MAJOR ELECTRICITY USERS' GROUP

6 August 2007

Mr Peter Harris
Acting Chair
Electricity Commission

By email to info@electricitycommission.govt.nz

Dear Peter

Post conference submission on Intention by the Electricity Commission to approve Transpower's Otahuhu Substation Diversity Proposal

1. This is a submission by the Major Electricity Users' Group (MEUG) to the Electricity Commission (the "Commission") advising of changes in the conclusions reached by MEUG following the Commission conference held 23 July 2007 (the "conference").

2. This submission has not been called for by the Commission. MEUG has taken this action because new information provided at the conference has allowed MEUG to offer a more informed view.

3. In keeping with the MEUG approach that being as open as possible will facilitate better outcomes, copies of this letter have also been sent to Transpower, various suppliers and distributors including those that submitted on the Otahuhu substation Grid Upgrade Plan (GUP) or Interim Grid Expenditure (IGE) and the Ministry of Economic Development. A copy will be posted on the MEUG web site.

4. In the last written submission by MEUG to the Commission on 16 July and as repeated at the conference on 23 July we submitted four conclusions. Each of those four conclusions is set out in the sections that follow along with subsequent changes in the view of MEUG.

MEUG conclusion a) of 16 and 23 July 2007

5. This conclusion was:

> *"The rules governing approval of reliability investments do not support the Commission notice of intention to approve the proposal."*

6. It was evident from the conference that there were material points of difference about the application of the rules and the relationship with the Government Policy Statement (GPS). For example the questioning by Commissioner Dell of Mr Deacon canvassed this issue (refer conference transcript pages 47 to 49). MEUG believe it important that how the rules and GPS mesh be fully understood by all parties including Transpower in developing proposals for approval, the Commission in considering such applications and affected parties. To this end MEUG requested an opinion from Chapman Tripp regarding the proper interpretation of the grid upgrade and investment rules in Part F.

PO Box 8085, Level 8, Wakefield House, 90 The Terrace, Wellington, New Zealand
T +64-4 494 0996, F +64-4 494 0997, info@meug.co.nz , www.meug.co.nz

7. A copy of the Chapman Tripp opinion to MEUG dated today is attached.

8. In paragraph 2 of their opinion, Chapman Tripp state:

   - "*The Electricity Commission has erred in failing to disaggregate the proposed investments into reliability investments necessary to meet the N-1 standard, and other reliability and economic investments, and applying clause 4.2 to those aspects of the proposal that are not necessary to meeting the N-1 standard.*

   - *In any event, the Electricity Commission has also erred in concluding that a variant based on the "$14 M option" is not a valid alternative project for GIT analysis purposes on the basis that it was not sufficiently "long term". The GIT requires a 20 year period of analysis of costs of an investment proposal, not a 20 year investment proposal, and it is necessary (and appropriate) for the Commission to consider the inter-relationship and relative efficiencies of short, medium and long term investment proposals*."

9. The above two conclusions reached by Chapman Tripp replace the first conclusion previously stated by MEUG on 16 July and at the conference.

MEUG Conclusion b) of 16 and 23 July 2007

10. This conclusion was:

> *"Should the decision stand then this will set an extremely poor precedent for requests by Transpower for new investment and subsequent approval by the Commission leading to extensive gold-plating."*

11. The conference didn't explore how much gold-plating risk there might be and MEUG has not undertaken any further work. To put this risk into context, if we are correct and approving Transpower's request will result in gold plating at Otahuhu substation, then any future request for capital works at any of the other 147 substations in New Zealand[1] will use the precedent set to seek approval for more than that just necessary to achieve Grid Reliability Standards.

12. MEUG do not wish to change conclusion b).

MEUG Conclusion c) of 16 and 23 July 2007

13. This conclusion was:

> *"The Commission should ask Transpower to proceed immediately with the under-grounding of existing overhead lines and splitting existing buses at an expected cost of approximately $14m."*

14. MEUG arrived at the view that the $14m option was the minimum because that had been the lowest capital cost option Transpower had, until the conference, tabled as the minimum cost to meet Grid Reliability Standards (GRS).

