reasonably likely to proceed if both the proposed grid investment does not proceed and no other alternative project proceeds;</p> <p>(c) unlikely to proceed if the proposed grid investment does proceed;”</p> <p>Subsequent subparagraphs would then need to be renumbered (d) through (f)</p>
	<p>b) <u>Alternatives involving multiple discrete projects</u></p> <p>As drafted, the clause does not make explicit that an alternative project may comprise a combination of several discrete elements which could be implemented separately, but only when combined provide benefits similar to those of the proposed grid investment. If the alternative project is a combination of elements, then any evaluation of that alternative should be a consideration of all those elements combined.</p>	<p>Meridian submits that the first three lines of the definition of “Alternative projects” should be replaced by the following:</p> <p>““Alternative project” means any alternative transmission augmentation project or transmission alternative to the proposed grid investment that individually is, or any combination of alternative transmission augmentation projects and/or transmission alternatives to the proposed grid investment that together are:”</p>
10	<p>The drafting of the clause can be simplified with no loss of meaning.</p>	<p>Meridian suggests that the clause could be amended to read:</p> <p>“Net market benefit” means the market benefit of a proposed grid investment or alternative project in a market development scenario less the cost of that proposed grid investment or alternative project in that market development</p>

		scenario."
11(e)	The drafting of this clause could be clarified.	Meridian submits that the "size of capital expenditure" would be more accurate as "amount of capital expenditure."
10, 11, 13	The definitions of " market benefit " and " cost " make use of the concept of terminal value. The drafting can be simplified and clarified by explicitly defining "terminal value".	<p>a) Insert at the end of paragraph 10 the words " , in each case over a period of 20 years from the commissioning date of that proposed grid investment or alternative project, together with any significant terminal value"</p> <p>b) Delete from the definitions of market benefit and cost in paragraphs 11 and 13 the words "over a period of 20 years from the commissioning date" and text in parentheses that follow those words; and</p> <p>c) Insert a definition of "terminal value" as a new paragraph 16 as follows: 16. "Terminal value" means the present value of the market benefits less the costs expected to arise from the proposed grid investment or alternative project more than 20 years after the commissioning date of such proposed grid investment or alternative project.</p>
15.	As proposed, the defined term "market development scenarios" defines a number.	Meridian suggests deleting the words "number of" in the first line.
21.	<p>A possible negative inference of including "local generation" in the definition of "non-transmission projects" (and in the definition of "transmission alternatives" in Part A) is that other generation (i.e. grid-connected generation) is excluded. It would, in any event, make sense to explicitly include all forms of generation.</p> <p>Meridian queries why the term "non-transmission projects" is used instead of "transmission alternatives" (as defined in Part A), given that the definitions are substantively identical.</p> <p>If the deletion of the word "local", proposed above is not accepted we query whether the term "local generation" (used both here and in the definition of transmission alternatives in part A) is intended to be different from the term "embedded generation" (defined in</p>	<p>Delete the word "local to clarify that <u>all</u> generation falls within the definition of "transmission alternatives" / "non-transmission projects."</p> <p>Meridian submits that the Electricity Commission consider not defining "non-transmission projects" in the GIT, but instead rely on the definition of "transmission alternatives" in Part A (subject to the above deletion of the word "local").</p> <p>Meridian submits that the term "embedded generation" be used or changes made to clarify the difference between embedded generation and local generation.</p>

	Part A)? If so, how?	
23	As proposed, the defined term "base case" defines a number.	Meridian suggests delete the words "number of" in the first line.

Appendix 3: Meridian Energy's submission on Questions in the Consultation Paper Draft Grid Investment Test

	Question	Comment
Q1:	Do you agree with the Commission's interpretation of the objectives of the GIT, and if not, why not?	<p>Meridian considers that the single objective of the GIT is an inadequate and narrow interpretation of the Government's objectives. The stated objective isolates one of the six objectives in Part F. It describes a cost benefit analysis. A preferable objective would focus on the desired outcomes and allow for strategic and qualitative inputs.</p> <p>Meridian suggests the objective of the GIT be amended to:</p> <p><i>To review and approve grid investments that provide effective solutions to identified transmission problems, where those solutions reflect the Government's objectives for the electricity system and are consistent with dynamic efficiency.</i></p> <p>Meridian suggests this objective should be included as part of the Preamble to the GIT rules.</p>
Q2:	Do you agree with the Commission's specification of the principal purpose of the GIT, and if not, why not?	<p>Meridian does not agree with the Commission's specification of the principal purpose of the GIT. Part F section III rule 2 states the purpose of the rules in section III. The relevant provisions for the GIT are to:</p> <ul style="list-style-type: none"> • Facilitate Transpower's ability to develop and implement long term plans (including timely securing of land access and resource consents) for investment in the grid; • Assist participants to identify and evaluate investments in transmission alternatives; and • Facilitate efficient investment in generation. <p>Meridian submits that these three outcomes are the principal purpose of the GIT.</p>
Q3:	Do you agree that cost-benefit test (incorporating probabilistic planning analysis) can be used even if a deterministic grid reliability standard is adopted, and if not, why not?	<p>Meridian agrees that it is possible to use probabilistic planning where a deterministic standard is used. This approach implies that the probability of (n-1) security resulting in an outage in a given location will be calculated. It is important to note that this probability will vary between locations, as alternative assets or technologies have different levels of reliability.</p>
Q4:	Do you agree with the Commission's proposal to apply a cost-benefit test to all reliability investment proposals, and if not, why not?	<p>Meridian agrees with the proposal to apply a cost-benefit test to all reliability investments. This was a strong argument in Meridian's submission to Ministry of Economic Development officials on the draft Transport Rules (December 2003).</p>

