

**UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION**

Frequency Response Metrics to Assess            )  
Requirements for Reliable Integration of        )  
Variable Renewable Generation                    )        Docket No. AD11-8-000

**COMMENTS OF THE ELECTRIC POWER SUPPLY ASSOCIATION**

The Electric Power Supply Association<sup>1</sup> (“EPSA”) submits these comments in response to the Federal Energy Regulatory Commission’s (“FERC” or “Commission”) January 20 and February 18, 2010 Notices establishing a date for comments on the Lawrence Berkeley National Laboratory’s report titled, “Use of Frequency Response Metrics to Assess the Planning and Operating Requirements for Reliable Integration of Variable Renewable Generation” (“LBNL Report”).<sup>2</sup>

**I.        COMMENTS ON LBNL STUDY**

EPSA agrees with the LBNL study that frequency response is a “critical aspect of reliability”<sup>3</sup> and the Executive Summary’s emphasis on the importance

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<sup>1</sup> EPSA is the national trade association representing competitive power suppliers, including generators and marketers. Competitive suppliers, which, collectively account for 40 percent of the installed generating capacity in the United States, provide reliable and competitively priced electricity from environmentally responsible facilities. EPSA seeks to bring the benefits of competition to all power customers. The comments contained in this filing represent the position of EPSA as an organization, but not necessarily the views of any particular member with respect to any issue.

<sup>2</sup> *Notices Inviting Comments*, Docket No. AD11-8-000 (January 20 & February 18, 2010); *LBNL Metrics Report*, by Joseph Eto et. al, filed in FERC Docket No. AD11-8-000 (December 2010). (“LBNL Study”)

<sup>3</sup> Mentioned throughout the LBNL study, phrase first used on p. xiv.

of assuring adequacy of secondary frequency response measures.<sup>4</sup> Clearly, and as outlined below, NERC and the Commission are working to address standards concerning the impacts of variable energy resource increases (e.g., consideration of frequency response as a metric for evaluating impacts) in a number of proceedings. As EPSA has noted in comments on the Variable Energy Resources (“VERs”) NOPR, there are numerous ways the grid is set to change in the coming years and EPSA members are owners, operators, and/or developers of every type of generation resource and associated technologies, including investments in VERs, energy storage and carbon capture and storage projects. Thus, EPSA has a vested interest in getting the competitive rules right as the most efficient means to satisfy reliability requirements. The LBNL study has provided an important platform, which tees up the discussion concerning the critical reliability impacts of variable energy resource penetration on system frequency response and control capabilities and suggested industry focus.

#### **A. FOUR MARKET IMPACTS OF INCREASED VERS**

As a subset of its key findings, the LBNL Study asserts that increased variable renewable generation will have four impacts on the electric system. Those impacts are first mentioned on page xvi of the introduction and then discussed in detail in Section 2.4. The impacts pertain to how variable energy resource generation will affect primary and secondary frequency control reserves. According to the LBNL study, the impacts of increased variable generation will be:

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<sup>4</sup> LBNL Study, p. xvi. (Executive Summary at 5.d)

- (1) Lower system inertia. While this effect is expected to be minor compared to the other three discussed next, other things being equal, lower system inertia would increase the requirements for primary frequency control reserves in order to arrest frequency at the same nadir following the sudden loss of generation.
- (2) Displacement of primary frequency control reserves. The amount of primary frequency control reserves that are on line and always available may be reduced as the conventional generation-based sources for these reserves are displaced by variable renewable generation, which currently does not provide primary frequency control.
- (3) Affect the location of primary frequency control reserves. Related to [number 2] above, the resulting re-dispatch of available conventional generation that currently provides primary frequency control may lead to transmission bottlenecks that prevent effective delivery of primary frequency control when it is needed.
- (4) Place increased requirements on the adequacy of secondary frequency control reserves. The demands placed on slower forms of frequency control, called secondary frequency control reserves, will increase because of more frequent, faster, and/or longer ramps in net system load caused by variable renewable generation. If these ramps exceed the capabilities of secondary reserves, primary frequency control reserves (that are set-aside to respond to the sudden loss of generation) will be used to make up for the shortfall.<sup>5</sup>

These are key fundamental findings, perhaps with finding number 4 being the most significant in terms of frequency response going forward. In fact, the displacement of secondary frequency control reserves (reserves that most, if not all, EPSC members provide) and the concern over the reliability impacts associated with that displacement were the subject of several comments in the VERCs rulemaking proceeding under Docket No. RM10-11-000. While that NOPR seeks to implement a new secondary frequency control reserve service (an additional Regulation market requirement), several commenters in that docket touch on the wide range of resources required to sustain, or in the cases

