POWERING NEW YORK—*RESPONSIBLY*

How New Yorkers have saved hundreds of millions in energy costs since 2000.

To keep the lights on, the New York Independent System Operator manages the flow of electricity across New York so it's produced and transported to your utility in exactly the right amount at exactly the right time.

Similar to the way air traffic controllers coordinate takeoffs and landings, we balance the supply and demand for electricity throughout the state.

To provide the lowest-cost power available to reliably meet consumer needs, we conduct and monitor competitive auctions of wholesale electricity every five minutes, every day of the year.

Since the inception of New York's competitive market...

NYISO has achieved

- **$6.4 billion** in reduced fuel costs due to system efficiency improvements that exceeded national efficiency gains by **300%**
- **$540 million** in savings from reduced reserve requirements
- **25 million tons** of carbon emissions avoided in 2013 versus 1999
- Integrated enough wind generation to power **490,000** homes each year

Overview

After many decades of buying electricity from utilities that produced and delivered electricity to their customers, New York's 19 million consumers today enjoy powerful and under-appreciated benefits made possible by New York's bold decision to reinvent the state's energy marketplace.

The market transformation dates back to the mid 1990s, when federal and state policymakers revolutionized New York's approach to buying and selling electricity. With little fanfare, the change, which sought to make New York's energy markets more competitive and efficient, has produced significant benefits, including:

- **$6.4 billion** in fuel cost savings due to increases in electricity generation efficiency from 2000 through 2013.
- **$540 million** saved due to reduced reserve requirements.
- Nearly **25 million tons of carbon emissions** avoided in 2013 compared to 1999—a 41 percent reduction equivalent to taking 4.8 million passenger vehicles off the road.
- 2013 electricity commodity costs are **only 2 percent higher** than electricity commodity costs in 2000, while inflation grew by more than **35 percent** over that same time frame.
- Electricity generated by **wind power** in New York increased from 103 gigawatt-hours in 2003 to 3,541 gigawatt-hours in 2013, enough electricity to power **490,000 New York homes** each year.

These gains reflect New York's 15-year-old commitment to competitive electricity markets that produce real benefits to consumers, the environment, and the economy. Through competition, New York State is achieving its goals of cleaner energy, improved efficiencies, and economic development.

The New York Independent System Operator (NYISO) is an independent and not-for-profit organization that manages the flow of electricity across New York so it is produced and transported where it is needed in exactly the right amount at exactly the right time.

The NYISO balances the supply and demand for electricity throughout the state. To provide the lowest-cost power available to reliably meet consumer needs, we conduct and monitor competitive auctions of wholesale electricity every five minutes, every day of the year.

Just as air traffic controllers coordinate takeoffs and landings...

NYISO balances the physical supply and demand for electricity throughout the state every six seconds.

We conduct and monitor competitive auctions of wholesale electricity every five minutes, every day of the year, to reliably and economically meet consumer needs.

How New York's market shift made NYISO necessary

Before 2000, electric utilities both generated and delivered most of New York's electricity to homes and businesses. In the competitive market, utilities have sold most of their generators while retaining primary responsibility for transmission and delivery. Electricity producers, which had previously received predictable revenues embedded in utility rates regulated by the state, now compete for revenues in an open market.

New York created the NYISO to design, deploy, administer, and monitor New York's new wholesale electricity markets. The NYISO evolved from the New York Power Pool, which had been managing New York's transmission grid for 30 years prior to forming the new market structure.

The NYISO mission is, in collaboration with its stakeholders, to serve the public interest and provide benefit to consumers by:

- Maintaining and enhancing regional reliability;
- Operating open, fair, and competitive wholesale electricity markets;
- Planning the power system for the future; and
- Providing factual information to policymakers, stakeholders, and investors in the power system.

The NYISO: A Snapshot

New York's Independent System Operator is one of nine such organizations in North America, which in total serve two-thirds of electricity consumers in the United States and more than half of Canada's. The NYISO, and its predecessor, have operated New York's high-voltage power grid since 1970 and assumed responsibility for designing, administering, and monitoring New York's wholesale electricity markets in 1999. It is also responsible for bulk electric system planning, which includes publishing 10-year forecasts of power demands and the need for resources to help New York meet its future energy needs.