	Question	Comment
Q5:	Do you agree that the time available to research and select a private sector rate is too short, and therefore the most practicable approach is to adopt Transpower's WACC?	<p>Yes, Meridian sees merit in with this approach, at least in the short term.</p> <p>However, we note that a theoretically correct approach would be to discount each cashflow by a separate rate adjusted for the risk associated with that particular cashflow. This is clearly not practical, and some level of aggregation will be necessary, but the key rates that are likely to be relevant are: Transpower's WACC, the social discount rate, and possibly a private commercial discount rate.</p> <p>In Meridian's view the use of a commercial discount rate on its own is incorrect. The benefits created by transmission are not necessarily captured by consumers or investors, rather they flow to society as a whole. These benefits include the future optionality created by having a National Grid. These benefits may be significant and a commercial discount rate would be too high. Using Transpower's WACC represents a reasonable compromise, especially as it reflects New Zealand's view of an appropriate discount rate for regulated services provided to society.</p> <p>Meridian suggests that the Commission should revisit this issue based on the nature of identified benefits and costs associated with different projects.</p> <p>We suggest that a pragmatic interim solution would be to conduct sensitivity analysis to determine the impact of using a social discount rate or private sector rate.</p>
Q6:	Is the choice of discount rate likely to materially affect which projects are selected under the GIT?	<p>If substantial social benefits accrue with a particular option, and the true social discount rate is low, then using Transpower's WACC would result in those benefits being given less than their due weight. This problem would be exacerbated if a commercial rate was used.</p> <p>We recommend that as a pragmatic solution sensitivity analysis be used to check the materiality of different discount rates. Meridian suggests that the Commission should revisit this issue based on the nature of identified benefits and costs associated with different projects.</p>
Q7:	Do you agree that a 20-year timeframe be adopted for the GIT, and if not, why not?	<p>The life of transmission and generation assets can be expected to be considerably longer than 20 years. (For example, 220 kV transmission assets are currently designed for an 80 year operational life.) Terminal values should be used in the GIT analysis in order to take into account the economic life of the assets.</p>
Q8:	Should terminal values be added if substantial net benefits	<p>Refer answer to Q7. On the face of it, terminal values do not seem analytically complex</p>

	Question	Comment
	are expected beyond the 20-year timeframe? In what circumstances should terminal values be used?	to determine, and Meridian submits that terminal values should be used in all circumstances.
Q9:	Does an initial central value for unserved energy of \$20,000/MWh reflect a balanced assessment of current New Zealand and international evidence? If not, how would you assess that evidence?	<p>Meridian does not wish to propose an alternative value for unserved energy.</p> <p>However, we do seek clarification of how the \$20,000/MWh value of unserved energy is reconciled to the value of security of supply, the trigger price for reserve energy of \$2,000/MWh stated in paragraph 60 of the Government Policy Statement and the standing offer price for reserve electricity from Whirinaki of \$1,000/MWh.</p> <p>In addition, it is not clear what the implication of a value of unserved energy is for the grid reliability standards. It should be clarified which of these two measures takes primacy in the event that (for example) a project with a negative NPV is required to meet grid reliability standards (as the test is currently written such a project would not go ahead, but it is not immediately apparent that this is the intention of Part F, or a desirable outcome).</p> <p>Finally, we note that a single value of reliability may not be an appropriate valuation throughout the transmission network, or for varying outage durations. We suggest the Electricity Commission should undertake further research in this regard.</p>
Q10:	Referring to the discussion in section 6.3 of the Frontier report, are there other empirical studies that should be reviewed to form an initial value for unserved energy?	Meridian is aware that a large number of empirical studies have been undertaken on this subject internationally. Meridian has not undertaken a comprehensive review of these studies, but such a review should be incorporated in any research that the Electricity Commission undertakes on this subject.
Q11:	Should a central value for unserved energy be adopted, or should separate values be assigned for different categories of consumer? If separate values should be assigned, what categories would you adopt and what values would you assign? Would consumers expect to pay different transmission charges if the transmission services they received reflected consideration of different unserved energy values?	<p>Meridian agrees with the Commission's approach, but would like to make some further comments on this issue.</p> <p>A specific value of \$20,000/MWh for unserved energy is effectively a deterministic standard. It implies that every MWh of unserved energy has the same value, whether this standard is exceeded, or whether it is breached. Furthermore, different types of customers (e.g. commercial, industrial and residential) are likely to value MWh differently. Duration and timeliness of notice also affect the value of unserved energy. For example, the amount of notice the industry receives before an outage is likely to affect the value of unserved energy (parties affected have a longer period of time to make other arrangements which reduces the value of unserved energy).</p>

