

**UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION**

Reliability Technical Conference

Docket No. AD16-15-000

**Prepared Statement of Mark Rothleder
on behalf of the California Independent System Operator Corporation**

My name is Mark Rothleder. I serve as Vice President, Market Quality and Renewable Integration at the California Independent System Operator Corporation (CAISO). Previously, I served as Executive Director of Market Analysis and Development and Principal Market Developer and Director of Market Operations at the CAISO. I am a registered Professional Electrical Engineer in the state of California and hold a Bachelor of Science degree in Electrical Engineering from the California State University, Sacramento. I have completed post-graduate coursework in Power System Engineering from Santa Clara University and earned a Master of Science in Information Systems from the University of Phoenix. Prior to joining the CAISO, I worked for eight years in the electric transmission department of Pacific Gas and Electric Company, where I worked on operations engineering, transmission planning and substation design.

My remarks today address two topics. First, I discuss measures the CAISO is taking in coordination with California states agencies, utilities, and Peak Reliability Coordinator to address the impact to electric grid reliability in southern California resulting from the current moratorium on natural gas injections at the Aliso Canyon natural gas storage facility. Second, I discuss

considerations involving the impact of distributed energy resources. Both of these issues are causing adaptation and require new operating practices and regulatory approaches to ensure customers receive safe and reliable electric service.

I. The moratorium on natural gas injections at Aliso Canyon requires mitigation measures to reduce the risks to reliable electric service in southern California

In October 2015, a natural gas leak was detected at the Aliso Canyon gas storage facility on the Southern California Gas Company (SoCalGas) system. Although SoCalGas has sealed the leak, it cannot resume injecting natural gas into Aliso Canyon until safety inspections are complete, and can only withdraw natural gas once it obtains necessary regulatory approvals. The limited operability of Aliso Canyon is a concern not only for residential gas customers, but also for gas-fired electric generating resources in southern California that normally rely on Aliso Canyon. To the extent these gas-fired resources are unable to obtain sufficient gas supplies through pipeline service to meet electric demand, such deficiencies could, under certain circumstances, result in gas curtailments to electric generation and the need to curtail electric service to southern California customers.

At the direction of the Governor of California, the California Energy Commission and California Public Utilities Commission (CPUC) organized an Inter-Agency Task Force to assess the risks posed by the limited operability of Aliso Canyon and the actions required to mitigate those risks. The CAISO was an active participant in that effort. Aliso Canyon supports electric reliability when

there are significant differences between flowing gas supply and actual gas demand. These differences can arise from unexpected changes between the amount of gas scheduled the day before and the actual gas demand occurring in real-time.

The Inter-Agency Task Force identified a number of risks associated with operations during the summer of 2016, including: (1) planned and unplanned outages or curtailments on the gas system often limit pipeline and other storage availability; (2) daily imbalances between the amount of gas nominated and the amount of gas burned can affect operating pressures and undermine pipeline integrity; and (3) rapid ramping of electric generation can exceed the dynamic capability of the gas system. The Inter-Agency Task Force also identified a number of actions to mitigate these risks. As part of that mitigation, the CAISO identified through an expedited stakeholder process proposed market rule changes to improve gas-electric coordination. On May 9, 2016, the CAISO filed tariff revisions in Commission docket ER16-1649 to request authority to implement these changes.

The Risk Assessment Report and the Reliability Action Plan developed by the Inter-Agency Task Force included analyses of the likely impacts if Aliso Canyon is unavailable. The analyses calculated multiple days in 2016 during which the SoCalGas system will be under significant stress without Aliso Canyon in operation. This stress will threaten uninterrupted gas service to electric generating resources and other non-core gas customers. SoCalGas relies on Aliso Canyon during stressed system conditions to meet hourly changes in gas

requirements as gas fired electric generating resources start up and operate during hours of peak demand. In addition, some of these resources must be available to produce power quickly in the event of outages on the transmission system or other unanticipated ramping needs.

The analyses conducted by the Inter-Agency Task Force estimate that, assuming no gas is withdrawn from Aliso Canyon, natural gas curtailments are possible this summer. Some of these curtailments may create a large enough impact to interrupt much of the power generation located in the Los Angeles Basin, affecting both the CAISO and Los Angeles Department of Water and Power (LADWP). The risk of curtailment increases as a result of unplanned outages of electric or gas transmission elements. The risk also increases if forecast conditions on the electric system are inaccurate and the system experiences unexpected ramps.

Based on its analyses, the Inter-Agency Task Force identified multiple mitigation measures to reduce the need for and magnitude of natural gas curtailments. Some of the mitigation measures are already being implemented, some are still under consideration. Among others, these mitigation measures include:

- Efforts to explore the use of remaining gas in Aliso Canyon to prevent electric service interruptions this summer.
- Efforts to efficiently complete the required safety review at Aliso Canyon to allow for safe use of at least a portion of the storage field.
- Examining whether any gas maintenance tasks on the SoCalGas system can be safely deferred.