The NYISO works with electricity generators, utilities, and other suppliers to balance the supply of electricity from hundreds of generators with demand for that electricity from millions of New York residents, businesses, and communities. Because New Yorkers' energy needs change constantly, the NYISO must constantly monitor, evaluate, and respond to fluctuations in supply and demand as it manages the flow of power on the grid statewide.

Every day, NYISO receives offers from energy producers to sell electricity. After balancing those offers with projections of consumer demand, the NYISO makes decisions designed to supply power to all parts of the state in the most efficient and cost-effective manner possible within the physical limits of the bulk power system.

GENERATE

Electricity is produced by local power plants.

TRANSFORM

Transformers ramp up electricity to high voltage to be transmitted.

TRANSMIT

High-voltage power lines move electricity through the grid.

TRANSFORM

Transformers lower the voltage for use in homes and businesses.

DISTRIBUTE

Electricity moves to low-voltage distribution lines run by local utilities.

CONSUME

Electricity is delivered via local utilities to consumers.

The best way to explore the impact of the NYISO is to review how some of its features have created specific, measurable benefits for New York's 19 million consumers, while being subject to the most demanding reliability standards in the nation.

An unsurpassed reliability record

The NYISO operates New York's high-voltage transmission grid to the nation's strictest set of reliability standards, which include nearly 1,000 requirements designed to promote reliability for New York's consumers. These requirements are established and enforced on a North America-wide basis, a Northeast-regional basis, and on a New York State–specific basis with regulators at the Federal Energy Regulatory Commission and New York State Public Service Commission monitoring the NYISO's compliance.

The NYISO has unfailingly delivered reliable grid operations for all New Yorkers. In its history of operating the transmission grid, independent audits have found the NYISO to be in full compliance with all reliability requirements. And when the 2003 Northeast Blackout occurred—initiated by events beyond New York's borders—the NYISO played a key role in restoring electricity service as quickly as possible to those New Yorkers impacted by the outage.

Operating under the nation's strictest reliability standards, the NYISO complies with nearly 1,000 unique reliability requirements to deliver reliable transmission service to all New Yorkers.

Increased fuel efficiency

Before New York restructured its energy markets, its electric industry was composed of electric utility companies and power authorities—each with a monopoly in its respective service area. As New York launched competition, private power producers, energy retailers and service providers, and others began entering the market. Today, more than 400 organizations participate in NYISO markets. This abundance of players has increased competition, and more competition creates more efficiency.

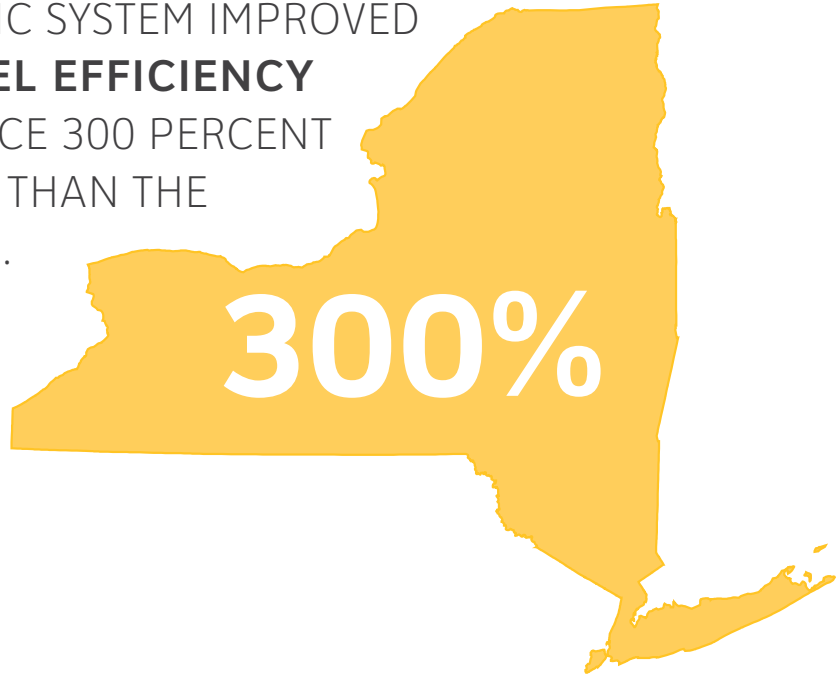
The logic is simple: when generators must compete to sell energy, they have an incentive to invest in operational efficiency to maximize their chance of being selected to supply energy, based on their offers into wholesale auctions.

