Gunns LIMITED
ABN 29 009 478 148

Date: 23rd May, 2008

The Secretary,
Reliability Panel
Australian Energy Market Commission
P.O. Box A2449
Sydney South NSW 1235

Ph: (02)82967800
Facsimile: (02) 8296 7899

Email: submissions@aemc.gov.au

Dear Sir,

Reliability Panel - Review of Frequency Operating Standards for Tasmania
Stakeholder comments

Gunns Limited appreciates the opportunity to provide its comments to the Reliability Panel on the important factors that need to be considered in the consultation process of its review of operating frequency standards for Tasmania. In particular, Gunns considers it is in a position to provide comments on key issues identified in this stakeholder comments request, as it is proposing to connect a significant load and a cogeneration facility to the Tasmanian system at George Town. We are interested and affected by the outcome of this process, both as a generator and as a load customer.

1. Background

Gunns Limited (Gunns) is developing a 213MW (at 0.85 pf) cogeneration power station near George Town, Tasmania in conjunction with its Pulp Mill project. The current plan is to connect the power station to Transend's electricity network at 220kV approximately 5 km from George Town Substation.

Gunns requires the power station to be registered by NEMMCO to allow connection and dispatch into the National Electricity Market (NEM).

Under the existing National Electricity Rules (NER), the proposed plant capability does not comply with the NER frequency standards for Tasmania. Gunns strongly supports the review of frequency operating standards for Tasmania to remove barriers to entry and create greater competition for generating capacity in Tasmania.

2. Factors to be considered

In Gunns view there are a number of factors that need to be considered in developing alternative standards. These are:

2.1 Barrier to entry of thermal generators in a competitive market. [anti-competition]

Under the present frequency standard it is very difficult for any generation technology other than hydro units to operate without the potential of significant plant damage and/or destruction. This standard effectively prevents entry of any new large thermal generation in Tasmania, and thus creates an entry barrier for the market and competition. It is important that the technical standards for Tasmania allow competition for the provision of

the services necessary to ensure appropriate quality of supply and reliability in the Tasmanian system.

The current standards ensure that no new large thermal plant can be connected to compete with the hydro plant and existing steam and Gas Turbine technology. At the same time, it is unlikely that any significant new hydro plant will be built, creating a limit to future capacity in the State.

The lack of alternative generation perpetuates the potential for market domination and inefficient energy pricing in Tasmania due to a lack of competition. In our view, the efficient operation of the wholesale market requires adequate competition at a regional level, and this needs to be considered in the determination of an appropriate frequency operating standard.

2.2 Facilitate economic growth in Tasmania [impact on economic growth]

The Gunns Pulp Mill will be a major economic boost to the Tasmanian economy, as identified in the IIS issued in July 2006. The Mill is a $2 billion dollar investment in the state. The pulp mill will consume approximately 1100 GWh per year, and at the same time the cogeneration plant can deliver 480 GWh to the grid. Being a renewable energy source, it will add significantly to renewable targets and carbon reduction schemes. The project has the ability to inject 60 MW of base load to the grid on a sustainable basis, and will therefore provide an additional significant alternative source of energy to Tasmania.

The project business case justification includes benefits from supplying its own generated energy and from supplying excess energy into the state. However the prevailing operating standards prevent connection of such generation into the grid. Changing the operating standards to

accommodate thermal units is important to increase the likelihood of the project delivering the promised benefits to Tasmania.

2.3 Facilitate alternative generation mix to improve reliability during dry spells. [impact on reliability]

The current reliability of energy supply in Tasmania depends on availability of hydro generation and running of Basslink. Considering that environmental hurdles and long lead times are likely to preclude the building of any new hydro schemes, and the susceptibility of the existing hydro capacity to a sustained dry spell (such as that currently being experienced), there is a potential risk that lack of alternative sources of generation will create supply shortages in the future. It is important to ensure a suitable generation mix is available to Tasmania to reduce the risk to future reliability resulting from a sustained dry spell period and Basslink failure or unavailability.

Base load generation in Tasmania is nonexistent due to the present frequency standard as it is not feasible to connect thermal units. The frequency standard review needs to achieve an appropriate balance between technically acceptable standards of reliability and facilitating internationally accepted standard designs of thermal units to be connected in Tasmania. The review should also consider if a permanent lack of thermal units in Tasmania provides a suitable level of reliability of supply. The Gunns' proposal can provide such a diversification in generation provided the frequency standard can accommodate generation plants similar to those in mainland Australia and other developed countries. In our view, consideration of an appropriate generation mix to provide diversification needs to be one of the key factors to be evaluated in developing a new standard.

