

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

California Independent System Operator)
Corporation _____)

Docket No. ER17-490

**MOTION OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR
CORPORATION TO FILE ANSWER AND ANSWER TO PROTEST**

The California Independent System Operator Corporation (CAISO) submits this answer to the December 27, 2016 protest of EDF Renewables LLC (EDF) filed in response to the CAISO's tariff amendment to clarify automatic voltage control requirements for resources providing dynamic reactive power.¹ As part of its filing, the CAISO has proposed tariff revisions to require that asynchronous resources provide dynamic reactive power as a condition of their interconnection pursuant to the requirements of Order No. 827 to utilize automatic voltage regulation systems.²

EDF is the only stakeholder that objects to this requirement. EDF objects to the requirement for three reasons. First, EDF argues that the CAISO has not demonstrated it is necessary for asynchronous resources to use automatic voltage control systems to provide dynamic reactive power pursuant to the requirements of Order No. 827.

Second, EDF asserts that there is no reliability standard that requires asynchronous

¹ The CAISO files this answer pursuant to Rules 212 and 213 of the Commission's Rules of Practice and Procedure, 18 C.F.R. §§ 385.212, 385.213. Rule 213(a)(2) prohibits answers to protests absent permission of the Commission and the CAISO hereby moves for leave to make the answer to the protest. Good cause for this waiver exists here because the answer will aid the Commission in understanding the issues in the proceeding, provide additional information to assist the Commission in the decision-making process, and help to ensure a complete and accurate record in the case. See, e.g., *Equitrans, L.P.*, 134 FERC ¶ 61,250, P 6 (2011); *Cal. Indep. Sys. Operator Corp.*, 132 FERC ¶ 61,023, P 16 (2010); *Xcel Energy Services, Inc.*, 124 FERC ¶ 61,011, P 20 (2008).

² *Reactive Power Requirements for Non-Synchronous Generation*, 155 FERC ¶ 61,277 (2016) (Order No. 827).

resources utilize automatic voltage control systems. Finally, EDF states that the CAISO has not offered any compensation for asynchronous resources to install automatic voltage regulator systems and, therefore, the CAISO's proposal is unjust and unreasonable.

The Commission should reject EDF's protest. Asynchronous resources providing dynamic reactive power pursuant to Order No. 827 need to control dynamic reactive power output to adhere to voltage schedules within the constraints of their facility design. Moreover, requiring asynchronous resources subject to Order No. 827 to respond to voltage schedules in a manner comparable to synchronous resources is consistent with requirements of the North American Electric Reliability Corporation (NERC) and the Western Electricity Coordinating Council (WECC) and ensures that there is no unduly discriminatory treatment among resources. Furthermore, the CAISO's proposal is consistent with the CAISO tariff requirements predating Order No. 827 that require asynchronous resources providing dynamic reactive power as a result of a system impact study finding to operate with automatic voltage regulation. The CAISO does not compensate these resources or synchronous resources for this capability. Given that the CAISO does not provide compensation for reactive power capability, it would be unduly preferential to compensate a limited subset of asynchronous resources for providing dynamic reactive power.

I. Resources providing dynamic reactive power on the CAISO grid must control their reactive power output for the purpose of controlling voltage.

EDF argues that the CAISO has not demonstrated that asynchronous resources need automatic voltage control systems to provide dynamic reactive power.³ The

³ Protest of EDF at 3.

CAISO operates voltage sensitive devices, and generating resources provide dynamic reactive support in a manner to maintain scheduled voltages at key substations throughout the system.⁴ In its tariff amendment, the CAISO explained that resources providing dynamic reactive power must absorb or inject reactive power automatically within the resources' power factor range in order to maintain voltage schedules.⁵ This "buck or boost" capability must occur continuously because actual voltage at a given substation fluctuates as the loading on transmission equipment and demand on the system changes. Voltages also fluctuate in real-time due to several other factors, including network topology changes and generation output from individual resources. Voltage regulators automatically adjust the dynamic reactive power of a resource, within its power factor capability, to help maintain a scheduled voltage, thus supporting stable voltages independent of other changes on the CAISO grid.

Currently, asynchronous resources providing dynamic reactive power based on a determination of need for dynamic reactive power in their system impact study must operate with automatic voltage control systems.⁶ These resources support scheduled transmission voltages by operating a resource with automatic voltage regulation. Without the capability to automatically change the reactive output of a resource within a

⁴ The CAISO does not operate resources in a constant power factor mode of operation or in a constant MVAR output mode. Only in an abnormal situation, *i.e.* if the automatic voltage control device is out of service, will the CAISO allow the resource to operate in a constant power factor or constant MVAR mode for a limited period of time.

