Comity: The Financial Rails for Our Future Energy Systems

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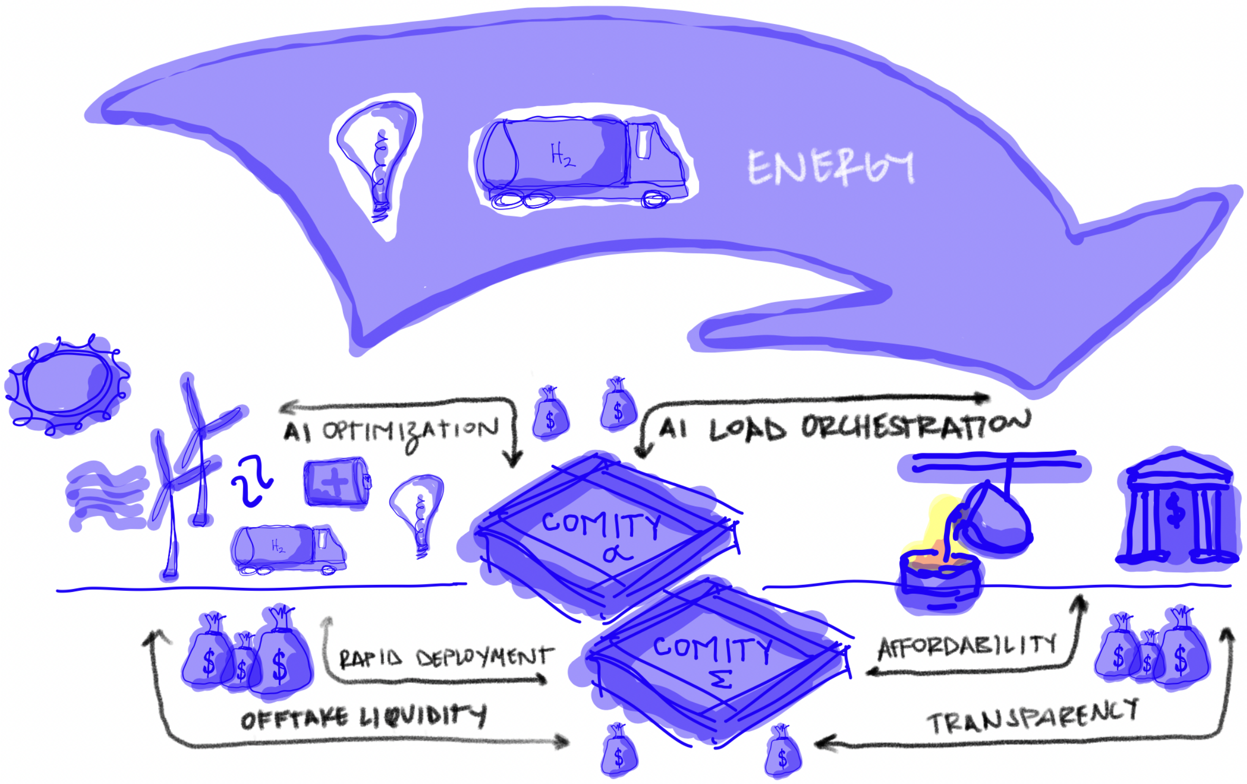
We are building the financial rails for our future energy systems.

In a few years, electrons will *sometimes* be put to work synthesizing other fuels (e.g. hydrogen, methanol) which can be more fungibly stored and transported.

Energy producers will use those e-fuels as inputs themselves, or to create electricity when the economics work [like today's gas or combined-cycle peaker plants do].

Comity increases the flow of energy to those who use it, and increases the capital made available to those who can produce it.



Comity [α] — for ***producers***: AI-optimized *allocation*. for ***consumers***: AI-optimized *consumption*
Comity [Σ] — the leading liquidity platform for financials and industrials to transact energy derivatives

History doesn't repeat itself, but it often rhymes.

Gas has similar network attributes to electric power — it is produced locally and needs to be delivered via roughly fixed throughput; its users expect their burners and machines to deliver power when the switch is flipped. The key difference is that storage for gas is *already* widespread.

Gas prices still have volatility, but much less than electricity, so much less volatility that gas participants maintain extremely liquid forward markets where entities are able to make fungible the distinction between physical and financial counterparties.

This dynamic, where producers and consumers are able to meet financial participants in liquid forward markets creates the conditions under which producers can deploy capital quickly.

