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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

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

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Q. What is your name and by whom are you employed?

A. My name is Neil Millar. I am employed by the California Independent System Operator Corporation (CAISO), 250 Outcropping Way, Folsom, California as the Executive Director, Infrastructure Development.

Q. Please briefly describe your employment and educational background.

A. I received a Bachelor of Science in Electrical Engineering degree at the University of Saskatchewan, Canada, and am a registered professional engineer in the province of Alberta.

I have been employed for over 30 years in the electricity industry, primarily with a major Canadian investor-owned utility, TransAlta Utilities, and with the Alberta Electric System Operator and its predecessor organizations. Within those organizations, I have held management and executive roles responsible for preparing, overseeing and providing testimony for numerous transmission planning and regulatory tariff applications. I have appeared before the Alberta Energy and Utilities Board, the Alberta Utilities Commission, and the British Columbia Utilities

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

Q. Have you previously testified before the Commission?

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

Q. What is the purpose of your testimony?

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

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

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

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

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

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

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

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

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

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

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

Duration – how long can the resource sustain its response once called? Availability – how many times can the resource be called during a time period? Response time – how quickly can the resource respond to an ISO dispatch instruction and achieve its full capacity?

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

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

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

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

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

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

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

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

A. Yes. This characteristic is equivalent to a start-up time for a generating resource. The resource, with the benefit of the advance notice, would still be required to respond within the specific time frames discussed above. This has been raised in previous proceedings, but has not been identified as a material issue in the

transmission planning process where the ISO is assessing and seeking for stakeholder input on the characteristics themselves.

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

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

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

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

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

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

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

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

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

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

II. GOALS FOR SUPPLY-SIDE DEMAND RESPONSE PARTICIPATION

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

A. Yes. Goals have been identified for local capacity needs in the LA Basin and San Diego in Tracks 1 and 4 of the Commission's recent long term procurement

proceeding, R.12-03-014.[1] These goals include development of new preferred resources as well as "repurposing" existing supply-side demand response programs that are very close to meeting the necessary characteristics but do not quite meet the necessary characteristics will be that there is no basis for further procurement above those levels in those areas at this time.

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

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

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

We understand that demand response resource contracts are generally short term; approximately 1- 3 years in length. Transmission planners evaluate DR resources as an alternative to long lead time facilities – generation or transmission. Obviously a one to three year lead time is not adequate for replacement of the DR resource with a transmission line or conventional generation if the DR resource was being relied upon and abruptly left the system. Accurate and dependable forecasting in addition to longer contract terms will therefore be needed to ensure sufficient time for resource replacement, which puts even more emphasis on the

[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.

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

Q. Does this conclude your testimony?

A. Yes, it does.