	Question	Comment
		A probabilistic or asymmetric standard, whereby the value of unserved energy increases when the standard is not achieved, would provide a better signal to Transpower. Meridian recognises that in practice there are likely to be practical limitations in the extent to which sophisticated probabilistic signals can be applied for investment and planning purposes. The Electricity Commission should develop proposals in relation to how the \$20,000/MWh criterion could be modified to reflect the diverse nature of customer requirements.
Q12:	Do you agree that sensitivities of \$10,000/MWh and \$30,000/MWh be used where the size and cost magnitude of the project warrant the additional analysis, and if not, why not?	Please refer to our answer to Q9 and Q11. Meridian agrees with the Commission's approach of adopting an initial central value and testing its materiality. We support the Commission's decision to undertake additional research and analysis of the most appropriate long-term solution.
Q13:	Do you agree the materiality threshold should be set at \$1 million, and if not, why not?	Meridian submits that this threshold is too low and would result in a significant bottleneck with respect to application of the GIT. Meridian suggests that a threshold of \$5 million would be more appropriate. A threshold of \$1 million would result in investment by Transpower in a single transformer being evaluated under the GIT. The Commission appears to have based its threshold on what is appropriate for deep connection assets. Meridian submits that connection assets should be paid for by the causer/beneficiary (under the pricing methodology). Investment in such assets would therefore be a matter for negotiation between Transpower and the causer/beneficiary and should not be considered under the GIT.
Q14:	Should the GIT be applied with less rigour and comprehensiveness for grid investments with capital costs between \$1 million and \$5 million than for investments costing more than \$5 million? If yes, is it necessary to specify what must be included in such analyses?	As discussed in Q13, Meridian submits that the threshold of \$1 million is too low and suggests that the GIT should be applied to investments that cost at least \$5 million. Meridian submits that there should be a single test applied to all proposals. Within this context it is anticipated that different factors will be more or less important to different proposals.
Q15:	Are there other variables the Commission should include in its description of the current status of the electricity industry, and if so, what are those variables?	Meridian submits that grid reliability standards should be considered as part of the current system. Reserve requirements should also be included. The difference between demand and supply may also be relevant information – there is no mention of information on the amount of available supply. Output from embedded

	Question	Comment
		<p>generation may also be relevant.</p> <p>This paragraph lists the variables to be used to specify reasonably expected future development of the electricity industry. This list compares directly with paragraph 24 in Appendix 2 except that the proposed rule includes an extra variable – 24(d)(vi) timing of decommissioned projects.</p> <p>We agree with the Commission that the primary issue for discussion in the list they have provided is paragraph c. Meridian suggests the nodal pricing is relevant and not the operating, maintenance costs or fuel costs of existing assets. Nodal pricing signals the cost of efficiently supplying demand and signals given the constraints in the current system.</p> <p>Further, cost benefit analysis relies on the difference between costs and benefits under various alternatives. The cost of the current system does not necessarily have to be taken into account.</p>
Q16:	Do you agree that the primary issue with wrongly predicting new generation capacity is that projects would be approved when none were needed, and vice versa?	<p>Meridian submits that errors with respect to approvals are the primary issue with wrongly predicting any input to the GIT.</p> <p>As discussed in more detail in our response to Q28, Meridian believes that averaging 5 scenarios could lead to an average solution that is not fit for purpose for any outcome. It should be accepted that incorrect predictions of new generation capacity are inherent in an open electricity market. Generator development behaviour is not driven by short-term profit alone, strategic decisions to increase market share, or phase out existing generation may also affect choices.</p>
Q17:	Is the choice between least-cost and bidding approaches likely to materially affect the choice of grid investment versus alternatives to transmission, and if so, why?	<p>Meridian notes that since the release of the consultation paper by the Electricity Commission the Government has released its report "Sustainable Energy – Creating a Sustainable Energy System for New Zealand". A quote from this paper is "The Government's aim is to move progressively to a more sustainable energy future, <u>keeping as many options open as possible</u>". (emphasis added)</p> <p>Meridian submits that this level of detail should not be part of the GIT. The Commission does not have a mandate to select generation options, but rather to facilitate efficient investment in generation (Part F section III, rule 2.3). The Electricity Commission should not be in the business of co-optimising generation and transmission investments. Transmission should be built to preserve optionality, ensure security of supply and bring</p>

