February 13, 2016

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: California Independent System Operator Corporation
Docket No. ER17-114-000; ER17-114-001

Response to Request for Additional Information

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) submits this filing in response to the January 12, 2017, request of the Commission's Office of Energy Market Regulation for additional information relating to the CAISO's filing to comply with Order No. 827.[1]

I. Introduction

In Order No. 827, the Commission established reactive power requirements for non-synchronous resources. Under the final rule, newly interconnecting non-synchronous resources that have not yet executed a facilities study agreement as of the effective date of the final rule must provide dynamic reactive power within the range of 0.95 leading to 0.95 lagging at the high-side of the generator substation.[2] This change eliminated the need for transmission providers to assess whether newly interconnecting non-synchronous resources must provide reactive power as a condition of interconnection through system impact studies.

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[1] *Reactive Power Requirements for Non-Synchronous Generation*, 155 FERC ¶ 61,277 (2016) (Order No. 827), *modified by* 157 FERC 61,003 (2016) (*Order on Clarification and Rehearing*).

The CAISO submits this filing pursuant to Section 205 of the Federal Power Act, 16 U.S.C. § 824d, and Section 35.13 of the Commission's regulations, 18 C.F.R. § 35.13. Capitalized terms not otherwise defined herein have the meanings set forth in Appendix A to the CAISO tariff.

[2] *Id.* at PP 22-25 and PP 34-38.

The Commission did not apply these requirements to existing non-synchronous resources.[3] Instead, in Order No. 827, the Commission stated that such existing resources will be exempt from the requirement to provide reactive power *unless* the transmission provider's system impact study shows that provision of reactive power by that resource is necessary to ensure safety or reliability.[4] Pursuant to Order No. 827, if a transmission provider's system impact study shows the need for reactive power because of an upgrade, the transmission provider may require that the resource provide reactive power capability consistent with the needs identified in the study.[5] Order No. 827 directed transmission providers to propose, as part of their compliance filings, tariff revisions to assess reactive power needs from existing non-synchronous generators making upgrades to their generating facilities that require new interconnection requests.[6]

In response to Order No. 827, the CAISO requested timely clarification or, in the alternative, rehearing.[7] The CAISO requested that the Commission clarify that a repowering of an existing non-synchronous facility that requires new inverters and an interconnection study constitutes a newly interconnecting facility under Order No. 827. On October 3, 2016, the Commission issued an order granting in part and rejecting in part the CAISO's motion. In its *Order on Clarification and Rehearing,* the Commission clarified that Order No. 827 does not preclude a public utility transmission provider from proposing in its compliance filing a tariff provision defining "newly interconnecting non-synchronous generator" as including a repowering of an existing generator.[8] The Commission stated that any such tariff revisions must be sufficiently detailed and narrow to define what constitutes a repowering of an existing generator capable of providing reactive power.[9]

In October 2016, the CAISO submitted its filing to comply with Order No. 827. Relevant to how Order No. 827 would apply to existing resources that are making modifications to their resources, the CAISO proposed new tariff section 25.4.1. The proposed tariff language builds on the CAISO's existing tariff that permits existing resources to modify their facilities without having to undergo an

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3 *Id.* at P 65.

4 *Id.*

5 *Id.* at P 66.

6 *Id.* at P 67.

7 *See* CAISO Motion for Clarification or, in the Alternative, Rehearing dated July 18, 2016. http://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14311431

8 *Order on Clarification and Rehearing* at P 8.

9 *Id.*

interconnection study process.[10] To do so, resource owners must demonstrate that the modification will not increase the total capability of the power plant or substantially change the electrical characteristics of the generating unit. Permissible modifications for existing resources include, *inter alia,* replacing inverters, so long as the total capability of the power plant and electrical characteristics of the resource will remain substantially unchanged. Under these circumstances, the CAISO will not require the resource owner to submit an interconnection request and will not undertake a system impact study.

In its compliance filing, the CAISO proposed to treat existing non-synchronous resources making upgrades that need to undergo an interconnection study process as newly interconnecting non-synchronous resources under the provisions of Order No. 827. Based on the questions presented by the Commission's Office of Energy Market Regulation and further reflection, the CAISO requests leave to change this proposed approach. The CAISO recognizes that the Commission is seeking to ensure existing non-synchronous resources making minor changes to their facilities do not face the additional cost of providing dynamic reactive power. To this end, the CAISO proposes to incorporate language that mirrors tariff language filed by Southern California Edison Company and recently accepted by the Commission.

