The Value of Markets

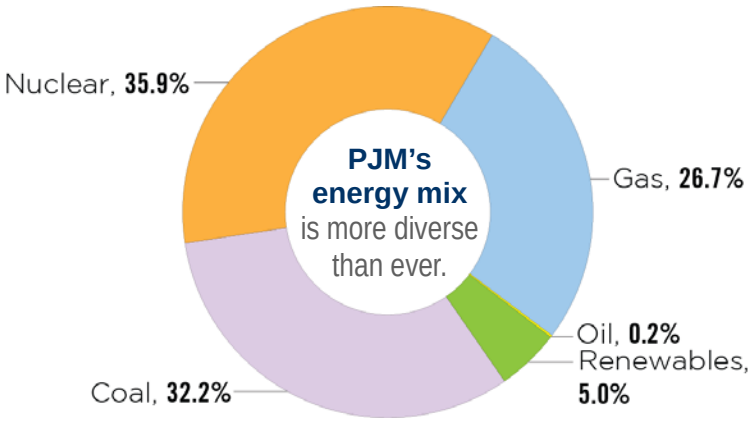
Organized wholesale electricity markets were created to address ever-increasing electricity prices and to encourage innovation through free-enterprise competition.

PJM Interconnection's markets have done just that. Competition has helped to create a less expensive, more reliable and cleaner grid that can offer market-based solutions to changes in public policy and the industry.

The PJM electric grid, serving 65 million people in 13 states and the District of Columbia, is more reliable than ever, encouraging significant private investment in new technology and resulting in decreasing emissions and historically low wholesale electricity prices.

If you want to know how we got here, look no further than the wholesale markets. Thanks to the markets, PJM's grid has strong electricity reserve margins, well in excess of our requirements. The generation mix is significantly more diverse than it was 10 and 20 years ago, and the PJM markets have facilitated an unprecedented technology switch from older, less-efficient generation resources to new, increasingly efficient resources.

2017 PJM Energy by Resource



Owners of some older generators have argued that electricity markets are flawed because their assets cannot compete, and that the replacement of less efficient plants by new, state-of-the-art generators results in a less reliable, less resilient grid. That's just not the case. Markets have resulted in a reliable grid today, and we are taking steps to ensure that it remains that way into the future.

The History of Markets

In the 1990s, federal lawmakers introduced wholesale electricity markets following a period of poor generator performance and escalating prices coupled with rate shocks as high-cost new generating plants came online. PJM established the first wholesale electricity market in the U.S. in 1997.

The wholesale markets were designed to meet short-term and future requirements of operating the electric power system reliably and at the lowest cost.

Federal policymakers saw competition among electricity suppliers as a means to control prices by attracting new sources of private investment for newer, less expensive technologies.

The wholesale markets manage prices by allowing the lowest-cost power source, wherever it is located, to provide electricity to wherever it is needed, over a wide region.

The movement to wholesale markets created the foundation for states to reform their retail electricity markets by opening access to this new supply of electricity at more competitive, and therefore lower, prices. Large regional markets such as PJM have served as a dynamic mechanism to encourage the building of new, less costly power sources while indicating which outmoded resources are no longer viable.

Even fully regulated states benefit from the organized wholesale markets. Utilities located in those states can buy and sell electricity in the markets when they need to or when it makes economic sense. Regulated utilities and states also benefit from the transparency of wholesale market prices – using them as a comparison when making electricity supply investment decisions.

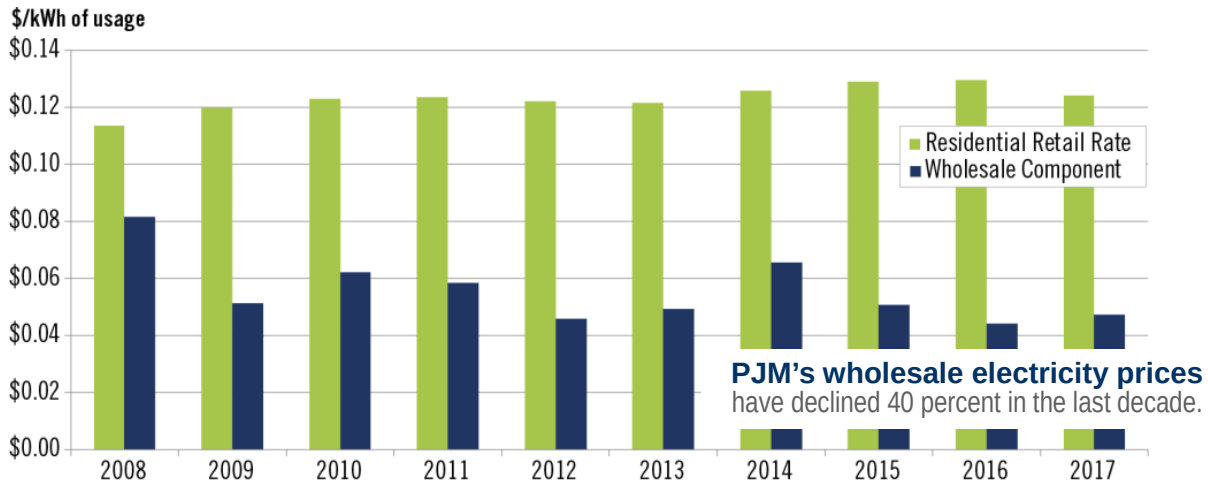
Markets Promote Reliable Systems at the Lowest Cost

Energy market prices signal to generators how much energy to produce and where, at any given time, to ensure the reliable flow of electricity. The pricing system guarantees that the lowest-cost generation option is used. The energy market encourages suppliers and consumers of electricity to buy and sell electricity at prices that are as low as possible while still ensuring reliability.