Experience elsewhere in the world (New Zealand, Ireland, UK) of such reviews indicates that adjustments to standards to accommodate thermal and gas turbine capability or other non-hydro based generators is achievable, even for small systems. The report made available by Alinta further indicates

that there seem to be no significant practical issues that would preclude the achievement of similar results in Tasmania.

2.4 Facilitate alternative generation mix to improve system reliability

The thermal generator that Gunns proposes to connect to the Tasmanian system offers a level of control that, we believe, is not available from other connected generators. This includes:

a. **Extremely fast controlled output reduction: The output of the generator can be reduced by 90% in under 3 seconds.**

b. **Ability to reduce output beyond 100%: Because the generator is used to supply the Pulp Mill as well as the Tasmanian Grid, the effective reduction in output available can be up to190 MW as the plant transfers from a net generator to a load**

c. **Ability to provide fast FCAS: Significant load shedding within the plant can boost the output to the grid by an equivalent amount.**

2.5 Economic factors in Decision Making

There are several economic factors that need to be considered in assessing the benefit of a tighter standard. They are:

a. **Cost of making non hydro generators compliant to the present standard;**
b. **Cost trade-off between additional reserve versus the capital cost of plant compliance with the present standard;**
c. **Cost trade-off between greater competition in the energy price in Tasmania versus a marginal increase in FCAS;**
d. **Reliability benefits.**

The suppliers of non-hydro generators (thermal units) tend to optimise production costs against international standards. In order to gain significant energy conversion efficiency the design limitations will lead to an optimum performance of the units across a tight frequency operating band. The cost to make plants compliant to wider frequency operation under normal events needs to be compared with the cost of tightening the standard. Other similar systems in the world have conducted similar exercises and have concluded that the cost of compliance to wider frequency band operation outweighs the cost of a tighter frequency standard. This exercise needs to be conducted in the development of the standard in Tasmania.

The second factor to be considered is the increased cost of FCAS in operating to a tighter band, against the cost of plant compliance and increased energy cost. The factors that need to be considered are the effect of base loaded fast reserve capability of thermal units against the sluggish response from hydro units. Further, base-loaded higher inertia plants increase the effective short circuit level in Tasmania, particularly under light load conditions. This allows an increased Basslink transfer level, and should be taken into account when evaluating the energy & FCAS economics. In particular, the analysis should consider the committed and potential increase in wind farm generation and the need for base load plant to provide reserve.

Thirdly it is suggested that the forecast combined energy reserve cost, with and without a new standard, is worth evaluating to assess the cost or benefit of the change.

Lastly the development of a new standard should also consider the reliability costs of thermal units (a number of them) for a range of scenarios.

3. Technical Assessment of Frequency Standard

Gunns has seriously investigated its plant's ability to meet the present frequency standard. Information sourced from Toshiba, Siemens, Alstom, GE & Mitsubishi indicates a consistent trend. Although they could comply with the mainland frequency standard, none of them could comply with the Tasmanian standard with a steam-driven machine of the required size.

3.1 Manufacturer supplied data

Thermal units are supplied with a time exposure over the life of the plant at various operational frequencies. The information sourced by Gunns indicates the following time vs. Frequency performance. This is the basis of the supplier's guarantee for their plant for its life time. It is obvious this frequency capability does not comply with the Tasmanian standard, while it is capable of complying with the mainland frequency standard.

