13th April 2015

Mr John Pierce
Chairman
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

Dear Mr Pierce

Proposed rule change: Reasonable endeavours to comply with dispatch instructions

The purpose of this letter is to formally request to a Rule change to amend clause 4.9.8(a) of the National Electricity Rules (NER) by replacing the existing obligation to exactly comply with a dispatch instruction with an obligation which: (i) requires generators use reasonable endeavours to comply; and (ii) incorporates AEMO's non-conformance process.

The ratification of this proposed Rule would align the Rules to what is, in the real world, technically feasible. It would reduce regulatory risk, improve certainty, reduce compliance costs, and as a result encourage generators to provide energy when it is of most value to consumers without the risk of an absolute compliance obligation to meet exact dispatch instructions. This proposed Rule change would increase the overall efficiency of the market.

Should you have any queries in relation to this Rule change proposal please do not hesitate to contact Kevin Ly, Head of Wholesale Regulation on kevin.ly@snowyhydro.com.au or on (02) 9278 1888.

Yours sincerely,

Roger Whitby

Executive Officer, Trading

Reasonable endeavours to comply with dispatch instructions issued by AEMO.

Snowy Hydro Limited Rule Change Request

April 2015

1) Name and address of rule change request Proponent

Snowy Hydro Limited
Level 37, 50 Bridge St
Sydney NSW 2000

2) Description of the proposed rule

Clause 4.9.8(a) of the National Electricity Rules provides that a Registered Participant must comply with a dispatch instruction given to it by AEMO unless to do so would, in the Registered Participant's reasonable opinion, be a hazard to public safety or materially risk damaging equipment.

The proposed rule seeks to amend clause 4.9.8(a) of the National Electricity Rules (NER) by replacing the existing obligation to exactly comply with a dispatch instruction with an obligation which: (i) requires generators use reasonable endeavours to comply; and (ii) incorporates AEMO's non-conformance process.

The adoption of reasonable endeavours as a basis for regulating generator behaviour would align the law to what is, in the real world, technically feasible. It would reduce regulatory risk, improve certainty, reduce compliance costs, and as a result encourage generators to provide energy when it is of most value to consumers without the risk of an absolute compliance obligation to meet exact dispatch instructions. This proposed change would increase the overall efficiency of the market.

AEMO's central dispatch obligation requires it to dispatch the market to ensure that power system security is maintained. AEMO's published Dispatch System Operating Procedure[1] outlines a process used by AEMO to identify non-conformance with dispatch targets. The rule change Proponent believes these procedures appropriately trade-off the requirement to ensure the secure operation of the power system through appropriate dispatch conformance, with the increase in overall costs if the compliance obligation is specified with a too high a level of precision. As a result, it is appropriate that those procedures are incorporated in the dispatch compliance obligation.

The proposed rule would contain two limbs. First, Registered Participants would need to use reasonable endeavours to comply with a dispatch instruction given by AEMO. Second, Registered Participants would need to manage their dispatch performance so that they do not trigger a non-conformance notice as outlined in AEMO's Dispatch System Operating Procedure. A breach of clause 4.9.8(a) will exist where the Registered Participant both does not use reasonable endeavours to comply with a dispatch instruction and triggers a non-conformance from AEMO. A proposed Draft Rule is shown in Appendix A.

[1] AEMO, Dispatch System Operating Procedure, SO_OP_3705, version 80, 23 October 2014

3) Statement of issue

3.1) The nature and scope of the issue with the existing Rules

Scheduled generators and loads provide a valuable service to consumers by providing a controllable load following service which accommodates for the variability in demand load. Non-scheduled generators and loads are capable of providing a similar service but because they are registered as non-scheduled they have no obligation to follow dispatch targets and provide a similar load following service. This inequitable treatment between scheduled and non-scheduled Participants is exasperated by the fact that Rule 4.9.8(a) is a strict compliance requirement to follow dispatch instructions which the Rule change Proponent will demonstrate costs significant resources but does not result in any tangible benefits to consumers.

Exact compliance with dispatch instructions in every dispatch interval is a physical impossibility. The AER has acknowledged this in its own compliance bulletin[2]:

> *While Registered Participants must endeavour to comply with dispatch instructions, the AER recognises that exact compliance with dispatch instructions in every dispatch interval is a physical impossibility.*

The position adopted by the AER appears to be that while it recognises this impossibility of compliance, it will only pursue generators for departures that are not 'minor', and where generators have failed to use their best endeavours to comply. However, the AER has refused to provide any guidance as to the size of the deviation that it would consider to be something other than 'minor'.

