Submissions received

- Drum B
- The Energy Centre
- Federated Farmers
- Fulton D

Submission by

B J Drum

B.J. Drum

8 June 2006

Electricity Commission
PO Box 10041
Wellington
Attention: Mr Roy Hemmingway

Submission on the Draft Decision made 27 April 2006 in respect of Transpower's Grid Update Proposal.

Dear Sir

Thank you for the opportunity to express my thoughts in respect of the above decision and events since.

It is with concern that I read about Transpower's revised proposal to run the proposed line at 220kv instead of 400kv, yet maintain the same route and pylons. The fact that they have announced that they will build the necessary substations sometime in the future so that they can satisfy the cost ceiling you have indirectly advised them of makes nonsense of the whole process and further highlights Transpower's disdain for everyone other than themselves.

Whilst you have not received Transpower's revised proposal yet and cannot, therefore, ask for submissions nor rule on it only serves to further highlight the real issues. Namely, the electricity industry as a whole lacks direction and a clear, long-term strategic plan and the fact that you are not able to advise Transpower on what is needed only exacerbates the situation.

In respect of the draft decision and the rationale applied I do have some queries and comments –

- It is my understanding that the need for additional transmission lines is based, primarily, on the fact that there is no new generation confirmed for Auckland or Northland and that the demand growth forecast is such that security of supply is at risk beyond 2010 without any investment. My query is what new generation is needed at Whakamaru if the new 400kv line (or any line for that matter) is built? In other words, is Whakamaru currently capable of generating the additional power provided by the new line because it is currently working under capacity or will a new generation station need to be built as well? Or does the $300m Transpower want to defer spending on substations at Whakamaru and Otahuhu amount to, effectively, new generation? Either way, surely it is more cost efficient to build new generation at Otahuhu initially and apply the savings in capital costs to the additional operating costs needed given that whatever fuel source is used at Otahuhu will not be renewable? What is the cost differential over time?

- I understand also that it is within Transpower's operating authority for them to also act as a generating company, not just a transmission company? If so, does this create a conflict of interest when deciding about generation in Auckland or Northland?
- You raised the concept of a transmission corridor and asked for feedback on this concept. Conceptually I am in favour of a transmission corridor, albeit with a number of provisos, namely that such a corridor utilises existing non-residential areas as much a possible, that all lines into Auckland need to fall within a single corridor and that underground tunnels are used in urban areas as a matter of common practice.
- Per my initial submission and as reported in the national press in recent times, there are plans by Transpower to build a tunnel from Bombay to Otahuhu at a cost of around $180m. It makes sense to pursue this as a logical starting point for any corridor that Transpower may ultimately acquire as it would enable all lines into Auckland from the south to be located in a single, easily accessible, place. The savings in easements alone would offset the cost of building the tunnel, not to mention the reduced maintenance costs that would also be enjoyed. Given the cost comparison between $90m to underground 9km of cable in trench for a single line in Transpower's initial proposal compared to a tunnel of some 25km that could house, off the top of my head, at least 10 existing lines into Auckland as well as all future development at a cost of $200m the answer is simple. Furthermore, given that there are also plans to pipe water from the Waikato into Auckland and gas from Taranaki, a single, multi-utility tunnel seems suitable.
- Given that Transpower propose to build at least 2 or 3 400kv lines, not just the one currently proposed, also lends credence to the need for a long-term coherent electricity plan of, say, 100 years, to be in the public domain at all times. It also supports the need for a clearly defined corridor to be established of a minimum width, inclusive of a green belt on the fringes and an agreeable and equitable formula to be established in regards to compensation payable (both initial and annuities) to directly and indirectly affected parties. It is imperative that some form of plan be formulated that is equitable to all parties.

Finally, one thing that has also been conveniently overlooked is that, given that the cost of any solution is ultimately borne by the consumer and that the consumers' are those directly affected by any solution, surely the consumers' desire for the least intrusive solution should be paramount.

Whilst I appreciate that you are only able to rule on proposals made by Transpower and that your ruling is based upon cost-benefit analyses alone, surely you will agree that it is necessary to intimate to Transpower and/or the Government what the ideal solution is in respect of the immediate issues as well as the future of the industry in general as it is most surely in everyone's best interest to have a clear and coherent plan for the future, rather than the current short-term planning that seems to exist.

Thank you again for the opportunity to present this submission.

Yours faithfully

Jeff Drum

Submission by

The Energy Centre

THE UNIVERSITY OF AUCKLAND
BUSINESS SCHOOL

Submission to the Electricity Commission and the Minister of Energy on:

Transpower's Auckland 400 kV investment proposal draft decision

The Energy Centre
The University of Auckland

Mr. Bart van Campen, MSc. MA. Energy Centre
Dr. R. Kirkpatrick, Energy Centre & Faculty of Engineering
Dr. Nirmal Nair, Power Systems Group & Faculty of Engineering
Prof. Dr. J. Panzar, Energy Centre & Business School
Dr. Aaron Schiff, Energy Centre & Business School

22 June 2006

The Energy Centre
The University of Auckland Business School
Commerce A Building, Level 1.04, 3A Symonds Street, Auckland
Private Bag 92019, Auckland, New Zealand
Tel: (09) 373-7599 ext 89557
Email: energy@auckland.ac.nz
www.business.auckland.ac.nz/energy

Contents

Executive Summary

The Energy Centre has reviewed the Electricity Commission's draft decision and all documentation relating to Transpower's proposed 400KV transmission upgrade from Whakamaru to Auckland. The recent suspension of the consultation process due to Transpower's withdrawal of their application and decisions to submit an amended proposal should be seen as part of a learning curve. This submission comments on the GIT (Grid Investment Test), the relationship between the SOO (Statement of Opportunities) and the GIT, and the wider strategic framework.

Accepting, as others have commented, that this is the first application of the GIT (the new decision-making process regarding transmission investments) and has involved a complex project, the process has been transparent and worthwhile. The present delay caused by the amended application provides an ideal opportunity to evaluate the process, learn any lessons and make adjustments if agreed.

This submission argues that in this first application of the GIT the economic (competition) benefits of transmission lines and the costs of constraints are potentially underestimated by the analysis. Recent developments in international economic theory have shown that competitive behaviour is influenced even before a transmission line reaches any physical constraint. Vice versa this means that excess transmission capacity is not a 'dead weight' but serves to enhance competition and therefore can have competition benefits ('The unused but useful line'). Indications from the present New Zealand market are that generators and retailers are already adjusting their corporate strategies to minimize exposure to 'locational base risks' at the potential expense of competition[1]. Major transmission projects cannot be studied independently from the national transmission system as a whole. Synergies between projects might make them together pass a GIT while individually they might not. Synergies that might not be evident in the short term, may also emerge in the context of a long-term national transmission plan.

The GIT ignores the impact of transmission decisions on generation investments. By applying equal, independent (exogenous) probabilities to the potential generation scenarios (as outlined in the SOO: gas, coal, renewable or large hydro), the GIT ignores the effect different transmission decisions have on the probability of resulting generation scenarios. As illustrated in the SOO, the national costs of different generation scenarios are not equal; neither are they influenced equally by different transmission decisions. {This is especially the case if thermal energy pricing assumptions are updated}. A limitation on transmission capacity into Auckland and reliance on significant new generation near Auckland are bound to rely on the gas- or coal-options, thereby directly affecting the generation options for New Zealand as a whole. On a life cycle basis transmission investment and running costs are small compared with generation. Care should be taken not to optimize transmission investments at the expense of non-optimal or adverse generation options. Optimal generation investments (and costs) benefit from a reduction in risks and uncertainty; and hence from longer-term certainty and security regarding transmission pathways. Transmission deferral does not create certainty.

From a high level perspective the GIT process has resulted in detailed analysis on many of the important issues. It is, however, unclear what process the Electricity Commission has followed for incorporating policy issues and concerns that are outside of the Commission's direct mandate. The legislation and policy that created the Electricity Commission clearly indicated a requirement for the Commission and the Government to consult and work together to achieve other Government Policy Objectives, e.g. relating to National Energy Strategy, Climate Change, Growth and Innovation, and investment climate. The GIT process, as currently applied, appears not to incorporate such strategic aspects relating to the NZ economy. For example, if grid upgrade deferral encourages thermal generation close to Auckland then this will have an adverse impact on Climate Change obligations.

[1] See also: International Energy Agency (IEA); Energy Policies of IEA Countries – New Zealand 2006 Review

1. Introduction and aim

The aim of this submission by The University of Auckland Energy Centre is to comment on aspects of the methodology, process and wider implications of the Grid Investment Test (GIT)-process, rather than comment in detail on the proposal that Transpower has put forward in the Grid Upgrade Plan (GUP) or the draft Electricity Commission Decision.

