TRANSPOWER NEW ZEALAND LIMITED

Response to consultation paper on Electricity Security of Supply Review

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TRANSPOWER

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1. Introduction

This submission is Transpower's response to the "Electricity Security of Supply Policy Review" consultation paper produced by Castalia Ltd.

This paper summarises Transpower's view of the proposals contained in the Castalia paper. A more detailed response to the specific questions posed by the consultation paper is contained in the Appendix.

Security of Supply is an issue that has been discussed within the electricity industry on a number of occasions and which continues to concern market participants and affect customer confidence. Transpower has been involved with past initiatives and believes that these proposals and associated measures should be accorded a high priority.

2. Scope of the consultation paper

Transpower's main concern with the consultation paper is that it focuses on one factor and does not consider all aspects of the security of supply problem or the full set of possible actions that could contribute to a solution. There are a number of issues that have been excluded from the paper's main analysis that we believe should be considered.

Peak capacity

The paper concentrates on the medium term concern with "energy adequacy", that is, having enough generating plant and fuel to meet demand over a period of months in a dry year. This is only part of the security of supply equation and should be considered in conjunction with the short term need for capacity adequacy to meet demand during peak load periods.

The National Winter Group, established in response to the events of 19 June 2006, proposed in its close-out paper of 29 September 2006 that future EC assessments of security of supply should be extended to include an assessment of generating capability to meet forecast peak demand.

It is important that the Electricity Commission ensure that there is an ongoing review of the ability to meet peak demand and that industry arrangements encourage the provision of sufficient generation offers at any time to meet demand. An element of the review should aim to quantify the acceptable economic risk of non supply.

Short term peak capacity problems lend themselves more readily to trade-offs, as the problems are usually highly visible and there is a greater community appetite to accept the cost of resolution.

Demand side participation

There are two sides to any market-driven solution to a problem. The consultation paper focuses on the supply remedies and does not cover available options for demand side initiatives (other than by way of price incentives). It is important to put this work into context and determine the extent to which the problem could be solved by demand side participation in the market including the existing demand-side bidding and forecasting project, capacity management options and the better use of ripple control for load management.

Market vs regulatory options

The solution identified in the consultation paper is a regulated approach. The introduction of effective hedge products, mandatory offering of available generation capacity and other market or combined market/regulatory mechanisms are equally valid options which have not been considered.

3. Comments on the analysis

This section outlines Transpower's view of the consultation paper's proposals. A more detailed response to the specific questions posed by the consultation paper is contained in the Appendix.

The consultation paper provides an economic analysis of the problem of energy adequacy in the context of security of supply. The proposal draws on a number of theoretical concepts applied to the New Zealand electricity market. In principle the approach may be sound; in practice it will be difficult to apply because of insufficient empirical data and the assumptions necessary to cover data inadequacies and qualitative issues. The approach also lacks a "real world" check and balance mechanism to determine the acceptability of its conclusions in relation to the risk appetite of the industry, government policy and the community at large.

The conclusion of the consultation paper is to advocate a "watch dog" process, i.e. to make any decision on the provision of reserve energy at the latest possible opportunity. The aim is therefore to allow the market time to react and, if that does not occur, to intervene only when absolutely necessary. The policy aims to distort the market as little as possible, which we also advocate. However, leaving the decision to the point at which only the generation with the shortest timeframe are able to be implemented distorts the optimal generation mix, as no other solutions would then be possible. The proposal also assumes that the timeframe for bringing open cycle gas turbines into the market is realistic (which may not be the case due to transmission lead-times and consenting processes).

Issues of particular concern are:

- In the proposed security of supply methodology, electricity consumers bear the full cost of non supply, but the cost to generators is simply loss of generation revenue. This results in asymmetric investment incentives for generators and consumers. This problem could be overcome by requiring generators to compensate consumers for unserved energy at the value of lost load (VoLL), or something approaching this figure. Long term hedging could also provide generators with the incentive to supply. This would provide an appropriate incentive for generators to invest to maintain security of supply at a level that reflects the value of electricity supply to consumers.

