

Submission on

Lower Waitaki Reliability Investigation Project

Assumptions, Approach and Options

Consultation Document

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Submitter:

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The transmission system supplying the main North Otago GXP at Oamaru provides N-1 security. In recent years this typically winter peaking area has changed into a summer peaking area due to rapid growth in irrigation and dairy conversion.

North Otago now boasts what must be the largest irrigation scheme in NZ, supplying 10,000 hectares, with a peak demand of approximately 10MW primary pumping and 2MW of secondary pumping. Stage 2 of this scheme will add a further 10MW of primary pumping and 5MW of secondary pumping. Preliminary development for Stage 2 is in progress.

Similar schemes proposed for the north side of the Waitaki River will require a combined total of approximately 40MW. There is sufficient water provisioned in the Waitaki Water Allocation Plan to see over 100MW of irrigation developed on both sides of the Waitaki Valley. It would be reasonable to assume that both water and land resources will be fully developed over the next 20 years.

Change in land use is driving demand for more infrastructure, capable of servicing different needs than past. The intensity of economic activity is making a quantum shift. The transmission grid needs to be modernised accordingly.

In addition the Holcim cement plant at Weston will add a further 15MW of load excluding any growth from support industries or population growth that will accompany this project.

The Government's Policy Statement with respect to Transmission services states:

The Government's objectives for the provision of transmission services are that:

the services are provided in a manner consistent with the Government's policy objectives for electricity, and in particular, that grid reliability should be maintained at a level required by residential, commercial and industrial users and by the Government's economic development objectives

It would take very little research to establish that the residential, commercial, and industrial users in North Otago wish to retain the current N-1 level of security. However this provision of the GPS does not appear to be the determining factor in the approval process for upgrades to non-core transmission assets implemented by the EC.

The threat inherent in the EC process is that the upgrade work required to maintain the N-1 security level may not be approved. The process is complex, time consuming, and appears to be focussed on short term band-aid outcomes rather than a genuine attempt to modernise infrastructure key to the region's economic development.

It does not consider the impact that a major reduction in the security of supply would have on the region. Even discussing such issues with the end users adds uncertainty and could easily lead to future investment decisions being deferred or even cancelled. A secure transmission supply is therefore essential to the economic future of this region.

The following comments are made with reference to the question numbers of the above consultation document:

Question 1.

NWL believes the development plan needs to address the following additional issues:

1. The voltage disturbances that occur at the Oamaru GXP when one of the 110kV lines is removed and subsequently returned to service.
2. The issues caused by circulating current at the Oamaru GXP resulting from the imbalance of the loading on each 110kV line and the absence of a closed 110kV bus at either Glenavy or Oamaru.
3. The impact that an N security supply would have on the region. The Transpower 2009/10 maintenance plan includes 13 days when either the OAM-WTK1 or the OAM-WTK2 line will be out of service for maintenance. This would equate to 13 days of reduced power or power outages if no action is taken.

4. In determining the economically efficient solution, the entire supply from grid to consumer must be included. Different transmission options will affect the supporting investment made by distribution companies (particularly with regard to their sub-transmission investment) and in some cases the investments made by consumers.
5. It is noted that the load forecast excludes the impact of load developing around the Waitaki GXP. In some development options this load may be serviced from the 110kV system and needs to be included in order to make comparisons between options. That is, depending on system configuration load may shift from one GXP to another and assuming load growth will only accrue onto existing GXP's would be incorrect.

Question 2

For planning purposes NWL considers the demand assumptions are conservative with regard to growth actually being experienced and the ancillary growth that will accompany major industrial developments such as the Holcim cement works.

The Oamaru GXP has moved from a winter peaking to a summer peaking GXP in the last two years. Actual growth has therefore been substantially higher than shown by simply comparing the annual growth in peak demand. This type of comparison would show that no growth occurred until the summer peak had reached the winter peak level. However the true rate of load growth should be based on a comparison of the summer peak demands.

At distribution network level growth can be more localised and therefore more extreme (10-30%). To address this growth sub-transmission and transmission solutions need to be coordinated. Growth rates are outstripping the planning process. Urgency is needed to avoid the real possibility of not being able to supply. These are outcomes that planning aims to avoid not contribute to.

Question 3

The generation assumptions listed are appropriate for the purposes of this report, but are a distraction from the urgent issues this project must address. In this process generation solutions will never make it onto the short list unless Transpower and/or line companies own them as alternative solutions and recognise the contribution they make on a long term basis.

The NBTC will not inject into the regional 110kV network, and will not provide a solution within the time frame being considered.

