

Testimony of Keith Casey, PhD  
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Committee on Energy and Commerce  
Subcommittee on Energy  
United States House of Representatives

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Chairman Upton, Vice Chairman Olson, Ranking Member Rush, and Members of the Committee:

My name is Keith Casey. I am the Vice President of Market and Infrastructure Development at the California Independent System Operator Corporation. Thank you for the opportunity to appear before you today to discuss the operation and effectiveness of the organized wholesale electricity markets in California. We appreciate the Committee's attention to this important issue. My testimony today will focus on what is working well in our markets as well as the challenges we face.

For the past eight years, I have been responsible for developing market design and infrastructure policies and overseeing the transmission planning and generation interconnection process for the California ISO. Prior to that I served as the Director of the California ISO's Department of Market Monitoring and have been with the California ISO since its inception in 1997.

The California ISO is a nonprofit, public benefit corporation chartered under the laws of the State of California for the purpose of ensuring efficient use and reliable operation of the electric transmission grid under its operational control. The California ISO operates wholesale energy and ancillary services markets to reliably manage the high-voltage transmission system that serves approximately 80 percent of California

electric load as well as a small portion of Nevada's electric load. We currently have over 180 entities participating in our markets and 18 entities that have made the transmission they own subject to our operational control. The California ISO monitors over 70,000 megawatts of electricity from more than 900 generators that serve 30 million customers. The California ISO is one of thirty eight balancing authorities in the Western Interconnection and represents about 35 percent of the electric load in the West. In the past 15 years, we have seen the development of significant new generation as well as new transmission lines and upgrades. These investments have ensured that the California ISO has sufficient supply margins to meet peak demand.

Since start-up, we have almost 20 years of operating experience and have evolved our markets since the Western Energy Crisis occurred 17 years ago. Without question, the Western Energy Crisis shook public confidence in the integrity and value of an organized market in California and cost ratepayers billions of dollars. The experience triggered significant market design and regulatory rule changes, such as the development of a year-ahead resource adequacy framework with rules that require resources procured for resource adequacy purposes to offer their supply into the market. The crisis also triggered much stronger rules and enforcement against market power and manipulation enabled largely through the Energy Policy Act of 2005. Over the many years that have passed since the crisis, we have continually evolved our market design to ensure we can efficiently balance supply and demand and meet the changing needs of the system.

Consequently, the California's ISO's electricity markets have matured significantly, and are in far better shape now than they were then to serve electric

demand in an efficient and reliable manner. Indeed, our success has encouraged other transmission providers in the West to join our real-time energy market and form the Western Energy Imbalance Market. That market currently serves five entities comprising approximately 8 western states and half the electric load in the Western Interconnection, and seven additional entities are planning to join the Western Energy Imbalance Market over the next three years. Since its inception in 2014, the Western Energy Imbalance market has created significant benefits, both by allowing economic transfers of energy among participating entities and by enabling greater integration of renewable resources by using a larger geographic footprint to balance oversupply conditions. The California ISO's work to help foster the Western Energy Imbalance Market has also resulted in greater situational awareness of grid reliability and greater ability to respond to major contingencies.

In recent years, California environmental energy policies are dramatically transforming the resource portfolio that serves electric load. California's renewable portfolio standard, greenhouse gas emission reduction goals, policies concerning the use of ocean and estuary water for power plant cooling, as well as distributed energy resource and rooftop solar goals have all contributed to a dramatic shift away from conventional power plants and to the deployment of new technologies such as battery storage and demand response. Today, renewables comprise about 30 percent of total energy produced in our markets and are on track to meet 50% by 2030 – if not sooner. The dramatic growth in renewables has improved fuel diversity by reducing our reliance on natural gas plants from 40% in 2015 to 32% in 2016.

This transition -- from large central station power model to a more diverse and decentralized system -- has created a new value proposition for the California ISO. Our centralized energy markets can successfully integrate and manage a diverse fleet of grid resources. The market efficiently commits and dispatches all types of resources (including gas-fired generation, demand response, as well as renewable resources to balance the system and maintain reliability. The markets also provide transparency on what is happening on the electric system by setting energy prices that reflect supply needs across an operating day and identifying transmission congestion.

In addition to operating the wholesale market, the California ISO has provided and continues to provide significant value to its market participants as the transformation of the electric grid occurs. We have developed a transparent and effective process for interconnecting new resources to the transmission system. In addition, as part of its responsibilities, the California ISO performs transmission planning functions for its planning area. These processes examine forecasts of electricity use and changes in resource portfolios to ensure sufficient infrastructure is available to serve electric customers. The California ISO has used these processes to approve over 7 billion dollars of transmission infrastructure to help facilitate the development of a large increase in renewable resources in its planning area while maintaining electric grid reliability.