- The analysis has been performed in isolation from the business context within which decisions will be taken. Therefore, the impact of the analysis on the "real world" has been adequately considered. Reliance on voluntary load curtailment (as happens when the security of supply standard is reached) reduces the confidence that customers have in the electricity sector. Lowering the standard to a level which will require more frequent conservation campaigns lowers consumer and investor confidence.[1] It is important that the consumer appetite for risk is properly understood and education is provided to promote confidence. The impacts of these intangible effects are important considerations as lack of business confidence will have a "knock on" effect on the cost of doing business in New Zealand by way of insurance premiums, international interest rate differentials, etc.

- Security of supply concerns and dispatch of reserve energy are signalled through prices. Transpower has noted on a number of occasions[2] that this approach can, under certain conditions, create market distortions. Hydro scarcity, although signalled by rising offer prices, will not always be immediately reflected in the spot price, since the spot price will also reflect other concerns. Hence, the use of a fixed value trigger fails to reflect the scarcity of hydro supply under all circumstances. The use of reserve generation would be more appropriately triggered by consideration of a combination of the current physical situation (lake levels and fuel supplies) and expectations of the future physical situation (inflows, fuel and plant availability, and demand), known hedge positions (a measure of likely behaviour going forward) and other relevant issues such as resource consent conditions. A non spot price trigger would also significantly decrease the ability of market participants to manipulate the use of reserve generation. It would aid investor certainty if the trigger(s) for the operation of reserve generation to conserve energy were defined in advance.

[1] The importance of business confidence is highlighted in the Government Policy Statement (October 2006) with references to the objectives for transmission standards (paragraph 80) and in association with the Grid Investment Test (paragraph 87g).

[2] Including Transpower's submission to the Ministry of Economic Development on Reserve Generation (June 2003)

- The proposal that the standard for security of supply be the percentage annual energy margin raises a number of issues. The first concern relates to the reference point from which this margin is calculated, i.e. the EC's demand forecast. Secondly, all variations are smoothed out by making this an annual energy margin instead of a margin for the period where the supply is expected to be short. Finally, a valid economic instrument should consider all significant sources of variability (i.e. forecast hydro inflows and wind energy as well as forecast demand).

- Expressing the standard security of supply as a percentage of total annual demand results in a value much lower than 1 percent; this gives the impression that the problem is an insignificant issue. However, this choice of measure fails to expose the gravity of the situation at times when security of supply is threatened. Putting these figures into perspective, 0.03 per cent and 0.1 per cent of total annual demand equates to 2000 to 3900 MWh a year, which could represent non-supply for all customers north of Huntly for 10 to 19 peak hours every winter. Stated in this way the standard looks less acceptable. Therefore, it is important to relate any measure to its actual effect on consumers in plain terms.

- Furthermore, expressing the target percentage as an expected figure masks the range of outcomes occurring under the proposed probabilistic approach. Consideration should be given to the range of unserved energy outcomes, not simply the average. The path of future demand growth is uncertain. If demand takes a lower path than forecast, unserved energy will be relatively small, while higher demand will result in unserved energy several times higher than the average of all cases.

- The "watch dog" approach advocates that the Electricity Commission stand ready for a last minute procurement of further energy from diesel-fired open cycle gas turbine capacity. This would be necessary when it becomes obvious that sufficient market investment would not be in place to provide the necessary capacity. The time allowed for this intervention is three years, the time that it is estimated that it would take to consent and commission an open cycle gas turbine. Not only is this timeframe debatable due to delays experienced in consenting processes, it is impossible to determine with any accuracy what energy supply will be available in three years' time.

- Concerns about sufficient investment in generation are raised in the report as a result of the revised analysis of the MED expected gross margin. However, the assumptions behind the revised analysis do not take into account replacing current generation that will be retired from the system. Experience shows that generation is not withdrawn until replacement generation is on-line. In addition, historical evidence has shown that committed generation does not tend to be forecast to the market until a few years prior to its commissioning. Therefore, the concerns voiced in the report are likely to have been overplayed.