This document will focus on the **sequence and timing** of major transmission investments and the cost-benefit methodology for their evaluation. The choice of different transmission technologies is not a focus of this submission.[2]

In chapter 2 an argument is made that the **competition benefits** of a transmission line are higher than would seem from first analysis. Even if part of the transmission capacity is not used, this excess capacity could serve a purpose and therefore could be assigned value. The effects of transmission constraints on corporate strategies in the present New Zealand electricity market are outlined.

Chapter 3 describes the **mutual interdependency between transmission and generation** investments; and warns that using the exogenous generation scenarios from the SOO seems to ignore this mutual interdependence. It also underlines the effects of uncertainty on generation investments.

Chapter 4 puts the present GIT-process in the **wider context of climate change and strategic (economic) issues** that New Zealand faces.

Conclusions based on the above are summarized in chapter 5.

Annex 1, 2 and 3 contain additional comments of a more general nature. Annex 4 provides an overview of the references used.

The present submission was originally aimed at the Electricity Commission's draft decision on the original Transpower proposal. The recent withdrawal of the original Transpower proposal and an announcement of an alternative proposal still to be detailed, has led to a suspension of the consultation process. The Energy Centre welcomes the Electricity Commission's open approach in seeking reactions to this first application of the Grid Investment Test.

[2] In the cost-benefit analysis underlying the Electricity Commission's draft decision the effect of different transmission technologies is limited in comparison to the effect of timing. Also technical details, uncertainty and differences in approaches between Transpower and the Electricity Commission are large. Some of these differences are briefly discussed in annex 1. Clarification and 'synchronization' of assumptions and approaches between these main actors would very much increase transparency, reliability and predictability of the process in the future. Long-term transparency and confidence in the process would also be helped if a more common vision would emerge on the strategic development of the grid as a whole (e.g. 220 kV, 400 kV or HVDC-backbone); and individual investments (proposals) evaluated in that context.

2. Transmission constraints and competition benefits

2.1. Competition benefits

In this section we comment on the Electricity Commission's assessment of the competition benefits of the 400 kV proposal versus the alternative projects. In short, the Commission rules out any potential competition benefits and excludes them from its quantitative analysis. The reasons for this are explained in paragraph 6.11.5 of its Draft Report, and in greater detail in section 7.5 of the Economic Assessment document.

The Commission's argument is that since the 400 kV proposal and the alternative projects provide "similar levels of *unconstrained* transmission capacity", any competition benefits would be equal under each scenario and therefore net out in the cost benefit analysis, which makes quantification unnecessary. In other words, the Commission argues that since all the projects that it considers relieve any potential transmission constraint into Auckland in every year during the period of study, there are no possible additional competition benefits that the 400 kV project could generate relative to the others.

However, this argument is based on the mistaken assumption that the intensity of competition in an electricity market can be improved by transmission investment only if an absolute transmission constraint is relieved. Under the Commission's reasoning, a transmission line that had 1000 MW of unused capacity at all times would not generate any additional competition benefits over and above those generated by a transmission line that always had 1 MW of spare capacity. As we will explain in detail in this section, relatively recent economic research has shown that this premise is false, and unused transmission capacity may well be very useful in generating competition benefits, even if there is no absolute transmission constraint in an engineering sense.

The basic argument as to why this is the case has been set out by Stoft (1997)[3] and was developed in more technical detail by Borenstein, Bushnell and Stoft (2000).[4] To see the basic issues, consider a country that is divided into two regions, X and Y. Suppose that both regions are identical in terms of their demand for electricity and the generation plant available. Suppose also that there is a single generator in each region that is capable of meeting all the demand within that region. Let us assume that the two generators are identical in terms of their technology and costs, and both are profit-maximising firms. Finally assume that each generator can easily increase its production capacity, so that it could meet additional demand at the same cost if necessary. Such a situation is clearly unrealistic, however it is useful for illustrating the relationship between transmission constraints and competition.

Given this hypothetical situation, our objective is to examine the profit maximising behaviour of the generators under various different scenarios regarding electricity transmission between the two regions. We will characterise the generators as competing by choosing the quantities of their output so as to maximise profits. Similar results would be obtained if we imagined generators competing by choosing prices.

Let us first consider the case where there is no transmission grid linking the two regions. In this case each generator will act as a monopolist within their local region, each will produce the monopoly output, and monopoly prices will result. Now let us consider the effects of building a transmission line between the two regions. Suppose that the line has extremely high capacity – greater than the total demand in each region. In this case, transmission constraints can never arise, and the two monopoly markets effectively merge to become a single duopoly market. Neither firm can produce the monopoly output any more, because if it did then the transmission line gives the other firm the ability to produce a little more and take some or all of its market. The other firm will have an incentive to do this because although

[3] "The effect of the transmission grid on market power", University of California Berkeley. Available at http://eetd.lbl.gov/ea/EMS/reports/40479.pdf.
[4] "The competitive effects of transmission capacity in a deregulated electricity industry", *The RAND Journal of Economics*, 31 (2): 294 – 325.

increasing its output causes prices to fall, the increase in output is spread across both regions and hence prices do not fall by as much as they would if the markets were separated.

Therefore, with a transmission line of very large capacity, a price arises in the market that is lower than the monopoly price. In what follows we will refer to the output of the firms that results from competition between them as the "duopoly output", and the resulting market price as the "duopoly price". Economic theory tells us that the duopoly output is higher than the monopoly output, and duopoly prices are lower than monopoly prices.

The competition enabled by building the transmission line reduces the deadweight loss in the market, and is therefore a benefit associated with building the transmission line. This benefit should be taken into account in any cost-benefit analysis of the transmission investment. Note also that our assumptions that the two regions and two firms are identical mean that each firm will produce the same output in the duopoly market, and each will serve half of the total demand Therefore, no power will actually flow over the transmission line, even though it is generating a competition benefit. From an engineering point of view the transmission line may appear to be useless as it does not actually transfer any power, but from an economic point of view the unused capacity on the transmission line is very useful indeed. Put another way, removing the apparently useless transmission line would be harmful to economic welfare, as prices would rise back to their monopoly levels and output would fall.

This argument illustrates the basic idea that unused transmission capacity may provide competition benefits. For simplicity of exposition we assumed that the transmission link had very high capacity, so that potential transmission constraints were not a factor. In particular, in our example it was possible for either generator to serve the total demand across both markets without encountering a transmission constraint. This leaves an important question unanswered: Does the capacity of the transmission line matter for generating competition benefits?

In our symmetric example, if both firms produce the same output then no power will actually flow over the transmission line, whatever its capacity. Therefore, it might appear that a line of 1 MW capacity would generate an equal amount of competition benefits as a line of 1000 MW capacity. This turns out not to be true, and in fact the amount of competition benefit (measured as the reduction in deadweight loss under competition) is generally increasing with the capacity of the line.

The reasons why this is the case are somewhat technical, and the reader is referred to Stoft (1997) for a more detailed explanation. To illustrate the basic idea, first of all we can show that building a relatively weak transmission line (one that is potentially constrained) will mean that the two generators can no longer obtain monopoly prices. To see why, suppose for example that the total demand in each region at the monopoly prices is 5000 MW and the transmission line has capacity of 1 MW. Suppose also that the firm in region X (call it firm A) is producing the monopoly output. In this case, the firm in region Y (call it firm B) will have an incentive to expand output a little, and take some of firm A's demand. As explained above, this will increase firm B's profit.

Both firms will face this same incentive to expand output, and the incentive will arise at output levels below the duopoly output (equivalently, at any price above the duopoly price). Therefore in equilibrium we cannot have a situation with an unconstraint line in which both firms are receiving the same price where that price is above the duopoly price. If so, the transmission line would be uncongested, and each firm would have the ability and incentive to expand output.

Therefore, it would seem that the same market price (the duopoly price) would arise with a transmission line of very small capacity as one with very large capacity. However, it is fairly straightforward to see that this cannot be the case. If demand in each region at the monopoly price is 5000 MW and the transmission capacity is 1 MW, then each firm will realise that the worst that can happen in a competitive sense is that its competitor takes 1 MW of its demand. Thus at worst each generator will have monopoly power over the residual 4999 MW of

demand and its profit maximising strategy will be to produce the monopoly output supported by this residual demand, rather than the (greater) duopoly output.

It is also possible to rule out an asymmetric situation in which one firm produces more output than the other, thus taking relatively more demand and congesting the line up to its limit. Overall, this leads to something of a puzzle. We have argued that competition with a weak transmission line between the two regions cannot result in the duopoly outcome, but neither can it result in the two generators receiving any symmetric prices above the duopoly level. If asymmetric outcomes also cannot exist, then what is the market outcome with a relatively weak transmission line?

It turns out that the market outcome can be found if we allow for more complex behaviour by generators. In particular we must allow generators to follow what are known as 'mixed' strategies, where they choose from different output levels according to some probability distribution. The mechanics of how such strategies are found is complex and beyond the scope of this submission, but Stoft (1997) gives a relatively clear explanation.

