

Summary of submissions - Generation fault ride through

Introduction

This summary of submissions contains the following sections:

- submissions received
- overall impression of submissions
- table summaries of responses to questions.

Submissions received

The Electricity Authority (Authority) received submissions from the following eight parties:

Submitter	Category
Contact	Generating company and retailer
Genesis	Generating company and retailer
Meridian	Generating company and retailer
Mighty River Power	Generating company and retailer
Nova Energy	Generating company and retailer
New Zealand Wind Energy Association (NZWEA)	Wind energy association
Transpower	Grid owner and system operator
Trustpower	Generating company and retailer

Overall impression of submissions

Contact, Genesis, Meridian, Mighty River Power, Nova and Trustpower agreed that the issues identified by the Authority are worthy of attention.

Contact, Genesis, Meridian, Mighty River Power and Nova supported the Authority's objective to address the increasing risk of cascade failure by adding dynamic voltage performance obligations to the Code. Only Trustpower did not agree with the Authority's objective.

Meridian and Trustpower did not support the Authority's proposed fault ride through standards.

Contact, Nova and Trustpower were opposed to the application of the proposed fault ride through standards to existing assets. These submitters expressed concerns that:

- (a) because the fault ride through standards were not considered in the design of existing generating stations, these assets may not be able to provide the required capability
- (b) the cost of upgrading existing generating assets to provide the required capability may be excessive

- (c) there may be an ongoing need for existing synchronous generators to demonstrate compliance through analysis and modelling work.

Meridian considered the over voltage aspects of the fault ride through standards to be more onerous than would reasonably be required to maintain system stability. In Meridian's view, the standards should not be based on a worst-case scenario HVDC bipole trip.

Meridian, Mighty River Power and Trustpower questioned whether the over voltage ride through requirements could be mitigated by other solutions such as:

- (a) the grid owner installing additional reactive plant at Haywards and Benmore
- (b) setting lower fault ride through standards and covering the residual bipole trip risks through alternative means such as extended reserve.

A number of submitters commented that the cost benefit analysis did not take into account the cost of carrying out initial compliance assessments for existing assets and any ongoing monitoring and testing requirements.

Mighty River Power commented that a transitional period would be required to allow asset owners sufficient time to undertake work to assess their portfolio of generating plant for compliance with the fault ride through standards.

Submitters made a number of suggested improvements to the wording of the proposed Code amendment. The Authority has considered these suggestions and made several changes to the wording of the proposed Code amendment as appropriate.

Table summaries of responses to questions

The tables that follow contain submitters' comments and the Authority's responses to:

- general comments
- each of the seven questions posed in the August 2015 consultation paper.

Decision paper

The Authority's decision paper for this Code amendment is available at:

<http://www.ea.govt.nz/development/work-programme/risk-management/fault-ride-through-project/>

General comments

Submitter	Submitter's comment	Authority's comment
Contact	Contact does not believe the Code proposal should be applied retrospectively i.e. to existing generation. This is because the voltage fault ride through criteria was not available at the time of the design and commissioning of existing stations, and therefore no provision was made to meet these criteria.	The proposal is not intended to apply retrospectively (in time). The proposal is intended to apply to all generating stations that export more than 30 MW from the effective date of any Code amendment brought into force. Contact's suggestion would exempt exacerbators who own existing generators from paying for the costs they cause to other participants.
Contact	With respect to the cost-benefit analysis, it is unclear from the consultation paper whether the cost to upgrade existing plant and the security assessments for existing plant or compliance assessments for new plant have been considered in the analysis, and where the responsibility to do this assessment would lie. Accurate modelling of generating units to determine performance during under and overvoltage events is a costly, complex and specialised activity.	The dispensation provisions in the Code allow plant owners to avoid uneconomic upgrades to existing plant. Such costs therefore are not an input to the cost benefit analysis. Compliance assessment for new plant is the responsibility of the plant owner, as it is in respect of other Code related performance requirements. The cost of compliance is factored into the cost benefit analysis.

Submitter	Submitter's comment	Authority's comment
Contact	A recommendation may be that the Electricity Authority and the system operator work with generators to model a representative sample of units to determine the costs, effectiveness, standards and guidance for modelling generator voltage fault ride through performance prior to implementing the proposed code amendments. No mention has been made of ongoing costs for monitoring compliance as additional monitoring equipment will be required.	This suggestion concerns an implementation phase that, if adopted, would follow the introduction of Code amendments, if made. As data on additional monitoring costs is not available, such costs are grouped in the allowance made in the cost benefit analysis for compliance with the proposed standards.
Contact	A suggestion may be that the Electricity Authority convenes an industry technical workshop for this consultation similar to that of the Normal Frequency Response workshop to facilitate responses from industry experts on the proposed criteria.	Submitters have already provided comprehensive feedback on the technical aspects of the proposed standards in the two rounds of consultation completed.
Genesis	Genesis notes that the new generation fault ride through provisions are intended to apply to both new and existing generating stations, however, it is unclear if each generator will need to demonstrate compliance of existing synchronous Generators with the new requirements to determine whether or not a dispensation will be required. If the generator will need to demonstrate compliance, this will require costly analysis and modelling. We are also concerned the Authority has not given adequate consideration of ongoing compliance costs to demonstrate compliance or request dispensations in the future.	The system operator would determine the least cost way of demonstrating compliance. The system operator is likely to focus on generating plant that has a history of tripping during transmission faults.
Genesis	The paper states that any requests for dispensations from the fault ride through standards would <i>likely be granted</i> by the system operator. This does not provide	The system operator is obliged to grant a dispensation where its

Submitter	Submitter's comment	Authority's comment
	sufficient certainty for existing generating stations. The implications of not granting a dispensation for our current generating stations are significant. We would be unable to generate into the system until new equipment is installed and/or compliance is gained for the current equipment. It will be more certain if the presumption in the Code was reversed for existing generators meaning existing generators will be granted a dispensation unless there was an explicit reason not to do so. This will reduce both compliance and administration costs around the implementation of the new standards.	principal performance obligations are not at risk as a result of the dispensation. The system operator has no particular reason to decline dispensations for existing generating stations because it already dispatches these stations (unless it becomes aware of new capability information not previously disclosed by generators).
Meridian	Meridian agrees there is benefit in specifying a fault ride through standard in the Electricity Industry Participation Code. This will provide a clear direction for future generation investment and assist with maintaining a stable power system. We note that adopting such a standard is common internationally.	Noted.
Meridian	Meridian supports determining compliance with an fault ride through standard through using power system analysis, as described in clause 8.25A(3) of the proposed Code amendment. This is an important improvement from the February 2011 proposal as it is the only practical way to determine compliance.	Noted.
Meridian	Meridian considers the proposed overvoltage aspects of the fault ride through standard are more onerous than is reasonably required to maintain system stability, and that this will ultimately result in unnecessary costs for the consumer. It is not clear to us what the rationale is for the fault ride through standard proposed. The significant changes to overvoltage requirements for the North Island and South Island "no-trip zone" make a previously acceptable requirement unacceptable.	The system operator's studies modelled a bipole loss of 1200 MW, but the HDVC link has an ultimate rating of 1400 MW, subject to the addition of another undersea cable. The proposed standard allows