Question 4

NWL requests that the following options be added:

1. Installing a new GXP at Livingstone and shifting the 220/110kV interconnection from Waitaki to Livingstone with new 110kV lines between Livingstone and Black Point/Ikawai. This would shorten the

110kV supply by 30km reducing conductor upgrade requirements and the interconnection transformers need upgrading anyway.

2. Option 3 but at 220kV rather than 110kV. This would provide an additional 220kV interconnection between Livingstone and Timaru. This would enable Timaru to be supplied from Livingstone thereby offloading the Livingstone – Islington line.
3. Re-establish the transmission corridor between Halfway Bush and Timaru to allow for the connection renewable generation. There are substantial resources which can be viably developed in the long term but need transmission as an enabler. Specifically wind generation on the Kakanui Ranges (note this is a confidential development currently only in investigation stage). NWL considers this possibility more probable than NBTC or generation at Studholme.

The options listed do not give any detail about the means by which they would be implemented. NWL would have the following concerns about option details:

1. NWL does not consider current configuration of the 110kV lines from Waitaki to Oamaru, with tee connected loads at Black Pt., Studholme and now Bells Pond, and the lack of bussing at Oamaru acceptable in terms of good design and operating standards. These tee connected loads cause an imbalance current to flow between the circuits via NWL's 33kV Bus at Oamaru, and the installation of a third tee connected load at Bells Pond will exacerbate this situation. There should be no more than one tee connection between any two busses. Any proposed development must also address these issues.
2. NWL seeks an assurance that any grid upgrades and connection of new load will comply with the voltage disturbance standards as required by Transpower's Connection Standard.
3. The area supplied from the Oamaru GXP experiences a significant voltage disturbance when the 110kV lines are switched in and out of service for maintenance. At times this voltage disturbance is sufficient to disrupt lighting at some industrial plants and may result in a loss of production. The introduction of voltage support capacitors at the Oamaru GXP may make this disturbance worse. Any proposed development must also address this issue.
4. NWL has reservations about increasing operating temperature as option for increasing thermal capacity ratings. This approach increases losses, the probability of in-service failure, maintenance cost, shortens asset life, and affects contractor availability and responsiveness. Over stressing critical assets correlates to catastrophic compounding fault sequences, the frequency of which, are increasing in the power supply. Experience suggests that you don't get away with these solutions unless there is significantly improved attention to asset management.

5. It has been suggested that Special Protection Schemes, that will automatically shed load, may be implemented with some options. Contractual agreements prevent load being shed (or any other change in line function service) when the contracted parties do not agree. NOIC has been mentioned as a connected load that could be included in a SPS, however the Black Pt GXP is subject to a Notional Embedding Agreement, and is required to meet the same service standards as the alternative solution that NWL could have implemented.

An additional consideration that NWL would like considered during the assessment of options, is the fact that Oamaru has a higher level of loss of supply risk as a result of being spur connected via river crossing. It has been exposed in this way since Transpower dismantled the coastal 110kV circuits between Oamaru and Palmerston. The Waitaki region has a history of transmission line structure failures due to snow and ice loading.

Reinstatement of a river crossing can take weeks. This requires special consideration in terms of the GPS:

The transmission grid should be adequately resilient against the effects of low probability but high impact events having regard to the load which could be disrupted and the duration of the disruption.

Snow storm events and river crossing failures have proven to be more than low probability events, are inherently high impact, and have significantly longer than average outage durations. Higher risk factors should be mitigated for via improved security.

Question 5.

NWL does not believe the long list of options is adequate in terms of consistency with good industry practice. It's preparation has been limited to analysis of narrowly defined load forecasts and not broader needs analysis which would have considered the following:

1. Standards for good design, planning contingencies, and operating practice should be defined and gap analysis undertaken before solutions are developed.
2. No consideration of long term development strategies and sustainability has been included. These are long term investments and therefore should seek to bring assets up to modern standards such that their service life into the future is maximised.
3. Coordination with NWL's network development plans.
4. Regional economic development plans.

Planning assumptions are orientated at the core grid whereas this project is addressing a regional grid issue. The planning assumptions are not appropriate and inadequate. The GUP/GIT process is not designed for regional networks.

NWL does not believe the Commissions principle objectives with regard to efficiency and fairness, as defined by s172N of the Electricity 1992 are being met by this process.

Question 6.

NWL does not agree that the proposed Base Case, i.e. "*that existing load continues to be met*" is appropriate. Where the existing transmission system has been delivering N-1 security for many years and other stakeholders have substantial investments configured to coordinate with that established service level, then the base case should be that the existing security and service levels be maintained.