One measure of efficiency is the amount of fuel needed to produce electricity in New York's power system. In the past 15 years of competitive markets for electricity supply, the fuel efficiency of New York's grid improved by more than 27 percent. That gain is more than three times the fuel efficiency improvements seen at the national level (8.25 percent) during this same period.

In the past 15 years of competitive markets for electricity supply, the fuel efficiency of New York's grid improved by more than 27 percent, reducing fuel costs by a total of $6.4 billion through 2013.

Improved fuel efficiency benefits consumers as the reduced fuel requirements lower the cost of supply. It also benefits the environment in terms of avoided emissions. Improved fuel efficiency translated into an estimated $6.4 billion in fuel savings from 2000 through 2013. During that same time frame, carbon emissions associated with electricity generation declined by more than 40 percent.

UNDER NYISO MARKETS, NEW YORK'S ELECTRIC SYSTEM IMPROVED **ITS FUEL EFFICIENCY** AT A PACE 300 PERCENT BETTER THAN THE NATION.



Reduced investment risk to consumers

Before 2000, New York's electric system required utility ratepayers to shoulder all risks of investments in generation. This is because energy rates set by regulators effectively guaranteed returns on investments in new generation.

The competitive electricity market shifts those investment risks from consumers to shareholders in generating companies. Today, independently owned companies earn returns for their investments only if they compete successfully. This holds true for electricity-generating assets that are no longer competitive and, thus, retire or suspend operations. The cost of those risks now rests with investors and shareholders and no longer with the ratepayer.

Competitive wholesale markets create pressure on less efficient generators. Since 2000, roughly 6,000 MW of older, noncompetitive generation have been retired.

Providing transparency to consumers

As part of its shared governance process, NYISO introduced a pioneering Consumer Impact Analysis process, marking its commitment to empowering consumers with greater transparency into its processes and procedures. The Consumer Impact Analysis provides a balanced review of how significant market rule changes may affect consumers.

Consumer Impact Analyses strive to give all market participants qualitative and quantitative information about consumer impacts before votes on proposed market rule changes. Before the implementation of a major new project, the Consumer Impact Analysis reviews the potential impacts on reliability, efficiencies, environment, new technology, and transparency.

Competition controls costs

Across the continental United States, the average residential monthly electricity charges range from $76.56 to as much as $136.63. Competitive market forces, combined with the fact that New York is the second most energy-efficient state in the continental United States, result in New Yorkers' average monthly electricity charges being in line with consumers around the country. The highest electricity charges tend to be paid by consumers in the southeastern region of the U.S., which does not administer competitive wholesale markets or coordinate system operations through an ISO.

Retail bills reflect the wholesale costs of electricity, delivery charges, plus taxes and fees. The NYISO's competitive markets for electricity work to control costs by encouraging investment and innovation in response to price signals. While electricity prices can fluctuate over time, the NYISO protects consumers by providing prices that accurately reflect generator costs while market forces apply pressure on generators to minimize those costs. ***While inflation drove up the cost of typical consumer goods by 35 percent from 2000 to 2013, the wholesale cost of electricity in 2013 was only 2 percent higher than in 2000.***

Reduced need for power reserves

New York's electric system maintains power reserves—generating capacity beyond projected need—that are akin to a household emergency fund. These reserves mean the electric system is prepared to cope with equipment breakdowns, severe weather, or other unplanned events that could affect system reliability. These reserves are essential, but they also come with a cost to maintain infrastructure that may only be utilized for brief periods.

