

THE NEW YORK ISO ANNUAL GRID & MARKETS REPORT

Reliability and a Greener Grid

Power Trends 2019

EXECUTIVE BRIEF

Meeting policy goals while maintaining reliability

The New York Independent System Operator (NYISO) stands on the cusp of the next evolution of the electric power system. New technologies, such as storage, solar, and Distributed Energy Resources (DERs) are entering the wholesale markets. New wind projects, including offshore projects, are being proposed. New environmental standards will likely cause resources that have been part of the generation fleet for decades to retire.

Policymakers are seeking aggressive clean energy goals and calling for as much of 100% of energy consumed by New Yorkers to come from carbon-neutral resources by 2040. Additional policy initiatives have been proposed to expand the integration of new technologies, such as energy storage, while other policies have

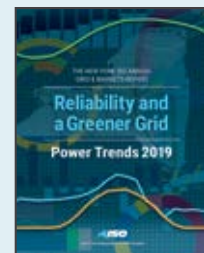
implications for the continued operation of “peaking” generators that have traditionally served to maintain system reliability in downstate regions at times of high electricity demand.

There is no historical precedent for the ambitious changes on the bulk power system envisioned by policymakers. Complicating achievement of these goals is the fact that these changes must be pursued in the context of a bulk power system that operates to the strictest reliability rules in the nation. **The NYISO believes that competitive wholesale electricity markets remain central to facilitating the accelerated changes policymakers have proposed in a way that will support system reliability and economic efficiency.**

Power Trends 2019 explores ...

- **The state of the grid.** Emerging trends and environmental standards are reshaping the way the power system as a whole is used. These resources, such as solar and DER, blur traditional lines for how energy is produced and consumed. Our history has demonstrated that competitive markets are well equipped to address the rapidly evolving grid of the future.
- **Achieving public policy goals.** Twenty years of experience running our wholesale energy markets proves their ability to support public policy objectives. We are proposing to use our markets to incorporate carbon pricing to create incentives for generator emissions improvements and more wind power, solar power and other zero-emitting resources.
- **Making policy work.** Due to upstate/downstate transmission limitations, investments in upstate renewables run the risk of diminishing returns. Nearly 90% of upstate’s energy is already produced from carbon-free resources. Transmission investment and state policies that rely on competitive wholesale markets could more efficiently meet the state’s energy goals and promote a more balanced and reliable resource mix.
- **Building the grid of the future.** The NYISO expects evolving environmental regulations and renewable energy goals to accelerate the transition from higher-emitting generation to lower-emitting resources. These changes have numerous impacts that we continue to study through our planning processes, fuel security assessments, and other initiatives.

Get the full report



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Power Trends 2019

Annual grid and markets report produced by the New York ISO.

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www.nyiso.com/power-trends

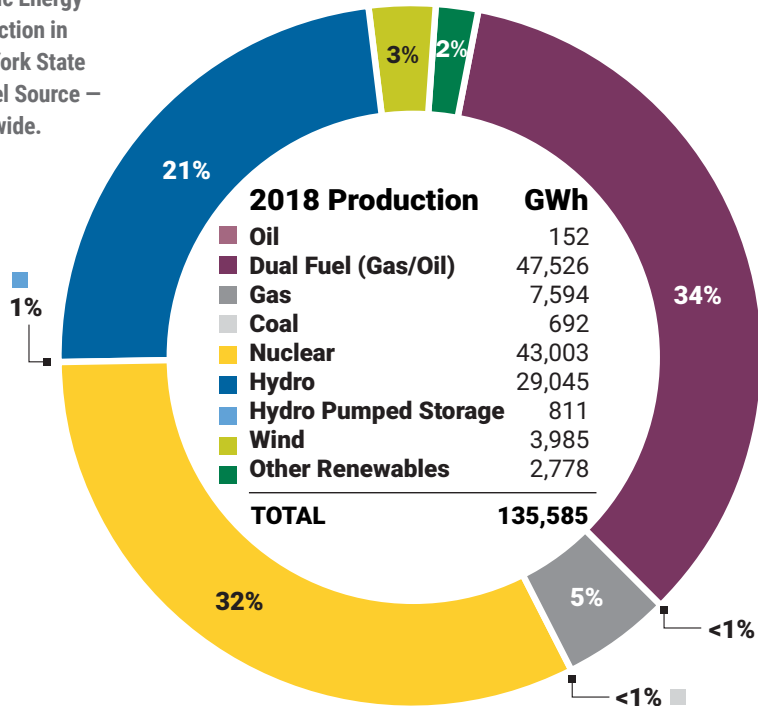


New York Independent System Operator

Resource diversity & fuel mix

Fuel mix affects both the reliability of the electric system and the price of power. A balanced array of resources enables the electric system to better address issues such as price volatility, fuel availability, and requirements of public policy.

Figure 16: 2018 Electric Energy Production in New York State by Fuel Source – Statewide.