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	The [system operator's] report appears to model the voltage impacts of a 'worst case scenario' HVDC bi-pole trip, but then adopt a standard which goes well beyond what is required to manage this scenario (e.g. as illustrated in Figures 4 and 5 of the SO report). The resulting proposal is one of the most onerous fault ride through standards in the world.	for the ultimate link rating and provides the grid owner with operational flexibility to make use of the full HVDC transient over voltage criteria under different operating conditions.
Meridian	Such a standard will impose additional costs on generators and ultimately consumers while providing little additional security benefit. We believe the standard proposed could even result in synchronous plant being non-compliant (our understanding of the proposal is that it will require all synchronous generation plant to undergo re-assessment, which will be costly in itself).	The proposed standard does not require all synchronous generation plant to undergo re-assessment. Any synchronous plant close to Haywards and Benmore that has a risk of tripping as a result of a bipole trip should be reassessed under the current Code: Technical Code A of Schedule 8.3, which requires generation to have voltage control systems to avoid cascade failure during voltage excursions.
Meridian	There is therefore a risk that turbine manufacturers will not alter the specifications of their plant to comply with New Zealand's proposed standard. This would limit the availability and choice of wind turbines for installation in New Zealand, and has the potential to significantly impact the economics of new wind farm investment. Where manufacturers are able to comply with the new standard, Meridian	The net present value (NPV) calculations based on Meridian's high end estimate of increased turbine costs are: Scenario A: \$3.6 m Scenario B: (\$1.9 m)

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	considers this will substantially increase capital costs. We consider the 1.25% increase in capital costs estimated by the Authority is low. We believe 2-3% is a more realistic estimate.	Scenario C: \$10.7 m. Only scenario B (moderate growth, diversified across NZ) shows a negative NPV. If the long run marginal cost of wind generation falls below the estimated \$3 per MW, the NPV calculations would improve.
Meridian	Meridian also considers the Authority's assumption that the increased cost will ramp down to zero over 10 years to be unrealistic given, as noted above, the New Zealand market represents a very small component of the global market. There is a risk that wind turbine manufacturers will not adjust the fault ride through capability of their equipment in response to New Zealand requirements, meaning there will be a significant and ongoing additional cost for wind farm construction.	Plant owners have the option to achieve fault ride through capability by installing centralised reactive support equipment, if capability is not available or able to be provided economically in individual generating units.
Meridian	Setting a fault ride through standard has important ongoing implications for system security and costs. It is critical that such a standard is well considered, with proper regard for the costs and benefits. Meridian considers such a standard needs to be set through a process that takes account of the real-world risks (rather than a hypothetical worst-case scenario), considers the full suite of options available to mitigate this risk, and selects an option or combination of options that address this risk at the lowest overall cost. Possible additional options to consider include:	Very few other grids are subjected to the over voltage levels that can occur at Haywards and Benmore. The Authority considered using standards from other grid codes but no other standards cover the over voltage conditions that arise on our grid. Any grid investment solution involving

Submitter	Submitter's comment	Authority's comment
	• A grid investment solution such as installing additional dynamic reactive support at Haywards or Benmore. This would assist the power system in dealing with overvoltage events arising from an HVDC bi-pole trip, and may result in a lower overall cost to the consumer than imposing ongoing requirements on wind farms. • Setting an fault ride through standard based on those used in major international markets (likely to be used by turbine manufacturers) and covering any residual system risk through alternative means e.g. extended reserve.	the addition of dynamic reactive support plant would require Transpower to make high capital investments at Haywards and Benmore. The level of wind generation to plan for would be uncertain and the net benefits would be lower than the fault ride through standards. Setting lower fault ride through standards and covering residual generator trip risks with extended reserve would increase the requirement for extended reserve and the costs incurred by reserve providers (network owners and grid connected loads). The additional costs would not be paid by the generators who cause the costs. The incentives on generators to make efficient decisions would be weakened with an increased risk of higher costs being passed on to consumers.
Meridian	Meridian encourages the Authority to reconsider the current proposal. Meridian thinks	The Authority developed the proposed

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	an appropriate standard should be developed through a collaborative process between the Authority, the system operator, the Grid Owner, affected generators and turbine manufacturers. This will ensure that the full costs and benefits of any new fault ride through standard are properly considered. We have not proposed a fully developed alternative at this stage as the six-week consultation timeframe is insufficient to properly consider this complex and important technical issue.	fault ride through standards with input from the system operator, the grid owner, generators, and a wind turbine manufacturer.
Mighty River Power	The proposed Code change does not contain a transitional date. The executive summary states that existing plants are excluded from the proposed Code amendment but the Code amendment refers to all generating stations. If the Code amendment only applies to new plants what is the definition of a new plant?	The Authority agrees that the proposed Code amendment should allow asset owners a reasonable period of time to manage the process of assessing their plant, seeking dispensations or making upgrade decisions. Clause 8.25 has been amended accordingly.
Mighty River Power	The executive summary states that existing plants are excluded from the proposed Code amendment but the Code amendment refers to all generating stations. If the Code amendment only applies to new plants what is the definition of a new plant?	The proposal is for the fault ride through standards to apply to all generating stations that export more than 30 MW. The executive summary inadvertently did not reflect this application.
Mighty River Power	The NI/SI envelope compliance is likely to be achieved by monitoring voltage at the generator terminal and ensuring protection and control follows the same with plant capability. It is unclear how generating units away from HAY/BEN are likely to comply for the HVDC envelope as the voltages at the generator terminal are likely to be	It is necessary to calculate the voltages using power systems analysis.

