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<b>Notes</b>	

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**The document was not produced by the CAISO and therefore does not necessarily reflect its views or opinion.**

1 **ALTERNATE PROPOSAL FOR PROXY DEMAND RESOURCE (PDR)**

2 Draft for Discussion Purposes

3 G. Muir Davis,

4 (And other supporting members of the Direct Access Subgroup)

5 **DOCUMENT SEQUENCE**

- 6 **(1) About this Document**
- 7 **(2) Document Summary**
- 8 **(3) Document Road Map**
- 9 **(4) And then the Main Body of the Document Begins**

10

11 **ABOUT THIS DOCUMENT**

12 This document translates a presentation to the DR Working Group  
13 made by G. Muir Davis of Southern California Edison Company. The  
14 presentation and this document present an alternate model for CAISO's  
15 Proxy Demand Resource (PDR) Demand Response (DR) resource  
16 product.

17 The alternate PDR model grew out of the work of a cross-section of  
18 DR Working Group members attempting to sort out issues and challenges  
19 concerning load belonging to a Load Serving Entity (LSE) that differs from  
20 the Curtailment Service Provider (CSP). Additionally, the alternate PDR

1 model appears to address a FERC concern that CSPs have direct access  
2 to CAISO wholesale markets.

3 This document, then, is a working draft composed of the  
4 contributions of people working on resolving direct access issues. While  
5 Southern California Edison Company (SCE) prepared this document, it  
6 does not necessarily reflect the company's views or policies concerning  
7 Demand Response.

8 The same statement applies to all individuals who worked on the  
9 alternate PDR model with respect to their employers' or clients' views or  
10 policies.

11 The purpose of this document, and its goal, is to present to CAISO  
12 a compelling alternate PDR model that hopefully increases DR resource  
13 volumes flowing into CAISO's markets and does so at a low cost, because  
14 the model helps simplify the DR product solution for CAISO.

15

16

## DOCUMENT SUMMARY

17 **Purpose/Goal.** The shared goal of market participants and  
18 interested stakeholders is to maximize the realistically achievable Demand  
19 Response (DR) resource flowing into CAISO's wholesale markets to help  
20 support network reliability, relieve congestion constraints, and provide

1 other benefits, such as helping meet state policy priorities to defer costly  
2 new generation construction and reduce carbon emissions.

3 To achieve this goal, DR should be structured so it is a viable  
4 resource. This means that DR is capable of competing with other supply-  
5 side resources, that DR participates in CAISO's wholesale markets, and  
6 that DR resources are attracted to the same or similar locations as would  
7 other supply-side resources.

8 CAISO markets should motivate CSPs to provide DR resources in  
9 high priced areas rewarding the DR capabilities, and not in the low-priced  
10 areas rewarding the load.

11 **CAISO DR Models.** CAISO has several DR models that it intends  
12 to deploy in MRTU Release 1. Initially there will be, Non-Participating  
13 Load (NPL), Participating Load (PL), and the "New" Proxy Demand  
14 Resource (PDR)<sup>1</sup>. Future releases eliminate the inclusion of Non-  
15 Participating Load (NPL), transform Participating Load (PL) to  
16 Dispatchable Demand Response (DDR), and continue Proxy Demand  
17 Response (PDR).

18 **CAISO PDR Model.** In CAISO's PDR model, DR and load are  
19 connected. The PDR is scheduled and dispatched at Custom Aggregation  
20 Groups (CAGs) while the load is scheduled using the Default LAP. The

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<sup>1</sup> CAISO "Guidance Document on MRTU Release 1 Provisions to Support 'Demand Response' Programs." August 1, 2008.

1 PDR is easier to use than PL, but less desirable than NPL. Unlike NPL  
2 which is essentially scheduled, dispatched, and settled at the LAP, PDR is  
3 scheduled and dispatched at the CAG and settled at the LAP. More  
4 specificity can be found in the previously footnoted, "CAISO Guidance  
5 Document ..."

6 The different bases for dispatching and settling are at odds with  
7 motivating PDR to high-priced areas.

8 **The Alternate PDR Model.** The alternate PDR (PDR-A) model  
9 proposed in this document attempts to resolve the principal barrier of a  
10 LSE serving DR, as a CSP, that belongs to another LSE. In other words,  
11 the PDR-A allows the CSP to serve DR independently of the LSE and  
12 participate directly with CAISO wholesale markets. That barrier between a  
13 CSP and DR, when the DR belongs to another LSE, is significant and  
14 makes the CASIO PDR Model unusable. Additionally, the separation of  
15 DR and Load as modeled in PDR-A solves FERC's interest in providing  
16 CSPs direct access to wholesale markets.

17 **PDR and PDR-A Similarities.** The PDR-A model is an  
18 evolutionary step modifying the core CAISO PDR product model. Both the  
19 PDR and PDR-A models assume DR is a limited-use resource; both  
20 products are supported by a Master file and Use Plan; they are bid and  
21 dispatched at CAGs and are treated the same with respect to RUC  
22 impacts; they are configured within a Local Capacity Area, not initially

1 intended for Ancillary Service provisioning and are products where a  
2 single PDR may contain multiple retail DR-related programs.

3       **Differences.** There are distinctive differences, though. The core  
4 point concerns how PDR-A uncouples Load from DR resources, which  
5 then allows CSPs to participate in CAISO's markets independently of the  
6 retail participant's LSE. This removes otherwise a highly segmented  
7 marketplace where only the retail participant's LSE can offer PDR based  
8 demand response products and programs. Additionally, existing DR  
9 resources that are currently provided to retail customers of LSEs other  
10 than the IOUs will either cease or remain outside of MRTU, and not be  
11 integrated into CAISO's wholesale markets.

12       *Settlement Differences.* PDR-A is settled as its own resource at the  
13 CAG. CAISO PDR ceases to exist after dispatch so the PDR is not  
14 settled. Instead, the Load is essentially settled at the Default LAP as  
15 uninstructed energy (UIE).

16       *Performance Requirements.* Unlike the CAISO's PDR, PDR-A  
17 includes performance requirements, exactly the same as requirements for  
18 generation; the aim being creation of a truly level playing field between  
19 supply-side generation resources and DR resources for maximum supply  
20 competition in the CAISO's markets.

1           **PDR-A functionality** is as follows:

- 2                   ■ PDR-A use is controlled by its Master File in the same  
3                   manner as other generating resources.
- 4                   ■ PDR-A is a use limited resource controlled by its “Use  
5                   Plan.” The Use Plan would contain the limits of use and  
6                   the limits of pricing or dispatch triggering. This is  
7                   intended to dramatically reduce the ability of the PDR-A  
8                   to be used as a “money-machine.”
- 9                   ■ PDR-A bids into the Day-Ahead Market and the Real-  
10                  Time Energy Market.
- 11                  ■ PDR-A is bid at a CAG, where configurations may be as  
12                  small as a P Node, or as big as a defined sub-LAP.
- 13                  ■ PDR-A is submitted as if it was generation, using all the  
14                  terms and conditions set by CAISO for generators.
- 15                  ■ PDR-A is settled at the CAG, based on the clearing of  
16                  nodal prices.
- 17                  ■ Determination of actual DR resources delivered is  
18                  determined through measurement of aggregate meter  
19                  usage, calculated off an established baseline and  
20                  performance against the baseline determines the quantity  
21                  to be settled at the CAG.
- 22                  ■ PDR-A appears as meter reductions in the LSE’s retail  
23                  electric service for specific customers; the reductions

1                   resulting from successfully executed DR resource  
2                   transactions would be removed from the LSE's Load for  
3                   settlement of uninstructed energy.

4                   **Allocating Responsibilities.** In the PDR-A model, nearly all  
5 responsibilities for the identification, organization, development, and  
6 harvesting of DR for bidding into CAISO's wholesale markets are the  
7 responsibility of CSPs.

8                   **Reviewing PDR-A Functionality.** Through case analysis, the  
9 performance characteristics of PDR-A are discussed and key issues which  
10 must be addressed to ensure the most efficient and effective PDR-A  
11 model are identified; notable issues are the mispricing of DR at CAGs,  
12 which might lead to abusive market conditions rather than DR solving  
13 problems at needed local nodal reliability and/or congestion points.

14                   **Document Conclusions.** The document concludes that most of  
15 the existing CAISO MRTU Participating Users Guide would not require  
16 changes to incorporate the PDR-A model, although Sections 5 and 6 of  
17 that document, Scheduling and Bidding, and Settlement and Validation  
18 would require modifications.

19                   Also, with respect to matters concerning potential gaming the  
20 document concludes that concerns can be mitigated through several  
21 mechanisms, in addition to those listed above, continuous market design  
22 improvement, ongoing rules changes, and effective market monitoring.



1           The final concluding comments focus on next steps; the  
2 recommendations as follows:

- 3           (1) CAISO adopts the PDR-A model, and incorporates the  
4           model in its required documentation, including BPMs, User  
5           Guides, etc.
- 6           (2) CAISO prepares a comparable working draft document  
7           detailing its PDR model, and includes in that document  
8           comparison to the PDR-A model, discussing the key  
9           differences and how CAISO will address the differences.  
10          CAISO may dismiss the differences, but should provide a  
11          clear explanation for those supporting the PDR-A model as  
12          to why its elements are being dismissed.
- 13          (3) A DR Working Group meeting is held to review CAISO  
14          proposal and the alternate PDR-A and work toward resolving  
15          which approach should be driven forward, including the  
16          possibility of a hybrid, or synthesized model; where the  
17          process of review includes written comments and  
18          suggestions from DR Working Group members.
- 19          (4) A process for extending the current Users Guide to include  
20          MRTU MAP release DR products is set forth and activated.
- 21          (5) A review of CAISO's BPMs begins following the  
22          completion/agreement/ decision regarding CAISO's final  
23          array of DR products that it will move to implement with

1 MRTU MAP; the schedule for this is agreed to at the DR  
2 Working Group meeting where the PDR and PDR-A  
3 products are reviewed.  
4

## 5 **DOCUMENT ROADMAP**

### 6 **Content of Sections 1 and 2**

7 This document is organized with the assumption that there may be  
8 some readers that would appreciate background information that sets a  
9 context for the alternate PDR proposal. Sections 1 and 2 do this by  
10 discussing DR policy priorities, CAISO's MRTU initiative, MRTU DR  
11 related products and their characteristics, CPUC support of CAISO's DR  
12 interests, and goals for demand response in MRTU.

13 **Readers familiar with the context in which the alternate PDR**  
14 **proposal is being advanced can go directly to section 3.**

1           **Content of Section 3**

2           Section 3 focuses on issues and challenges of DR product models,  
3 which cover DR independence from LSEs (Loads), Tariff implications,  
4 measurement and verification, and direct access and the role of LSEs as  
5 direct access is implemented.