II. The Commission should accept the CAISO's proposal described in this response as it relates to existing resources making modifications to their facilities.

On January 12, 2017, the Commission's Office of Energy Market Regulation requested additional information to process the CAISO's compliance filing. The CAISO provides the following answers to the Commission's questions.

1) Definition of Repowering Projects

On page six of the transmittal letter, CAISO states that "for "interconnection customers making upgrades to their existing resources that do need to undergo an interconnection study process, the CAISO is proposing to treat these repowering projects as newly interconnecting resources under the provisions of Order No. 827."

a. Please define "repowering projects." Please explain how this definition is "sufficiently detailed and narrow to clearly define what constitutes a repowering of an existing generator *capable of*

[10] *See* CAISO tariff section 25.1.2; *see also* Section 12 of the CAISO's Business Practice Manual for Generator Management. https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Generator%20Management

> ***providing reactive power*," consistent with the Order No. 827 Rehearing Order. [Footnote omitted.]**

Section 25 of the CAISO tariff and section 5.19 of the CAISO's current *pro forma* the Generator Interconnection Agreement (GIA)[11] recognize projects may request modifications to their Generating Units or Generating Facility. If the modification increases the total capability of the power plant or substantially changes the electrical characteristics of the generating unit, then the modification would need to go through the interconnection study process.[12] Other modifications may not trigger this requirement and many modifications proceed without the need for an interconnection study process. The CAISO refers to the projects that do not need to undergo an interconnection study process as repowering projects. As an example, repowering projects could be existing wind farms built in the 1980s that want to repower the generating facility with current state of the art windmills.

The CAISO's existing procedures for evaluating repowering project requests by an owner of an existing resource made pursuant to section 25.1.2 of the CAISO tariff allows resource owners to obtain a new interconnection agreement with the CAISO, and the relevant participating transmission owner, without having to participate in the CAISO Generator Interconnection and Deliverability Allocation Procedure study process, if the resource owner demonstrates that the "total capability and electrical characteristics of the Generating Unit will remain substantially unchanged."[13] These repowering projects do not require the resource owner to undergo an interconnection study.

As described in the CAISO's Business Practice Manual for Generator Management, any repowering of an existing resource, unless replaced with identical equipment, will result in some changes to the total capability and electrical characteristics of the resource. These changes will cause some degree of corresponding change in the performance of the transmission system. The CAISO will only consider changes to be "substantial" if there is a proposed change in fuel source as described in the Business Practice Manual or if the changes have an adverse electrical impact on the transmission system. Adverse impacts to the transmission system include increasing the power flow during normal or contingency conditions, increasing the short circuit duty in a manner that overstresses transmission equipment, or creating adverse angular or voltage

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[11] *See* Appendix EE of the CAISO tariff, Large Generator Interconnection Agreement for Interconnection Requests Processed under the Generator Interconnection and Deliverability Allocation Procedures.

[12] CAISO tariff section 25.1(b) and (c).

[13] Attached hereto, as Appendix A, is a copy of a diagram that depicts the business process for a resource owner to pursue a repowering project.

stability impacts, compared to the impacts associated with the original generating facility.[14]

The CAISO's filing to comply with Order No. 827 relied on this process to assess whether or not an existing non-synchronous resource making an upgrade to its facility should provide dynamic reactive power. The CAISO proposed that if an existing resource requesting modifications to its generating unit must complete an interconnection study process, then it would need to provide dynamic reactive power.[15]

Upon further consideration, the CAISO proposes the following mechanism to assess whether an existing resource requesting modifications to its generating unit must provide dynamic reactive power pursuant to Order No. 827. If an existing resource makes modifications that require the submission of an interconnection request and the subsequent interconnection study finds that the reactive power requirement is necessary to ensure system safety or reliability, then the CAISO will require the entire facility to comply with the dynamic reactive power requirements of Order No. 827. In addition, when an existing resource requests to repower and its replaces electric generating units with new non-synchronous electric generating units, then the CAISO will require the new non-synchronous generating units to provide dynamic reactive power, whether or not submission of a new interconnection request is required.