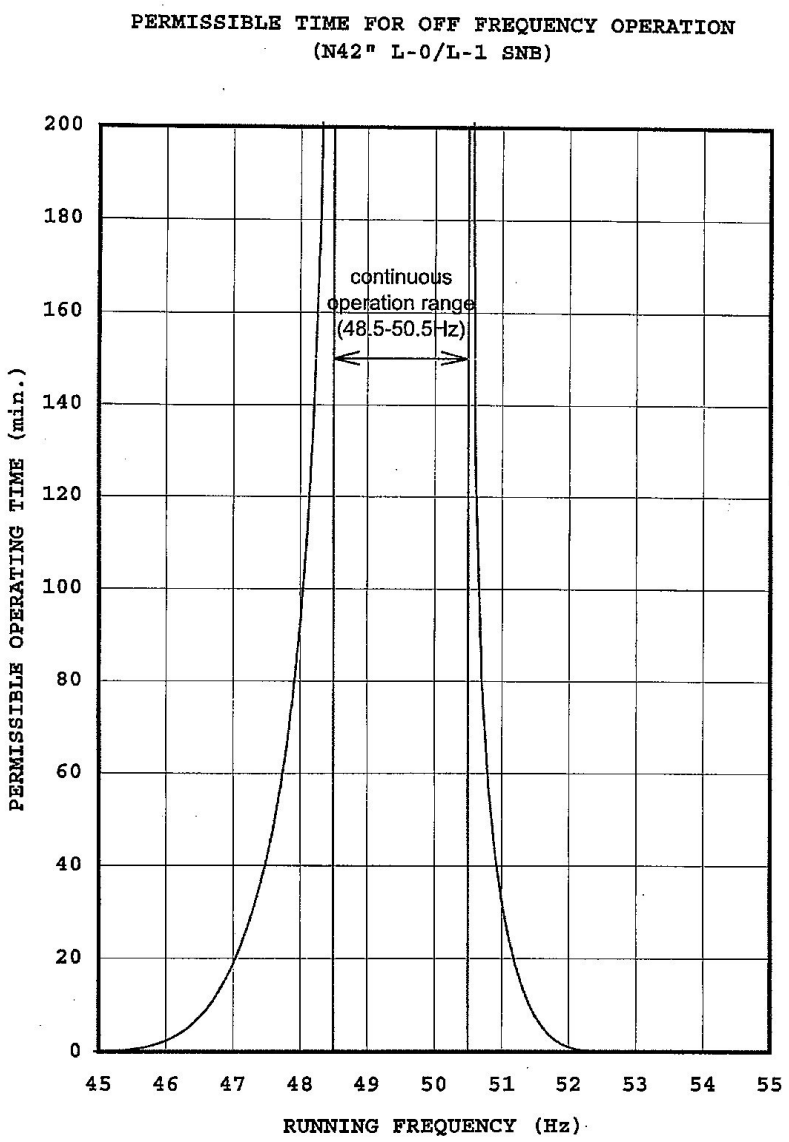

Figure 1 - Frequency envelope of thermal plants from Toshiba

The permissible operating time is the total time that the machine can operate at a particular frequency before a major overhaul or turbine blade failure. It is possible, under the present standard, to destroy the turbine in one event.

Therefore it is essential that the standards review panel sources information from suppliers as input in the development of the standard.

3.2 Historical frequency incident review

In preparation for its supplier discussions, and to assess risks to its plant, Gunns has collected data of post-Basslink operational frequency excursions to analyse potential life of the plant based on the manufacturer's information and an assumption that the system will continue to perform in a consistent manner. The results are shown in the Table below.

Table 1: Projected Generator life based on 12 months Actual System Performance

	Standard	Projected Life (Years)	
		Under Frequency	Over Frequency
1	No frequency protection	7.5	3.7
2[1]	Current Tasmanian Automatic Access >60 Hz – Instantaneous >53 Hz – 120 sec >51 Hz – 600 sec <49 Hz – 600 sec <47.5 Hz – 120 sec <46 Hz – Instantaneous	22.3	3.8
3[1]	Tasmanian Minimum Access >60 Hz – Instantaneous >55 Hz – 9 sec >53 Hz – 120 sec >51 Hz – 600 sec <49 Hz – 600 sec <47.5 Hz – 9 sec <46 Hz – Instantaneous	36.2	3.8
4	Toshiba recommendation >50.5 Hz – 60 sec	61	21.1

[1] Current Tasmanian standards and the Alinta proposal give a normal operating range, when islanded, of 49 – 51 Hz. Gunns proposed generator cannot operate at 51Hz for more than a few minutes – highest sustainable frequency is 50.5Hz, with a total projected life at 51Hz of approximately 30 minutes.

	<48.5 Hz – 60 sec		
5	**Mainland Regions Automatic Access** **>52 Hz – Instantaneous** **>51 Hz – 120 sec** **>50.5 Hz – 600 sec** **<49.5 Hz – 600 sec** **<49 Hz – 120 sec** **<47 Hz – Instantaneous**	**30.5**	**10.9**
6	**Mainland Regions Minimum Access** **>52 Hz – Instantaneous** **>51 Hz – 9 sec** **>50.5 Hz – 600 sec** **<49.5 Hz – 600 sec** **<49 Hz – 120 sec** **<47.5 Hz – 9 sec** **<47 Hz – Instantaneous**	**64.2**	**140.6**
7[1]	**Alinta Proposal** **>52 Hz – Instantaneous** **>51 Hz – 120 sec** **<48.5 Hz – 300 sec** **<48 Hz – 120 sec** **<47 Hz – Instantaneous**	**27.4**	**10.9**
8	**Gunns Proposal** **>51.6 Hz – Instantaneous** **>51.0 Hz – 120 sec** **>50.5 Hz – 600 sec** **<48.5 Hz – 600 sec** **<48 Hz – 120 sec** **<47 Hz – Instantaneous**	**22.3**	**19.4**

From the table it is concluded that compliance to the existing standard will lead to plant life reduction of approximately 80%. It is requested that the standard review takes into account the cost and reliability implications of plant failure risk and extended plant overhaul outages posed by the present standard.