Implicit in this stance is the proposition that the Rules do in fact, on their terms, require strict conformance. In short, the law is divorced from reality.

The problematic nature of the existing rule is illustrated by comparing, on the one hand, a requirement to comply with dispatch instructions to the tenth or hundredth of a megawatt, with, on the other, the obvious impossibility of ever operating large generation equipment to that level of precision. Yet this is what a plain reading of clause 4.9.8(a) requires. The rule change Proponent has analysed the ability of scheduled generators in the NEM during the June 2014 period to meet dispatch targets. The tables below show that at present, almost all generators breach the rule every day that they generate.

% of time not meeting the Dispatch Target

Generator Type	> 50 MW	> 20 MW	> 1 MW	> 0.1 MW	Dispatch Targets Count
Coal	0.03%	0.61%	58.85%	90.92%	**402,547**
OCGT	0.06%	0.79%	29.96%	88.34%	**73,986**
CCGT	0.03%	0.34%	60.11%	94.08%	**71,311**
Hydro	0.03%	0.27%	27.46%	88.00%	**216,933**
Total	**0.03%**	**0.50%**	**47.27%**	**91.60%**	**764,777**

Table 1: Percentage of time in June 2014 where scheduled generators did not meet dispatch targets

Table 1 shows the percentage of time in June 2014 where scheduled generators did not meet dispatch targets by various margins from greater than 50MW to greater than 0.1MW. It can be seen

[2] AER, Compliance Bulletin No. 1, Complying with dispatch instructions, December 2006

that hydro generators perform relatively better than other generator types but still result in greater than 88% of the time being unable to meet the exact dispatch target by less than 0.1MW.

At the level of 0.1MW, almost all targets are missed. Where a target is met with this level of precision, it is as much by accident as design. Even at the level of a whole MW, almost half the targets analysed in our sample period were missed, resulting in, on average, more than 10,000 breaches of this rule every day.

Table 2 uses the same data set as Table 1 but displays the data in terms of a percentage (%) deviation from the Dispatch Target to allow for generator size.

% of time not meeting the Dispatch Target

Generator Type	> 1% x Target	> 5% x Target	> 10% x Target	> 20% x Target	Dispatch Targets Count
Coal	30.29%	2.96%	0.80%	0.31%	**402,547**
OCGT	34.47%	4.38%	2.76%	2.19%	**73,986**
CCGT	43.62%	11.98%	5.88%	2.14%	**71,311**
Hydro	52.16%	6.57%	3.53%	1.89%	**216,933**
Total	**39.61%**	**6.43%**	**3.70%**	**2.58%**	**764,777**

Table 2: Percentage of time in June 2014 where scheduled generators did not meet dispatch targets categorised by percentage (%) deviation from the dispatch target.

As demonstrated from our analysis summarised in tables 1 and 2 Generators are, in effect, at the mercy of the AER; it is only the exercise of the AER's discretion (upon which there are no particular constraints) which prevents generators from being penalised for every dispatch interval in which they do not *exactly* generate the target output. This is an unsatisfactory situation, since the AER is not bound by own its own compliance policies and can modify or give new meaning to its stated position at any time.

We also believe that current rule is uncertain in its enforceability and scope, which in turn creates uncertainty for generators applying the rule to their generation activities. Furthermore, the guidance produced by the AER in relation to its approach to enforcement has not been satisfactory.

In summary, the rule change Proponent believes clause 4.9.8(a) is deficient on the following grounds:

a) it is potentially uncertain in its enforcement and in the boundaries of its enforceability;;

b) it is divorced from reality, placing a burden on generators which they are physically unable to meet;

c) it is inconsistent with intention of the NER, as well as the operation of many of its provisions and AEMO's procedures (both of which contemplate regular departure from the need to exactly comply with dispatch instructions);

d) it creates uncertainty and regulatory risk for market participants, encouraging behaviour that reduces the efficiency of the spot market;

e) it is unnecessary for the safe, efficient operation of the NEM while imposing an unnecessary compliance burden; and

f) it makes generators unreasonably dependent on the discretion of the AER in order to avoid having fines or penalties levied against them.