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<sup>5</sup> LBNL Study, p. xvi.

considered in the LBNL Study, restore frequency control following a disturbance.<sup>6</sup>

EPSA agrees with LBNL concerns about the adequacy of secondary frequency control reserves, particularly as they may arise from the potential of VERs to increase those needs and of the possible displacement of such reserves by VERs entry. Therefore, EPSA endorses LBNL's subsequent recommendation that "greater attention be paid to the impact of variable renewable generation on the interaction between primary and secondary frequency control reserves than has been the case in the past,"<sup>7</sup> as well as assuring adequacy of secondary frequency control reserves today. As the Commission is aware, EPSA had identified in the VERs NOPR proceeding that focus on Regulation market requirements alone was too narrow as much of the frequency restoration following a disturbance is provided outside the Regulation market by other resource ramping.

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<sup>6</sup> ISO/RTO Council, pp. 1-2: "The Commission should instead allow transmission providers to develop just and reasonable mechanisms to integrate VERs without negatively impacting the reliability of the integrated transmission system, and should afford transmission providers sufficient time to do so."

Midwest TOs, p. 4: "As discussed below, the Midwest ISO Transmission Owners support the development of new standards to integrate VERs. The new standards, however, should not impair reliability or provide any resource with an undue advantage or disadvantage."

BPA , pp. 9, 12: To support this type of a commercial and reliability framework, the Commission should work with the industry to clarify the roles and responsibilities of source and sink balancing authorities for the provision of balancing reserve capacity and dealing with the most extreme variations in VER output.

It is crucial that the Commission articulate clear policy regarding the operational and reliability treatment of VER tail events.

<sup>7</sup> LBNL Study, p. xvi.

## **B. HOW THE LBNL STUDY RELATES TO OTHER PROCEEDINGS AT THE COMMISSION**

Indeed, greater attention must be paid to the frequency response relationship to VERs and more importantly to the adequacy of secondary frequency control reserves than has been afforded in the past. In that vein, the fourth potential impact found in the LBNL Study should be a basis for evaluation in all proceedings concerning Frequency Response or the integration of VERs in general.<sup>8</sup> There are a plethora of such proceedings and the market impacts found in the LBNL study may provide a cohesive way to make sure the Commission's findings in all of those proceedings provide a consistent focus on the adequacy of secondary frequency control reserves to assure grid reliability and do so through fair and transparent competitive markets.

Some of the proceedings before the Commission have a direct and substantial link to frequency response and the impact of VERs entry and, therefore, the suggested focus on secondary frequency control reserve adequacy found in the LBNL study should be considered in those other proceedings. Those proceedings include: the VERs NOPR (RM10-11); regional system resource flexibility service discussions, where some ISOs/RTOs are considering revisions;<sup>9</sup> and, ongoing discussions at NERC on Bal-003, which seeks to form reliability standards concerning frequency response. All of these proceedings affect each other. The three metrics found in the LBNL study exist to better

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<sup>8</sup> While the LBNL study and the VERs NOPR focus on frequency regulation, RTOs are required to manage inadvertent interchange over interties with their neighbors such that Area Control Error (ACE), as averaged over ten minutes, is maintained within acceptable limits. RTO markets procure regulation services to manage ACE.

<sup>9</sup> Frequency Regulation Compensation in the Organized Wholes Power Markets, 134 FERC ¶ 61,124, Docket No. RM11-7-000 and AD10-11-000) (February 17, 2011), P 7-13.

evaluate *past* events where large losses of load occurred. How automatic frequency response has reacted to past events can provide some insights into the impacts of significant VERs entry and the types and volumes of required secondary frequency control reserve services, including the ability to minimize the occurrence of frequency excursions triggering primary frequency response measures.<sup>10</sup> Thus, each of these proceedings must be considered, at the very least, with the same set of system and market impacts in mind. The potential for displacement of secondary frequency control reserves as a market impact found in the LBNL study, may, for example, indicate the need for better market signals to value resource flexibility beyond that signaled through Regulation markets. Competitive market compensation for all of these services is needed not only to attract, but also to maintain, the resource flexibility to reliably and efficiently operate the electric system. Thus, in both the regional proceedings within each ISO/RTO and in developing national policy, the Commission should keep the four LBNL market impacts in mind, particularly market impact number 4.