Submitter	Submitter's comment	Authority's comment
	unknown.	
Mighty River Power	It is unclear whether other issues such as any conflict with frequency ride-through are consistent with proposed voltage ride-through in terms of automatic voltage regulator capabilities.	The system operator would address any plant specific issues when it assesses plant performance.
Mighty River Power	The new fault ride through curves are slightly different to the previous consultation in Feb 2011. Where have these curves been published before and what are the assumptions for the new curves including the HVDC one?	Only the transient over voltage component of the standards is different. The system operator explained the changes and modelling assumptions in its supplementary revision report in appendix F to the August 2015 consultation paper.
Mighty River Power	The main issue we would like to see addressed is for the Authority to provide further clarity as to how the criteria are impacted by the improved reserve sharing through the HVDC and commissioning of new geothermal plant in recent years. It is likely that the envelopes need to be reassessed to ensure accuracy.	The criteria are not affected by reserve sharing on the HVDC link or by commissioning of new geothermal plant. The over voltage standard is based on a bipole trip and the under voltage standard is based on major transmission faults. Reserve sharing has no effect on under or over voltages that can occur on the system.
Mighty River Power	The new criteria, which do not include dispensation cost allocation, are likely to increase the burden on performing synchronous plant while non-compliant plant may still get a dispensation without meeting their share of the overall system cost. We consider that a cost allocation mechanism needs to be considered in conjunction with this Code	The allocation of costs to dispensation holders is to be considered in a parallel project to review the instantaneous reserve cost allocation.

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	change.	In the short term, the allocation of instantaneous reserve costs to synchronous plant would not increase because of any dispensations granted – the system operator already procures reserve to cover the risk of North island wind farms disconnecting because of a bipole trip.
Mighty River Power	The new HVDC envelope (Figure 8.3, Page 35) contains no performance standard criteria for HAY/BEN. Transpower also needs to explore other options for controlling over voltage issues for the loss of HVDC. In our understanding those over-voltage issues are related to reactive support equipment at HAY/BEN for the HVDC.	Transpower has its own transient over voltage criteria for Haywards and Benmore that is identical to Figure 8.3. Refer to the response above to Meridian's comment about grid investment options.
Mighty River Power	MRP also considers the cost benefit analysis for the proposed Code change could be improved. We would like to see analysis of how much benefit is likely to be achieved as a result of the proposed Code change and a full quantification of the costs of the change. It is unclear whether the proposed Code change covers all generating plant or just new ones (See Executive Summary Page 2).	Section 4.3 in the August 2015 consultation paper provides analysis of the costs and benefits of the Authority's proposal.
Nova	Nova supports the objective 'to ensure that the system operator can continue to meet its principle performance objectives to dispatch assets made available in a manner which	Noted.

Submitter	Submitter's comment	Authority's comment
	avoids the cascade failure of assets arising from voltage excursions during transmission faults' . Nova also supports introducing fault ride-through standards for all new generation to ensure that such risks stay within acceptable bounds.	
Nova	Nova does not believe there is a sufficient case to support applying new standards on existing generators, even if it is assumed that those generators can seek, and receive dispensations from the system operator.	Existing generators already impose instantaneous reserve availability costs on others. The proposed standards should apply equally to both existing and new generating plant to ensure that these costs are correctly allocated to the parties that cause them.
Nova	The consultation paper proposes that generators that cannot comply with the new requirements should pay a share of instantaneous reserve costs. Nova favours market like approaches where those that create a risk should bear the cost of mitigating the risk. However, Nova believes it is inappropriate for the Authority to retrospectively impose costs on generators that fully complied with the Code requirements at the time of their construction, unless there is clear evidence of market failure or significant overall benefit in doing so.	Noted. The Authority does not propose to allocate costs retrospectively to any generating plant. The intent of the proposal is to apply the standards after an effective date to existing generators so that any costs caused in the future by existing generators can be correctly allocated to existing generators.
Nova	Proposing a Code change that requires generators to seek dispensations from the system operator for existing plant is an unsatisfactory and clumsy mechanism. The	Owners of existing generating plant able to meet the proposed fault ride

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	process of gaining a dispensation can be expensive, and offers no certainty around the conditions to be applied in individual circumstances. As stated in the Discussion Paper, dispensations 'would likely be granted by the system operator'; which begs the question around the process if a dispensation is not granted, or if conditions with the dispensation are considered excessive by the applicant.	through standards would not need to apply for dispensations. Applying the proposed standards to both new and existing plant would ensure that all parties pay for the costs they cause. Applicants may appeal a decision of the system operator in relation to a dispensation to the Rulings Panel.
Nova	The system operator has determined a new set of voltage parameters against which generators will be either expected to comply with, or seek a dispensation. It is not clear what assumptions the system operator made around the availability of synchronous generation when determining those parameters, but in any case it would seem reasonable to either: • set a different requirement for existing generation versus new generation, rather than now applying a new standard to all generation or • not impose a new standard on existing generation at all other than meeting or improving on their existing capability.	All generators connected to the grid, whether existing or new, face the same transient voltage disturbances. The effect of applying different standards to different classes of plant would be to allow some plant owners to avoid paying for costs they cause.
Nova	As Nova submitted on the 2011 Consultation; requirements around generation fault ride-through are a significant issue for co-generation plants which are closely tied to	Plant owners can seek a dispensation for plant that cannot meet the

Submitter	Submitter's comment	Authority's comment
	major industrial plants. In many cases the co-gen plants are set to isolate from the grid under certain conditions in order to stay operational. While they can provide some instantaneous voltage support, they cannot necessarily fully meet the proposed new Code requirement.	standards.
Nova	Nova believes the new Code should be applied to new generation only. It is not clear that charging existing exacerbators will provide a net market benefit. The advantages of applying a new charge to existing generators, at the cost of requiring those existing generators to seek a dispensation from the new Code requirements, has little merit.	Both existing and new exacerbators that cause costs should pay those costs. This would ensure that all plant competes on an equal basis.
NZWEA	Singling out wind as a "problem" in the electricity sector demonstrates a lack of understanding of wind turbine technology and the broader electricity system. It indicates that the authors of the report are poorly informed and not up to date.	The proposed fault ride through standards are intended to apply equally to all generating stations that export more than 30 MW. The Authority accepts that the standards affect wind generation more than synchronous generation but this is only because wind generation has a lesser fault ride through capability.
NZWEA	The Wind Grid Integration Project set the wind industry and Transpower/the system operator on a path of cooperation and dialogue on the electrical design of windfarms. The proposals set out in this document appear to set the electricity sector back to pre the Wind Grid Integration Project.	The Wind Generation Investigation Project itself recommended that dynamic fault ride through requirements for generators be incorporated in the Code (see section 2.2 in the February 2011 consultation