15. At the conference the $14m IGE option was discussed and the following emerged:

    a) The $14m option comprised bus section circuit breakers (approximately $3m[2]) and the balance under-grounding for existing overhead cables.

    b) Under-grounding of existing overhead cables is not standard practice in similar substations overseas, refer conference transcript (p63):

    "Graham Pinnell: *Good electricity industry practice (GEIP) is in reference to international practice. Are there instances, commonly overseas, where we have got*

[1] Electricity Commission, Reasons for Decision set out in Notice of Intention to Approve Transpower's Otahuhu Substation Diversity Proposal, 25 May 2007, paragraph 6.3.44 states "there are presently 148 220 kV and 110 kV substations."
[2] The capital cost for bus section circuit breakers only was referred to orally at the Commission briefing on 27 June 2007 as being between $2m and $3m.

overcrossings in existing substations that are not being retrofitted with cabling to remove those overcrossings?

Robert Derks: *Our understanding is that is the case. Not all overcrossings are removed at all substations and there is some evidence that says that some utilities don't remove overcrossings."*

16. From these comments at the conference it became apparent that perhaps the minimum capital works to immediately meet GRS is $3m for bus section circuit breakers only, not the $14m option.

17. Post the conference MEUG has further considered if spending $3m for bus section circuit breakers would meet good electricity industry practice (GEIP). We note:

    a) There is no single document that sets out the requirements for meeting GEIP.

    b) To establish if Otahuhu requires cabling to meet GEIP would require a study of the current practice applied internationally to substations supplying major loads. However, Transpower has already confirmed, and this is recorded in the conference transcript, that cabling is not usual practice overseas.

    c) GEIP changes over time and existing substations that met GEIP when constructed may not meet today's GEIP standard. This does not mean that we must immediately upgrade them.

    d) We can also consider Transpower's recent practice when building or refurbishing important substations.

        i) The new Te Kowhai substation important for Hamilton supply does not include any cabling.

        ii) When the Manapouri substation was upgraded the overhead structures were strengthened rather than changed to underground cables. MEUG understands that the option of under-grounding cables was not seriously considered as an option for that upgrade. Manapouri could be considered to be at least as important as Otahuhu as it supplies 15% of New Zealand's load.

    e) There are arguments that repairing cable faults could take much longer than overhead lines (e.g. 1998 Auckland CBD outage) and this would therefore increase the cost of lost load.

18. Given what we have heard at the conference and Transpower's past practice, we now believe it is reasonable to conclude that the $3 million option is sufficient for Otahuhu substation to meet GEIP. The cabling can be considered to be an enhancement that may be desirable if a major reconstruction is to be undertaken in the future. Therefore MEUG have reached the new conclusion that the minimum capital works to immediately achieve GRS and GEIP is $3m for bus section circuit breakers only, not the $14m option.

19. If there were no forecast demand growth for Auckland, the $3m cost of the bus section circuit breakers at Otahuhu substation is all that would be needed to meet GRS in the future. However all parties agree that demand for electricity in Auckland will increase and this needs to be considered. The need to be forward looking in the context of the earlier minimum expenditure that MEUG had proposed was commented on by Mr Derks for Transpower at the conference (transcript p58), with text in brackets added by MEUG

    "If implemented in isolation of a long-term plan, it (ie the $14m option) *could result in a stranding of assets. Now, what I'm saying there is that the bus section circuit breakers are common to all the options, however the cabling is different. If we put in an option that got rid of the cross-overs, it would not be adaptable to any of the other proposals that we put forward in our plan."*

20. From these comments MEUG:

a) Agree that there is likely to be a need for future capital works at Otahuhu substation to meet GRS in the future. Note there is not necessarily a common view on the type of work that is needed, when that work is needed and even the location (eg instead of Otahuhu, may be better to locate future reactive support elsewhere in Auckland) because of differences in forecasts of future demand and generation in Auckland and north.

b) Note the bus section circuit breakers are common to the three options in the Transpower GUP; and

c) Agree that if the $14m option previously considered by MEUG as the minimum were approved then there would be a risk of stranding cables if subsequently a new separate Gas Insulated Switchgear (GIS) substation was built. The outcome could be a higher NPV cost than the GIS proposal recommended by Transpower.

