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Electricity Authority

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### **Normal Frequency - Asset Owner Performance Obligations**

Mighty River Power welcomes the opportunity to comment on the proposed amendment to the Electricity Industry Participation Code (EIPC) 2010 to clarify the obligations on generators relating to frequency contribution in the normal band. No part of this submission is confidential.

Mighty River Power supports the Electricity Authority's view on the need to amend the frequency obligations and related technical code in the EIPC. However, we do have a few concerns regarding the framework chosen to introduce the change and wording of the proposed code.

We understand that there are some generators that cannot or may not be able to comply with the proposed changes. Our main concern is that some generators may choose not to comply as there are no on-going costs associated with applying for dispensations. The proposed framework does not provide incentive to meet compliance (provide responsive governors or machines) and at the same time does not penalise non-compliance. This could result in a surge of dispensations which would hinder the potential benefits outlined in the consultation paper.

We provide comments on the specific questions in the consultation paper and the particular clauses of proposed code change as an Appendix. If you have any questions please contact me [varun.nand@mightyriver.co.nz](mailto:varun.nand@mightyriver.co.nz) or 07 858 8438.

Yours faithfully

Varun Nand  
Asset Specialist - Electrical

## Appendix A

### Response to Questions

<b>Q1</b>	<b>Do you agree that the problems identified with the current generator AOPOs are creating inefficiencies?</b>
	Yes. The current wording of the AOPOs does allow for generators to contribute less to frequency correction in the normal band (49.8 – 50.2 Hz) without penalty by deliberately reducing governor sensitivity (by introducing deadbands).
<b>Q2</b>	<b>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.</b>
	Refer to Appendix B.
<b>Q3</b>	<b>What comments do you have on the Authority's proposal for an eight-month transition period?</b>
	<p>This will depend on the assessment of our existing governors to see if they are capable of complying and what action(s) are required to make them compliant. The proposed 8 months may be unrealistic as work involved in carrying out testing, settings changes, and applying for dispensations (as required) will require a lot of resources (internal and external) that other Generators may also require the services of.</p> <p>Mighty River Power proposes a transition period of 3 to 5 years or with the next round of Routine Testing.</p>
<b>Q4</b>	<b>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?</b>
	<ol style="list-style-type: none"><li>1. Consultant fees for settings changes</li><li>2. Testing and modelling</li><li>3. Additional business Interruption</li><li>4. Dispensations (as required)</li></ol>

<p><b>Q5</b></p>	<p><b>What on-going costs, relative to the status quo, do you anticipate that affected parties, particularly generators, might incur if the proposed Code amendment was to proceed?</b></p>
	<ol style="list-style-type: none"> <li>1. Application fee for renewal of dispensations (where dispensations are not granted for the duration of life of plant).</li> <li>2. If geothermal machines are required to back off on power output to provide spare capacity for frequency keeping, costs will be incurred due to: <ol style="list-style-type: none"> <li>a. Loss of generation revenue</li> <li>b. Cost of fuel when vented.</li> <li>c. IPPC (carbon tax) costs due to the need to continuously vent geothermal steam</li> <li>d. Additional wear and tear</li> </ol> </li> </ol>
<p><b>Q6</b></p>	<p><b>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?</b></p>
	<p>No immediate cost implications or on-going cost for non-compliance (or seeking dispensation) could hinder potential benefits of the code change. Parties could seek dispensation where they choose not to comply, as opposed to where they cannot comply. Mighty River Power understands that some fuel types may not be able to comply with some aspects of the proposed code change; however there may be an opportunity for other parties to benefit from this.</p>
<p><b>Q7</b></p>	<p><b>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?</b></p>
	<p>No comment.</p>
<p><b>Q8</b></p>	<p><b>What comment do you have on the Authority’s assessment of the proposed Code amendment against the Code amendment principles?</b></p>
	<p>No comment.</p>

