

July 19, 2021

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. ER21- ____-000**

Tariff Amendment to Comply with Order No. 2222

Dear Secretary Bose:

The California Independent System Operator Corporation (“CAISO”) submits this tariff amendment to comply with Order No. 2222,¹ which the Commission issued to remove barriers to distributed energy resource aggregations’ (“DERAs”) participating in the capacity, energy, and ancillary service markets operated by RTO/ISOs.² The CAISO respectfully requests that the Commission accept this filing in compliance with the requirements of Order No. 2222.

I. Introduction

The CAISO, transmission owners, and stakeholders have worked diligently for many years to ensure distributed energy resources (“DERs”) can access the CAISO’s wholesale markets. In 2016, the CAISO was the first RTO/ISO to establish a DERA model. However, even before then, the CAISO enabled DERs to participate in its markets. Since 2005, over 500 new resources comprising over 2,200 MW have interconnected to the distribution grid to participate in the CAISO’s wholesale markets. The CAISO tariff allows DERs to participate in its markets regardless of what tariff or retail program they used to interconnect originally.³ Likewise, the CAISO tariff does not

¹ *Participation of Distributed Energy Resource Aggregations in Markets Operated by Regional Transmission Organizations and Independent System Operators*, Order No. 2222, 85 FR 67094 (Oct. 1, 2020), 172 FERC ¶ 61,247, at P 1 n.1 (2020), *corrected*, 85 FR 68450 (Oct. 29, 2020); *order on reh’g*, Order No. 2222-A, 86 FR 16511 (Mar. 24, 2021), 174 FERC ¶ 61,197 (2021); *order on reh’g*, Order No. 2222-B, 175 FERC ¶ 61,227 (2021).

² The CAISO submits this filing pursuant to section 205 of the Federal Power Act, 16 U.S.C. § 824d. Capitalized terms not otherwise defined herein have the meanings set forth in the CAISO tariff, and references to specific sections, articles, and appendices are references to sections, articles, and appendices in the current CAISO tariff and revised or proposed in this filing, unless otherwise indicated.

³ Section 25.2 of the CAISO tariff.

distinguish between DERs directly interconnected to the grid and DERs behind a retail customer meter. Distributed resources also participate through the CAISO's demand response programs, which are uniquely tailored to accommodate customers with rooftop solar, energy storage, electric vehicles, energy efficiency devices, and behind-the-meter generation.⁴

Because the CAISO was the first RTO/ISO to establish a DERA model, the CAISO already complies with the vast majority of the mandates in Order No. 2222.⁵ This filing generally describes the CAISO's current tariff revisions, and the few incremental changes the CAISO proposes to implement to align its tariff with the final rule. These incremental changes include:

- Lowering the DERA minimum capacity requirement from 500 kW to 100 kW;
- Providing an opt-out for small utilities;
- Revising the CAISO's definition of a DER to match the Commission's;
- Creating a heterogeneous DERA model that can include demand response;
- Clarifying that a DERA may not receive "double" compensation from retail programs for capacity, energy, or other services it provides the CAISO markets, and requiring the distribution company to confer regarding any double-counting concerns; and
- Requiring DERAs to notify the CAISO when their information changes due to the removal, addition, or modification of a DER within the DERA.

Although the CAISO established the DERA model in 2016, experience has demonstrated that DER developers prefer their resources participate as stand-alone wholesale resources or participate in retail net energy metering programs. Small DERs that would make up a DERA generally are co-located with load and eligible to participate under net energy metering programs, which compensate them at a much higher retail rate instead of a lower wholesale rate. For example, according to the U.S. Energy Information Administration, the average retail price of electricity in California in 2019 was \$168.90/MWh,⁶ compared to an average CAISO wholesale rate of about \$41/MWh.⁷ In California, virtually all DERs are eligible to participate in net energy metering programs. When the CAISO established the DERA model in 2016, the

⁴ See Section 4.13.4 of the CAISO tariff.

⁵ The CAISO believes "everything will be alright if we just keep . . . 22, 22." TAYLOR SWIFT, 22 (Big Machine 2012).

⁶ U.S. Energy Information Administration, State Electricity Profiles, <https://www.eia.gov/electricity/state/>.

⁷ CAISO Department of Market Monitoring, 2019 Annual Report on Market Issues and Performance (June 2020), <http://www.aiso.com/Documents/2019AnnualReportonMarketIssuesandPerformance.pdf>.

California Public Utilities Commission (“CPUC”) limited net energy metering resources to no more than one MW in capacity, potentially creating a need for some larger DERs to enter the wholesale markets.⁸ However, the CPUC removed the capacity limit in 2017, allowing DERs and even transmission-connected resources to participate under net energy metering programs, regardless of their size. The CPUC’s program has been highly successful and a boon to the growth of distributed generation in California, but it leaves little incentive for eligible resources to participate in DERAs. Resource adequacy eligibility further incentivizes resources in the CAISO footprint to participate as stand-alone wholesale resources, demand response resources, or net energy metering resources. California regulatory authorities have not adopted qualifying capacity counting rules for DERAs to provide resource adequacy capacity, which leaves developers without the revenue streams from capacity contracts and power purchase agreements.

In 2020, the CAISO surveyed market participants and distributed resource developers on the DERA model and Order No. 2222. Nearly every participant listed net energy metering incentives and resource adequacy ineligibility as the foremost challenges to participating under the DERA model. Few respondents pointed to any obstacle with the CAISO tariff or its market rules. To the contrary, respondents noted that it is easier and more cost-efficient to participate in the wholesale markets as stand-alone resources or demand response resources. Many developers likewise pointed out that would-be aggregators lack efficient technology to optimize, measure, and dispatch the DERs within a DERA. Several respondents also expressed that neither distribution companies nor developers have experience implementing and operating DERAs and, therefore, there is little clarity on how DERAs will be studied and then operate, especially for DERs participating in retail and wholesale markets simultaneously.⁹ Accordingly, the CAISO believes it is critical to continue to work with local regulatory authorities, distribution companies, developers, and affected stakeholders to enhance the DERA model so DERAs can participate efficiently in the wholesale markets. Order No. 2222 has helped to advance this conversation.

⁸ California Public Utilities Commission, “Net Energy Metering,” <https://www.cpuc.ca.gov/nem/>.

⁹ Several respondents wrote nearly identical conclusions in their comments: “There is not currently a business case for DERAs.”

II. Background

A. Order No. 2222

Order No. 2222 seeks to ensure that RTO/ISOs provide robust, fair models for DERAs¹⁰ to participate in the wholesale energy markets.¹¹ Order No. 2222 explains that barriers to the participation of new technologies, such as many types of DERs, in the RTO/ISO markets can emerge when the rules governing participation in those markets are designed for traditional resources and effectively limit the services emerging technologies can provide.¹² For example, DERs tend to be too small to meet the minimum size requirements to participate in the RTO/ISO markets on a stand-alone basis, and they may not meet certain qualification and performance requirements because of the operational constraints they may have as small resources.¹³ According to Order No. 2222, existing participation models for aggregated resources, including DERs, often require those resources to participate in the RTO/ISO markets as demand response, which limits their operations and the services they are eligible to provide.

Although none of these barriers exists for the CAISO, Order No. 2222 seeks to address them by requiring all RTO/ISOs to revise their tariffs to establish a participation model for DERAs if they have not already done so.¹⁴ The participation model must: (1) allow DERAs to participate directly in RTO/ISO markets and establish DERAs as a type of market participant; (2) allow aggregators to register DERAs under one or more participation models that accommodate the physical and operational characteristics of the DERA; (3) establish a minimum size requirement for DERAs that does not exceed 100 kW; (4) address locational requirements for DERAs; (5) address distribution factors and bidding parameters for DERAs; (6) address information and data requirements for DERAs; (7) address metering and telemetry requirements for DERAs; (8) address coordination between the RTO/ISO, the aggregator, the distribution utility, and the relevant electric retail regulatory authorities; (9) address modifications to the list of resources in a DERA; and (10) address market participation agreements for DERAs.¹⁵

¹⁰ The Commission defines a distributed energy resource as “any resource located on the distribution system, any subsystem thereof, or behind a customer meter,” including “electric storage resources, distributed generation, demand response, energy efficiency, thermal storage, and electric vehicles and their supply equipment.” Order No. 2222 at P 1 n. 1.

¹¹ Order No. 2222 NOPR at P 1 n. 3 (“We define, for present purposes, organized wholesale electric markets as the capacity, energy, and ancillary service markets operated by regional transmission organizations (RTO) and independent system operators (ISO)”).

¹² Order No. 2222 at P 2.

¹³ *Id.*

¹⁴ Order No. 2222 at P 8.

¹⁵ *Id.*

The CAISO already complies with most of these requirements, which generally follow the DERA model the CAISO established in 2016.¹⁶

B. The CAISO's Efforts on Distributed Energy Resource Participation

The CAISO and its participating transmission owners have established pathways to ensure DERs can easily access and participate in the CAISO's wholesale markets for energy and ancillary services. The CAISO tariff allows DERs to access the wholesale markets quickly. The CAISO allows DERs to participate as stand-alone resources, aggregations, and demand response resources. The CAISO continually works to ensure that its tariff keeps pace with emerging technologies and grid trends.

In 2014, the CAISO began the DERA initiative to allow small DERs—including energy storage resources—to aggregate into consolidated resources to meet the CAISO's extant minimum capacity requirement of 0.5 MW. The purpose was to allow smaller DERs to participate in the wholesale market by aggregating their capabilities.¹⁷ The Commission approved the CAISO's DERA model as just and reasonable in 2016.¹⁸ Because the DERA model generally complies with all of Order No. 2222's requirements, the CAISO discusses it at length in the next section.

Besides the DERA initiative, in 2015 the CAISO began the first phase of its Energy Storage and Distributed Energy Resource ("ESDER") initiative, which sought to remove barriers to DER participation generally and address emerging issues regarding energy storage. The first phase focused on the non-generator resource model, demand response enhancements, and clarifications on the rules for "multiple-use applications," namely resources capable of both providing service to end-use customers and the wholesale electricity markets.¹⁹ The Commission approved the CAISO's initial ESDER reforms in 2016.²⁰

In 2016, the CAISO began phase two of its ESDER initiative. Phase two implemented more demand response performance evaluation methodologies to capture unique storage and load types, and clarified station power settlement treatment for storage resources. The Commission approved the CAISO's phase two reforms in 2018.²¹

¹⁶ See Section 4.17 of the CAISO tariff.

¹⁷ *California Independent System Operator Corp.*, 155 FERC ¶ 61,229 (2016).

¹⁸ *Id.*

¹⁹ The examination of multiple-use application rules did not result in tariff revisions.

²⁰ *California Independent System Operator Corp.*, 156 FERC ¶ 61,110 (2016).

²¹ *California Independent System Operator Corp.*, Letter Order approving tariff revisions, Docket No. ER18-2242-000 (October 24, 2018).

In 2017, the CAISO began phase three of the ESDER initiative which focused on demand response enhancements, and the Commission approved the resulting tariff amendments in 2019.²² The CAISO is now implementing phase four of the ESDER initiative. In addition to streamlining participation agreements for energy storage, the fourth phase focused on (1) creating biddable state-of-charge parameters for storage resources, (2) applying market power mitigation and creating default energy bids for energy storage resources, (3) reflecting demand response operational characteristics, and (4) establishing the effective load carrying capability for variable-output demand response resources.²³

Additionally, each CAISO transmission owner that is FERC jurisdictional and operates distribution facilities has a wholesale distribution access tariff (“WDAT”) specifically to enable DERs to interconnect to the distribution grid and participate in the CAISO wholesale markets. These transmission owners actively participate in CAISO stakeholder processes and update their WDATs to remain consistent with the CAISO tariff. From 2005 to 2021,²⁴ the CAISO transmission owners have brought online more than 500 stand-alone DERs comprising over 2,200 MW of new distributed generation into the CAISO’s wholesale markets.²⁵

The CAISO also has continued to work closely with the CPUC on distributed generation in California. Among other initiatives, the CAISO has participated actively in the CPUC’s proceeding on retail interconnections,²⁶ the distribution resources plans, microgrids, electric vehicles, and multiple-use applications in California.