While the other referenced proceedings before the Commission address broader issues than the ability to measure planning and operating requirements using frequency response, the LBNL conclusion regarding the importance of adequacy of secondary frequency control reserves and the importance of achieving sufficient resource flexibility through competitive market prices available to all suppliers should still be kept in mind in deciding the outcome in

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<sup>10</sup> Secondary frequency control reserves include both ramping capability within the Regulation service as well as ramping capability outside of Regulation service. EPSC comments in the VERs NOPR identified the importance of not excluding the latter as much ramping in RTOs is performed outside of the Regulation market.

those cases. These proceedings include: the staff request for comments regarding rates, accounting and financial reporting for new storage technologies (AD10-13); smart grid interoperability standards (RM11-2); and the Notice of Proposed Rulemaking concerning Variable Energy Resources (RM10-11).

The Commission must consider all of these proceedings in a comprehensive manner, starting with the basic premises presented in the LBNL study. Specifically, the Commission must ask how secondary frequency reserves are affected, including whether such resource flexibility is sufficiently valued in RTO markets, whether additional explicit competitive market mechanisms are necessary to retain and attract required flexibility, and how competitive market fundamentals are developed, retained or enhanced to ensure adequate secondary frequency control reserves.

Maintaining adequate frequency and system control in competitive markets requires effective distinctive market value through market prices in order to achieve reliability standards. As EPSA stated in its post-technical conference comments after the Commission's September 23, 2010 Frequency Response Conference, FERC, NERC and the industry need to consider market solutions to meet the engineering parameters to solve frequency response problems. However, in considering all of the imminent changes to the grid, it would be helpful to approach defining all potential reliability problems using the same set of market impacts. In the end, in all of these proceedings, the Commission must consider the level of reliability it expects to maintain and how that will be achieved through a competitive market. Starting with a basic consideration of

how VERs affect the secondary frequency control reserves that EPSA members provide is an essential element upon which the Commission can build conclusions in all of these other proceedings.

### **C. DEFINITIONS**

The LBNL Study inadvertently spotlights the glaring inconsistencies that still exist in defining key terms that span all of the proceedings concerning VERs. Because the Commission needs the final outcome of all of those proceedings to work in tandem, it would be helpful if there were a common lexicon of terms. Whether FERC or NERC define the following terms, consistency and certainty are paramount, as is the timeliness of getting the terms commonly defined so that various VERs proceedings can move forward.<sup>11</sup>

First and foremost, there have been many instances where “frequency response” and “frequency regulation” have been used interchangeably. The first reflects the dynamic characteristics of a system to respond to disturbances while the latter generally refers to the service of changing output to maintain frequency (and Area Control Error) within defined bounds. As FERC staff explained at the February 15, 2011 Commission meeting, frequency response is an automatic action responding to a change in frequency and frequency regulation is a more deliberate response to an RTO instruction.<sup>12</sup> NERC materials describe frequency response as “the ability of a system or elements of the system to react or

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<sup>11</sup> However, in creating a common lexicon of terms, EPSA urges the Commission to stick to general definitions and not adhere to specific numbers.

<sup>12</sup> February 15 Meeting Transcript, pp. 9-10. However, in EPSA’s understanding, frequency response includes frequency arresting (primary frequency control which is automatic) and recovery (secondary frequency control – some of which is not automatic).

respond to a change in system frequency.”<sup>13</sup> The LBNL study adopts NERC’s definition. However, NERC has noted in other Commission proceedings that there are further nuances to the definition; for example, NERC has asserted that the Commission and others have failed to recognize the difference between “frequency response” and “frequency bias.”<sup>14</sup> Common terminology development is extremely important both from a reliability standpoint and for the instant LBNL study to be effective in using metrics to analyze significant events.

## II. CONCLUSION

Wherefore, EPSA respectfully requests that the Commission consider the comments herein.

Respectfully Submitted,



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<sup>13</sup> See NERC VERs Report at 11 and NERC’s Glossary of Terms:  
[http://www.nerc.com/files/Glossary\\_12Feb08.pdf](http://www.nerc.com/files/Glossary_12Feb08.pdf)

<sup>14</sup> *Request of the North American Electric Reliability Corporation for Clarification and Rehearing*, Docket No. RM06-16-010 (April 19, 2010), p. 6.

**CERTIFICATE OF SERVICE**

I hereby certify that I have served a copy of the comments via email upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Washington, D.C. May 6, 2011.

A handwritten signature in black ink, appearing to read "Nancy Bagot", written over a horizontal line.

Nancy Bagot, VP of Regulatory Affairs