Submitter	Submitter's comment	Authority's comment
		paper).
Trustpower	In the Consultation Paper the Authority identifies a trip of the HVDC link as one of the major risks impacting grid security. While the work may have been undertaken, the Consultation Paper does not indicate that other alternatives, such as but not limited to, the addition of further reactive plant, or constraints etc, to mitigate the impact of a HVDC link trip have been considered.	Refer to the response above to Meridian's comment about grid investment options.
Trustpower	The Authority now proposes the retrofitting of equipment/functionality to existing assets to achieve a higher standard of compliance, even though little if any analysis has been provided to show how the existing equipment will actually perform. This would suggest the retrofitting of additional equipment/functionality to achieve a higher level of compliance is premature and unwarranted at this stage.	The Code includes an existing obligation for grid generators to support the system operator in avoiding cascade failure during voltage excursions. The standard proposed provides a definitive performance criteria for generators in meeting the existing obligation. Any decisions to retrofit equipment lie with plant owners, this is not the role of the Authority.
Trustpower	Trustpower believes that such retrospective application would not necessarily be consistent with best-practice regulatory change management principles. It could increase uncertainty for prospective investors and suppliers about potential (but currently unknown) changes that may impact them in future, and/or introduce a tendency to gold-plate new assets. Both effects would increase costs to consumers in the long-run.	Refer to the response above to Nova's comment about retrospective application.

Submitter	Submitter's comment	Authority's comment
Trustpower	Should the Authority decide to implement Code amendments, Trustpower strongly urges the Authority to consider standards that are already in existence in other jurisdictions, thereby not inhibiting or deterring suppliers from competing in a 'unique' New Zealand market.	Standards already in existence in other jurisdictions are customised to grids in other countries that are very different to the grid in New Zealand.

Q1.Do you agree the issues the Authority has identified are worthy of attention?

Submitter	Submitter's comment	Response
Contact	Yes. Contact would like to see some analysis on actual events to determine what level of risk the system is currently facing. Given the flattening of growth predicted over the next 10 years and the risk around a shutdown at Tiwai we would expect the number of new wind farms being built and connected to be much lower than what has been consented.	Noted. The suggested additional analysis has no effect on the design of the proposed fault ride through standards.
Genesis	Yes.	Noted.
Meridian	Meridian agrees there is benefit in specifying a fault ride through standard in the Code. We do not support the fault ride through standard the Authority has proposed.	Noted. Meridian's reasons for not supporting the standards are covered in the general comments section.
Mighty River Power	Yes, however wind generation technologies are getting better all the time.	Noted.
Nova Energy	Yes, it is appropriate to ensure that the costs of reserve to cover significant voltage excursions are covered in a manner that provides appropriate market signals and that these are well signalled before the next round of generation build.	Noted.
NZWEA	Fault ride through is an issue worthy of attention in any electricity system. Singling out wind turbines makes no sense, therefore it is questionable whether the Authority has identified an issue worthy of attention in terms of how the Authority has framed the problem.	The proposed standards are intended to apply equally to all generating stations that export more than 30 MW of generation.
Transpower	No comment.	-
Trustpower	While Trustpower acknowledges that the Authority's intent is reasonable, there does seem to be unreasonable focus on wind generation along with a change in direction from previous work. In the Consultation Paper the Authority has identified two major types of faults as having	Any synchronous generation not able to meet the standards would be treated the same way as wind generation.

Submitter	Submitter's comment	Response
	the greatest effect on the power system – 220kV transmission faults, and HVDC trips. The paper then goes onto implicate nonsynchronous generation, namely wind generators, for degrading grid security. This approach seems unfair and somewhat biased. Much of the thermal plant (~2000MW) and their auxiliary system plant may be susceptible to voltage perturbations that may result in plant tripping from under or over voltage, however this is not identified or mentioned anywhere in the consultation. The Authority assumes that this plant will be able to meet the proposed requirements at “no additional cost”. Within the Consultation Paper’s introduction, the Authority cites lack of information regarding “appropriate performance standards”, yet all asset owners are required to submit asset capability statements. The key change of approach from the 2011 proposal (which required that any Code changes be applicable to new plant only), to the 2015 stance of retrospective Code requirements, is unacceptable. To attempt to back-fit requirements will likely incur significant cost to asset owners, and hence consumers, providing little, if any, overall benefit in terms of grid security.	The Authority did not comment on the fault ride through capability of synchronous thermal plant in any detail. However, the proposal applies fault ride through standards to all classes of generation, ie, there is no bias against wind generation. The current asset capability statement requires generators to provide voltage control information but not transient voltage performance information. The proposed standards would not apply retrospectively, but would apply to all generating stations with an injection of greater than 30 MW. Owners would have the option to upgrade plant, if economic, or obtain a dispensation and pay for the cost of the dispensation.

Q2.Do you agree with the objectives of the proposed amendment? If not, why not?

Submitter	Submitter's comment	Response
Contact	Yes. Contact does not however support the inclusion of existing stations in the proposed Code amendment. As noted above we would like to know what the level of risk is at present, based on past system events.	Noted. Refer also to the response to Contact's comment for Q1.
Genesis	Yes.	Noted.
Meridian	Meridian agrees with the objectives of the proposal. We do not support the fault ride through standard the Authority has proposed.	Noted. Meridian's views on the standards are covered in the general comments section.
Mighty River Power	Yes.	Noted.
Nova Energy	Yes. The objectives are consistent with good industry practise.	Noted.
NZWEA	Of course an objective of operating any power system is to ensure a cascading failure does not occur. The question is how to get to the right outcome. The proposed approach has a high chance of getting to the wrong outcome, i.e. one that costs much more than it should.	NZWEA gives no supporting reasons for the position it has taken.
Transpower	No comment.	-
Trustpower	No. Trustpower doesn't agree with the amendments as proposed as it is not clear to us that items such as, but not limited to, those below have been adequately considered in the assessment of the problem:	The Authority based the proposal on transmission fault analysis on the North and South Island power systems. The fault ride through

Submitter	Submitter's comment	Response
	• The fault ride through capability of existing (and proposed) windfarms does not appear to have been acknowledged, • The reasonableness of the pre-fault load flow scenarios appears extreme, • The response and impact of load and distribution systems has not been clearly articulated. The objectives fails to recognise the causers of large events on the system and address remedies in these areas first. However we do recognise the need for fault ride through requirements as part of a modern grid code, and would support the adoption of a reasonable internationally available standard for new generation plant.	capability of wind farms and other forms of existing generation have no influence on the proposal. The pre-fault load scenarios are based on Transpower's operating limits for the a.c. and d.c. transmission system. The response and impact of load and distribution systems, other than the modelling of motor load, does not influence the proposed standards. Refer to the response to Meridian's comments on grid upgrade solutions in the general comments section.