6           **Content of Section 4**

7           Section 4 focuses on mapping the framework of PDR-A.  
8 Similarities and differences between the two models are discussed, setting  
9 up Section 5, wherein a base case and two alternative outcomes for a  
10 PDR-A DR resource bidding into CAISO's markets.

11           **Content of Section 5**

12           In Section 5, PDR-A functionality is specified, the alignment of  
13 responsibilities with PDR-A functionality is outlined and then cases  
14 illustrating how PDR-A works and how it solves CAISO PDR model related  
15 issues are presented.

16           **Content of Sections 6 through 8**

17           Section 6 considers the PDR and PDR-A models and whether  
18 significant MRTU DR resource Users Guides changes would be required.

19           Section 7 discusses market "gaming" concerns raised by some DR  
20 Working Group members.

1 Section 8 asks – if PDR-A were adopted, would there be a need for  
2 any other DR products serving CAISO’s markets?

### 3 **Final Section 9**

4 Section 9 makes recommendations concerning next steps with  
5 respect to how to proceed to sort the PDR and PDR-A models, coming to  
6 a final determination of the best PDR product for serving CAISO markets.

7 The main body of the document follows.

## 8 **ALTERNATE PROPOSAL FOR PROXY DEMAND RESOURCE (PDR)**

### 9 Draft for Discussion Purposes

10 G. Muir Davis

11 (And other supporting members of the Direct Access Subgroup)

## 12 13 **1.0 INTRODUCTION**

### 14 **1.1 Demand Response as a Policy Priority**

15 Demand Response (DR) as an electric power resource is an  
16 important policy priority of the California legislature, the California Public  
17 Utility Commission (CPUC), the California Energy Commission (CEC), the  
18 Federal Energy Regulatory Commission (FERC) and the California  
19 Independent System Operator (CAISO).

1           In its efforts to respond to FERC orders and changing FERC  
2 priorities regarding DR, as well as to support California DR policy  
3 priorities, the CAISO has been developing DR products that enable DR to  
4 be bid into its wholesale markets.

### 5           **1.2 Market Redesign and Technology Upgrade**

6           Simultaneously, the CAISO's market design is evolving through the  
7 introduction of a new system, referred to as Market Redesign and  
8 Technology Upgrade (MRTU). As MRTU is introduced, the CAISO plans  
9 to enable DR participation in its wholesale markets.

10           There are two planned steps to full deployment of MRTU.  
11 Release1 involves deployment of initial capabilities of the new system,  
12 wherein DR may participate in two ways: (1) as Non-Participating Load  
13 (NPL) and (2) Participating Load (PL).

14           The second release, being deployed approximately a year after the  
15 first release, completes the transition to full operation of MRTU. The  
16 second release has been labeled Markets and Performance (MAP).

1           **1.3 MRTU-MAP DR Products**

2           For the MAP release phase of the MRTU deployment, the CAISO  
3 has two, and possibly three, DR products it intends to make available.

4           The first product is Proxy Demand Resource (PDR); the second is  
5 the transformation of Participating Load (PL) to Dispatchable Demand  
6 Resource (DDR). The third product under consideration is referred to as  
7 “Partial Participation Option, DDR.”

8           **1.4 CPUC Support for CAISO’s DR Priorities**

9           The CAISO’s efforts to integrate DR into its wholesale markets is  
10 supported by the CPUC, which has directed the state’s Investor-Owned  
11 Utilities (IOUs) to review and revise its retail demand management and  
12 demand response programs to integrate more fully into CAISO’s  
13 wholesale markets MRTU, (which may be modified by CPUC decisions  
14 regarding IOU applications for funding for 2009-2011 demand response-  
15 related retail programs).

16           Through the CPUC’s current review and approval process  
17 concerning the IOUs’ applications for funding its retail DR related  
18 programs for 2009-2011, IOUs have been directed to work more closely  
19 with CAISO to increase DR participation in CAISO wholesale markets.

1           In amended applications to the CPUC, the IOUs provided detail on  
2 the challenges faced and the timing required to modify and/or migrate  
3 retail DR programs into wholesale markets.

4           Also, as part of the amended filings, the CAISO was encouraged to  
5 reactivate its DR working group for purposes of addressing the many  
6 issues that were raised by IOUs, and by interveners, in the presently  
7 occurring CPUC proceedings concerning the IOU applications for funding  
8 for DR related retail programs for 2009-2011.

## 9   **2.0 GOALS FOR DEMAND RESPONSE IN MRTU**

### 10       **2.1 General, Shared Goals**

11           In general, the goal is to maximize the integration of Demand  
12 Response resources into CAISO's wholesale markets, thereby helping to  
13 maintain system reliability and to mitigate costly network congestion  
14 through market participation rather than through exceptional dispatch.

15           Also, success in maximizing DR participation in CAISO markets is  
16 believed to help defer the need for new power generation, to reduce  
17 carbon emissions, and to maximize the efficient use of electric power by  
18 consumers.

19           Decision rules are needed to guide actions designed to achieve the  
20 general goal. Decision rules should include at least the following points:

21           (1) *Ensure DR can be a viable resource*

1 For DR to be an ongoing reliable resource for CAISO, it should  
2 compete head-to-head with generation. That is, DR must be bid,  
3 dispatched, and settled as an independent resource. Absent such  
4 competition, market-clearing prices may not fully reflect the true value of  
5 energy or capacity.

6 *(2) DR should be focused on constrained network nodal points*  
7 *and/or aggregations of points*

8 MRTU will provide more granular information on, and associated  
9 pricing of, congestion in the regional transmission grid. This should assist  
10 distribution level grid control in mitigating localized network constraints, as  
11 well.

12 Accordingly, the DR market design should ensure that generation  
13 and DR resource location specific incentives are the same in order to  
14 maximize the probability of least cost network solutions to specific-location  
15 reliability and congestion problems.

16 *(3) Ensure DR aligns and fits into wholesale markets “naturally”*

17 Natural integration of DR into the CAISO’s markets is critically  
18 important. What is meant by the term “natural” is that DR aligns and fits  
19 consistent with its capabilities, i.e., DR resources integrate naturally into  
20 network operations as solutions to specific operations requirements.



1 Further, natural integration of DR into CAISO wholesale markets  
2 means the limited nature of DR is acknowledged, and is a central part of  
3 DR product specifications for CAISO wholesale market participation.

4 Finally, a naturally aligned DR resource is “summoned” with a price  
5 trigger that makes the value of providing DR worth it, compared to  
6 opportunity cost tradeoffs previously noted.

## 7 **2.2 Important Distinctions between Generation and DR**

### 8 **Resources**

9 The CAISO views Participating Load DR as comparable to  
10 generation. It defines the comparability of PL to generation as follows.<sup>2</sup>

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<sup>2</sup> Source for Table 1 is: “Demand Response Working Group 2: Demand Response in MRTU Release 1 and Design Details for Post-Release 1,” by Jim Price, Lead Engineering Specialist, CAISO, June 12, 2008, unnumbered page.

1 **Table 1: Comparison of PL and Generator Resources**

<b>Participating Load Resource</b>	<b>Generator Resource</b>
Base Load Schedule	Base Load
Minimum Load Reduction	Minimum Generator Output
Minimum Load	Maximum Generator Output
Load Reduction Initiation Time	Start-Up Time
Minimum Base Load Reduction Time	Minimum Time Between Curtailments
Minimum Load Reduction Time	Minimum Up Time
Maximum Load Reduction Time	Maximum Daily Energy Limit
Minimum & Maximum Daily Energy Limit	Maximum Daily Energy Limit
Maximum Daily Curtailments	Maximum Number of Curtailments
Load Drop Rate	Ramp Up Rate
Load Pickup Rate	Ramp Down Rate
Load Reduction Initiation Cost	Start-Up Cost
Minimum Load Reduction Cost	Minimum Load Cost

2

3

4

5

The comparison in Table 1 is correct, but not very useful without recognizing the constraints on DR availability. These constraints are extreme by supply-side standards.

## 2.3 Summary of CAISO Demand Response Models

To ensure that readers are familiar with CAISO's DR products, the following briefly summarizes them. For those familiar with these products, skip forward to Section 3.

### *MRTU Release 1 DR Products*

For MRTU Release 1, there are two DR products recognized by the wholesale markets – Non-Participating Load (NPL) and Participating Load (PL).

#### **MRTU RELEASE1: NON-PARTICIPATING LOAD DR PRODUCT.** NPL

also may be characterized as bundled IOU and direct access customers where demand response is captured through existing Commission approved IOU retail programs that are targeted for specific markets (e.g., industrial, commercial, residential, agricultural), customer segments (e.g., large and small industrial and commercial), and energy efficiency needs (e.g., agricultural pumping efficiency and DR, residential energy efficiency programs).

NPL does not submit bids for participation in CAISO markets. NPL is committed by the CSP before the IFM. If the CSP decides to commit NPL, it notifies CAISO before the IFM that NPL has been committed for the next day. CAISO then, during the RUC process, adjusts its RUC requirements according to the CSP's commitment(s).

1           A noteworthy point is that NPL is does not participate in CAISO's  
2 wholesale markets because the demand response is defined by the LAP  
3 and is not confined within the MRTU desire that all DR be revealed within  
4 Sub-Laps.

5           Readers are directed to SCE's CPUC Amended Application for  
6 funding its 2009-2011 DR programs for a discussion of issues and  
7 concerns prompted by NPL.

8           **MRTU RELEASE 1: PARTICIPATING LOAD DR PRODUCT.** Participating  
9 Load in MRTU Release 1 is composed of entities, including entities with  
10 Pumping Load, providing Curtailable Demand, which has undertaken in  
11 writing by execution of a Participating Load Agreement (PLA) to comply  
12 with all applicable provisions of CAISO Tariff, as they may be amended  
13 from time to time.

14           PL provides Curtailment Demand under the Participating Load  
15 Agreement (PLA) with CAISO.

16           PL is expected to respond to CAISO dispatch instructions; PL can  
17 participate in the DAM and Ancillary Services markets, as well as the  
18 Real-Time Market.

19           PL as a DR resource may bid into CAISO's Day-Ahead and its  
20 Real-Time Imbalance Energy Market under MRTU Release 1. It is eligible  
21 to provide Non-Spinning Reserve as well as Imbalance Energy.

1 Readers are directed to SCE's CPUC Amended Application for  
2 funding its 2009-2011 DR programs for a discussion of issues and  
3 concerns prompted by PL.