In practice what this means is that with a relatively weak transmission line, generators will choose high outputs (close to the duopoly output) some of the time, and choose low outputs (close to the monopoly output) the rest of the time. It can be shown that the probability that generators choose high outputs increases as the capacity of the transmission line increases. Therefore, the overall average or expected market output increases as transmission capacity increases. Equivalently, market prices fall as transmission capacity increases. Intuitively, an increase in transmission capacity increases the intensity of competition among generators, even if no actual transmission constraints are relieved. This occurs up to a point at which the price reaches the duopoly price. Beyond some sufficiently large level, additional increases in transmission capacity have no further effect on market prices. Figure 1 summarises these conclusions.

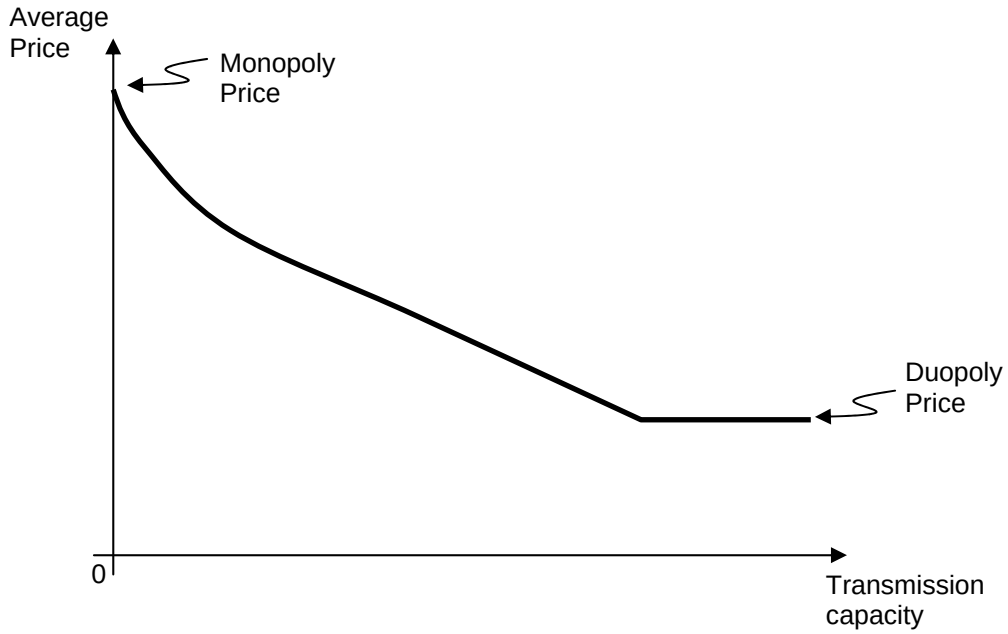

Figure 1 Average market price as a function of transmission capacity.

The above argument was framed in the context of a simple situation with symmetric markets and symmetric generators. Stoft (1997) and Borenstein, Bushnell and Stoft (2000) have analysed more complex situations where there is asymmetry among the firms and markets, and have shown that similar conclusions about transmission and competition continue to apply. The conclusion of this literature about the relationship between transmission capacity and competition is therefore quite robust.

Of course to quantify the benefits of increasing transmission capacity in practice one needs to at least be able to compute the equilibria that arise in a realistic model of the transmission system in question. When mixed strategies are involved this is not a straightforward computation, and the development of algorithms for doing this is an active research topic.[5] It is also unclear to what extent any equilibria obtained reflect real agent behaviour. As stated above, the non-cooperative equilibria obtained in spot market models might turn out to be different from the strategies adopted by agents who have many constraints that are not modelled, and are also concerned about the effects of their actions beyond the short-term profits of a single trading period. Nevertheless, the fact that these effects are difficult to quantify does not mean we should ignore them as being negligible.

In summary, the Commission's cost-benefit analysis assesses benefits only in terms of reliability, and rules out competition benefits on the basis of the absence of transmission constraints under all projects that it considers. In this section we have argued that the Commission's justification for ignoring competition benefits is flawed. Since the 400 kV project provides more actual capacity than the alternative projects (at least in some years), it would be expected to generate greater competition benefits as a result of the mechanisms discussed in this section. The key idea is that a transmission line provides a *threat* of competition to generators located in different areas. As we have shown, for generators to take this threat seriously (and thus for it to have a significant effect on market outcomes), the line must have sufficiently large capacity that generators do not find it profitable to ignore the possibility of output expansion by a rival. All this may occur even if we do not observe any resulting flows of power over the transmission line, and even if it is never actually physically constrained.

Conclusion

In our opinion the Commission's analysis therefore underestimates the gross benefits of the 400 kV project relative to the alternatives, which biases its findings in favour of the latter. The commission should attempt to estimate the competition benefits associated with the greater unused capacity provided by the 400 kV project and include them in the cost-benefit analysis, before dismissing these as immaterial.[6]

[5] See SFE Workshop Proceedings on EPOC web site, www.esc.auckland.ac.nz/epoc

[6] A similar conclusion was reached by the University of Auckland Electric Power Optimization Centre (EPOC) in its submission on the draft GIT regarding modelling and quantification of the effect of bidding, gaming and competition benefits; 29 October 2004

2.2. Effects of transmission constraints in NZ-market

In this section we discuss several aspects relating to the occurrence of transmission constraints in the lines to Auckland and the wider network of New Zealand. One of the arguments on whether there is a transmission constraint (at present and in the foreseeable future until 2017) between Whakamaru and Otahuhu, is based on an analysis of price differences between these nodes in the period 1996-2005. It is concluded from this analysis that there is little price separation between these nodes in this period and therefore negligible indication that transmission constraints are contributing to market power and increased prices[7].

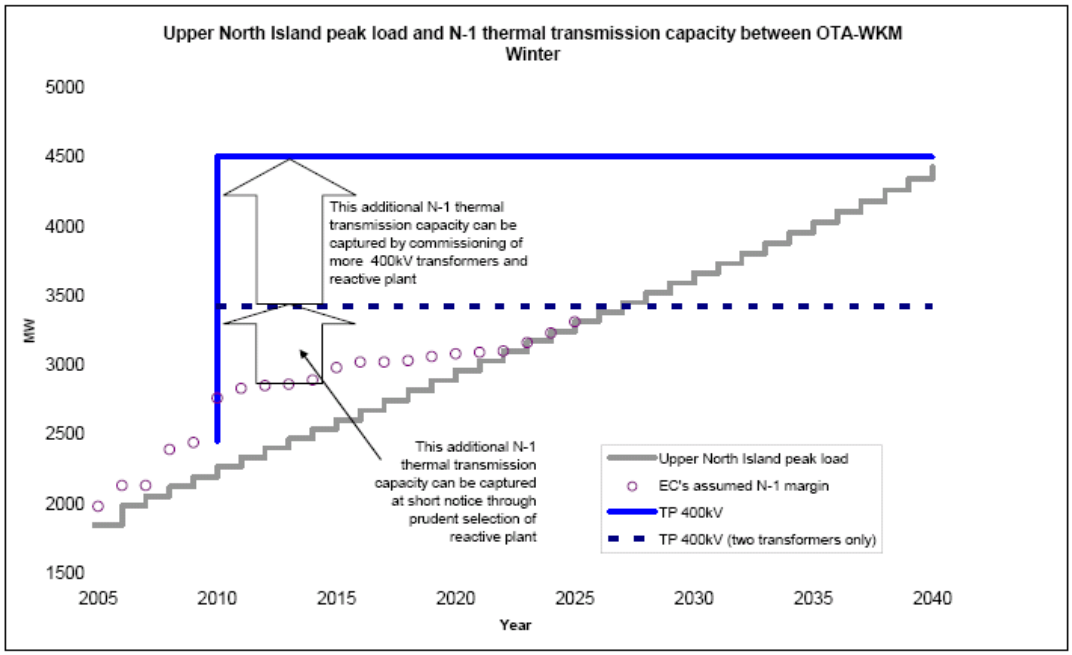

Figure 2: Differences in transmission capacity between different transmission scenarios[8]

Upgrading the network to keep up with demand growth (as the Commission's alternative proposals do – see figure 2) would keep (possible) transmission constraints at a similar negligible level. The final conclusion from this seems to be that any transmission capacity beyond this is resolving a negligible constraint, and therefore both the proposed 400 kV and the Commission's alternatives have equal unconstrained capacity; and therefore competition benefits (e.g. compared to a do-nothing scenario) are equal between the 400 kV and alternative scenarios and do not need to be quantified.

There are several remarks to be made about this analysis. In the first place economic theory (as described above) suggests that the *possibility* of a constraint on a transmission line (even if it does not actually occur) could lead to price increases at both ends of the line (i.e. prices closer to monopoly level at both nodes). In such a situation, an analysis of price nodal differences between just the two nodes could easily show up no or little price differential – and hence lead to a conclusion that there is no constraint – while the impact was real on both sides of the line. The absence of nodal price differences is therefore no evidence of an absence of market power or absence of constraints.