Markets also ensure reliability for the future. The PJM capacity market secures electricity to meet consumers' needs three years in advance. The capacity market has attracted sufficient investment in new generators to meet future needs. Through 2022, PJM has procured 21 percent higher reserves than the expected peak electricity demand.

The PJM markets help save consumers at least $2.3 billion a year by integrating more efficient resources, ensuring the lowest production costs, and reducing the need for reserves by drawing from a wide pool. Wholesale electricity prices are lower than they've ever been, hitting a historical low in 2016 and remaining slightly above that level in 2017. From 2008 to 2017, wholesale electricity prices in PJM fell by *more than 40 percent.* In the chart below, the average PJM wholesale rate includes both the cost to supply electricity and the cost of transmitting it. The residential retail rate is a weighted average across PJM. The wholesale markets have allowed customers to benefit from both falling natural gas prices and competition among generators vying for new entry.

PJM Wholesale Rates 2008–2017



Markets Drive Investment Without Consumer Risk

Markets are the most powerful tool for attracting investment in new generation and new technology at the least cost.

From 2010 to 2017, PJM saw a drastic technology shift. Nearly 27,000 megawatts of PJM's oldest generators, averaging 46 years, retired from the system. They were replaced by more than 32,000 megawatts of new, more efficient, lower-emission generation such as gas turbines, wind and solar.

Such a significant technology transition in a short period of time risks energy shortfalls or sharp price increases. Markets drove an orderly changeover, with no effect on reliability, keeping an ample supply at historically low market prices.

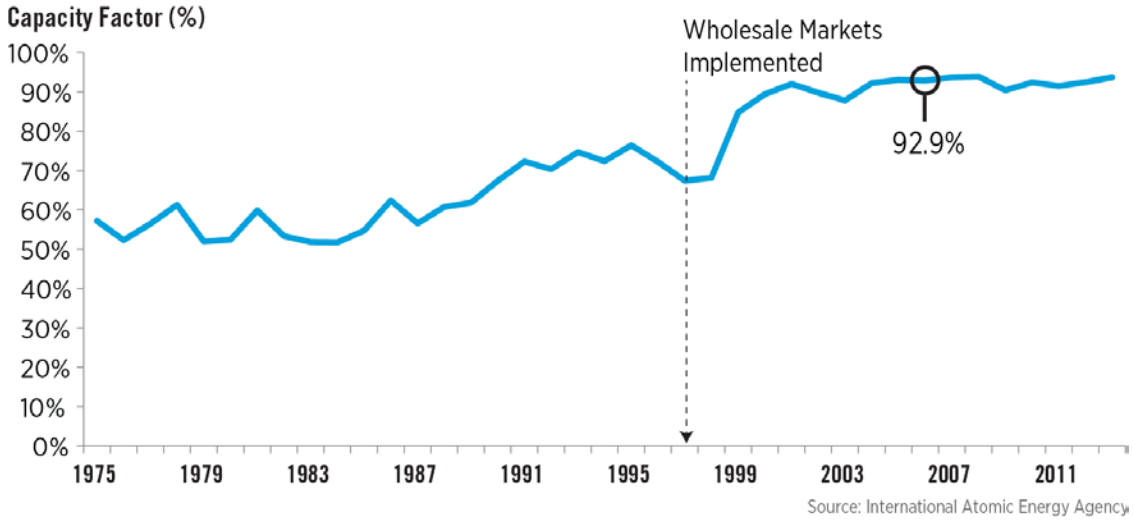
This influx of new generation has been largely paid for by private investment rather than consumers. These investors, not ratepayers, bear the financial risk of this technology transition.

Markets Improve Generator Performance

In addition to driving a more cost-effective fleet of generators through new investment, markets have incented existing generators to operate more efficiently. Generators are paid when they produce electricity; therefore, they are incentivized to operate to the limits of their capabilities. If they cannot operate at that level, they lose the opportunity to earn revenue. Since the introduction of wholesale markets, generator performance has improved substantially, resulting in lower costs and better reliability for consumers.