This language mirrors tariff language submitted by Southern California Edison Company,[16] which the Commission accepted on February 2, 2017.[17] To implement this language, the CAISO would modify proposed tariff section 25.4.1 as set forth below. Underscored language reflects additions; strikethrough language reflects deletions.

25.4.1 Asynchronous Generating Facilities–Reactive Power

~~After September 21, 2016, an existing Asynchronous Generating Facility making upgrades to its Generating Unit(s) that require a new Interconnection Request under Section 25 will provide reactive power capability as described in Section 25.4.1.~~
~~The Generating Unit will maintain a composite power delivery at~~

[14] CASIO Business Practice Manual for Generator Management Section 12.2. https://bpmcm.caiso.com/BPM%20Document%20Library/Generator%20Management/BPM_for_GeneratorManagement_V17_clean.docx

[15] *See* proposed CAISO tariff section 25.1.4.

[16] Southern California Edison company Order No. 827 compliance filing in Docket ER17-203 on October 27, 2016 at 13-14. https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14385126

[17] *Southern California Edison Company*, 158 FERC ¶ 61,118 (2017). https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14481966

~~continuous rated power output at the high-side of the generator substation at a power factor within the range of 0.95 leading to 0.95 lagging, unless the CAISO has established a different power factor range that applies to all Asynchronous Generating Facilities on a comparable basis. This power factor range standard shall be dynamic and can be met using, for example, power electronics designed to supply this level of reactive capability (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors or reactors, or a combination of the two.~~

The reactive power requirements set forth in FERC's Order No. 827 will apply to: 1) the entirety of an existing Asynchronous Generating Facility in the event such Generating Facility makes modifications that require the submission of a new Interconnection Request, and a subsequent Interconnection Study finds that the reactive power requirement is necessary to ensure system safety or reliability; 2) new Asynchronous Electric Generating Units, when an existing Generating Facility replaces Electric Generating Units with new Asynchronous Electric Generating Units, whether or not submission of a new Interconnection Request is required. Under these requirements, the Asynchronous Electric Generating Facility or Asynchronous Electric Generating Unit, as applicable, will maintain a composite power delivery at continuous rated power output at the high-side of the generator substation at a power factor within the range of 0.95 leading to 0.95 lagging, unless the CAISO has established a different power factor range that applies to all Asynchronous Generating Facilities on a comparable basis. This power factor range standard shall be dynamic and can be met using, for example, power electronics designed to supply this level of reactive capability (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors or reactors, or a combination of the two.

After September 21, 2016, an existing Asynchronous Generating Facility making upgrades to its Generating Unit(s) through the Fast Track Process will maintain a composite power delivery at continuous rated power output at the high-side of the generator substation at a power factor within the range of 0.95 leading to 0.95 lagging, unless the CAISO has established a different power factor range that applies to all Asynchronous Generating Facilities on a comparable basis. This power factor range standard shall be dynamic and can be met using, for example, power electronics designed to supply this level of reactive capability (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors or reactors, or a combination of the two.

~~After September 21, 2016, an existing Asynchronous Generating Facility making upgrades to its Generating Unit(s) that does not require a new~~

~~Interconnection Request under Section 25 will provide reactive power capability consistent with requirements of its existing Generator Interconnection Agreement.~~

The changes to proposed tariff section 25.4.1 will ensure that existing non-synchronous generators that make modifications to their facilities that require an interconnection request will only need to comply with the dynamic reactive power requirements of Order No. 827 if the CAISO conducts an interconnection study that finds a need exists. The changes will also ensure that existing non-synchronous resources that replace existing generating units with new generating units will comply with the dynamic reactive power requirements of Order No. 827 at those new units. The first triggering event in this proposed language applies to existing non-synchronous generating facilities which have requested modifications that require the submission of an interconnection request. Consistent with Order No. 827, dynamic reactive power requirements will only apply to the generating facility if the CAISO's system impact study shows that provision of reactive power by that resource is necessary to ensure safety or reliability.[18] The second triggering event applies to generating facilities that replace electric generating units with new non-synchronous generating units. In this instance, the dynamic reactive power requirements of Order No. 827 will apply only to the replacement units, and not to the entirety of the generating facility, unless the entire generating facility is being replaced. In other words, the scope and definition of a "repowering" for purposes of the CAISO's proposed compliance with Order No. 827 would be limited to new non-synchronous generating units only.

b. Is there a distinction in the CAISO tariff between an upgrade of a facility and a repowering of a facility? If so, please explain.

