

Rulemaking 13-09-011
Exhibit No.: ISO-DR002
Witness: Neil Millar

Order Instituting Rulemaking to Enhance
the Role of Demand Response in Meeting
the State's Resource Planning Needs and
Operational Requirements

Rulemaking 13-09-011

**TESTIMONY OF NEIL MILLAR ON BEHALF OF THE CALIFORNIA
INDEPENDENT SYSTEM OPERATOR CORPORATION**

1 Commission. Since November, 2010, I have been employed at the CAISO, leading
2 the Transmission Planning and Grid Asset departments.

3 **Q. Have you previously testified before the Commission?**

4 **A.** Yes, I presented testimony in Tracks 1 and 4 of the LTPP proceeding (Docket
5 No. 12-03-014).

6 **Q. What is the purpose of your testimony?**

7 **A.** I will discuss the steps that the CAISO has taken to identify the supply-side
8 demand response (DR) resource characteristics that can be used by transmission
9 planners to offset the need for conventional generation or transmission investments
10 in local capacity areas. I will also discuss the reasons why supply-side demand
11 response resources must be integrated into the CAISO market if these resources are
12 to be available to mitigate reliability concerns. Finally, my testimony addresses
13 goals for increased demand response participation in the CAISO markets.

14 **I. SUPPLY-SIDE RESOURCE CHARACTERISTICS NEEDED TO ADDRESS**
15 **LOCAL AREA CONCERNS**

16
17 **Q. Please describe the CAISO's evaluation of non-conventional resource**
18 **alternatives in the 2013-2014 transmission planning process.**

19
20 **A.** The ISO developed a conceptual methodology for exploring the use of non-
21 conventional resource alternatives that was posted on September 4, 2013. The ISO
22 relied upon the methodology in the ISO's 2013-2014 transmission planning process.
23 This methodology set out the basic characteristics of various non-conventional
24 resources (*e.g.*, response time, duration and availability) that could be used to assess
25 their effectiveness in meeting local needs and avoiding or deferring the need for

1 transmission or conventional generation, and the ISO's conceptual approach
2 developed to identify areas across the ISO footprint for more detailed study.

3 Due to the emerging issues in the southern California area (LA Basin and San
4 Diego), the efforts in the 2013/2014 Transmission Plan focused on the effectiveness
5 of non-conventional resources in that area. Because of extensive needs in the area
6 resulting from the anticipated repowering or retirement of once-through-cooling
7 generation as well as the retirement of the San Onofre Nuclear Generating Station,
8 the ISO focused on testing the effectiveness of different mixes of resources rather
9 than testing whether non-conventional resources could play a role in meeting the
10 local capacity needs. The general characteristics set out in the methodology were
11 useful in guiding the discussions with stakeholders. This ultimately led to the study
12 efforts documented in the ISO's 2013/2014 Transmission Plan. This involved
13 examining specific scenarios identified by SCE (the only scenarios proposed by
14 stakeholders in that planning cycle), which I understand were in part informed by
15 the characteristics outlined by the ISO regarding the effectiveness of various non-
16 conventional resources. Those studies found that a number of the scenarios were
17 effective in helping meet local capacity needs – with varying degrees of
18 effectiveness based on location – including the scenario that included a significant
19 amount of 4-hour duration demand response.

20 **Q. Is the CAISO conducting a similar analysis in the current transmission**
21 **planning cycle?**

22
23 **A.** Yes. The ISO intends to further refine its analysis of southern California needs
24 in the LA Basin/San Diego area taking into account the updated non-conventional
25 generation scenarios developed by SCE through the advancement of SCE's "living

1 pilot” program, as well as other updated information. Further, the ISO is exploring
2 methods to screen other areas in the ISO footprint where the timely deployment of
3 non-conventional resources may defer investments in conventional resources or
4 transmission upgrades.

5 **Q. What are the characteristics that supply-side DR programs must be capable of**
6 **providing to grid planners and operators in order to mitigate local area**
7 **reliability issues?**

8
9 **A.** John Goodin has provided an overview of supply side resources and their role in
10 to producing an economic system dispatch. Mr. Goodin’s testimony identifies
11 system needs to restore operating reserves on an hourly basis, and restore Area
12 Control Error (ACE) on a 15 minute basis, as well as refers to local capacity needs.
13 I will describe in more detail how supply-side resources, and in particular supply-
14 side demand response, can meet local capacity needs. There are three general
15 characteristics in particular that must be considered in assessing the effectiveness of
16 demand response programs in helping meet local capacity needs:

17 Duration – how long can the resource sustain its response once called?

18 Availability – how many times can the resource be called during a time period?

19 Response time – how quickly can the resource respond to an ISO dispatch
20 instruction and achieve its full capacity?

21 The requirements for duration and availability depend greatly on the specific
22 circumstances in each local area, namely the load profile, the other resources in the
23 area, and the specific combination of transmission and local resources serving the
24 load. These can also evolve over time as net load profiles change, particularly in

1 response to load modifying demand response and energy efficiency and
2 development of distributed generation.

