Hydro Tasmania
the renewable energy business

10 November 2008

Julian Eggleston
Reliability Panel
PO Box A2449
Sydney NSW 1235

By email: submission@aemc.gov.au

Dear Julian,

Review of Tasmanian Frequency Operating Standards – Draft Determination Supplementary Comments

Primary Concerns:

During the public forum held in Hobart on October 30th a number of claims were made that Hydro Tasmania wishes to comment on. The majority of these are in relation to the ROAM modelling referenced by both AETV and Aurora in their presentations. Hydro Tasmania challenges some of the assumptions used, in particular the following;

- CCGT Dispatch Optimisation
- FCSPS enablement
- Basslink import equation formulation
- Inertia application in constraint equations
- The Gunn's development; and
- FCAS pricing.

These issues are developed in more detail in the attached Supporting Information.

Further, the Roam modelling does not seem to reflect the dynamic nature of the NEMMCO dispatch engine or the limitations of the five minute timeframe that it operates within. No proposal has been made on how the modelled results could be replicated in a market environment.

Drawing these issues together it is Hydro Tasmania's position that the Roam modelling does not accurately represent the benefit cost of tightening the Tasmanian frequency operating standards.

Another issue raised at the forum was the availability of interruptible load. Hydro Tasmania wishes to make it explicitly clear that interruptible loads are not exclusive to the Basslink SPS. They are the subject of purely commercial arrangements negotiated between interested parties and there are no technical or commercial reasons why the same load can not be used by TVPS under separate commercial arrangements..

Finally, Hydro Tasmania would like to make it clear that AETV have not presented any detailed alternative mechanisms to address the impacts of increased raise FCAS requirements. AETV did suggest there may be possible commercial approaches for alleviating the Basslink inefficiency cost, but that they would need to assess the technical and legal capacity to enter into such arrangements. Hydro Tasmania is very doubtful that suitable arrangements based on off market contracts is workable.

Our contact for this review is David Bowker on 03-62305775 who will be happy to clarify any queries which you might have.

Yours sincerely,

Vince Hawksworth
CEO

Supporting Information:

The following comments are referenced to the ROAM report "Tasmanian Frequency Reserve Market Impact Study" which was submitted as part of Alinta's supplementary submission 24 July 2008 to the Reliability Panel.

"3.3) CCGT DISPATCH OPTIMISATION

The larger single CCGT generator will be able to operate for periods of time where there is sufficient FCAS contingency services and/or Basslink can optimally provide FCAS services in place of energy imports (as energy will be provided by the CCGT). In order to determine the likely optimal dispatch behaviour of the larger single generation unit, four scenarios have been assessed in which the larger single unit is constrained to a lower maximum output. Additionally, the CCGT is restricted from providing the R6 FCAS service to avoid self provision. The four cases considered are as follows…"

This statement suggests ROAM modelled the equivalent energy transfer by allowing TVPS to be at full output as often as possible with this energy displacing Basslink imports. Therefore, their model would not demonstrate the issue of high R6 requirement occurring at high imports as their cases would not be required to achieve this scenario, based on our interpretation of the above information. Hydro Tasmania's position has always included the concern about the impact of high R6 when the system inertia is low, which occurs at high imports. Under these conditions Basslink flow is reduced to allow for global FCAS transfer. This results in the net energy increase to Tasmania being substantially less than that calculated for a fully dispatched new TVPS plant.

"3.6.1) FCSPS

The load enabled for FCSPS is not public information and thus the limit imposed on Basslink transfer cannot be accurately determined. For the purposes of the back-cast, ***ROAM assumes that sufficient load or generation is available and armed for FCSPS action to allow Basslink to be dispatched to approximately 422MW import (the average import limit historically imposed by FCSPS in the back-cast timeframe), and full export.*** *This is known to be inconsistent with history, and as such the back-cast will tend to slightly misstate Tasmanian energy prices…"*

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"3.6.2) Contingency Requirements

NEMMCO has provided the basis on which the Tasmanian contingency FCAS requirements are calculated for the purposes of completing this study and ROAM has adapted this to dynamically calculate the contingency response required for Tasmania in the 2-4-C simulation…"

These statements from the ROAM report suggest the following:

Basslink import constraint equation R6 requirements

If ROAM has assumed a fixed amount of FCSPS tripping is available at all times and then applied these into the formulae provided by NEMMCO, the R6 requirements for Basslink import constraint equations will be very optimistic for Basslink imports below the value for which the assumed amount of load tripping is the precise match. In practice, NEMDE calculates the amount of tripping that the SPS will be applying for that dispatch interval regardless of the amount of load tripping available for that dispatch interval. To clarify, if there is, say, 300MW of tripping in total available, Basslink could be permitted (under the particular system conditions prevailing) to import say 420MW. NEMDE then determines the amount of FCAS (R6, etc) to support the contingency. With current parameters applied to the calculator, the R6 as determined varies substantially with a change in frequency standard (47.5 to 48.0). Now, say Basslink import is reduced to 350 MW but we retain 300 MW of tripping as an input to the calculator, it will return a substantially reduced amount to R6. If ROAM has assumed a "flat" amount for tripping for all imports, the calculated R6 will in most cases be totally understated - in particular for the tightened frequency standard.