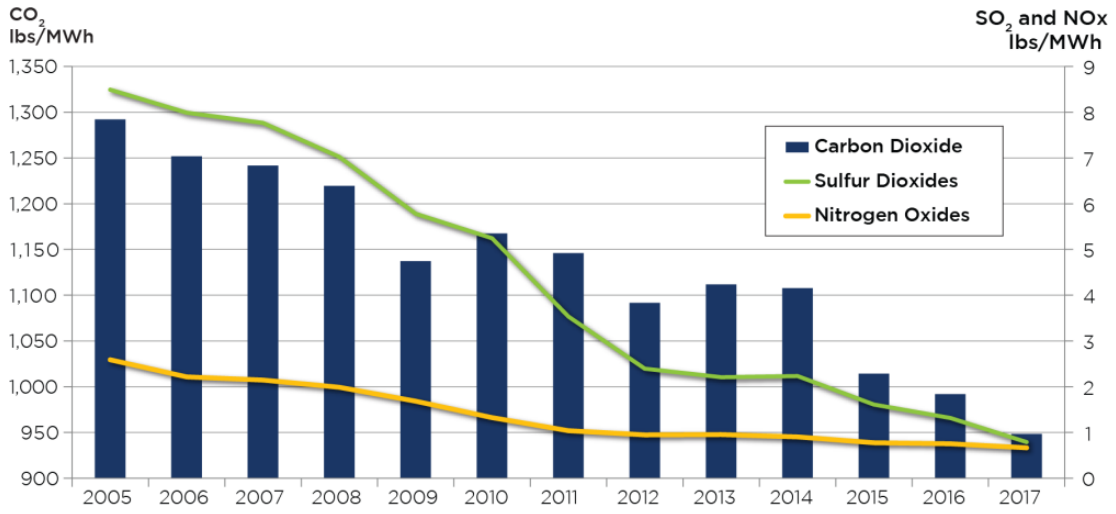
By way of example, it is in the era of competitive markets that nuclear power has built its reputation as a reliable source of available power. Across the present-day PJM fleet alone, nuclear units increased their annual operational availability by nearly 20 percent. In a nuclear-rich state like Pennsylvania, this improvement to the state's fleet alone is the equivalent of adding one new nuclear reactor – or 14,000 megawatts of new wind capacity.

PJM Nuclear Fleet (1975–2013)



Markets Have Driven Lower Emissions

New technologies tend to improve efficiency, and PJM's current generation mix is 30 percent less carbon-intensive than 10 years ago. On average, producing one megawatt of power in PJM emits 13 percent less carbon dioxide than it did 10 years ago. This reduction has come at zero additional cost to consumers. Emissions reductions are largely the result of the competitive markets encouraging the free entry of new, competing technologies.



Markets Support the Economy

The area served by PJM accounts for 21 percent of the U.S. gross domestic product. Thus affordable wholesale electricity prices have an outsized impact on the economic productivity of our region and the nation.

States that have elected to rely on market forces to stimulate the entry and exit of generators have cultivated some of the most attractive environments for new resource development and investment in the U.S. For example, the top three states in PJM with generation projects under consideration are Ohio (20,000+ MW), Pennsylvania (18,000+ MW) and the PJM portion of northern Illinois (15,000+ MW). This is no accident. Policies have enabled these states to nurture a vibrant market for generator development that attracts billions of dollars of private investment – more than $17 billion in Ohio and Pennsylvania alone.

*"Policies have enabled these states to nurture a vibrant market for generator development that attracts billions of dollars of private investment – **more than $17 billion in Ohio and Pennsylvania alone**."*

Markets Can Adapt and Offer Solutions

As the energy industry continues to evolve, competitive markets are still the best way to keep the grid reliable and to increase its resilience. The markets have the proven ability to address actual issues of reliability. After 22 percent of generators failed to perform during the 2014 polar vortex, PJM instituted a system of market penalties that has improved reliability, as evidenced by the grid's performance during the winter's cold snap in late December 2017 into early January 2018.

But now the markets that have been a catalyst for this strong and consumer-friendly system are threatened by state subsidies and federal directives to save aging, less competitive plants. Not only are such interventions unnecessary, they are likely to roll back the progress and stability that the markets have facilitated. They will damage the markets and cost consumers at least $3.8 billion, according to the independent market monitor who oversees PJM's market operations.

It is widely acknowledged that PJM's grid is reliable, and will continue to be years into the future without government intervention. But we have also acknowledged the concerns raised by officials and regulators about the grid's long-term resilience, should natural gas and renewable generation continue to replace coal and nuclear generation. We believe this concern raises reasonable questions about fuel supply security, In May 2018, PJM announced a plan to analyze a specific component of resilience – fuel supply security – to determine the degree of risk to the grid from potential fuel supply interruptions. We will determine whether certain generators are less exposed to fuel supply risks than other generators, place a value on that attribute, and let generators compete to meet those fuel-security criteria. These attributes could include dependability of delivery by pipeline, barge or rail, on-site fuel storage or dual-fuel capacity.

The PJM markets can provide excellent, fuel-neutral tools to value fuel security attributes.

The system did not always work as well as it does today. Not so long ago, before wholesale competition, consumers needed relief from electricity rate shocks. Wholesale markets delivered that relief and then some, helping to lower energy costs while making the grid more reliable. We shouldn't turn our back on this progress. The markets are working, and it's imperative we keep it that way.