Q3.Do you agree the benefits of the proposed amendment outweigh its costs?

Submitter	Submitter's comment	Response
Contact	Contact somewhat agree. Contact's view is that the most likely scenario is B with the recent changes to the HAMI charges and the proposals in the new TPM relating to HVDC charges. It is questionable (please see our response to question one above) as to whether the probability of exceeding the threshold in scenario B will occur in the next 10 years. Contact feels that the benefit would be minimal and it is unclear whether the cost to upgrade existing plant and compliance assessment costs have been considered as these are largely unknown at this stage. No mention has been made of ongoing costs for monitoring compliance as additional monitoring equipment will be required.	The cost benefit analysis takes a view on the growth in wind generation through to 2030. Any growth in wind capacity beyond 2030 would increase the net benefits of the proposal. The dispensation provisions in the Code allow plant owners to avoid uneconomic upgrades to existing plant. Such costs therefore are not an input to the cost-benefit analysis.
Genesis	Yes, in principle, for the industry as a whole. The analysis is high level but, based on the assumptions used, Genesis Energy agrees there is likely to be an overall net benefit.	Noted.
Meridian	No. Meridian considers the costs of the proposal will outweigh the benefits, given the particular fault ride through standard proposed. The assumption that wind turbine costs will increase by 1.25% of installed capital costs to meet the fault ride through standard is overly conservative. We consider the cost impact is more likely in the range of 2-3%. Meridian does not agree with the assumption that this additional cost will ramp down to 0% over 10 years. Meridian considers international turbine manufacturers may not respond to the New Zealand standard given the relative size of the New Zealand market. As such, additional costs may well be ongoing indefinitely.	The NPV calculations based on Meridian's high end estimate of increased turbine costs are: Scenario A: \$3.6 m Scenario B: (\$1.9 m) Scenario C: \$10.7 m Only scenario B (moderate growth, diversified across NZ) shows a negative NPV. If the long run

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		marginal cost of wind generation falls below the estimated \$3 per MW, the NPV calculations would improve.
Mighty River Power	MRP has major concerns with the adequacy of the cost and benefit analysis. It is not clear how much benefit is likely to be achieved as a result of these proposed Code changes. More importantly, the costs of the proposed Code change are not fully quantified. For example, there could be additional costs for the existing synchronous plants to carry out testing, protection upgrades or AVR replacements. These costs do not appear to have been identified and quantified. It is also likely that with new HVDC controls and improved FIR sharing and new arrangements for SIR sharing through the DC are likely to challenge some of the existing assumptions around benefits. We do not agree with assumption 4.3.11 in the consultation paper as we now have or will in the future have a single frequency/reserve market. Likewise with respect to assumption 4.3.14 this assumption does not hold in relation to procurement by generators as cover for wind generation. In addition to this, cost does not include generator cost required for implementation.	The benefits and input assumptions to calculate the benefits are explained in section 4.3 of the August 2015 consultation paper. Fast instantaneous reserve and sustained instantaneous reserve sharing across the HVDC link and the proposed national market for instantaneous reserve were taken into account in the cost benefit analysis. The assumption in paragraph 4.3.11 is based on a national market for instantaneous reserve. The assumption in paragraph 4.3.14 is not affected by procurement (of reserve) by generators, although generators do not current procure their own reserve in the market. The dispensation provisions in the Code allow plant owners to avoid uneconomic upgrades to existing

Submitter	Submitter's comment	Response
		plant. Implementation costs therefore are not an input to the cost benefit analysis.
Nova Energy	The analysis makes provision for the costs to wind generation to meet the fault ride through standard, but it does not consider the costs of testing other generation and ensuring that it fully meets the standard. While non-wind generators and co-generation are generally synchronous, it cannot be automatically assumed that it will fully perform within the envelope specified by the system operator under all conditions. In such cases generators will potentially be required to undertake further analysis and seek dispensations. There is nothing in the analysis presented that indicates that this is justified, in fact the results of wind scenario B suggests that it is not. It seems to be an unnecessary expense to include existing generation given that the real issue is the potential impact of future generation developments. Set a formula under which future generation that does not meet the required fault ride through standard pays a proportionate share of the cost of reserve required to cover the system fault ride through requirements. The application of the formula need not be limited to large generators, and the long term costs can be taken into account by generators when they design and build their plant. The cost of reserve will be a function of their availability and mix of generation in the system. If the average cost of reserve increases, then some operators may choose to upgrade their plant to meet the standard.	Generators are already obligated under the Code to preserve power system stability and support the system operator in meeting its principal performance obligations. The requirements are now much clearer as a result of the studies performed to develop the fault ride through standards. It is arguable that generators already have an obligation to check performance of their plant against this new information. The application of the proposal to both existing and new generation is based on the principle that all generators unable to meet the fault ride through standards should pay a share of the cost of the reserve required to cover the plant.
NZWEA	No. The proposed approach will lead to poor outcomes. We need to continue to develop and evolve the cooperative, innovative approach that has served New Zealand well to date and has lead to very innovative solutions that are world leading.	NZWEA gives no supporting reasons for the position it has taken.
Transpower	We support the underlying policy objective but consider that an updated cost benefit analysis for the revised proposal would need to include the additional compliance (e.g. retrofit) and other transaction costs (e.g. administrative costs for generators and the	The dispensation provisions in the Code allow plant owners to avoid uneconomic upgrades to existing

Submitter	Submitter's comment	Response
	system operator).	plant. Such costs therefore are not an input to the cost-benefit analysis.
Trustpower	No. Costs will depend on the degree of ride-through capability mandated by the Authority. There is no rationale provided within the paper for the requirements as laid out in figures 8.1 and 8.2. By adjusting voltage limits and time durations by marginal amounts, significant cost savings may be available. As a result, some asset owners may be subject to greater costs than is realistically required or necessary. Ultimately, however, all these costs will be passed onto consumers, who would probably end up paying significantly more than the benefits estimated by the Authority. Further to this we are unsure if the fault ride through capability of existing wind generation in the North Island has been taken into account in the reserve procurement process when estimating the costs.	Figures 8.1 and 8.2 are based on detailed fault studies as explained in the February 2011 consultation paper.

Q4. Do you have any suggested market-based options that would be easier to implement than option A?