Fungibility between energy production and storage will soon shrink energy price volatility, and will create huge markets for energy where many more financial participants than today are happy to share in the risk of operating entities producing and consuming energy.

Because debt is so much more abundant than equity, and because new equity dilutes existing equity, large corporations in advanced economies are built on *leverage:* the correct allocation and tranching of equity-like risk and debt-like risk to grow. Corporations tend to earn returns to their equity via (massive) scale.

Importantly, the use of leverage necessitates consistent net operating margin. A highly levered entity can burst with fairly little perturbation. An important way to maintain consistent operating margin is to offload the volatility of input prices (or revenues).

Capital markets assist in eliminating price and revenue volatility for operating entities so that those operating entities can access the debt necessary to scale. That is, *to access the leverage necessary to create returns to equity*.

Energy producers, deliverers, and heavy users are no different than other corporations. Indeed, they are voracious buyers of volatility protection.

Over the next 10 years, we will facilitate trillions of dollars to flow through primary participants in the energy transition. We'll reap the economic surplus we generate from reducing cost of capital to energy participants in the form of huge enterprise value.

▼ Learn about electricity markets

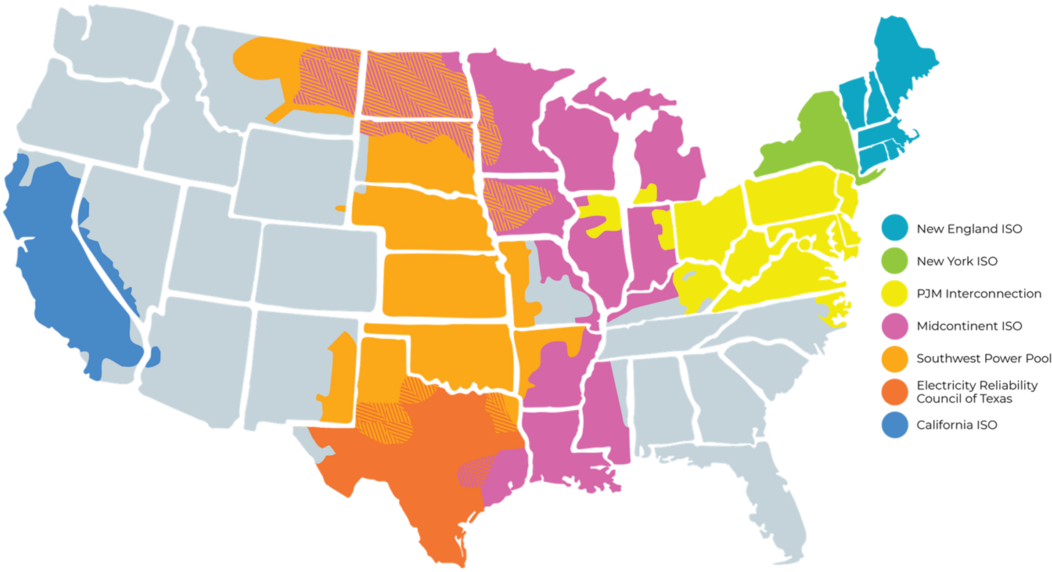
Independent System Operators (ISOs) convene the power markets for ~65% of Americans

In 1996, the Federal Energy Regulatory Commission (FERC) issued Order No. 888, creating the Independent System Operator (ISO) system for wholesale energy markets in the US. Prior to the creation of ISOs, utility companies were often vertically integrated and controlled generation, transmission, and retail pricing. This created local monopolies and high energy prices.

The ISO system creates unregulated wholesale markets overseen by an independent administrator. This promotes competition and makes it easier for new entrants to participate in the market, which yields lower prices for consumers.

Each ISO’s mandate is to operate a reliable, safe electrical grid and to keep energy costs as low as possible. There are seven ISOs in the US:

- California Independent System Operator (CAISO): California and portions of Nevada
- Electric Reliability Council of Texas (ERCOT: Texas
- Independent System Operator - New England (ISO-NE): New England
- Midcontinent Independent System Operator (MISO): 15 states in the midwest and the south
- New York Independent System Operator (NYISO): New York
- Pennsylvania, Jersey, Maryland Interconnection (PJM): 13 states in the east and DC
- Southwest Power Pool (SPP): 14 states from North Dakota to Texas



US Energy Markets, by region. RTO/ISO markets are: CAISO, ERCOT, SPP, MISO, PJM, NYISO, ISO-NE