## Appendix B

Clause Reference	Submitter's Comments	Submitter's Alternative Drafting
8.17	Mighty River Power's understanding has been that this has always been the intent of the code.	
	Intent is agreed. However, the statement about making a contribution "to correct frequency" requires some additional criteria. Correct to what? 50Hz?	...contribution to correct frequency to nominal 50Hz while the ...
<b>Schedule 8.3 Technical Code A - Assets 5 (1) c</b>	What is the definition of "equivalent system"? Since all the requirements in this clause are relative to a speed governor, why is this required?	
<b>Schedule 8.3 Technical Code A - Assets 5 (1) c (i)</b>	"provides stable performance" evidenced how? Is the suggested criterion in the Companion Guide for Testing of Assets a good minimum?	...provides stable performance with minimum gain margin of 3dB and minimum phase margin of 25°.
<b>Schedule 8.3 Technical Code A - Assets 5 (1) c (ii)</b>	Is the proposed deadband range intended as a maximum input parameter for the governor only, or as the measured response of the entire unit? The method of measurement encompasses the entire unit? (i.e. System frequency vs. Servomotor movement).	
	Deadband (as measured across the entire unit) is expressed in percentage terms of nominal frequency, not <i>above</i> and <i>below</i> nominal frequency; so should be specified as one figure. e.g. 0.05Hz or 0.1% As an input parameter for the governor, it is often specified in terms of % above, and/or below nominal frequency.	...has a deadband not greater than 0.05Hz or 0.1%.
	If the proposed deadband range is intended to be a maximum as measured across the entire unit (i.e. inherent deadband plus selected value as set in governor), then we believe this requirement is too stringent for every generating unit to comply with.	
<b>Schedule 8.3 Technical</b>	The term "droop" is not specific enough. Does it refer to	

Clause Reference	Submitter's Comments	Submitter's Alternative Drafting
<b>Code A - Assets 5 (1) c (iii)</b>	<p>Permanent Droop, which is an adjustable parameter on the hydro governor? Or, is it referring to Speed Regulation (also commonly called "Power Droop") which is not directly adjustable, but is proportionately less than the Permanent Droop setting. From elsewhere in the consultation paper (Page 18 of 39) it seems that what is being discussed is Power Droop, however on that page it commences discussion with describing "Permanent Droop".</p> <p>For consistent definitions, it is recommended that they should be drawn from IEEE or ASME industry standard documents (e.g. IEEE Std 125; ASME PTC 29).</p>	
	<p>Also, the statement "set as low as practical" raises a question about who decides what is practical, and for whose benefit. The limit of 7% implies that any setting between 0 and 7% is compliant.</p>	
	<p>There is some discussion in the paper (page 18 of 39, last paragraph) that implies if this (Permanent or Power Droop) setting is set low, the unit will be more responsive. Although, it has some effect on how far (the extent) a unit will change output to in the fullness of time, it has little to do with how responsively it will happen. This is much more dependent on the parameters that affect transient behaviour like the PID (Proportional, Integral, Derivative) gain settings; or Temporary Droop and Dashpot Time Constant on a mechanical governor.</p>	
	<p>Therefore, the wording should relate to whichever droop is selected. Permanent Droop will always be proportionally more than Speed Regulation. Therefore, if the proposed maximum 7% refers to Power Droop, the maximum Permanent Droop could - stay at 10%, as it was in previous versions of the</p>	<p>...has a permanent droop setting between 0 - 10%.</p>

Clause Reference	Submitter's Comments	Submitter's Alternative Drafting
	EGRs or Code.	
<b>Schedule 8.3 Technical Code A - Assets 5 (1) c (iv)</b>	<p>Old mechanical governors could well have been only PI controllers, but modern digital electronic governors are at least PID, if not PIDD, controllers. Therefore, some mention of Derivative gain should be included along with the Proportional and Integral Gains.</p> <p>Taking into consideration the earlier requirement in 5 (1) c (i) about stable performance, there needs to be some qualification criteria around the statement "set as high as practical". Stable performance can range from just stable to very stable. So what is the acceptable minimum margin of stability (phase and gain)?</p>	
<b>Schedule 8.3 Technical Code A - Assets 5 (1) c (v)</b>	<p>Having the freedom to add more deadband selectively in the controller (up to a maximum value) in addition to whatever inherent deadband there already is in the entire control (governor to wicket gates) will exacerbate non-linearities.</p>	
<b>Schedule 8.3 Technical Code A - Assets 5 (1) d</b>	<p>To be able to run a unit under governor control and have it steady enough to synchronise to the system, requires that governor parameters are already adjusted to values that will give the unit adequate stability at speed-no-load. It is very likely that these (off-line) parameter settings will also give adequate stability when the unit is first synchronised and paralleled to the grid. However, subsequent stability (on load) testing will confirm whether the on-line settings can be relaxed a little to yield stable, but more responsive, behaviour.</p> <p>To cater for some of the older mechanical governor plant, there are more parameters that could be included in the list and "droop" should be more specifically defined.</p>	<p>...including, but not limited to Permanent Droop, Temporary Droop, Dashpot Time Constant, Proportional Gain, Integral Gain, Derivative Gain, etc., prior to:</p>