4 *DR Products for MRTU MAP Release*

5 In addition to the transformation of Participating Load to DDR, the  
6 following DR products are in development for deployment with the MRTU  
7 MAP release.

8 **PROXY DEMAND RESOURCE.** CAISO is offering a new DR product to  
9 be available sometime after MRTU Release 1 executes.

10 Proxy Demand Resource (PDR) stems from CAISO recognizing  
11 that NPL and PL functionality may be insufficient for capturing and  
12 integrating price-responsive DR programs into MRTU Release 1.

13 PDR is designed to capture and integrate DR programs that are  
14 embedded in IOU loads (as Non-Participating Load) where it can be  
15 difficult to anticipate the Megawatt (MW) quantities of DR from price-  
16 responsive DR programs before the Day-Ahead Market executes.

17 Also, PDR is designed to capture and integrate DR programs that  
18 use the PL model where there are difficulties maintaining demand  
19 forecasts for scheduling of Custom Aggregation Groups (CAGS)  
20 supporting DR programs that have changes in customer enrollments from  
21 month to month.

22 PDR-based demand response is the combination of load that is  
23 scheduled using the Default LAP, and a separate proxy generator

1 resource identifier scheduling at the CAG. The DR MW quantity is  
2 included in the Default LAP as self-schedule. The PDR is bid and  
3 dispatched at the CAG, and then vanishes before settlements. The load  
4 portion of the PDR is settled at the LAP as uninstructed energy (EIU).

5 Readers are directed to SCE's CPUC Amended Application for  
6 funding its 2009-2011 DR programs for a discussion of issues and  
7 concerns prompted by PDR.

8 **PROSPECTIVE ADDITIONAL DR PRODUCT: PARTIAL PARTICIPATION**  
9 **DISPATCHABLE DEMAND RESOURCE.** At the 12 December 2008 Demand  
10 Response Working Group meeting, CAISO indicated it was considering  
11 another DR product. This new product is called "Partial Participation  
12 Option for Dispatchable Demand Resource" (PPO-DDR).

13 As described at the meeting, MRTU Release 1 places PL in  
14 Custom LAPS for Day-Ahead energy scheduling, and pseudo-generator  
15 bids for non-spinning reserve.

16 DDR adds to MRTU PL by allowing participation in CAISO's Real-  
17 Time Market, co-optimizing energy and Ancillary Services. Also, market  
18 functionality for Spinning Reserve and Regulation, and recognition of  
19 operating characteristics (min. & max. energy limits, etc.) are added  
20 features.

21 CAISO considers the advantages of DDR to be locational prices for  
22 load adjustments, co-optimization, and recognizing some operational  
23 benefits that PDR does not yield.

1 PDR is designed to simplify administration of Custom LAPS in initial  
2 DR integration into MRTU and to facilitate the uptake of small DR loads.

3 Under the PDR model, Load is scheduled at a Default LAP and  
4 dispatched as a Proxy Generator at local levels. Settlement is done as an  
5 adjustment to the Default LAP load.

6 The PDR model is intended to make it easier to administer end-use  
7 customer participation, and lessen coordination requirements of CAGS  
8 with separate Curtailment Service Providers (CSP), or Demand Response  
9 Providers (DRP) – terms which are used interchangeably in this paper –  
10 from LSEs.

11 The PPO-DDR model emerged from CAISO listening to  
12 stakeholder concerns about MRTU's use of CAGS. Recent concerns  
13 pertain to some Participating Loads facing excessive costs by needing to  
14 schedule the PL's entire Load using a CAG. Under such a regime, Load  
15 may not receive more as savings for DR than will be charged for losses.

16 Another concern regarding Participating Load pertains to  
17 uncertainties as to how CRRs for hedging congestion costs will ultimately  
18 work.

19 CAISO is considering offering PPO-DDR as a DR product in  
20 response to the above situation. The design under consideration would  
21 allow customers to designate the amount of their total Load that shall be  
22 treated as PL. Only the designated portion of the aggregated Load would  
23 be placed in the CAG, with a separate Resource ID, and the remainder

1 would be scheduled at the Default LAP (DLAP). Energy and Ancillary  
2 Service bids would be eligible as PL only up to the designated quantity.

3 PPO-DDR gives market participants the option of declaring all Load  
4 to be PL, or, as noted above, only a portion of aggregate Load as PL. The  
5 designated Scheduling Coordinator for the DR would be responsible for  
6 separating the metered demand between PL settled at the CAG clearing  
7 price and Load settled at the Default LAP price.

8 Load designated as Partial Participation will be treated as a fixed  
9 quantity; uninstructed energy (final metered demand, minus the Day-  
10 Ahead schedule and Real-Time dispatch) would be considered NPL and  
11 therefore settled at the DLAP price.

12 The PPO-DDR model is aligned exclusively for use as a subset of  
13 the DDR model. CAISO's view is that a similar option is not needed for  
14 PDR, since load already settles at the DLAP.<sup>3</sup>

### 15 **3.0 ISSUES AND CHALLENGES RE: CAISO DEMAND RESPONSE**

#### 16 **MODELS**

17 Because this paper is focused on presenting an Alternate PDR  
18 model, this section will focus on main issues and challenges facing the  
19 existing CAISO PDR model, thus setting up a discussion of PDR-A as a  
20 way to address identified issues and challenges.

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<sup>3</sup> "Addition of 'Partial Participation' Option for Dispatchable Demand Resource," Jim Price, Lead Engineering Specialist, Market & Product Development, CAISO, December 12, 2008, presented to the Demand Response Working Group meeting, same date.



1 Readers are directed to SCE's CPUC Amended Application for  
2 funding its 2009-2011 DR programs for a complete discussion of all issues  
3 and concerns pertaining to all CAISO proposed DR products, except for  
4 the recently suggested PPO-DDR.

### 5 **3.1 DR is linked to Load**

6 As previously noted, through MRTU Release 1, the CAISO expects  
7 that CSPs of DR to the CAISO are essentially IOUs; as such there is an  
8 assumption that the LSEs have sufficient Load for provisioning DR to the  
9 CAISO.

10 As MRTU evolves, other entities may choose to become CSPs.  
11 Retail participants may receive energy from one LSE and DR from a  
12 separate CSP as part of the CSP's portfolio. The retail participant may  
13 choose to bid directly into the CAISO's markets. The option will remain for  
14 LSE customers to provide DR through their LSEs, as well.

15 As Load and DR are required to be coupled, it will become  
16 increasingly more important to navigate the disparate services provided by  
17 the CSP and the LSE. It may ultimately be the case that DR services are  
18 limited to the retail participants LSEs only. In other words, a single  
19 Scheduling Coordinator (SC) would be required to provide energy services  
20 and DR services for each retail participant. This would ultimately cripple  
21 DR in wholesale markets.

1           Also, this introduces an unprecedented level of required  
2 coordination between LSEs, CSPs and retail customers of LSEs.  
3 Coordination with the CAISO may be necessary in some cases, as well.

4           Coordination amongst affected parties in most cases will cover  
5 forecasting, grid operations and control, allocation of DR resources  
6 between wholesale markets and LSE retail requirements, dynamic  
7 configuring and reconfiguring of Custom LAPS, and possibly settlements  
8 execution.

9           The array of coordination points may vary somewhat by the specific  
10 CAISO DR product. Thus, dynamic coordination amongst affected parties  
11 also may vary depending on whether DR is being provided as PL, PDR,  
12 DDR, or, possibly PPO-DDR.

13           Finally, it should be expected that infrastructure changes will be  
14 necessary between LSEs and its customers, especially for customers who  
15 have chosen a third party CSP for their DR offerings.

16           For instance, meter changes to separate core energy service  
17 provided by an LSE from DR offered by LSE customers may be required,  
18 which in turn may impact internal LSE business processes, including but  
19 not limited to meter data management, meter-to-cash business processes,  
20 and billing.

### 21           **3.2 Tariff Implications**

1           There are two main categories of Tariff implications that present  
2 challenges for deployment of DR products as CAISO currently envisions.

3           *“Perverse Incentives”*

4           The first main category concerns risks of “perverse incentives”  
5 arising from LSE retail customers being able to participate in LSE CPUC  
6 approved retail demand management/response programs or engaging  
7 instead in bidding DR into the CAISO’s wholesale markets.

8           A second dimension of “perverse incentives” concerns certain  
9 arbitrage and location allocation mispricing circumstances which may  
10 result in DR aggregating at CAGs that are not necessarily high congestion  
11 stress points at the nodal level of network operations. These will be  
12 discussed further in Sections 4 and 5.

13           *Regulatory Approvals*

14           The second main category of Tariff implications involves regulatory  
15 approvals at the California Public Utilities Commission and potentially with  
16 FERC.

17           CPUC tariff related considerations include the LAP nature of tariffs  
18 versus the Sub-LAP nature of CAISO’s wholesale markets.

19           Default tariffs that have DR components will be strained as there is  
20 an attempt to integrate them as DR in the wholesale markets. IOUs will  
21 be faced with attempting to dispatch the whole default tariff population, or

1 dispatching a portion of the default tariff population. The whole default  
2 tariff population is beyond the sub-LAP requirement that the CAISO  
3 prescribes. Dispatching a portion of the default tariff population subjects  
4 some customers to events while passing over others. It is unclear  
5 whether the disparity of treatment requires differential pricing.

6 It is unclear to what extent the above issues vary by DR product,  
7 i.e., by PL, DDR, PPO-DDR, and PDR. If there is meaningful variance,  
8 the complexity of resolving Tariff implications increases, which might  
9 prolong the DR deployment and post-deployment quantity development  
10 processes for CAISO, LSEs, CSPs, and possibly retail customers of LSEs.

11 The PDR-A proposal is shaped in hope of contributing to reducing  
12 Tariff related deployment delays, thereby enabling a smoother and faster  
13 DR deployment and development effort for CAISO.

### 14 **3.3 Measurements and Verification**

#### 15 *Baseline Methodology*

16 Unlike generation, where the factors affecting performance are  
17 mature and widely known, as well as thoroughly incorporated into  
18 CAISO's BPMs, DR resources, by virtue of their highly customized nature,  
19 present a unique measurement and verification challenge.

20 DR availability and performance depend on end-users owning the  
21 DR resource agreeing to the terms that govern its bidding, scheduling, and

1 ultimate execution. While standardization of terms can be set, the  
2 practical reality is that DR availability and performance is unique for each  
3 aggregated source, even if the resource conforms to standards and  
4 practices set forth in CAISO's DR Users Guide and BPMs.

5 To provide DR at network nodes where it is most needed, unique  
6 DR resources sourced from individual end-users most often must be  
7 aggregated in a customized fashion, i.e., in most cases, individual end-  
8 user DR resources are bundled and offered as a resource specifically  
9 available for calling at specific nodes within the network.