	Question	Comment
		<p>the benefits of contestable generation and retail markets to all consumers. Transmission is generally required ahead of generation investment because lead times for transmission assets are longer (7-10 years is typical, compared to 1-3 years for generation assets).</p> <p>Where transmission is being built to enable specific generation this should not be an issue as the generator will be committed to the new plant.</p> <p>See also our response to Q16, generator's behave strategically, taking factors other than short-term profit into account in their decisions.</p>
Q18:	Do you agree that the least cost approach, supplemented with sensitivity analysis of 'realistic bidding' approaches, is the most practicable approach for New Zealand?	See our response to Q17.
Q19:	Do you agree with the above criteria for committed projects? Should criteria be added or deleted, and if so, which ones?	Meridian supports these criteria.
Q20:	Is there value in distinguishing between anticipated and modelled projects?	<p>Meridian submits that anticipated projects have more in common with committed projects than modelled projects. There should either be a separate category for anticipated projects, or committed projects and anticipated projects should be grouped together. Modelled projects are more generic and speculative. They are used as a mechanism for valuing options or constructing scenarios.</p> <p>Future projects should be sought from the industry as early as possible and built into all the scenarios. Many of these projects will not happen if the transmission is not there to support it. Since transmission lead times are 2-3 times generation projects, the GIT must treat anticipated projects seriously.</p> <p>It will be important that scenarios reflect current knowledge rather than being tied to the SOO (which could be up to two years old).</p>
Q21:	Is the description of modelled projects clear and unambiguous?	<p>Meridian submits that it is not clear why the definition of "modelled projects" should be limited to those projects whose likelihood, nature, timing are <u>likely to be affected by</u> whether the proposed grid investment or alternative project proceeds.</p> <p>Meridian suggests the subparagraph (c) of the definition of modelled projects be deleted.</p> <p>Projects which have been identified in the statement of opportunities as "likely to</p>

	Question	Comment
		<p>occur”, the likelihood, nature and timing of which are <u>unlikely</u> to be affected by the proposed grid investment or alternative project, should equally be considered in each of the paragraphs of the GIT where the term modelled projects is used (paragraphs 11, 12, 17, 24(d) and 30). Such projects might include, for example, likely investments that would not yet meet the detailed certainty criteria of committed or anticipated projects, but in respect of which planning is well advanced.</p>
Q22:	<p>Is the description of existing and decommissioned projects clear and unambiguous?</p>	<p>Meridian asks that the definition be amended to clarify that the existing grid is an existing project, and that grid-connected generation is also an existing project. We presume that this is the intent.</p> <p>Because of these exclusions, the definition of “decommissioned projects” does not include the decommissioning, removal or de-rating of existing grid assets. The consequence of this is that, for example, under paragraph 17, the decommissioning of a part of the existing grid is not required to be factored into the supply side of a market development scenario. With this clarification, the words “transmission augmentation projects” are presumably redundant, as anything which might be a commissioned “transmission augmentation project” would presumably also be an existing grid asset.</p> <p>Meridian submits that this could be clarified by amending the definition of “existing projects” to include all existing grid assets by inserting the words “assets forming part of the grid,” before the words “transmission augmentation projects”.</p> <p>Meridian also suggests that use of the word “assets” rather than “projects” may help clarify this.</p>
Q23:	<p>Which criteria do you disagree with, and why? What other criteria should be considered? Are the above criteria clear and understandable?</p>	<p>Meridian submits that criteria (d) (that there must be an appropriate number of alternatives) is not a criteria that an individual alternative must satisfy and should therefore be removed. Rather, Meridian suggests that if an alternative meets the pre-feasibility criteria (i.e. the other criteria) then that alternative should proceed to the analysis stage.</p> <p>Meridian requests that criteria (c) be re-worded to clarify that alternatives must be of appropriate size, reliability and seasonal availability to displace the grid investment.</p> <p>We also recommend the addition of two criteria:</p> <ul style="list-style-type: none"> • Alternatives must be substantially cheaper than investing in the grid (10% or \$10

	Question	Comment
		<p>million).</p> <ul style="list-style-type: none"> • Alternatives must be immediately available when required (for example, demand-side management must be on an automatic trip). <p>It is important that development of alternatives does not result in the owner of that investment gaining market power.</p>
Q24:	<p>Are there other variables that should be included in the definition of market benefits, and if so, what are those variables? Are the variables defined clearly and unambiguously?</p>	<p>Meridian notes that quantification of differences in benefits is all that is strictly necessary to gauge the relative merits of proposals.</p> <p>Meridian submits that other factors should be included in consideration of grid investment proposals. This will enable a more strategic approach that will better meet the Government's objectives, as stated in the GPS.</p> <p>National strategic factors (NSFs) can broadly be thought of as the benefits to consumers of having a single electricity system. NSFs must:</p> <ul style="list-style-type: none"> • Comprise material, national economic benefits (as opposed to transfers). • Not be included in the core analysis. • Have a value in a normal market (i.e. if a mechanism was available consumers would pay for them). <p>We have currently also identified investment option value as an NSF. In generation, optionality on future technology and resource access is valuable. In transmission, it can be strategically important to ensure that the ability to expand capacity later is retained (this could result in obtaining a consent for a larger capacity line than is currently required).</p> <p>Qualitative factors should also be included in the assessment. In developing appropriate qualitative criteria, Meridian has endeavoured to identify issues associated with investing in a robust National Grid that are unlikely to be fully accounted for by a cost benefit analysis approach. We have identified the following four criteria:</p> <ul style="list-style-type: none"> • The extent to which competition in generation and retail markets is maintained and/or enhanced. • The extent to which security of supply is maintained and/or enhanced. • The extent to which diversity in future supply options are provided for, with