US electricity markets

Deregulated wholesale electricity markets generally operate with a two-settlement mechanism that consists of a real-time (RT) and day-ahead (DA) market. In both markets, generators (power plants) and suppliers (utilities companies) make supply and demand bids to deliver or consume power at a particular location (i.e. node on the electrical grid) and time interval. The RT market accepts bids on a rolling basis for immediate delivery, while the DA market accepts bids during a fixed time window each day for each hour of the following day. The markets also allow for purely financial participation via virtual bidding, in which participants—such as Equilibrium, DC Energy, Gridmatic, and Gaiascope—arbitrage price differences across the RT and DA markets at a particular location. These bids are either virtual supply bids (INCs), with which power is sold in the DA market and purchased in the RT market, or virtual demand bids (DECs), with which power is purchased in the DA market and sold in the RT market.

This basic market mechanism also exists for the use of transmission lines, and are named variously across markets [e.g. 'up to congestion', 'point-to-point'].

These market mechanisms exist across time horizons in both the ISO and secondary markets. However, along the forward curve, liquidity and depth are lacking, due to the difficulty of statistically pricing the risk of such positions.

Finally, persistently high bid / ask spreads exist due to the difficulty of forecasting load and prices. 'Virtual bidders' are fundamentally market makers who share in the volatility risk and serve the market by closing it.

Day-ahead and real-time market operations

Determining energy prices

Energy prices are set by reconciling supply and demand with physical limitations of the electric grid.

1. In the past, energy markets used a cost-based pricing system. This set prices based on generator estimates, which incentivized generators to bid up the price. ISOs today use a bid and offer system to run a competitive market and set prices by matching supply quotes and demand bids.

2. The flow of energy along the grid is subject to physical constraints. Transmission lines have a fixed capacity, so energy is often dispatched on "inefficient" routes to meet supply. A portion of energy is also lost as it travels the grid, with larger losses coming over longer distances. It is impossible to perfectly attribute purchased energy to its source. Therefore, ISOs have developed a two-settlement system. Each node on the grid where energy is injected or withdrawn has a locational marginal price (LMP). Generators and buyers are subject to the LMP at their corresponding node.

Market operations

Each day in the day-ahead market (DAM), the ISO matches generation (supply) and load (demand) through a bid process. Power producers (generators) submit price curves indicating how much power they will produce and at what price point. Buyers (load serving entities, LSEs) submit curves indicating how much power they will purchase and at what price. The ISO uses this information to coordinate dispatch and to set localized prices, called locational marginal prices (LMPs), at eligible nodes on the grid. Generators and LSEs who participate in the DAM receive or pay the day-ahead LMP for power they produce or purchase.

In the real-time market, the ISO updates LMPs every five-minutes to match actual demand. They also re-coordinate dispatch schedules to accommodate differences between expected demand set in the DAM and actual demand in the real-time market. Generators and LSEs who participate in the real-time market pay the real-time LMP for power they produce or purchase.

Bid types

Participants like Comity capitalize on daily spreads between the day-ahead and real-time markets using virtual supply (INC), virtual demand (DEC) bids and up-to-congestion (UTC; sometimes called point-to-point [PTP]) positions

- **INC offer.** The bidder sells energy at a specific node at the day-ahead LMP and buys the energy at the same node at the real-time LMP. Profitable if real-time price is less than day-ahead price. High potential exposure as real-time prices can spike to cap of $1,000/MWh in PJM and $5,000/MWh in ERCOT.
- **DEC bid.** The bidder purchases energy at a specific node at the day-ahead LMP and sells the energy at the same node at the real-time LMP. Profitable if real-time price is greater than day-ahead price. Limited downside exposure as lower bound of real-time price is zero.
- **Up-to-congestion bid (UTC)** and **Point-to-point obligation (PTP)**. The bidder takes a position on the congestion price between two nodes (the difference between sink LMP and source LMP). Profitable if real-time congestion is greater than day-ahead congestion forecasts.

Further reading

Grid and market design

1. Today’s Grid and the Evolving System of the Future, National Academies Press (2017)
2. Energy Primer: A Handbook for Energy Market Basics, Federal Energy Regulatory Commission (2020)
3. Electricity Market Design, William Hogan (2021)

Power trading

1. Virtual Bidding and Electricity Market Design, William Hogan (2016)
2. Algorithmic Bidding For Virtual Trading in Electricity Markets, Sevi Baltaoglu (2018)
3. A Data-Driven Convergence Bidding Strategy Based on Reverse Engineering of Market Participants' Performance: A Case of California ISO, Ehsan Samani (2021)