Submitter	Submitter's comment	Response
Contact	No.	Noted.
Genesis	No. Option B is not recommended or supported by Genesis Energy due to the differing dynamics and responses of the North and South Island Grids. Option C is not recommended or supported by the Genesis Energy due to the layout and high impedance of the New Zealand Grid relative to international Grids.	Noted.
Meridian	We agree that option A would be overly complex. We do not have any other market-based approaches to suggest.	Noted.
Mighty River Power	No, but the burden of additional reserve (or other performance standard) required to cover for non-compliant (in respect to fault ride through) plant should not fall on the rest of the market. Asset owners of non-compliant plant could perhaps be required to contribute to the procurement of additional reserve due to their non-compliance. This option can be either implemented in the market as fault ride through reserve or built into the cost allocation of dispensations.	Agreed. This is planned to be addressed in the reserve and event change cost allocation review.
Nova Energy	Set a formula under which future generation that does not meet the required fault ride through standard pays a proportionate share of the cost of reserve required to cover the system fault ride through requirements. The application of the formula need not be limited to large generators, and the long term costs can be taken into account by generators when they design and build their plant. The cost of reserve will be a function of their availability and mix of generation in the system. If the average cost of reserve increases, then some operators may choose to upgrade their plant to meet the standard.	This is essentially the proposal, but the proposal applies to all generation, not only new generation.
NZWEA	No. Windfarms can be designed to provide a range of local benefits, as has occurred at a number of windfarms in New Zealand. We need to continue with this approach of	Noted, although the proposal is not concerned with to local benefits.

Submitter	Submitter's comment	Response
	innovation and local design.	
Transpower	No comment.	-
Trustpower	No.	Noted.

Q5. Do you agree that the proposal does not preclude a move to market-based arrangements in the future?

Submitter	Submitter's comment	Response
Contact	Yes.	Noted.
Genesis	Genesis does not disagree, although moving from a prescribed option to a market-based option could be more challenging than simply starting with a market-based approach.	Noted.
Meridian	Yes.	Noted.
Mighty River Power	MRP is unsure. This proposal gives an advantage to asset owners with non-compliant plant as this is not penalised in any form, in addition to this it requires additional performance from synchronous machines.	The proposal does not advantage asset owners with non-compliant plant.
Nova Energy	The proposal to use dispensations in this way is clumsy and non-market like. While it does not preclude a market option, it may force a significant amount of work to be undertaken to meet the standards, or for dispensations to be sought, that might otherwise be avoided if a solution were adopted for new generation only.	Nova's approach would not address the issue of costs avoided by existing non-complaint plant.
NZWEA	What is needed is a framework and culture that encourages innovative design. Why move away from this and why use a standard/market dichotomy? Mechanisms need to be in place to ensure that Innovative designs support system stability.	Innovative design in the absence of performance standards does not ensure system stability or address the issue identified by the Authority.
Transpower	No comment.	-
Trustpower	Yes.	Noted.

Q6. Do you agree the Authority's proposed amendment complies with section 32(1) of the Act?

Submitter	Submitter's comment	Response
Contact	Yes.	Noted.
Genesis	Yes.	Noted.
Meridian	Meridian does not agree that the proposal complies with section 32(1) of the Act. In particular, the proposal will not contribute to the efficient operation of the electricity industry as it will impose substantial additional costs on existing wind farm operations and new wind farm investment. These costs will ultimately be borne by the consumer.	The proposal ensures that all exacerbators who increase system costs pay for those costs, and ensures that all generation competes in the market on an equal basis.
Mighty River Power	Agree but clear improvements in efficiency need to be identified based on a robust cost and benefit analysis.	Noted, although the Authority has identified efficiency improvements in its analysis.
Nova Energy	No. Competition in the industry requires low barriers to entry and part of that is market participants' having the confidence that they will not be captured by retrospective changes to the Code. While such changes can sometimes be inevitable, there is no evidence that a retrospective change is required in this case. The net benefits of applying the new standard to existing generation are not demonstrated.	The proposal is to apply the fault ride through standards equally to both new and existing generating stations to ensure that all exacerbators who increase system costs pay for those costs.
NZWEA	This proposal has very little likelihood of improving the efficiency of the electricity system.	The Authority has identified efficiency improvements in its analysis.
Transpower	No comment.	-
Trustpower	No. Increasing costs on new and existing wind generation will very definitely affect competition in the electricity industry. The proposed changes will contribute to an incremental increase in reliability of supply of electricity to consumers. However we are unsure whether this benefit will exceed its	The Authority's cost benefit analysis indicates that benefits will exceed costs.

Submitter	Submitter's comment	Response
	incremental cost.	

Q7. Do you have any comments on the drafting of the proposed amendment?

8.21 Excluded generating stations

(1) For the purposes of clauses 8.17, 8.19, [8.25D](#) and the provisions in **Technical Code** of Schedule 8.3 relating to the obligations of **asset owners** in respect of frequency...

Submitter	Submitter's comment	Response
Contact	No comment.	-
Genesis	No comment.	-
Meridian	No comment.	-
Mighty River Power	Clause 8.21 Excluded generating units/stations criteria need to be clearly defined for non-compliant fault ride through units/stations.	Clause 8.21(1) of the Code defines an excluded generating station.
Nova Energy	No comment.	-
NZWEA	No comment.	-
Transpower	No comment.	-
Trustpower	No comment.	-

8.25A Fault ride through

- (1) Each **generator** must ensure that each of its **assets**, when **connected** to the **grid** at 110 kV or 220 kV, is capable of remaining stable and **connected** when the **grid line** to **line** voltage is within the no-trip zone shaded and marked "No-trip zone" in Figure 8.1 (for an **asset** in the North Island) or Figure 8.2 (for an **asset** in the South Island) for the period of 6 seconds immediately following the commencement of a zero impedance three-phase short circuit fault, or an unbalanced short circuit fault, on any part of the **grid** in the **island** in which the **asset** is **connected**.
- (2) Each **generator** must ensure that each of its **assets**, when **connected** to the **grid** is capable of, remaining stable and **connected** when the **line** to **line** voltage at Haywards 220 kV bus (for an **asset** in the North Island) or Benmore 220 kV bus (for an **asset** in the South Island) is within the no-trip zone shaded and marked "No-trip zone" in Figure 8.3 for the period of 1 second immediately following the commencement of a trip of the **HVDC link**.
- (3) Whether a **generator** is complying with subclause (2) must be determined using power system analysis that uses—

 - (a) study cases provided by the relevant **grid owner**; and
 - (b) relevant system assumptions provided by the **system operator**.
- (4) A **generator** is not required to comply with subclause (1) in respect of an **asset** in the event of a fault of a type described in subclause (1), if the **asset** becomes isolated from the **grid** as a result of the fault.
- (5) A **generating unit** need not comply with subclause (1) to the extent that it is complying with a **special protection scheme** approved by the **system operator**.
- (6) The absolute **grid** voltage (per unit) shown on the Y axis of Figure 8.1 and Figure 8.2 is the ratio of **grid line** to **line** voltage on a **line** to the nominal operating voltage of the **line** (that is, 110 kV or 220 kV).