4. Further considerations

In addition to the issues raised relating to matters discussed by the consultation paper, there are a number of other considerations that should be evaluated:

- In order to enable reserve generation to reach the market, it is important to ensure that the transmission required for it to do so has the necessary capacity. The lead time to build transmission is far in excess of the time needed to build new generation. Any "watch dog" approach should incorporate this factor into its timescales.

- How to integrate this report with the draft New Zealand Energy Strategy (NZES). Although the Energy Strategy is touched on when evaluating the MED expected gross energy margins and the likelihood that no further coal stations will be commissioned, there is little reference to other issues arising from the strategy. The introduction of more intermittent renewable energy is likely to require there to be complementary firming energy, i.e. energy that is required to be available if the intermittent energy is not available at its forecast levels. Proposals have been made to balance wind energy with firming hydro energy. This would mean that hydro, if used for this purpose, would not be available for reserve purposes. Also, a predominance of wind energy would mean that, in years where there is a dry spring and hydro inflows are low, the country would be dependent on wind energy to perform in the following winter. It is necessary to determine if weather patterns show a correlation between wind flow and rainfall. If such a correlation were found it would raise issues relating to the adequacy of wind generation in some circumstances and the possible need for higher levels of firming capacity, which would need to be thermal in periods when hydro storage was low.

- SOO scenarios for dry years. The current published SOO scenarios under Part F do not include a dry year scenario. As a consequence, planned transmission investment to alleviate grid constraints for such a dry year is unlikely to satisfy the current Grid Investment Test criteria. As there are a number of grid constraints that can affect transfer from the North Island to the South in a dry year the SOO scenarios would therefore need to be extended to cover this situation to facilitate thermal generation response to a dry year situation. Transpower has suggested that for this, and other reasons, the requirement that the GIT use SOO scenarios be removed in order to allow sensible analysis of such issues of relevance to good grid planning.

- Transpower has made the point at Security Advisory Group meetings that, at times when the supply side is being pushed hard to deliver, it is important that there be no pressure placed on the security measures that the system operator uses to maintain security of supply. It is the wrong time to experiment with lower levels of ancillary services when the system is put under pressure.

5. Possible solutions

Our response has already highlighted the fact that an appropriate solution may include further development of demand side response. Another approach that should be considered is the relaxation of RMA requirements governing minimum lake levels during times that security of supply is at risk. The ownership of this additional water resource would need to be carefully managed to avoid potential conflicts of interest.

6. Recommendations

Transpower recommends that, when reviewing the Electricity Security of Policy, the Electricity Commission should consider:

- its ongoing role in monitoring peak capacity, as proposed in the close-out report of the National Winter Group
- whether demand side response could help to alleviate the pressure to address energy adequacy during dry year events
- the impact on consumer confidence, particularly business and investor confidence
- incorporating the forecast variation in hydro inflows and wind energy into the calculation of the energy margin percentage
- stating the security of supply standard in terms of the actual effect on consumers (MWh of non-supply per year)
- the impact of the lead time needed to build new transmission, should further reserve generators be commissioned
- the demand on hydro generation to provide both firming energy for the proposed increase in intermittent renewable generation and reserve generation
- removing the link between the GIT and the SOO, or at least extending the SOO scenarios to include a dry year scenario
- relaxing the RMA requirements governing minimum lake levels during times that security of supply is at risk.

Appendix : Consultation questions

Question 1: Economic approach to the level of security of supply

What are your views on adopting an economic approach to choosing the level of security of supply?