The ability to dispatch resources to reliably meet ever-changing grid conditions will always be paramount

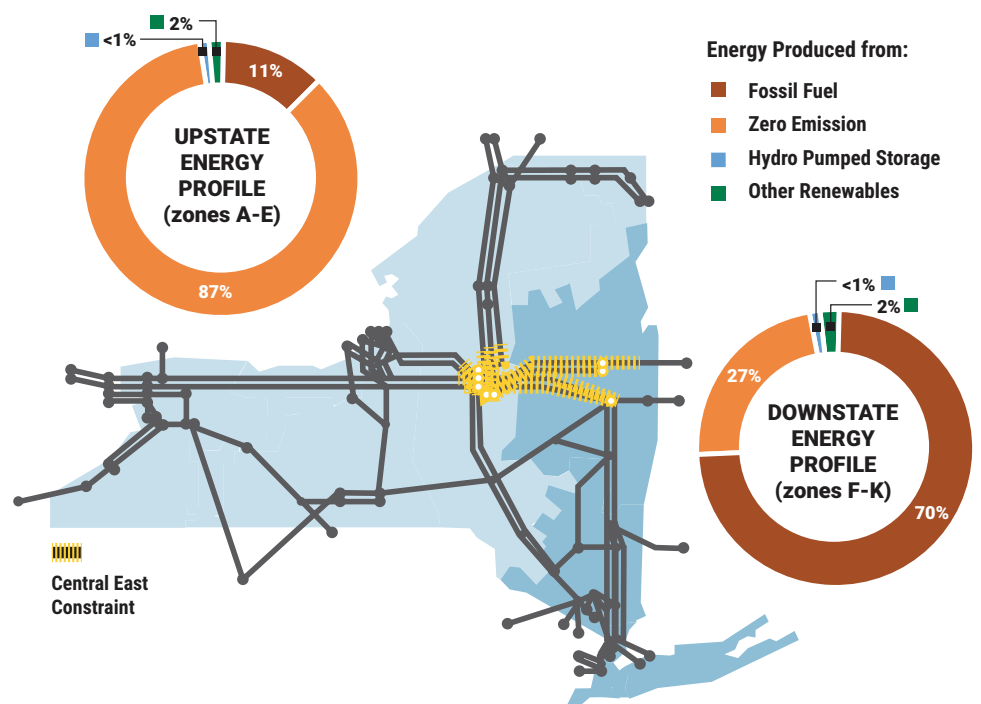
Generating capabilities overall have shifted considerably from 2000 to 2019:

- Coal declined from 11% to 2%
- Natural gas and dual-fuel grew from 47% to 59%
- Oil dropped from 11% to 6%
- Wind grew from near-zero to 4.5%
- Hydro and pumped storage dropped from 15% to 14%
- Nuclear stayed at 14%

The 'Tale of Two Grids'

From a statewide perspective, New York has a relatively diverse mix of generation resources. However, New York's bulk power system is characterized by stark regional differences.

Without market-based incentives for investment in renewable resources and a more robust transmission system to move power to load, state policies could promote a resource mix where new renewable resources increasingly displace the output from existing renewable or other zero-emitting resources.



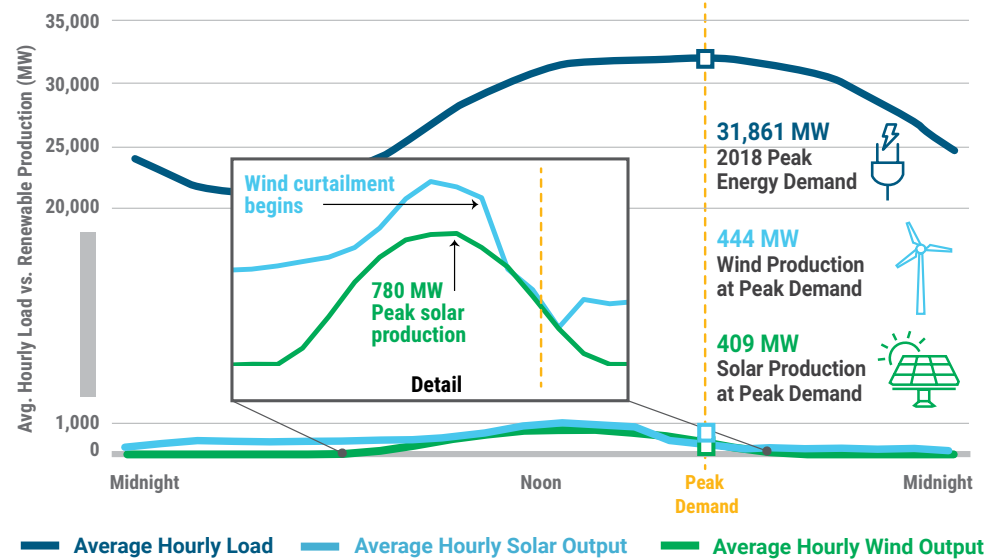
CASE STUDY: Renewable contribution & Intermittency at peak demand

August 29, 2018:

This peak demand day illustrates the challenge of reliably integrating intermittent resources to supply the system under high-demand conditions.