III. Compliance with Order No. 2222

The CAISO’s existing tariff complies with most of the directives in Order No. 2222. This section describes how the CAISO’s existing tariff complies with these directives (following the order in which they appear in the final rule). Where the CAISO does not already comply with Order No. 2222, the CAISO describes how it proposes to revise its tariff to comply. Most of the CAISO’s proposed tariff revisions in this filing are

²² *California Independent System Operator Corp.*, Letter Order, Docket No. ER19-2733-000 (Nov. 6, 2019).

²³ See CAISO Final Proposal on ESDER Phase 4, available at <http://www.caiso.com/InitiativeDocuments/FinalProposal-EnergyStorage-DistributedEnergyResourcesPhase4.pdf>.

²⁴ Data before 2005 is not publicly available.

²⁵ Each CAISO transmission owner maintains WDAT queue data on its public website.

²⁶ Commonly referred to as Rule 21, the CPUC rule that governs retail interconnections. These figures represent wholesale supply resources only. These figures do not include other distributed resources such as demand response and retail resources like rooftop solar.

minor changes to align the CAISO's existing DERA participation model with the final rule.

A. Small Utility Opt-Out

Order No. 2222 directs each RTO/ISO to amend its market rules as necessary to (1) accept bids from a DERA if its aggregation includes DERs that are customers of utilities that distributed over 4 million MWh in the previous fiscal year, and (2) not accept bids from a DERA if its aggregation includes DERs that are customers of utilities that distributed 4 million MWh or less in the previous fiscal year, unless the electric retail regulatory authority permits such customers to be bid into RTO/ISO markets by a DERA.²⁷ Order No. 2222 notes that each RTO/ISO may implement this requirement similar to its small utility opt-in provision under Order No. 719-A.²⁸

To comply with this requirement, the CAISO proposes to adapt the small utility opt-in provision in its *pro forma* Demand Response Provider agreement for the CAISO's *pro forma* Distributed Energy Resource Provider Agreement, replacing demand response references with DER references.²⁹ Although the CAISO is unaware of any small utility that has opted out of wholesale market participation for demand response or DERs, the CAISO's proposed tariff revision will ensure Distributed Energy Resource Providers ("DERPs") have complied with their small utility requirements and the CAISO has confirmed their DERAs' eligibility.

B. Definitions of DER and DERA

Order No. 2222 defines a DER as "any resource located on the distribution system, any subsystem thereof, or behind a customer meter."³⁰ The Order notes this definition is technology-neutral, ensuring that any resource technically capable of providing wholesale services through aggregation is eligible to do so.³¹

The CAISO currently defines a DER as "any resource with a first point of interconnection to a Utility Distribution Company or a Metered Subsystem."³² To ensure compliance with Order No. 2222, the CAISO proposes to revise its definition of a DER

²⁷ Order No. 2222 at P 65.

²⁸ Order No. 2222 at P 66.

²⁹ Proposed Article 4.1.4 of Appendix B.21 to the CAISO tariff.

³⁰ Order No. 2222 at P 114.

³¹ *Id.*

³² Every reference to a utility distribution company in the CAISO tariff provisions regarding DERAs also refers to metered subsystems. For concision, the CAISO has omitted the metered subsystem reference below; however, metered subsystems share all the utility distribution company rights and obligations for DERAs.

to align with the Commission's definition, ergo: "Any resource located on the distribution system, any subsystem thereof, or behind a customer meter in a Utility Distribution Company or a Metered Subsystem."³³ This revised definition includes the Commission's clarifications on subsystem and behind-the-meter interconnections while preserving the CAISO's tariff-specific terms for Utility Distribution Company³⁴ ("UDC") and Metered Subsystem.³⁵

C. Eligibility to Participate in CAISO

1. Participation Model

Order No. 2222 defines a DER aggregator as "the entity that aggregates one or more distributed energy resources for purposes of participation in the capacity, energy and/or ancillary service markets of the regional transmission organizations and/or independent system operators."³⁶ The CAISO already has a similar term in its tariff, Distributed Energy Resource Provider ("DERP"), which the CAISO defines as "the owner/operator of one or more Distributed Energy Resource Aggregations that participates in the CAISO markets as such."³⁷ The CAISO also uses the term DERA to refer to the aggregation itself as a market resource, distinct from the provider in charge of the DERA. The CAISO defines a DERA as "A resource comprised of one or more Distributed Energy Resources."³⁸ These definitions are consistent with the Commission's definitions.

³³ Proposed "Distributed Energy Resource," Appendix A to the CAISO tariff.

³⁴ Appendix A to the CAISO tariff defines a Utility Distribution Company as "An entity that owns a Distribution System for the delivery of Energy to and from the CAISO Controlled Grid, and that provides regulated retail electric service to Eligible Customers, as well as regulated procurement service to those End-Use Customers who are not yet eligible for direct access, or who choose not to arrange services through another retailer."

³⁵ Appendix A to the CAISO tariff defines a Metered Subsystem as "A geographically contiguous system located within a single zone which has been operating as an electric utility for a number of years prior to the CAISO Operations Date as a municipal utility, water district, irrigation district, state agency or federal power marketing authority subsumed within the CAISO Balancing Authority Area and encompassed by CAISO certified revenue quality meters at each interface point with the CAISO Controlled Grid and CAISO certified revenue quality meters on all Generating Units or, if aggregated, each individual resource, Participating Load, Reliability Demand Response Resource, and Proxy Demand Resource internal to the system, which is operated in accordance with a MSS Agreement described in Section 4.9.1."

³⁶ Order No. 2222 at P 118.

³⁷ "Distributed Energy Resource Provider," Appendix A to the CAISO tariff. Using "Provider" in lieu of "Aggregator" also avoids giving distributed energy resource aggregation and distributed energy resource aggregator the same acronym, which would be confusing.

³⁸ "Distributed Energy Resource Aggregation," Appendix A to the CAISO tariff.

Order No. 2222 then requires each RTO/ISO to have tariff provisions that allow DERAs to participate directly in RTO/ISO markets.³⁹ The CAISO already complies with this requirement. Section 4.17 of the CAISO tariff broadly describes the rules for DERAs to participate in the CAISO markets. Section 4.17.1, for example, states the CAISO “will accept Bids for Energy or Ancillary Services from Distributed Energy Resource Aggregations.”⁴⁰ As the CAISO explains in Section III.C(3), below, the CAISO allows DERAs to provide multiple services simultaneously in the wholesale markets and the retail markets so long as the parties resolve any double counting concerns.⁴¹

2. Types of Technologies

Order No. 2222 requires that each RTO’s/ISO’s rules do not prohibit any particular type of DER technology from participating in DERAs.⁴² The Order also clarifies that RTO/ISOs must enable demand response resources to participate in DERAs as well.⁴³

The CAISO’s DERA model distinguishes neither among distributed generating supply technology types or energy storage, nor among distributed and behind-the-meter resources.⁴⁴ However, the CAISO’s DERA model does not contemplate demand response resources participating in DERAs. In the CAISO, demand response resources participate in one of the CAISO’s two demand response models: proxy demand resources or reliability demand response resources.⁴⁵ The CAISO therefore proposes to implement a “heterogeneous” DERA model that can include technologies that supply energy to load and technologies that curtail demand.⁴⁶ Consistent with the Commission’s clarifications in Order Nos. 2222-A and 2222-B, the CAISO’s proposal for

³⁹ Order No. 2222 at P 129.

⁴⁰ The CAISO does not have a centralized forward capacity market like some RTOs, so no CAISO tariff provisions are necessary to enable DERAs to provide capacity. Load-serving entities and procurement authorities may procure DERAs bilaterally and otherwise outside of CAISO processes.

⁴¹ Put another way, except for the provisions on double counting, there is no prohibition in the CAISO tariff regarding DERAs’ providing multiple services in wholesale or retail markets simultaneously.

⁴² Order No. 2222 at P 141.

⁴³ Order No. 2222 at PP 142-5.

⁴⁴ See *generally* Section 4.17.3 of the CAISO tariff. The DER, DERA, and DERP definitions in Appendix A to the CAISO tariff likewise do not specify technologies.

⁴⁵ Proxy demand resources bid economically like other supply resources. Reliability demand response resources are included in the CAISO’s optimization and dispatch only when the CAISO is near or experiencing an emergency.

⁴⁶ Unlike the New York Independent System Operator, which collapsed its demand response models into a DERA-type model, the CAISO proposes to maintain its existing demand response models for homogeneous aggregations that include demand response resources only.

heterogeneous DERAs applies requirements consistent with the CAISO's demand response requirements and Order No. 745.

As an initial matter, the CAISO proposes to create a new term, "Distributed Curtailment Resource," to describe the DERs that will curtail demand within a DERA. The CAISO proposes to define a Distributed Curtailment Resource as "a Distributed Energy Resource providing Demand curtailment as part of a heterogeneous Distributed Energy Resource Aggregation."⁴⁷ This new term will allow the CAISO to distinguish Distributed Curtailment Resources from the Distributed Energy Resources within a DERA that inject Energy and the CAISO's demand response models.⁴⁸ The CAISO proposes to use the term Distributed Curtailment Resources and its associated rules exclusively within the context of heterogeneous DERAs because only these resources will share rules from the DERA context and the demand response context. The CAISO therefore proposes that a DERA may not consist of Distributed Curtailment Resources only; it must have at least one DER capable of injecting energy.⁴⁹ The CAISO's demand response models already allow for aggregated DERs to provide demand response.⁵⁰

The CAISO proposes that heterogeneous DERAs will be subject to all the requirements applicable to homogeneous DERAs, as discussed in this filing and Section 4.17 of the CAISO tariff. Although a heterogeneous DERA must consist of at least one DER that injects energy and at least one distributed curtailment resource, these resources will still participate together under a single resource ID as a DERA.⁵¹ The scheduling coordinator for a heterogeneous DERA will submit bids for energy or ancillary services or energy self-schedules representing the net injection or withdrawal⁵² of energy from the DERs that inject energy—including any energy storage⁵³—plus the demand curtailment from the distributed curtailment resources.⁵⁴ Heterogeneous

⁴⁷ "Distributed Curtailment Resource," proposed Appendix A to the CAISO tariff.

⁴⁸ Namely, Proxy Demand Resources and Reliability Demand Response Resources.

⁴⁹ Proposed Section 4.17.7.

⁵⁰ Likewise, the CAISO's existing DERA model was designed for a homogeneous aggregation of DERs that inject energy. The CAISO does not believe it is necessary or efficient to collapse all of the CAISO's demand response rules into the DERA model. Doing so would delay any implementation significantly, and with little apparent gain. As discussed herein, developers have seen little incentive to participate under the DERA model while the CAISO's two demand response models both have capacity in the gigawatts.

⁵¹ Proposed Section 4.17.7 of the CAISO tariff.

⁵² For DERAs with storage resources, for example, the scheduling coordinator would account for the aggregated, net energy injection and withdrawal within the relevant trading/settlement interval. This net response would then be added to the demand curtailment within the DERA.

⁵³ Energy storage can participate in a heterogeneous DERA as DERs injecting and withdrawing energy or as Distributed Curtailment Resources.

⁵⁴ The CAISO will settle the curtailment as positive supply.

DERAs would submit the same bid parameters as other DERAs, as discussed in Section III.E, below.⁵⁵ Likewise, upon receiving a dispatch from the CAISO, the heterogeneous DERA must provide a net response of energy, demand curtailment, or both at its PNode(s) within its sub-LAP that follows its distribution factors.⁵⁶

Because heterogeneous DERAs contain distributed curtailment resources, the scheduling coordinator must calculate the demand curtailment in each interval based on established demand response rules.⁵⁷ The CAISO proposes scheduling coordinators do so under by selecting one of the CAISO's seven methodologies for calculating a demand response energy measurement as the difference between the expected "baseline" demand and the distributed curtailment resources' demand during dispatch.⁵⁸ These well-established demand response methodologies offer scheduling coordinators and DERPs the flexibility to calculate their baselines optimally based on the resources and technologies within the DERA.⁵⁹ These methodologies include calculations for load curtailment, load shifting, behind-the-meter energy to serve load, and all at once. In simplest terms, the CAISO proposes to treat the distributed curtailment resources within a heterogeneous DERA similar to demand response resources.