[7] "The analysis suggests that regional price separation in the Auckland region is modest, particularly once the effects of transmission loss and constraint rentals are removed. The analysis does not assess the existence or extent of market power held by generators in the Auckland region. It does, nevertheless, suggest that there is little evidence of the exercise of market power in the wholesale electricity market in the Auckland region between October 1996 and April 2005 arising from transmission constraints. It also suggests that even when a major generator outage occurred, there was little evidence that regional market power due to the resulting transmission constraints was exercised. The subsequent regional vertical integration that occurred may arguably further mitigate any incentives generators have to exercise market power when transmission constraints occur."

[8] Source: Electricity Commission (2006); Transpower's Proposed 400 kV North Island Investment - Transpower-Electricity Commission Staff Discussions - Transpower Issues and Commission Staff Comments; 23 March 2006

In the second place, a limited constraint does not mean the economic effect is negligible. As discussed in chapter 2.1 party behaviour becomes complex, but can have significant price impact. Neither can past constraint analysis simply be extrapolated into the future, assuming the same behaviour under the same 'negligible' constraints. Equilibrium analysis studies can help calculate optimum generator strategies under such circumstances and therefore help to assess likely behaviour and likely competition effects under different transmission levels.

Transmission constraints in the wider network
An analysis of nodal price data in an Electricity Commission Market Design Report[9] indicated considerable nodal price differences when studying among others Haywards and Otahuhu nodes (see figure 3)[10] This and other studies – e.g. Evans (2005)[11] - indicate significant transmission constraints in the centre of the North Island and on the interisland HVDC-link.

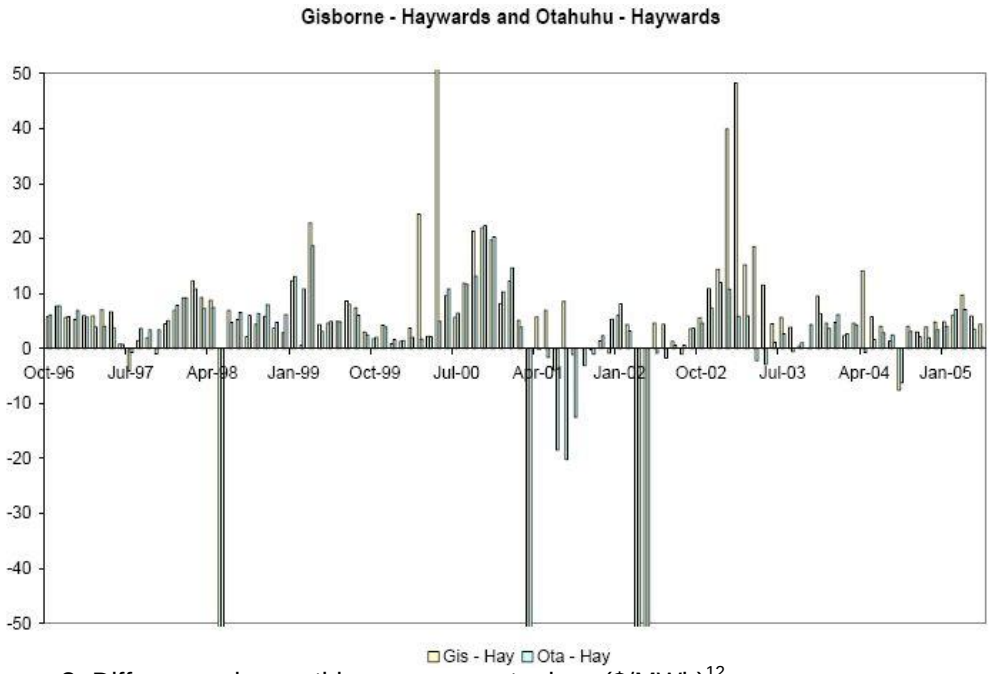

Figure 3: Differences in monthly average spot prices ($/MWh)[12]

Neither in the Commission's, nor in Transpower's documentation does it seem to have been taken into account that major upgrades to these two constraints have been planned. The same 2005-Grid Upgrade Proposal (GUP-2005-Volume 4) outlines a series of smaller upgrades (smaller in monetary terms: ca. $25 million) that would add in the order of 600 MW of (North-South) Total Transmission Capability (TTC) through the centre of the North Island. Most of these upgrades are already being implemented and are expected to be finished by 2008. These upgrades could significantly increase the interregional transfer of electricity to the Whakamaru-node well before 2010 and therefore increase the pressure on the Whakamaru – Otahuhu-circuits. These upgrades to the network should be clearly included in the analysis. Their effects can definitely not be identified from an analysis of historical price nodal data confined to the Whakamaru-Otahuhu nodes.

The GUP (Volume 3) also contains a proposal for a major upgrade to the Interisland HVDC-link that will still have to be evaluated by the Electricity Commission. If approved it would add around 400 MW of North-South transmission capability by 2010, as well as higher reliability and availability. This can therefore be expected to increase the (potential) supply of hydro-

[9] NZIER; Market design report – initial stock-take paper; Report to the Electricity Commission; August 2005.
[10] Conclusion: "While the current grid meets the technical criterion, it does not always meet the economic criterion. From time to time at peak demand periods there are transmission constraints in the economic sense that impact on prices in the top of the South Island, in the central North Island and into Auckland. Occasionally the HVDC link between the two islands also acts as an economic constraint."
[11] L. Evans, R.B. Meade; Alternating currents or counter-revolution; December 2005
[12] NZIER (2005); graph shows monthly average spot price differences between Gisborne-Haywards and Otahuhu – Haywards; the latter is of primary concern for this text.

power from the South Island to the North Island, especially in wet years. These (potential) major upgrades should also be included in the analysis.

Locational basis risk, strategy and competition
As described above in the symmetric generator model of chapter 2.1 with sufficiently high transmission capacity, generators are expected to produce at the duopoly price and duopoly level. With decreasing transmission capacity economic theory suggests that generator behaviour would tend towards strategies in which each generator produces less.

In a recent review of the New Zealand Electricity Market the International Energy Agency (IEA)[13] expressed its worry over the trend that the generators-retailers have continued to concentrate their customer basis geographically around the location of their major generation assets to avoid locational basis risk. [14] "[..] locational basis risk is a significant barrier to entry. To reduce their locational basis risk, generators have realigned their retail generation portfolios so that they better match the geographic locations of their customers. While this vertical integration reduces price and basis risk for these companies, it does it at the expense of competition." [15]

Even in the absence of significant, real nodal price differences in the present New Zealand market, the (perceived) risk of price nodal difference may be enough to lead to a pre-emptive change in corporate policies to avoid this risk by preferring contracts with customers close to the generation base (thereby avoiding the need and risk of transporting electricity over the transmission network to other regions), with potential significant impacts on competition. The (perception of) potential transmission constraints could therefore have a significant impact on competition, without the power being physically transported and therefore without such impact showing up in significant price nodal differences, through the mechanisms explained above. [16]

Put simply, a lack of transmission investment results in a weak *threat* of competition between generators. Where the risk of constraints has a clear impact on companies policies regarding present operation of their generation portfolio, it will also – more than likely – have a major effect on decisions regarding the timing and location of new generation investments. [17]

Conclusion
The Energy Centre recommends that the costs and benefits of transmission constraints and upgrades are analysed and discussed in the wider context of future developments in the national transmission grid as a whole, rather than on a narrow project-by-project basis.[18]

[13] International Energy Agency (IEA); Energy Policies of IEA Countries – New Zealand 2006 Review; 2006
[14] IEA (2006): "In energy markets, basis risk refers to the risk associated with price separation due to location differences. This is different from price risk, which in large part reflects temporal risks associated with needing to buy or sell a commodity at a point in time. An example of a company exposed to basis risk: the company has an obligation to serve load in the North Island and owns equivalent amounts of generation in the South Island. In addition to transportation costs, there may be transmission constraints bringing power from the South Island to the North Island, which could lead to much higher prices in the North Island than in the South Island. In the absence of other physical or financial contracts, the company would have to sell South Island electricity and buy North Island electricity at a net loss. In efficient markets, basis risk represents a market signal to build generation or transportation infrastructure. If the total cost of the infrastructure is less than the long-term basis differential, then market participants will build."
[15] The Electricity Commission remarks on market power in Auckland (on EC-website under FAQ): "Meridian Energy currently has greater opportunity to exercise market power in the South Island than is foreseen in Auckland with regard to Genesis generation. That is, it is not an unusual situation in New Zealand to see a regional reliance on generation owned by a single company."
[16] Evans (2005) states that detecting abuses of market power (ex-post) is extremely difficult, especially so because most empirical methods to this aim, rely on an accurate measurement of marginal cost of generation, which – for the NZ situation – is made extremely difficult due to the high proportion of hydro-electricity. "This inability to detect non-competitive behaviour makes it all the more important that the market is conducive to competition." The exercise of some market power per se is not bad – as it can provide the necessary price signals to encourage competitive entry and new investment in generation and transmission.
[17] Proposed Financial Transmission Rights might also be relevant in this context.
[18] Similar recommendations were made in the Electric Power Optimization Centre (EPOC) submission to the draft GIT (29 October, 2004) regarding the modelling and calculation of synergies between upgrades in different parts of the network. The individual projects might not look attractive, but together their value could be much greater than the sum of their individual contributions.