Wind production was robust during much of the day, increasing from about 400 MW at midnight to nearly 1,100 MW by noon. Solar resources grew to 780 MW just after noon.

Figure 18: Intermittent Resource Contribution to Load on 2018 Peak Demand Day (August 29)



The issue: Like most summer days, peak demand was not reached until 4 p.m. By then, transmission constraints required that wind production be curtailed to 444 MW. Solar declined by 48% from its peak, contributing only 409 MW as peak demand reached 31,861 MW.

Filling the gap: Production from natural gas and dual-fuel resources increased to meet growing demand as production from intermittent resources declined. Improved transmission, to unbundle upstate renewable supply will continue to be paramount. Battery storage can also play an important role in meeting peak demand.

A history of lowered costs & reduced emissions

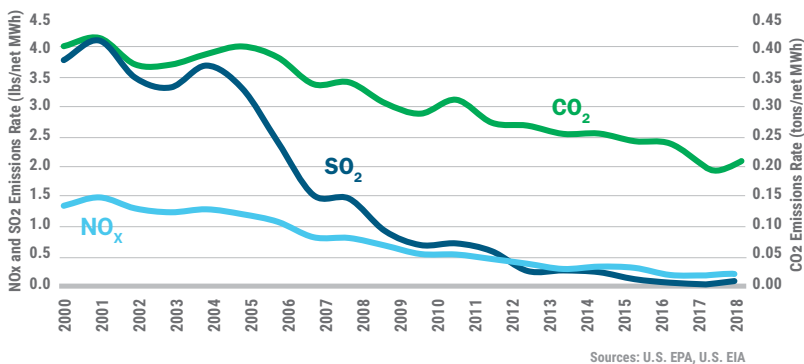
For 20 years, the NYISO's markets have resulted in a more efficient grid and continue to support a shift toward cleaner sources of generation. This has occurred while also meeting the nation's most stringent reliability rules.

23%

lower power costs in 2018 since the NYISO markets were launched in 2000



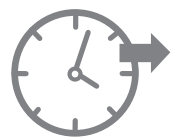
Figure 22: Emissions Rates from Electric Generation in New York: 2000-2018



Every 5 minutes 24/7, 365

Electricity in New York is bought and sold through wholesale energy markets.

▪ **Energy Markets:** Provide day-ahead and real-time commitments to meet load.



▪ **Ancillary Services:** Every six seconds resources compete to respond to changing system needs.



▪ **Capacity Markets:** Ensure enough generation to meet peak demand and encourage generators to invest in new technology and deactivate outdated resources.



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www.nyiso.com/power-trends

Making policy work

While the implications of climate change are being debated in our nation's capital and in state capitals like Albany, the physical needs associated with maintaining bulk power system reliability must be fully understood and at the core of effective policymaking decisions.

For 20 years, the NYISO's competitive wholesale markets, bulk power system operations, and comprehensive system planning processes have played a central role in transforming the energy landscape in New York.

Underlying all NYISO processes has been the belief that open, competitive markets for wholesale electricity result in the most efficient allocation of resources and serve New Yorkers best by minimizing the costs of producing the energy they need.

Through engagement with policymakers, regulators, and stakeholders, the NYISO intends to develop the innovative market products and planning tools designed to address the needs of the grid of the future.

“Accelerating this transformation won't be easy: the U.S. energy system has considerable inertia and risk aversion, since the industry is highly capitalized and must provide essential services all the time.

This creates an inherent tension between the energy incumbents and the technology disruptors that must instead be harnessed to advance innovation, with incumbents and disruptors each playing an essential role.”

— Former U.S. Energy Secretary Ernest Moniz, speaking to the U.S. Senate Energy & Natural Resources Committee, Feb. 2019

How the NYISO is addressing a changing grid

- **Carbon pricing.** A proposal to integrate a “social cost of carbon” into our wholesale markets to better align our markets with state goals for clean energy development and reduced CO₂ emissions.
- **Ancillary services & reserve enhancements.** Initiatives to improve resource flexibility to balance the intermittent nature of solar and wind power and sustain grid reliability.
- **Integrating new technologies.** New market rules to expand the participation of Energy Storage Resources (ESRs) and Distributed Energy Resources (DERs) in wholesale energy markets.
- **Behind-the-meter (BTM) solar.** New processes to reflect the effects of BTM solar resources on energy forecasts used in wholesale markets and grid operations.
- **Enhancing fuel security.** Evaluation of vulnerabilities including extreme weather; and development of recommendations for market, planning and operational enhancements.

About the New York Independent System Operator



Independent and transparent, we reliably manage NY's power grid and wholesale energy markets and direct the flow of energy over 11,000 miles of transmission.

Our Mission

- ✓ **Maintaining** and enhancing regional reliability
- \$ **Operating** open, fair and competitive wholesale electricity markets
- 🗺️ **Planning** the power system for the future
- 🔍 **Providing** factual information to policymakers, stakeholders and investors in the power system