think differently

nova energy

22 July 2014

Submissions
Electricity Authority
PO Box 10041
Wellington 6143

By email: submissions@ea.govt.nz

Dear Sirs

Re: Consultation Paper – Normal frequency asset owner performance obligations

Thank you for the opportunity to provide feedback on the consultation paper on the proposed changes to Part 8 of the Code. The Authority notes that there are significant benefits expected from the proposed code changes. What is not so clear is the potential cost to generators that may be incurred in complying with the new operating requirements.

Adopting generator settings to operate to a dead-band of +/- 0.025 will have a significant cost to some forms of generation, in particular cogeneration plants that are required to maintain steam pressures for industrial processes. Fuel supplies and ambient air temperatures can also mean that open-cycle gas turbines will also require continuous adjustments to meet the tighter limits. Nova understands that dispensations will be available, but there is still no guarantee that these will provide sufficient concessions to reduce the overall costs on generation to less than the market benefits expected from the new settings.

Nova expects that there is an optimal 'dead zone' range; i.e. a point where the benefits of a tighter limit are balanced against the costs to generation of operating to the tighter conditions, and the potential for collective generation hunting against load or frequency changes is minimised. Nevertheless, Nova suspects that the demand-side frequency deviations will always occur at a faster rate that generators can respond, so system frequency oscillations within the normal band will always be present and generation will just continually play catch-up. It is not clear that the Authority has given enough consideration to these details.

Nova therefore suggests that the System Operator be asked to consider pro-forma applications for dispensation, based on the proposed limits, before the Code is amended. In this way the costs might be better recognised and taken into account before the new limits are locked-in.

Our detailed response to the questions in the discussion paper is appended to this letter. We would be pleased to have the opportunity to discuss our views further.

Yours sincerely

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Appendix A Nova Energy submission

Question No.	Question	Response
1	Do you agree that the problems identified with the current generator AOPOs are creating inefficiencies?	No. While there is some ambiguity with the current wording in the Code, the potential existing inefficiencies would appear over-stated as: • The System Operator currently obtains relevant information (e.g. applicable dead-band) via mandatory ACS submission/updates; • The System Operator currently reviews and agrees governor settings with the asset owner whenever relevant changes are made (to governor or ACS); • The proposal would allow a generator to apply for a dispensation negating to a certain extent creating the desired 'level playing field' for all generators, though it is noted that future costs may be imposed on dispensation holders. (Nova supports the dispensation approach where a generator has valid reasons for not complying with the relevant frequency-related AOPO). Further, the System Operator / Authority appear to have taken an overly theoretical, high-level review of issues without consideration of some of the wider potential practical or physical considerations. E.g. Assuming 2,000 MW of compliant generation connected to system with conservative (slow response) collective droop of 7% produces collective 60 MW response to 0.1 Hz system frequency deviation from load change. What will be the collective system response and will it meet desired objective? Or would there be momentary over-correction in system frequency triggering possible generation hunting and exacerbating system frequency fluctuation? The analysis from the TASC-011 has been based on two specific governor models, modelled in apparent isolation to the grid. Rather than undertake robust system-wide studies (where demand dynamics also come into play, requiring an accurate system load model) to assess the complete system impacts, TASC-011 and the Authority propose to implement the Code changes (at considerable implementation cost) and then monitor

Question No.	Question	Response
		system frequency deviation distribution to determine whether changes have been effective and/or efficient. Further robust analysis should be undertaken to assess complete collective system-wide impacts and cost-benefits prior to implementation of the proposal.
2	Do you have any comments relating to the drafting of the proposed Code amendment? Please provide comments and suggested drafting improvements with reference to specific parts, schedules and clauses of the draft proposed Code amendment set out in Appendix A.	Schedule 8.3, 5(1)(c)(i): 0.025 Hz is too narrow. Setting to 0.1 Hz would provide benefits sought by Authority over existing arrangements while reducing implementation costs and risk. Schedule 8.3, 5(1)(c)(iii) and (iv):"as low as is practicable" and "as high as practicable" is still subjective wording. What are the assessment criteria to be applied by System Operator?
3	What comments do you have on the Authority's proposal for an eight- month transition period?	Too short considering: • Likely number of non-compliant generators. • Availability of skilled resources (including OEM) capable of undertaking the governor commissioning tests required following required system enhancements. • OEM lead-times where control system modifications are required. • System operator resource required to review and approve resulting changes, before and after implementation.
4	What costs do you anticipate that affected parties, particularly generators, may face in transitioning to the new regime if the proposed Code amendment were to proceed?	Compliance testing and governor modification/upgrade particularly where OEM or specialist engineering resource required. Potentially in excess of $50,000 per generator where opportunity cost considered.
5	What on-going costs, relative to the status quo, do you anticipate that that affected parties, particularly generators, might incur if the proposed Code amendment was to proceed?	**Steam Turbines.** For most steam turbines the turbine governor can control only one parameter at a time, (e.g. MW or steam backpressure or steam inlet pressure or steam flow rate), If the primary parameter being controlled is not MW, which is often the case with steam turbines running in a cogeneration configuration, then the governor droop needs to have a dead-band wide enough to ensure that the turbine steam flow is not being affected by grid frequency excursions. If the

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		dead-band is not wide enough, there is increased risk of the turbine control becoming unstable or the primary controlled parameter being forced out of specification on a regular basis. **Gas Turbines** Gas turbines typically have a number of different control modes, with the control system selecting the appropriate control mode based on both operator selections and plant parameters. Typically there will be a kW control mode to control turbine output at part load, a Temperature control mode to maintain the turbine hot section within allowable limits, and speed control modes for each of the turbine shafts. The kW control mode would typically have kW droop configured as part of that control mode. The operating mode that allows continuous operation at maximum output, and also has the highest thermal efficiency is Temperature control. However, when operating in Temperature control mode, further increase in output is prevented so there is no droop response to a grid under-frequency event, and to ensure stable operation there will be a small dead-band before the GT will back off load in an over-frequency event. Strict compliance with the proposed rule change would therefore require continuous operation in kW control mode, at a slightly reduced output and reduced efficiency. Operation in kW control mode very close to maximum output potentially exposes the GT hot section to increased thermal cycling at high temperatures, potentially increasing maintenance costs. Excessive wear rates have been observed on some new generation components before a control dead-band was introduced. If left unchecked, the scheduled 50,000 hour component replacement would most likely been required before 5,000 hours operation. Although it isn't clear, the draft rules suggest that generating plant must normally be running at slightly less than full output so that there is some "spinning reserve" available for when frequency dips below 50Hz. If this is the intention it isn't clear how much "spinning reserve" is required.

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6	What comment do you have on the Authority's evaluation of the alternatives and the cost-benefit assessment of the preferred Code amendment (the proposal) set out in sections 5.3 and 5.4?	As per Q1 above, further detailed system modelling is required before a robust cost-benefit assessment can be completed.
7	What comment do you have on the Authority's assessment of the proposed Code amendment against the requirements of section 32(1) of the Act?	No comment
8	What comment do you have on the Authority's assessment of the proposed Code amendment against the Code amendment principles?	No comment