10 These CAGs are, in effect, second order, or derivative, bundles of  
11 DR that are bid into the CAISO's markets. As such, the risk and  
12 responsibility for DR that is bid falls on the aggregator, whether it is an  
13 LSE or a CSP.

14 In turn, where penalties may result from actual DR delivery varying  
15 from scheduled DR, the onus is on the aggregator to transfer penalties to  
16 its customers, or "eat them."

17 In order for this general model to work, DR baselines are critical to  
18 reliably bidding and delivering DR resources to CAISO. Thus far, the  
19 specification of baseline methodology remains an open question. Will  
20 baselines be determined on a process basis, or can a heat-driven metric  
21 be developed and applied, or are there other bases for setting baselines?

1           With multiple DR products available for use, the establishment of  
2 baselines is more complicated. Insofar as baselines will be critical for  
3 coordination among DR parties, i.e., LSE retail customers, LSEs, and  
4 CSPs, learning is critical.

5           As the CAISO details its DR products, readying them for  
6 deployment with MRTU releases, more learning and developing  
7 methodologies for measuring and verifying DR resources will be  
8 necessary.

#### 9           *Visibility to DR Resources*

10           Transparency is vital to effective and sustainable DR resource  
11 provisioning for the CAISO. But there are complications when it comes to  
12 transparency since some individual end-users providing DR may not want  
13 their resource profiles to be visible to other end-users, or to DR parties  
14 outside the frame of a selected CSP.

15           SCE, in its Amended Application, and in discussions with CAISO  
16 staff, has proposed a “DR Portal” where specific DR availability and  
17 characteristics can be posted on a daily basis without risking breach of  
18 confidentiality required by some consumers, LSEs and CSPs. This portal  
19 also would be accessible by regulators, giving regulators the ability to  
20 monitor and understand quite deeply the DR resource picture on an  
21 ongoing basis.

1 SCE continues to advocate for the timely development of this or  
2 similar portal. It may be beneficial to develop the portal in advance of DR  
3 products going live as a means of establishing expected quantities as well  
4 as a driver for getting baselines in order in advance of DR products  
5 coming on line.

#### 6 *Adjustments to Baselines*

7 Baseline methodology is a critical step that is required to ensure  
8 that DR can be appropriately measured and verified.

9 Maintaining up-to-date baselines may be a challenge as retail  
10 participants' usage may be continuously changing. While the underlying  
11 DR resource may remain more or less the same over time, baselines may  
12 have to be adjusted as load conditions change in the network.

13 It will be important to include in DR product specifications, and  
14 within the CAISO's User Guide for DR, baseline methodology and  
15 calculation requirements as well as how dynamic variances will be  
16 handled.

#### 17 *Bids, Dispatch and Settlement*

18 As stated before, measurement and verification is critical to reliable  
19 bidding of DR. The CAISO's dispatch of DR will vary between the Day-  
20 Ahead Schedule and what happens in Real-Time. Variances may or may

1 not be meaningful from a valuation standpoint, depending on network  
2 reliability conditions and other factors.

3           Insofar as the metrics for DR quantification and deployment are  
4 ambiguous, variances between Day-Ahead scheduled DR and Real-Time  
5 calls on DR resources may amplify grid reliability risks, possibly driving  
6 various intended or unintended market disruptions, or abuses.

7           One of the underlying premises of the PDR-A proposal is that  
8 simplifying DR product specifications, if not the overall array of product  
9 options, will increase the reliability and assurance in the measurement and  
10 verification of DR resources.

### 11           **3.4 Direct Access Customers and the Role of LSEs**

12           The As-Is situation for DR seeking direct access to the CAISO's  
13 markets is that such DR must negotiate with its LSE in order to participate  
14 in any DR program. For MRTU Release 1, direct access is practically  
15 unavailable, as nearly all DR must flow through LSEs, which function as  
16 aggregator and Scheduling Coordinator for DR bid into CAISO markets.

17           The design for MRTU MAP assumes that direct access of DR will  
18 be possible. For purposes of product design and specification of DR, it  
19 should be assumed that enabling direct access DR will require Tariff  
20 changes by the CPUC. There are a number of issues associated with  
21 such Tariff changes, many of them inventoried in the IOUs' Amended  
22 Applications.



1           Whether CPUC tariff changes are required to enable direct access  
2 may be a significant determinant of actual DR quantities bid into CAISO  
3 markets. If tariff changes are required, the specification of DR products  
4 should take into consideration the possibility that direct access DR may be  
5 slower coming to CAISO markets than many might prefer.

6           If direct access is slow to come as a function of tariff change  
7 process cycles of the CPUC, and possible issues as to whether direct  
8 access is allowed without changes in state law, a DR product that is  
9 flexible and can evolve as the policy and market environments evolve may  
10 be worth focusing on, leaving other products for later development and  
11 deployment.

12           There seems to be a general consensus that the PDR product  
13 being offered by CAISO has the built in flexibility to evolve consistent with  
14 the evolution of policy and market factors.

15           The PDR-A proposal attempts to further enhance PDR flexibility, in  
16 turn hopefully contributing to the mitigation of risks to other DR products,  
17 while helping to minimize costs to CAISO and market participants  
18 pursuing the general objective of maximizing DR resources for use by  
19 CAISO.

## 4.0 PROPOSED MODIFICATIONS IN CAISO PDR MODEL

In this section, the PDR-A model is outlined.

### 4.1 Similarities between the PDR and PDR-A Models

The PDR-A proposal is not significantly different from the CAISO's current PDR model. It is intended to be an evolutionary adjustment of the existing model, focused on certain elements deemed to enhance the value of PDR as a DR product.

Both the PDR and PDR-A models are:

- Limited use resources
- Supported via a Master file and Use Plan
- Bid and dispatched at CAGs (also referred to as Custom Aggregation Groups, or CAGs)
- Treated the same with respect to RUC impacts
- Configured within a Local Capacity Area
- Not initially intended for Ancillary Services provisioning
- Products where a single PDR may contain multiple retail demand response programs

### 4.2 Principal Differences between PDR and PDR-A Models

It should be clear from a look at the similarities between the PDR and the proposed PDR-A models that the alternate proposal is an attempt to remove MRTU barriers to demand response. PDR-A adds dimensional

1 freedom to PDR attempting to make incremental improvements in the  
2 CAISO's design. The PDR-A model fosters existing retail demand  
3 response programs where the IOUs act as CSPs and current retail  
4 participant crosses the LSE boundaries. The PDR-A model also supports  
5 the CAISO's effort to meet FERC's direct participation requirements.

6         Since the PDR-A is not bundled with Load, CSPs will be able to  
7 participate directly in the wholesale market. The DR Working Group  
8 members have been and continue to promote aspects likely to increase  
9 the probability of maximum quantities of DR participation for all CSPs.

10         At the core of differences between the CAISO PDR and the PDR-A  
11 models is a view that treating Load and DR elements as bundled  
12 resources limits a curtailment service provider, for all practical purposes,  
13 serving its own load.

14         In other words, a CSP cannot function independently of the retail  
15 participant's LSE. Accordingly, the CAISO PDR model threatens existing  
16 IOU demand response programs where the retail participants are  
17 receiving their energy service through an LSE other than the IOU. In this  
18 case, the IOU is acting as the CSP and the Load is being served by an  
19 LSE who is not the CSP, the DR cannot be bid in as PDR since the CSP  
20 does not have the Load to bundle with the DR element.

21         The CAISO PDR requirement to bundle Load and DR elements  
22 results in DR programs that can be offered only by host LSEs. The

1 consequence is diminished DR potential, which translates into a higher  
2 probability of DR resource provisions being less than the maximum.

3 By contrast, the PDR-A model is focused primarily on enabling  
4 CSPs to provide DR resources to CAISO through direct bidding, which  
5 wholly disintermediates the LSE. Doing so reduces the number of limiting  
6 factors and ambiguities regarding the roles of LSEs, CSPs, and retail  
7 customers. It appropriately aligns risks and liabilities with CSPs by taking  
8 LSEs out of the DR resource delivery “equation.”

9 The main differences between the CAISO’s PDR model and the  
10 alternate proposal concern (1) the relationship of DR to Load, (2)  
11 settlement processes, and (3) performance requirements.

#### 12 *The Relationship of DR to Load*

13 This point has been discussed above. If Load is linked to the DR  
14 resource, this constitutes a potential barrier to maximizing DR that can  
15 participate in CAISO’s markets.

16 The PDR-A proposal, like the CAISO’s PDR model, eliminates this  
17 potential barrier by setting an Independent Resource ID for the DR  
18 resource, thus separating it from the Load.

19 Also, doing so may help mitigate tariff barriers discussed above by  
20 ensuring DR resource transparency for purposes of measurement,  
21 verification, and market monitoring.

1           *Settlement Processes*

2           In the CAISO's PDR model, settlement of PDR essentially  
3 disappears since PDR is not settled but instead the uninstructed energy  
4 deviation of the Load is settled at the Default LAP. In the CAISO's PDR  
5 model, it is paying the Load, not the specific DR resource, as uninstructed  
6 energy (UIE).

7           In the PDR-A model, the proposal is to settle PDRs at CAGs.  
8 Doing so allows for the separation of Load from the DR resource so that  
9 the specific DR resource can be paid.

10           Further, the PDR-A model treats the independent resource as  
11 responsive and pays for Instructed Behavior rather than Uninstructed  
12 Behavior.

13           The UIE payment method results in a characterization of DR as  
14 being out of control. The PDR-A model colors DR in a light of being under  
15 the CAISO's ability to instruct changes in the DR resources being  
16 supplied.

17           *Performance Requirements*

18           The CAISO PDR model sets no requirements on DR performance.  
19 The consequence of this omission is potentially increased risk that DR is  
20 bid and scheduled but does not deliver when called, or only partially  
21 delivers. The allocation of penalties is ambiguous in the CAISO PDR

1 model because Load and DR resources are wholly coupled. Accordingly,  
2 penalties as structured may be insufficient disincentives for parties to  
3 participate in markets driven to minimize variances between what is bid,  
4 scheduled, and delivered; and the possibility of intentionally abusive  
5 behavior designed to unfairly influence market prices may be more likely.

6 The PDR-A model includes performance requirements, in like  
7 manner to requirements for generation. At this stage in the articulation of  
8 the PDR-A model, an open question is how treating DR resources like  
9 generation resources would shape measurement and verification for  
10 performance and settlements; additionally, how baseline methodologies  
11 might require updates and adjustments to flow through SLIC.