3. Interdependence of transmission and generation investments

3.1. Transmission investments drive generation investments

In this section we discuss the interdependence of transmission and generation investments and the undesirability of using exogenous generation scenarios to assess the costs and benefits of transmission investments.

Similarly to New Zealand, many countries around the world are going through complex processes regarding the justification and planning of transmission investment decisions in newly deregulated electricity markets.[19] Before deregulation, generation and transmission were in many cases substitutes and the decisions between these were often made by vertically integrated utilities with a large amount of information and control over transmission and generation investment decisions as well as operation, decommissioning, maintenance, etc.

In the new deregulated markets generation and transmission investment are generally the domain of different parties, whose interests, information levels, etc are far from equal; leading – among others factors – to a reduction in information sharing and – hence - increased risks. Although transmission and generation investments still are mutually interdependent, the decisions about each have been decoupled. Both types of decisions relate to major investment, long lead times-to-build, long planning horizons and large uncertainties. In this respect transmission investments incur an even higher capital-to-running-costs and even longer lead-times-to-build and planning horizons than for generation investments. The inherent uncertainties over such long periods and (partly) public nature of the grid security services delivered, have spurred most countries to leave transmission (largely) in the publicly controlled domain, with the aim to provide an adequate framework and market conditions for generators, retailers, distributors and consumers.

In their respective analyses both Transpower and the Electricity Commission evaluate the costs and benefits of transmission alternatives in the context of 5 possible generation scenarios, showing the different value of transmission projects under these scenarios. These scenarios are assigned exogenous probabilities, which ignores the aspect of interdependence between generation and transmission; i.e. that (expected) decisions on transmission scenarios will influence the profitability of different generation investments (technology as well as location) differently. More specifically the signal not to build a new transmission line, will stimulate (is in part aimed at promoting) generation investments near Auckland to serve local loads.

Several studies – among others as commissioned by the Electricity Commission[20] - have concluded that significant generation[21] near and North of Auckland will almost certainly have to be coal- or gas-based.[22] Addition of such significant generation capacity would also (partially) defer the need of investments in other generation capacity for the provision of power to load-centres other than Auckland. A decision not to pursue a grid upgrade between Whakamaru and Otahuhu will therefore have a serious effect on the location, timing and size of future generation.

If deferral of a grid upgrade encourages new power generation in Auckland or to the north (probably coal- or gas-based as stated in the Commission's reports), a strong grid would encourage all options (generation scenarios) to compete for new generation capacity.

[19] See among others: International Energy Agency; Learning from blackouts; 2005; W. Pfaffenberger & F.P. Sioshani (eds); Electricity market reform: an international perspective; 2006

[20] SKM; Alternatives to Transmission for Supply of Auckland's Growing Electricity Demand; October 2004

[21] SKM-2004: "The addition of 1,000 MW of capacity would probably permit deferral of transmission reinforcement by ten years."; additionally " there are credible but limited demand side options for deferring transmission upgrade."

[22] Apart from the significant fuel constraint, consenting and (gas)-infrastructure issues. The uncertainty regarding gas supply already forced the government to underwrite the gas-supply-disruption risk for the new E3P-gas-fired plant being built at Huntley. Barring new discoveries of gas in New Zealand, continued gas supply would require major infrastructure investments (up to 1 billion NZ$ - i.e. same order of magnitude) in LNG- or CNG-facilities and pipelines; most likely before any company will invest in new gas-fired power stations.

A rough analysis of the economic outcomes of the different generation scenarios (in Present Value terms - see figure 4) as described by the Electricity Commission in the SOO, would lead to the conclusion that there is 'option value' in leaving generation scenarios open. A 'limited' choice between the Coal- and Gas-thermal-options would give an average weighted PV of $15,548, while a 'free option' between all four scenarios would give an average weighted PV of $14,978. The difference of $ 570 million could be defined as a 'generation option value.[23]

	Capital cost ($ million)		Operational cost ($ million)		($ million)	Average NPV	
Scenario	**Generation**	**transmission**	**Variable**	**Fixed**	**Total**	***Option gas or coal***	***Option all 4***
Gas-thermal	2,457	587	11,106	414	14,564		
Coal-thermal	3,099	884	11,979	569	16,531	*15,548*	
Large Hydro	5,399	686	8,052	771	14,908		
Rene-wables	4,275	693	8,326	612	13,906		*14,978*
						Difference option value	***570***

Figure 4: NPV analysis of different SOO-scenarios and 'weighted' average outcomes[24]

Note that the figures in the SOO were calculated on the basis of 2004-data, with an average oil price of US$25 per barrel, while at present the Ministry of Economic Development for its new forecast seems to be calculating with $40-$60 per barrel (base case scenario) and $75-$120 per barrel (high oil scenario). It is therefore strongly advised to update the underlying energy cost calculations in the SOO to evaluate their impact on the costs and benefits of the transmission investments. Such an update would also likely indicate that imported energy costs are higher than the original SOO and hence scenarios which involve import energy may have a lower probability.[25]

Conclusion

The analysis and arguments presented in this chapter are not meant as a definitive outcome of this specific transmission decision, but rather as an illustration that transmission decisions do provide a driving influence on generation investments; and that the resulting change in probable generation scenario outcomes has a significant (non-neutral) effect. We therefore recommend that these effects be taken into consideration.

[23] Electricity Commission; Initial Statement of Opportunities -p.110

[24] Source: Electricity Commission; Initial Statement of Opportunities; 2005; figure 21. Note that all costs are Present Value. Also note that in the original SOO-table transmission investment costs for gas and coal-thermal were $87 and $85, respectively; this, however, was a typing error; the totals (to which the analyzing text in the SOO refers) didn't add up and it was specifically stated that "The Coal Thermal scenario has the highest operating costs and the highest transmission cost."

[25] In reviewing SOO sensitivity cases it might be useful to consider the scenario where local gas exploration success does not occur and LNG imports are expensive. For this case even current base load CCGT operation may not be economic.

3.2. Uncertainty and investment decisions

In this section we discuss further the impacts of uncertainties on investments in generation and transmission.

A strong case is made in the underlying economic analysis by the Electricity Commission that postponing major decisions will create time for more clarity about generation investments; thereby reducing the investment risk in transmission and keeping transmission investment level and technology options open (transmission option value). The inverse can be argued for potential investors in new generation capacity: where the 'options' for transmission are kept open, uncertainties increase for generation investments, increasing risks and therefore costs. A reliable, long-term plan for the development of transmission pathways could significantly reduce that set of uncertainties and risks for generation investments, ultimately leading to a more efficient outcome.

The SOO-scenarios as discussed in chapter 3.1 indicate that – across all scenarios – the necessary transmission investment levels are a factor of five lower than the necessary generation investments. Including operational and fuels cost for generation and transmission over their lifetime, the differences increase further. Roughly transmission costs are only in the order of 5 to 10% of end-use electricity price. With growing fuel prices, this share is expected to decrease further over the years. These differences amplify the need for care in optimizing the option value of transmission without accounting for its effect on generation investment.

The above 'rough' analysis, might give an insight into why many stakeholders (especially generators, retailers and lines companies, but also end-users in the Auckland area) seem to make a different cost-benefit analysis than the Electricity Commission and strongly urge in favour of significant transmission investments to Auckland. Remember that these groups would be the beneficiaries as well as the cost-bearers of the extra (excess) capacity. Evans (2005)[26] has suggested the formation of a club of 'grid off-takers' as a 'market-based' board for Transpower. It would seem that such a 'virtual board' consisting of generators, retailers, distribution companies and businesses in Auckland, would make a different cost-benefit analysis than the Electricity Commission.

If –as argued - the deferral of transmission investment decisions causes some uncertainty amongst potential new generation investors, the same might be true for other (energy-intensive) industries considering new investment in New Zealand.

Conclusion

The Energy Centre concludes that the analysis of costs and benefits of major transmission upgrades cannot and should not be seen separately from their influence on risks and profitability of different types of generation. Creating 'option value' for transmission investments might do so at the expense of 'option value' for generation investment.

Since the present decision-making process on transmission investments is still new and evolving, we recommend that an analysis be made of the different cost-benefit and risk evaluations of new generation investments and compare these with the assumptions made in the GIT.