The CAISO tariff does not use defined terms to distinguish between an upgrade of a facility and a repowering of a facility. The CAISO generally uses the term *repowering* in its Business Practice Manual to refer to projects that modify their generating units but *do not* increase total capability of the resource or involve modifications that substantially change the resource's electrical characteristics such that its re-energization may violate applicable reliability criteria.

[18] Order No. 827 at PP 65-66.

c. Please explain how this definition of repowering projects is reflected in the proposed tariff revisions. Would all existing resources making upgrades that are required to undergo an interconnection study process pursuant to existing tariff Section 25 satisfy the definition of "repowering projects"?

No. As explained in its response to question (1)(a) above, upon further consideration, the CAISO is proposing a new mechanism to apply the requirements of Order No. 827 to existing resources making modifications to their generating facilities. Under this new mechanism, existing resources making modifications that are required to undergo an interconnection study process would be subject to the dynamic reactive power requirements of Order No. 827, if the CAISO determines through a system impact study that it would be subject to these requirements. In this case, the reactive power requirements would apply to the entire generating facility. For existing resources that are replacing a generating unit with a new non-synchronous generating unit, the dynamic reactive power requirements of Order No. 827 would apply to the new generating unit only. .

2) <u>Reactive Power Requirements for Upgrades</u>

Under proposed CAISO tariff Section 25.4.1, "an existing Asynchronous Generating Facility making upgrades to its Generating Unit(s) that require a new Interconnection Request under Section 25 will provide reactive power capability as described in Section 25.4.1." Existing Section 25.1 provides that existing interconnection customers must submit a new interconnection request for:

> **(b) each existing Generating Unit connected to the CAISO Controlled Grid that will be modified with a resulting increase in the total capability of the power plant;**
> **(c) each existing Generating Unit connected to the CAISO Controlled Grid that will be modified without increasing the total capability of the power plant but has changed the electrical characteristics of the power plant such that its re-energization may violate Applicable Reliability Criteria;**
> **(d) each existing Generating Unit connected to the CAISO Controlled Grid whose total Generation was previously sold to a Participating TO or on-site customer but whose Generation, or any portion thereof, will now be sold in the wholesale market, subject to Section 25.1.2; and**
> **(e) each existing Generating Unit that is a Qualifying Facility and that is converting to a Participating Generator without repowering or reconfiguring the existing Generating Unit,**

subject to Section 25.1.2.

a. Under proposed Section 25.4.1, would an upgrade or repowering project be required to provide reactive power to support the generating capacity of its entire plant, or only provide reactive power for the incremental amount of new capacity that must undergo an interconnection study? Please explain how your response is reflected in the proposed tariff revisions. If necessary, please include separate responses for upgrades and repowerings.

Under the changes to proposed section 25.4.1 set forth in response to question (1)(a) above, the CAISO would treat only the replacement units, and not the entirety of the generating facility as a newly interconnecting resource for purposes of Order No. 827. This rule is reflected in the CAISO's proposed tariff language set forth in response to question (1)(a) above.

b. Please explain why requiring each type of resource described in existing Sections 25.1(b)-(e) to comply with the reactive power requirements of Order No. 827 is consistent with Order No. 827. Among other things, please explain why CAISO's proposal is consistent with the Commission's finding that the reactive power requirements of Order No. 827 do not apply to existing non-synchronous generators making upgrades that require new interconnection requests, absent a showing by the transmission provider's system impact study that provision of reactive power by that generator is necessary to ensure safety or reliability. If CAISO is seeking approval of the proposal under the independent entity variation standard, please justify your variations in light of Order No. 827, specifically related to concerns that older wind generators making upgrades to their facilities may face significant cost in providing reactive power. [Footnote omitted.]

In its compliance filing, the CAISO did not propose to treat each type of resource described in existing CAISO tariff sections 25.1(b)-(e) as a newly interconnecting non-synchronous resource under Order No. 827. Instead, the CAISO proposed to treat an existing non-synchronous resource making modifications to its resource that increase the total capability of the power plant, or substantially change its electrical characteristics such that its re-energization may violate applicable reliability criteria (*i.e.* resources listed in sections 25.1(b) and (c)), as a newly interconnecting non-synchronous resource for purposes of Order No. 827.[19] The CAISO is proposing to change that trigger in this response.

