

File 5/11C

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Manager, Economics and Approvals
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Upper North Island Reactive Support Investigation Project

Thank you for the opportunity to provide feedback on the UNI Reactive Support Project consultation document dated June 2009. Voltage stability (or instability) in the UNI region is a topic that has been of ongoing concern to Northpower and to end-use customers supplied via the Northpower network, so we welcome this review.

In May 2009, Northpower was given the opportunity to provide some preliminary comments on the "Assumptions, Approach and Options" document prior to general release. We understand that our feedback resulted in some "fine-tuning" of the document. In addition, we received some feedback from Transpower on technical questions that we raised and this has assisted in our understanding of the issues.

Northpower was also involved in sourcing input data for the SKM motors study which is mentioned in this document.

Overall impression of the document

In our opinion, the "Assumptions, Approach and Options" document has been well-structured and presents the issues in a logical manner. The document covers issues relating to dynamic voltage support that have been of significant concern to Northpower and the Large Industrial sites for many years. We acknowledge the time and effort that has gone into researching and preparing this document.

Responses to the questions

In this submission, we will initially address the ten questions posed in the text of the "Assumptions, Approach and Options" document, and then raise some other issues

Question 1: Any other issues or considerations to be incorporated

In our feedback on the preliminary version, we questioned whether any consideration had been given to voltage-balance between phases in the UNI. Some protection devices are programmed

to detect phase imbalance. Historically, there seemed to be some phase-imbalance at times, possibly due to particular grid-configurations. The feedback from Transpower indicated that changes have recently been made at Islington and Haywards to improve phase-balance.

Northpower suggests that this is a topic that could be considered in conjunction with the UNI voltage support study. This would be from the point-of-view of factoring in the capabilities of the various solutions to correct voltage imbalances if they exist (now or in future) rather than committing resources to ascertain whether an imbalance problem actually exists right now.

Question 2: Appropriateness of demand assumptions for this project

The winter forecasts on Table 4.2 in section 4.1.2 appear reasonable. However, we wonder if the extreme summer loadings may converge more quickly towards the winter peaks with the continuing deployment of heat-pumps and air-conditioning in the UNI?

It should also be noted that the winter peaks are presently “flattened” by the application of load-control. Summer peaks are generally more “pure” because the Transmission Pricing Methodology (TPM) only encourages the management of load at the times of peak regional load.

Table 4.1 of section 4.1.1 indicates that power factors are low at Bream Bay and Kensington. Northpower’s pricing signals to end-use customers could see these power factors being lifted to 0.95. However, the impact of the PF=1.0 requirement on the Transmission Agreement (TA) is yet to be finalised – this is covered in a separate comment at the end of this submission.

Question 3: Motor load forecast approach

The nature of the motor-load will change over time due to several factors including:

- Replacement of older motors with modern energy-efficient motors;
- Replacement of older motor-control systems with more sophisticated motor-control and motor-protection systems;
- Deployment of additional variable speed drives (VSD’s) and replacement of older VSD’s with modern VSD’s which have better ride-through capabilities; and
- Replacement of resistance heating in homes by heat-pumps.

These factors are independent of general load-growth.

We understand that Transpower will undertake a sensitivity analysis to ascertain how the possible changes in motor load percentages might affect the timing of the deployment of voltage support solutions.

Question 4: Generation assumptions

We consider the assumptions in section 5 about generation in the UNI are reasonable, subject to the proviso in section 2.1 of the consultation document regarding the Otahuhu B station.

While there are other generation projects proposed within the UNI, none of these appears to be committed to the point where it would be reasonable to factor them into the study. In addition, some of the proposed projects are of an intermittent nature (wind or tidal) and so could not be relied upon to be generating at critical times.

Questions 5 and 6: Long list of options

We agree with Transpower that the “long list” of options of different technologies (or generic options) appears to be relatively “short”. As pointed out by Transpower, there will be a “long list” of potential components (and presumably various locations to deploy the components).

Question 7: Base case

Northpower agrees that the “do nothing” option would be unacceptable and therefore does not represent the Base Case.

Beyond that, the consultation paper does not give much detail of the Base Case except to say that it will be the cheapest of the items on the “long list”.

We agree that the Base Case will need to be developed using the N-1 criteria so that the incremental costs to meet voltage support criteria under N-G-1 can be assessed. Obviously, Northpower’s preference would be for the preferred project to meet voltage support criteria under N-G-1.

Question 8: Commensurate GIT approach

The approach sounds reasonable. Whether it meets the requirements of the GIT is a matter for Transpower to negotiate with the approving authority.

Question 9: Other costs and benefits

Northpower considers it is vital that the study includes ongoing operational & maintenance costs of the various alternative projects. One technology might have a lower initial capital cost than another option, but the ongoing year-by-year costs of that option might be higher.

Question 10: Value of Lost Load (VoLL)

Thank you for specifically mentioning the Marsden Point refinery.

Relevant information on the VoLL for the refinery was tabled at the NAaN conference.

Other matters

Specific comments on two matters follow.

Transient Voltage Performance Criteria in Section 3.1

We agree with the criteria suggested in section 3.1. We would like to add that some on-load tap-changers (OLTC’s) on Distributor networks may be programmed to lock-out if the voltage goes below 0.8pu to guard against incorrect operation in the event of a loss of VT potential. Consequently, OLTC’s may not be of any assistance while the voltage is below 0.8pu.

We would also point out that, even if the voltage remains below 0.8pu for less than 4 seconds, there will be some loss of load because some motors and some older variable speed drives (VSD’s) can not ride-through such “dips”. In section 3.1, Transpower has allowed for 25%-90% of Group 1 motors to trip in the event of a fault that causes a voltage depression.

Requirement for PF = 1.0

As far as we are aware, the Transmission Agreement (TA) still contains a requirement for power-factors of off-take loads at GXP's in the UNI to be maintained at exactly of 1.0 during regional peak load periods from 1 April 2010 onwards. While all parties (including the EC) appear to acknowledge that 1.0 is an impractical target, the issue has not yet been resolved. Unless it is resolved soon, Northpower and other Distributors in the UNI will need to advise Transpower of their non-compliance to this requirement from 1 April 2010 because there is no practical way to achieve power-factors of 1.0 in the timeframe (if at all).

We understand from Transpower that their modelling has indicated that shifting the static power-factor towards unity would have a negligible effect on the need for dynamic support in the UNI. However, it is not clear (to us) how the combined effects of a high static power factor at the connection point at each GXP plus additional dynamic voltage support on the grid itself might affect voltage stability. Surely, at some point, the grid power factor would be leading?

In addition, in order to meet a PF=1.0 criteria, some form of dynamic power-factor correction would be required at the connection point at each GXP, in addition to fixed capacitor banks, in order to respond to changes in load with sufficient speed.

Regards

A handwritten signature in black ink, appearing to read 'MH es.', with a long horizontal line extending from the end of the signature.

Mike Hayes
Network Commercial Manager