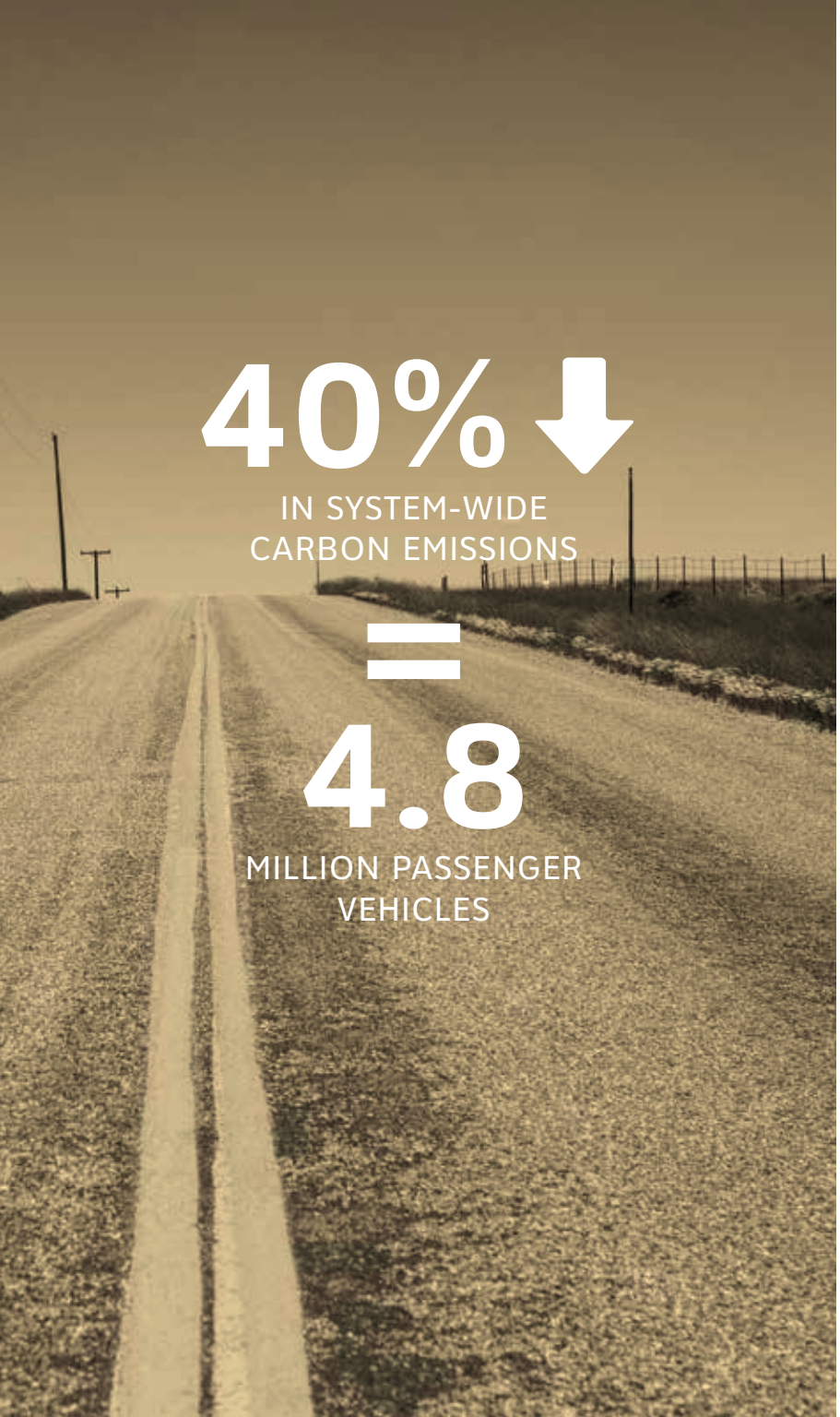
MORE EFFICIENT USE OF POWER HAS HELPED REDUCE RESERVE REQUIREMENTS, RESULTING IN A SAVINGS OF OVER **$540 MILLION** SINCE 2000.

As electricity generation becomes more efficient, it also becomes more reliable, and New York needs less power in reserve. Before the NYISO was created, New York's electric system typically maintained 22 percent more generation capacity than needed to meet projected peak demand levels. Since the formation of NYISO and onset of competitive electricity markets, reserve margins have declined to 17 percent above peak demand levels. From 2000 to 2014, this factor alone has saved an estimated $540 million in consumer costs.

Increased availability of existing power plants

New York's competitive wholesale electricity markets incentivize power plants to operate more efficiently and effectively. Before any investments in new resources, it is best to optimize existing resources; competitive markets drive that outcome by providing market-based incentives to invest in operational efficiencies. This has resulted in increased generator availability of more than 95 percent in 2013 compared to 90 percent when the state committed to restructuring markets in 1999. The improved availability of New York's conventional generation fleet is delivering the equivalent of more than 1,400 MW of new generating capacity from existing generators.

Increased efficiencies of New York's existing generation fleet resulted in 1,400 megawatts of new power. That's enough energy to power 1.4 million homes.



Environmental gains

NYISO's markets require that generators reflect the cost of emissions controls in their pricing, providing an incentive for lower-emitting and more-efficient resources to operate.

