18 February 2009

Major Electricity Users' Group
Level 8, Wakefield House, 90 The Terrace
PO Box 8085
Wellington

Attention: Ralph Matthes

Dear Ralph,

Re: North Auckland and Northland Proposal One, Grid Upgrade Project

The purpose of this letter is to provide advice to the Major Electricity Users Group (MEUG) on the Electricity Commission's (the Commission) 19 December 2008 Notice of Intention (NOI) to decline Proposal One. Strata Energy Consulting (Strata) has been asked to consider the technical aspects and issues arising from the Commission's decision.

Applicability of the staged investments option

In the NOI the Commission has provided indicative Grid Investment Test (GIT) results for a short-list of five alternatives to Transpower's Proposal One. These alternatives are:

1. Staged investments option;
2. High temperature conductor (HTC) option;
3. Roskill reinforcement option;
4. Rodney generation option; and
5. Marsden generation option.

As the Commission has found the staged investments option and the Roskill reinforcement option to each be alternatives with a lower present value (PV) cost than Proposal One, the Commission has not undertaken detailed assessment and consideration of the HTC, Rodney generation and Marsden generation options.

The Commission has declared its intention to decline Proposal One because, in its view, the staged investments option and the Roskill reinforcement

option each have a lower PV cost than Project One. It should be noted that the only reason the staged investments option has a lower PV cost than Proposal One is because an option value of $30.5 million for the deferral of the first cross harbour cable between Penrose and Albany has been attributed to it.

The Commission has based the $30.5 million option value on the probability of the Rodney power station proceeding and providing the benefits of a transmission alternative. As presented in the NOI, the Commission's view that the staged investments option is a cheaper alternative to Option One hangs on the probability of Rodney power station proceeding and on the Rodney power station being an alternative to Option One. However, in Strata's view, it is unlikely that a single generation unit will provide the same reliability and security levels as the transmission cable contained in Proposal One. Therefore, Strata considers that the Rodney generation option would not meet the requirements of a transmission alternative, as set out in Clause 19.4 of the GIT.

While Strata believes that the Marsden generation option offers more diversity than the Rodney generation option, Strata queries whether the Marsden generation option is viable in light of evidence that base load generation, rather than peaking generation, is required in the North Auckland and Northland (NAaN) region to accommodate a flattening load profile. This overarching reason, coupled with the reasons set out in the NOI, mean that Strata does not consider the Marsden generation option to be a viable transmission alternative.

While Strata agrees with the Commission's approach of using a staged investments option, we believe that it would have been more appropriate for the Commission to apply this methodology to each of Proposal One and the Roskill reinforcement option. Strata suggests using the HTC option as a transmission alternative to each of Proposal One and the Roskill reinforcement option, and using two generation units at Rodney as an additional alternative to the Roskill reinforcement option. The options before the Commission under this approach would be as follows:

- Proposal One;
- Staged investments option using Proposal One and the HTC option;
- Roskill reinforcement option;
- Staged investments option using the Roskill reinforcement option and the HTC option;
- Staged investments option using the Roskill reinforcement option and two generation units at Rodney coming online in 2026 rather than 2028.

With respect to the HTC option, it is considered that more detailed consideration of this transmission option would be appropriate. Transpower's need to reconductor most of its lines in Auckland over the next 10-20 years provides an opportunity to consider HTC and the corresponding increase in

the capacity of those lines. The staged investments option provides for the HTC option to be kept open pending further investigation of the use of this technology in New Zealand. With respect to the staged investments option using Proposal One, hopefully this will provide sufficient time to confirm whether or not the HTC option is indeed an alternative to Proposal One. With respect to the staged investments option using the Roskill reinforcement option, this will provide sufficient time to confirm whether the HTC option is an alternative.

With respect to the use of two generation units at Rodney, it is considered that this might represent an alternative to transmission, because of the increased reliability. This, combined with the fact that the second generation unit at Rodney is proposed to be generating in 2028, just two years after the Penrose – Albany cable is proposed to be operational under the Roskill reinforcement option, means that two generation units at Rodney in 2026 could also be used as alternative under a staged investments option for the Roskill reinforcement option.