	Question	Comment
		<p>particular regard to renewable and indigenous fuel supplies.</p> <ul style="list-style-type: none"> The complexity of the proposal having regard to the Resource Management Act and other legislative requirements and the need to gain early certainty. <p>Meridian also suggests that proponents should have the option to be able to contribute the difference between the NPV of its project and the highest value project in order to enable the project to be approved.</p>
Q25:	Should competition benefits be included in the GIT, and if so, how should they be measured?	<p>Meridian agrees with the Commission's proposed approach to the quantification of competition benefits.</p> <p>While identifying and valuing competition benefits in the GIT adds additional complexity, ignoring competition benefits would fail to adequately capture the range of benefits from transmission investment. Meridian submits that competition benefits should be evaluated where they may have a material effect on the outcome of the investment analysis.</p> <p>Competition benefits are important and Meridian suggests that where competition benefits are not considered sufficiently significant to quantify, they should be accounted for in the qualitative measures.</p> <p>The ACCC has considerable experience with this issue and we submit that the Electricity Commission should consult with the ACCC and review their experience.</p> <p>The draft GIT rules (paragraph 11 in Appendix 2) allow inclusion of competition benefits at the discretion of Transpower or the Board. Meridian submits that if inclusion of competition benefits remains optional – all proponents and not just Transpower should have the discretion.</p>
Q26:	Are there other variables that should be included in the definition of project cost? Are the variables defined clearly and unambiguously?	Meridian agrees with the cost definitions.
Q27:	Should Government policies that reflect externalities and that explicitly impose costs or benefits on electricity market parties be included in the GIT?	On first principles, yes, these costs and benefits should be included in the cost benefit analysis. It is not clear what the justification for excluding them would be.
Q28:	Should the Commission assess projects against several base case scenarios? If not, how should the Commission deal with	In Meridian's view the Commission has not made its thinking clear on what is meant by a base case and applying the GIT as currently drafted does not appear likely to produce

	Question	Comment
	uncertainty regarding future generation location?	<p>meaningful results.</p> <p>In general, a cost benefit analysis counterfactual is what would be done if the investment being considered did not occur. The counterfactual is sometimes called the base case. The counterfactual may involve doing nothing (and accepting the possibility of shortages) or implementing some alternative investment. The proposed investment and the counterfactual can be tested against a number of scenarios but the counterfactual should not change (i.e. the comparison of outcomes should always be against the same alternative investment).</p> <p>Meridian submits that it is not meaningful to test an investment against a range of alternative investments each of which is optimal for a certain future outcome. Once an investment and its counterfactual are identified those same two investments should be tested under a range of scenarios of load and generation capacity to determine the likelihood of shortage with each investment. In the same way, transmission alternatives should be tested against a single investment base case under varying load/generation profiles.</p> <p>Meridian submits there needs to be a transparent process in identifying the base case scenarios. Meridian is aware that Transpower's planning scenarios differ from those of the Electricity Commission.</p>
Q29:	Do you agree with the Commission's approach of replacing proposed grid investments with alternative arrangements if they are already in a base case scenario? If no, what other approach should be adopted?	As discussed in our response to Q28, proposed grid investments will not be in the base case if it is appropriately defined.
Q30:	Do you agree sensitivity analysis should be conducted on the parameters listed above? What other variables should be considered for sensitivity analysis, and why?	In general, Meridian agrees that sensitivity analysis of uncertainty around key variables is important. However, we query whether sensitivity analysis on five different load/generation profiles is practical or would yield meaningful information. It may be preferable to select a single representative load/generation profile against which to conduct sensitivity analysis.
Q31:	Should the Commission use real options analysis where it is practicable to do so? How important do you think it is to value flexibility in regard to decisions to be made under the GIT, and in what circumstances is it most important to value flexibility?	Meridian submits that real options analysis that places a value on waiting and the creation of options is crucial but suggests that the analysis should not be too involved so as to avoid the possibility of the Electricity Commission becoming locked into a particular scenario.

	Question	Comment
		<p>Meridian is concerned that the focus of option analysis should not be limited to only deferral analysis. For example, there are options to stop a project that is no longer needed – this option can enhance the value of starting rather than deferring the start. We do not want to see the focus of option analysis limited or concentrated on the question of whether an investment should be deferred without considering the wider range of enablement, flexibility and variation options that also exist.</p> <p>It is important that optionality in terms of both generation and transmission investments is recognised in the assessment. This is one of the reasons why we have recommended the integration of National Strategic Factors and other qualitative factors into the assessment. (see Q24)</p>
Q32:	If it is complicated to apply real options analysis, should the Commission initially focus on the scenario analysis approach and develop real options analysis at a later stage?	Real options analysis is complicated. However, the Electricity Commission must ensure that the value of optionality is included in its assessment of grid investment proposals. This is one of the reasons why we have recommended the integration of National Strategic Factors and other qualitative factors into the assessment. (see Q24)
Q33:	In regard to the NPV analysis, which decision rule should be adopted, and why? Is the probability-weighted approach likely to be too complicated, and achieve spurious accuracy?	<p>Probability-weighting is a good theory that is likely to give spurious accuracy. It could yield meaningless results, particularly if a sensible approach to packages of inter-related and complementary investments is not adopted.</p> <p>Meridian agrees with the Commission that it is important that the Commission have the authority to disaggregate investments into components if the investments are stand-alone and have plausible alternatives. However, it is also important to consider the benefits of investing in a package of complementary and inter-related transmission assets. It may be that the package does not make sense in components (for example, because additional capacity would be stranded by a lower rated line to which it is connected). The additional benefits associated with the interactions of the components may be sufficient to outweigh the benefit of an alternative to one of the components.</p>
Q34:	Is a decision rule required now to choose between the NPV result and the real options result if they conflict?	Meridian submits that a range of factors should be considered when making a decision. The Electricity Commission should exercise its discretion in the context of the GPS.
Q35:	Do you agree with the assessment in Table 2? If not, what assessments do you think should be changed and why?	Meridian submits that the GIT would better meet these criteria if it was augmented with qualitative factors and national strategic factors. We have completed an analysis of the revised test against these criteria. It is presented in section G of our submission.