The CAISO will settle each heterogeneous DERA as a single supply resource, as detailed for all DERAs in Section III.F, below; however, the CAISO will settle each heterogeneous DERA based on the sum of (1) the net energy provided by its DERs, accounting for any negative energy⁶⁰ from energy storage resources, and (2) the demand curtailment provided by the distributed curtailment resources, represented as positive supply.⁶¹ Similar to the CAISO's practice for demand response resources, the CAISO proposes that scheduling coordinators submit sufficient data for the CAISO to settle, monitor, and audit each heterogeneous DERA.⁶² Specifically, for each settlement interval, the scheduling coordinator must submit to the CAISO:

⁵⁵ Proposed Section 4.17.7 of the CAISO tariff.

⁵⁶ *Id.*

⁵⁷ See Order No. 2222-B at PP 44-45.

⁵⁸ *Id.* (citing Sections 4.13.4 (performance evaluation methodologies for baselines) and 11.6 (settlement of demand response energy)). Distributed curtailment resources would be eligible to use a methodology based upon the type of end users within the aggregation. The Commission has approved the eligibility requirements based upon the CAISO's demonstration that they produce statistically valid baselines for different users.

⁵⁹ Similar to any demand response resource, the scheduling coordinator calculates the baseline and response to dispatch for the entire aggregation—in this case all the distributed curtailment resources within the DERA; not for each individual sub-resources.

⁶⁰ *I.e.*, charging or withdrawals.

⁶¹ Proposed Section 11.6.5.1 of the CAISO tariff.

⁶² See Section 11.6.1 of the CAISO tariff.

- (1) the net injection or withdrawal of energy from the DERs that are not distributed curtailment resources;⁶³
- (2) the demand curtailment provided by the distributed curtailment resources;
- (3) the customer load baseline or generator output baseline used to calculate the demand curtailment for the distributed curtailment resources; and
- (4) the actual underlying consumption or energy during all hourly intervals for the calendar days for which meter data was collected to develop the baseline.

These data points will allow the CAISO to understand and settle the heterogeneous DERA while ensuring compliance with the CAISO tariff. The CAISO implemented nearly identical requirements in its ESDER Phase Two stakeholder initiative at the behest of the CAISO Department of Market Monitoring.⁶⁴ In the CAISO's experience, the data has been essential to understand and monitor resources providing supply through curtailed demand.⁶⁵

Order No. 2222-B also clarifies that heterogeneous DERAs providing demand response are subject to the net benefits test to ensure dispatching that resource to curtail demand is cost effective relative to supply. In compliance with Order No. 745, the CAISO applies the market clearing price established by the net benefits test as a bid floor for demand response resources.⁶⁶ Consistent with this rule and the CAISO's market optimization, the CAISO proposes to apply the net benefits test to heterogeneous DERAs in the same way.⁶⁷ That is, scheduling coordinators for heterogeneous DERAs must bid above the market clearing price established by the net benefits test. This requirement would therefore also apply to the energy resources within a heterogeneous DERA and the distributed curtailment resources within a heterogeneous DERA.⁶⁸ This is unavoidable. The very nature of the aggregation

⁶³ The net injection could be a negative number, for example, where a DERA consists of storage resources, which are largely charging in a given settlement interval.

⁶⁴ See Section 11.6.1 of the CAISO tariff.

⁶⁵ Similar to demand response resources, because the CAISO will require this additional data, the CAISO proposes to clarify in the tariff that only the sum of the energy and curtailed demand will be considered settlement quality meter data, consistent with how other scheduling coordinator metered entities are treated under the CAISO tariff. *Id.*

⁶⁶ Section 30.6.3 of the CAISO tariff. The CAISO posts the net benefits test results on its website, along with supporting documentation and the threshold Market Clearing Prices that were in effect in the previous twelve (12) months, and any updated supply curve analysis. The CAISO posts the threshold Market Clearing Prices determined for each month on the CAISO website by the fifteenth day of the immediately preceding month. Section 30.6.3.2 of the CAISO tariff.

⁶⁷ Proposed Section 30.5.2.6.

⁶⁸ To be sure, the net benefits test would *not* apply to a homogeneous DERA of DERs providing supply/energy only, such as a DERA consisting of conventional generation and storage (with no demand response).

requires the resource bid, be dispatched, and be settled as a single resource. There is no mechanism for the CAISO to apply the net benefits test to only a portion of the DERA. In any case, the CAISO does not believe the net benefits test will constrain heterogeneous DERAs. Resources curtailing demand pursuant to CAISO dispatch generally submit bids among the most expensive. There is no reason to believe DERs providing demand response within a DERA would have economics different from other demand response resources. As the CAISO's Department of Market Monitoring has shown, "proxy demand response capacity was primarily offered into the day-ahead market at bid prices over \$750/MWh and into the real-time market near the \$1,000/MWh bid cap."⁶⁹ The net benefits test, on the other hand, frequently establishes a market clearing price of \$0/MWh. In 2021, the market clearing price has ranged from \$16/MWh to \$41/MWh.⁷⁰ As such, the CAISO's application of the net benefits test to heterogeneous DERAs avoids creating a barrier to DERA participation, ensures cost effectiveness, and complies with Orders Nos. 745 and 2222.

3. Double Counting of Services

Order No. 2222 allows RTO/ISOs to limit the participation of resources in RTO/ISO markets through a DERA that are receiving compensation for the same services as part of another program.⁷¹ The Order ensures these limits through three specific requirements. Each RTO/ISO must revise its tariff to (1) allow DERs that participate in one or more retail programs to participate in its wholesale markets; (2) allow DERs to provide multiple wholesale services; (3) include any appropriate restrictions on the DERs' participation in RTO/ISO markets through DERAs, if narrowly designed to avoid counting more than once the services provided by DERs in RTO/ISO markets.⁷² Order No. 2222-A also clarifies that RTO/ISOs should allow DERAs to participate in wholesale and retail programs, and avoid preventing DERAs from wholesale participation unless that is the only way possible to prevent double-counting.⁷³

⁶⁹ CAISO Department of Market Monitoring, 2018 Annual Report on Market Issues and Performance, p. 42, available at <http://www.aiso.com/Documents/2018AnnualReportonMarketIssuesandPerformance.pdf> ("While the total amount of registered capacity and energy bids from demand response increased significantly between 2017 and 2018, the additional proxy demand response capacity was primarily offered into the day-ahead market at bid prices over \$750/MWh and into the real-time market near the \$1,000/MWh bid cap. The incremental bid capacity in 2018 was from both supply plan and non-supply plan resources. The majority of demand response capacity remained concentrated at the top of the resource supply stack and was infrequently dispatched in the day-ahead and real-time markets").

⁷⁰ CAISO, Demand Response Net Benefits Test Results, <http://www.aiso.com/Pages/DocumentsByGroup.aspx?GroupID=AA4CD173-9624-4B52-B148-3D3C8EAB375C>.

⁷¹ Order No. 2222 at P 159.

⁷² Order No. 2222 at P 160.

⁷³ Order No. 2222-A at P 64.

The CAISO complies with the Order's requirements to allow DERAs to participate in retail and wholesale markets. Section 4.17.1 of the CAISO tariff allows DERAs to provide Energy and Ancillary Services. The CAISO does not restrict DERAs from any CAISO market or service. If a DERA meets the requirements to provide a service to the CAISO markets, it may do so.⁷⁴ Likewise, the CAISO allows DERAs to provide multiple wholesale services, similar to other supply resources.

The CAISO also already has provisions to prevent double counting of retail and wholesale services. Section 4.17.3(d) of the CAISO tariff prevents a DER from participating in a DERA where the DER already participates in a retail net energy metering program that does not expressly permit wholesale market participation. As the CAISO explained in 2016, under California's current net energy metering program, a resource already receives benefits from netting its excess energy against subsequent electricity bills (at a retail rate); therefore, there is no energy available to offer into the CAISO markets because excess energy is banked for later withdrawal.⁷⁵ This tariff provision also follows Commission precedent finding exports to the transmission grid under a net energy metering program do not constitute a sale for resale of electricity under the Federal Power Act because these customers are, on a net basis, consumers.⁷⁶ Moreover, the CAISO's rule against net energy metering participation is not a blanket prohibition; the rule allows for dual participation in a net energy metering program and the CAISO markets where the retail tariff authorizes participation in the wholesale markets. This rule provides flexibility for future net energy metering constructs that avoid double counting issues. It also ensures the UDC will work with the CAISO and the DERP to resolve net energy metering concerns should they arise within a DERA.

Although net energy metering is the obvious candidate for double counting, the CAISO recognizes that other retail programs could present double counting issues. Rather than try to predict them and offer a prescriptive list against retail programs, the CAISO proposes to add two new tariff provisions that address double counting generally. First, the CAISO proposes to add a simple provision stating that a DERA "may not receive compensation from retail programs for capacity, Energy, or other services it provides the CAISO Markets."⁷⁷ This tariff provision creates a compliance obligation on the DERA and the DERP to avoid double counting. Second, as part of the UDC review process, the CAISO proposes to require the UDC and the CAISO to confer

⁷⁴ Technology- and model-neutral ancillary service certification requirements are set forth in Appendix K to the CAISO tariff, for example.

⁷⁵ *California Independent System Operator Corp.*, 155 FERC ¶ 61,229 at P 6 (2016).

⁷⁶ *Id.* (citing *Sun Edison LLC*, 129 FERC ¶ 61,146 (2009) *reh'g granted*, 131 FERC ¶ 61,213 (2010); *MidAmerican Energy Co.*, 94 FERC ¶ 61,340 (2001)).

⁷⁷ Proposed Section 4.17.3(h) of the CAISO tariff.

regarding any concerns about whether the DERA will “receive compensation from retail programs for capacity, Energy, or other services it provides the CAISO Markets.”⁷⁸ As explained in Section III.H, below, this provision will allow the UDC to verify the DERs in a DERA are not already receiving compensation from other programs that would cause double counting. If the UDC raises such concerns, the CAISO will notify the DERP, which will work with the UDC and CAISO to resolve them.⁷⁹ If any disputes remain, the applicable governmental authority would resolve them.⁸⁰ The CAISO notes that its proposal provides flexibility in identifying double counting issues while retaining flexibility to identify solutions to any double counting issues, avoiding the need to simply block certain DERs from participating in DERAs. The CAISO believes this approach is carefully balanced and consistent with the Commission’s preference to avoid prohibiting DERs due to double counting concerns.⁸¹

Order No. 2222 also requires RTOs/ISOs to restrict the RTO/ISO market participation of DERs through aggregations after determining whether a DER proposing to participate in a DERA is (1) registered to provide the same services either individually or as part of another RTO/ISO market participant; or (2) included in a retail program to reduce a utility’s or other load serving entity’s obligations to purchase services from the RTO/ISO market (e.g., through demand response).⁸² The CAISO already complies with this requirement through its UDC coordination process, which verifies each DER⁸³ is not already participating in another DERA or retail or wholesale demand response program.⁸⁴ The CAISO’s proposed new double-counting provisions, discussed above, also will mitigate any double-counting risk.

⁷⁸ Proposed Section 4.17.4 of the CAISO tariff.

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ Order No. 2222-A at P 64.

⁸² P 161 continued: “Also, if a distributed energy resource is registered to provide the same service twice in an RTO/ISO market (e.g., as part of multiple distributed energy resource aggregations, as part of a distributed energy resource aggregation and a standalone demand response resource, and/or a standalone distributed energy resource), then that resource would also be double counted and double compensated if it clears the market as part of both market participants. Thus, we find that it is appropriate for RTOs/ISOs to place restrictions on the RTO/ISO market participation of distributed energy resources through aggregations after determining whether a distributed energy resource that is proposing to participate in a distributed energy resource aggregation is (1) registered to provide the same services either individually or as part of another RTO/ISO market participant; or (2) included in a retail program to reduce a utility’s or other load serving entity’s obligations to purchase services from the RTO/ISO market.”

⁸³ For demand response and DERAs, the provider must provide the CAISO a list of each service account—including the specific retail meter and location—for every participant. The CAISO and the UDC then verify these accounts are not inappropriately “double registered” for multiple aggregations or programs that do not allow for cross-participation.

⁸⁴ Section 4.17.4 of the CAISO tariff.

