

PRIMER ON ISOs, RTOs AND THEIR GOVERNANCE

ISO = Independent System Operator RTO = Regional Transmission Organization

1. OVERVIEW OF U.S. ELECTRICAL SYSTEM

The physical electrical system consists of 3 "Interconnections" that are largely independent with minimal power exchange. Operationally, there are 66 U.S. "Balancing Authorities" that each operate a portion of the grid, balance supply and demand at all times, and assure Federal reliability standards are met. Most Balancing Authorities are individual utilities, while most of the total power flow is managed by 7 larger regional entities (ISOs or RTOs). ISOs/RTOs also oversee organized wholesale electricity markets, whereas most utilities are vertically-integrated regulated monopolies that control all electricity generation, transmission, and distribution within their territory.

- Eastern Interconnection (36 balancing authorities, including 5 in Canada)
 - Western Interconnection (37 balancing authorities, including 3 in Canada and Mexico)
 - ERCOT (most of Texas - 1 balancing authority - within a single state, so not regulated by the FERC)
- [see the [Balancing Authorities map](#) or Fig. 1]

Each ISO or RTO (they are very similar) is an independent body that operates the high-voltage Transmission grid within its region; assures non-discriminatory open access to transmission; forecasts, schedules and dispatches generation to meet demand; manages interconnection of new generation; administers the region's competitive wholesale electricity markets; monitors the fairness and neutrality of markets for all participants; and provides reliability planning for the bulk electricity system. An ISO/RTO does not own any of the transmission or generation assets it manages. Each ISO has its own FERC-approved governance structure (described later).

- California ISO ([CAISO](#))
- Electric Reliability Council of Texas ([ERCOT](#))
- New York ISO ([NYISO](#))
- New England ISO ([ISO-NE](#))
- PJM Interconnection ([PJM](#))
- Midcontinent ISO ([MISO](#))
- Southwest Power Pool ([SPP](#))

[see [FERC RTO map](#) or Fig. 2] [see [better FERC map and descriptions](#)] [see [summary of each ISO/RTO](#)]

Non-ISO/RTO regions (including Colorado) are operated by individual vertically-integrated utilities (or Federal systems like TVA, BPA, WAPA) that have been granted monopoly status over "ratepayers" in their territory, and they are regulated by state Public Utility Commissions (PUCs or PSCs). A "cost-plus" utility revenue model guarantees a substantial rate-of-return on all investments, which incentivizes capital-intensive, inefficient solutions lacking in innovation or consumer choice. Although these utilities don't participate in wholesale power markets, they must still comply with open Transmission access. Power exchanges between utilities are mostly bilateral agreements or PPAs. They retain control over their transmission system, which leads to preferential treatment for their own generation over more affordable and/or cleaner generation from competitive suppliers and marketers. [See the non-RTO (Southwest, Northwest, and Southeast) regions on the [FERC market overview map](#).]

2. ORIGIN AND CHARACTERISTICS OF ISOs & RTOs [also see [wikipedia](#)]

In the mid-90s, many regions pushed for wholesale competition as a way to create equal access to the transmission system and provide consumers with a choice of energy suppliers. ISOs were established by FERC Orders 888 & 889 in 1996 to provide open and fair access to transmission, and promote competitive wholesale electricity markets. Order 888 also allowed utilities to recover stranded costs associated with providing open access to transmission during the transition from regulated monopolies to open competition. Order 888 stated that the main purpose of an ISO is to "operate the transmission systems of public utilities in a manner that is independent of any business interest in sales or purchases of electric power by those utilities."

FERC Order 888 defined how independent power producers (IPPs) and power marketers would be allowed fair access to transmission systems, and specified the unbundling of a utility's generation and transmission and distribution. Most ISOs are set up as nonprofit corporations.