Generating unit event R6 requirements

When calculating R6 for a generating unit contingency, the amount of load tripping is not relevant. The answers determined by the NEMMCO calculator would not be erroneous. However, as already discussed, if high import cases are excluded, the ROAM modelling would not observe the extreme R6 issues typically evident during low inertia scenarios (350 - 480 MW import with low Tasmania demand) due to abundant "global" FCAS supply. NEMMCO's "Final advice on Tasmanian frequency operating standards" shows extreme R6 values up to 146MW (47.5Hz) and 208MW (48.0Hz) for 144MW contingency and 423MW (47.5Hz) and 576MW (48.0Hz) for 210MW contingency. With little or no Basslink import headroom, such high R6 values will be unachievable without Basslink import being constrained for global FCAS transfer.

Inertia applied in FCAS calculations

ROAM has apparently included TVPS inertia in the FCAS calculations. NEMMCO, in their paper, have discounted the TVPS inertia when considering a trip of TVPS. This has been considered necessary, and differs from current practice, due to the substantial error that would result from retaining inertia of the large tripped machine, which represents over 30% of the total inertia. The increased R6 arising from the reduced inertia is substantial.

FCAS Sources

The facility is assumed to trip the pulp mill load on loss of the cogeneration facility to limit the net FCAS enablement required to levels well below the current largest unit. It is noted that the Gunns cogeneration facility can provide FCAS and/or FCSPS services, although the commercial implications of providing these services are unclear. Information provided by Gunns suggests that the facility may provide 170MW of FCAS Lower services, as this will be readily achievable through controlled generation reduction. FCAS Raise services may also be provided through reduction in internal load of up to 65MW. (Note that 130MW Lower and 50MW Raise service offers have been included in the modelling following consultation with Gunns Limited).

The Gunns project also serves to significantly increase system inertia and thus reduces the requirements for all contingency FCAS services in Tasmania, particularly in low load periods. The contribution that the Gunns facility provides to system inertia has been included in the FCAS contingency requirements calculations based on data provided by HMAC.

ROAM has obviously included the Gunns generation which increases inertia and provides substantial additional FCAS services. At this stage the Gunns development is still uncertain and it is not clear whether the assumed amounts of FCAS will be available and/or bid into the market. The system will need to work without Gunn's contribution, so Hydro Tasmania's position is that Gunn's contribution should be ignored and consequently the ROAM modelling is too optimistic in this respect.

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FCAS pricing

Although nonlinear, these equations also proved suitable to co-optimise the energy target of the Alinta CCGT with fast raise FCAS costs by dynamically constructing a piecewise linear approximation to the relationship between energy dispatch and fast raise FCAS requirements based on demand and previous system inertia.

It is not clear what FCAS bid pricing has been used in the model. The amount of FCAS (supply quantity) versus demand will determine the actual pricing in the market and ROAM's estimates could be very optimistic based upon their assumptions of supply and the FCAS demand scenarios delivered by their model.

"6.1) GENERAL OVERVIEW

...Dispatching a larger single generator of up to 210MW causes significant market distortion, increasing FCAS R6 average price and costs by a factor of up to 30. The significantly increased FCAS contingency requirement causes Basslink to be trapped exporting at high levels to enable R6 import into Tasmania. This in turn leads to very high NSR's on Basslink and furthermore the higher energy production required from

Tasmania generators to support the Basslink export raises Energy prices by 2 to 3 times.

Dispatch of a larger single generation unit however can be managed in the Tasmania system through controlled dispatch at times of low demand or shortages of FCAS raise services provision. *For the period preceding new entry of a second significant thermal generation development, the analysis shows that the Alinta plant may provide the least cost of energy supply for the market at dispatch up to full load at times. Dispatch of up to 190MW is achievable without any self provision of FCAS in excess of 30% of the time. Such a base loaded generation will facilitate local firm supply under critical water shortages, allow building up of storages and also cover possible extreme events such as loss of Basslink for long periods of time."*

Hydro Tasmania does not agree with the statement highlighted above. There is no market mechanism to effectively control dispatch other than being directed by NEMMCO and this will not be appropriate on a day to day basis. Basslink could therefore remain trapped in an export situation and even if some co-optimisation were introduced to control TVPS output, this could take several dispatch intervals (with a 3 MW per minute interval ramp rate). The effect can have substantial market impact.