

Electricity generation and sale in open electricity markets in the US

In an open electricity market in the US, an Independent System Operator (ISO) is responsible for coordinating and controlling the electricity grid.¹ Entities that wish to sell power into the grid submit a series of bids to the ISO, each bid indicating exactly where and when on the grid they propose to sell electricity and specifying their minimum price. The ISO will match supply with demand and accept all bids up to a certain market clearing price.² Bids at or below the market clearing price are accepted, which means they are paid out at the full market clearing price and the seller must produce the promised electricity. Bids above the market clearing price are discarded.

In this market, three of Porter's five forces hold little strength. First, the threat of substitutes is very low, as it would be difficult and impractical for a consumer of grid electricity to switch to say, running their own gas generator. Second, the power of sellers is low as each market has many sellers, none with significant market power or a differentiated product. What power sellers do hold is in their ability, if their generating technology allows for it, to choose when and where to sell their electricity. Third, buyers in this market hold essentially no power. This is because the ISO is responsible for setting the market clearing price, so even if buying power is grouped together in a single monopolistic power retailer (e.g., PG&E in Northern California), they hold little power over the price they pay.

Rivalry between existing firms in the electricity generation space is fierce. In the primary electricity market, generators sell an undifferentiated product (electrons on a wire) that for some generators cannot be stored, creating a use-it-or-lose-it situation. Since all generation bids on the market clear at the same market clearing price, each generator submits the lowest bid which will make them money. All bids are eventually made public. The result is generating

¹ [https://en.wikipedia.org/wiki/Regional_transmission_organization_\(North_America\)](https://en.wikipedia.org/wiki/Regional_transmission_organization_(North_America))

² <https://www.iso-ne.com/about/what-we-do/in-depth/how-resources-are-selected-and-prices-are-set>

companies invest heavily into process and cost optimization, as in the short term it is often the only way to increase profits.

The threat of new entrants into the market is significant. New entrants threaten existing companies primarily by employing a new technology to lower production costs. For example, a new entrant may assemble a solar array where they see both 1) favorable environmental conditions (i.e., lots of sun) and 2) a high market clearing price on the grid. That new solar array, while requiring a large, fixed investment to construct, enjoys nearly zero marginal cost for electricity generation and cannot on its own store power, and thus submits generation bids to the ISO of exceedingly low prices. Traditional fuel-based generators can't directly compete with these prices, and thus must adjust their strategy and tactics accordingly (e.g., produce and sell electricity when the sun isn't shining.)