Strata believes that a staged investments option for the Roskill reinforcement option is particularly attractive, as rather than the two year option period under Proposal One, a 10 year option period exists. It is considered likely that other options such as increased Northland generation, new conductor technology and energy storage technology will develop over this 10 year period. The option value for a 10 year deferral should be higher as costs are being deferred further into the future.

Unserved energy

A key issue is the probability of a double circuit failure of the Otahuhu – Henderson 220kV circuits. From the NOI it is unclear why the Commission has added a $9 million benefit to Proposal One, when a double circuit failure is also included as a cost in the estimate of unserved energy (EUE) costs for the Roskill reinforcement option and the other transmission alternative options. On the surface this appears to be double counting the impact of the double circuit failure. The Commission should provide a clear explanation of the difference between the high impact low probability (HILP) event benefit and the EUE costs in the Commission's analysis.

Treatment of Vector's Penrose – Quay Street cable

It is noted that the Commission has reduced the capital costs provided by Transpower to reflect the Commission's view of the costs faced by Vector which should be included in the GIT (i.e. $12 million for transformer upgrades at the Wairau Road substation). Strata also notes the statement in the NOI that "Proposal One will not in itself result in a 'switched N-2' level of

security at Quay Street" (paragraph 5.3.59, page 25) and the Commission's consequent conclusion that the implementation (or not) of the Penrose – Quay Street cable is neutral between Proposal One and the alternative options. However, Strata considers that it would have been more appropriate to include the cost of Vector's Penrose – Quay Street cable in the GIT, as Vector's security standard of 'switched N-2' is considered to be appropriate for a load of the significance of the Auckland central business district.

Cost of using the Vector tunnel

The Commission has included a cost for using the Vector tunnel of $38 million. This cost is based on Transpower's avoided cost of laying under the road the Penrose – Hobson St section of the Penrose – Albany cable. This rationale implies an acceptance by Transpower and the Commission that Vector should be able to realise monopolistic rents from Transpower (and therefore transmission users) if Transpower uses the Vector tunnel.

The Commission does not provide any analysis of alternative methods of estimating the cost of Transpower using Vector's tunnel, such as:

- the marginal cost to Vector from the tunnel being used for the Penrose – Albany cable;
- the cost to Vector of building the tunnel and the (optimised) regulated asset value of the tunnel; and
- an acceptable commercial return to Vector from Transpower's use of the tunnel.

It is considered that the cost of using the Vector tunnel should be reviewed by the Commission.

Summary

In summary, Strata suggests that the staged investments analysis should be applied to each of Proposal One and the Roskill reinforcement option. Strata anticipates that the PV cost of the staged investments option using the Roskill reinforcement option will be materially lower than the PV cost of the staged investments option using Proposal One.

Strata also suggests that the Commission review its analysis of unserved energy, the cost of using Vector's tunnel, and the appropriateness of excluding the cost of Vector's Penrose – Quay Street cable from the GIT.

Comments on the Commission's questions and other points

Comments on aspects and issues arising form Strata's review of the NOI are provided in table 1 below.

Table 1

Item	Comment
The Commission's questions	
Do you consider that the Rodney generation option should be regarded as an alternative project?	Key issues are: 1. the reliability of the Rodney generation option versus transmission; and 2. the probability of the Rodney generation option proceeding. *Point 1* A single generation unit is not normally considered to be equivalent in terms of reliability to a transmission circuit (either cable or line). This is because transmission is inherently more stable than generation (static versus moving parts) and because transmission provides access to a diverse generation base with multiple fuel sources. Relying on a single 120MW generation unit at Rodney (until 2028) does not appear to meet the requirements of Clause 19.4 of the GIT because it could not be reasonably expected to provide similar benefits to the proposed transmission investments. *Point 2* In a letter dated 4th December 2008, Genesis Energy advised the Commission that Genesis Energy does not have certainty regarding gas supply and gas infrastructure. In addition, Genesis Energy does not have resource management consents, although it has applied for these. Given this uncertainty, and notwithstanding point 1 above, considering the Rodney generation option as a transmission alternative seems to be overly optimistic. In Strata's opinion, a single generation unit at Rodney is unlikely to meet the requirements of a transmission alternative and therefore not be