21. With respect to point c) above MEUG note if the $14m option were approved there might also be the possibility of new solutions emerging that would have a Net Market Cost less than that of the GIS option. Opportunities for innovation to find lower cost solutions if approval for a minimum set of works is made now include (refer Bill Heaps conference transcript p12):

a) "*Construction of the new Pakuranga 220 kV substation*."

b) "*Incremental reactive support requirements.*"

The GUP request assumes all reactive support is at Transpower substations. There might be opportunities within the Vector network that might be more effective and cheaper.

c) "*Improved maintenance and comprehensive contingency planning*."

This refers to the current condition assessment work being undertaken by Transpower at Otahuhu substation. MEUG is not aware of when this work will be completed.

22. Taking the above discussion into account and the newly identified minimum work of $3m plus the question of optionality that some solutions provide, MEUG suggest the range of solutions the Commission needs to consider can be broadly summarised as follows:

a) Options involving an entirely new substation at Otahuhu. Those are the GUP options 2 and 3. Option 2 being an Air Insulated Switchgear (AIS) substation and Option 3 being a Gas Insulated Switchgear (GIS) substation. Transpower have sought approval for option 3 and the Commission had notified an intention to approve that work. Both the GIS and AIS options include $3m for bus section circuit breakers plus under-grounding of existing overhead cables ($11m cost).

b) Options based on extending the existing Otahuhu substation. These can be subdivided into another two categories:

i) GUP option 1 that included $3m for bus section circuit breakers plus under-grounding of existing overhead cables ($11m cost);

ii) Options not considered in the GUP or the Commission decision:

- Approving and completing bus section circuit breakers plus under-grounding of existing overhead cables at a cost of $14m immediately and over the balance of the future 20 years of the GIT considering further work options as more information becomes available. This was the minimum option MEUG suggested prior to the conference.

- Approving and completing bus section circuit breakers only at a cost of $3m. Over the balance of the future 20 years of the GIT considering further work options as more information becomes available. This might not include the $14m for under-grounding existing overhead cables. This is the minimum immediate cost option that only became apparent at the conference

23. These options are summarised in the table below:

Table 1: Capital costs of options arising post conference

Option	Requested for approval now			Possibly for approval later (provide options for future decisions)	Possible total approved over next 20 years
	Common	Other	Total	In GIT these are modelled projects	
	$m	$m	$m	$m	$m
Post conference minimum (and extend):					
- Best case: Under-grounding cables not needed and Innovation possible	3.0		3.0	< 61.8	< 64.8
- Worst case: end up implementing GIS	3.0		3.0	79.2	82.2
IGE minimum (and extend):					
- Best case: Innovation possible	3.0	11.0	14.0	< 61.8	< 75.8
- Worst case: end up implementing GIS and strand under-grounded cables	3.0	11.0	14.0	79.2	93.2
GUP option 1: upgrade and extend	3.0	72.8	75.8	-	75.8
GUP option 2: new AIS substation	3.0	77.0	80.0	-	80.0
GUP option 3: new GIS substation	3.0	79.2	82.2	-	82.2

24. The cost estimates are all NPV and most are derived or calculated using the NPV capital costs set out in table 7.1 of the Commission decision of 25 May 2007. The numbers would need further work to meet the requirements of the GIT such as:

a) The assumed $3m "common" works for bus section circuit breakers needs to be confirmed.

