Wholesale Electricity Markets

ISO new england

Why Markets?

Markets are designed to promote competition among providers of goods and services, leading to innovation and efficiency in the way products are priced, produced, and delivered. In 1999, the electric power industry was restructured in New England to create wholesale markets to introduce competition and revolutionize the way electricity is bought, sold, generated, transmitted, developed, and even used.

Today, the region has an interrelated suite of competitive wholesale markets that work together to ensure the constant availability of electricity for New England's 6.5 million households and businesses. Nearly 400 market participants complete approximately $10 billion of wholesale electricity transactions annually.

ROBUST MARKETS

In a relatively short time, New England's electricity markets unleashed creative forces that have resulted in a more reliable, cost-effective, and environmentally-friendly power system.

New England's wholesale markets play a central role in encouraging the development of traditional and nontraditional bulk power system resources. The markets are providing accurate price signals for participants to make informed decisions regarding investment in new power plants to significantly increase supply and new high-voltage transmission lines to move power across the region more efficiently. These improvements have helped keep the system running smoothly despite record-high consumer demand.

Markets are also enabling significant growth and development of power supply resources that run on renewable and low-carbon-emitting fuels. Wind and biomass make up a growing portion of projects proposed for development in the region.

In addition, New England is the first region in the country to allow a reduction in demand to serve as a "resource" and bid in the wholesale markets in competition with power plants. These demand-side resources lessen the need to build expensive new infrastructure and help achieve environmental goals.

As the markets spur advancement of these alternative resources, ISO New England is supporting new "Smart Grid" technologies to keep in step with the 21st-century developments. Technological innovations, stimulated by markets, are resulting in more efficient power system operations and more coordinated system management among regions throughout the Northeast.

The combined impact on wholesale prices of new investment and technological advancement has been positive. Factoring out the impact of historically high prices of natural gas and oil, which fuel roughly 60% of the region's power plants, wholesale prices have remained steady in the face of rising demand and the costs of meeting environmental standards.

Factors Affecting the Market

The balance of supply and demand and the cost to produce power essentially determine wholesale electricity prices. The cost of fuel is the most important factor in the price of wholesale electricity. Since most power plants in New England operate on natural gas or oil, the price of electricity is tied to the price of those two fuels. How much supply is available depends on how many plants are able to operate on any given day, the availability of the fuels they use to produce electricity, and the efficiency of the transmission system. Demand is driven by weather, time of day, and economic activity.

History and Development of Markets

Competitive wholesale markets were introduced in the 1990s primarily in areas of the country that historically experienced high electricity prices. This was true in New England, which lacks indigenous sources of coal, oil, and natural gas.

Five of the six New England state legislatures approved restructuring laws that established a framework for retail competition. These laws required utilities to sell off their power plants, thus separating the ownership of their generation and transmission assets. Federal rules required transmission owners to provide all electricity suppliers with open, nondiscriminatory access to their lines to enable competition. While the federal government regulated the wholesale side of the industry, the states maintained regulatory oversight of retail purchases and sales.

The decision to create a system operator that was financially independent from market participants and could take on the role of an autonomous market administrator was made jointly by New England's electric power companies and its state regulators. ISO New England began operation in July 1997 with the support of the New England Conference of Public Utilities Commissioners (NECPUC) and the New England Power Pool (NEPOOL), the regional group of private and municipal utilities that worked together to ensure a dependable supply of electricity before the ISO took on that role.

ISO New England's role and responsibilities are clearly defined. In addition to overseeing the fair administration of the wholesale electricity markets, the ISO operates the bulk power generation and transmission system and manages a comprehensive, regional planning process that involves all stakeholders. ISO New England's independence ensures that its decisions are unbiased and are always made in the interest of ensuring a reliable and efficient supply of electricity.

INTRODUCTION OF WHOLESALE MARKETS

Two years after its formation, ISO New England introduced wholesale electricity markets beginning with a single pricing system. This market was a stepping stone to a more sophisticated market design. A single pricing system, in which wholesale prices were the same in Connecticut as in New Hampshire, masked power system inefficiencies, such as the additional cost of serving congested areas.

ISO New England implemented redesigned markets in 2003, which included a number of improvements to encourage the development of new products and services, trigger demand-side participation, and promote cost-effective ways of producing and delivering electricity. The revised markets established eight different wholesale pricing zones to more accurately reflect the cost of producing and delivering electricity across the grid. Locational pricing has since guided the development of power system resources in areas that need these resources the most—which helps maintain regional reliability and increase power system efficiency.

WHO PARTICIPATES

Nearly 400 companies now participate in New England's wholesale electricity markets—more than double the number that existed when the markets first opened. Most market participants are members of NEPOOL, whose members represent six industry sectors: generation, transmission, supplier, publicly-owned, end-users, and alternative resources.