Item	Comment
	considered as an alternative project unless it is demonstrated that the generation unit can meet extremely high reliability standards or multiple generation units are installed.
Do you consider that the Rodney generation option should be included in the market development scenarios?	As discussed in point 2 under the first question above, there are technical, resource access and commercial hurdles for the Rodney generation option to overcome before it goes ahead. However, given the Government's change of stance towards fossil fuelled generation projects it is legitimate to consider a market development scenario that includes fossil fuelled generation.
Do you consider that the High Temperature Conductor (HTC) option should be regarded as an alternative project?	Whilst there are issues to be resolved regarding the use of HTC in New Zealand, the technology is maturing and has demonstrated benefits. Key issues are: 1. Transpower has to reconductor most of its lines in Auckland over the next 10-20 years; and 2. The risk of a double circuit failure on the Otahuhu – Henderson circuits (a high impact low probability (HILP) event). The Commission calculates the benefit of avoiding a HILP event at $1.3m per annum, or $9m in 2007 dollars. *Point 1* The need for Transpower to reconductor most of its lines in Auckland over the next 10-20 years, provides an opportunity to consider HTC and the corresponding increase in the capacity of those lines. *Point 2* The HTC option would not remove the risk of a double circuit failure on the Otahuhu –Henderson circuits (a high impact low probability (HILP) event), whereas the Penrose –Albany cable would. In the Commission's analysis, this HILP event is given a value of $1.3 million per annum, or $9 million in

Item	Comment
	2007 dollars. It is considered that the following questions need to be answered regarding the HILP risk assessment: 1. In respect of the estimated cost of $800 million for a tower failure HILP event, which is used by the Commission to derive the $1.3 million value, what value of lost load (VOLL) has been used in deriving the $800 million cost? 2. If this is not $20,000/MWh how has the alternative VoLL been calculated and does this comply with the requirements of the GIT? 3. How can the significant difference between Transpower's assessment of the potential risk at 1:350 years and the Commission's assessment of the potential risk at 1:650 years be reconciled? 4. What contingency arrangements has Transpower already got in place if a HILP event occurs on the Otahuhu – Henderson circuits? What additional contingency arrangements could be adopted to reduce the risk of a HILP event further? The staged investments alternative provides for the HTC option to be kept open pending further investigation of the use of this technology in New Zealand. Hopefully this will provide sufficient time to confirm whether or not the HTC option is indeed an alternative project.
Do you consider that the Roskill option should be regarded as an alternative project?	The Roskill option is technically feasible and therefore Strata considers that it should be included as an alternative project. It is noted that this option has the effect of delaying the need for a cross harbour cable between Penrose and Albany by about 10 years. It is considered that this deferral of capital investment adds a significant option benefit to the Roskill reinforcement option. The option value for a 10 year deferral should be higher than the two year deferral option value for the staged alternative as costs are being deferred further into the future.

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	The options that may develop over 10 years include increased Northland generation (e.g. clean coal gas or oil, biogas, geothermal, wind), new conductor technology (e.g. HTC, super conductor) and energy storage technologies. It is suggested that the Commission is asked to consider applying the staged investments methodology to the Roskill reinforcement option, using the HTC option and two generation units at Rodney as alternatives.
Do you consider that the Marsden option should be regarded as an alternative project?	Given the smaller incremental generation unit size of the Marsden generation option, it provides additional diversity benefits over the Rodney generation option. The incremental nature of the Marsden generation option is advantageous by acting to defer transmission investment up to the point where no more generation can be built. However, the key issue is the uncertainty of the Marsden generation option proceeding. The Marsden generation option is for a peaking diesel plant. However, distribution companies have been noting how the Auckland and NAaN load profiles are becoming flatter. This means that base load generation may be required in the longer term for the NAaN region. This in turn raises a key question as to the suitability of the Marsden (peaking) generation option in the longer term.
Do you consider that the staged investments alternative should be regarded as an alternative project?	Transpower and the Commission agree that the staging of the Proposal One investments is appropriate. The main difference is that the Commission considers that an option benefit arises by deferring a decision on whether to proceed with the Penrose – Albany cable, whereas Transpower wants certainty (approval) of the whole of Proposal One now, rather than in 2011. Vector also argues that it needs certainty regarding the Penrose – Albany component in order to plan its network augmentations. Given the possibility of future generation projects in the NAaN region and the existence of the HTC and Roskill options, it is considered sensible to defer the

