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Regional Energy Markets & California's Green Goals

Informational Hearing *Background*

History of the CAISO

Before the establishment of independent transmission operators, electricity was a matter of local concern and was regulated strictly at the state level. The technology simply was not there to move electricity over great distances.

The utility industry operated for years as a monopoly with each local utility providing generation, transmission and distribution services for its area. When technology evolved to provide the ability to move electrons over many miles, plants could be located away from consumers and the concept of competitive markets became viable.

Independent system operators (ISOs) and regional transmission organizations (RTOs) were created following the 1992 passage of the Federal Energy Policy Act, which introduced competition to the wholesale side of the electricity business. The concern was that utilities were monopolizing the grid and, in an effort to restrict competition, preventing the use of transmission lines by competitors.

To address this concern the use of ISOs and RTOs were authorized to ensure access to the transmission without discrimination. These entities are often compared to air traffic controllers, because they independently manage the electron traffic on a power grid they do not own, much like airlines on an airport runway.

The California Independent System Operator (CAISO) is one of nine independent system or regional operators in North America. These are reflected on Attachment A. Collectively, they deliver over 2.2 million gigawatt-hours of electricity each year and oversee more than 270,000 miles of high-voltage power lines. While major sections of the country operate under more traditional market structures, including most balancing authorities in the west, two-thirds of the nation's electricity load is served by independent grid operators. These ISOs or RTOs manage the electricity dispatch on transmission lines which are owned largely by electric utilities. They also put the generation, which is "scheduled" by the participating utilities, into a competitive market where the lowest cost resources are dispatched to serve customer load.

In California the CAISO has served in this role since the deregulation of the electricity grid in the 1990s. It is not a state agency but is a nonprofit public benefit corporation operating under federal law and jurisdiction of the Federal Energy Regulatory Commission (FERC). The CAISO manages the flow of electricity across the high-voltage, long-distance power lines that make up 80 percent of California's and a small part of Nevada's grid. The lines encompass all of the investor-owned utility territories and some municipal utility service areas. Other areas of the state remain under vertically controlled utilities including the Los Angeles Department of Water and Power (LADWP) and the Sacramento Municipal Utilities District (SMUD).

The CAISO opened its two California control centers in 1998 as the state restructured its wholesale electricity industry. While utilities still own transmission assets, the CAISO controls the routing of electrons, maximizing transmission system efficiency and generation resources. As the nerve center for the power grid, the CAISO matches buyers and sellers of electricity, facilitating over 28,000 market transactions every day to ensure enough power is on hand to meet demand. Every five minutes, the CAISO forecasts electrical demand and dispatches the lowest cost generator to meet demand while ensuring enough transmission capacity for delivery of power.

Western Grid

The nation's bulk electric system is broken out into several regions each of which has transmission which is interconnected across state lines. California is one of fourteen states with transmission systems that are interconnected across western North America along with British Columbia, Alberta, and a portion of Baja California.

Although the transmission lines are interconnected, there are 38 separate balancing authorities in the western interconnection each of which is responsible for operating a transmission control area. It matches generation with load and maintains consistent electric frequency of the grid, even during extreme weather conditions or natural disasters. The western interconnection operates under federal standards set by the National Electric Reliability Corporation (NERC) and must collectively maintain the system of 60 hertz. Each of the 38 system operators in the western interconnection must maintain that frequency within the standard or be subject to penalties by NERC. The 38 balancing authorities are reflected on Attachment B.

A few balancing authorities are federal systems including the Bonneville Power Administration and the Western Area Power Administration. However, except for the CAISO, most of the balancing authorities are vertically integrated utilities (they own the generation, transmission and distribution systems) and are responsible for system operations and management, and, typically, for providing power to retail consumers. In vertically integrated balancing authorities, wholesale physical power trade typically occurs through bilateral transactions.

California's ISO is the largest balancing authority in the west, handling an estimated 35 percent of the electric load. It is the only independent grid operator in the western U.S. and operates the only competitive wholesale power markets in the west.

Western Energy Imbalance Market

The California ISO's western Energy Imbalance Market (EIM) is a real-time bulk power trading market. The EIM is distinctly different from the CAISO's primary market in that the energy trade in the EIM is limited and intermittent. It's in essence generation that a participating utility considers surplus at the last minute. The CAISO-EIM operates a five-minute market and the surplus generation may be dispatched to serve customer load if it's got the right price, if there's a customer (utility) need, and if there is sufficient transmission availability to move the power. It allows participating balancing authorities to buy and sell the final few megawatts of power to satisfy demand within the hour it is needed. This makes the EIM different from CAISO's normal management. The EIM is small, quick, and voluntary, while normal CAISO operation occurs on a day-ahead schedule and requires more long-term coordination and control. The EIM only comprises 1-3% of CAISO's total wholesale energy costs.