## 12 **5.0 ILLUSTRATIVE CASES OF PDR-A**

13 In this section, discussion of how the PDR-A model would work  
14 under different market conditions, or operations conditions, is presented.  
15 To set up discussion of specific cases, a summary of PDR-A functionality  
16 begins the section.

### 17 **5.1 PDR-A Functionality**

18 DR resources would be bid into the Day-Ahead Market (DAM) and  
19 or the Real-Time Energy Market (RTEM). DR resources would be bid at  
20 CAGs where the configurations may be as small as a P Node, or as big as  
21 a defined sub-LAP or Local Capacity Area.

1 DR resource bids would be submitted as if DR were generation,  
2 using all the terms and conditions set by the CAISO for generator market  
3 participation.

4 DR resources that are bid would be settled at the specified CAG,  
5 based on the clearing of nodal prices (LMPs). Determination of actual DR  
6 resource delivery would derive from measurement of aggregate meter  
7 usage, calculated off an established baseline. Verified performance  
8 against the baseline would determine the energy to be settled at the CAG.

9 In accordance with this process, DR resources appear as meter  
10 reductions in the LSE's retail electric service for specific customers. The  
11 reductions resulting from successfully executed DR resource transactions  
12 in CAISO's markets would be removed from the LSE's Load for settlement  
13 of uninstructed energy.

14 This is the only adjustment affecting LSE operations and its meter-  
15 to-cash business processes with the CAISO. There may be meter-to-cash  
16 impacts between the LSE and the retail participant due to DR resource  
17 participation in the wholesale markets. Otherwise, the LSE's Load is  
18 unaffected by the participation of DR resources in CAISO markets.

19 It is important to emphasize that PDR-A functionality simplifies the  
20 processes for DR to participate in CAISO's markets, improves the  
21 comparability of generation and DR resources, and may help reduce the

1 costs and time requirements in detailing how DR can participate in  
2 CAISO's market.

3 In other words, insofar as PDR-A functionality is equivalent to  
4 generation, existing CAISO Business Practice Manuals may require little if  
5 any modification, and the DR related User Manual may be less  
6 complicated, or at least familiar to existing market participants.

## 7 **5.2 Alignment of Responsibilities with PDR-A Functionality**

8 Effective execution within the functionality noted above requires the  
9 allocation of responsibilities amongst Marketing, Enrollment, Operations,  
10 and Settlement processes.

### 11 *Alignment of Marketing Responsibilities in the PDR-A Model*

12 Implementation of PDR-A occurs wholly through Curtailment  
13 Service Providers; as does marketing and enrollment of customers  
14 providing DR resources. CSPs would be responsible for paying  
15 customers to participate. This may take the form of a capacity payment  
16 and/or an energy payment.



1           *Alignment of Enrollment Responsibilities in the PDR-A Model*

2           All enrollment activities are the responsibility of CSPs, i.e.,  
3 procurement, installation, reading and maintaining of required metering,  
4 telemetry and auto DR equipment at customer sites; registration of  
5 participant load with the CAISO as a new Resource ID, and coordination  
6 of PDR-A acceptance and certification testing.

7           A coordination protocol between CSPs and LSEs would be wise so  
8 that LSEs know in detail which customers are contributing DR resources.  
9 While this information may be obtainable from the CAISO, a direct link  
10 between the LSE and the CSP is necessary during the deployment by  
11 LSE customers of DR resources, and possibly reduce distribution level  
12 grid control risks associated with DR executing independent of Load.

13           *Alignment of Operations Responsibilities in the PDR-A Model*

14           Operations requirements of DR resources include hourly  
15 forecasting of energy usage for each Resource ID, submitting energy bids  
16 for each Resource ID in the Day-Ahead Market, forecasting available DR  
17 capacity that can be bid in the energy markets, modeling actual Load  
18 response (if necessary) when the CAISO dispatches PDR-A how IE bid  
19 levels are decided, who receives ADS dispatch for IE, and who activates  
20 Load reduction via auto DR.

21           All these operation responsibilities fall to the CSP.

1            *Alignment of Settlement Responsibilities in the PDR-A Model*

2            Measurement and verification of Load reductions is the  
3 responsibility of the CSP submitting DR bids, schedules, and ensuring  
4 execution of DR resources when called.

5            However, because variances from schedules for DR resources  
6 potentially have significant network-wide effects, it would be wise for both  
7 the CAISO and LSEs to independently verify DR resource outcomes as  
8 well.

9            In the PDR-A model, the CSP is responsible for validating CAISO  
10 settlements and receiving revenues for PDR from CAISO. However, the  
11 LSE (only for scheduled and adjusted UIE) pays CAISO for energy (again,  
12 scheduled and UIE) that participating LSE customers consume as part of  
13 “Resource IDed” Load.

14            Finally, there are no charges, such as Uplift, LMPs levelized to the  
15 DLAP, or elimination of double payments for IE/UIE assessed to  
16 participating LSE customers. All charges are assessed on the CSP.

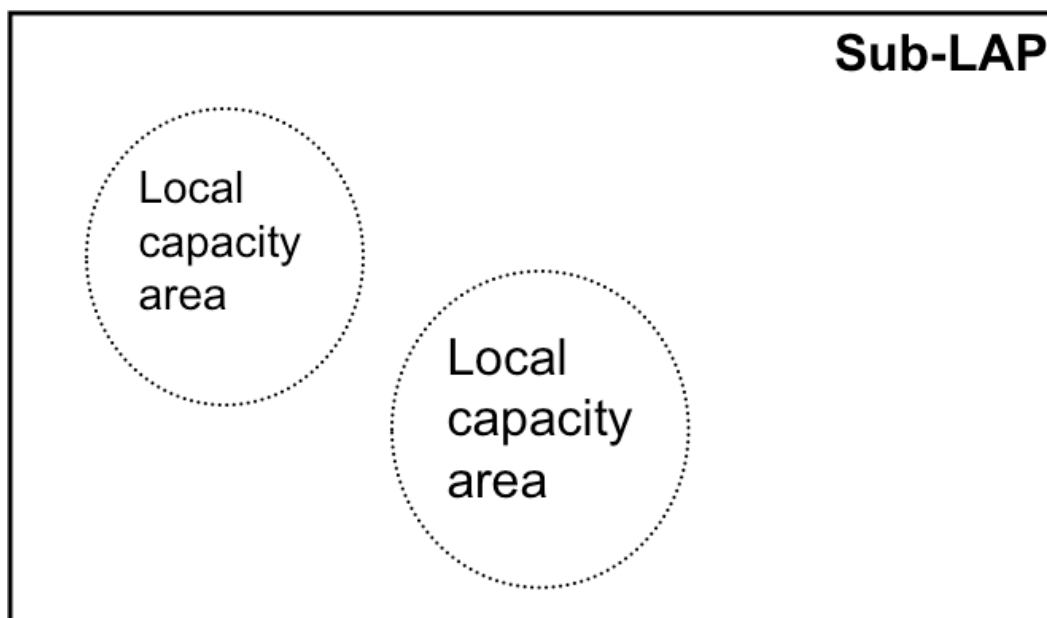
17            For the PDR-A model (or for the CAISO’s PDR model) to work, it is  
18 essential that Retail Participants work with their LSEs and CSPs at the  
19 retail level to support DR resources at the wholesale level.

1           **5.3 Cases Illustrating how PDR-A Works**

2           *Setting Up the Basis for Review of Cases*

3           Consider a specific sub-LAP where there are two Local Capacity  
4 Areas. This is illustrated in the diagram below.

5           **Diagram 1: Baseline Characteristics of a Network Environment**

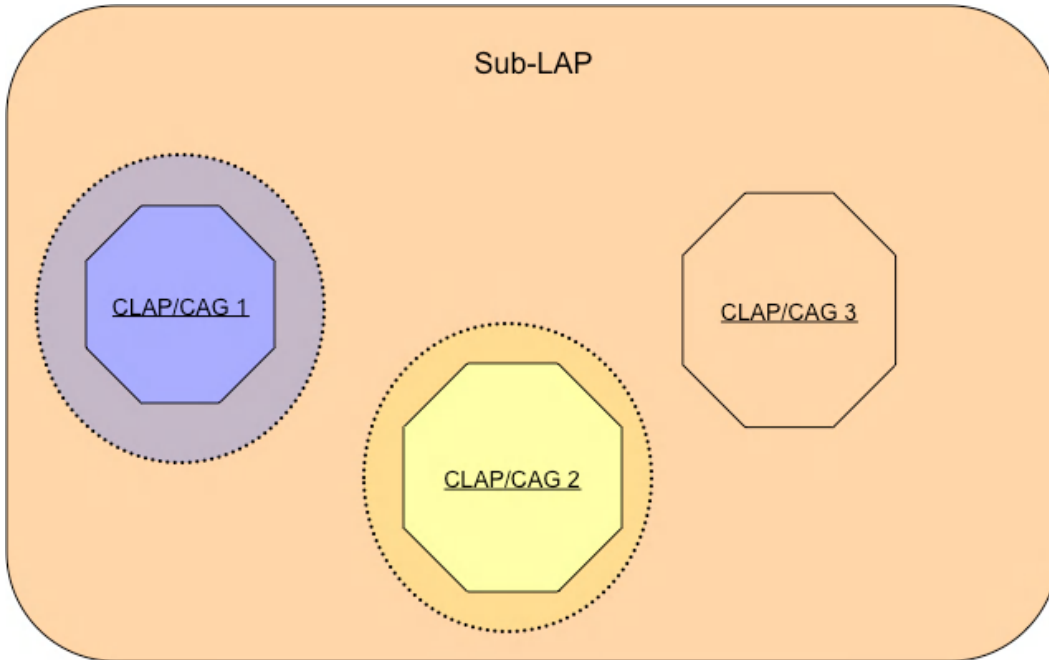


6

7           Diagram 1 shows a simple network environment composed of two  
8 local capacity areas. To meet reliability requirements and/or congestion  
9 constraints, DR resources are organized and deployed. To do so, CAGs  
10 must be created.