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	Penrose – Albany cable decision in order for the options to, hopefully, become firmer.
Do you agree with the Commission's treatment of Vector's augmentations?	With respect to the Wairau Road – Albany augmentations, it is considered appropriate that the Commission has included the $12 million cost of the alternative augmentations that it has identified, as these appear to meet Vector's reliability standards at least cost. With respect to the Penrose – Quay Street cable, on the basis that Proposal One will not in itself result in a 'switched N-2' level of security at Quay Street, then it is logical that the implementation (or not) of the Penrose – Quay Street cable is neutral between Proposal One and the alternatives. The Commission's view that Vector can defer its decision on whether to invest in the Penrose – Quay Street cable until a decision on the Penrose – Albany cable is made appears reasonable, provided that Vector is still able to install the Penrose – Quay Street cable in 2013. However, in respect of the Commission's decision to exclude the costs of the Penrose – Quay Street cable from its GIT analysis of Proposal One or any of the alternatives, Strata considers that the costs should have been included. Whilst this does not change the relative costs of Proposal One and the alternatives, it does affect the absolute costs. By excluding the costs the Commission appears to consider that 'switched N-1' is acceptable, rather than 'switched N-2'. Our experience is consistent with the advice that Vector has received, which is that on distribution networks higher levels of redundancy are required, since distribution networks are generally built to lower standards than transmission networks.
Do you agree with the Commission's treatment of the possible property cost of the HTC option?	This is outside the scope of Strata's assessment.

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Is the cost of $38 million for Vector's tunnel robust?	The $38 million cost for use of Vector's tunnel is based on Transpower's avoided cost of laying under the road the Penrose – Hobson St section of the Penrose – Albany cable. This rationale implies an acceptance by Transpower and the Commission that Vector should be able to realise monopolistic rents from Transpower (and therefore transmission users) if Transpower uses the Vector tunnel. The Commission does not provide any analysis of alternative methods of estimating the cost of Transpower using Vector's tunnel, such as: • the marginal cost to Vector from the tunnel being used for the Penrose – Albany cable; • the cost to Vector of building the tunnel and the (optimised) regulated asset value of the tunnel; and • an acceptable commercial return to Vector from Transpower's use of the tunnel.
Other points	
EUE and HILP event costs and benefits	In its May 2008 Economic Assessment (paragraph 6.6) Transpower sets out its assumptions for calculating the value of unserved energy cost. Both a single contingency and an Otahuhu – Henderson double circuit outage (e.g. tower collapse) are considered. Transpower adds the costs of unserved energy to the HTC and Roskill alternatives (Table 3, page 39) rather than attributing a benefit to Proposal One. In its NOI, the Commission includes the same EUE cost values for the Roskill reinforcement and HTC options, and includes a $9.3 million EUE cost for the Rodney generation option. In addition, the Commission includes a benefit of $9 million to Proposal One for a HILP event benefit. The discussion of the Commission's approach to calculating the HILP event benefit is similar to that used by Transpower in calculating the EUE cost. Whilst the assumptions and values placed on probability and outage times differ between the Commission and Transpower, it appears that both are covering the HILP event impact.

Item	Comment
	Why has the Commission added a further HILP event benefit to Proposal One when it appears to have been included in the EUE costs attributed to the alternatives?
Use of Vector's tunnel	The use of Vector's tunnel is interesting from a security of supply perspective, as fires or floods can occur in these structures. Given that Proposal One adds the Penrose – Albany cable to the tunnel, minimising the risk of a catastrophic tunnel failure needs to be considered. The proposed eventual co-location of two Penrose – Albany cables in a single tunnel may be considered the same as dual circuits on a single tower.
Possible Rule change proposal	The Commission notes that the Rules do not provide it with the ability to approve the first part of Proposal One (the 'Pakuranga – Penrose works'), which means that it has to reject Proposal One in its entirety, rather than just rejecting the second part. Is the Commission intending to propose a Rule change that introduces more flexibility in the manner in which the Commission is able to approve investment proposals?

I trust the above will assist MEUG in formulating a submission to the Commission on the NOI. Please contact me if you require any further information or advice.

Yours sincerely,

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