Appendix 4: Meridian Energy's suggested rewording of Draft Grid Investment Test

The draft GIT is copied below with Meridian's suggested insertions underlined and deletions struck through. These changes reflect our comments in Appendix 2 and are proposed to improve the wording of the Electricity Commission's draft GIT. Meridian's suggested structural changes to the GIT where included in Appendix 1.

Making of Electricity Governance Rule

1. In accordance with rule 6.6, Section III of Part F (**Transport Rules**) of the Electricity Governance Rules and the provisions of the **Act**, the **Minister**, on the recommendation of the **Board**, on *[insert date here]*, makes this **grid investment test** a schedule to Section III, Part F of the **rules**.

Preamble

2. Rule 2 in Section III, Part F of the **rules** specifies the purposes of the rules in Section III.
32. Rule 6.1 in Section III, Part F of the **rules** requires the Electricity Commission, formally constituted as the **Board**, to determine the most appropriate **grid investment test** and in so doing must have regard to the objectives in rule 6.3, as required by rules 6.1 and 6.3.
43. Pursuant to rule 6.2, the **grid investment test** is to be applied:
 - (a) by the **Board**, in developing **grid reliability standards**, to review and approve **reliability investments** and **economic investments** and to review **transmission alternatives**, and
 - (b) by **Transpower**, to determine proposed **economic investments** for inclusion in the proposed **grid upgrade plan**.

The grid investment test

54. A **proposed grid investment** satisfies the **grid investment test** if:
 - (a) the **proposed grid investment** maximises the **expected net market benefit** compared with a number of **alternative projects**;
 - (b) the **expected net market benefit** of the **proposed grid investment** is greater than zero; and
 - (c) if sensitivity analysis is conducted, a conclusion that a **proposed grid investment** satisfies sub-paragraphs (a) and (b) above is sufficiently robust having regard to the results of that sensitivity analysis.

For the purposes of this grid investment test:

65. "**Proposed grid investment**" means an **economic investment** or **reliability investment** ~~in the grid~~ proposed by **Transpower** that requires estimated capital expenditure prior to commissioning of \$1 million or more.
76. The application of the **grid investment test** may involve less rigorous and comprehensive analysis than would otherwise be required, where the **proposed grid investment** requires estimated capital expenditure prior to commissioning of less than \$5 million.

87. **"Alternative projects"** means any alternative transmission augmentation projects **and or transmission alternatives** to the **proposed grid investment** that **individually is, or any combination of alternative transmission augmentation projects and/or transmission alternatives to the proposed grid investment that together** are:
- (a) technically feasible;
 - (b) reasonably likely to proceed if **both** the **proposed grid investment** does not proceed and **no other alternative project proceeds**;
 - (c) unlikely to proceed if the **proposed grid investment** does proceed;
 - (d) reasonably expected to provide similar benefits, in type but not necessarily in magnitude, to relevant nodes, as the **proposed grid investment**;
 - (e) appropriate in number and technology given the cost magnitude of the **proposed grid investment**, the complexity of the required modelling and the urgency of the **proposed grid investment**; and
 - (f) reasonably expected to enable the deferral of investment of the type contemplated by the **proposed grid investment** for a period of 1 year or more.
98. **"Alternative projects"** includes any variant of the **proposed grid investment** involving a non-negligible change in the timing of that **proposed grid investment**.
109. **"Expected net market benefit"** means the probability-weighted average of the **net market benefit** for each of the **market development scenarios** developed for the future with the **proposed grid investment** or **alternative project**.
110. **"Net market benefit"** means, ~~for a market development scenario developed for the future with that proposed grid investment or alternative project,~~ the **market benefit** of a **proposed grid investment** or **alternative project** in **that a market development scenario** less the **cost** of that **proposed grid investment** or **alternative project** in that **market development scenario**, **in each case over a period of 20 years from the commissioning date of that proposed grid investment or alternative project, together with any significant terminal value.**
121. **"Market benefit"** means the present value of the benefits to those persons who produce, distribute and consume electricity from a **proposed grid investment** or **alternative project** ~~over a period of 20 years from the commissioning date (unless significant market benefits or costs are expected to arise from the proposed grid investment or alternative project after that time, in which case the then present value of any future benefits may also be included in the market benefit of the proposed grid investment or alternative project)~~ and includes:
- (a) changes in fuel costs of **existing projects-assets**, **committed projects** and **modelled projects**;
 - (b) changes in the value of involuntary **demand** curtailment;
 - (c) changes in the costs of demand-side management;
 - (d) changes in costs resulting from the deferral of capital expenditure on **modelled projects**;
 - (e) changes in costs resulting from differences in the **size amount** of capital expenditure on **modelled projects**;
 - (f) changes in costs resulting from differences in operations and maintenance expenditure on **existing projects-assets**, **committed projects** and **modelled projects**;