Order 889 established an Open Access Same-time Information System (OASIS) to provide potential transmission users with information on available transmission capacity, prices, and other information. Prior to Orders 888/889, vertically-integrated entities controlled energy provision in their territories and there was no consumer choice (still true in Colorado and elsewhere).

FERC Order 2000 in 1999 defined and promoted the (voluntary) formation of RTOs to administer the transmission grid on a regional basis. An RTO is defined by 4 minimum characteristics and 8 minimum functions ([listed here](#)), including: independence from market participants, full control of transmission facilities and coordination of security, tariff administration and design, transmission congestion management, market monitoring, transmission planning and expansion, and administering OASIS. RTOs are independent, membership-based, non-profit organizations that ensure reliability and optimize supply and demand bids for wholesale electric power. Members of RTOs can include: independent generators, transmission companies and load-serving entities, vertically-integrated utilities, and other entities such as power marketers and energy traders.

Participation in an RTO is not mandatory in order to comply with Order 888 (an ISO is fine but is less rigorously defined, and ISOs can become RTOs). Both ISOs and RTOs are associated with "deregulation", retail electricity choice, and management of a transmission grid they don't own over a wide geographic region. An ISO is usually within a single state, and an RTO usually manages a multi-state region. An ISO either does not meet the minimum standards to be called an RTO, or has not applied to the FERC for RTO status.

[note: If Colorado (or the [Mountain West Transmission Group](#)) forms a new ISO ("COISO"), maybe it should be designed to comply with the 12 requirements for RTO status to make that status easier to achieve in the future, especially if competition takes off in the Western Interconnection.]

Additional Resources:

- Good summary from CAISO: [Why ISOs/RTOs are good for America](#).
- Overview of wholesale markets, RTO/ISOs, and competitive markets (somewhat dated): [website](#) or [PDF](#).
- This [brief summary of utility structures](#) points to [state-by-state summaries](#) of utility structure and PUC makeup (with contact information), plus interesting energy data (time series of monthly retail electricity cost; and net generation by fuel source). Here are some of the pages for Colorado: [Regulatory Commission](#); [Largest Utilities](#); [Energy Data](#). It's a commercial product, so much more info is locked, but what's available is useful.

3. ISO / RTO GOVERNANCE

PJM: [[FERC overview and map](#)]

PJM has a 2-tier governance structure: [Board of Managers](#) (independent) + [Members Committee](#) (generation and transmission owners, suppliers, distributors, marketers, and end-use customers).

[Board of Managers](#) - 9 voting members plus a non-voting president (3-year staggered terms). Board members (and all PJM employees) must have no affiliation with any market participant. The Board is responsible for grid operations, creating and operating competitive and non-discriminatory markets, and also ensuring that no member or group of members has undue influence over PJM operations. Board membership AS A GROUP must have certain defined expertise. A nominating committee identifies qualified Board candidates and proposes them to the Members Committee for election ([factsheet](#)).

[Members Committee](#) - Decides on changes and initiatives proposed by committees and user groups. Members have a vote in a broader Stakeholder Process that includes (non-voting) state and consumer advocates, an independent market monitoring entity, PJM Staff, and PJM's Board of Managers.

[Main Governance Webpage](#) - Summary of governance structure and governing documents.

- 1-page factsheets on: [Governance](#), [Governing Documents](#), and [Stakeholder Process](#).

- Governing Documents and Manuals [available here](#), including:
 - Open Access Transmission Tariff (covers overall PJM operations and transmission service).
 - Operating Agreements (Members must sign - defines roles and responsibilities of Board, Members, PJM Staff).
 - Reliability Assurance Agreement (reliability standards for electricity sellers).

[PJM's 3 priorities](#) (see links for each priority): 1) keep the lights on (grid operation, supply/demand balance, transmission monitoring); 2) market operations - buy and sell energy (energy, capacity, and ancillary services markets); and 3) plan for the future (15 year outlook).

[PJM is revenue neutral](#) (ie, non-profit). It recovers its costs from Members based on their activity level.