4. Minimum and Maximum Size of DERA

Order No. 2222 requires each RTO/ISO to implement a minimum size requirement not to exceed 100 kW for all DERAs. The CAISO's minimum capacity requirement for DERAs is 500 kW.⁸⁵ To comply with the Order, the CAISO proposes to lower its minimum capacity requirement to 100 kW.⁸⁶

5. Minimum and Maximum Capacity Requirements for DERs in a DERA

Order No. 2222 expressly avoided establishing a minimum or maximum capacity requirement for individual DERs to participate in RTO/ISO markets through a DERA.⁸⁷ Instead, the Order directs each RTO/ISO to propose a maximum capacity requirement for individual DERs participating in its markets through a DERA or, alternatively, to explain why such a requirement is unnecessary.⁸⁸ The Order explains that capping the maximum capacity size of an individual DER participating in a DERA would ensure that larger resources must participate individually, allowing RTOs/ISOs to independently model and verify the metering of these larger resources.⁸⁹ Independent modeling and verification may provide system operators with greater operational awareness and control to address changing system conditions.⁹⁰

The CAISO's current tariff already complies with these requirements. First, the CAISO does not have a minimum capacity requirement for any DER in a DERA.⁹¹ Second, the CAISO has capped individual DER capacity at one MW to participate in a DERA for the reasons described in the Order, and because large DERs participating together in a DERA could pose greater challenges to the UDCs.⁹²

6. Single Resource Aggregation

Order No. 2222 requires each RTO/ISO to revise its tariff to allow a single qualifying DER to avail itself of the proposed DERA rules by serving as its own DERA.⁹³

⁸⁵ Section 4.17.5.1 of the CAISO tariff.

⁸⁶ Proposed Section 4.17.5.1 of the CAISO tariff.

⁸⁷ Order No. 2222 at P 179.

⁸⁸ *Id.*

⁸⁹ Order No. 2222 at P 181.

⁹⁰ *Id.*

⁹¹ See *generally* Section 4.17 of the CAISO tariff.

⁹² Section 4.6.3.2 of the CAISO tariff; "Participating Generator," Appendix A to the CAISO tariff.

⁹³ Order No. 2222 at P 185.

The CAISO already complies with this requirement. Section 4.17.3(a) expressly states that DERA “will consist of *one or more* DERs.”⁹⁴

D. Locational Requirements

Order No. 2222 requires each RTO/ISO to revise its tariff to establish locational requirements for DERs to participate in a DERA that are as geographically broad as technically feasible.⁹⁵ The Order notes that each RTO/ISO must provide a detailed, technical explanation for the geographical scope of its proposed locational requirements, including, for example, a discussion of the RTO/ISO’s system topology and regional congestion patterns, or any other factors that necessitate its proposed locational requirements.⁹⁶

The CAISO currently requires the DERs in a DERAs to be in the same sub-load aggregation point (“sub-LAP”).⁹⁷ This allows each DERA to have DERs across multiple pricing nodes without creating additional congestion on the CAISO controlled grid.⁹⁸ As the CAISO explained in its 2016 filing, if an aggregation could have resources on both sides of a constraint, a CAISO dispatch instruction to alleviate a constraint between these two sub-LAPs may actually exacerbate the problem. The sub-LAP restriction also follows the CAISO’s rules for demand response resource aggregations.⁹⁹ For comparison, the CAISO generally has over 12,000 pricing nodes but approximately 23 sub-LAPs at any time. As such, the CAISO’s locational requirements for DERAs are as geographically broad as technically possible. In Order No. 2222, the Commission noted it was “persuaded by comments that identify the various benefits of multi-node distributed energy resource aggregations,” and that “[i]n particular, we are persuaded by CAISO’s arguments that multi-node aggregations allow for greater market participation by reducing transaction costs and assembling appropriately sized resources optimized for the wholesale electricity markets.”¹⁰⁰ The CAISO’s locational requirements thus comply with Order No. 2222.

⁹⁴ Section 4.17.3(a) of the CAISO tariff (emphasis added).

⁹⁵ Order No. 2222 at P 204.

⁹⁶ *Id.*

⁹⁷ Section 4.17.3 of the CAISO tariff.

⁹⁸ *California Independent System Operator Corp.*, 155 FERC ¶ 61,229 at P 10 (2016).

⁹⁹ Section 4.13.2 of the CAISO tariff.

¹⁰⁰ Order No. 2222 at P 206.

E. Distribution Factors and Bidding Parameters

Order No. 2222 requires each RTO/ISO to establish market rules that address distribution factors¹⁰¹ and bidding parameters for DERAs.¹⁰² Specifically, each RTO/ISO that allows multi-node aggregations must (1) require that DERAs give to the RTO/ISO the total response they would provide from each pricing node, where applicable, when they initially register their aggregation and to update these distribution factors if they change; and (2) incorporate appropriate bidding parameters into its participation models as necessary to account for the physical and operational characteristics of DERAs.¹⁰³ In describing these requirements, Order No. 2222 expressly cites to the CAISO tariff as an example.¹⁰⁴

The CAISO already complies with Order No. 2222's requirements involving distribution factors and bidding parameters. First, the CAISO specifically requires each DERA to provide a net response at its PNode or PNodes within its sub-LAP that follows CAISO dispatch instructions and the distribution factors the DERA provided in its bid¹⁰⁵ or as default factors in the CAISO's master file.¹⁰⁶ Second, the CAISO requires DERAs to submit the common bid components for supply resources,¹⁰⁷ and bid components specifically needed for DERAs, including the distribution factor, ramp rate, minimum and maximum operating limits; energy limit, and contingency flag.¹⁰⁸ Thus, the CAISO has established market rules that address distribution factors and bidding parameters for DERAs in compliance with Order No. 2222.

F. Information and Data Requirements

Order No. 2222 requires each RTO/ISO to revise its tariff to (1) include any requirements for DERAs that establish the information and data a DERA must provide about the physical and operational characteristics of its aggregation; (2) require DERAs to provide a list of the individual resources in its aggregation; and (3) establish any

¹⁰¹ Distribution factors indicate how much of the total response from a DER would be coming from each node at which one or more resources participating in the aggregation are located.

¹⁰² Order No. 2222 at P 225.

¹⁰³ *Id.*

¹⁰⁴ Order No. 2222 at P 225 n. 558.

¹⁰⁵ Section 30.5.2.6 of the CAISO tariff requires each DERA to submit distribution factors with each bid. If the scheduling coordinator does not submit the generation distribution factors for the bid, the CAISO will use the DERA's default generation distribution factors registered in master file.

¹⁰⁶ Section 4.17.3(f) of the CAISO tariff.

¹⁰⁷ Section 30.5.2.1 of the CAISO tariff.

¹⁰⁸ Section 30.5.2.6 of the CAISO tariff. (The contingency flag is a common tool for resources to designate when their reserve bids are eligible, *i.e.*, Contingency Only or not).

necessary information that must be submitted for the individual DERs.¹⁰⁹ The CAISO already complies with these requirements. First, section 4.17 of the CAISO tariff broadly establishes “the information and data that a DERA must provide about the physical and operational characteristics of its aggregation.”¹¹⁰ As explained above, DERAs also must provide operational data in each bid.¹¹¹ Second, section 4.17.4 of the CAISO tariff requires each DERP to provide the DERA’s operational and technical characteristics to ensure the CAISO can model the DERA accurately in the CAISO’s master file and full network model.¹¹² More specifically, Section 4.17.4 states:

Each Distributed Energy Resource Provider will provide information, as described in the Business Practice Manual, identifying each of its Distributed Energy Resource Aggregations and such information regarding the location, capacity, operating characteristics and applicable Generation Distribution Factors of its Distributed Energy Resource Aggregation(s) as may be reasonably requested from time to time by the CAISO.

Article 4.2.1 of the CAISO DERP Agreement likewise states:

The Distributed Energy Resource Provider has identified the Distributed Energy Resources that it owns, operates, or has a contractual entitlement to as part of a Distributed Energy Resource Aggregation in Schedule 1, as required by Section 4.17 of the CAISO Tariff. The Distributed Energy Resource Provider has also provided to the CAISO in Schedule 1 the required information regarding the capacity and operating characteristics of each of the Distributed Energy Resource Aggregations listed in that schedule. Pursuant to Sections 8.9 and 8.10 of the CAISO Tariff, the CAISO may verify, inspect, and test the capacity and operating characteristics of the Distributed Energy Resource Aggregations identified in Schedule 1.

Order No. 2222 also requires that each DERA identify each DER,¹¹³ and that the RTO/ISO tariff describe how the RTO/ISO will share all information requested with the UDC.¹¹⁴ Section 4.17.4 the CAISO requires sufficient information to confer with the

¹⁰⁹ Order No. 2222 at P 236.

¹¹⁰ *Id.*

¹¹¹ See Sections 30.5.2.1 and 30.5.2.6 of the CAISO tariff.

¹¹² Section 4.17.4 of the CAISO tariff uses the same language the CAISO tariff uses to require other supply resources to provide accurate operational and technical characteristics. See *generally* Section 4 of the CAISO tariff.

¹¹³ Order No. 2222 at P 238.

¹¹⁴ *Id.*

UDC, including the service account of each DER in the DERA.¹¹⁵ It also describes how the CAISO will share the information with the UDC, as detailed in Section III.H, below. The CAISO therefore requires sufficient information to comply with these Order No. 2222 requirements.¹¹⁶

Order No. 2222 also requires DERAs to provide aggregate settlement data for the DERA and to retain performance data for individual DERs in a DERA for auditing purposes.¹¹⁷ The CAISO complies with this requirement. First, section 11.6.5 of the CAISO tariff describes how the CAISO will settle the aggregate output of a DERA, which depends on whether the DERs in the DERA are located at a single PNode or across multiple PNodes. In the former case, the CAISO settles the DERA at the single PNode locational marginal price.¹¹⁸ In the latter case, the CAISO settles the DERA based on the weighted average locational marginal price of the PNodes where the DERs are, and their distribution factors.¹¹⁹ Second, section 10.3.2.1.2 of the CAISO tariff requires the scheduling coordinator for a DERA to aggregate the meter data of the underlying DERs to the level of the DERA.¹²⁰ The same section also requires the meter data for DERAs to be settlement quality and an accurate measure of the actual production or consumption of energy by each DER in the DERA in each settlement period. For auditing purposes, section 10.3.2.1.2 also requires the scheduling coordinator to retain the settlement quality meter data of each DER comprising a DERA for a period of at least three years, and to inform the CAISO as may be reasonably requested by the CAISO. Because DERAs are scheduling coordinator metered entities, the scheduling coordinator also is subject to the inspection, retention, and audit requirements for supply resources.¹²¹ The CAISO thus complies with Order No. 2222's requirements for the DERA to provide aggregated data while maintaining sufficient disaggregated data for auditing.

¹¹⁵ Because the DERs in a DERA already will have interconnected via some process, the service accounts generally provide the UDC with sufficient information to verify the composition of the DERA, including the capacity of each DER, its location, loss factor, etc. As such, the CAISO tariff does not need to describe every potential piece of information possibly needed.

¹¹⁶ Order No. 2222 also requires RTOs/ISOs to revise their tariffs to establish any necessary physical parameters DERAs must submit as part of their registration process only to the extent these parameters are not already represented in general registration requirements or bidding parameters applicable to DERAs. The CAISO believes the requirements described in this section and in section III.E suffice.

¹¹⁷ Order No. 2222 at P 240.

¹¹⁸ Section 11.6.5 of the CAISO tariff.

¹¹⁹ *Id.*

¹²⁰ The level of the DERA is memorialized in the Distributed Energy Resource Provider Agreement.

¹²¹ See Section 10.3.10 of the CAISO tariff.

Finally, Order No. 2222 requires that the DERP update its list of DERs within the DERA, and any associated information, as it changes.¹²² Although the requirement that resources provide the CAISO with accurate operational and technical characteristics is constant,¹²³ the CAISO proposes to revise its tariff to require DERPs to notify the CAISO whenever DERA information changes due to the removal, addition, or modification of a DER within the DERA.¹²⁴ The CAISO also proposes to include a new section regarding DERA modifications, as detailed in Section III.I, below. Additionally, Article 4.2.3 of the DERP Agreement requires the DERP to notify the CAISO of “any proposed change(s) to the registration of technical information for its Distributed Energy Resource Aggregation(s).” With these additions, the CAISO complies with all data and information requirements in Order No. 2222.