3 Currently, the local capacity areas examined by the ISO tend towards requiring
4 DR durations in the 4 to 8 hour time frame. This aligns with the existing
5 requirement that local capacity resources also meet the system capacity resource
6 requirements, which include a 4-hour minimum duration requirement. The ISO
7 notes that increased distributed generation, particularly solar PV, may alter the “net”
8 load shape such that 2-hour duration products may provide value in the future. The
9 solar PV generation tends to lower the lengthy afternoon demand, but generally
10 leaves a shorter duration peak in the 5 to 7 PM time frame that can create an
11 opportunity for a shorter-duration DR product. An issue the Commission may have
12 to consider is how to assess DR products that are not currently effective at
13 addressing current local area needs but may be effective in the future, but this issue
14 may be addressed by the flexibility provided in the relatively short terms of DR
15 contracts.

16 Availability requirements also vary on a case-by-case basis based on load
17 patterns, the nature of other resources in the area, and nature of the contingencies
18 that necessitate dispatching DR. The ISO has tested several situations to estimate
19 the likely range of availability requirements and has been able to develop ranges for
20 those cases. There is also the possibility for a wide dispersion in results – if the
21 conditions driving DR dispatch occur at all in a location, the conditions can persist
22 and require a number of dispatches.

1 The response time requirement is more specific, and less affected by local
2 circumstances. After a contingency, system operators have 30 minutes total elapsed
3 time to ready the system for the next contingency. There are two ways to address
4 this requirement. The first way is to have resources that can respond sufficiently
5 fast that the need for the dispatch is determined, the dispatch is communicated, and
6 resources respond, all within 30 minutes. The other way is to develop demand
7 response resources that have a slower response time, but that can be dispatched any
8 time the ISO forecasts system conditions that would require the load reduction if the
9 contingency were to occur.

10 Our understanding is that the latter framework is not practical as a demand
11 response alternative because that approach may require dispatches too frequently.
12 The ISO would not just dispatch the demand response every time the first
13 contingency actually happens, but every time the ISO forecasts local conditions as
14 requiring the demand reduction if the first contingency were to happen.

15 The ISO has been putting most of its focus into the former approach because the
16 industry has expressed little support for the viability of the latter method. However,
17 the ISO is not opposed to the latter methodology, provided the resource has
18 sufficient availability to meet the much higher anticipated frequency of dispatch.

19 **Q. Is the ISO willing to consider programs where the resources are given advance**
20 **notice of their need or their potential need?**

21 **A.** Yes. This characteristic is equivalent to a start-up time for a generating
22 resource. The resource, with the benefit of the advance notice, would still be
23 required to respond within the specific time frames discussed above. This has been
24 raised in previous proceedings, but has not been identified as a material issue in the
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1 transmission planning process where the ISO is assessing and seeking for
2 stakeholder input on the characteristics themselves.

3 **Q. Can the CAISO grid operators dispatch DR programs that have longer start-**
4 **up notice periods, similar to conventional resources?**

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6 **A.** As I have discussed above, longer dispatch requirements can be accommodated,
7 provided that higher availability requirements can be sustained. The added
8 complexity of dispatching these types of resources on a forward-looking basis puts
9 additional emphasis on the need for these resources to be fully integrated into the
10 ISO market, as I discuss in more detail below.

11 **Q. Why is it important for the grid operators to have control of a DR resource**
12 **through the CAISO's economic dispatch system rather than a manual**
13 **notification process?**

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15 **A.** The ISO's market system is taking on increasingly complex grid operations
16 through a security-constrained dispatch process. The scope of the operational
17 challenge of managing a broader range of resources with widely varying
18 characteristics and increased variability necessitates that supply side demand
19 response resources be fully integrated into the market. Reverting to manual
20 notification processes for one resource is counter to the enhancements and
21 improvements made to CAISO system operations thus far and contrary to the
22 concepts of "smart grid" evolution.

23 The shortcomings in a manual notification process fall into three general
24 categories:

25 • Transparency of location – tracking locations of resources and manually
26 overlaying those impacts within the security-constrained dispatch of the

1 market is overly complex in today's operating environment, and locations
2 are critical in meeting local reliability needs

- 3 • Better accuracy on availability on a day ahead and real time basis – the
4 known quantities of DR available are also critical in both time frames.
- 5 • Price discovery – the price impacts of the DR resources can only properly be
6 represented through market participation and directly contributing to price
7 formation.