3.2) Existing Rule – Cost of Compliance

The existing rule imposes significant costs on generators, and a deadweight loss on the market as a whole. This makes the generation of electricity more costly, leading to higher prices for consumers as a result of regulatory risk that produces no additional benefit in terms of system security or stability.

Depending on the risk profile of a Registered Participant, a very conservative entity would incur unnecessary expenditure to minimise the risk of being in breach of clause 4.9.8(a). For Snowy Hydro, examples of this expenditure are:

- Keeping reserve solely for energy dispatch compliance;
- Unit start / stop operational costs in meeting dispatch targets; and
- Market cost of factoring compliance cost of being the marginal generator.

3.2.1) Keeping reserve solely for energy dispatch compliance

Snowy Hydro bids its major power stations on an aggregated unit basis. This means that if the aggregated unit is dispatched to a specific loading (say 250 MWs for Lower Tumut (T3) aggregate dispatchable unit) then one or more the relevant physical units may be operated to comply with the dispatch instruction. However the efficiency of the energy conversion process varies radically with different loading points and is typically higher near maximum loadings (refer to Figure 1 for example power station efficiency curve).

The dispatch level of 250 MWs could be met by dispatching one (1) Lower Tumut physical unit at 250 MWs (very close to its maximum efficiency operating point but with only 25 MWs of spinning reserve).

Under the current Rules clause 4.9.8(a) the rule change Proponent has to seriously consider other alternatives to meeting the 250 MWs dispatch target to minimise the risk of breach of 4.9.8(a). For example, running two physical units each at 125 MW and operating quite inefficiently but with 300 MWs of spinning reserve. This conservative operational behaviour would allow for unexpected changes in dispatch targets which would cause a breach of Rules clause 4.9.8(a).

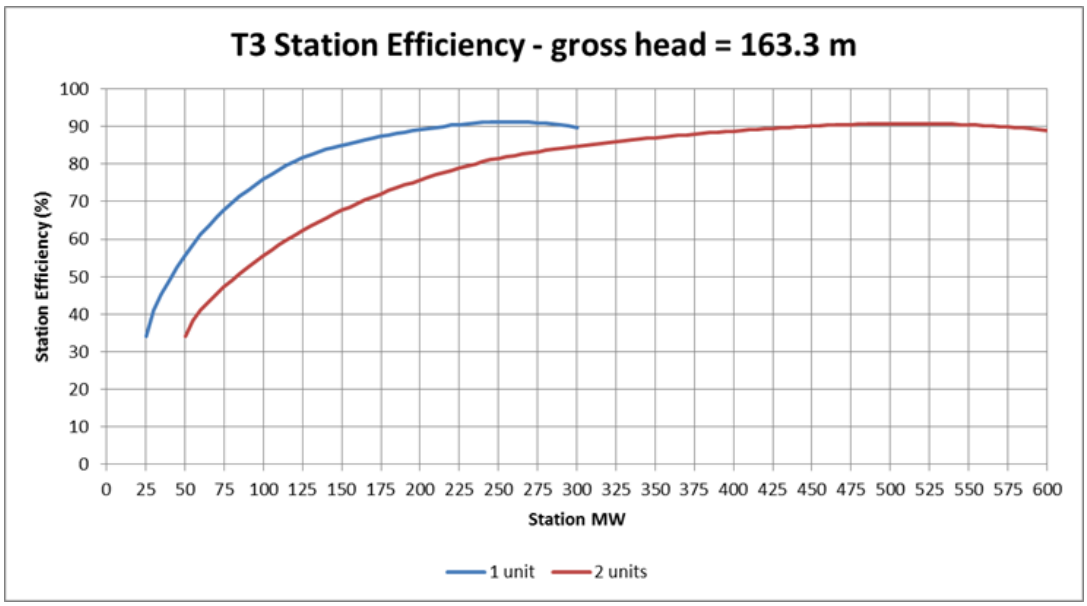

Figure 1 - Tumut 3 Power Station Efficiency Curves

From Figure 1 there is a very material and direct trade-off between the efficiency of the energy conversion and the quantum of available spinning reserve. Two physical units running at 125MW each result in the station efficiency of 62% compared to one physical unit running at 250MW with a station efficiency of 91%.

Clause 4.9.8(a) mandates a dramatic reduction of energy conversion efficiency (from the renewable potential energy of the stored water) which increases costs as multiple machines are run at less efficient turbine efficiency points in order to minimise the risk of breaching the relevant Rule. A 5 to 10% loss of energy conversion efficiency is plausible and would come at an economic dead loss of the order of $10 to $20 million per annum across the Snowy Hydro Electric Scheme.