ERCOT: [\[FERC overview and map\]](#)

Board of Directors: ERCOT is a membership-based non-profit governed by a 16-member Board that appoints the CEO and Executives that oversees operations, sets goals and policy direction, and approves the budget and market rules. The "hybrid" board consists of independent members (unaffiliated with the power industry), consumers, and representatives from industry market segments (independent generators, transmission and distribution providers, power marketers, coops, munis, IOUs, PUCT Chair (non-voting)). The [Technical Advisory Committee \(TAC\)](#) makes policy recommendations to the Board and is assisted by various subcommittees and workgroups. ERCOT is subject to oversight from the PUC of Texas and the Texas Legislature. [\[Main Governance Webpage\]](#) [\[Board Policies and Procedures \(PDF\)\]](#)

ERCOT is an ISO that provides open access to transmission, schedules power, manages financial settlement for the wholesale bulk-power market, and administers "retail switching" for the fraction (7/24) of "energy choice customers". [\[ERCOT factsheet\]](#)

CAISO: [\[FERC overview and map\]](#)

CAISO is a **nonprofit public benefit corporation** operating under [these bylaws, incorporation documents and enabling legislation](#).

Board of Governors: 5 members serve 3-year staggered terms. The ISO's Board Nominee Review Committee, consisting of 36 Member-Stakeholders, gives a list of ranked recommendations to the State Governor. The ranked list is chosen from a list of qualified candidates determined by an independent executive search firm. Candidates must have at least one of four stated general qualifications that complement the existing Board, and must have no connection to any participant involved in any market administered by the ISO. The Senate must confirm the Governor's choice. [\[Board selection policy \(PDF\)\]](#) [\[Executive structure \(PDF\)\]](#)

Regulation. CAISO is regulated by the FERC. The California PUC regulates investor-owned utilities operating in the ISO balancing authority area. Publicly owned utilities in California are regulated by their respective city councils or other governance bodies. [\[CAISO rules and regs\]](#)

From FERC: CAISO operates a competitive wholesale electricity market and manages the reliability of its transmission grid. CAISO provides open access to the transmission grid and performs long-term planning. CAISO centrally dispatches generation and coordinates the movement of wholesale electricity in California and a portion of Nevada. CAISO's markets include energy (day-ahead and real-time), ancillary services, and congestion revenue rights. CAISO also operates an Energy Imbalance Market (EIM), which currently includes PacifiCorp's two balancing authority areas.

NYISO: [\[FERC overview and map\]](#)

Board of Directors: The 10-member Board and ISO employees (CEO + Staff) are independent of any direct relationship to any market participant or stakeholder. They oversee management of the ISO's transmission system and electricity markets, give policy direction and goals to the CEO, and select officers of the ISO. Recommendations for Board membership are made by the three standing committees of stakeholders below.

Market Participant stakeholder committees (Management, Operating, Business Issues) share governance responsibilities with the Board (but also selects Board members?). The voting power in the committees is specified from the various market sectors: transmission owners (20%), generation owners (21.5%), suppliers (21.5%), end-use consumers (20% total), and public power (17%, including munis and coops, power authorities, 2% environmental parties). 58% vote is required to pass. Membership fee \$5000. [\[NYISO governance overview \(PDF\)\]](#) [\[NYISO Governance FAQ \(PDF\)\]](#)

Trouble with NYISO governance? As of 2015, New York was apparently considering restructuring governance to be more like the CAISO model. Excerpts from Gov. Cuomo's proposal to the NY PSC for reform of the NYISO:

- "The current wholesale market structure is not designed for, nor may be well suited for, the proliferation of clean distributed energy resources."