Improved fuel efficiency from 2000 to 2013 contributed greatly to New York's more than 40 percent reduction in system-wide carbon emissions—equivalent to the annual emissions of 4.8 million passenger vehicles.

Consistent with New York's commitment to competitive markets, the Empire State played a key role in the development of the Regional Greenhouse Gas Initiative (RGGI), the first market-based CO_2 emissions reduction program in the United States. This program, in combination with more-efficient power plants, greater integration of renewable resources, and demand-side energy efficiency, has contributed to New York emission reductions of 94 percent of SO_2, 81 percent of NO_X, and 41 percent of CO_2 since the onset of New York's wholesale power markets in 2000.

Demand-reduction programs

Since New York restructured the electricity market, efficiencies made possible through competitive markets have changed the way in which we address peak electricity demand periods, ultimately saving resources and money.

Prior to competitive wholesale markets, New York's utilities and regulators typically addressed growth in peak demand by increasing generating capacity or expanding transmission. Today, demand-response resources can be used to shave the peak during periods of high demand, supporting system reliability while providing incentives or revenue to businesses that reduce energy consumption during periods of high demand.

Large power customers and aggregated sets of smaller consumers participate in several demand-response programs developed in NYISO markets. When a new all-time peak was recorded on July 19, 2013, demand-response programs helped to shave peak demand by approximately 1,000 megawatts.