3.2.2 Unit start / stop operational costs in meeting dispatch targets

Any unexpected dispatch target that exceeds a generator's on-line reserve may result in more units being started than are required after the first dispatch period. This is due to the synchronising time reducing a generator unit's ability to fully ramp to its capacity in a single dispatch period.

This is most likely to occur when the previous dispatch period targets are zero, so there are no units on line and thus no reserve. Quite often not one but two additional units will need to be started and shut down.

Table 3 provides a conservative estimate of the yearly cost of additional generator units starting and stopping to minimise the risk of breaching clause 4.9.8(a). The yearly cost to Snowy Hydro is estimated to be at least $200,000 and is likely to escalate with the change in generation mix in the NEM resulting in more intermittent generation.

	Start Targets / Year	Estimated % un-forecast	Cost per additional unit start/stop	Yearly cost /additional Unit
MURRAY	620	20%	$800	$99,200
UPPTUMUT	500	20%	$650	$65,000

TUMUT3	320	10%	$1,274	$40,768
			SUM	$204,968

Table 3: Conservative estimates of unit start/stop operational costs.

3.2.3 Market cost of factoring compliance cost of being the marginal generator

Running a unit as the marginal generator includes costs such as unit wear and tear and efficiency losses associated with the varying dispatch targets and unit start/stops.

Being the marginal generator also increases the dispatch compliance cost ie. the potential regulatory cost of non-compliance.

A generator would factor all these costs as a risk premium to their Offer price to compensate for the higher risk of being dispatched as the marginal supplier.

Snowy Hydro, and possibly other Registered Participants, do rebid MW quantities to higher prices on occasions to avoid being the marginal supplier due to this dispatch compliance risk. Any hour where this occurs and the spot price is increased by $1/MWh and assuming the NEM demand was 20,000MW, increases the cost of dispatch by approximated 20,000 MWh * $1/MWh =$20,000. Over the course of a year with 8760 hours this increased risk premium to compensate for the potential regulatory risk of non-compliance could amount to ten's of millions of dollars.

3.3) Net Cost of Existing Rule

The rule change Proponent estimates total costs per annum to Snowy Hydro to be in the millions of dollars. AGL and Hydro Tasmania have significant hydro assets and it is envisaged that similar pro-rata costs would equally apply to their hydro assets.

Current clause 4.9.8(a) may be justified if there was a corresponding benefit to system security. In fact, it is clear that there is no such benefit, and that the costs of compliance are not offset by any tangible benefits that advance the NEO. Generators will continue to have strong financial incentives in the absence of a requirement to exactly comply with dispatch targets given:

a) a non-conformance trigger from AEMO removes the generator bids as a basis for setting the dispatch price (cl. 3.8.21(k)). A generator that fails to meet its dispatch targets during periods of high prices is likely to have the effect of reducing the spot price if its bids cannot be used as a basis for setting the spot price; and

b) the Causer Pays regime for recovering the costs of regulating Frequency Control Ancillary Services penalises generators who are not meeting their dispatch targets.

In addition, the NEM is a highly competitive market where energy is co-optimised with the eight (8) ancillary services markets. Any deviations from energy targets would not only subject the generator to Causer Pays payments with regulating services but result in other ancillary service providers meeting the central dispatch requirements. All generators therefore have strong commercial interest to meet their dispatch targets to limit competitive responses from other generators.

3.4) Reasons Why Exact Compliance is Impossible

Not only is the exact compliance demanded by the existing rule costly and undesirable, in most instances it is impossible. It is also inconsistent with the flexibility contemplated by many clauses of the NER. We set out further details below variables in the fuel/energy conversion process which make exact compliance with 4.9.8(a) physically impossible.