[26] L. Evans, R.B. Meade; Alternating currents or counter-revolution; December 2005

4. GIT and transmission-planning in wider context

What follows outlines some considerations the Energy Centre views are important regarding transmission planning, but that are at present not included in the GIT-process.

Encouragement of renewables and Climate Change Policy

One limitation of the current GIT process is the absence of any analysis of the impact transmission decisions will have on the type and location of new generation investments. The interim decision encourages new generation close to Auckland, but no comment is made about the type of generation which can be built close to Auckland. Significant generation close to Auckland would almost certainly be mainly thermal (gas or coal) based. New discoveries of natural gas are a possible fuel for stations in Auckland itself; imported coal a possible thermal fuel for new stations north of Auckland; and LNG a possible fuel for stations north of Auckland. The potential for new wind, geothermal and hydro generation in or north of Auckland seem modest.[27] Although it is readily acknowledged that new thermal fuelled stations close to Auckland may avoid some transmission investments, they will directly impact New Zealand's CO_2 production and hence Climate Change obligations.[28] Depending on the quantity of thermal fuel used in new potential generation close to Auckland, and the value of CO_2 the PV of CO_2 costs could outweigh the advantage of delaying the grid investment.

National Grid Plan and National Energy Strategy

Perhaps equally as serious as climate change effects may be the impact thermally fuelled stations close to Auckland could have on the "regionalisation" of the power market. If there is insufficient transmission capacity into Auckland from the south the power price in Auckland may become separated from the remainder of New Zealand. This may especially be of concern when updated imported thermal energy prices (gas and coal) are considered.

Following on from the discussion above it seems as if the National Energy Strategy will encourage renewables in the electricity sector. As the renewable resources are located primarily south of Whakamaru, the present GIT process seems to be missing a long term strategic view on the entire transmission grid (National Grid Plan) rather than just the individual project at hand (e.g. Whakamaru to Otahuhu) and how this countrywide grid backbone will assist in attaining the National Energy Strategy goals and objectives.

Resource consent and use of land for the grid corridor

The Commission's draft decision has been seen by many as a rejection of the need to build a major new transmission line into Auckland; and by some even as a 'victory' for the affected landowners. Most of the Commission's analysis relates, however, to postponement of a major transmission upgrade (2017 or 2021). In its request for submissions the Electricity Commission therefore included the specific question[29] whether there is value in progressing the transmission corridor, despite the negative draft decision. Considering the likelihood of a major transmission upgrade needed somewhere within the next decade and the complex and lengthy RMA-process, in the Energy Centre's view there would be a clear value to progressing such a transmission corridor. This would create clarity for all parties involved.

Final considerations

It is not clear from the current process what role the Government intends to take in the event of a major disagreement between the Electricity Commission and Transpower. If there had been consensus between the Commission and Transpower the role of the Government may have been minor. Given the circumstances it seems pragmatic for the Government to assist in the decision process for this GUP application.[30] For future GUPs the Government and other interested parties might have to assist the Electricity Commission to modify the GIT process to assist future GUP applications.

[27] See also: Electricity Commission; Alternatives to Transpower's proposed Whakamaru-Otahuhu 400 kV transmission line – alternatives analysis stage II; December 2005

[28] Both the PM and Deputy PM have commented upon this in recent speeches.

[29] Q1 -Do you consider there may be value in progressing at this stage a transmission corridor that would accommodate a range of overhead line technologies? Do you consider that such a corridor could be implemented under current legislation? If not, what changes do you consider would need to be made?

[30] The Prime Minister and Deputy Prime Minister have both clearly indicated, that Government input is required for this first major grid upgrade proposal subsequent to the establishment of the Electricity Commission

5. Conclusions

- The present application of the Grid Investment Test to the 400 kV transmission upgrade to Auckland is the first in the new regulatory context. Both the Electricity Commission and Transpower have invested considerable effort and have done a commendable job in guiding this application through a process wrought with uncertainty and a steep learning curve. The recent withdrawal of the original proposal and tabling of an alternative proposal is seen as part of this learning curve.
- The present outcomes show some major differences of methodological approach and assumptions between the two main players, which makes 'objective' comparison of results difficult and the process less transparent. There is a definite need for 'synchronizing' the approaches and assumptions in this and future transmission decisions.
- There is also a need for a common strategic view on the overall, long-term development of the national transmission network between the main players. Within this framework, the GIT should attempt to account for synergies between individual transmission projects.
- The GIT as presently applied misses or underestimates some important benefits, especially concerning the competition benefits of 'excess transmission capacity'.
- Indications from the New Zealand electricity market are that the present transmission grid is already under considerable stress and that the major gentailers are already adjusting their corporate strategy accordingly, with considerable potential effect on competition.
- The GIT – applied to exogenous generation scenarios – fails to account for the influence (and estimated economic consequences) of transmission decisions on generation investment decisions.
- Where the GIT – as presently applied – puts a lot of value on the 'option value' of postponing a major grid upgrade (in the hope of more certainty about generation investments in the mean time), it fails to take into account the costs of risk and uncertainty added to new generation investment.
- There are several wider policy aspects of transmission upgrades that the present GIT is not designed to take into consideration, for example climate change, New Zealand's national energy strategy and resource consenting considerations. These aspects are bound to return with every major transmission upgrade decision and a way should be found to incorporate these aspects in the decision-making process. No easy solutions seem likely; given there will be a clear tension between the wish to incorporate more of the national priorities (government policies) into the decision-making process; and the fear of overexposure to (short-term) political influences.

Annex 1. Technical issues and differences of approach

It is clear – and commendable - that the Electricity Commission has chosen to independently assess costs and benefits of the different transmission options. Despite (or because of) the increasing amounts of supporting documentation provided by both sides, it is in the end difficult to keep an overview of the underlying reasons and impact of these – sometimes – major differences. This is not made any easier by the fact that the Transpower and Electricity Commission 'alternatives' don't overlap; in fact the only common scenario that they calculated is the 400 kV in 2010. Some differences in technical assumptions and costs will be commented upon briefly.

Investment levels

The Electricity Commission in its analysis comes to a different conclusion from Transpower about the most economic technology to use. Where Transpower deems the 400 kV option by far cheaper than the 220 kV-option (by 30%); the Electricity Commission's estimate for the 400 kV investments seem to be a lot higher than Transpower's, while the 200 kV are a lot lower (45%). This difference is partly 'masked' by the fact that the timing of investment is different in their respective scenarios.

It is unclear what factors lead to these significant differences in investment estimates between the 2 major parties in this debate. It is beyond the scope of the Energy Centre to comment further on these differences, except that the 400 kV-option would link up to Transpower's strategic vision for the grid (400 kV backbone), while the present draft EC-decision fails to comment on the strategic implications of choosing an alternative technology in this one case; and what its vision on the strategic development of the grid is.

Reliability levels

Both Transpower and the Electricity Commission have made in-depth reliability analyses of the different options. There is a striking – and worrisome – difference, however in the fact that Transpower deems investment in a major upgrade a more reliable option, while the Electricity Commission deems that postponing this investment and investing in smaller, intermediate measures will lead to a more reliable grid. The Energy Centre wants to express its concern that there seems to be a major underlying (but unarticulated) difference in approaches between the main parties; mainly in the sense that Transpower seems to be adopting a more general, strategic approach to reliability, leaving major opportunity for operational flexibility and smaller investments as operational circumstances require (eg towards the end of the planning horizon), while the Electricity Commission seems to focus more on interim-optimizing and 'micro-managing' the reliability issues, thereby affecting operational flexibility.[31]

Definition of 'unconstraint' capacity

The EC's use of the concept of 'similar unconstraint capacity' between the different alternatives is unclear and creates confusion. It is largely unclear whether this would refer to 'technical' or 'economic constraints'. In some (EC-ordered) publications and media releases, the word 'unconstraint' is lost, suggesting there is equal transmission capacity in all alternatives at all time. Chapter 2 shows an overview of significant difference in actual transmission capacity available between a 2010- upgrade and interim solutions (until 2017).

Timing vs. technology

Because of the different (cost and reliability) assumptions between Transpower and the Electricity Commission, as well as the different time-frames of investment, it is - at times - difficult to differentiate between the 'technical' and 'timing' influence of the different alternatives. It would have been useful if the Electricity Commission had not only done its own modelling of alternative transmission technologies in 2017, but also in 2010 to be able to clearly compare with the Transpower technical calculations (in 2010) and differentiate between the influence of different technology assumptions and investment delay in the Electricity Commission's analysis. As it stands, it seems the delaying of the transmission investment has – in the EC-analysis - a much larger impact than the choice of technology.

[31] As echoed for instance in the Technical Peer Review by General Electric.