G. Metering and Telemetry System Requirements

Order No. 2222 does not establish specific metering and telemetry requirements for DERAs, and instead “provide[s] the RTOs/ISOs with flexibility to establish the necessary metering and telemetry requirements for distributed energy resource aggregations.”¹²⁵ The Order thus requires each RTO/ISO to explain in its compliance filing why such requirements are just and reasonable and do not pose an unnecessary and undue barrier to individual DERs joining a DERA.¹²⁶

The Commission has already found that the CAISO’s metering and telemetry provisions for DERAs are just and reasonable.¹²⁷ DERAs are scheduling coordinator metered entities in the CAISO, which means the scheduling coordinator and not the CAISO polls the DERs’ meters; performs the validation, estimation, and editing; and then submits the aggregate settlement quality meter data for the DERA to the CAISO.¹²⁸ The settlement quality meter data must be an accurate measure of the actual production or consumption of energy by DER that comprises a DERA in each settlement period. Importantly, only the DERA itself is subject to the CAISO’s wholesale metering requirements. Because each DER has interconnected under a retail tariff or a WDAT, the CAISO does *not* impose its physical metering standards on each DER or distributed curtailment resource. Section 4.17.5.2 of the CAISO tariff expressly states that each DER must be directly metered under a meter that complies with the UDC tariff

¹²² Order No. 2222 at P 238.

¹²³ Section 4.17.4 of the CAISO tariff (for DERAs).

¹²⁴ Proposed Section 4.17.4 of the CAISO tariff.

¹²⁵ Order No. 2222 at P 263.

¹²⁶ *Id.*

¹²⁷ Section 4.17.5.2 of the CAISO tariff; Article 4.2.2 of Appendix B.21 to the CAISO tariff; *California Independent System Operator Corp.*, 155 FERC ¶ 61,229 at P 13-14 (2016).

¹²⁸ Sections 10.3.2.1.2 and 4.17.5.2 of the CAISO tariff.

and any standards of the local regulatory authority. If no tariff or local regulatory standards exist, then a DER will comply with the metering standards in the CAISO's business practice manual for metering.¹²⁹

Similar to other supply resources, the CAISO only requires relatively larger capacity to provide real-time telemetry—at the aggregate level—to the CAISO's energy management system.¹³⁰ Specifically, any DERA providing ancillary services and any DERA 10 MW or greater must provide direct telemetry consistent with the CAISO's telemetry standards for supply resources.¹³¹ Again, the DERP would provide direct telemetry for the aggregate resource. At this time, the CAISO does *not* require each DER to provide direct telemetry.

As in 2016, the CAISO's metering and telemetry rules currently provide the CAISO with sufficient information for operation and settlement on the DERA without being onerous on the individual DERs. The CAISO's metering and telemetry rules for DERAs follow the CAISO's rules for traditional supply resources and demand response resources. For these reasons, the CAISO's rules are just and reasonable and compliant with Order No. 2222.

H. Coordination among the CAISO, the DERP, and the UDC

1. Market Rules of Coordination

Order No. 2222 requires each RTO/ISO establish market rules that address coordination among the RTO/ISO, the DERA, the distribution utility, and the electric retail regulatory authorities. Consistent with the Order, the CAISO addresses coordination with each entity below.

¹²⁹ Section 4.17.5.2 of the CAISO tariff.

¹³⁰ *Id.*

¹³¹ *Id.* (citing Section 7.6.1 of the CAISO tariff).

2. Role of UDCs

Order No. 2222 requires each RTO/ISO to incorporate a comprehensive and non-discriminatory process for timely review by the UDC of the individual DERs that comprise a DERA, which is triggered by initial registration of the DERA or incremental changes to a DERA already participating in the markets.¹³² The Order further requires each RTO/ISO to coordinate with UDCs to develop a review process that includes criteria by which the UDCs would determine whether (1) each proposed DER is capable of participation in a DERA; and (2) the participation of each proposed DER in a DERA will not pose significant risks to the reliable and safe operation of the distribution system.¹³³ RTO/ISOs also must share with UDCs any necessary information discussed in Section III.F, above,¹³⁴ and must incorporate the results of the UDC review process into their DERA registration process.¹³⁵

The CAISO complies with these requirements. Order No. 2222 notes that its proposed UDC review process must be transparent, provide specific review criteria, and provide adequate and reasonable time for review.¹³⁶ The Order expressly cites to the CAISO tariff as meeting these principles, stating, “For example, the approach used in the CAISO Distributed Energy Resource Provider program.”¹³⁷

Section 4.17.4 of the CAISO tariff explains the UDC review process. Once the DERP has met all CAISO informational requirements, the CAISO will confer with the UDC¹³⁸ regarding the DERA. The UDC must provide written comments within thirty days¹³⁹ regarding the accuracy of the information about DERs comprising a DERA or raise concerns regarding whether any DERs

- (1) are participating in another DERA;
- (2) are participating as a demand response resources;
- (3) are participating in a retail net energy metering program that does not expressly permit wholesale market participation;
- (4) do not comply with UDC or requirements of the local regulatory authority; or

¹³² Order No. 2222 at P 292.

¹³³ *Id.*

¹³⁴ Section IV.F of the Order.

¹³⁵ Order No. 2222 at P 292.

¹³⁶ Order No. 2222 at P 293.

¹³⁷ Order No. 2222 at P 292 n. 709.

¹³⁸ Or metered subsystem, as applicable.

¹³⁹ Order No. 2222-A clarifies that the UDC review process should not exceed 60 days. Order No. 2222-A at P 72. Because the CAISO’s UDC process is 30 days, the CAISO tariff is already compliant.

(5) may threaten the safe and reliable operation of the distribution system, if operated as part of a DERA.¹⁴⁰

As discussed in Section III.C.3, above, the CAISO also proposes the UDC can raise issues regarding double-counting. If the UDC raises one of these six concerns, the CAISO will provide the DERP with the UDC's written comments,¹⁴¹ and the DERP will resolve those concerns with the UDC before the CAISO allows the individual DER to participate in a DERA.¹⁴² Consistent with Order No. 2222,¹⁴³ the CAISO tariff also states that any disputes regarding UDC concerns would be brought to the appropriate governmental authority for the UDC.¹⁴⁴

Order No. 2222-A clarifies that if a UDC recommends removal of a DER from a DERA for reliability reasons, the RTO/ISO "should not remove the resource without . . . a showing that the resource presents significant risks to the reliable and safe operation of the distribution system."¹⁴⁵ The CAISO proposes to add clarifying language to Section 4.17.4 consistent with the Commission's clarification.¹⁴⁶ The CAISO also proposes to state expressly that it will share the UDC's written comments with the DERP, consistent with Order No. 2222-A.¹⁴⁷

Additionally, Article 4.1.1 of the CAISO's DERP Agreement provides that each DER and the DERA must satisfy all applicable rules and regulations of the UDC tariffs and any requirements of the applicable local regulatory authority, and applicable interconnection requirements, if any.

The CAISO's UDC review process complies with Order No. 2222. Order No. 2222 expressly cites the CAISO's process as a model because it carefully balances the

¹⁴⁰ Section 4.17.4 of the CAISO tariff.

¹⁴¹ The CAISO proposes to include new tariff language to make this requirement transparent. Proposed Section 4.17.4 of the CAISO tariff.

¹⁴² In other words, all other DERs could participate in the DERA in the meantime.

¹⁴³ Order No. 2222 at P 299.

¹⁴⁴ *Id.*

¹⁴⁵ Order No. 2222-A at P 76.

¹⁴⁶ Proposed Section 4.17.4 of the CAISO tariff. The same provision in Order No. 2222-A also suggests that RTOs/ISOs require affidavits or other evidence from UDCs. Because this is a suggestion and because the CAISO tariff already requires the UDC to provide written comments, the CAISO has not proposed amendments at this time. UDCs must provide sufficient information for the CAISO and DERP to confer and resolve concerns, and the form that information may take will vary on a case-by-case basis. A prescriptive list of the documentation the UDC must provide would likely constrain, not aid, the process at this time. The CAISO plans to provide examples of supporting documentation in its business practice manuals and may revisit this issue once it gains experience with DERAs and the UDC review process.

¹⁴⁷ Proposed Section 4.17.4 of the CAISO tariff. Order No. 2222-A at P 75.

UDC's interests and obligations over its distribution grid with the DERA's rights to participate in the wholesale markets. The CAISO's process also provides all parties with opportunities to resolve any concerns.

3. Ongoing Operational Coordination

Order No. 2222 requires each RTO/ISO to (1) establish a process for ongoing coordination, including operational coordination, that addresses data flows and communication among itself, the DERA, and the UDC; and (2) require the DERA to report to the RTO/ISO any changes to its offered quantity and related distribution factors that result from distribution line faults or outages.¹⁴⁸ The Order further requires each RTO/ISO to include coordination protocols and processes for the operating day that allow distribution utilities to override RTO/ISO dispatch of a DERA if necessary to maintain the reliable and safe operation of the distribution system.¹⁴⁹

The CAISO complies with these requirements. As explained in Section II.B, above, DER participation in the CAISO's markets is not new to the CAISO or the UDCs. Several hundred DERs comprising over 2 GW of capacity already participate in the CAISO markets. Just as for these resources, the CAISO tariff requires DERAs to use a scheduling coordinator for all bidding, scheduling, and dispatch.¹⁵⁰ The scheduling coordinator communicates between the CAISO and the resource to ensure ongoing operational coordination.¹⁵¹ Scheduling coordinators also must report any outages consistent with sections 9 and 30 of the CAISO tariff. Outage data is public on both the CAISO's OASIS and its public website for outages.¹⁵² Likewise, scheduling coordinators for UDCs can submit planned and forced outages, allowing the UDC to pre-empt or override CAISO dispatch. For example, the CAISO has worked with UDCs during recent years to coordinate highly dynamic public safety power shutoffs to avoid wildfire risk during inclement conditions.

Additionally, Section 4.17.2(f) of the CAISO tariff requires the CAISO to "coordinate with the applicable Utility Distribution Company or Metered subsystem to avoid conflicting operational directives, which may include but is not limited to sharing Dispatch Instructions." Section 4.17.6 of the CAISO tariff also specifically requires DERAs to respond to dispatch instructions, including market awards and exceptional dispatches. It also requires DERPs to operate "consistent with limitations or operating orders established by the Utility Distribution Company," and to "submit Outages to the

¹⁴⁸ Order No. 2222 at P 310.

¹⁴⁹ *Id.*

¹⁵⁰ Section 4.17.1 of the CAISO tariff.

¹⁵¹ See *generally* Section 30.5.2 of the CAISO tariff; Appendix B.1 to the CAISO tariff.

¹⁵² <http://www.caiso.com/market/Pages/OutageManagement/Default.aspx>.

CAISO as necessary to reflect any distribution constraints impacting Distributed Energy Resources that comprise a Distributed Energy Resource Aggregation under its control.” As explained in Section III.E, above, in the event of an outage, scheduling coordinators for DERAs also may update their distribution factors with each bid.

Order No. 2222 also requires each RTO/ISO to apply any existing resource non-performance penalties to a DERA when the aggregation does not perform because a distribution utility overrides the RTO’s/ISO’s dispatch.¹⁵³ The CAISO complies with this requirement. Section 11.6.5 of the CAISO tariff states the CAISO will assess a DERP with uninstructed imbalance energy whenever the DERA does not follow a dispatch instruction (for any reason, including UDC override).¹⁵⁴

The CAISO thus complies with Order No. 2222’s requirements regarding operational coordination. The CAISO issues dispatches to hundreds of resources on the UDC’s systems every day, and the CAISO is unaware of any issue that would warrant changes to the CAISO, UDC, or scheduling coordinator processes for coordination. Although introducing DERAs will require monitoring and may require future enhancements, the CAISO’s existing processes are just and reasonable for maintaining reliability on the transmission and distribution grids.¹⁵⁵

4. Role of Local Regulatory Authority

Order No. 2222 requires each RTO/ISO to specify how each RTO/ISO will accommodate and incorporate voluntary relevant electric retail regulatory authority involvement in coordinating the participation of DERAs in RTO/ISO markets.¹⁵⁶ The Order notes that relevant electric retail regulatory authorities have a role in coordination, *i.e.*, in setting rules at the distribution level and in RTO/ISO stakeholder discussions.¹⁵⁷ The Order also notes many relevant electric retail regulatory authorities indicate strong interest in participating in such coordination.¹⁵⁸

¹⁵³ Order No. 2222 at P 312 (“We find that this requirement will ensure that distributed energy resource aggregations are subject to non-performance penalties similarly to other resources participating in RTO/ISO markets. We note that this requirement will incent distributed energy resource aggregators to register individual distributed energy resources on less-constrained portions of distribution networks in order to minimize the likelihood of incurring non-performance penalties from the RTO/ISO”).

