

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

Reactive Power Requirements for
Non-Synchronous Generation

Docket No. RM16-1

**MOTION FOR CLARIFICATION AND, IN THE ALTERNATIVE, REQUEST FOR
REHEARING OF THE CALIFORNIA INDEPENDENT SYSTEM
OPERATOR CORPORATION**

I. Introduction

The California Independent System Operator Corporation (CAISO) respectfully submits this motion for clarification or, in the alternative, request for rehearing¹ of Commission Order No. 827.² In Order No. 827, the Commission adopted a final rule requiring all newly interconnecting non-synchronous generators to provide reactive power at the high-side of the generator substation as a condition of interconnection as set forth in their large generator interconnection agreement or small generator interconnection agreement. The CAISO generally supports the Commission's final rule but seeks clarification on whether a repowering project that requires new inverters constitutes a newly interconnecting facility under Order No. 827. The CAISO requests that the Commission clarify that a repowering of an existing facility that requires new inverters and an interconnection study constitutes a newly interconnecting facility under Order No. 827. The Commission has recognized that modern inverters can provide

¹ The CAISO submits this motion pursuant to Rules 212 and 713 of the Commission's Rules of Practice and Procedure, 18 C.F.R. §§ 385.212, 385.713 and section 313 of the Federal Power Act, 16 U.S.C. 825I.

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

reactive power capability. The Commission's regulations should treat repowering projects that will use new inverters equipped with reactive power capability in a similar manner as greenfield projects that will use new inverters equipped to provide reactive power capability.

II. Background

In Order No. 827, the Commission required all newly interconnecting non-synchronous generators to provide reactive power at the high-side of the generator substation as a condition of interconnection as set forth in their large generator interconnection agreement or small generator interconnection agreement. The Commission, however, did not apply this requirement to existing resources making upgrades that require new interconnection requests after the effective date of the final rule. The Commission determined instead that these resources would only be required to provide reactive power if the transmission provider's system impact study shows that provision of reactive power by the resource is necessary to ensure safety or reliability.³ The Commission granted transmission providers the flexibility to apply the reactive power requirement to the entirety of the existing non-synchronous resource's capacity when it makes an upgrade that requires a new interconnection request, and the system impact study shows the need for reactive power.⁴

III. Statement of Issue and Specification of Error or Clarification

The Commission should clarify that the requirements of Order No. 827 apply to repowered projects that install new inverters and must undergo a new interconnection

³ Order No. 827 at P 65.

⁴ *Id.* at P 66.

study because these types of projects constitute newly interconnecting facilities. Absent this clarification, the CAISO requests rehearing on this limited issue on the grounds that Order No. 827 is in error and should be modified.

IV. Discussion

In its proposed rule, the Commission proposed to require all newly interconnecting resources (*i.e.*, new generators seeking to interconnect to the transmission system), both synchronous and non-synchronous, to provide reactive power as a condition of interconnection. In its final rule, however, the Commission exempted non-synchronous resources making upgrades from the requirement to provide reactive power capability unless there is a demonstrated need in a system impact study. In support of this exemption, the Commission cited comments explaining that most upgrades that require new interconnection requests do not involve fundamental changes to the original technology, or to the hardware, but instead simply involve software upgrades.⁵ The CAISO is concerned that some entities may interpret the Commission's final rule to extend this exemption to repowering of facilities that require new inverters - an action that is much more significant than a software upgrade – and must undergo a new interconnection study. The Commission should clarify that a repowering of a resource that requires new inverters and an interconnection study is not an upgrade to an existing facility, but instead constitutes a newly interconnecting facility for purposes of Order No. 827.

Under the CAISO's Commission-approved tariff, entities may obtain an interconnection agreement for a repowered generation project without having to

⁵ Order No. 827 at P 64.

participate in the CAISO's generator interconnection and deliverability allocation procedure study process, if they demonstrate that the total capability and electrical characteristics of the resource will remain substantially unchanged.⁶ If the CAISO and the applicable participating transmission owner confirm that the electrical characteristics of the resource are substantially unchanged, then the CAISO will not place that request into the interconnection queue, and will not undertake a system impact study. Under Order No. 827, such upgrades to existing resources would not be required to provide reactive power capability as a condition of signing a new interconnection agreement.

