Questions Received During Denver Frequency Response Technical Conference

Agenda Item 1

David Bertagnolli: Where did you account for the energy given up by the GENERATORS as they slow down?

Inertial Power.

Pedro Rebellon: how do you account fro droop?

Its in the Governor Response.

Albert DiCaprio: The presenter said that the reliability issue is based on the "arrested frequecy" but won't the relays trip if the initial low point (when initeria stops the frequecny) is lower than the relay settings?

Yes, the objective is to have sufficient response to prevent this from happening.

Randy Seggerman: DO some governor responses have a set dead band, within they do not provide a response?

Yes.

Agenda Item II

Dilip Mahendra: What would be the impact of variable frequency drives on inertia

They do not provide inertial power or load damping.

Bill Henson: Just to be clear: I'm pretty sure that IEEE 1547 specifies a must trip by combinations of frequency and time. DG meeting 1547 can trip at inside that envelope and many will just to make sure that they have some margin.

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Presilo Galliguez: what is the makeup of coal vs gas combined cycle generation in two events?

There has not been that level of review done on the events. It would require a data request to all BAs and there is not

Presilo Galliguez: Combined cycle plant will not have 5% droop. Sydney N

Presilo Galliguez: Combined cycle units have power augmentation such as chillers and duct burners. Sydney N

Bill Henson: Also, don't forget impacts on emissions limits in the "costs of response"--Governor response (and even having the capability to provide governor response for some modes of control) can eat into emissions budgets.

We agree

Albert DiCaprio: The presenter stated that the Team is focused on a BA obligation, how then will the BA comply if the only energy production assets in its area are wind and nuclear. The presentation shows what units "can" do, but does not address what they "must" do. It seems that the team is missing the opportunity to discuss the wider picture of inertial obligations and who produces the energy and who is obligated in the current restructured industry. Since not all BAs are part of a market, the concept of paying for inertial response is not universal. The question then is who will provide the primary response when there are no units with the "interest" of providing the response given that the BA is obligated to "provide" the response? What incentive is there for any asset to spend any time or resources to installing and maintaining equipment unless there is a mandatory standard for them to do so?

The drafting team is recommending that this standard move forward being applicable to the BA. Based on the level of response seen today in each interconnection, the drafting team believes there is not an issue with meeting the standard with the rules in place today. This position is supported by the data supplied through the field trial.

Presilo Galliguez: Need to discuss frequency responsive operating reserves.

The drafting team is going to provide a more detailed definition of frequency responsive reserve and provide more details in the background documents.

Agenda Item III

Dan O'Hearn: Does any of this apply to generation only BAs since they don't have load beyond their own paristici load associated with the generation

Current allocation covers gen only BAs – evaluating other methods

Luke Weber: The only performance requirement in proposed MOD-027-1 is 5.3. For an otherwise stable simulation, a disturbance simulation results in the turbine/governor and load control and active power/frequency control model exhibiting positive damping. Bob C

Agenda Item IV

Agenda Item V

Dan O'Hearn: just because 30% are providing sufficent FR doesn't mean that we are ok. What incentive is there for those generators to continue to do that...especially as other BAs or generators are leaning on the system. It isn't fair to rely on the large players to maintain reliability and it is a dangerous assumption to think that will continue in the face of rampant gaming of reliability standards and good utility practice by some.

> The drafting team disagrees with the position that there is rampant gaming of reliability standards. Currently in most areas of the country, the majority of the generation is owned and operated by load serving entities or have a contract with either a load or market area and have an incentive to ensure reliable operation. Additionally, to the extent that it is needed, BAs are able and encouraged to work with the generation within their BA Area to address the issue of response.
>
> Incentive not issue – reliability is -

Raymond Vojdani: The question is related to having over-biased system. In the WECC, the Interconnection Bias is about 2000 MW/0.1 HZ, but generally speaking, loss of 1000 MW drops the frequency of the Interconnection by 0.1 of HZ. Having over-biased situation has helped BAs to contribute more during low frequency events and have helped to restore frequency much faster. This is not a disadvantage, if anything, it is a good thing for the Interconnection, since it helps stabilizing the frequency much faster rather than dragging the frequency. Granted, there is a small cost to the generators for their contribution, but, that's a small price to play and do business.

> There is not universal agreement that over biasing an interconnection is a good thing and in fact there has been issues at least partially caused by over response. Stabilizing frequency can occur at a level other than 60 Hz. This comment appears to make the case that frequency can only stabilize at 60 rather than at a level off of 60 Hz, which is not correct. Additionally, if all entities other than the contingent utility over responds and then the contingent utility restores the lost generation, frequency could remain higher than 60. This is not the appropriate outcome.

Albert DiCaprio: The presenter is correct that the current group of Ancillary Services does not include primary response service. The concept of imposing a mandate on all "suppliers" to provide OR to purchase their obligation will allow NERC to define the goal, to allow the assets to decide what is the most financially beneficial approach (to include a new ancillary service). The tariff issue is no different than the allocation for regulation. Units can regulate and still meet the tariffs today. Why would that be different for primary response?

> The same argument can be made that any BA can contract for the services needed. In fact, FERC Order 890 recognizes that the tariff could be modified by the transmission provider (or market operator) to address the issue if needed to address the issue of schedule versus response desired. The drafting team recognizes that the recommendation may not be the end state and that others may desire more rules be put in place. However, the drafting team does not believe

it should develop rules. Instead the drafting team will develop a clear definition of what is needed for reliability.

Dan O'Hearn: what if you are a smaller ba and have an IPP that has a negative response...do you have to make up for that as a BA?

The BA must retain responsibility for its BA Area, therefore, the BA is responsible for the area even if it contains an IPP with a negative response.

Mike Oatts: To argue the extreme, what if all generators turn off govenors - then where are we left without a requirement? Gerry B

Arturo Moralez: Even after presentations, the measurements proposed seem to include AGC control effects.

It is impossible to measure Frequency Response without including some AGC. The objective is to get the best measure of Frequency Response provided while at the same time minimizing the effect of AGC. When Frequency Response withdrawal must be part of the Frequency Response measure, this tradeoff between getting a good Frequency Response measure that can capture withdrawal and the inclusion of AGC in the measurement.

Agenda Item VI

wayne vanliere: Can a contingent BA (ie the BA where the event occurred) be exempt from the freq response calculation for that event?

No – because Form 1 & 2 has an adjustment provision to address your issue

Summary

Fred Frederick: I appologize if this was previously addressed. Has the impact of this proposed standard been considered for generators that are located near to loads with large load shifts (steel mills, etc.)

Form 1 & 2 has an adjustment provision to address non-conforming loads