3.4.1 Fossil fuel generation

Most of the scheduled generating units in Australia operate by burning fossil fuel (i.e., coal, oil or gas) to produce heat, which in turn creates steam that is used to spin turbines that generate electricity. The following factors make it difficult for the Operator of fossil-fuel burning generation plant to control the precise MW quantity of electricity produced:

a) the quality of the fuel;

b) whether the unit is producing a level of output that is approaching its minimum or maximum load;

c) ambient temperature;

d) the condition and operating point of the plant;

e) the stability of the boiler and/or the combustion process; and

f) in the case of gas turbine generation plant, the level of system frequency

3.4.2 Hydro-electric generation

Hydro-electric generating plant operates by using water, fed by gravity, to spin turbines. The following factors make it difficult for the Operator of hydro-electric generation plant to control the precise MW quantity of electricity produced:

a) the operation of the headwater including pipeline and tailwater infrastructure;

b) whether the unit is producing a level of output that is approaching its minimum or maximum load;

c) transient and dynamic water pressure fluctuations within the water supply infrastructure; and

d) the condition and operating point of the plant.

3.4.3 Governor Control Systems

All scheduled generators are required to operate their scheduled generating units to comply with the registered performance standards for the relevant unit. To comply with the relevant registered performance standards, most scheduled generators are fitted with governor control systems that automatically adjust the output of the unit in response to frequency fluctuations.

These governor control systems help protect the stability of the power system by managing frequency deviations. However, when the governor control system automatically adjusts the output

of a generating unit, the Scheduled Generator's output necessarily deviates from the target specified in a dispatch instruction. The existence of this requirement is inconsistent with clause 4.9.8(a) as currently drafted, since it implies that generators do not need to (and in fact prevents generators from) exactly complying with dispatch instructions.

3.4.4 Failure of scheduled generating units

Failure of scheduled generating units, and failure of their associated control systems, is a common occurrence in the NEM, resulting in those scheduled generating units not complying with dispatch instructions issued to them. The rule currently makes no allowance for such failures – every instance of failure can result in generators being in breach.

3.4.5 Metering Equipment

Notwithstanding that AEMO issues dispatch instructions which require scheduled generators to generate a specified quantity of electricity, the metering equipment for scheduled generators operating in the NEM is permitted to have an error accuracy tolerance of between 0.5% and 3%, which may lead to non-compliance with a dispatch instruction. Again this is inconsistent with the current drafting of clause 4.9.8(a).

3.4.6 Instructions to Provide Frequency Control Ancillary services

AEMO may at any time issue a dispatch instruction to a scheduled generator to provide frequency control ancillary services (FCAS), which require a scheduled generator to adjust its output in order to help maintain the frequency within power system.

In circumstances where AEMO issues a dispatch instruction to a scheduled generator to provide FCAS (pursuant to clause 4.9.3A(a)), it is impossible for that generator to simultaneously comply with a dispatch instruction issued to implement central dispatch (pursuant to clause 4.9.2). This again demonstrates the inadequacy and indeed absurdity of clause 4.9.8(a) – generators can comply with clause 4.9.8(a) or participate in the FCAS market, but not both.

3.5) How the rule change addresses the identified issues

As mentioned, the proposed rule contains two limbs. Firstly, the rule change proposal amends clause 4.9.8(a) to a **reasonable endeavours** obligation to comply with a dispatch instruction given to it by AEMO. Secondly, Registered Participants would need to manage their dispatch performance so that they do not trigger a non-conformance notice as outlined in AEMO's Dispatch System Operating Procedure.

An approach which requires reasonable endeavours, rather than exact compliance, reflects the reality of operating large, complicated equipment in a market where dispatch targets can change every five minutes. It means that generators continue to operate under an obligation to do everything they reasonably can to meet dispatch targets, without being exposed to penalties for a breach of the NER for every dispatch interval in which they are unable to meet their target exactly.

System security will be further safeguarded by the adoption of AEMO's non-conformance process. In fulfilling its functions, AEMO consults on and publishes operating procedures outlining the systems and processes it uses to meet its central dispatch obligations. The rule change Proponent believes these procedures appropriately trade-off the need for Registered Participants to comply with dispatch instructions to ensure secure operation of the power system, and the increase in overall

costs if the compliance obligation is specified with a too high a level of precision. Generators will also continue to be bound by clause 4.9.8(b) to ensure that their generating units are at all times able to comply with their latest generation dispatch offer.

4) How the proposed rule will or is likely to contribute to the achievement of the National Electricity Objective

As with all proposed changes to the NER, this rule change proposal must meet and support the National Electricity Objective (NEO). The NEO is stated in section 7 of the National Electricity Law:

> "... to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:
>
> a. price, quality, safety, reliability and security of supply of electricity; and
>
> b. the reliability, safety and security of the national electricity system."