[19] CAISO tariff section 25.1.1.

The CAISO is not requesting relief under the "independent entity variation" standard.[20] This standard allows the Commission to extend greater flexibility to the CAISO to customize interconnection procedures than the Commission would extend to a non-independent transmission provider because the CAISO does not own generation, and therefore lacks the incentive to discriminate in favor of certain generation or to obstruct access to the grid by independent generators.[21] Here, the CAISO's proposal is consistent with Order No. 827, as modified by the Commission's *Order on Clarification and Rehearing*.

Existing resources undertaking modifications to their facilities must comply with Order No. 827 only if the CAISO makes a finding through an interconnection study that the resource must provide reactive power. For purposes of "repowerings" as the CAISO uses that term, the dynamic reactive power requirements of Order No. 827 will apply only if the existing resource replaces a generating unit with a new non-synchronous generating unit. In this case, the requirements will only apply to the new non-synchronous generating unit. This proposal is sufficiently detailed and narrow to define what constitutes a repowering of an existing resource's generator unit that will be required to provide dynamic reactive power.[22]

With respect to the cost to existing resources of installing reactive power capability, the Commission has recognized that technological advancements have reduced the cost of providing reactive power.[23] These technological enhancements apply equally to new resources and existing resources that make modifications to their facility to include new non-synchronous generating units. To the extent that other generating units at an affected power plant that are not part of the upgrade, the CAISO will not treat these power plants as newly interconnecting non-synchronous resources for purposes of Order No. 827.

III. Conclusion

The CAISO's proposed tariff provisions, as modified in this filing, are consistent with the Commission's Order No. 827 and the Commission's *Order on Clarification and Rehearing*. The CAISO respectfully requests that the

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20 *Standardization of Generator Interconnection Agreements and Procedures*, Order No. 2003, 68 Fed. Reg. 49,845 (Aug. 19, 2003), FERC Stats. & Regs. ¶ 31,146 (2003) (Order No. 2003), *order on reh'g,* Order No. 2003-A, 69 Fed. Reg. 15,932 (2004), FERC Stats. & Regs. ¶ 31,160 (2004), *order on reh'g,* Order No. 2003-B, 70 Fed. Reg. 265 (2005), FERC Stats. & Regs. ¶ 31,171 (2005), *order on reh'g*, Order No. 2003-C, 70 Fed. Reg. 37,661 (2005), FERC Stats. & Regs. ¶ 31,190 (2005).

21 *Id*.

22 *Order on Clarification and Rehearing* at P 8.

23 Order No. 827 at PP and 10.

Commission accept this filing together with the changes the CAISO agreed to make in its November 15, 2016 answer to motions to intervene.

Please contact the undersigned if you have any questions regarding this matter.