4. Required Frequency Standard for connecting Gunns

Based on the assumption that the settings requested by Gunns are adopted, the required Tasmanian frequency operating standard to enable Cogeneration Plant to be connected in Tasmania is *proposed* in table 2 below.

The table also presents the aspects of the standard which need to be changed (shown highlighted) and the corresponding values from the current standard are shown within brackets.

Condition	Containment	Stabilisation	Recovery
Interconnected Operation			
No contingency or load event	49.75 to 50.25 Hz, 49.85 to 50.15 Hz 99% of the time	49.85 to 50.15 Hz within 5 minutes	
Load event	49.0 to 51.0 Hz	49.85 to 50.15 Hz within 10 minutes	
Generation event	48.0 to 51.0 Hz (47.5 to 51.0 Hz)	49.85 to 50.15 Hz within 5 minutes	
Network event	48.0 to 53.0 Hz (47.5 to 53.0 Hz) With Cogeneration units allowed to trip at 51.6 Hz	49.0 to 51.0 Hz within 1 min	49.85 to 50.15 Hz within 5 min
Separation event	47.5 to 55.0 Hz (46.0 to 55.0 Hz) With Cogeneration units allowed to trip at 51.6 Hz	48.0 to 51.0 Hz (47.5 to 51.0 Hz) within 2 minutes	49.85 to 50.15 Hz within 10 min
Multiple contingency event	47.0 to 55.0 Hz (46.0 to 55.0 Hz) With Cogeneration units allowed to trip at 51.6 Hz	48.0 to 51.0 Hz (47.5 to 51.0 Hz) within 2 min	49.85 to 50.15 Hz within 10 min
Islanded Operation			
No contingency or load event	49.0 to 50.5 Hz (49.0 to 51.0 Hz)		
Load event	48.0 to 51.0 Hz (47.5 to 53.0 Hz)	49.0 to 50.5 Hz (49.0 to 51.0) Hz within 10 min	

Condition	Containment	Stabilisation	Recovery
Generation event	48.0 to 51.0 Hz (47.5 to 53.0 Hz)	49.0 to 50.5 (49.0 to 51.0 Hz) within 5 min	
Network event	47.5 to 52.0 Hz (47.5 to 53.0 Hz) With Cogeneration units allowed to trip at 51.6 Hz	49.0 to 50.5 Hz (49.0 to 51.0 Hz) within 5 min	
Separation event	47.0 to 55.0 Hz (46.0 to 60.0 Hz) With Cogeneration units allowed to trip at 51.6 Hz	48.0 to 51.0 Hz (47.5 to 53.0 Hz) within 2 min	49.0 to 50.5 Hz (49.0 to 51.0 Hz) within 10 min
Multiple contingency event	47.0 to 55.0 Hz (46.0 to 60.0 Hz) With Cogeneration units allowed to trip at 51.6 Hz	48.0 to 51.0 Hz (47.5 to 53.0 Hz) within 2 min	49.0 to 50.5 Hz (49.0 to 51.0 Hz) within 10 min

Table 2 Proposed Frequency standard for connecting Gunns

It can be seen from the above table that, based on the assumption that Gunns adopts the protection settings within the plant capability, the changes in operating frequency band required are mainly in the containment band, with one change in the stabilisation band and in the upper frequency limit with no disturbance when Islanded.

For Network, Separation and multiple contingency events the containment band **is based on the assumption that Cogeneration plant can be added to the OFGSS to trip at 51.6 Hz.** If this is not possible under the NER, setting an upper end to these bands will be very difficult.

5. Summary Conclusions

Gunns appreciates the timeliness of this review and strongly support compressing the frequency standard towards the mainland frequency standard. We recognise that, given the system size in Tasmania, achieving the mainland standards at present is difficult.

We believe, however, that the standard we have proposed is a reasonable step forward but, considering the plant supplier information, that the upper end of the frequency band, as it applies to our generator, needs to be set at 51.6 Hz.

Gunns strongly suggests that a serious evaluation of the overall benefit be conducted. We believe that a pragmatic and practical solution is essential to create the economic benefits of competition, diversity of supply in Tasmania and importantly to allow Gunns' Plant to be connected in Tasmania.

If you have any queries on this submission, Please contact Pieter Blom on (03)6335 5455; (0409)024416 or Greg Stanford on (03)6394 5149; (0419)331948

Yours Sincerely,

Greg Stanford
Project Manager
Gunns Limited