- (g) changes in costs for **ancillary services**;
 - (h) changes in transmission **losses**;
 - (i) subsidies or other benefits provided under or arising pursuant to all applicable laws, regulations and administrative determinations; and
 - (j) if considered appropriate by **Transpower** or the **Board** and separately identified and calculated, **competition benefits**.
132. "**Competition benefits**" means the effects of greater competition between **generators** resulting from a **proposed grid investment** or **alternative project** on:
- (a) the cost of **dispatch**;
 - (b) forecast **demand** growth; and
 - (c) the timing of **modelled projects**.
143. "**Cost**" means the present value of the costs of a **proposed grid investment** or **alternative project** to those persons who produce, distribute and consume electricity ~~over a period of 20 years from the commissioning date (unless significant market benefits or costs are expected to arise from the proposed grid investment or alternative project after that time, in which case the then present value of any future costs may also be included in the cost of the proposed grid investment or alternative project)~~ and includes:
- (a) capital costs incurred prior to the commissioning of the **proposed grid investment** or **alternative project** (as the case may be);
 - (b) operating, maintenance and dismantling costs over the operating life of the **proposed grid investment** or **alternative project** (as the case may be);
 - (c) costs to **participants** associated with testing of the **proposed grid investment** or **alternative project** (as the case may be);
 - (d) any additional amount, approved by the **Board**, that could reasonably be considered to be a cost related to the commissioning of a **proposed grid investment** or **alternative project** (as the case may be); and
 - (e) costs of complying with or arising pursuant to all applicable existing and anticipated laws, regulations and administrative determinations.
154. The **market benefits** and **costs** of a **proposed grid investment** or **alternative project** are determined for each of the **market development scenarios** for the future with that **proposed grid investment** or **alternative project** by comparing that **market development scenario** with the corresponding **market development scenario** developed for the **base case**.
16. **"Terminal value"** means the present value of the **market benefits** less the **costs** expected to arise from the **proposed grid investment** or **alternative project** more than 20 years after the commissioning date of such **proposed grid investment** or **alternative project**.
175. "**Market development scenarios**" means the **number of** reasonable future states of the electricity industry, developed for use in determining the **market benefits** and **costs** of a **proposed grid investment** and **alternative projects**, for each of:
- (a) the future with a **proposed grid investment**;
 - (b) the future with each **alternative project**; and

- (c) the future without the **proposed grid investment** or any **alternative project**.
186. Except where the development of an alternate future scenario to those outlined in the **statement of opportunities** is reasonably justified, the **market development scenarios** must be the possible future scenarios outlined in the **statement of opportunities** and the probability of occurrence of a **market development scenario** will be as set out in the **statement of opportunities** in respect of the relevant possible future scenario.
197. The supply-side of any **market development scenario** must include:
- (a) **committed projects**;
 - (b) **decommissioned projects-assets**; and
 - (c) **modelled projects**.
208. "**Committed projects**" means transmission augmentation projects and **non-transmission projects**, other than the **proposed grid investment** and **alternative projects**, which are reasonably likely to proceed in a similar timeframe regardless of whether or not the **proposed grid investment** or any **alternative project** proceeds and in relation to which either:
- (a) all of the following are satisfied:
 - (i) the proponent has obtained all required planning consents, construction approvals and licences, including completion and acceptance of any necessary environmental impact statement;
 - (ii) construction has commenced or a firm commencement date has been set;
 - (iii) the proponent has purchased, settled or acquired land (or commenced legal proceedings to acquire land) for the purposes of construction;
 - (iv) contracts for supply and construction of the major components of the plant and equipment (including any generators, turbines, boilers, transmission towers, conductors, terminal station equipment) have been finalised and executed, including any provisions for cancellation payments; and
 - (v) the financing arrangements, including any debt plans, have been conducted and completed; or
 - (b) in the case of transmission augmentation projects, the **Board** has unconditionally approved the project following application of this **grid investment test**.
2119. "**Decommissioned projects-assets**" means the decommissioning, removal or de-rating of **existing projects-assets** which are reasonably likely to occur in a similar timeframe regardless of whether or not the **proposed grid investment** or **alternative project** proceeds and in relation to which either:
- (a) both of the following are satisfied:
 - (i) a final decision to decommission, remove or de-rate the **existing project-asset** after a specified date has been made and has been publicly announced; and
 - (ii) contracts to directly or indirectly facilitate the decommissioning, removal or de-rating of the **existing project-asset** have been finalised and executed; or

