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Subject: **GE Comments: Docket AD10-11-000** - May 26 2010 Technical Conference on Frequency Regulation Compensation

Dear Sarah:

GE attended the technical conference which was both timely and informative. We appreciate the opportunity to provide comments on this most important issue.

We would specifically like to offer comments on the topic of asymmetric regulation markets. In this context, we are referring to the practice of separating the procurement of regulation services between "up", i.e. increasing power output, and "down", i.e. decreasing power output, in response to AGC commands. Division of these two, substantially different, services into separate markets has been practiced by some systems, most notably CAISO, for some time.

GE has extensive experience, including the recently completed Western Wind and Solar Integration Study[1], in examining the operational challenges associated with integrating large amounts of wind and solar generation. These studies have shown that a lack of available reserves can be an impediment to the ability of grids to accept wind power during periods of system stress. Broadly, this issue was addressed by all of the conference speakers. However, it is extremely important to note that both the timing and system conditions that drive scarcity of reserves are, almost without exception, different for shortages of up versus down reserves. GE, as well as other investigators, have repeatedly found that one of the first problems that grids encounter as they try to accommodate higher levels of wind power are minimum load limits. Under these conditions, committed generation may be hard against lower limits, making it expensive or even impossible to offer down regulation. We have seen analytically that wind generation may be curtailed in order to allow more expensive thermal generation to run above minimum in order to provide down regulation services. Anecdotal evidence from operating grids supports this.

As the commission well knows, wind and solar generation are inherently asymmetrical resources: power output can easily be reduced should the economics favor that response. Modern wind plants can provide faster and deeper power reductions than most conventional thermal generation. By contrast, the ability to increase output has either severe capital or opportunity costs. Thus, it is economically nonsensical under all but the most extreme conditions for wind and solar to offer up regulation. Conversely, the economics for providing down regulation service may be highly compelling under the conditions during which grids will be most short of that service.

[1] http://www.nrel.gov/wwsis May 20, 2010

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During the conference, the concept of asymmetric regulation markets was briefly discussed, but dismissed on the basis that the opportunity cost to the renewable generators makes participation in this market unattractive. This statement is certainly true in systems with small to moderate levels of renewable generation. However, the observation misses the point that the light load issue becomes progressively more pressing as levels of wind generation increase. Future high wind and solar systems will almost certainly be short of down reserve capability under some conditions.

We see considerable potential benefits with the adaptation of asymmetric regulation markets to grids seeking to accommodate high levels of wind power. Specifically, the amount of wind (and possibly solar) power curtailment due to reserve shortages would be reduced, and the total rating of environmentally friendly wind power that can be accommodated in a given system would be increased. We see little downside other than some additional complexity. The system will have greater depth and liquidity for regulation markets, which should translate to increased economy for ratepayers. This approach will remove an unnatural advantage for incumbent generators. We expect this will also present an opportunity for not only renewable generation, but for other resources including demand response as well.

Thanks again for the opportunity to provide comments,

Very truly yours,

Nicholas Miller

cc. H. Elahi, M. Shah