11           *Energy and Money Flows Amongst DR Resource Parties*

1 **Diagram 2: Organization of Three PDRs at Custom LAPS (or CAGs)**



2

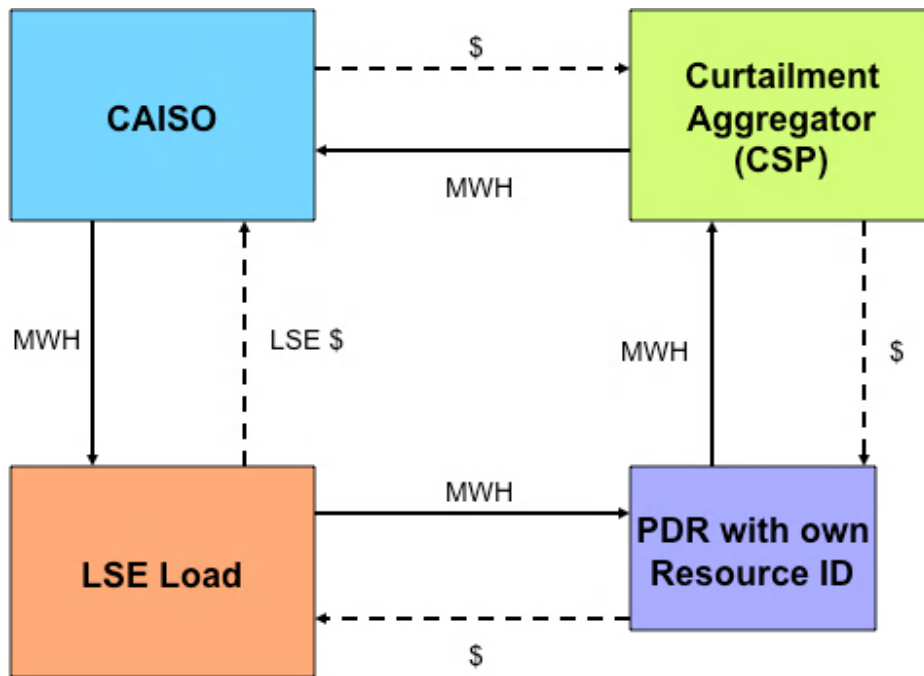
3 One or more CSPs proceed to organize PDRs at CAGs to deliver  
 4 DR resources to meet network reliability and/or congestion mitigation  
 5 requirements. These CAG-based PDRs are bid into the CAISO’s Day-  
 6 Ahead Market.

- 7 ■ CAISO pays money to the responsible CSP(s) and
- 8 receives in return Megawatt quantities from demand
- 9 curtailments.
- 10 ■ CAISO delivers Megawatt quantities from demand
- 11 curtailments as it would from other supply side resources.

- 1           ■ The PDR with its own specific Resource ID is the source
- 2           of demand curtailment that the CSP harvests and bids
- 3           into CAISO's markets

4           Diagram 3 below visually depicts energy and money flows.

5           **Diagram 3: Energy and Money Flows Amongst Parties to PDR Bid into**  
6           **CAISO's Day-Ahead and Real-Time Markets**



- 7
- 8           Retail Load is split at the bottom carving out the PDR with its own
- 9           specific Resource ID. The PDR-A model anticipates that monies are
- 10          required to be paid to the LSE in the separation of resources.

11          *Volume and Value Components Integral to Presentation of Cases*

1           To illustrate, Diagram 4 below depicts the curtailment capability of a  
2 hypothetical LSE where the DR contributions are aligned with LSE  
3 customer accounts identified as the sources of the DR resource for a  
4 specific PDR with its own specific Resource ID.

5           In Diagram 4 below, there are three sources of curtailment  
6 capability – ESP-A, which can deliver 10MW out of a 100MW load, ESP-  
7 B, which can deliver 10 MWs and IOU, which can deliver 30 MWs.

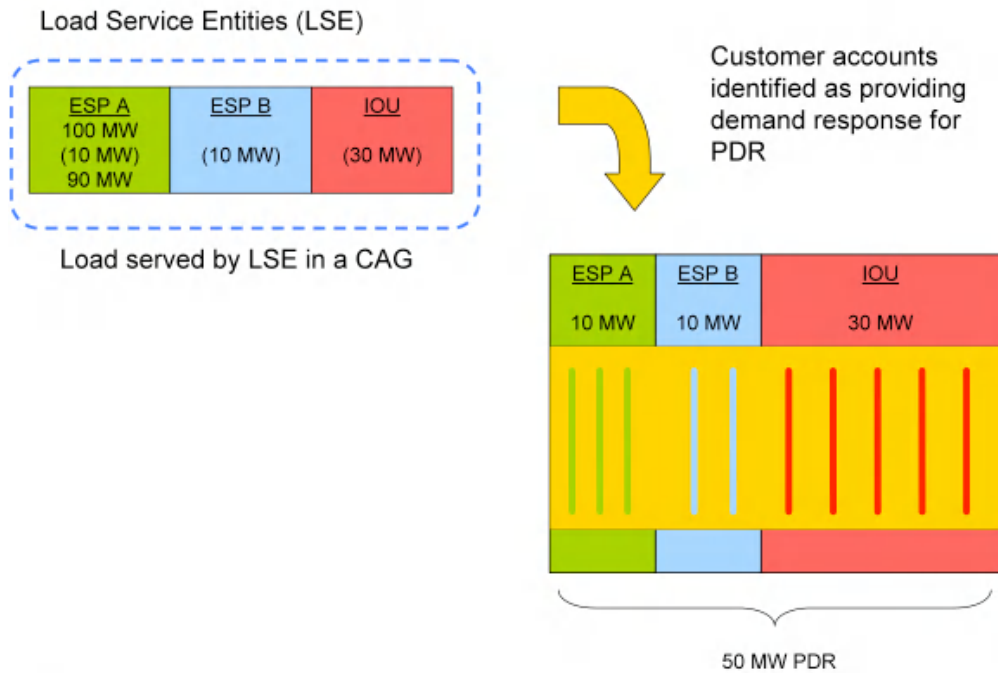
8           It is important to remember that under the PDR-A model, where DR  
9 resources are uncoupled from Load, it is possible for a PDR with its own  
10 specific Resource ID to come from more than one LSE service territory.

11           Assume for illustration purposes that Diagram 4 curtailment  
12 sources do cross over LSE boundaries. The reason for using this  
13 assumption will be explained in discussion of Diagram 7 below.

14           These three sources align with specific customer accounts. The  
15 visual depiction shows the curtailment source and the lines under each  
16 curtailment source are abstract symbols representing the actual customer  
17 accounts.

18           When these curtailment sources are combined, they create a 50  
19 MW PDR that can be bid into CAISO's markets.

2 **Diagram 4: Sourcing Curtailment from LSE Customer**



**PDR is the demand response capability separated out of load**

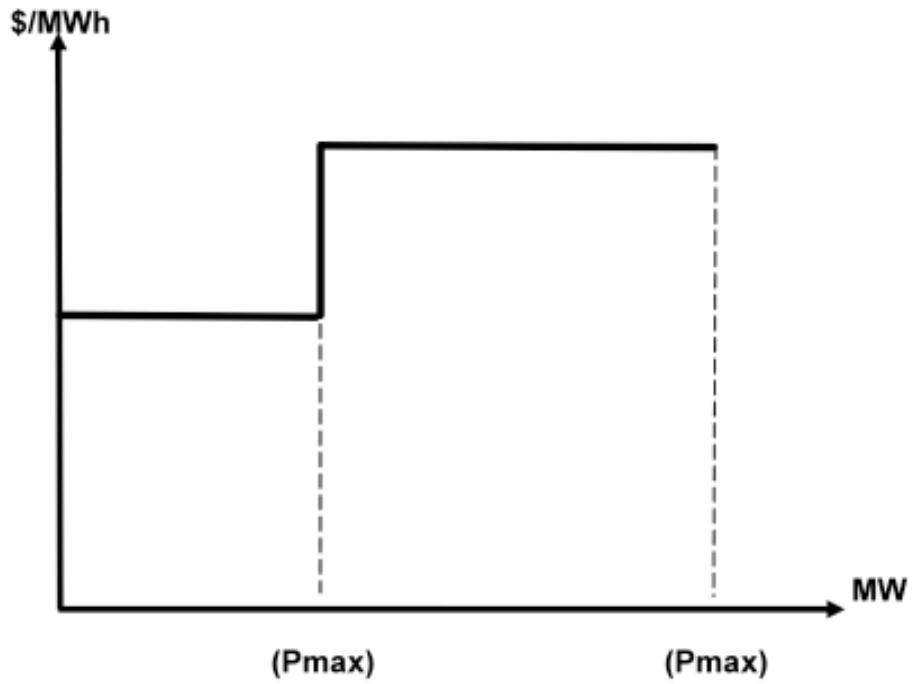
3 *Single versus Multiple Programs and PDRs*

4 PDR, in the PDR-A model, can be bid into the CAISO’s markets as  
 5 a single program or as multiple programs. The distinction between single  
 6 and multiple programs rests in how individual LSE customer curtailment  
 7 capabilities are bundled and mapped into specific CAGs.

8 Depending on the characteristics of the local area’s network  
 9 reliability/congestion constraint problems, one or more CAGs may be  
 10 organized and bid into the CAISO’s markets.

11 Diagram 5 below depicts the bid curve for a single program PDR.

1 **Diagram 5: Single Program PDR Resource Bid**

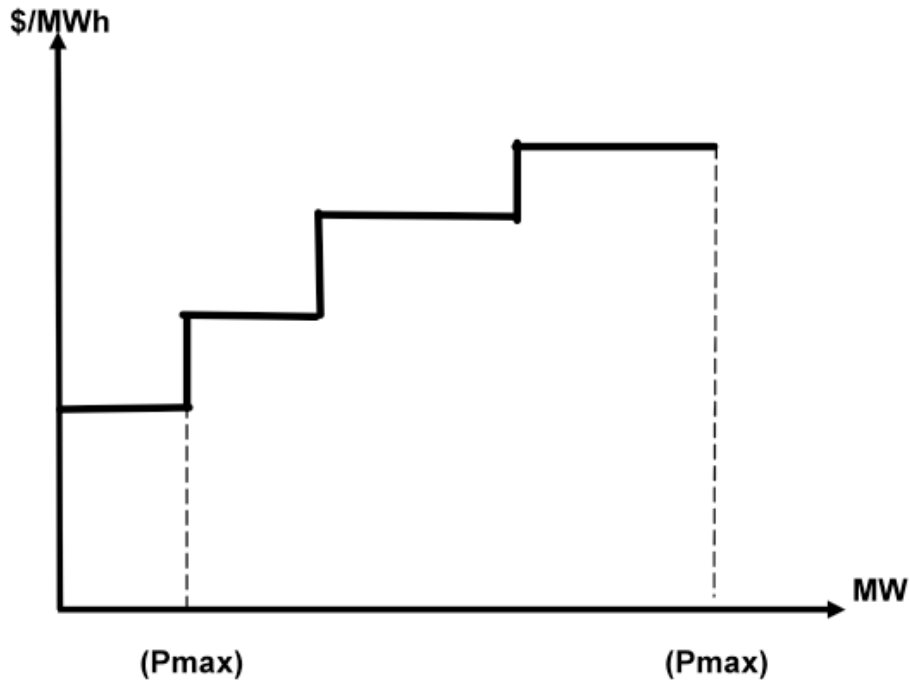


2

3           Diagram 6 below depicts the bid curve for a multiple programs  
4 case. The bid curve depicted in Diagram 6 represents the sum of multiple  
5 CAGs that a CSP bids into the CAISO's markets.