STAKEHOLDER COLLABORATION

ISO New England's collaborates closely with NEPOOL, state regulators who form NECPUC, and other public officials to develop the rules and procedures that guide the wholesale electricity marketplace.

The electricity system and the challenges the industry faces are complex and continuously changing. Through ongoing, transparent collaboration, all viewpoints and options are considered in creating and improving the markets.

Market Monitoring

The ISO relies on two independent market monitoring units—one internal, one external—to quickly detect and mitigate anti-competitive market behavior or outcomes. Every year, ISO New England's independent market monitors prepare reports that review market results and offer insight into the markets' competitiveness and effectiveness, as well as areas of market design and operation that need enhancement or improvement.

Market Products and Services

Carefully designed markets are fundamental to ensuring that the region's 14 million residents have the electricity they need in their daily lives. These wholesale electricity market products and services help develop a bulk power system that is reliable, economical, and environmentally sound.

ENERGY MARKET

The Energy Market is the foundation of the region's wholesale electricity markets. It includes several core components.

Day-Ahead and Real-Time Markets are run to coordinate the commitment and dispatch of generation and demand resources and facilitate electric energy trading. Power plant offers to sell electricity are ranked by price. One by one, the lowest-priced plants are selected, accounting for transmission constraints and potential outages, until enough supply is committed to meet demand. The last plant chosen sets the wholesale "clearing" price. All producers that offer their resources at or below the clearing price are scheduled to operate and earn the clearing price for their production. Those that offer too high are not selected to run, creating a built-in incentive not to overbid. Having a Day-Ahead Market allows market participants to secure prices the day before the operating day and hedge against price fluctuations that can occur in real time.

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Locational Marginal Pricing sets prices for wholesale electricity at 900 points, or nodes, on the bulk power grid. The "nodal" prices are then averaged into eight pricing zones. Suppliers are paid nodal prices, and demand pays zonal prices. The price is based on the cost to produce the electric energy, the cost to deliver it (i.e., transmission congestion costs), and line losses. Revealing the costs of these three elements for each region of the system points to where either power system infrastructure is needed or where other measures can be taken to reduce costs, such as conservation or increased demand response. Areas that experience higher prices attract new generation, transmission, and demand-side investment.

Financial Transmission Rights and Auction Revenue Rights are risk management tools that allow market participants to hedge against the impacts of differentials in locational marginal prices, including transmission congestion costs.

ANCILLARY SERVICES MARKETS

Ancillary services act as an insurance policy against the unforeseen loss of a major power plant or transmission line. In addition, they help balance the flow of electricity minute-to-minute.

Forward and Real-Time Operating Reserves ensure that sufficient resources are held in "reserve" and are available to produce electricity on short notice when an outage or another problem occurs. Since electricity cannot be stored, these resources are especially valuable during peak-demand periods. These markets also allow certain demand-side resources to provide reserves by reducing their electricity use when called on by the ISO. The Forward Reserve Market also incorporates a locational component in the price of reserve power to encourage investment in quick-start and demand-response resources located close to heavy demand centers.

Regulation allows the ISO to instruct specific power plants to increase or decrease output moment-by-moment to balance system frequency, which must always be kept at a constant rate.

Voltage Support allows the system operators to maintain transmission voltages within acceptable limits.

Black-Start Capability is provided by specific power plants at strategic locations and involves restoring generation to restart the transmission system following a systemwide blackout.

CAPACITY MARKET

Capacity markets compensate supply resources and demand resources either for the electricity they are capable of producing if needed—or in the case of demand resources, for the electricity they avoid using—to ensure that enough electricity capacity exists to meet regional reliability requirements.

The **Forward Capacity Market (FCM)** provides efficient long-term signals to direct decisions to invest in new generation and demand resources and to maintain existing resources. ISO New England projects the needs of the power system three years in advance and then holds an annual auction to purchase the right amount of resources. A unique feature of this market allows demand-side resources to participate on an equal footing with power plants to meet supply needs.

Physical & Reliability	Market Tools
Electricity • Day-to-day electric power	**Energy Market** • Day-Ahead Energy Market & Real-Time Energy Market
Power System Reliability • Reserve power • Frequency	**Ancillary Services Market** • Forward Reserve Market • Regulation
Long-Term Resource Adequacy	**Capacity Market** • Forward Capacity Market

About ISO New England

ISO New England is the independent, not-for-profit corporation responsible for providing day-to-day reliable operation of New England's bulk power generation and transmission system, overseeing and ensuring the fair administration of the region's wholesale electricity markets, and managing comprehensive regional bulk power system planning.

Its board of directors and 460 employees have no financial interest in any company doing business in the region's wholesale electricity marketplace. ISO New England serves a six-state region that includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

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