⁵ See CAISO transmittal letter filed on December 5, 2016 in Docket ER17-490 at 4.

⁶ See *e.g.* Appendix EE of the CAISO Tariff, Appendix H, section A.iii, which states in part: "Asynchronous Generating Facilities shall also be able to provide sufficient dynamic voltage support in lieu of the power system stabilizer *and automatic voltage regulation* at the generator excitation system if the Phase II Interconnection Study shows this to be required for system safety or reliability." [Emphasis added.]

power factor range, resources required to provide dynamic reactive support would be unable to do so.⁷

The question in this proceeding is whether the CAISO's proposal reflects a just and reasonable means to ensure that resources required to provide dynamic reactive power can do so continuously in response to changing grid conditions.⁸ EDF's protest offers no factual basis to counter the record supporting the CAISO's proposed tariff revisions. EDF fails to explain why newly interconnecting asynchronous resources subject to Order No. 827 should not also operate with automatic voltage control systems.⁹ Nor does EDF Renewables provide an alternative for how its resources can provide dynamic reactive power consistent with the requirement of Order No. 827 without installing an automatic voltage regulator system.

II. The CAISO's proposal is consistent with NERC and WECC standards for resources providing dynamic reactive power.

EDF argues that NERC Reliability Standard VAR-002-4 and WECC Reliability Standard VAR-002-2 do not apply to asynchronous resources.¹⁰ As an initial matter, the CAISO disputes EDF's assertion that NERC Reliability Standard VAR-002-4 does not apply to asynchronous resources subject to the requirements of Order No. 827.

⁷ The CAISO's proposal allows asynchronous resources subject to the requirement of Order No. 827 to install a plant-level volt/var regulator to meet the requirement to operate with automatic voltage regulation.

⁸ The CAISO's proposal need only establish that its proposal is just and reasonable, not that it is superior to alternatives. See *New England Power Co.*, 52 FERC ¶ 61,090 at 61,336 (1990), *reh'g denied*, 54 FERC ¶ 61,055, *aff'd Town of Norwood v. FERC*, 962 F.2d 20 (D.C.Cir. 1992); *City of Bethany v. FERC*, 727 F.2d 1131, 1136 (D.C.Cir. 1984), *cert. denied*, 469 U.S. 917 (1984).

⁹ EDF Renewables may believe that it can elect to operate newly interconnection asynchronous resources subject to Order No. 827 using unity power factor. This would not be consistent with the requirements of Order No. 827.

¹⁰ Protest of EDF Renewables at 4-5.

Requirement 1 of NERC Reliability Standard VAR-002-4 requires each generator operator to operate each generator connected to the interconnected transmission system in the automatic voltage control mode (with its automatic voltage regulator in service and controlling voltage) or in a different control mode as instructed by the transmission operator, unless the generator is exempted by the transmission operators or for other specified reasons.¹¹ The CAISO has not issued any such exemption to asynchronous resources providing dynamic reactive power that are subject to the NERC Reliability Functional Model. To the contrary, under the CAISO's tariff existing asynchronous resources required to provide dynamic reactive power must use automatic voltage regulator systems.¹²

In 2010, the CAISO proposed uniform reactive power requirements for asynchronous resources. The Commission rejected these proposed requirements without prejudice. On rehearing, the CAISO argued that the Commission's order rejecting its proposed requirements was inconsistent with then applicable NERC Reliability Standard VAR -002-1.1b. The CAISO argued this standard required resources to provide reactive power capability. The Commission disagreed on the grounds that VAR-002-1.1b applied only to the extent that the generator had the capability to provide reactive power. In part, the Commission determined:

While VAR-002-1.1b does apply to all generators, the September 2010 Order required that each generator control voltage or reactive power output as directed by the transmission operator, but only to the extent that such control is "within applicable facility ratings." CAISO

¹¹ See NERC Reliability Standard VAR-002-4 at http://www.nerc.com/_layouts/PrintStandard.aspx?standardnumber=VAR-002-4&title=Generator%20Operation%20for%20Maintaining%20Network%20Voltage%20Schedules

¹² See e.g. Appendix EE of the CAISO Tariff, Appendix H, section A.iii.

disregards the important condition that the generator must control voltage only to the extent that it is able to do so within its equipment ratings. Therefore, consistent with VAR-002-1.1b and the September 2010 Order, a generator that is without reactive power capability may not be able to contribute to maintaining the transmission operator's requested voltage schedule. The transmission operator's voltage schedule must consider the generator's ability to accommodate the voltage schedule, rather than the transmission operator having unfettered discretion to require a generating facility to contribute reactive power outside of its rating. [Footnotes omitted.]¹³

Asynchronous resources subject to Order No. 827 are now required to supply reactive power, further this reactive power must be 100 percent dynamic. As a result, new asynchronous generators will be able to contribute to maintaining the transmission operator's requested voltage schedule, but they can only do so if the reactive power is controlled by an automatic voltage regulator system.