1 **Diagram 6: Multiple Program PDR Resource Bid**



2

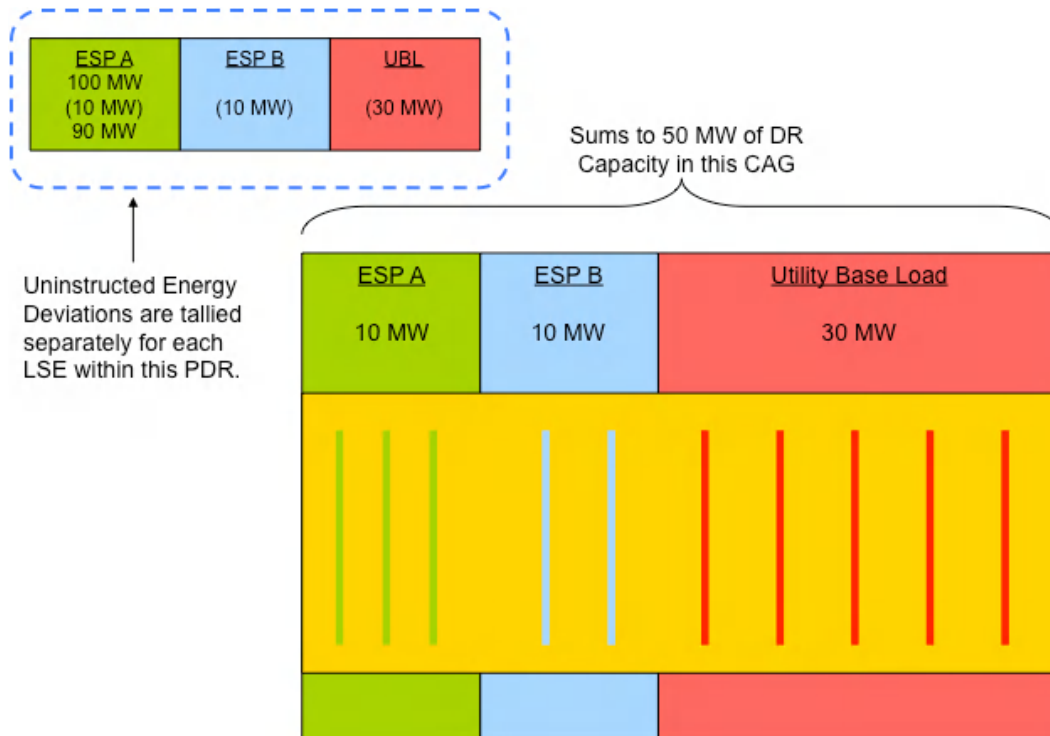
3 *Settling PDRs*

4 Returning to the curtailment sourcing case depicted in Diagram 4,  
 5 consider the settlement of the PDR derived from the three curtailment  
 6 sources – ESP-A, ESP-B, and ISO.

7 The PDR settlements flow from and to the CSP, to the right, for the  
 8 energy and money flows, as depicted in Diagram 3. Since, in the PDR-A  
 9 Model the DR and the Load are unbundled, there is an Uninstructed  
 10 Energy deviation adjustment that is made separately for each LSE within  
 11 the PDR, i.e. each LSE, ESP-A, ESP-B, and IOU, will have an adjustment  
 12 to their UIE taking into account their Load’s participation in the DR. This

1 adjustment is necessary to accommodate curtailment sources that cross  
 2 over LSE boundaries. This is visually depicted in Diagram 7 below.

3 **Diagram 7: Depiction of PDR Settlement Involving Multiple LSEs**



4

5 *The Base Case*

6 Now, with this foundation in place, consider a specific example of a  
 7 Capacity Bidding Program (CBP) at the retail service level, which serves a  
 8 PDR bid into the CAISO's wholesale markets.

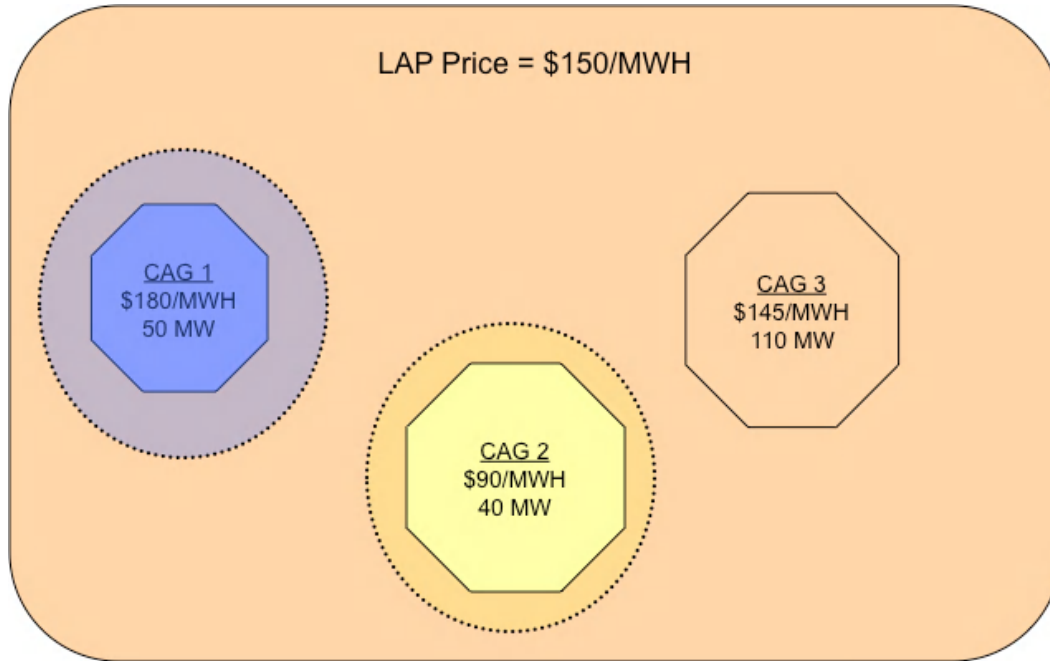
9 Begin with specification of the Master File and associated Use  
 10 Plan. The information contained in it is as follows:

- 1                   ▪ Monday-Friday (HE 12 – HE19)
- 2                   ▪ Three firm energy products: (1) 1-4 hour, (2) 2-6 hour,
- 3                   and (3) 4-8 hour
- 4                   ▪ 15,000 equivalent heat rate
- 5                   ▪ Maximum dispatch: 24 hours per month

6                   The retail program is a 200 MW demand response program that  
7 translates into DR resources composed of a 50 MW PDR in one CAG,  
8 labeled in Diagram 8 as CAG 1; a 40 MW PDR in CAG 2, and 110 MW  
9 PDR in CAG 3. In the Diagram 8 case, the PDR bid prices is set at  
10 \$150/MWH (using a natural gas price of \$10/MMBtu).

11                  Diagram 8 below shows the Locational Marginal Prices (P-node or  
12 CAG prices) reflecting the market prices that settled CAISO's Day-Ahead  
13 Market. In other words, in Diagram 8, you see two numbers shown  
14 withing each CAG. The top CAG number is a \$/MWH value that reflects  
15 the CAG market price, and the bottom number is the MW quantity making  
16 up the PDR, as described in the preceding paragraph.

1 **Diagram 8: Value of Specific CAGs when Called by CAISO and Cleared in**  
 2 **CAISO’s Day-Ahead Market**



3  
 4 Continuing with the example case, consider the value differences  
 5 shown between the CAG market prices and the PDR bid prices at  
 6 \$150/MWH. In addition, this case also indicates that the DLAP market  
 7 price is also \$150/MWH.

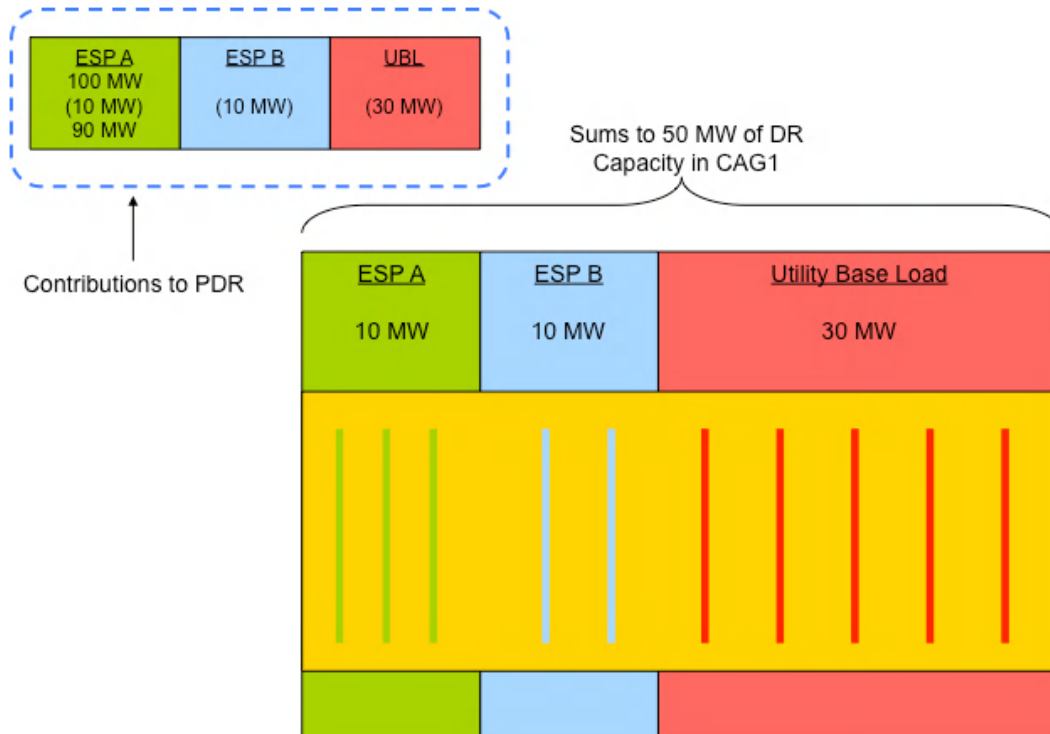
- 8 ■ PDR in CAG 1 – is the only PDR that is dispatched since
- 9 the market clearing price exceeds the bid price by
- 10 \$30/MWH (180/MWH – 150/MWH = \$30/MWH gain).
- 11 ■ PDR in CAG 2 – is not dispatched since the market
- 12 clearing price fails to meet the \$150/MWH PDR bid price
- 13 by \$60/MWH.