(Box 4.5 – page 42)

Adopting an economic approach to security should, in principle, provide a philosophically sound approach to the determination of security supply limits. It is valuable to identify all the countervailing pressures and necessary considerations that should be incorporated into such a calculation. It also provides a useful tool to enable the results of other security of supply studies to be compared with the New Zealand approach. However, the elements used in the Castalia analysis are not the only relevant considerations when calculating the appropriate security of supply level. The economically derived security of supply level should be viewed in the context of the risk appetite of the electricity market. A more appropriate standard would be achieved by incorporating measurable values for parameters such as business confidence.

The Electricity Commission will ultimately make the decision on the acceptability of any security of supply standard. However, a valuable exercise would be to check this standard against a "back stop" level for security of supply that is felt to be a workable standard by the industry. This will compare the calculated standard's workability by weighing it alongside the perceived risk appetite and highlight changes required to the calculated standard to ensure it is "fit for purpose".

Question 2: Winter energy deficit is the main problem

Can the predominant energy security of supply problem be quantified adequately as a winter energy deficit?

(Morrison & Co analysis – referenced on page 28)

The paper defines "energy adequacy" as having enough generating plant (and the fuel to run it) to meet demand (MWh) over a period of months or years, i.e. over the medium term. This is in contrast to "capacity adequacy", which is having enough MW to meet demand on an hourly timescale, which is not covered in this paper.[3]

[3] Refer to comment in the main body of the submission

Although it is true that past experience has shown energy adequacy situations arise over the winter period, there is concern that the growing load in the Auckland region and the demand for electricity for cooling devices, such as air-conditioning, will lead to energy adequacy problems in the warmest months also. Any energy deficit over the summer months creates additional concerns as, during those periods, transmission lines will be running under summer rating limits, which reduces the ability to convey electricity from generation to load centres by an average of 11 percent (up to a maximum of 19 percent in some cases).

Defining energy adequacy in terms of a seasonal problem tends to lead to the conclusion that hydro storage is the main indicator of security of supply. The Castalia report recognises that hydro storage is not the only issue and identifies that security of supply can also be affected by large transmission failures, lack of wind generation compared to forecast for a prolonged period, disruptions of gas supply and major faults on gas platforms. This is an important point and although the report states that transmission and distribution adequacy are outside its scope, the Government Policy Statement (GPS) states that one of the key components of security of supply is that "the system has sufficient reserve energy (plant and fuel, or contracted demand response) to cope with extreme dry sequences or other unexpected supply disruptions"[4]. We therefore endorse the concept that security of supply should be considered at a more generic level than simply the threat of low hydro flows. If, however, only hydro storage is considered as an input into the calculations then the "back stop" concept of an acceptable level of security of supply allows the other factors to be taken into consideration when setting the final standard.

Additional Question: Generator/retailer contract positions

How much additional risk of shortages is created by possible patterns of generator/retailer contract positions?

(Box 3.3 – page 29)

Vertical integration of generation and load can have a number of consequences. If vertically integrated companies hedge around 75-80 per cent of their load against generation then, instead of prices on the spot market indicating a shortage of supply, these signals may be largely hidden from view. In these cases, signs of a looming crisis would occur in periods when hedges are insufficient and price spikes result for a period of a few hours. Not only does this mean a late indication of a problem it also means that price signals are removed from the market that would encourage the building of peaking stations.

In addition, as the report states, it is likely that the cautious nature of a vertically integrated generator will hold back on its generation in order not to expose any load to the spot market and higher prices. This ensures that the vertically integrated generators look after their own exposure to the spot market but, by not making this generation available to the market as a whole, they contribute to exposing unhedged load to risk.

[4] Government Policy Statement on Electricity Governance (October 2006), paragraph 36

Question 3: Marginal costs of demand constraints

What marginal costs should be attributed to demand restraints at various levels?

(Box 4.1 – page 36)

The marginal cost of demand constraints is defined as the additional cost per additional MWh of demand constraint at the prevailing price and quantity. This captures the fact that each unit of energy withheld must be worth at least the prevailing price to consumers (or they would not have purchased the original amount) plus the idea that successive amounts of demand restraint are progressively more annoying and costly to consumers.