b) If the options to approve now $3m or $14m of work were made and subsequently it was found the GIS option is indeed the best long term solution, then the 20 year NPV capital cost probably wouldn't be the simple sum of that initial approved work plus other non-common GIS work. That is because there would be a delay in seeking approval for and then constructing the GIS option compared to the timetable in the GUP option 3. This delay in construction of the new GIS substation would result in a lower NPV than indicated in the table above.

c) In addition to the NPV of the capital works, the GIT requires NPV of operating and other costs to be estimated. The Commission decision of 25 May 2007 included consenting, property and noise abatement costs, and operating and maintenance costs. In the Commission analysis these costs were in sum lower for GUP option 1 than options 2 and 3. As the options to approve $3m or $14 now are closely related

to GUP option 1, then it might be expected the "Best case" for both of those options would also have less non-capital related costs than GUP options 2 and 3.

25. Just taking capital costs, the option with the minimum possible NPV cost is to immediately approve the $3m for bus section circuit breakers on the assumption innovative solutions will be found that are lower cost than the solutions proposed in the GUP. Even if no new solutions are found and a separate new GIS substation is then built, then there will be no underground cable assets stranded as would be the case if the Commission approved the $14m option.

26. Another interesting outcome from having identified a new minimum investment of $3m as opposed to $14m is that the option value of only approving now the bus section circuit breakers is possibly greater than $17.4m[3]. This is, in the view of MEUG, sufficiently material that the Commission should consider this option benefit under Schedule F4, clause 27.10.

27. The GIT requires a comparison of other benefits also. The principle benefit for the Otahuhu substation GUP being "changes in the value of involuntary demand curtailment" per Schedule F4, clause 27.2. This market benefit is commonly referred to as the value of loss load (VOLL) or value of Expected Un-served Energy (EUE). For evaluating reliability investments the NPV of EUE benefit is calculated as the forecast quantity of EUE in any year times the predetermined unit value of EUE as set out in Schedule F4, clause 27.2. The latter is $20,000/MWh. The former, that is the quantity to which this unit value is applied, is calculated using complex models based on the equipment at risk and internationally sourced statistics on the probability of each piece of equipment failing under different scenarios. The basic intention of those models for assessing reliability investments is simply to estimate the quantity of EUE that would occur for "single credible contingency events."

28. The Commission decision of 25 May 2007 provided a small NPV EUE benefit for GUP options 2 and 3 relative to GUP option 1 of $0.21m and $0.24m respectively. These EUE benefits are approximately 0.3% of the NPV capital costs, which is much less than the uncertainty bounds on the capital estimates themselves. If those numbers are correct, then MEUG expect the NPV EUE benefit difference between the $3m or $14m options in table 1 above and the GUP options will also be relatively small. Therefore the Net Market Benefit of the options in table 1 above is likely to rank the same as the ranking for their NPV capital costs.

29. The conference canvassed whether or not the High Impact Low Probability (HILP) savings in Expected Un-served Energy (EUE) fitted that to be tested under the GRS of being "single credible contingency events." The point about how unlikely such events are was well made by Mr Everett (conference transcript pages 32 and 33). Following the conference MEUG has further considered whether the approach by a majority of commissioners to decide HILP events should be ascribed a 1 in 100 year probability whereas the available evidence was that the lower bound for such probabilities was greater than 1 in 500 years and the upper bound 1 in 10,000 years[4]. MEUG did not specifically request Chapman Tripp to consider this; although post the conference it has occurred to MEUG that there are statistical techniques for analysing uncertainty bounds for small sampling populations such as very rare occurrences. If the Commission had explored with expert advisors that all such techniques had been considered before arriving at the 1 in 100 assumption then this would have given us a degree of comfort.