8 While a manual notification process is completely untenable in today's
9 operating environment, the operating environment is anticipated to become even
10 more complex in the future, not less. Local demand needs are anticipated to become
11 increasingly variable due to higher levels of distributed generation. Further, the ISO
12 is exploring more sophisticated contingency modeling enhancements into its market
13 software, which will put even greater emphasis on the need for all resources to be
14 fully integrated into the market. As part of its enhanced contingency modeling
15 initiative, the ISO is moving towards more directly market-based dispatch to ensure
16 post contingency conditions can be restored to acceptable levels within the 30
17 minutes rather than relying on "exceptional dispatches" which would increase the
18 gap of manual, telephone-based dispatches of DR. The contingency modeling
19 enhancements initiative seeks to ensure that the ISO has sufficient unloaded
20 capacity (which can include DR and offline resources) to return the system to a
21 normal state within 30 minutes. The initiative introduces new constraints into the
22 market optimization and procures capacity based on energy flow (*i.e.*, the greater
23 the flow, the greater the need). Relying on the market optimization is superior to a

1 manual dispatch for several reasons. First, the contingency recovery is based on
2 energy flow. It is less efficient to determine the capacity needed beforehand in an
3 offline study because the optimization can more accurately use projected and real-
4 time information. The optimization can also determine, based on flow, whether a
5 resource located in a specific area can be effective in recovering from a
6 contingency. In other words, transmission constraints may limit how much a
7 resource is effective. Second, resources ramp up to their full dispatch at different
8 speeds. By incorporating this information into the optimization, the ISO can ensure
9 that it is committing the most efficient and economic resources within the time
10 necessary to recover from a contingency. Third, in the case of the contingency
11 modeling enhancements, providing capacity may result in an additional payment.
12 This payment is determined by the optimization and reflects the shadow cost of the
13 constraint, providing price discovery. In this way, the ISO is using the market to
14 ensure reliability most efficiently and effectively. Lastly, committing a resource
15 through the constraint provides “notice” to a resource that it may be called upon
16 should a contingency occur. This increases the transparency in the market and
17 allows resources to prepare for potential dispatch. All of these benefits are only
18 accessible if the resource has a bid in the market for the optimization to use.

19 **II. GOALS FOR SUPPLY-SIDE DEMAND RESPONSE PARTICIPATION**

20 **Q. The April 2, 2014, Ruling and Revised Scoping Memo asked for testimony**
21 **about increasing the level of DR participation in the CAISO market. Do you**
22 **believe that the Commission has already established goals for increased**
23 **participation?**

24 **A.** Yes. Goals have been identified for local capacity needs in the LA Basin and
25 San Diego in Tracks 1 and 4 of the Commission’s recent long term procurement
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1 proceeding, R.12-03-014.¹ These goals include development of new preferred
 2 resources as well as “repurposing” existing supply-side demand response programs
 3 that are very close to meeting the necessary characteristics but do not quite meet the
 4 necessary characteristics will be that there is no basis for further procurement above
 5 those levels in those areas at this time.

6 The ISO will reevaluate needs in the LA Basin and San Diego area based on
 7 more current information in the 2014-2015 transmission planning process, and the
 8 ISO may also identify other areas in that planning cycle and future planning cycles.

9 **Q. Are there other things the Commission should consider in increasing demand**
 10 **response goals for participation in the CAISO market?**

11 **A.** Yes. As the CAISO noted during the recent long term procurement proceeding,
 12 the Commission should ensure that adequate tracking processes are in place to
 13 monitor the development and effectiveness of supply-side demand resources,
 14 particularly in critical areas such as southern California.

15 We understand that demand response resource contracts are generally short
 16 term; approximately 1- 3 years in length. Transmission planners evaluate DR
 17 resources as an alternative to long lead time facilities – generation or transmission.
 18 Obviously a one to three year lead time is not adequate for replacement of the DR
 19 resource with a transmission line or conventional generation if the DR resource was
 20 being relied upon and abruptly left the system. Accurate and dependable
 21 forecasting in addition to longer contract terms will therefore be needed to ensure
 22 sufficient time for resource replacement, which puts even more emphasis on the
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¹ Specifically, the decisions in Tracks 1 and 4 authorize SCE to procure up to 1000 MW in preferred resources and energy storage, and SDG&E to procure 200 MW in preferred resources and energy storage. Both utilities have optional authorization to procure preferred resources above these levels. See D.14-03-004, pp. 3-4.

1 careful monitoring of all issues related to DR performance. For instance, are
2 approvals proceeding; are resources being developed to meet authorized
3 procurement; are the resources performing as expected; and is any level of customer
4 fatigue likely to affect future performance?

5 **Q. Does this conclude your testimony?**

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7 **A.** Yes, it does.

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