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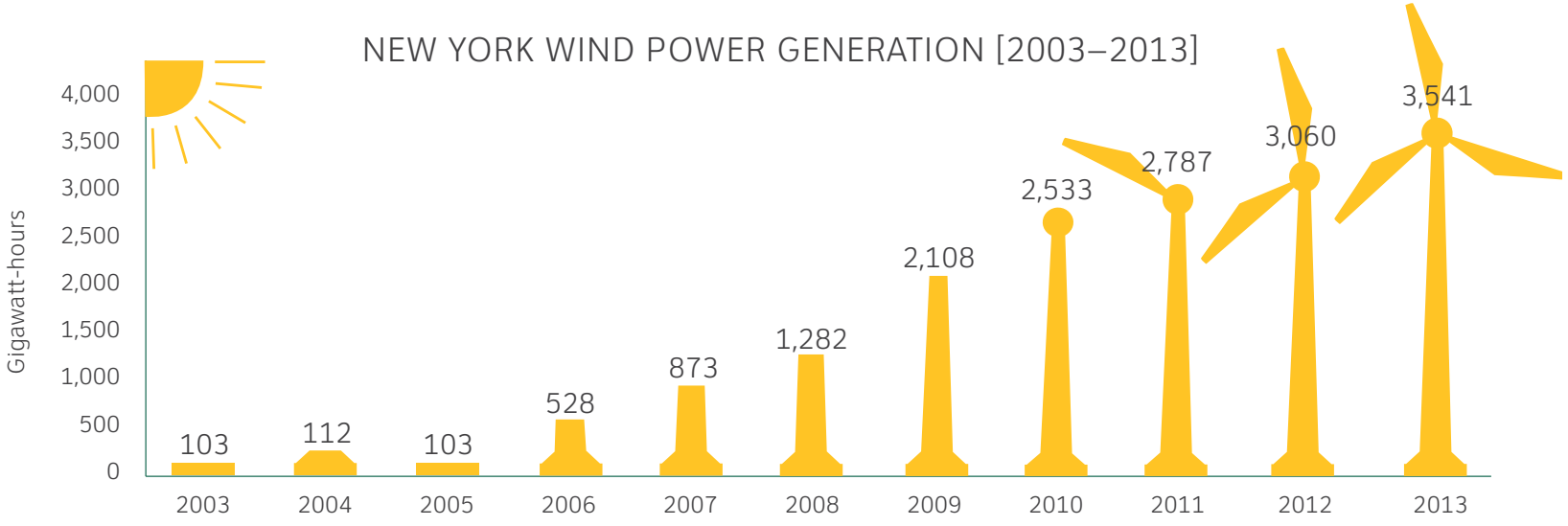
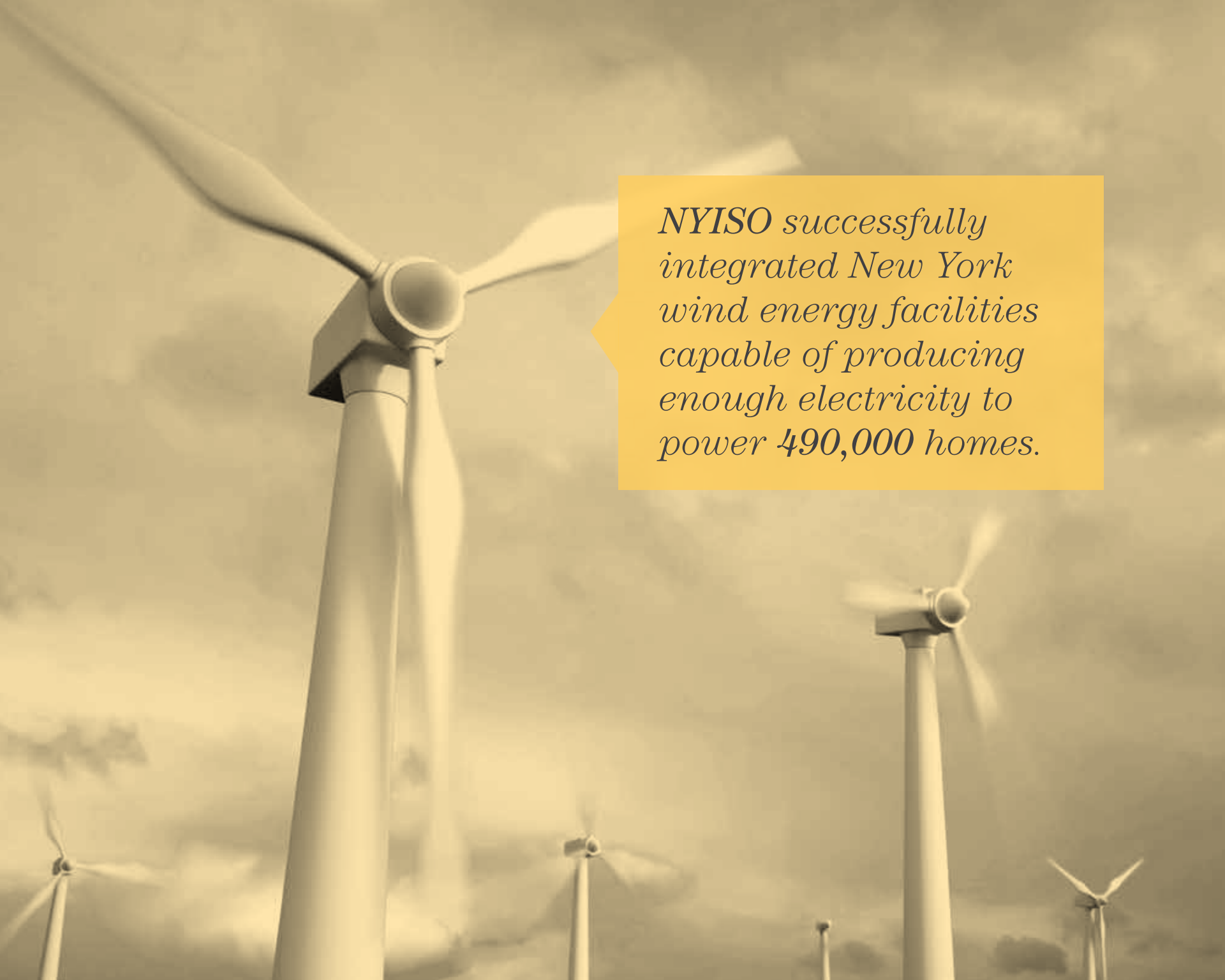
Growing green power

NYISO's competitive electricity markets have contributed to New York State's initiatives to grow renewable energy. Utilizing cutting-edge technologies and forecasting processes, the NYISO has earned recognition as a global leader in wind integration. New York's market design and operational protocols for wind power serve as models for other markets across the nation and around the world.

NYISO's efforts have supported numerous state initiatives to grow renewable power. Wholesale electricity markets and grid operations continually evolve to meet the changing needs of the power system, such as the need to integrate energy from new sources, including solar, wind energy, battery storage, flywheels, and smart-grid technologies. In fact, electricity generated by wind power in New York increased from 103 gigawatt-hours in 2003 to 3,541 gigawatt-hours in 2013, equivalent to the average annual electricity consumption of 490,000 New York homes.

These same market and system refinements also supported integration of New York's first utility-scale solar resource, a 31 MW solar project on Long Island.