¹⁵⁴ The CAISO assesses all supply resources with uninstructed imbalance energy for failure to follow dispatch. See Section 11.5.2 of the CAISO tariff.

¹⁵⁵ Order No. 2222 expressly states that it does not prescribe “specific protocols or processes for the RTOs/ISOs to adopt as part of the operational coordination requirements, but rather” allows for “an approach to ongoing operational coordination.” Order No. 2222 at P 311.

¹⁵⁶ Order No. 2222 at P 322.

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

The CAISO complies with this requirement, and agrees that local regulatory authorities play a critical role in setting rules at the distribution level and coordinating with the CAISO and market participants. Section 4.17.2(b) requires each DERP to comply with any applicable local regulatory authority requirements. Section 4.17.4 likewise allows UDCs to raise issues regarding non-compliance with local regulatory authority requirements, and it requires resolution of UDC issues by the appropriate authority. The CAISO thereby complies with Order No. 2222, which expressly cites to the CAISO's tariff as a model, stating:

We note that the roles delineated in CAISO's Distributed Energy Resource Provider tariff provisions may provide an example of how relevant electric retail regulatory authorities could be involved in coordinating the participation of distributed energy resource aggregations in RTO/ISO markets. CAISO's Distributed Energy Resource Provider model requires that distributed energy resource providers comply with applicable utility distribution company tariffs and operating procedures incorporated into those tariffs, as well as applicable requirements of the local regulatory authority.¹⁵⁹

I. Modifications to DERAs

Order No. 2222 requires each RTO/ISO to specify that DERAs must update their lists of DERs in each aggregation and any associated information and data.¹⁶⁰ However, the Order states that, when doing so, DERAs will not be required to re-register or re-qualify the entire DERA. The Order notes "because the impacts of modifications may often be minimal, an abbreviated review process should be sufficient for the distribution utility to identify the cases where an addition to the list of resources might pose a safety or reliability concern."¹⁶¹ To the extent an RTO/ISO requires a DERA to provide information on the physical or operational characteristics of its DERA, Order No. 2222 also requires each RTO/ISO to ensure that the DERA must update such information if any modification to the list of resources participating in the aggregation results in a change to the aggregation's performance.

As noted in Section III.H, above, the requirement for DERAs (and all supply resources) to provide the CAISO with accurate operational and technical characteristics is constant.¹⁶² Additionally, Article 4.2.3 of the DERP Agreement requires the DERP to notify the CAISO of "any proposed change(s) to the registration of technical information for its Distributed Energy Resource Aggregation(s)." Nevertheless, the CAISO

¹⁵⁹ Order No. 2222 at P 323.

¹⁶⁰ Order No. 2222 at P 336.

¹⁶¹ Order No. 2222 at P 337.

¹⁶² Section 4.17.4 of the CAISO tariff (for DERAs).

proposes to revise its tariff to state expressly that DERPs must notify the CAISO whenever DERA information changes due to the removal, addition, or modification of a DER within the DERA.¹⁶³ The CAISO also proposes to include a new tariff provision specifically addressing DERA modifications.¹⁶⁴ This provision will reiterate that a DERP must notify the CAISO of any changes to the information it provided during the registration process due to the removal, addition, or modification of a DER within the DERA.¹⁶⁵ Moreover, the DERP must notify the CAISO of any changes to its DERA's physical or operational characteristics.¹⁶⁶ The CAISO will notify the UDC, which will have 14 days to raise any concern via written comments consistent with the initial UDC review process.¹⁶⁷ The CAISO's existing tariff provisions and proposed tariff revisions thus comply with Order No. 2222.

J. Market Participation Agreements

Order No. 2222 requires each RTO/ISO to include a standard market participation agreement that defines the DERA's role and responsibilities and its relationship with the RTO/ISO. An aggregator must execute the agreement before it can participate in the RTO/ISO markets.¹⁶⁸ As discussed throughout this filing, the CAISO complies with this requirement. Section 4.17.1 of the CAISO tariff requires DERPs to execute a DERP Agreement before participating in the CAISO markets. The DERP Agreement itself is Appendix B.21 to the CAISO tariff, and defines the DERP's role, responsibilities, and its relationship with the CAISO.

Order No. 2222 also requires the DERA participation agreement to include an attestation that the DERA complies with the tariffs and operating procedures of the distribution utilities and the rules and regulations of any electric retail regulatory authority. The CAISO complies with this requirement. Article 4.1.1 of the DERP Agreement states that a DERP must satisfy all applicable rules and regulations of the UDC tariffs and any requirements of the applicable local regulatory authority, and applicable interconnection requirements, if any.¹⁶⁹ The CAISO thus complies with Order No. 2222.

¹⁶³ Proposed Section 4.17.4 of the CAISO tariff.

¹⁶⁴ Proposed Section 4.17.4.1 of the CAISO tariff.

¹⁶⁵ *Id.*

¹⁶⁶ *Id.*

¹⁶⁷ *Id.*

¹⁶⁸ Order No. 2222 at P 352.

¹⁶⁹ It also states the DERP "must ensure that Distributed Energy Resources that comprise its Distributed Energy Resource Aggregation satisfy all applicable rules and regulations of Utility Distribution Company or Metered Subsystem tariffs, any requirements of the Local Regulatory Authority, as well as applicable interconnection requirements, if any. The Distributed Energy Resource Provider must certify to the CAISO

IV. Effective Dates

For the proposed tariff sections that pertain to heterogeneous DERAs, the CAISO requests an effective date no later than November 1, 2022.¹⁷⁰ The software enhancements required to enable heterogeneous DERAs are substantial, and the CAISO plans to implement them as part of the CAISO's 2022 Fall software release, but the CAISO has not established the precise date. The CAISO requests authority to provide market participants with advance notice of the actual effective date, and to provide the Commission notice of the actual effective date of the Tariff revisions within five business days of their implementation, consistent with other Commission orders.¹⁷¹

For all other proposed tariff revisions, the CAISO requests an effective date contemporaneous with the Commission's approval of those tariff revisions. In any case, the CAISO's existing DERA tariff provisions are effective today and will remain in effect as the CAISO complies with Order No. 2222.

that any required agreements between the Distributed Energy Resource Provider and the Load Serving Entities or other agreements required by the Local Regulatory Authority are fully executed.”

The CAISO does not require DERs to interconnect pursuant to a WDAT to participate in DERAs, or even to participate as stand-alone wholesale resources. Section 25.2 of the CAISO tariff merely requires DERs to interconnect pursuant to the applicable tariff, as established by the local regulatory authority. Likewise, the Commission agreed with the CAISO in its 2016 proceeding that interconnecting under a WDAT was not required to participate in a DERA. *California Independent System Operator Corp.*, 155 FERC ¶ 61,229 at P 60 (“We agree with CAISO and SolarCity that it would be unduly discriminatory to require all distributed energy resources to interconnect through a WDAT when the WDAT interconnection rules do not apply to some distributed energy resources, such as dispatchable demand response resources. Accordingly, we find that CAISO’s proposed language is reasonable because it does not limit or expand upon the scope of entities that must interconnect through a WDAT.”).

¹⁷⁰ Proposed Sections 4.17.7, 11.6.5.1, and 30.5.2.6 of the CAISO tariff.

¹⁷¹ See, e.g., *California Independent System Operator Corp.*, 175 FERC ¶ 61,076 at P 1 (2021).

V. Communications

Pursuant to Rule 203(b)(3) of the Commission's Rules of Practice and Procedure,¹⁷² the CAISO requests that all correspondence, pleadings, and other communications regarding this filing should be directed to following:

Roger E. Collanton
General Counsel
Anthony Ivancovich
Deputy General Counsel
Andrew Ulmer
Assistant General Counsel
William H. Weaver
Senior Counsel
California Independent System
Operator Corporation
250 Outcropping Way
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VI. Service

The CAISO has served copies of this filing on the California Public Utilities Commission, the California Energy Commission, and all parties with scheduling coordinator agreements under the CAISO tariff. In addition, the CAISO has posted a copy of the filing on the CAISO website.

¹⁷² 18 C.F.R. § 385.203(b)(3).

VII. Contents of Filing

Besides this transmittal letter, this filing includes these attachments:

- Attachment A Clean CAISO tariff sheets incorporating this tariff amendment
- Attachment B Red-lined document showing the revisions in this tariff amendment
- Attachment C Matrix mapping Order No. 2222 compliance directives to existing and proposed CAISO tariff provisions

VIII. Conclusion

For the reasons set forth above, the CAISO respectfully requests that the Commission find that the CAISO complies with Order No. 2222.

Respectfully submitted,

/s/ William H. Weaver

Roger E. Collanton
General Counsel
Anthony Ivancovich
Deputy General Counsel
Andrew Ulmer
Assistant General Counsel
William H. Weaver
Senior Counsel

Counsel for the California Independent
System Operator Corporation

Attachment A – Clean Tariff

Tariff Changes to Implement Final Rule – FERC Order No. 2222

California Independent System Operator Corporation

July 19, 2021

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4.17 Distributed Energy Resource Aggregations

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4.17.3 Requirements for Distributed Energy Resource Aggregations

The following requirements apply to Distributed Energy Resource Aggregations:

- (a) A Distributed Energy Resource Aggregation will consist of one (1) or more Distributed Energy Resources.
- (b) A Distributed Energy Resource may not participate in more than one Distributed Energy Resource Aggregation.
- (c) A Distributed Energy Resource participating in a Distributed Energy Resource Aggregation may not participate as a resource in the CAISO Market separate from the Distributed Energy Resource Aggregation.
- (d) A Distributed Energy Resource participating in a Distributed Energy Resource Aggregation may not also participate in a retail net energy metering program that does not expressly permit wholesale market participation.
- (e) Each Distributed Energy Resource Aggregation must be located in a single Sub-LAP.
- (f) A Distributed Energy Resource Aggregation must provide a net response at its PNode(s) within its sub-LAP that is consistent with CAISO Dispatch Instructions and applicable Generation Distribution Factors submitted through the Distributed Energy Resource Aggregation's Bid or as registered in the Master File.
- (g) Distributed Energy Resource Aggregations are Scheduling Coordinator Metered Entities. Scheduling Coordinators for a Distributed Energy Resource Aggregation must have entered into a Scheduling Coordinator Metering Agreement with the CAISO. A Distributed Energy Resource participating in a Distributed Energy Resource Aggregation may not also participate in the CAISO Markets as a CAISO Metered Entity.

- (h) A Distributed Energy Resource Aggregation may not receive compensation from retail programs for capacity, Energy, or other services it provides the CAISO Markets.
- (i) Distributed Curtailment Resources may participate in heterogeneous Distributed Energy Resource Aggregations pursuant to these rules and Section 4.17.8. Aggregations of only Distributed Curtailment Resources without other Distributed Energy Resources that inject Energy must participate as Proxy Demand Resources or Reliability Demand Response Resources.

4.17.4 Identification of Distributed Energy Resources

Each Distributed Energy Resource Provider will provide information, as described in the Business Practice Manual, identifying each of its Distributed Energy Resource Aggregations and such information regarding the location, capacity, operating characteristics and applicable Generation Distribution Factors of its Distributed Energy Resource Aggregation(s) as may be reasonably requested from time to time by the CAISO, and when the information changes due to the removal, addition, or modification of a Distributed Energy Resource or Distributed Curtailment Resource within the Distributed Energy Resource Aggregation. All information provided to the CAISO by a Distributed Energy Resource Provider regarding the operational and technical characteristics of its Distributed Energy Resource Aggregation(s) must be accurate.