- 1                   ■ PDR in CAG 3 – is not dispatched since the market  
2                   clearing price fails to meet the \$150/MWH PDR bid price  
3                   \$5/MWH.
- 4                   ■ As an aside for this Case 1, if the PDR were a DLAP  
5                   resource, the 200 MW PDR would be dispatched since  
6                   the market clearing price equals the bid price 150/MWH =  
7                   150/MWH.

8                   Given these outcomes, DR resources are developed in CAG 1  
9                   because the gain is superior to outcomes for CAG 2 and CAG 3. In  
10                  principle, the higher priced CAGs will draw DR resource development.  
11                  The development of additional resources (DR or generic supply) in high  
12                  priced CAGs will lower market prices and cause convergence between  
13                  CAG and DLAP market prices.

14                  Diagram 9 below visually depicts the settlement.

1 **Diagram 9: 50 MW Award for PDR in CAG 1**



2

3 Value derived from the settlement is allocated back to the CSP  
 4 consistent with the performance of each specific PDR. In this case let's  
 5 look at the PDR in CAG 1 only.

6 CAISO PDR model would ignore the PDR in the settlement process  
 7 and instead pay each of the LSEs their commensurate UIE for their Load  
 8 that did not show up. ESP-A would receive 10MW of UIE, ESP-B would  
 9 receive 10MW of UIE, and the Utility would receive 30MW of UIE.

10 The PDR-A model, would result in the CSP receiving an energy  
 11 payment of \$180/MWH for 50 MW or \$9,000.

1           If the UIE charge were \$200/MWH, the two models would result in  
2 a very different outcome. Let's take a look at ESP-A as an example of this  
3 difference:

4           CAISO's PDR

- 5           ▪ CSP's PDR receives \$0 energy payment
- 6           ▪ ESP-A's scheduled energy was 100 MW at \$150/MWH.
- 7           ▪ PDR does not get scheduled but ESP-A receives  
8           \$200/MWH for the 10 MW of UIE.
- 9           ▪ ESP-A charge results are \$13,000 (100x\$150 –  
10           10x\$200).

11          PDR-A

- 12          ▪ CSP's PDR receives \$1,800 energy payment (10x\$1800
- 13          ▪ ESP-A's scheduled energy was 100 MW at \$150/MWH.
- 14          ▪ PDR adjusts ESP-A's UIE energy schedule by 10 MW so  
15          ESP-A receives \$0 for UIE.
- 16          ▪ ESP-A charge results are \$15,000 (100x\$150).
- 17          ▪ Net charges for example are \$13,200 (100x\$150 –  
18          10x\$180).

19           The point of this example is that settlement can take place with one  
20 party, the LSE, for load and another party, the CSP, for DR resources.

21

1 **6.0 PDR/PDR-A AND MRTU DR RESOURCE USERS GUIDES**

2 If the CAISO were to modify its PDR model to incorporate key  
3 elements of the alternate proposal, or if the PDR-A model were adopted,  
4 would there be significant changes required in the MRTU-Participating  
5 Load Users Guide?

6 Since the current MRTU-Participating Load Users Guide (Users  
7 Guide) is focused on MRTU Release 1, and since the CAISO hopes to  
8 have the PDR product available after the start of MRTU Release 1, but  
9 possibly before MRTU MAP is released, and since the current Users  
10 Guide does not include details on how to use the PDR product, the CAISO  
11 is, in effect, starting at ground zero for including PDR in the User Guide,  
12 which ever PDR model is adopted. Therefore, the effort to integrate the  
13 CAISO PDR model or the PDR-A model, or some hybrid thereof should be  
14 the same.

15 This section identifies where information on PDR needs to be  
16 included in the Users Guide. Matters identified herein would apply to any  
17 subsequent MRTU Users Guide for DR resources prepared in support of  
18 the MRTU MAP release.

19 To incorporate PDR into Section 3 of the current Users Guide, the  
20 following additions and changes would be required:



- 1                   ■ The General Overview should add a refinement to the  
2                   definition of Participating Load, defining PDR and linking  
3                   it to the general definition.
- 4                   ■ While contractual agreements and processes would not  
5                   need to change, refinements in Section 3.4, Resource  
6                   Registration, would be necessary; articulation of  
7                   Resource ID requirements for PDRs as distinct from  
8                   other types of Participating Load Resource IDs, if any,  
9                   would be necessary.

10                To incorporate PDR into Section 4, Operational Requirements, of  
11                the current Users Guide no changes would be required.

12                Sections 5 and 6, Scheduling and Bidding, and Settlement and  
13                Validation, respectively, of the current Users Guide would require  
14                modification to ensure clarity regarding how PDR schedules, bids, and  
15                settlements are cleared.

16                Notably, settling PDR at the CAG is a change from the CAISO's  
17                PDR model; so if the PDR-A model were to be applied, settlement process  
18                modifications would be critical.

19                Because the CAISO PDR might be available as a product after  
20                MRTU Release 1 goes live, but before MRTU MAP release, the current  
21                Users Guide should be modified to include PDR.

1 **7.0 ISSUES AND MITIGATION OF POSSIBLE MARKET ABUSES**  
2 **REGARDING PDR/PDR-A**

3 CAISO staff periodically refers to a study by LECG concerning DR  
4 market operations and risks of “gaming,” i.e., intentional abuse of the  
5 CAISO’s markets to create an unfair advantage that results in superior  
6 value for a specific market participant.

7 The LECG characterization of the abuse potential in DR products is  
8 that a “money machine” may be created.

9 DR resources participating in the CAISO’s markets are unlikely to  
10 be large relative to total energy resources flowing through the CAISO’s  
11 markets under any circumstances, as the previously noted Brattle Group  
12 report to the CEC indicated. In market environments with thin volumes,  
13 the potential for abuse is greater by virtue of market thinness, but the  
14 impact on other markets is lesser for the same reasons.

15 Concerns about DR resource bidding that could contribute to  
16 gaming worries pertain to the arbitrage opportunities created when  
17 resources are free to find and participate in problem niches of markets.  
18 The DR resources will tend to be very limited in available energy and or  
19 very high price bid resources. Thus the ability to find gaming opportunities  
20 will be limited. Even if opportunities are found the ability to participate will  
21 be very limited due to the limited use capabilities of most DR resources  
22 within the CAISO’s markets.

1           Also, in situations where reserve margins drop below minimum  
2 standards the opportunity for supply side resources to misprice, or price  
3 gouge is limited by the existence of DR resources.

4           Further, the possibilities of gaming are additionally managed if DR  
5 product definitions are robust and incorporate controls that reduce the  
6 potential for abuses in the first place.

7           Finally, and most importantly, the PDR-A model helps to reduce  
8 risks of gaming activities in several ways:

- 9           ■ The Master file and Use plan would identify the specific  
10 locational benefits and usage parameters of a PDR,  
11 which reduces the value of trying to game an aggregated  
12 DR market (that competes directly with generation in the  
13 CAISO's high volume Integrated Forward Market)
- 14           ■ Uncoupling of Load and DR resources eliminates any  
15 ambiguities about how DR is being bid relative to LSE  
16 NPL, and clearly aligns responsibilities for outcomes with  
17 CSPs
- 18           ■ Attraction of DR to locations where need is high  
19 reinforces the point made in the first bullet, above
- 20           ■ Distinctive Resource ID for PDRs ensures that specific  
21 behavior on the part of CSPs and the underlying original  
22 curtailment sources can be tracked and evaluated in

- 1 detail, in turn enhancing the ability of market monitors to  
2 apply prophylactic solutions that preempt developing  
3 abuses
- 4 ■ Clear performance requirements reinforce the ability to  
5 detect potentially abusive behavior by CSPs and/or  
6 underlying original curtailment sources
  - 7 ■ Effective measurement and verification, which ensures  
8 accounting for performance

## 9 **8.0 PDR-A AND OTHER CAISO DEMAND RESPONSE MODELS**

10 As proposed, the PDR-A model sufficiently enhances the  
11 probability for maximum DR resource participation in the CAISO's  
12 markets.

13 As proposed, the PDR-A model robustly enables direct access,  
14 direct participation by individual consumers, and CSPs. Because the  
15 model allows for maximum customization through the organization of  
16 PDRs in CAGs, it is capable of providing all services that DDR or PPO-  
17 DDR might provide.

18 Further, the PDR-A design attempts to make DR resources  
19 comparable with generation, which, if achieved, would serve to  
20 significantly reduce the process modifications required in the CAISO  
21 Users Guides and BPMs.

1           Accordingly, the PDR-A may be the only DR product that the  
2 CAISO needs to develop, deploy, and operate.

### 3 **9.0 RECOMMENDATIONS ON NEXT STEPS**

4           This document is a proposal that attempts to make the case for an  
5 alternate PDR model. It is by no means a complete, or “fully baked”  
6 proposal.

7           There is support for the proposal from several quarters.  
8 Accordingly, the recommendation is that the CAISO support the  
9 completion of the PDR-A model and work to either adapt its existing PDR  
10 model, find a hybrid solution that takes into the design the key features of  
11 the PDR-A model, or agrees to make the PDR-A model the platform for its  
12 DR products.

13           In accordance with this perspective, the following next steps are  
14 recommended:

- 15           (1)    The CAISO prepares a comparable working draft document  
16                    detailing its PDR model, and includes in that document  
17                    comparison to the PDR-A model, discussing the key  
18                    differences and how the CAISO will address the differences.  
19                    The CAISO may dismiss the differences, but should provide  
20                    a clear explanation for those supporting the PDR-A model as  
21                    to why its elements are being dismissed.

- 1           (2)    A DR Working Group meeting is held to review the CAISO  
2                   proposal and the alternate PDR-A and work toward resolving  
3                   which approach should be driven forward, including the  
4                   possibility of a hybrid, or synthesized model; where the  
5                   process of review includes written comments and  
6                   suggestions from DR Working Group members.
- 7           (3)    A process for extending the current Users Guide to include  
8                   MRTU MAP release DR products is set forth and activated.
- 9           (4)    A review of the CAISO's BPM begins following the  
10                   completion/agreement/ decision regarding the CAISO's final  
11                   array of DR products it will move to implement with MRTU  
12                   MAP; the schedule for this is agreed to at the DR Working  
13                   Group meeting where the PDR and PDR-A products are  
14                   reviewed.

15