Dated: February 13, 2016

Respectfully submitted,

/s/ Andrew Ulmer
Roger E. Collanton
General Counsel
Anthony Ivancovich
Deputy General Counsel
Andrew Ulmer
Director, Federal Regulatory Affairs
The California Independent System Operator Corporation
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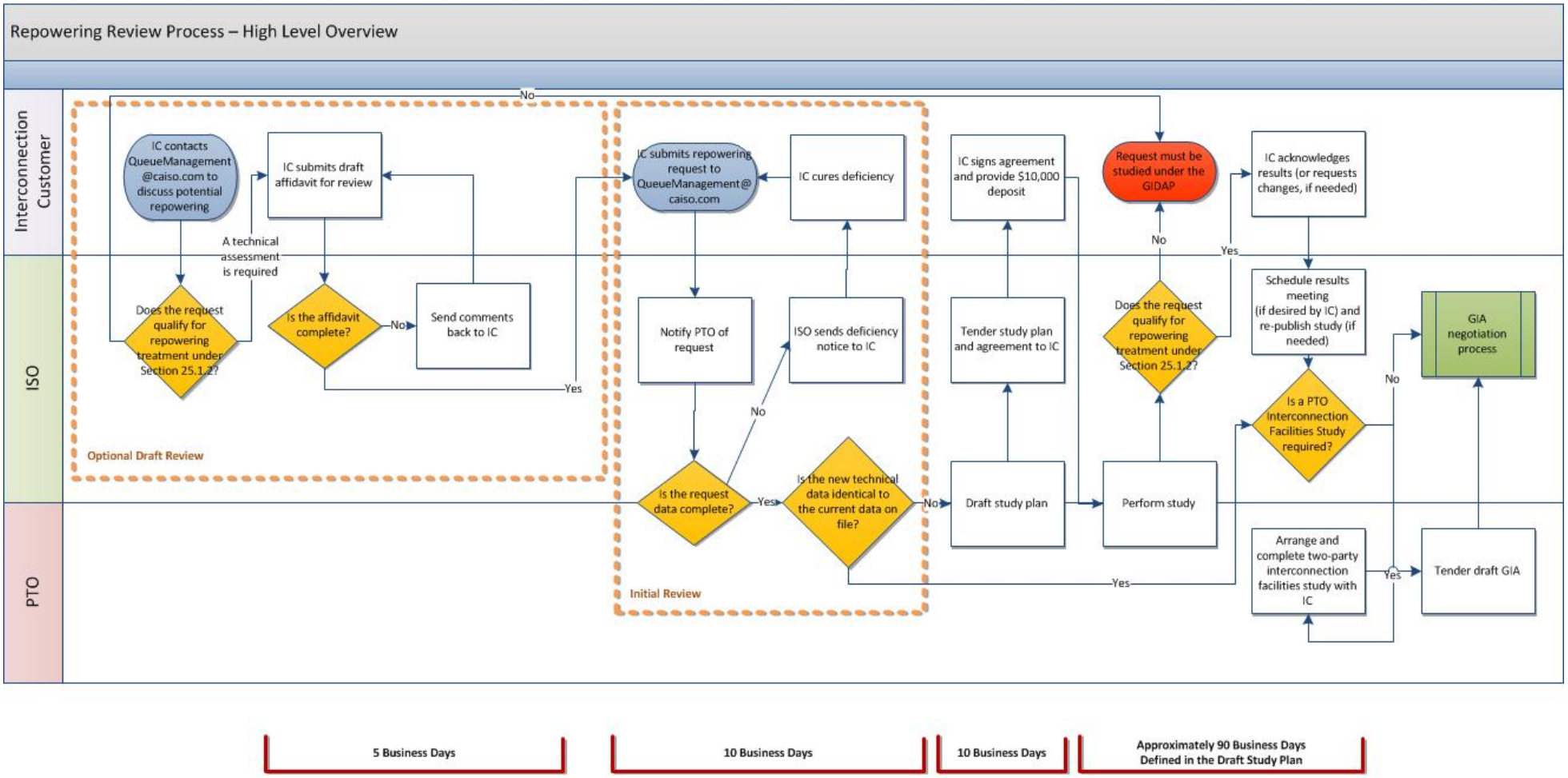
Appendix A

Response to Request for Additional Information

California Independent System Operator Corporation


Repowering Review Process – High Level Overview
Interconnection Customer
ISO
PTO
IC contacts QueueManagement@caiso.com to discuss potential repowering
IC submits draft affidavit for review
A technical assessment is required
Does the request qualify for repowering treatment under Section 25.1.2?
Is the affidavit complete?
No
Send comments back to IC
Yes
Optional Draft Review
IC submits repowering request to QueueManagement@caiso.com
IC cures deficiency
Notify PTO of request
ISO sends deficiency notice to IC
No
Is the request data complete?
Yes
Is the new technical data identical to the current data on file?
No
Initial Review
IC signs agreement and provide $10,000 deposit
Tender study plan and agreement to IC
Draft study plan
Request must be studied under the GIDAP
No
Does the request qualify for repowering treatment under Section 25.1.2?
Yes
Perform study
IC acknowledges results (or requests changes, if needed)
Schedule results meeting (if desired by IC) and re-publish study (if needed)
Is a PTO Interconnection Facilities Study required?
No
Yes
Arrange and complete two-party interconnection facilities study with IC
Yes
GIA negotiation process
Tender draft GIA
5 Business Days
10 Business Days
10 Business Days
Approximately 90 Business Days Defined in the Draft Study Plan

CERTIFICATE OF SERVICE

I certify that I have served the foregoing document upon the parties listed on the official service list in the captioned 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 13th day of February, 2017.

/s/ Grace Clark
Grace Clark