NYISO successfully integrated New York wind energy facilities capable of producing enough electricity to power 490,000 homes.

Planning and investment

As New York transitioned to its new marketplace, the NYISO accepted responsibility for bulk system planning. Through planning processes that spotlight existing limitations and emerging needs, more focused investments in our state's electric infrastructure have been made, yielding significant benefits for consumers.

Planning for new generation: Before restructuring, New York faced a "generation gap." New York City lacked access to sufficient local generating capacity to meet reliability standards. At the time, common practice was to site power plants in areas where it was cheaper to build—generally, in rural upstate communities—which seemed to save money in the short term. However, transmitting electricity across the state can result in reliability issues in high-demand areas because of transmission limitations. Under competitive markets, new generation plants have been built closer to where demand is greatest—New York City, Long Island, and the Hudson Valley.

Since NYISO began operating New York State's electricity markets in 2000:

- Private and public power suppliers have added more than 10,400 megawatts of new generation—with 80 percent sited in these high-demand areas.
- The new additions represent 27 percent of New York's electricity requirements (peak demand plus reserve margin).

Planning infrastructure investments: Government officials, Wall Street investors, and energy industry professionals across the nation and globe rely on NYISO's authoritative data and expertise. Here's how the NYISO planning process works:

- *Identifying needs:* Using a market-oriented process, NYISO examines a 10-year horizon to assess the future reliability of the power system.
- *Encouraging market-based solutions:* NYISO's market-based approach encourages private-sector investment in projects to improve New York's energy infrastructure.
- *Evaluating proposed solutions:* When projects are proposed, NYISO rigorously studies them to be sure they will operate safely and securely if connected to the grid.

Since launching this planning process in 2005, NYISO has conducted seven assessments, five of which identified emerging reliability needs. In each case, the markets responded to address the needs.

NYISO's leadership in information technology

NYISO information technology is among the best in the nation, resulting in significant efficiencies for the competitive wholesale electricity markets and market participants. NYISO continuously deploys software enhancements to increase the timeliness, visibility, and accuracy of market data and grid information.

Vital investments made in New York's power infrastructure over the past 15 years include measures designed to stay ahead of the information technology curve.

"Smart-grid" investments: NYISO is also helping transform our electric grid to a "smart grid" that will help New York transition to a smarter, more energy-efficient future.

In 2013, NYISO and New York's transmission-owning utilities and power authorities completed a statewide $75 million smart-grid initiative, supported by $37.8 million in funds from the U.S. Department of Energy. This investment gives the NYISO access to real-time regional data on the condition of the grid to help avoid outages like the one experienced in 2003.

Incorporating the capabilities of the smart-grid project, NYISO's new control center is a showcase of advanced technology to power New York's future, supporting greater coordination with neighboring regions, improving coordination between gas pipelines and the power grid, and facilitating the integration of renewable resources.

- Quickly detect irregularities, predict problems and take corrective action to maintain reliability.
- 2,300-square-foot video wall is the largest utility installation in North America.

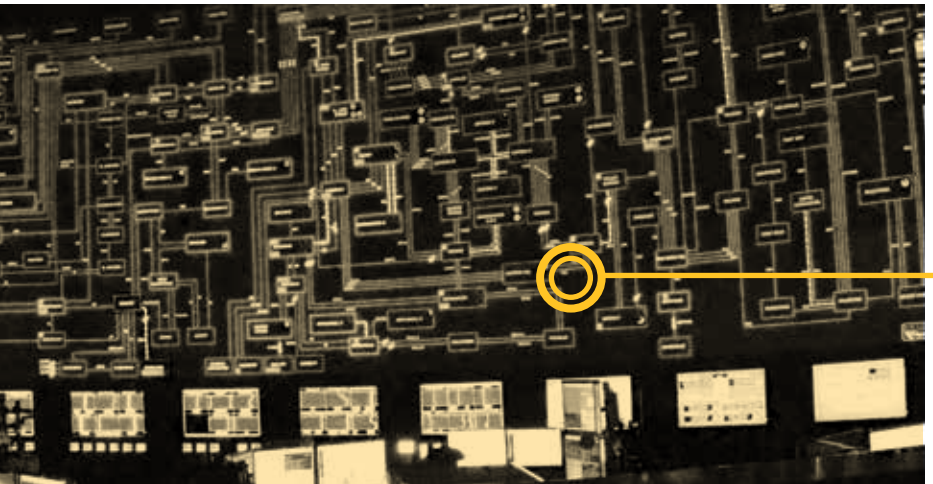
The NYISO's sound finances and lean operations

Although NYISO annually manages billions of dollars' worth of electricity, it makes no profit from its around-the-clock work. NYISO is a completely nonprofit organization with no financial stake in managing New York's wholesale electricity markets.