Annex 2: Role of Government in Grid approval process

The Government Policy Statement on Electricity Governance dated Oct 2004 makes it clear that the Electricity Commission does not have accountability for Climate Change Policy. It does however in the Foreword obligate the Commission to: "take into account and contribute as appropriate to the Government's wider policy objectives"' and para 2: "the Commission is required by the Act to seek to achieve the following specific outcomes": para 2g: "The electricity sector contributes to achieving the Government's climate change objectives by….and removing barriers to investment in.…renewables".
There is also a clear requirement throughout the document for the Commission to achieve "efficiency" although a precise definition of this term is not given. The definition would appear to include at least economic efficiency, pricing efficiency (low and fair cost), fuel usage efficiency, CO2 generation efficiency (minimum CO2 generated).

There is no specific process laid out which defines how the Commission is to take account of other Government Policy neither is there a specific process for the Government to advise the Commission of how it wants its broader Policy initiatives taken account of in Commission deliberations.

Government statements by both the Prime Minister and Deputy Prime Minister over the past weeks may be a proper way for the Government to signal to the Commission how it wants Climate Change Policy intentions taken account of in the Commission's decision. A more clearly defined process may be more appropriate in the future.

The Commission's role in promoting economic and pricing efficiency is rather narrowly estimated in the GIT. The main focus of the GIT is on Transmission cost and benefit, but the Commission appears to have a broader responsibility to look at economic and pricing efficiency across the entire electricity sector and potentially the impact of the electricity sector on the economy. The Commission appears as if it would need to consult with and ask the Government for direction on this broader analysis.

If one took a broad view it would also seem reasonable to assume the Commission has an obligation to support other policy such as the Growth and Innovation Framework. The Commission might thus be expected to consider new investor confidence and balance this against cost. Again Government input would need to be sought. Some of the current statements especially by the Deputy Prime Minister would indicate the Government prefers a conservative approach that ensures adequate Transmission capacity, rather than one than tries to minimise cost. The Government is clearly signalling the asymmetric risk of transmission constraints.

Annex 3: Social & operational issues

Social Issues, consultation, compensation

Legislation from 20 plus years ago allowed Government, through its various agencies, to acquire property rights and easements and provide compensation on a compulsory basis. Current attitudes to individual rights would indicate that this is not an acceptable approach and that property acquisition and compensation is primarily a commercial discussion with compensation set by the parties based on discussion and mutual agreement. For projects of national importance, such as the grid upgrade, it is unclear how to balance the rights of the individual and those of society. Generous compensation appears to be a sensible approach to allow timely agreement, but the money for compensation is paid for by all New Zealander's via their power bills in the case of new grid investment. The "outrage" from some of the public affected by the process adopted by Transpower to develop a grid corridor route would indicate that lessons learned should be developed for future projects of national importance. In most cases it appears as if consultation should begin as early as possible perhaps even prior to conceptual engineering work. Progress on consultation will relatively quickly get to discussions on compensation. Perhaps New Zealand has something to learn from other countries where townships compete for new industry rather than adopting a NIMBY approach.

For the current grid corridor proposed by Transpower it is possible that a more consultative process may have assisted discussions between Transpower and affected landowners. Transpower was in part trapped by a desire to keep grid upgrade costs low to satisfy the GIT and the desire of landowners for "fair" compensation. As has recently become clear from discussions about additional transmission proposals North of Auckland, the GIT-process favours the most economical option (generally overhead, not underground), while social and RMA-issues would probably favour a more expensive (underground) option or alternative route. A poor outcome would be that a 'most economic' transmission project is approved through the GIT, but then rejected in the subsequent RMA-process; with the potential result that the whole approval process would have to be redone. The uncertainty created by such a (possible) outcome would be beneficial to none.

Consistency with National Energy Strategy

It would have been helpful if the National Energy Strategy, currently under development by MED, had been available prior to a decision on grid capacity north of Whakamaru. Electricity is a portion of the NZ Energy Strategy not separate from it. Energy is itself not important in its own right, but is important for what it provides to the economy and citizens. In the absence of an agreed Energy Policy it is worthwhile to broadly anticipate what this Policy will contain and ensure that current decision in the Electricity Sector will not undermine the principles which will be developed as part of the National Energy Strategy.

It would be anticipated that the National Energy Strategy will:

1. encourage renewables in the electricity sector
2. encourage renewables in the liquid fuels sector
3. seek to minimise CO2 production
4. seek to attain fair energy prices which assist economic activity while reflecting the true environmental cost

All of the above objectives would seem poorly served by encouraging new thermal capacity close to Auckland at the expense of renewable options from further south. Although the Electricity Commission does not have accountability for the impact of its decisions on Climate Change and other national objectives, the Government Policy Statement on Electricity Governance does give indications that these objectives should be addressed by the Electricity Commission. These are discussed in more detail in annex 2.

Older 110 KV lines and possibly older 220 KV lines

One potential benefit of new high voltage transmission capacity would be the removal of older lower capacity and lower voltage circuits. It is probable that the number of transmission lines through an area maybe of equal importance to the height of transmission pylons. Much of the EC interim proposal addresses the complexity of managing the existing 110 KV grid in the

event of a major fault on the parallel higher voltage system. There appears no thought or consideration of the social benefits of "tidying up" the current grid during the overall upgrade process.

Grid Reliability Standards

Auckland's power outage problems on 12/6/06 have provoked considerable adverse reaction. Few, however, have focused on the underlying issues and have instead focused on the impacts. Given this response it seems useful to comment on Grid Reliability Standards in relation to the GIT process.

To understand the root cause of the Auckland problems one must look at the GRS, Grid Reliability Standards, imposed to define the "acceptable reliability" for our high voltage transmission system. These are defined by the Electricity Commission not Transpower. Basically they require our transmission system to survive a single major fault, but not 2 simultaneous faults. Major faults are the loss of a major transmission line, or substation or generator. The single problem which occurred in Auckland on 12/6/06 appears to have caused more than 1 major fault. Transpower is preparing a report on the outage which will document the exact cause. The GRS has a dual purpose: firstly to ensure faults which cause a lack of supply are rare, and secondly to ensure we do not overspend on grid reliability. From a high level perspective it is easy to request the Government to directly or indirectly impose or pay for a higher reliability standard as Transpower's shareholder. This can not be done without some economic impact of higher power prices or reductions in Government revenue (which will impact other areas of the economy). Prior to Transpower submitting its amended Grid Upgrade Proposal it may be appropriate to review the GRS. For the majority of the country the present GRS may be adequate. For our major cities it is possible that some review might be beneficial. We should perhaps look to comparable overseas cities to decide what might be appropriate. Changes to the GRS will not have an immediate impact as Transpower has to propose a reliability upgrade based on the GRS and then the Commission must consider the proposal. The Commission decides whether it meets the GRS and if so whether it is the least cost approach before they approve or decline Transpower's proposal. After approval Transpower would still require RMA approval and for many projects would also require access to the areas where upgrade work is to be performed. As Transpower does not have legal easements over much of New Zealand's high voltage transmission system it may be complex to gain access to the transmission assets in order to upgrade them.

Is this an appropriate time to reconsider the GRS for our cities prior to considering an amended grid upgrade proposal? No decision is a decision to continue with our current standards.

Project and operational concerns

On top of the issues raised above there are some quite practical issues which would advise against an interim grid upgrade.

Project planning vs. execution

It is always wrong to separate responsibility for project planning and execution between two different organisations which do not have a common reporting structure. Those responsible for project execution must accept and own the design basis involved. In simple terms this would strongly indicate that the EC should not be a project planner. They are a regulator, and the roles of a regulator and planner are quite different. If the EC has an oversight/audit role in addition to its regulatory role it should audit and approve and not plan. The Commission's view that it can not evaluate the economic benefit of Transpower's proposals without comparing them with other alternatives has merit. However it seems prudent to develop these options in conjunction with Transpower, rather than through independent consultants.

Governance

Those who are responsible for project execution must be responsible for the approved budget. This almost always means they must have generated the project cost estimate or at the very least have fully concurred with the cost estimate. It seems difficult to understand how the Board and Executive of Transpower could assume responsibility for a project budget

generated by an EC cost estimate. This was clearly not the intention of the Commission approach but appears as if Commission cost estimates might influence the outcome.

As a country we are approaching decisions on major new infrastructure in several areas, while the decision-making process for major national infrastructure upgrades is still evolving. Recent changes to the RMA process have facilitated projects that span several jurisdictions. It remains to be seen whether these changes will be sufficient or whether some additional modifications might be required.

Operational issues: "KISS" principle
Some non-operational personnel have a tendency to resolve an operational constraint with an apparently low cost but complex solution. This is almost always the wrong approach. For almost all operational constraints the KISS principle is appropriate. Solutions should be "as simple as possible, but not more simple than required". In this regard an outsider view on the EC's interim solution would be that it seems to contravene the KISS principle in that it apparently adds considerable complexity (PST phase shift transformers and the like) to avoid the need for a simple and straight forward transmission upgrade.