SB 350 & Studies

Senate Bill 350, passed in 2015, expressed the intent of the Legislature "to provide for the transformation of CAISO into a regional organization" in the western states subject to further study and legislative approval of CAISO governance. The CAISO was also directed to study the impacts of expanding the electricity grid over the western United States.

The CAISO retained The Brattle Group, Energy and Environmental Economics, Inc., Aspen Environmental Group, and Berkeley Economic Advising and Research, LLC to evaluate the following impacts of a regional ISO as outlined by SB 350:

- Overall benefits to California ratepayers;
- Emissions of greenhouse gases and other air pollutants;
- The creation or retention of jobs and other benefits to the California economy;
- Environmental impacts in California and elsewhere;
- Impacts in disadvantaged communities in California; and
- Reliability and integration of renewable energy resources.

"Senate Bill 350 Study: The Impacts of a Regional ISO-Operated Power Market on California," can be found at <http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=4C17574F-73AE-40E3-942C-59C3A13BBDF1>

CAISO Governance

California is the only state in the nation where the governing board of its regional transmission operator is politically appointed. The CAISO board of governors has five members who are appointed by the Governor and confirmed by the Senate. Other ISOs/RTOs are governed by boards of directors whose members vary in number from five to ten. In general, new board members are identified by a nominating committee and their appointment is ratified by either a vote of the ISO/RTO's members or by a vote of the board.

Technically any transmission operator can join the CAISO today. However the unique structure of the CAISO's governing board and control of its members by the Governor and Senate has been a barrier to expansion. The CAISO reports that several other balancing authorities have expressed an interest in joining the CAISO but must see a statutory change in the governance and offer a board that balances the policies of all participating balancing authorities. This is the primary purpose of legislation pending in the Senate, AB 813 (Holden). As amended March 8, 2018, AB 813 would establish in state law the operating principles required for any RTO that any California transmission operator, retail seller, or local publicly owned utility joins. The principles largely reflect the CAISO's current operations and are largely reflected in tariffs that have been approved by FERC:

- Open and transparent meetings consistent with Bagley-Keene;
- Access to records, consistent with Public Records Act;
- Protection of state resources choices and procurement;
- Alignment of transmission costs with transmission benefits;
- Prohibition on centralized capacity markets for California resources or load serving entities;
- Requirement for GHG tracking;
- Facilitation of participation of DERs in the markets;
- Requirement that market prices for electricity moving into California reflect the price of carbon (GHG adder); and
- Prohibit the participation of any transmission operator or load serving entity in an RTO without those principles and require that the entity pull out if operating principles deviate from these statutory requirements.