- Establishing an interim set of gas balancing rules, which are currently pending review by the California Public Utilities Commission.
- Funding to create a gas conservation messaging campaign.
- Expanding energy efficiency and demand response programs in southern California
- Enhancing gas-electric coordination efforts by refining information they exchange on expected system conditions and expected gas burns.
- Scheduling tabletop exercises to manage gas pipeline outages as well as to address emergency procedures in the event of a gas curtailment on the SoCalGas system.
- Assessing whether emergency ratings on transmission paths that serve the Los Angeles Basin may be increased and exploring the utilization remedial action schemes if necessary to maximize use of these transmission paths during emergency conditions.
- Operationalizing the Flex Alert program this summer to encourage electricity conservation.

The CAISO expects that these measures in conjunction with its own tariff revisions will mitigate but not eliminate the risk posed by the limited operability of Aliso Canyon. Moreover, the work to develop and implement these measures has resulted in unprecedented coordination among the CAISO, LADWP, SoCalGas, Southern California Edison and California state agencies. The CAISO expects to leverage this coordination to identify the need to adapt and refine mitigation strategies. Nevertheless, significant electric grid reliability concerns remain stemming from the interaction between gas pipeline balancing requirements and the reliance on natural gas generating resources to serve load in Southern California, particularly during peak summer periods or ramping

periods. As we move into summer, the CAISO and affected entities will gain operational experience without Aliso Canyon. This experience will also inform how to evolve mitigation strategies to manage the risk of gas curtailments over the immediate operating horizon and heading into winter as well as inform longer-term efforts to study and design the integrated gas and electric system to be less reliant and more resilient to gas infrastructure such as Aliso Canyon. .

II. The proliferation of distributed energy resources will transform operating practices to manage electric grid reliability

Within the CAISO balancing authority, there is a significant growth of distributed energy resources. Many of these resources do not participate in the CAISO's markets as supply resources, but nonetheless have the potential to transform operating practices on the CAISO transmission system. From the perspective of a transmission system operator, distributed energy resources can cause changes in operating practices because transmission system operators have limited monitoring and control of distributed energy resources. However, distributed energy resources are transforming the supply mix in the CAISO's balancing authority area and provide a significant opportunity for a source of grid reliability services and resiliency. This transformation will require coordination between transmission system operators, utility distribution companies and regulatory authorities.

The coordination activities required will include enhancing and improving production forecasts to understand what impacts to demand are occurring by virtue of the operation of distributed energy resources. This effort requires increased communication about where distributed energy resources are located

and their operational profiles. The CAISO must continue to develop and incorporate day-ahead and real-time forecasts for distributed energy resources in applicable market applications. One challenge to this effort has involved forecasting behind-the-meter solar when the CAISO cannot verify the actual production that occurs on a day-to-day basis to help improve forecasting models.

The CAISO must also ensure clear lines of communication exist between itself and distribution system operators and planners. We will need to agree on what information to exchange as well as the timing of that information exchange to ensure coordinated operation and planning, both in the long and short-term planning horizon as well as the day-ahead and real-time markets. This coordination is critical to ensure resource deliverability, feasible dispatch, as well as safe and reliable operation of both transmission and distribution systems.

In addition, transmission and distribution system operators and planners will need to coordinate to ensure a common understanding exists of what grid capabilities distributed energy resources are providing to both the distribution and transmission systems. For example, do these resources provide sufficient energy given that they may have energy limitations in the case of storage and demand response? Do these resources provide voltage or inertial support for system operations or are additional transmission or distribution elements necessary to ensure grid stability? One area to examine is the development of technical interconnection requirements as part of grid codes for distributed energy resources.

While challenges exist, it is important to recognize the contribution that distributed energy resources make to the reliable operation of the bulk power system. For instance, energy storage on the distribution system can help mitigate over-supply conditions. By serving load, distributed energy resources can help mitigate conventional resource needs. Distributed energy resources may also benefit the system by reducing peak demand and thereby avoiding the need for transmission upgrades. These resources can also provide ancillary services to the transmission system.

The CAISO supports examining new paradigms to integrate distributed energy resources into overall system operations. While the CAISO's work focuses on transmission system planning and operations, the CAISO also believes opportunities exist for utility distribution companies to leverage distributed energy resources as potential service providers to support distribution grid operations. This will require identifying services these resources can provide to the distribution system, including performance requirements and rules for procuring, measuring, and compensating distributed energy resources. Similar to deferring investment for a transmission element, distributed energy resources may help defer or eliminate the need to invest in distribution upgrades.

Regulators will also need to adapt to determine how best to support the integration of distributed energy resources and integration. For example, regulators should consider how best to create incentives to manage variability close to the source of that variability rather than exporting variability from the source to the transmission grid. These incentives could take the form of

allocating costs of managing variability on a cost causation basis to interconnected entities that add variability to the grid. Such an approach may encourage the development of micro-grids or aggregations of distributed energy resources that help manage variability closer to the source of that variability. Regulators should also consider mechanisms to support the application of new control technologies to expand the use of aggregated load management systems (e.g., air conditioning or electric vehicle charging) to support integration of distributed energy resources.

III. Regional Collaboration

The CAISO has seen significant operational benefits of EIM transfers that are helping manage imbalances and variability caused by the increased presence of variable energy resources on the integrated grid. We expect that regional collaboration efforts can be extended to support regions meeting reliability services such as the new frequency response requirements.

Respectfully submitted,

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Dated: May 24, 2016