As further described in the Business Practice Manual, the CAISO will confer with the applicable Utility Distribution Company or Metered Subsystem regarding information provided about Distributed Energy Resources comprising a Distributed Energy Resource Aggregation(s). The Utility Distribution Company or Metered Subsystem will have an opportunity to provide written comments within thirty (30) days regarding the accuracy of the information about Distributed Energy Resources comprising a Distributed Energy Resource Aggregation(s) or raise concerns with respect to whether the Distributed Energy Resources (1) are participating in another Distributed Energy Resource Aggregation; (2) are participating as a Proxy Demand Response resource or a Reliability Demand Response Resource; (3) are participating in a retail net energy metering program that does not expressly permit wholesale market participation; (4) do not comply with applicable Utility Distribution Company tariffs or requirements of the relevant Local Regulatory Authority; (5) receive compensation from retail programs for capacity, Energy,

or other services that would be offered to the CAISO Markets; or (6) may pose a significant threat to the safe and reliable operation of the Distribution System, if operated as part of a Distributed Energy Resource Aggregation. If the Utility Distribution Company or Metered Subsystem raises concerns based on these factors, the CAISO will provide the Distributed Energy Resource Provider with the Utility Distribution Company or Metered Subsystem's written comments, and the Distributed Energy Resource Provider will resolve those concerns with the Utility Distribution Company or Metered Subsystem prior to the CAISO allowing the individual Distributed Energy Resource to participate in a Distributed Energy Resource Aggregation. Any disputes regarding these concerns shall be undertaken with the applicable Governmental Authority for the Utility Distribution Company or Metered Subsystem and shall not be arbitrated or in any way resolved through a CAISO dispute resolution mechanism.

4.17.4.1 Modifications to Distributed Energy Resource Aggregations

The Distributed Energy Resource Provider will notify the CAISO of any changes to the information it provided during the registration process due to the removal, addition, or modification of a Distributed Energy Resource or Distributed Curtailment Resource within the Distributed Energy Resource Aggregation. The Distributed Energy Resource Provider also will notify the CAISO of any changes to its Distributed Energy Resource Aggregation's physical or operational characteristics. The CAISO will notify the applicable Utility Distribution Company or Metered Subsystem of any changes, and the Utility Distribution Company or Metered Subsystem will have fourteen (14) days to provide the CAISO any written comments raising concerns under Section 4.17.4.

4.17.5 Characteristics of Distributed Energy Resource Aggregations

4.17.5.1 Size Limits

A Distributed Energy Resource Aggregation will be no smaller than 100 kW. A Distributed Energy Resource Aggregation that includes Distributed Energy Resources located at different PNodes will be no larger than 20 MW.

4.17.5.2 Metering and Telemetry

Scheduling Coordinators shall submit to the CAISO Actual Settlement Quality Meter Data or Estimated Settlement Quality Meter Data for Distributed Energy Resource Aggregations they represent for each Settlement Period in an Operating Day. Distributed Energy Resources and Distributed Curtailment

Resources participating in a Distributed Energy Resource Aggregation will be directly metered pursuant to a meter that complies with any applicable Utility Distribution Company tariff and any standards of the relevant Local Regulatory Authority or, if no such tariff exists or no standards have been set by that Local Regulatory Authority, the metering standards as further detailed in the CAISO's Business Practice Manual. Distributed Energy Resource Providers must make Settlement Quality Meter Data from individual Distributed Energy Resources and Distributed Curtailment Resources comprising a Distributed Energy Resource Aggregation available to the CAISO upon request.

Distributed Energy Resource Providers shall provide information regarding Distributed Energy Resource Aggregation(s) with a rated capacity of 10 MW or greater or, if the Distributed Energy Resource Aggregation(s) provides Ancillary Services, through telemetry to the CAISO's EMS in accordance with the CAISO's standards for direct telemetry and consistent with the requirement for telemetry set forth in Section 7.6.1.

4.17.6 Operating Requirements

Distributed Energy Resource Aggregations will respond to CAISO Dispatch Instructions. The CAISO may dispatch a Distributed Energy Resource Aggregation to the extent the Distributed Energy Resource Aggregation bids or schedules Energy or Ancillary Services into the CAISO Markets and receives an award. The CAISO may also issue an Exceptional Dispatch Instruction for the Distributed Energy Resource Aggregation for reliability pursuant to Section 34.10. Distributed Energy Resource Aggregations shall respond to Dispatch Instructions consistent with Generation Distribution Factors for the Distributed Energy Resource Aggregation.

Each Distributed Energy Resource Provider will operate its Distributed Energy Resource Aggregation(s) in a manner consistent with limitations or operating orders established by the Utility Distribution Company or Metered Subsystem. Scheduling Coordinators for Distributed Energy Resources Providers shall submit Outages to the CAISO as necessary to reflect any distribution constraints impacting Distributed Energy Resources that comprise a Distributed Energy Resource Aggregation under its control. The CAISO shall have the authority to coordinate and approve Outage schedules for the Distributed Energy Resource Aggregation(s) listed in a Distributed Energy Resource Provider Agreement, in accordance with the provisions of Section 9.

4.17.7 Heterogeneous Distributed Energy Resource Aggregations

Heterogeneous Distributed Energy Resource Aggregations are subject to all the requirements in Section 4.17. Heterogeneous Distributed Energy Resource Aggregations must consist of at least one Distributed Energy Resource that injects Energy and at least one Distributed Curtailment Resource, participating together under a single Resource ID as a Distributed Energy Resource Aggregation through a Distributed Energy Resource Provider. The Scheduling Coordinator for a heterogeneous Distributed Energy Resource Aggregation will submit Bids for Energy or Ancillary Services or Energy Self-Schedules representing the net injection of Energy from the Distributed Energy Resources that are not Distributed Curtailment Resources plus the Demand curtailment from the Distributed Curtailment Resources. Scheduling Coordinators must include Bid parameters consistent with Section 30.5.2.6. A heterogeneous Distributed Energy Resource Aggregation must provide a net response of Energy, Demand curtailment, or both at its PNode(s) within its sub-LAP that is consistent with CAISO Dispatch Instructions and applicable Generation Distribution Factors submitted through the Distributed Energy Resource Aggregation's Bid or as registered in the Master File. To calculate the Demand curtailment provided by the Distributed Curtailment Resources within a heterogeneous Distributed Energy Resource Aggregation, the Scheduling Coordinator must calculate a Demand Response Energy Measurement for the Distributed Curtailment Resources, excluding the Distributed Energy Resources that are injecting Energy and not Distributed Curtailment Resources, consistent with the requirements in Sections 4.13.4 and 11.6.

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11.6.5 Settlement of Distributed Energy Resource Aggregations

Settlements for Energy provided by a Distributed Energy Resource Provider from a Distributed Energy Resource Aggregation shall be based on the applicable PNode or Aggregated PNode of the Distributed Energy Resource Aggregation. For Distributed Energy Resource Aggregations comprising a single PNode, settlement for Energy transactions would reflect the LMP at that PNode. For Distributed Energy Resource Aggregations comprising multiple PNodes settlement for Energy transactions would be the weighted average LMP of the PNode(s) based on the applicable Generation Distribution Factors

submitted through the Distributed Energy Resource Aggregation's Bid or as registered in the Master File. Consistent with the provisions of Section 11.5.2, the CAISO will impose UIE on a Distributed Energy Resource Provider if the Distributed Energy Resource Provider's Distributed Energy Resource Aggregation does not follow a Dispatch Instruction.

11.6.5.1 Settlement of Heterogeneous Distributed Energy Resource Aggregations

Settlements for Energy and Demand curtailment provided by a Distributed Energy Resource Provider from a heterogeneous Distributed Energy Resource Aggregation will be consistent with Section 11.6.5. The CAISO will settle each heterogeneous Distributed Energy Resource Aggregation based on the sum of (1) the net Energy provided by the Distributed Energy Resources, accounting for any Load and any negative Energy from energy storage resources, and (2) the Demand curtailment provided by the Distributed Curtailment Resources, represented as positive Supply. For settlement, monitoring, compliance, and audit purposes, the Scheduling Coordinator for each heterogeneous Distributed Energy Resource Aggregation must submit in the Settlement Quality Meter Data Systems:

- (1) the net injection or withdrawal of Energy from the Distributed Energy Resources that are not Distributed Curtailment Resources;
- (2) the Demand curtailment provided by the Distributed Curtailment Resources, calculated consistent with the requirements of Section 11.6.1;
- (3) the Customer Load Baseline or Generator Output Baseline used to calculate the Demand curtailment for the Distributed Curtailment Resources, calculated consistent with the requirements of Section 4.13.4; and
- (4) the actual underlying consumption or Energy during all hourly intervals for the calendar days for which the Meter Data was collected to develop the baseline.

Only the net injection of Energy and the Demand curtailment will be considered Settlement Quality Meter Data.

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30.5.2.6 Supply Bids for Distributed Energy Resource Aggregations

In addition to the common elements listed in Section 30.5.2.1, Supply Bids for Distributed Energy Resource Aggregations will contain the following components as applicable: Generation Distribution Factors, Ramp Rate, Minimum and Maximum Operating Limits; Energy Limit, and Contingency Flag. If the Scheduling Coordinator does not submit the Generation Distribution Factors for the Bid, the CAISO will use default Generation Distribution Factors registered in Master File. The CAISO will apply a net benefits test to determine a threshold Market Clearing Price for Demand Response Providers and heterogeneous Distributed Energy Resource Aggregations. The CAISO will not accept heterogeneous Distributed Energy Resource Aggregations Bids for Energy below this threshold Market Clearing Price in the CAISO Markets.

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Appendix A

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- Distributed Curtailment Resource

A Distributed Energy Resource providing Demand curtailment as part of a heterogeneous Distributed Energy Resource Aggregation.

* * * * *

- Distributed Energy Resource

Any resource located on the distribution system, any subsystem thereof, or behind a customer meter in a Utility Distribution Company or a Metered Subsystem.

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Appendix B.21 Distributed Energy Resource Provider Agreement

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4.1.4 Small Utility Limits

A Distributed Energy Resource Provider that aggregates in utilities that distribute: (1) over four million MWh in the previous fiscal year must certify to the CAISO that its participation is not prohibited by the Local Regulatory Authority; or (2) four million MWh or less in the previous fiscal year must certify to the CAISO that its participation is permitted by the Local Regulatory Authority applicable to Distributed Energy Resources, and that it has satisfied all applicable rules and regulations of the Local Regulatory Authority.

Attachment B – Marked Tariff

Tariff Changes to Implement Final Rule – FERC Order No. 2222

California Independent System Operator Corporation

July 19, 2021

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4.17 Distributed Energy Resource Aggregations

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4.17.3 Requirements for Distributed Energy Resource Aggregations

The following requirements apply to Distributed Energy Resource Aggregations:

- (a) A Distributed Energy Resource Aggregation will consist of one (1) or more Distributed Energy Resources.
- (b) A Distributed Energy Resource may not participate in more than one Distributed Energy Resource Aggregation.
- (c) A Distributed Energy Resource participating in a Distributed Energy Resource Aggregation may not participate as a resource in the CAISO Market separate from the Distributed Energy Resource Aggregation.
- (d) A Distributed Energy Resource participating in a Distributed Energy Resource Aggregation may not also participate in a retail net energy metering program that does not expressly permit wholesale market participation.
- (e) Each Distributed Energy Resource Aggregation must be located in a single Sub-LAP.
- (f) A Distributed Energy Resource Aggregation must provide a net response at its PNode(s) within its sub-LAP that is consistent with CAISO Dispatch Instructions and applicable Generation Distribution Factors submitted through the Distributed Energy Resource Aggregation's Bid or as registered in the Master File.
- (g) Distributed Energy Resource Aggregations are Scheduling Coordinator Metered Entities. Scheduling Coordinators for a Distributed Energy Resource Aggregation must have entered into a Scheduling Coordinator Metering Agreement with the CAISO. A Distributed Energy Resource participating in a Distributed Energy Resource Aggregation may not also participate in the CAISO Markets as a CAISO Metered Entity.

(h) A Distributed Energy Resource Aggregation may not receive compensation from retail programs for capacity, Energy, or other services it provides the CAISO Markets.

(i) Distributed Curtailment Resources may participate in heterogeneous Distributed Energy Resource Aggregations pursuant to these rules and Section 4.17.8. Aggregations of only Distributed Curtailment Resources without other Distributed Energy Resources that inject Energy must participate as Proxy Demand Resources or Reliability Demand Response Resources.