Since 2011, the California ISO's transmission planning process has included criteria to approve new transmission to support federal and state policies. This feature was reinforced by the final rule of the Federal Energy Regulatory Commission involving regional transmission planning and cost allocation, known as Order No. 1000. This rule

requires that transmission planning processes consider transmission needs driven by public policy requirements established by state or federal laws or regulations.

Order No. 1000 also included requirements to allow for competition for building new transmission. Pursuant to Order No. 1000, the California ISO has conducted nine competitive solicitations in which it has evaluated competing project sponsors' proposals to build a needed transmission solution and selected an approved project sponsor. The California ISO has awarded four projects to independent transmission developers, two projects to incumbent utility participating transmission owners, two projects to collaborations between incumbent utility participating transmission owners and independents, and one project to a public power entity that was not an existing participating transmission owner. The ISO has applied the lessons it has learned to improve its competitive solicitations.

Notwithstanding the success of the California ISO's markets and infrastructure development processes, there remain significant challenges to enable the transformation of the electric grid. Two significant challenges are 1) to maintain resources needed for essential reliability services during the transformation of the electric grid and 2) to ensure the infrastructure needed to access a more diverse set of resources across the West to satisfy state renewable portfolio standards.

Reliably integrating high levels of renewables into the power system represents a significant challenge. The changes in make-up of the generator fleet has created some operational challenges for us. Not only must the ISO focus on meeting peak load, but it now must also ensure sufficient ramping capability, both upwards and downwards, is available over relatively short periods to meet the sudden swings associated with

variable energy resources. To this end, the California ISO has focused on resource adequacy enhancements to ensure that sufficient flexible resources are procured and offered into its market. The California ISO has also made significant investments to improve its real-time market to provide accurate price signals for resources to follow energy dispatch instructions and meet expected ramping needs. In addition, the California ISO still needs essential reliability services such as voltage support and frequency response to support a reliable electricity grid. The California ISO must ensure it has adequate dispatchable resources to provide these essential reliability services. For the near future, the California ISO expects these resources will primarily be natural gas-fired generation.

Notwithstanding the need for gas-fired dispatchable resources, several factors have placed economic pressure on these resources. First, the proliferation of renewables pursuant to California's Renewable Portfolio Standard has depressed energy market prices during certain operating hours of the day and their output has displaced many conventional plants. Second, the success of behind-the-meter solar and the growth of community choice aggregation in California have made large load serving entities reluctant to enter into long-term bilateral contracts with independent power plants that provide payments for the resource capacity. These utilities are facing the prospect of an eroding customer base, which has created the risk of stranded costs. As a result, conventional power plants are beginning to seek some form of backstop contract from the California ISO to keep them financially viable. Currently, the California ISO is working with the California Public Utilities Commission and market

participants to explore regulatory and market options for addressing this procurement problem.

Ultimately, we will need a new regulatory or market framework to ensure the system not only has the energy it needs but also the essential reliability services to meet ramps, maintain voltage levels and ensure the system can recover from contingencies such as a frequency disturbance. Successful integration of renewable resources at the high levels that California and other Western states are pursuing will require a resource mix with the capabilities that conventional synchronous resources have typically provided to the electric system.

We have another significant challenge: how to tap into the benefits of an expanded western region. To date, the majority of California's renewable resources are located within the state – and the vast majority of new projects going forward are solar photovoltaic resources located in the California ISO's system. Relying too heavily on these resources will exacerbate renewable integration challenges because the California ISO must balance demand with supply in real-time. When the California ISO system has too much supply during peak solar hours and cannot export its excess to other entities through the Western Energy Imbalance Market it has to curtail renewable energy. As California looks to achieve a 50 percent renewable portfolio standard and beyond, it could take advantage of the opportunity to tap into other high quality renewable resources in the West, such as wind in Wyoming and New Mexico or solar in Arizona and Nevada . Having a more diverse resource mix of renewables will lessen the integration challenges and may be a more cost effective solution to meeting California's policy objectives. Any such procurement will need to be consistent with

California's renewable portfolio standard and will likely require new transmission across multiple states. New transmission options will also provide benefits to different states across the region, but reaching agreement on what those benefits are and ultimately how the costs can be shared will be an extremely complex process. Ultimately, this is an issue best left to the states within the region to resolve but it is a major challenge for the future.

The benefits of an organized market in the California and other western states have included both economic savings and help in meeting ambitious clean energy goals. Going forward, we continue to look for opportunities to enhance our markets and services and to work with policymakers and all stakeholders to overcome the challenges and further realize the benefits I have highlighted for you.

Thank you for the opportunity to be here today and I look forward to your questions.