30. When there may be an option value in excess of $17.m at stake (refer paragraph 26 above) and the Otahuhu substation decision may set a precedent for the other 147 substations in New Zealand, then relying on a judgement call outside of the range that Commission staff have been able to estimate as the probability for HILP events is very concerning.

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[3] Calculated as the NPV (all capital costs) of GUP option 3 of $82.2m less the NPV of post conference minimum option of approving $3m now plus future yet to be considered and approved works totaling possibly less than $64.8m.

[4] Refer Electricity Commission, Reasons for Decision set out in Notice of Intention to Approve Transpower's Otahuhu Substation Diversity Proposal, 25 May 2007, paragraph 6.3.45.

31. One surprise at the conference was a remark by Commissioner Dell when opening the questions for Mr Everett. The first bullet point of the last slide presented by Mr Everett stated:

> "*Transpower's proposal and options fail the GIT since they cost more than the value they will create*."

32. The question by Commissioner Dell (transcript page 37), with that part of interest highlighted follows:

> "Doug Dell: *Graeme, can I pick you up on the last slide and the first bullet point. Can you just explain that? By and large it contradicts what the Commission has found by applying the GIT.* ***Basically, the Commissioners found that by applying the GIT to the proposal in comparison with the alternatives, it does create a positive market value****."*

33. MEUG was very much surprised at this comment and either we or the Commissioners have a misunderstanding of the GIT results. As far as MEUG is aware the absolute EUE benefits estimated by Transpower as part of the GUP application of 11 December 2006 were dismissed as too high by the Commission and there has never been any estimate of those since. Even had the EUE benefits estimated by Transpower been included, those benefits would have been less than half the capital cost of the GIS option. The GIS option does not have a positive market benefit.

34. Mr Gleadow (conference transcript page 38) confirmed that only the relative EUE benefit compared to the GUP option 1 had been estimated not the overall economic benefit. Mr Gleadow also noted that the Commission had made that point only recently in a reply of 18 July to a MEUG letter of 11 July. That Commissioners may have believed the proposal that they intended approving had a positive market benefit and were not aware of recent correspondence between MEUG and the Commission clarifying this misconception is a concern.

35. To recap, MEUG by written submission on 16 July and then at the conference stated conclusion c) that:

> *"The Commission should ask Transpower to proceed immediately with the under-grounding of existing overhead lines and splitting existing buses at an expected cost of approximately $14m."*

36. Based on the discussion in paragraphs 13 to 34 above, MEUG wish to replace that conclusion with the following new conclusion:

    a) "The Commission should immediately approve the common work for all options of approximately $3m for bus section circuit breakers; and

    b) The Commission should confirm with Transpower that the condition assessment programme for the existing switchyard plus work undertaken since 12 June 2006 will bring overhead wires to the level expected for good electricity industry practice."

MEUG Conclusion d) of 16 and 23 July 2007

37. This conclusion was:

    "The Commission should request Transpower to submit an economic investment proposal for capital works over and above the works needed to meet Grid Reliability Standards of $14m."

38. Following on from the new conclusions in paragraph 36 above, MEUG wish to revise conclusion d) with the following conclusion:

    "The Commission request Transpower in future GUP to clearly unbundle work that approval is being sought for as a reliability investment (F:III:13.4) from that being sought for as an economic investment (F:III:14.3)."

39. This conclusion is consistent with the conclusion of Chapman Tripp, refer paragraph 2.1 of their memorandum dated 6 August 2007.

Concluding comments

40. The discussion at the conference has markedly improved the understanding by MEUG of technical options and how the rulebook works. New information from the conference has also resulted in a revision of views. This letter advises the Commission on changes to the conclusions from those made in earlier submissions as a result of the conference.

41. MEUG and advisors to MEUG are available to discuss this submission if needed. This submission is not confidential.

Yours sincerely

Ralph Matthes
Executive Director

Attachment:

Chapman Tripp Memorandum to MEUG, *Otahuhu substation investment proposal – analysis of legislative scheme*, 6 August 2007