In contrast, if a repowering will result in an interconnected resource increasing its total capability of the power plant, then the resource must submit an interconnection request.⁷ Likewise, a resource must submit a new interconnection request if, without increasing the total capability of the power plant, it changes its electrical characteristics such that its re-energization may violate applicable reliability criteria.⁸ Under Order No. 827, the CAISO would need to undertake a system impact study to assess whether these upgraded resources should provide reactive power as a condition of interconnection.⁹

For resources that are repowering projects and installing new inverters, conducting a system impact study should not be necessary to require them to provide

⁶ CAISO tariff section 25.1.2; see also Section 12 of the CAISO's Business Practice Manual for Generator Management. https://bpmcm.caiso.com/BPM%20Document%20Library/Generator%20Management/BPM_for_GeneratorManagement_V14_clean.docx

⁷ CAISO tariff section 25.1 (b).

⁸ *Id.* at section 25.1(c).

⁹ Order No. 827 at PP 64-67.

reactive power capability as a condition of interconnection. These repowering projects will likely alter the electrical characteristics of existing resources such that the repowerings will need to undergo a new interconnection study process pursuant to CAISO tariff. For example, a repowering project may involve a natural gas facility converting its plant to a solar photovoltaic facility.

In Order No. 827, the Commission recognized that modern inverters can be designed to provide reactive power capability at all levels of real power output.¹⁰ Accordingly, resources that are installing new inverters as part of a repowering project that needs to undergo an interconnection study process should be considered newly interconnecting resources for purposes Order No. 827. These repowerings will include modern inverters that can provide reactive power capability. No system impact study should be necessary to demonstrate the need for these resources to provide reactive power capability because the resource should be able to configure the inverter to provide this capability.

As interconnection customers propose projects to meet California's 50 percent renewable portfolio standard, repowering projects that are using new inverters should be required to provide reactive power capability as a condition of interconnection. These repowerings will involve more than software upgrades. They will include new plant and modern inverters. By treating these repowerings as newly interconnecting facilities under Order No. 827, the Commission will promote voltage stability on the CAISO controlled grid and mitigate the possibility that the system impact study process will not identify a reactive power capability need. This action will also send an important

¹⁰ *Id.* at P 48.

regulatory signal that repowerings that involve inverter based technologies should use modern inverters to ensure they can provide essential reliability services like reactive power to the electricity grid.

The CAISO reiterates its concerns that system impact studies may not always identify deficiencies in reactive power support and absorption because they do not study all conditions that occur. In particular, deficiencies can occur during off peak conditions and on days with high levels of variable energy resources and low demand periods or during periods when transmission infrastructure or synchronous resources are out of service.¹¹ System impact studies will not capture these deficiencies. Instead, the case-by-case approach relies heavily on the assumptions of future conditions that may not prove true and do not account for unanticipated events. As a result, relying on a system impact study approach places a level of subjectivity in studying operating scenarios because of the numerous combinations of generation resources and transmission facilities out on maintenance, load levels, and non-synchronous resource production levels. Clarifying that repowerings that require new inverters constitute newly interconnecting resources under Order No. 827 will facilitate more effective and efficient system operations and planning. In addition, this clarification will treat all projects using modern inverters in a comparable manner.

V. Conclusion

The Commission should clarify that repowering projects that require new inverters and an interconnection study constitute newly interconnecting resources under

¹¹ Order 827 at P 18. See also CAISO Draft Final Proposal dated November 11, 2015 at 11-13. See discussion of CAISO system impact study process to assess reactive power capability for non-synchronous resources. <http://www.aiso.com/Documents/DraftFinalProposal-ReactivePowerRequirements-FinancialCompensation.pdf>

Order 827. This will ensure that these repowered resources provide reactive power capability and will treat inverter-based resources whether repowering or greenfield projects in a comparable manner under the Commission's regulations.

Dated: July 18, 2016

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service lists in the above-referenced proceedings, 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 18th day of July 2016.

Is/ Anna Pascuzzo

Anna Pascuzzo