The additional cost should also include costs related to business confidence. When determining the additional costs that a consumer is prepared to pay above the prevailing price, a business investor must be confident of receiving that additional supply in order to plan for their business. With inadequate security a business investor would not be prepared to invest.[5]

Question 4: Annual energy margin as operational standard

Do you agree with the proposed use of a simple percentage annual energy margin as the operational standard for security of supply?

(Box 5.1 – page 44)

A simple percentage energy margin is derived from the difference between the expected hydro capability and the expected demand over the period of time under consideration.

We note that, in order to deliver a secure energy supply, the proposed measure is critically dependent on the demand forecasts. Transpower has previously highlighted a number of concerns about the Electricity Commission's demand forecasting. While forecasts of fundamental economic drivers have not changed substantially since the initial Statement of Opportunities was released, the Electricity Commission's energy demand forecast has fallen. This drop appears to be driven by changes in the specification of the forecasting model and the shortening of the historical period used in the analysis.

Converting this measure into a percentage also raises a number of concerns. Firstly, variations are smoothed out by making it an annual energy margin instead of a margin for the period when the supply is short. Also, for a valid economic instrument, it is appropriate to consider all sources of variability, in particular forecast hydro inflows and wind energy during the critical period, as well as forecast demand.

[5] Refer to footnote 1 on the importance of business confidence highlighted within the GPS.

Additional Question: Assumptions in dry periods

What range of assumptions might be relevant for the cost of reserve energy or demand reductions in dry periods?

(Box 4.5 – page 41)

For the most part, the assumptions and calculations appear to be reasonable. However, the implicit assumption that 20GWh per annum of supply shortfall will be able to be accommodated by demand restraint and "planned and well-publicised power rota cuts" may need to be examined further. If a proportion of this unserved energy were to result in "unexpected and indiscriminate power cuts at peak times " then this should be valued at a value of lost load (VoLL) figure of $20,000-$30,000/MWh. The total cost of the unserved energy would consequently rise substantially and this would alter the conclusions in favour of a higher energy margin and an optimal return period for the predicted unserved energy of more than every 20 years on average. In Transpower's view, the sensitivity testing should include a test that values 10-20 per cent of the forecast unserved energy at VoLL.

This cost would be increased further by the incorporation of the indirect costs of qualitative factors into the standard, as is required to ensure business and investor confidence.

Question 5: Acceptable level of un-served energy

What are your views on the acceptable expected level of un-served energy each year relative to the range between 0.03 percent and 0.1 percent of total annual demand identified in this paper?

(Box 4.5 – page 41)

Expressing the standard security of supply as a percentage of total annual demand results in a value much lower that 1 per cent; this gives the impression that the problem is an insignificant issue. However, this choice of measure fails to expose the gravity of the situation at times when security of supply is threatened. Putting these figures into perspective, 0.03 per cent and 0.1 per cent of total annual demand equate to 2000 to 3900 MWh a year, which could represent non-supply for all customers north of Huntly for 10 to 19 peak hours every winter. Stated in this way the standard looks less acceptable. Therefore, it is important to relate any measure to its actual effect on consumers in plain terms.

Question 6: Probability of demand constraint and energy margin

What are your views on how to translate the acceptable level of un-served energy into a probability of demand restraint and an energy margin?

(Box 4.5 – page 41)

It is important to use a measure that can easily be understood. The level of un-served energy has a theoretical derivation and is not intuitive or suitable for use on a day-to-day basis. An energy margin percentage figure is a more readily understandable measure. However, as highlighted in the response to question 4, the energy margin percentage should be expressed as a percentage of all varying quantities, including hydro flow and wind energy, and further evaluation of the EC load forecast should be undertaken before using this in the calculation.

Additional Question: Inferred energy margin

What are your views on the inferred optimal energy margin of between 12 percent and 17 percent?

(Box 4.5 – page 41)

We reiterate the comments relating to the method used to calculate the energy margin in the response to question 4 and emphasise that it is important to relate this to the actual impact on consumers.