Submitter	Submitter's comment	Response
Contact	Add additional sub clause 8.25A Fault ride through (7) A generating unit need not comply with sub clause (1) if commissioned prior to xxxx date.	The proposal is to apply the fault ride through standards to new and existing generating assets.
Genesis	Sub clauses (1) and (2) ought to clearly state that the voltage is measured at the Grid Connection Point. Current drafting may be open to interpretation. Sub-clause (3); It is not clear who is required to carry out the modelling to demonstrate compliance and what the role of the Generator Owner is or isn't. Sub-clause (6) This clause appears overly complicated and unnecessary. Per Unit (PU) is widely understood engineering terminology that may not require definition here. If it is to be defined it should be moved to Clause 1.1 (definitions).	Subclauses (1) and (2) refer to the grid line to line voltage: By definition this is measured at the grid. Subclause (3): The obligation lies with the generator, as stated in subclause (2). Subclause (6): The per unit system is not widely understood by non-engineers. The term "per unit" is defined in this clause (as opposed to clause 1.1 (Interpretation) of the Code) because the term does not appear in any other clauses in the Code.
Meridian	8.25A – the term “connected to the grid at 110kV or 220kV” implies that this obligation does not apply to embedded generation. Is this the Authority's intention? 8.25A(1) – the reference to “6 seconds” is unnecessary given Figures 8.1 and 8.2 specify the duration of the no-trip zone. We consider this term creates confusion and should be removed. 8.25A(2) – this clause suggests that all generators will need to be tested against this obligation, rather than just generators that are close to Haywards and Benmore.	Clause 8.25A: The obligation is not intended to apply to embedded generation. Clause 8.25A(1): The 6 second period in clause 8.25A(1) and the 1 second period in clause 8.25(2) clarify the periods of time over which the obligations apply.

Submitter	Submitter's comment	Response
	Meridian considers this is unnecessary and will increase compliance costs. 8.25A(3) – Meridian supports generator compliance being determined by power systems analysis. This is an important improvement on previous proposals. 8.25A(6) – Meridian considers this clause is written in a way that is unnecessarily complicated and could be mis-interpreted. We question whether a percentage-based approach would be clearer and more consistent with other descriptions of voltage requirements within the Code.	Clause 8.25A(2): All generators would need to be tested to determine ride through requirements, although study results could be applied on a regional basis. Clause 8.25A(3): Noted. Clause 8.25A(6): The per unit approach is commonly used in other Codes and in Transpower documentation. A percentage-based approach would add clutter to figures 8.1, 8.2 and 8.3.
Mighty River Power	Clause 8.25A is non-standard and does not have any performance measure. Study assumptions and case studies could mean incremental costs at different times. Clause 8.25A(4) "A generator is not...". It should mean to address the generating unit not the whole generator which is defined as the asset owner not the asset itself.	Performance measures are not particularly relevant to clause 8.25. The performance requirements in absolute terms are defined in figures 8.1, 8.2 and 8.3. 8.25A(4) applies to the asset owner, not the assets. Agreed that 8.25A(5) should be changed to match the wording used in 8.25(4).
Nova Energy	No comment.	-
NZWEA	No comment.	-
Transpower	The policy objective (refer 4.2.3) is for the fault ride through standards to apply to	Agreed and clause 8.20A(1)

Submitter	Submitter's comment	Response
	generating stations that export 30 MW or more to a local network or the grid. The drafting for the obligation contained in clause 8.25 specifies that assets only connected to the 110kV and 220kV remain connected. This does not reflect the policy intent and would create incentives to connect only to lower voltages. To avoid this issue the drafting needs to delete when connected to the grid at 110 kV or 220 kV and substitute all instances of "the grid" with "a network".	amended accordingly. Updates to the original drafting introduced an inadvertent change in the meaning of this clause.
Transpower	The voltage envelope definitions relate to the positive sequence component of the voltage, consistent with the analysis in the system operator report (refer section 6.2 clause 8.3.13). We recommend replacing the term 'line to line' used under 8.25A (1) and (2) with "phase to earth". This will require a change also to clause 8.25A (6): The absolute grid voltage (per unit) shown on the Y axis of Figure 8.1 and Figure 8.2 is the ratio of grid phase to earth voltage to the nominal operating phase to earth voltage of the 110kV or 220kV bus.	Agreed and clause 8.25A(1), (2), and (6) amended accordingly.
Trustpower	The description of "Zero Impedance Fault" is misleading. Reference to "fault" would be better. Separating out the under and over voltage figures, Fig 8.1 and 8.2, would provide better clarity and understanding. Currently the figures tend to suggest the fault ride through capability needs to start at 0.9 p.u. and sustain through to 1.2 p.u. (i.e. a 0.3 p.u. change in voltage) rather than the explicit 1.1p.u. pre-contingent voltage used in the modelling to derive the requirement (i.e. a 0.1 p.u. change in voltage). Sustaining 1.2 p.u. voltage for 2 seconds and the 1.15 p.u. for a further 4 seconds is extreme by international standards. The over-voltage requirements with respect to the HVDC appear to have been derived from an unrealistic HVDC flow, generation and load combination.	The term 'zero impedance fault' is a more specific term than 'fault'. The required fault ride through capability is defined in the proposed Code a no-trip zone shaded and marked in the in figures 8.1, 8.2 and 8.3. Separating the under and over voltage figures would add additional unnecessary complexity to the Code drafting. The over voltage requirements are derived from operating conditions that the grid owner plans to utilise under different plant configurations.

8.25B Reactive current and active power output

- (1) Each **generator** must ensure that each of its **generating units** generates at least the maximum **reactive current** specified in the **generator asset capability statement** for the period of 6 seconds immediately following the commencement of a fault on the **grid** described in clause 8.25A(1).
- (2) Each **generator** must ensure that each of its **generating units** provides **active power** output relative to pre-fault **active power** output at least in proportion to the **grid voltage** at the **grid injection point** for the period of 6 seconds immediately following the clearance of a fault on the **grid** of a type described in clause 8.25A(1).
- (3) Subclause (2) does not apply to a **wind generating station** if there has been a reduction in the intermittent wind power source during the 6 seconds following the commencement of the fault.