- "NYISO's board of directors does not have adequate public and consumer representation, and are not subject to the same transparency standards as other governmental organizations. "

[\[Article #1\]](#) [\[Article #2\]](#)

ISO-NE: [\[FERC overview and map\]](#)

Board of Directors: The 10-member Board is elected by the ISO through a nominating process that involves representatives from the Board, the New England Power Pool (NEPOOL), and the New England Conference of Public Utilities Commissioners. [\[Main Governance page\]](#)

MISO: [\[FERC overview and map\]](#)

Board of Directors: The Board includes nine Directors elected for three-year staggered terms, plus the President and CEO of MISO. Directors may serve for up to 3 terms (4 with a waiver). Four stakeholder committees report directly to the board.

Nomination: The Nominating Committee is a hybrid committee composed of three Board members appointed by the Chair and two non-Directors appointed by the Advisory Committee. The Nominating Committee oversees the recruitment and selection of new Board candidates by selecting an executive search firm to provide at least two candidates for each open Director position. Members may submit the names of candidates to the executive search firm who will provide them to the Nominating Committee. [\[Corporate Governance doc\]](#)

SPP: [\[FERC overview and map\]](#)

Very opaque and unhelpful website regarding governance. A "Regional State Committee" is comprised of one designated commissioner from each state regulatory commission that has jurisdiction over an SPP Member (which wouldn't work in a single-state ISO). However, the [Organizational Chart](#) shows this committee as equal to other entities including the Board of Directors. The current Board Chair was elected in April 2000, so not much turnover! [\[Main Governance page\]](#)

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U.S. electric power regions

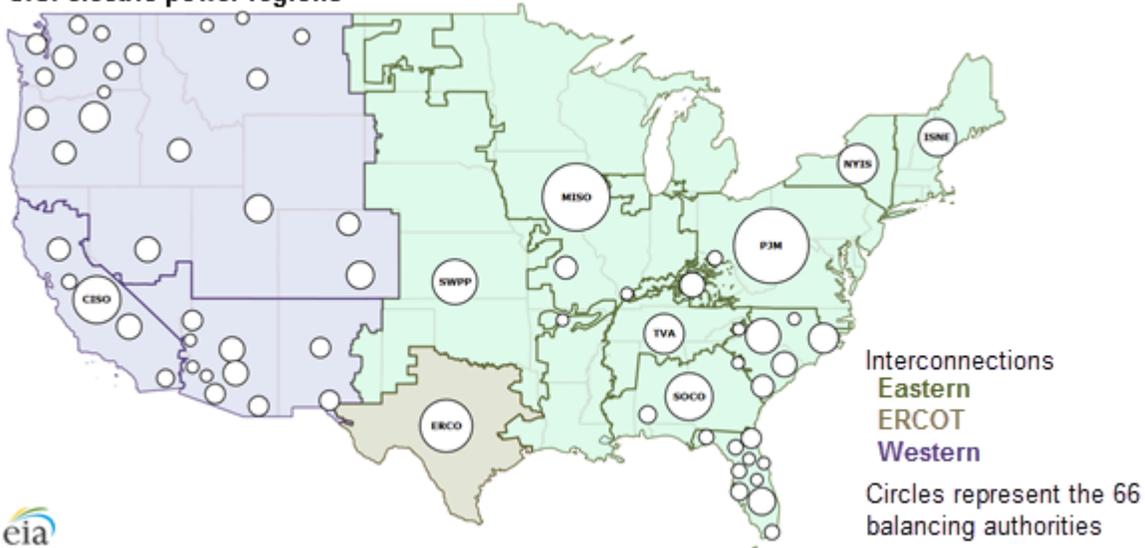


Figure 1: The U.S. electricity grid consists of 3 "Interconnections" with a total of 66 "Balancing Authorities".
<https://www.eia.gov/todayinenergy/detail.php?id=27152>