Annex 4: References

- S. Borenstein, J. Bushnell and S. Stoft (2000) ; "The competitive effects of transmission capacity in a deregulated electricity industry", *The RAND Journal of Economics*, 31 (2): 294 – 325.
- Chief Executives' Forum (2006); Letter from Chief Executives' Forum Re Auckland Transmission Strengthening; 11 May 2006 http://www.electricitycommission.govt.nz/pdfs/opdev/transmis/400Kv/corres/CEO-Letter-11May06.pdf
- Electricity Commission (2006); Transpower's Proposed 400 kV North Island Investment - Transpower-Electricity Commission Staff Discussions - Transpower Issues and Commission Staff Comments; 23 March 2006
- Electricity Commission (2005); Alternatives to Transpower's proposed Whakamaru-Otahuhu 400 kV transmission line – alternatives analysis stage II; December 2005
- Electricity Commission (2005); Initial Statement of Opportunities (SOO); July 2005
- Electricity Commission (2006); website discussions and questions: http://www.electricitycommission.govt.nz/opdev/transmis/400kv/faqs400kv
- Electricity Commission (2006); Draft decision on Transpower's Auckland 400kV grid investment proposal for the purposes of consultation under section III of part F of the Electricity Governance Rules 2003 (+ supporting documentation); 27 April 2006
- Electric Power Optimization Centre (EPOC - 2004); Submission on draft Grid Investment Test; 29 October, 2004
- Energy Centre (2005); Submission to Electricity Commissions on the Initial Statement of Opportunities (SOO); 9 June 2005
- L. Evans, R.B. Meade (2005); Alternating currents or counter-revolution; December 2005
- GE Energy (2006); Memo/Peer Review "Review of Auckland Alternatives Transmission Reports; 12 April 2006
- International Energy Agency (2005); Learning from blackouts; 2005
- International Energy Agency (2006); Energy Policies of IEA Countries – New Zealand 2006 Review; 2006
- NZIER (2005); Market design report – initial stock-take paper; Report to the Electricity Commission; August 2005.
- W. Pfaffenberger, F.P. Sioshani (2006); Electricity market reform: an international perspective; 2006
- SFE Workshop Proceedings on EPOC web site: www.esc.auckland.ac.nz/epoc
- Sinclair Knight Merz (2004); Alternatives to Transmission for Supply of Auckland's Growing Electricity Demand – report for the Electricity Commission; October 2004
- S. Stoft (1997); "The effect of the transmission grid on market power", University of California Berkeley. Available at http://eetd.lbl.gov/ea/EMS/reports/40479.pdf.
- Transpower (2005); Grid Upgrade Plan 2005

Submission by

Federated Farmers

Gen-I House
154 Featherston Street
PO Box 715, Wellington
New Zealand
Tel (04) 473-7269
Fax (04) 473-1081
Email: receptionwgton@fedfarm.org.nz
Website: http://www.fedfarm.org.nz

FEDERATED FARMERS OF NEW ZEALAND (INC)

23 June 2006

Jenny Walton
Electricity Commission
PO Box 10041
WELLINGTON

Dear Ms Walton,

Transpower's Auckland 400kV Grid Investment Proposal: Draft Decision

Federated Farmers of New Zealand welcomes the opportunity to provide comments on those questions the Electricity Commission raises in its draft decision. The Federation understands consultation on the draft decision has been suspended while the Commission considers the Transpower's revised proposal. There are however important questions that apply to both proposals and the Federation will focus its response on the question of the easement corridor, namely:

> *Do you consider there may be value in progressing at this stage a transmission corridor that would accommodate a range of overhead line technologies? Do you consider that such a corridor could be implemented under current legislation? If not, what changes do you consider would need to be made?*

Federated Farmers of New Zealand opposes the negotiation and securing of property rights in a transmission corridor well in advance of a decision being required for the investment and resulting use of that corridor.

Transpower's behaviour so far towards affected landowners on the proposed 400kV line between Whakamaru and Otahuhu has in many instances seen many landowners left distressed and angry. For landowners to have suffered their way through negotiations only to find the corridor was no longer necessary would be to rub salt in their wounds.

The Public Works Act recognises that the affected landowner should be left no better or worse off than before the action is taken. Given the long lifetime of the lines and the necessary on-going relationship between Transpower and affected landowners, the Federation considers it important that the same standard apply here.

Federated Farmers is aware that Transpower has pressured a number of landowners into signing agreements that may have resulted in the landowner receiving inadequate compensation. The federation considers this could have been avoided if the landowners were able to obtain good independent advice before entering into discussions with Transpower.

There are however only a few lawyers and legal specialists with experience in both the Public Works Act and negotiating easement agreements. This makes it difficult for

many landowners to access the advice they need to make informed decisions in their dealings with Transpower.

In an effort to bring some certainty to this process, landowner organisations and Transpower met well over two years ago in anticipation of the proposed 400kV line being built. The Federation alone had invested a great deal of time and resources towards trying to develop model access and easement agreements.

It was envisaged that the model agreements would be used as the basis of Transpower's negotiations with landowners for the right to erect new lines on private land.

With significant grid upgrades planned in the short-medium term, it was considered important by the landowner organisations to ensure landowners were treated in a consistent manner and supported by an agreement that addressed at least in general terms many of the issues they faced from having lines across their land.

Such an approach would not only have provided certainty to both land and line owner but negotiations would have necessarily been streamlined and less onerous for all concerned.

The end result of these negotiations however has been mixed.

Landowner organisations remain unable to endorse model agreements that fail to adequately protect the interests of those directly affected. Solutions to those inadequacies proposed by Federated Farmers include:

- Regular reviews of the easement arrangements to take into account the changing circumstances of the land and land-use options.
- Payment of compensation as an annuity adjusted to take into consideration emerging impacts on the landowner (subdivision, other land-uses, opportunity cost, etc.).
- Ensuring formal easements are secured against existing lines with no easements.

Transpower refuses to accept annuities as a form of compensation payment and are reluctant to establish formal easements against existing lines, except where they require renegotiation in the case of upgrade with injurious affection.

Federated Farmers and other landowner organisations still hold hope that Transpower will concede these points, but until they do any discussions with landowners for easement rights are making unable to progress. This is arguably the primary reason why Transpower has faced difficulties in securing rights necessary to complete the corridor.

Transpower have advised the Federation that they own approximately properties comprising 15% of the proposed transmission corridor, but that this is by way of purchasing the entire property instead of the interest in the corridor alone. This would suggest that outright property purchase on a willing-buyer willing-seller basis is the only means by which Transpower can successfully acquire an interest in the transmission corridor. Although Federated Farmers supports the construction of power lines on private property where the landowner willingly sells that interest in their land,

this approach should raise questions around the affordability of Transpower's overall grid investment proposal.

To conclude, Federated Farmers is aware that Transpower's behaviour has placed many landowners under a great deal of stress and anxiety. Transpower policies have created an impasse in discussions with landowners with a number of important issues left unresolved.

As such, Federated Farmers would be very concerned if the Electricity Commission enabled Transpower to acquire the corridor in advance of it being required.

Yours sincerely,

Don Nicolson
Vice President

Submission by

D Fulton

Dynes. W. Fulton J.P.

9 June 2006

SUBMISSION on Draft 400kV Whakamaru to Auckland

I have some unease in making this submission as it appears that the actions and announcements that have been made publicly in the past few day will pre empt this process.

The Minister of Finance Dr Cullen, Transpower's Dr Craven and indeed the response from Commissioner Roy Hemmingway has indicated that the ground has shifted a long way from when we were asked to send in submissions and these may well now be superfluous .

I feel uncomfortable that we have been used in this consultation process and in the end I believe it will be Central Governments that will dictate the final outcome. We are not that naive and know that continual dialogue and meetings have been taking place with these three participants and the Government Ministers.

I own a dairy farm in the Orini District which has nine pylons that transverse the property. Six are the WKM- OHA 220kV A and B lines. The other three being the 200kV C line.

Although the proposed 400kV line will not be on my property if the other options of thermal up grades and the duplexing go ahead I will be affected.

While the 400kV is now on hold in the draft decision made by the Commissioner I wish to make the following points.

- The need to supply the ever increased electrical energy demands to Auckland has never been doubted.
- I oppose the proposed electrical corridor as it has not been defined . The threat that this now imposes on land owners with no defining corridor or time when it may be required makes the uncertainty worse .
- The thermal upgrades of the A and B lines I support as this is enables an immediate relief to the power supply required.

- I support the duplexing of the A and B lines.

- Further the HVDC needs to be the preferred method to transmitting the supply of energy on the main trunk links. Benmore to Otahuhu

The way Transpower choose to approach the process of securing a new line corridor through the Waikato for their new transmission 400kV line can only be described as appalling. The Board Chairman, CEO , and members of the Board have chosen to hid behind their consultants and staff, which leaves me with very little respect for the Transpower Board .
Their consultation process was nothing short of being arrogant, bulling and confrontational .