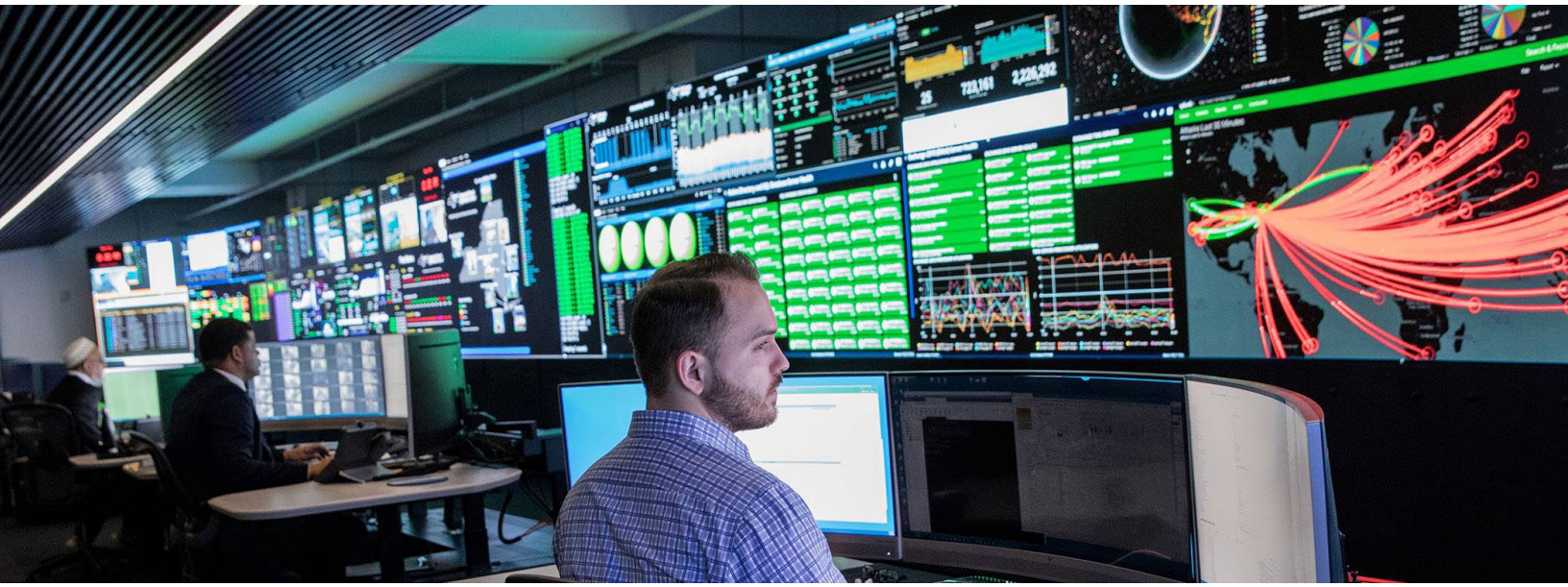


THE UTILITY OF THE FUTURE: HOW NYPA IS USING THE PI SYSTEM™ TO CREATE AN END-TO-END DIGITAL UTILITY

Founded in 1931 by Franklin Delano Roosevelt, the New York Power Authority (NYPA) is the largest state public power operation in the United States. With over 1,400 miles of transmission assets scattered across the state, NYPA's mission is to power the economic growth and competitiveness of New York State by providing customers with low cost, clean, reliable power. But doing so is no small feat. It requires optimizing power generation assets, ranging from hydro to combined cycle, fossil fuel, and natural gas, as well as moving power supply from the resource-rich northern terrain to the densely populated New York City.

With 83 percent renewable energy, $200 million in energy services business and an AA credit rating, it's clear that NYPA is delivering on its promises. Yet the utility understands that achieving operational excellence is a dynamic process. Never content to settle, NYPA embarked on an ambitious strategic plan focusing on customer empowerment, infrastructure modernization, and resource alignment. After signing an Enterprise Agreement (EA) with OSIsoft in 2017, NYPA adopted the PI System as an enterprise-wide data infrastructure at the center of its transformation into an end-to-end digital utility.

ACTIONABLE INSIGHTS FOR ASSET OPTIMIZATION

A key part of NYPA's strategic plan is infrastructure modernization, which focuses on smart generation and transmission as well as asset management. To effectively manage and optimize assets, NYPA enacted a four-part digital strategy that includes sensor deployment, a communications backbone, an Integrated Smart Operations Center (iSOC), as well as an ISO 55001 certification effort. "The PI System plays a key role in helping us in terms of asset performance management, keeping our eyes and ears on what is happening with our fleet," said Kedaar Raman, Program Manager at NYPA, during PI World San Francisco 2019.

As a first step, NYPA assessed the most critical assets within its fleet, including generators, transformers, breakers, and turbines, selected a suite of sensors, and developed the infrastructure to integrate the data into an enterprise PI System.