4.17.4 Identification of Distributed Energy Resources

Each Distributed Energy Resource Provider will provide information, as described in the Business Practice Manual, identifying each of its Distributed Energy Resource Aggregations and such information regarding the location, capacity, operating characteristics and applicable Generation Distribution Factors of its Distributed Energy Resource Aggregation(s) as may be reasonably requested from time to time by the CAISO, and when the information changes due to the removal, addition, or modification of a Distributed Energy Resource or Distributed Curtailment Resource within the Distributed Energy Resource Aggregation. All information provided to the CAISO by a Distributed Energy Resource Provider regarding the operational and technical characteristics of its Distributed Energy Resource Aggregation(s) must be accurate.

As further described in the Business Practice Manual, the CAISO will confer with the applicable Utility Distribution Company or Metered Subsystem regarding information provided about Distributed Energy Resources comprising a Distributed Energy Resource Aggregation(s). The Utility Distribution Company or Metered Subsystem will have an opportunity to provide written comments within thirty (30) days regarding the accuracy of the information about Distributed Energy Resources comprising a Distributed Energy Resource Aggregation(s) or raise concerns with respect to whether the Distributed Energy Resources (1) are participating in another Distributed Energy Resource Aggregation; (2) are participating as a Proxy Demand Response resource or a Reliability Demand Response Resource; (3) are participating in a retail net energy metering program that does not expressly permit wholesale market participation; (4) do not comply with applicable Utility Distribution Company tariffs or requirements of the relevant Local Regulatory Authority; (5) receive compensation from retail programs for capacity, Energy,

or other services that would be offered to the CAISO Markets; or (65) may pose a significant threat to the safe and reliable operation of the Distribution System, if operated as part of a Distributed Energy Resource Aggregation. If the Utility Distribution Company or Metered Subsystem raises concerns based on these factors, the CAISO will provide the Distributed Energy Resource Provider with the Utility Distribution Company or Metered Subsystem's written comments, and the Distributed Energy Resource Provider will resolve those concerns with the Utility Distribution Company or Metered Subsystem prior to the CAISO allowing the individual Distributed Energy Resource to participate in a Distributed Energy Resource Aggregation. Any disputes regarding these concerns shall be undertaken with the applicable Governmental Authority for the Utility Distribution Company or Metered Subsystem and shall not be arbitrated or in any way resolved through a CAISO dispute resolution mechanism.

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4.17.5 Characteristics of Distributed Energy Resource Aggregations

4.17.5.1 Size Limits

A Distributed Energy Resource Aggregation will be no smaller than ~~0.5 MW~~ 100 kW. A Distributed Energy Resource Aggregation that includes Distributed Energy Resources located at different PNodes will be no larger than 20 MW.

4.17.5.2 Metering and Telemetry

Scheduling Coordinators shall submit to the CAISO Actual Settlement Quality Meter Data or Estimated Settlement Quality Meter Data for Distributed Energy Resource Aggregations they represent for each Settlement Period in an Operating Day. Distributed Energy Resources and Distributed Curtailment

Resources participating in a Distributed Energy Resource Aggregation will be directly metered pursuant to a meter that complies with any applicable Utility Distribution Company tariff and any standards of the relevant Local Regulatory Authority or, if no such tariff exists or no standards have been set by that Local Regulatory Authority, the metering standards as further detailed in the CAISO's Business Practice Manual. Distributed Energy Resource Providers must make Settlement Quality Meter Data from individual Distributed Energy Resources and Distributed Curtailment Resources comprising a Distributed Energy Resource Aggregation available to the CAISO upon request.

Distributed Energy Resource Providers shall provide information regarding Distributed Energy Resource Aggregation(s) with a rated capacity of 10 MW or greater or, if the Distributed Energy Resource Aggregation(s) provides Ancillary Services, through telemetry to the CAISO's EMS in accordance with the CAISO's standards for direct telemetry and consistent with the requirement for telemetry set forth in Section 7.6.1.

4.17.6 Operating Requirements

Distributed Energy Resource Aggregations will respond to CAISO Dispatch Instructions. The CAISO may dispatch a Distributed Energy Resource Aggregation to the extent the Distributed Energy Resource Aggregation bids or schedules Energy or Ancillary Services into the CAISO Markets and receives an award. The CAISO may also issue an Exceptional Dispatch Instruction for the Distributed Energy Resource Aggregation for reliability pursuant to Section 34.10. Distributed Energy Resource Aggregations shall respond to Dispatch Instructions consistent with Generation Distribution Factors for the Distributed Energy Resource Aggregation.

Each Distributed Energy Resource Provider will operate its Distributed Energy Resource Aggregation(s) in a manner consistent with limitations or operating orders established by the Utility Distribution Company or Metered Subsystem. Scheduling Coordinators for Distributed Energy Resources Providers shall submit Outages to the CAISO as necessary to reflect any distribution constraints impacting Distributed Energy Resources that comprise a Distributed Energy Resource Aggregation under its control. The CAISO shall have the authority to coordinate and approve Outage schedules for the Distributed Energy Resource Aggregation(s) listed in a Distributed Energy Resource Provider Agreement, in accordance with the provisions of Section 9.

4.17.7 Heterogeneous Distributed Energy Resource Aggregations

Heterogeneous Distributed Energy Resource Aggregations are subject to all the requirements in Section 4.17. Heterogeneous Distributed Energy Resource Aggregations must consist of at least one Distributed Energy Resource that injects Energy and at least one Distributed Curtailment Resource, participating together under a single Resource ID as a Distributed Energy Resource Aggregation through a Distributed Energy Resource Provider. The Scheduling Coordinator for a heterogeneous Distributed Energy Resource Aggregation will submit Bids for Energy or Ancillary Services or Energy Self-Schedules representing the net injection of Energy from the Distributed Energy Resources that are not Distributed Curtailment Resources plus the Demand curtailment from the Distributed Curtailment Resources. Scheduling Coordinators must include Bid parameters consistent with Section 30.5.2.6. A heterogeneous Distributed Energy Resource Aggregation must provide a net response of Energy, Demand curtailment, or both at its PNode(s) within its sub-LAP that is consistent with CAISO Dispatch Instructions and applicable Generation Distribution Factors submitted through the Distributed Energy Resource Aggregation's Bid or as registered in the Master File. To calculate the Demand curtailment provided by the Distributed Curtailment Resources within a heterogeneous Distributed Energy Resource Aggregation, the Scheduling Coordinator must calculate a Demand Response Energy Measurement for the Distributed Curtailment Resources, excluding the Distributed Energy Resources that are injecting Energy and not Distributed Curtailment Resources, consistent with the requirements in Sections 4.13.4 and 11.6.

* * * * *

11.6.5 Settlement of Distributed Energy Resource Aggregations

Settlements for Energy provided by a Distributed Energy Resource Provider from a Distributed Energy Resource Aggregation shall be based on the applicable PNode or Aggregated PNode of the Distributed Energy Resource Aggregation. For Distributed Energy Resource Aggregations comprising a single PNode, settlement for Energy transactions would reflect the LMP at that PNode. For Distributed Energy Resource Aggregations comprising multiple PNodes settlement for Energy transactions would be the weighted average LMP of the PNode(s) based on the applicable Generation Distribution Factors

submitted through the Distributed Energy Resource Aggregation's Bid or as registered in the Master File. Consistent with the provisions of Section 11.5.2, the CAISO will impose UIE on a Distributed Energy Resource Provider if the Distributed Energy Resource Provider's Distributed Energy Resource Aggregation does not follow a Dispatch Instruction.

11.6.5.1 Settlement of Heterogeneous Distributed Energy Resource Aggregations

Settlements for Energy and Demand curtailment provided by a Distributed Energy Resource Provider from a heterogeneous Distributed Energy Resource Aggregation will be consistent with Section 11.6.5. The CAISO will settle each heterogeneous Distributed Energy Resource Aggregation based on the sum of (1) the net Energy provided by the Distributed Energy Resources, accounting for any Load and any negative Energy from energy storage resources, and (2) the Demand curtailment provided by the Distributed Curtailment Resources, represented as positive Supply. For settlement, monitoring, compliance, and audit purposes, the Scheduling Coordinator for each heterogeneous Distributed Energy Resource Aggregation must submit in the Settlement Quality Meter Data Systems:

- (1) the net injection or withdrawal of Energy from the Distributed Energy Resources that are not Distributed Curtailment Resources;
- (2) the Demand curtailment provided by the Distributed Curtailment Resources, calculated consistent with the requirements of Section 11.6.1;
- (3) the Customer Load Baseline or Generator Output Baseline used to calculate the Demand curtailment for the Distributed Curtailment Resources, calculated consistent with the requirements of Section 4.13.4; and
- (4) the actual underlying consumption or Energy during all hourly intervals for the calendar days for which the Meter Data was collected to develop the baseline.

Only the net injection of Energy and the Demand curtailment will be considered Settlement Quality Meter Data.

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30.5.2.6 Supply Bids for Distributed Energy Resource Aggregations

In addition to the common elements listed in Section 30.5.2.1, Supply Bids for Distributed Energy Resource Aggregations will contain the following components as applicable: Generation Distribution Factors, Ramp Rate, Minimum and Maximum Operating Limits; Energy Limit, and Contingency Flag. If the Scheduling Coordinator does not submit the Generation Distribution Factors for the Bid, the CAISO will use default Generation Distribution Factors registered in Master File. The CAISO will apply a net benefits test to determine a threshold Market Clearing Price for Demand Response Providers and heterogeneous Distributed Energy Resource Aggregations. The CAISO will not accept heterogeneous Distributed Energy Resource Aggregations Bids for Energy below this threshold Market Clearing Price in the CAISO Markets.

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Appendix A

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- Distributed Curtailment Resource

A Distributed Energy Resource providing Demand curtailment as part of a heterogeneous Distributed Energy Resource Aggregation.

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- Distributed Energy Resource

Any resource ~~with a first point of interconnection to a~~ located on the distribution system, any subsystem thereof, or behind a customer meter in a Utility Distribution Company or a Metered Subsystem.

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Appendix B.21 Distributed Energy Resource Provider Agreement

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4.1.4 Small Utility Limits

A Distributed Energy Resource Provider that aggregates in utilities that distribute: (1) over four million MWh in the previous fiscal year must certify to the CAISO that its participation is not prohibited by the Local Regulatory Authority; or (2) four million MWh or less in the previous fiscal year must certify to the CAISO that its participation is permitted by the Local Regulatory Authority applicable to Distributed Energy Resources, and that it has satisfied all applicable rules and regulations of the Local Regulatory Authority.

Attachment C – Compliance Table

Tariff Changes to Implement Final Rule – FERC Order No. 2222

California Independent System Operator Corporation

July 19, 2021

Requirement Category	Relevant CAISO Tariff Provisions
Small Utility Opt-out	Proposed Article 4.1.4 of Appendix B.21
Definitions	“Distributed Energy Resource Provider” and “Distributed Energy Resource,” Appendix A
Participation Model	4.17
Types of Technologies	Proposed “Distributed Curtailment Resource,” Appendix A, Proposed 4.17.7, Proposed 11.6.1, Proposed 30.5.2.6
Double Counting of Services	Proposed 4.17.3(h), Proposed 4.17.4
Min/max DERA Size	Proposed 4.17.5.1
Min/max DER Requirements	4.6.3.2, 4.17, “Participating Generator,” Appendix A
Single Resource Aggregation	4.17.3(a)
Locational Requirements	4.17.3
Distribution Factors and Bidding Parameters	4.17.3(f), 30.5.2.1, 30.5.2.6
Information and Data Requirements	4.17, Proposed 4.17.4, 10.3.2.1.2, 11.6.5, 30.5.2.1, 30.5.2.6, Articles 4.2.1 and 4.2.3 of Appendix B.21,
Metering and Telemetry	4.17.5.2, 10.3.2.1.2, Article 4.2.2 of Appendix B.21
Role of Distribution Companies	Proposed 4.17.4, Article 4.1.1 of Appendix B.21
Ongoing Operational Coordination	4.17.1, 4.17.2, 4.17.6, 11.6.5, 30.5.2, Appendix B.21
Role of Local Regulatory Authority	4.17.2, 4.17.4
Modifications to DERAs	Proposed 4.17.4, Proposed 4.17.4.1, Article 4.2.3 of Appendix B.21
Market Participation Agreements	4.17.1, Appendix B.21