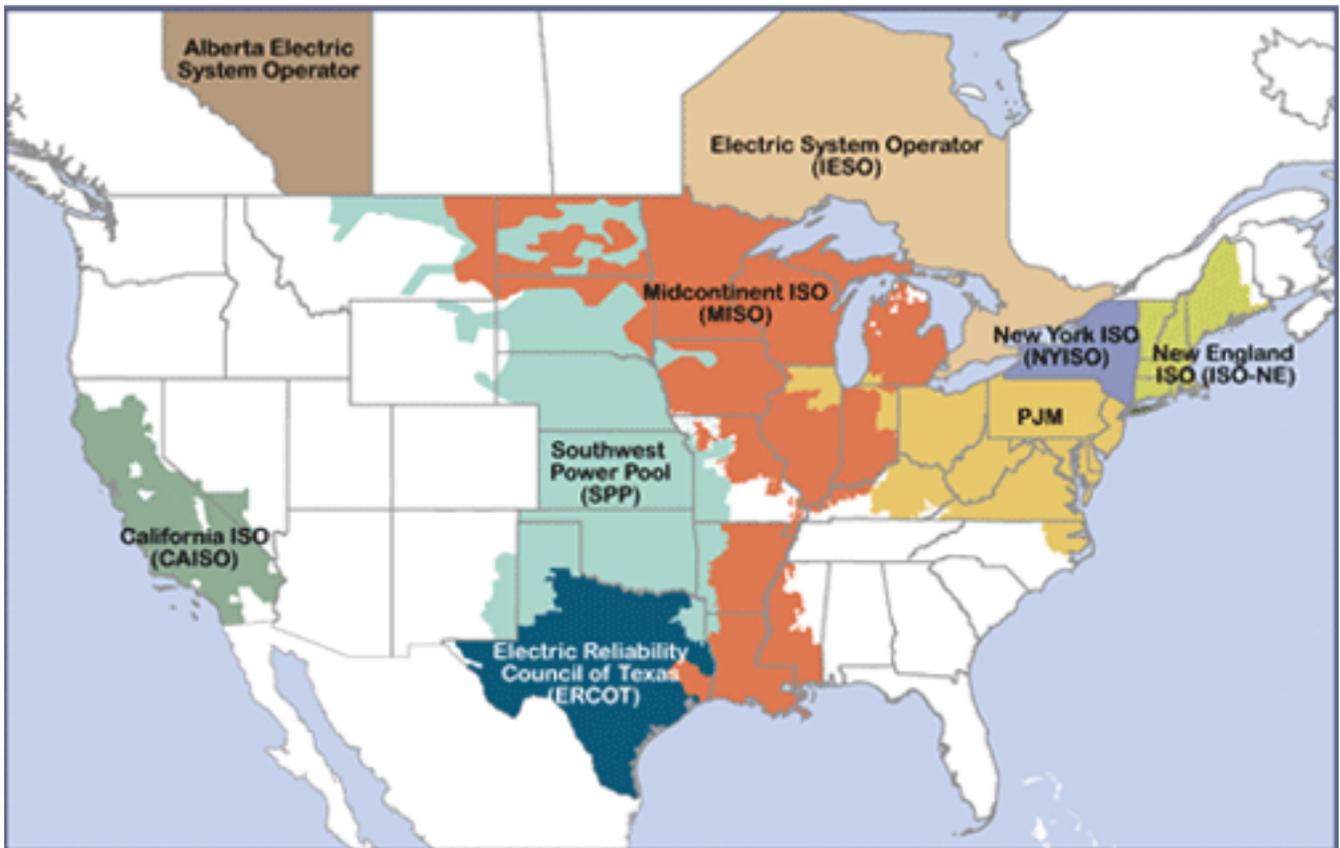


Figure 2: RTOs/ISOs, which have competitive wholesale electricity markets and are regulated by the FERC. Non-RTO regions are operated by individual vertically-integrated utilities regulated by state Public Utility Commissions (PUCs or PSCs), which have "cost-plus" utility revenue models.

<https://www.ferc.gov/industries/electric/indus-act/rto.asp>
 Also see - <https://www.ferc.gov/market-oversight/mkt-electric/overview.asp>