Further, as discussed above, NWL believes that there has been significant degradation of supply quality over recent years which have only been permitted so that asset can reach the end of its service life. Short term temporary solutions should not be perpetuated but addressed as part the larger upgrade.

This planning process is orientated at sustaining the existing solution and does not facilitate true modernisation of the grid, with consequent loss of potential innovation and national benefit.

Grid planning assumptions also fail to recognise different consumer needs. In this case, land use and economic activity is changing significantly. Consumer needs have changed significantly with respect to those the existing grid assets were design to meet.

It is absurd that the outcome of increasing demand for electricity is to respond with a decrease in service.

Reducing security levels will make it more difficult for Transpower to meet its contractual obligations, particularly with regard to consumer agreement to maintenance shutdowns. Load diversity results in there being no off-peak season and treating consumers equally is now proving difficult. Good industry practice would dictate that shutdowns be minimised with increased use of "live line" techniques. Night time and weekend maintenance scheduling will become more common. These costs should be included in the base case assessment.

Question 7.

NWL does not consider the GIT approach is appropriate for regional networks as core grid planning assumptions are being applied.

Our concerns with the GIT process are that it targets short term, least cost, minimum service outcomes. It does not take a long term view, and does not take into account the real costs of non supply. Failure to upgrade the supply in a timely manner could also have a major impact on the future economic growth within this region.

The Grid Reliability Standards do not recognise the diversity between load groups. NWL's network is summer peaking as a result of irrigation and dairy load. However its urban load, which represents the majority of its consumers, is winter peaking. Consequently there is no "off-peak" time of the year when maintenance outages can occur that will treat all consumers fairly. Similarly, the timing of shutdowns that are optimal for local needs, may be detrimental to the core grids ability to service load in other regions.

This process does not appear to meet the objectives set out in the GPS, with regard to *"delivery of electricity to all classes of consumers in an efficient, fair, reliable and environmentally sustainable manner"*.

Regional New Zealand deserves a modern, globally competitive, power supply as much as any other part of the nation.

Question 8.

The investment in sub-transmission and distribution networks should be considered when comparing one option against another such that the optimal integrated power supply is developed.

Inadequate power supply will also result in the use of diesel generator sets or diesel pumps. This is not an energy efficient outcome for NZ and needs to be reflected in the forecast.

The opportunity cost of losing economic development for this region should also be included.

Question 9.

In the words of the Government Policy Statement

"Transpower's customers should be permitted some flexibility over standards (which may be higher or lower than the norm) so long as the integrity of the core grid is not compromised" (GPS, 2009, para 75, page 21).

The Commission's assessment of an averaged valuation of lost load is a "one size fits all" which disadvantages regional grid users and the agricultural sector in particular.

NWL considers the Commissions default Value of Lost Load too low for the following reasons:

1. Oamaru's economy and employment is based on secondary sector industrial processing. Indirect costs of outages at these facilities impact more heavily on the businesses up-stream and down stream.
2. Regional economies also have a high component of tourism. This industry has a particularly high VoLL lifting the weighted average.
3. Regions also have higher vulnerabilities to emergency events. For example they do not have strategic fuel reserves. Accordingly they have more dependence on a reliable power supply.
4. Farm production in the region is very dependent on irrigation. The growth in dairying and the processing of dairy products is increasingly energy intensive. The cost of electricity to run a typical spray irrigated dairy farm is up to one fifth of the farms gross income, i.e. one dollar per kilogram of milk solid revenue based on a payout of \$5 per kilogram. And, the production of milk powder consumes around 95% of Fonterra's electricity requirements.
5. This situation has changed significantly since the Commission last assessed VoLL. Significant issues with regard to animal welfare and the environment result from loss of water and loss of power supply. Production is lost over long periods.
6. Farmers size their investment in pumps to run at high levels of utilisation. Water is now such a scarce resource that it is applied as efficiently as possible. Loss of pumping for just a few hours can result in measurable decline in production which may last for weeks.
7. Production per head of population is much higher in regional economies.
8. Regions are more likely to be involved in economic activity that utilises natural resources and minerals and therefore form the backbone of national economic wealth creation.
9. The value of lost load calculation should not be confined to unplanned outages. If the upgrade work is either not approved, or is not completed within the required timeframe, the impact of Transpower's annual maintenance plan must also be considered when calculating the VoLL. The plan for 2009/10 includes 4 continuous outages that vary from 2 to 5 days, and at N security these planned outages will result in a supply outage for some consumers.

NWL suggests a VoLL in the order of \$70,000MWh is more accurate.