Among the nation's nine Independent System Operators or Regional Transmission Operators, including two other single-state ISOs, NYISO has the lowest annual operating budget and the fewest personnel.

Further, independent auditing of NYISO's billing controls has consistently verified the accuracy and integrity of its billing processes—critically important to consumers when billions of dollars are transacted each year. These consistently positive opinions of independent auditors ultimately validate that consumers are receiving what they pay for in terms of energy supply.

The budget process strives to achieve a sound balance between cost effectiveness and the resources needed to continue to improve the reliability of grid operations, ensure effective market design and administration, and perform essential system planning functions. Throughout its history, the NYISO has always kept spending at or below the approved budget.



- Customizable displays that present weather information, grid condition data and system alerts.
- Integration of smart-grid technology to improve transmission system efficiency by reducing line losses.
- More than 3,000 live status points.

NYISO's shared governance, independence, and consumer focus

NYISO operates as a truly independent, nonprofit organization dedicated to transparency in how it operates, the information it provides the public, and its role as an impartial broker of New York's wholesale electricity markets. NYISO provides open transmission access to all market participants, facilitating competition among wholesale suppliers to improve transmission service and allowing market forces to provide fair electricity prices.

In addition to creating a competitive marketplace for electricity, NYISO created a system of shared governance that provides all market participants—from consumers to electric generators—a greater voice in the operation and evolution of the marketplace. Under NYISO's transparent, inclusive process, representatives of these market participants have voting power in exercising responsibilities that include:

- Preparing NYISO's annual budget
- Reviewing and recommending candidates for NYISO's board vacancies
- Developing and adopting technical guidelines for operation of the bulk power system
- Market design and system planning

Most notably, NYISO stakeholders share responsibility with the NYISO board to develop and approve proposed changes to NYISO's governing documents, including its federally approved tariffs.

In the years ahead, NYISO intends to continue building on the foundation of the last 15 years of success. The team—which includes our regulators, policymakers, market participants, consumers, and NYISO employees—has built on New York's energy legacy that started with Edison and continues today with our state-of-the-art control center.

The road ahead

New York's electricity market participants will continue to work together to meet our state's electricity needs and power New York responsibly for the benefit of consumers, the economy, and the environment.

Origins of the NYISO

The need for a more reliable electric system to meet the energy needs of New York State is at the heart of NYISO's origins and evolution throughout the years. It all started with a blackout that would infamously turn the lights out—not only in New York, but throughout the Northeast.

1965

The Northeast Blackout of 1965 begins with a power disruption in Niagara Falls, Ontario, and spreads throughout the northeastern United States, ultimately affecting 30 million people.

1966

New York's seven investor-owned utility companies establish the New York Power Pool (NYPP) to coordinate the reliable operation of their respective systems.

1967

The New York Power Authority begins participating in several NYPP committees, and later joins the NYPP officially.

1970–1990s

The NYPP balances electricity supply and demand, maintaining transmission voltage, monitoring system contingencies, managing operating reserves, and dispatching generation—many of the same tasks NYISO performs today.

1992

Congress passes—and the president signs into law—the Energy Policy Act of 1992, aimed at improving energy efficiency.

1996

Under the 1992 law, the Federal Energy Regulation Commission (FERC) begins restructuring the electric industry, opening transmission lines to competition. The FERC suggests the formation of independent entities to manage transmission to ensure open access. It also calls for the separation of generation, transmission, and distribution services.

The Public Service Commission outlines its plan for New York State's future regulatory regime and the structure of a competitive electric industry. This plan calls for an electric system operated by an entity "independent of all energy suppliers."

1997

Responding to state and federal actions, the NYPP files a proposal with the FERC to form an independent system operator (NYISO), which is then approved.

(December) 1999

NYISO assumes operational control of the state's power grid and begins the operation of competitive wholesale electricity markets statewide.

1990s

A nationwide movement to restructure the electricity industry emerges, driven by the need to address rising electricity prices by encouraging efficiencies through greater competition.

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For more information or further details, visit the NYISO website.

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