The Proponent has carefully considered the benefits of the change against the NEO and is of the view the proposal supports the NEO.

As outlined in section 3.3 there is a significant net cost to the existing Rule. The existing Rule does not adequately recognise that there is an existing Regulation frequency control ancillary service market that provides a market price (shadow price) for the economic value of load following services. This market price coupled with a User pays (Causer Pays) regime for the cost recovery of this market service ensures strong commercial incentives to follow dispatch targets. The rule change Proponent has shown that a strict compliance regime as mandated by the existing Rule 4.9.8(a) is both not required and results in deadweight economic costs.

The introduction of a reasonable endeavours obligation and tying this obligation to the AEMO Dispatch system operating procedure will advance the NEO by:

a) a decrease in compliance costs as regulatory uncertainty is greatly reduced; and

b) an improvement in Registered Participants' confidence, which is likely to result in less conservative generation plant behaviour with no material degradation of system security. This should ensure a more responsive supply market to changing consumer demands and a more efficient electricity market.

Each of these points is discussed below.

4.1) Decrease in compliance costs

The rule change Proponents has shown in section 3.2 that the current Rules clause 4.9.8(a) directly costs significant money to reduce the risk of a breach. A conservative estimate puts this cost at least $5 million per annum.

There are other generators with similar generation portfolios to Snowy Hydro's and it is expected these generators would incur similar pro-rata costs.

Other Registered Participants with thermal and renewable generation assets would incur compliance costs to varying degrees depending on the risk profile of individual businesses.

The adoption of reasonable endeavours as a basis for regulating generator behaviour would significantly reduce the regulatory risk and costs of non-compliance, and as a result encourage generators to provide energy when it is of most value to consumers.

4.2) More responsive supply market to changing consumer demands

Being exposed to an exact compliance regime does adversely affect trading behaviour and efficient dispatch and pricing. Specifically, sub-optimal trading behaviour is likely to result from an attempt to minimise the risk of a breach leading to a reduction in market efficiency.

In particular, generators taking a more conservative approach to responding to price volatility in the market will result in spot price outcomes that are not necessarily reflective of underlying market conditions. Allocative and dynamic efficiency are impacted as the optimal mix of plant is not dispatched and long-term investment signals are distorted. These issues are likely to flow through to the operation of the financial market.

5) Expected costs, benefits and impacts of the proposed rule

As indicated in sections 3 and 4, the rule change if implemented will have the effect of resolving a number of concerns by:

- reducing regulatory and compliance risk, by replacing an exact compliance obligation - which is impossible to achieve - with an obligation to use reasonable endeavours; and

- tying reasonable endeavours obligations with an already established and recognised AEMO Dispatch operating procedure, which would have the effect of increasing confidence in the market to be more responsive to changing consumer demands.

As outlined in section 3 the expected benefits to Registered Participants are likely to be significant with estimated cost savings in the tens of millions across all generators in the NEM.

The expected costs associated with implementing this proposal are negligible. The power system will continue to operate in a secure manner and all generators would still have strong commercial interests to meet dispatch targets to have their bids part of the spot price setting process, to reduce their exposure to causer pays charges, and to limit their competitor responses with rival substitution services.

Entities likely to be affected by the rule change are:

- Generators would be positively affected with greater certainty in regulatory requirements to comply with dispatch instructions;

- AEMO remains unaffected. AEMO would continue to monitor whether their Dispatch operating procedure is fit for purpose and consult with Registered Participants on any changes to the procedure as necessary;

- AER would be positively affected as the rule change would remove ambiguity as to how compliance with dispatch targets are measured and triggered. This should reduce AER costs to derive unnecessary parallel systems and processes to monitor dispatch compliance; and

- Consumers would be beneficiaries of the rule change as cost savings from generators should flow through a more efficient and competitive energy services.

Appendix A - Proposed Draft Rule - Clause 4.9.8(a)

A Registered Participant will breach this clause 4.9.8(a) if, with respect to a dispatch instruction given to it by AEMO:

(1) it does not use reasonable endeavours to comply with that dispatch instruction unless to do so would, in the Registered Participant's reasonable opinion, be a hazard to public safety or materially risk damaging equipment; and

(2) one or more of the Registered Participant's scheduled generating units, scheduled network services or scheduled loads which caused or contributed to the Registered Participant's failure to comply with clause 4.9.8(a)(1) has been declared and identified as non-conforming by AEMO under clause 3.8.23.