Question 7: Frequency and magnitude of electricity market failure

Do you agree that there is insufficient evidence to be able to assess the likely frequency or magnitude of any electricity market failure in respect of security of supply?

(Box 6.1 – page 50)

It is true that there is little evidence available. However, the question we pose is "what would constitute sufficient evidence to enable the likely frequency and magnitude of market failure?" To obtain empirical evidence would mean that the system would need to "fail". If the intention is that setting security standards means this will not happen, and the appetite of the industry is that it will not allow it to happen, then we are never going to obtain the type of evidence required. Therefore, firm conclusions cannot be reached if we use this approach. The purpose of this report is to provide viable pre-emptive alternatives and not to wait to provide a solution based on experience of failure.

Question 8: "Watch dog" approach

Do you agree that, given the uncertainty about market failure, the best policy going forward is to adopt a "watch dog" approach? This would mean the Commission standing by to intervene if it becomes obvious that the market will not be in a position to meet the optimal reserve energy margin within the lead time of commissioning an open cycle gas turbine capacity, but being ready to switch to more comprehensive intervention options if the frequency and magnitude of market failure is greater than expected?

(Box 6.2 – page 64)

The "watch dog" approach allows the market maximum time to react to provide sufficient reserve energy, with the EC only intervening if that does not occur. This policy aims to distort the market as little as possible, which Transpower also advocates. However, leaving the decision to the point at which only the generation with the shortest timeframe can be implemented distorts the optimal generation mix, as no other solutions would then be possible. This also assumes that the time allowed for bringing open cycle gas turbines into the market is realistic (which may not be the case due to transmission lead-times and consenting processes).

If the policy adopted is to "wait and see" then some of the "wait and see" time could be usefully used to accelerate the work on demand-side participation that is currently with the EC. Ensuring that both supply and demand respond appropriately to price signals would temper any need for regulated intervention.

Question 9: Regime and Policy

Do you agree that the scope of Regime and Policy should be clarified to give the Commission more operational flexibility?

(Box 8.1 – page 69)

It is recommended that the detailed operational aspects be removed from the Reserve Energy Policy in the Government Policy Statement and moved to a policy level where the Commission can define and review them as needed.

The report proposes that:

- the role of the regime should include setting the 1-in-60 standard, or an alternative standard, contracting for reserve energy and dispatching it to the market, levying market participants
- the role of the policy should include the way that security of supply is measured, the trigger process for intervention and the form of intervention (namely, the type of reserve energy and structure of payment).

It is important to make this distinction clear, with the Regime incorporating the principles and the EC dealing only with the policy applications.

Question 10: Levy arrangements

Do you agree that the current levy arrangements should remain in place?

(Box 7.1 – page 67)

Economic theory would suggest allocating costs to causers in order to maximise efficiencies. However, this is often hard to achieve in practice. The universal levy is the easiest option to administer, but this should not be the only driver for the selection of the method of payment. The MED comprehensive review of the Electricity Commission's security of supply policy is the forum in which any proposed changes to the current system should be considered. The fact that a number of parties self-provide security of supply should be taken into acount. It is also important that the security of supply provided by these parties be agreed to be robust and verified.

Question 11: Pre-announced process and clear energy market trigger

Do you agree that the procurement process should be pre-announced, and that a clear trigger for procurement be established in terms of an annual energy margin?

(Box 9.1 – page 79)

It is important that all decisions, triggers and subsequent processes followed be transparent. It also follows that the type of procurement being used should be clearly identified well ahead of time.

Question 12: Compulsory provision of information

Do you agree that no further compulsory requirements should be imposed for the provision of information to the Commission?

(Box 9.2 – page 84)

We would be loath to advocate compulsory data collection as the current regime is working well without compulsion. Therefore, we cannot see that there is a need to change the policy from one of voluntary provision of information to compulsory provision. This may need to be reassessed if the method by which the Minzone is calculated changes.