Submitter	Submitter's comment	Response
Contact	No comment.	-
Genesis	Sub-clause (1): Reactive Power performance is specified in the Asset Capability Statement (ACS), not Reactive Current. Under a system voltage fault, the value of Reactive Current cannot be derived from the ACS Reactive Power values, as they are based on steady state voltages. Sub-clause (1): How will compliance with this clause be determined pre-event? Who is responsible for demonstrating compliance? Under what circumstances will compliance need to be demonstrated? Sub-clauses (1) and (2): What systems would record this data to demonstrate compliance? Generator Owner systems only record data at the Generator terminals, which is not time stamped to system parameters.	The system operator can update the ACS to include any additional parameters required for fault ride through capability and would determine requirements for demonstrating compliance. The system operator uses a companion guide to asset testing and commissioning to assist asset owners in carrying out tests. It is likely that the system operator would build up and make available guidance information for fault ride through testing, as it becomes

Submitter	Submitter's comment	Response
		available from asset owners.
Meridian	8.25(B)(1): The wording of this clause implies that the generating unit will, in all circumstances, supply maximum reactive current for 6 seconds from the commencement of the fault (regardless of the length or severity of the fault). This does not relate to normal, stable automatic voltage regulator (AVR) action. This may be clarified by amending that "...generating units are capable of generating at least...", but that normal AVR action should prevail. The reference to the "fault on the grid described in clause 8.25A(1)" is confusing, because clause 8.25A(1) relates to the definition of a "no-trip zone". Furthermore, the 6 second period would not appear to add value to any assessment of compliance against this clause; the protection clearance time will be much less than this. Meridian is unclear what is intended with the reference to 6 seconds in this clause. It is not clear how quickly the generating unit is expected to reach the maximum reactive current; this clause implies instantaneous response. Again, normal stable AVR action should prevail. The ability of Meridian's shunt-connected static excitation systems to comply with this clause cannot be assessed until clarifications are given. 8.25(B)(2) - The relevance of the reference to 6 seconds in this clause is not clear.	Noted and clause 8.25B(1) amended accordingly.
Mighty River Power	Clause 8.25B(1) and (2) both can be defined in terms of current.	Noted although it would be more complex to express clause 8.25B(2) in terms of current.
Nova Energy	No comment.	-
NZWEA	No comment.	-
Transpower	We consider the drafting at 8.25 (B) (1) for ride-through fault response will cause problems for voltage stability because full reactive current for such a long period would be expected to create a significant and unwanted voltage rise. The reactive current	Agreed and clause 8.25(B)(1) amended accordingly.

Submitter	Submitter's comment	Response
	requirement should not be the 'maximum' regardless of the system voltage because during the period of the fault itself, the reactive current from a generator close to the fault is not a controlled value and for a generator remote from the fault this requirement would require unwanted modifications to their excitation control systems. In addition if the voltage has recovered acceptably then generation would be expected to return immediately to Voltage or Mvar set point control (depending on its dispatch situation) and not attempt to put out maximum reactive current. We consider the response must allow for generators' differing positions in relation to the fault location and for that reason the reactive current response must be appropriate to the voltage conditions each generator faces. An 'appropriate' response is a suitably controlled response of up to the maximum generator reactive current capabilities specified in the generator asset capability statement (ACS). The magnitude of any particular response after fault clearance would vary depending on the voltage at the generator terminals and the excitation control system specified in the generator ACS. We propose for 8.25B (1). Each generator must ensure that each of its generating units generates or absorbs reactive current as appropriate to reverse the measured change in its terminal voltage without exceeding the generating unit's transient rating limit both during the period of a fault on the grid as described in clause 8.25A (1), and for at least 6 seconds during the post-fault recovery period. The specification for the 6 seconds will assist generator performance settings for generators connected by converters and those using external devices (e.g. Statcoms) to provide reactive current.	
Trustpower	We suggest this clause is reworded. The clause effectively requires maximum active and reactive current simultaneously, which may not be physically possible. Additionally the present wording requires the injection of maximum reactive current for six seconds from a fault, regardless of whether or not the voltage has recovered to its pre-fault value. The Authority may want to prioritise reactive power over active power, and adjust	Agreed and clause 8.25(B)(1) amended accordingly.

Submitter	Submitter's comment	Response
	the active and reactive power injected depending on the characteristics of the fault and the post fault recovery characteristics.	

8.25C Use of additional equipment

A **generator** may comply with clause 8.25A in relation to a **generating station** by—

(a) ensuring that the performance of **generating units** that comprise the **generating station** comply; or

(b) installing additional equipment within the **generating station**; or

(c) a combination of the methods described in paragraphs (a) and (b).

Submitter	Submitter's comment	Response
Contact	No comment.	-
Genesis	No comment.	-
Meridian	No comment.	-
Mighty River Power	No comment.	-
Nova Energy	No comment.	-
NZWEA	No comment.	-
Transpower	No comment.	-

Submitter	Submitter's comment	Response
Trustpower	What about a requirement for HVDC to provide some voltage compensation?	A grid investment solution involving voltage compensation would require Transpower to submit a grid upgrade plan proposal to the Commerce Commission for approval. As Transpower has designed all of its equipment at Benmore and Haywards to its HVDC transient over voltage standard, it is very unlikely to agree to submit such a grid upgrade plan. Even if a regulatory mechanism could be found to require Transpower to change its standard, it is uncertain that this approach would have higher net benefits to consumers.

8.25D Application

(1) Clauses 8.25A and 8.25B do not apply—

(a) to a **wind generating station** when it operates at less than 5% of rated **MW**:

(b) to any **asset** at an **excluded generating station**.

Submitter	Submitter's comment	Response
Contact	No comment.	-
Genesis	No comment.	-
Meridian	No comment.	-
Mighty River Power	No comment.	-
Nova Energy	Clauses 8.20D (1) & (2) in the 2011 Consultation Paper should be retained [exempting existing assets].	The proposal is intended to apply to all generating stations that export more than 30 MW. Nova's approach would exempt exacerbators who own existing generators from paying for the costs they cause to other participants.
NZWEA	No comment.	-
Transpower	No comment.	-
Trustpower	No comment.	-

8.38 Authority may require excluded generating stations to comply with certain clauses

- (1) Despite clauses 8.17 and 8.25D, the **system operator** may, at any time, apply to the **Authority** for the **Authority** to issue a directive that an **excluded generating station asset** must comply with clauses 8.17, 8.19, 8.25A and 8.25B...

Submitter	Submitter's comment	Response
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Submitter	Submitter's comment	Response
Contact	No comment.	-
Genesis	No comment.	-
Meridian	No comment.	-
Mighty River Power	No comment.	-
Nova Energy	No comment.	-
NZWEA	No comment.	-
Transpower	No comment.	-
Trustpower	No comment.	-