In this tariff amendment, the CAISO is merely proposing to require asynchronous resources subject to the requirements of Order No. 827 to operate with automatic voltage control systems. These resources are required to provide dynamic reactive power. This capability will be part of these asynchronous resources' facility ratings. NERC Reliability Standard VAR-002-04 (the current version of NERC's standard for generator operation for maintaining network voltage schedules) does not distinguish between synchronous and asynchronous resources. Based on the aforementioned Commission's rehearing order, to the extent a resource subject to NERC's Reliability Functional Model has the capability to provide dynamic reactive power within its facility capabilities, it should operate consistent with NERC Reliability Standard VAR-002-04, *i.e.* using an automatic voltage regulator system. Resources subject to the

¹³ *Cal. Indep. Sys. Operator Corp*, 137 FERC ¶ 61,143 (2011) at P 20.

requirements of Order No. 827 will have this capability. Thus, these resources must control the reactive power to maintain the designated voltage schedule within their reactive power capability, and the best means to do this – as recognized by WECC’s regional reliability standard VAR-002-2 – is to use an automatic voltage regulator system.

The CAISO recognizes that WECC Reliability Standard VAR-002-2 does not apply to asynchronous resources. Pursuant to this standard, WECC requires synchronous resources to operate with automatic voltage regulator systems in service. But it is only logical for asynchronous resources that provide dynamic reactive power to operate with a voltage control system that is comparable to a synchronous resource.

Moreover, the Commission has recognized the growing penetration of asynchronous resources.¹⁴ Absent increases in demand to match this growing penetration, asynchronous resources that have no fuel costs will displace synchronous resources. It is logical to require asynchronous resources obligated to provide dynamic reactive power pursuant to Order No. 827 to operate with automatic voltage regulator systems similar to synchronous resources.

III. The CAISO’s tariff amendment treats all resources providing dynamic reactive power in a similar manner.

EDF asserts that the CAISO’s proposal is unjust, unreasonable and unduly discriminatory because the CAISO offers no compensation for asynchronous resources to install automatic voltage regulator systems.¹⁵ As explained in its transmittal letter, the CAISO currently does not generally compensate resources for reactive power

¹⁴ Order No. 827 at P 13.

¹⁵ Protest of EDF Renewables at 5-8.

capability, including installation costs for automatic voltage regulator systems. The CAISO does not compensate synchronous resources for installing automatic voltage regulators. Also, the CAISO does not compensate existing asynchronous resources providing dynamic reactive power based on a finding of need in a system impact study for installing automatic voltage regulator systems. Accordingly, the Commission should not condition acceptance of the CAISO's tariff amendment on the provision of compensation to asynchronous resources subject to the requirements of Order No. 827. Doing so would create an undue preference.

The Commission has accepted different approaches for organized markets to compensate resources for the capability to provide reactive power. However, the Commission has not required that transmission providers pay resources for having the capability to provide reactive support, including installing automatic voltage regulators, unless they compensate their own or affiliated generators for this capability. In Order No. 827, the Commission did not change the Commission's existing policies on compensation for reactive power.¹⁶ With respect to compensation, the CAISO's tariff amendment treats all similarly situated resources – those providing dynamic reactive power – in a comparable manner.

IV. Conclusion.

The Commission should reject EDF's protest. The CAISO has demonstrated that its proposal is just and unreasonable. Asynchronous resources with the capability to provide dynamic reactive power must control their reactive power output automatically and continuously in response to changing grid conditions. The CAISO's proposal is consistent with requirement 1 of NERC Reliability Standard VAR-002-4. The CAISO's

¹⁶ Order No. 827 at P 52.

proposal treats asynchronous resources subject to the requirements of Order No. 827, in the same manner as asynchronous resources that are required to provide dynamic reactive power as a result of a system impact study finding to operate with automatic voltage regulator systems. In that regard, the CAISO's proposal avoids any undue discrimination issues. The CAISO respectfully requests that the Commission issue an order no later than March 6, 2017 accepting its proposal.

Dated: January 11, 2017

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon all of the parties listed on the official service list for the captioned proceeding, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, California this 11th day of January 2017.

/s/ Grace Clark

Grace Clark