- (b) consents or contracts for the operation and maintenance of the **existing project-asset** have been terminated or have expired with no reasonable prospect of renewal, or in relation to which agreements for early termination have been finalised and executed.
220. **"Existing projects-assets"** means **assets which form part of the grid, transmission augmentation projects** and **non-transmission projects** that have been commissioned prior to, and are in operation at the time of, the application of this **grid investment test**.
231. **"Non-transmission projects"** includes investments in **local** generation, energy efficiency, demand-side management and distribution network augmentation.
242. **"Modelled projects"** means transmission augmentation projects and **non-transmission projects**, other than the **proposed grid investment** and **alternative projects**, which are:
- (a) identified in the **statement of opportunities** as likely to occur in a **market development scenario**; **and**
- (b) reasonably expected to occur in that **market development scenario** within the time horizon for assessment of the **market benefits** and **costs** of the **proposed grid investment** and **alternative projects**; **and**
- ~~(c) — the likelihood, nature and timing of which will be affected by whether the proposed grid investment or any alternative project proceeds.~~
253. **"Base case"** means the **number of market development scenarios** developed for the reasonable future state of the electricity industry without the **proposed grid investment** or any **alternative project**.
264. The **base case** must be reasonable having regard to:
- (a) the **grid reliability standards**;
- (b) any possible future scenarios outlined in the **statement of opportunities**;
- (c) the current state of the electricity industry, including the following elements of the current state of the electricity industry:
- (i) the size and location of **demand**;
- (ii) the value(s) of unserved energy (which value(s) will be the value or values published by the **Board** for this purpose from time to time or, if no such value or values is published by the **Board**, \$20,000/MWh);
- (iii) the operating and maintenance costs of efficiently supplying **demand** from **existing projects**;
- (iv) transfer capacities and capabilities of key transmission lines; and
- (v) the cost of providing sufficient **ancillary services** and the cost of transmission **losses** involved in efficiently supplying **demand**; and
- (d) reasonably expected future market development, including:
- (i) the size, timing and location of **demand** growth;
- (ii) the value of unserved energy (which value(s) will be the value or values published by the **Board** for this purpose from time to time or, if no such value or values is published by the **Board**, \$20,000/MWh);
- (iii) the size, location and timing of **committed projects** and **modelled projects**;

- (iv) the operating and maintenance costs of efficiently supplying **demand** by means of **existing projects-assets**, **committed projects** and **modelled projects**;
 - (v) the capital costs of efficiently supplying **demand** by means of **modelled projects**;
 - (vi) the timing of **decommissioned projects-assets**;
 - (vii) transfer capacities and capabilities of key transmission lines; and
 - (viii) the cost of providing sufficient **ancillary services** and the cost of transmission **losses** involved in efficiently supplying **demand**.
275. Where a material **market benefit** or **cost** cannot be quantified, the direction of the **market benefit** or **cost** and likely magnitude of the **market benefit** or **cost** must be identified.
286. All present value calculations must use a discount rate equal to the regulated **Transpower** weighted-average cost of capital applicable at the time this **grid investment test** is applied.
297. Either standard net present value analysis or real options analysis must be applied in assessing the **expected net market benefit** of a **proposed grid investment** or **alternative project**, depending on which type of analysis is more appropriate having regard to the likelihood of occurrence of any real options during the economic life of the **proposed grid investment** or **alternative project**.
308. If real options analysis is used, all material real options must be taken into account in determining the **market benefits** and **costs** of a **proposed grid investment** or **alternative project**.
3129. Sensitivity analysis must be applied in assessing the **expected net market benefit** of a **proposed grid investment** or **alternative project**, unless it can be demonstrated that applying sensitivity analysis is either:
- (a) not reasonably practicable; or
 - (b) not reasonably necessary.
320. In applying sensitivity analysis, a number of alternative reasonable scenarios should be developed for each of the **market development scenarios** using reasonable variations in the following:
- (a) forecast **demand**;
 - (b) the size, timing, location, and operating and maintenance costs of:
 - (i) the **proposed grid investment** or **alternative project**; and
 - (ii) **committed projects** and **modelled projects**;
 - (c) the capital cost of:
 - (i) the **proposed grid investment** and the **alternative projects**; and
 - (ii) **modelled projects**;
 - (d) the timing of **decommissioned projects-assets**;
 - (e) the value(s) of unserved energy (which varied value or values will be the value or values published by the **Board** for this purpose from time to time or, if no such value or values is published by the **Board**, \$10,000/MWh and \$30,000/MWh);
 - (f) the discount rate used in the present value calculations;

- (g) a range of consistent hydrological inflow sequences, as defined in the **statement of opportunities** and **centralised data set**;
 - (h) **generator** and demand-side bidding strategies; and
 - (i) key input variables in the calculation of **competition benefits**.
334. Unless the context calls for another interpretation:
- (a) terms defined in Part A of the **rules** take that defined meaning;
 - (b) a reference:
 - (i) to the singular includes the plural and conversely;
 - (ii) to a person includes an individual, company, other body corporate, association, partnership, firm, joint venture, trust, or Government Agency;
 - (c) the word including or includes means including, but not limited to, or includes, without limitation;
 - (d) where a word or phrase is defined, its other grammatical forms have a corresponding meaning.