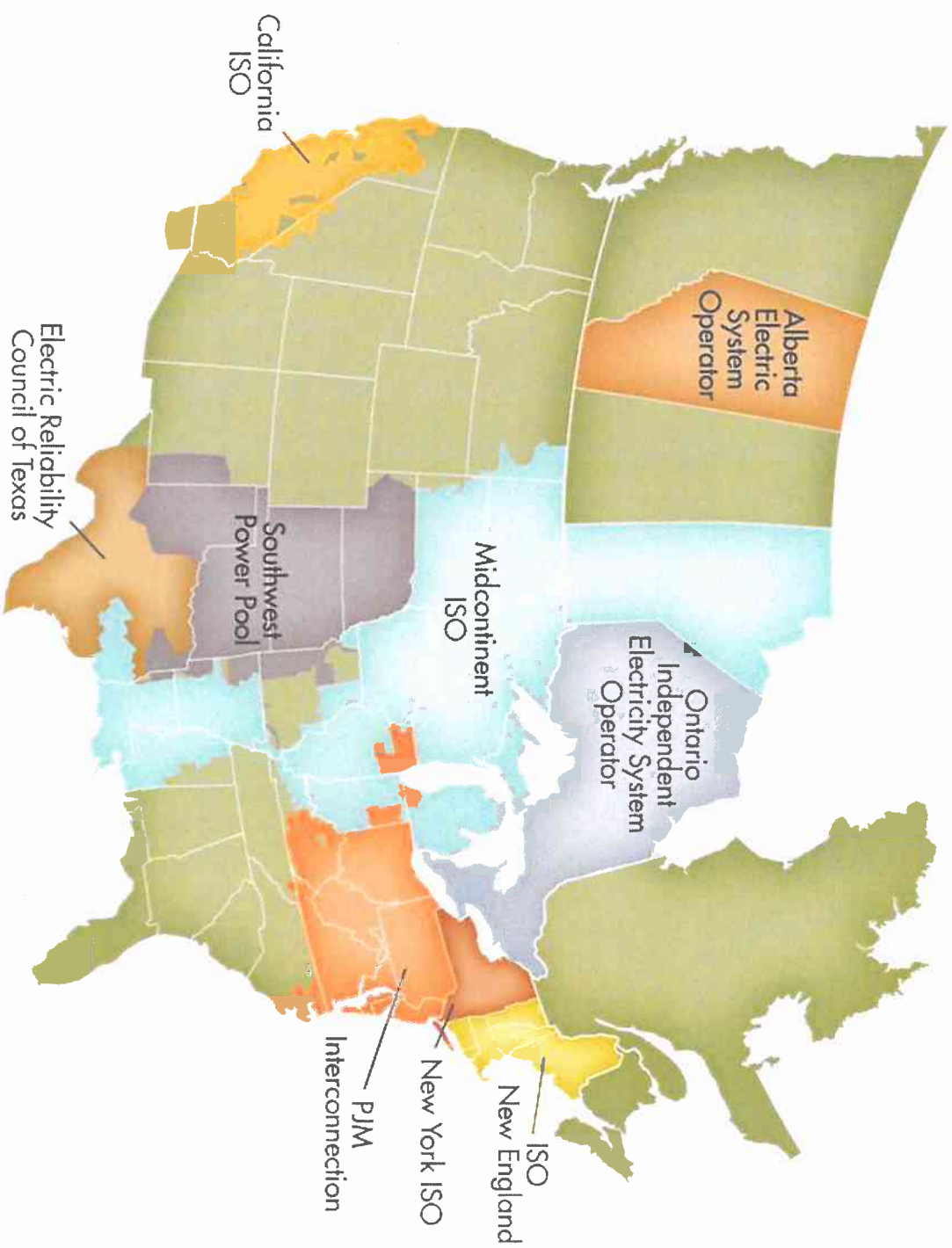
Upon the submission of the governing documents to the CEC, a public hearing by the CEC, and certification by the CEC that the CAISO's new governing documents are in compliance with statutory principles, California appointments to the CAISO Board would end. The Governor would then be required to make three, staggered appointments, confirmed by the Senate, to a new CAISO western states committee which would be advisory to the new regional board and have member from all states with participating balancing authorities.

AB 813 mandates that any California-based transmission operator, retail seller, or local publicly owned utility that joins an approved ISO/RTO but finds that the ISO/RTO changes course and does not operate consistent with the AB 813 principles, must withdraw from the ISO/RTO.

The bill is in the Senate Rules Committee pending referral to policy committee.

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North America
Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs)



Western Interconnection Balancing Authorities

January 5, 2017

AESO - Alberta Electric System Operator

AVA - Avista Corporation

AZPS - Arizona Public Service Company

BANC - Balancing Authority of Northern California

BCHA - British Columbia Hydro Authority

BPAT - Bonneville Power Administration-Transmission

CFE - Comision Federal de Electricidad

CHPD - PUD No. 1 of Chelan County

CISO - California Independent System Operator

DEAA - Arlington Valley, LLC

DOPD - PUD No. 1 of Douglas County

EPE - El Paso Electric Company

GCPD - PUD No. 2 of Grant County

GRID - Gridforce Energy Management, LLC

GRIF - Griffith Energy, LLC

GRMA - Gila River Power, LP

GWA - NaturEner Power Watch, LLC

HGMA - New Harquahala Generating Company, LLC

IID - Imperial Irrigation District

IPCO - Idaho Power Company

LDWP - Los Angeles Department of Water and Power

NEVP - Nevada Power Company

NWMT - NorthWestern Energy

PACE - PacifiCorp East

PACW - PacifiCorp West

PGE - Portland General Electric Company

PNM - Public Service Company of New Mexico

PSCO - Public Service Company of Colorado

PSEI - Puget Sound Energy

SCL - Seattle City Light

SRP - Salt River Project

TEPC - Tucson Electric Power Company

TIDC - Turlock Irrigation District

TPWR - City of Tacoma, Department of Public Utilities

WACM - Western Area Power Administration, Colorado-Missouri Region

WALC - Western Area Power Administration, Lower Colorado Region

WAUW - Western Area Power Administration, Upper Great Plains West

WWA - NaturEner Wind Watch, LLC

Not a NERC-Registered BA

PACE & PACW are a single registered entity but two BAs