CHALLENGE

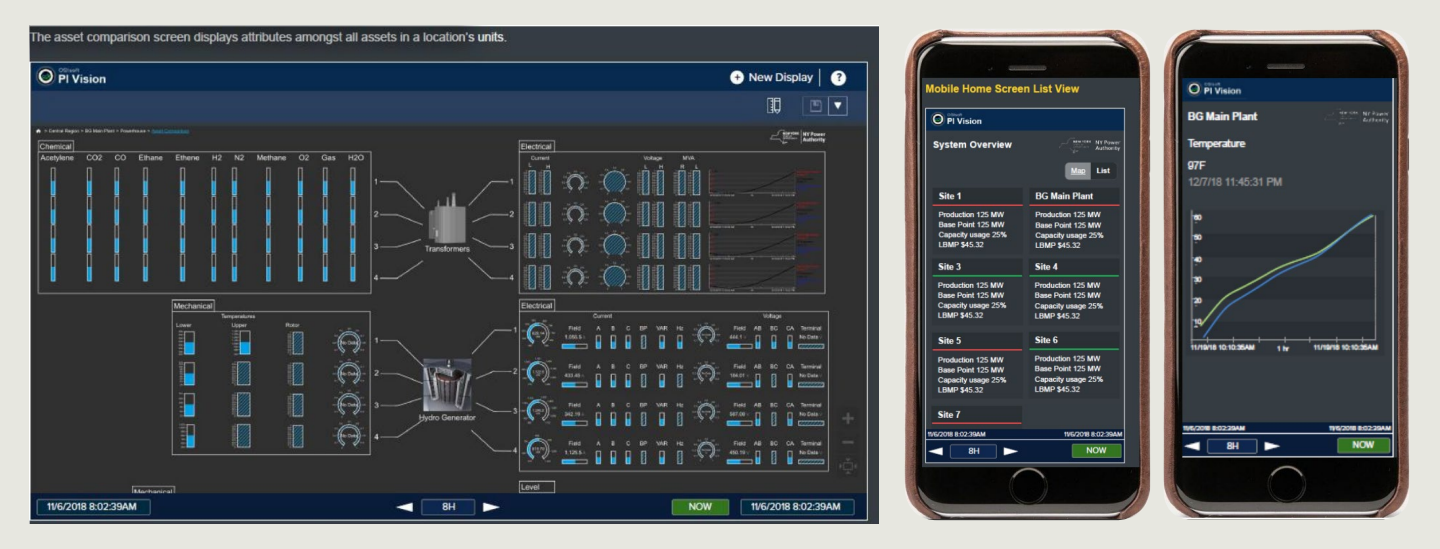
Deliver clean, reliable, & low-cost power to customers throughout the entire state of New York.

SOLUTION

Contextualized asset data in the PI System to monitor asset health & plant performance.

BENEFIT

A modernized smart grid to make data-driven decisions & optimize performance.



PI Vision displays deliver a complete picture of NYPA's asset performance to NYPA staff.

During the first phase of sensor deployment in 2017, NYPA had approximately 25,000 PI tags. By the end of 2019 this number is projected to hit 100,000 tags. Sensor-based data is leveraged by NYPA engineers and operators to better understand equipment performance using information in the PI System. All asset data is also fed back to the iSOC at company headquarters via the two-way communications backbone, which includes 1,000 miles of dark fiber, as well as microwave links to transmit data when fiber is not cost-effective.

With data collected in the PI System across the enterprise, the iSOC seeks to provide team members with a single source of truth to optimize performance and detect problems before a catastrophe strikes. Within the iSOC sits the communications and data network infrastructure, OT and IT, cyber security, and asset health monitoring and diagnostics.

"Digitization of our asset gealth information, whether it be a generator or transmission infrastructure, or our communications network, is essential for NYPA to make informed and effective decisions on our critical assets," said Adam Shapiro, Smart Grid Solutions Architect at NYPA.

Equipped with PI Vision displays, the iSOC team leverages Asset Framework (AF), the contextualization layer of the PI System, which provides a unified data model of operations. The iSOC utilizes advanced pattern recognition and artificial intelligence tools for asset performance management. Using near real-time and historical data to create analytic models, the staff can monitor process data from multiple equipment sensors to determine when the asset is displaying abnormal behavior. The system provides early warning indications of equipment failure, enabling the team to make scheduled adjustments or repairs.

PI DAY EVERY DAY

Part of NYPA's digital strategy is the Digital Worker Utility Program, which seeks to provide staff access to the right information anytime and anywhere to make data-driven decisions. To provide the workforce with additional digital tools and investigate ways to extract more value from the tools they already have, NYPA engineers setup PI Day — an event that included IT, OT, R&D, Engineering, site operations, analytics, and OSIsoft team members.

Once everyone began working together, the team solicited feedback to determine how to develop an intuitive Asset Framework (AF) data hierarchy. The sensor deployment program will continue to increase the number of tags, and the team needed a logical way to organize and standardize the data so people could find the right information easily.

Using AF to map NYPA's data streams to their digital twins, the staff began creating web-based PI Vision displays, which integrated operational, weather, and financial data. Users can now quickly input

> Being able to get to information when you need it takes the stress away from any situation."
>
> *— Kedaar Raman, Program Manager, NYPA*

6,000+ MW, low-cost fleet • 83% of generation is renewable (hydro) • 1,400 miles of transmission • Cleanest conventional fleet in the state

simple calculations for asset utilization and even compare asset performance efficiently. "PI Vision displays serve as a decision support tool that helps us to provide context to all this information... by considering asset, system, and environmental conditions," Raman noted.

Today, the Digital Worker Utility Program helps increase safety, reduce rework, and increase worker satisfaction, all while speeding up decision making.

AVOIDING NIAGARA FALLOUT

Situated on the border of the United States and Canada, Lake Erie feeds water into the Niagara River and is prone to below-freezing temperatures in the wintertime. With low temperatures come massive pieces of ice that can break away and float down the Niagara River, putting downstream power assets at risk for massive damage. To mitigate risk, every fall NYPA must install the Lake Erie-Niagara River ice boom between the two bodies of water. While the boom is successful, NYPA mechanics must periodically go out on ice-cutting ships during harsh winter conditions to physically break the ice.

Prior to the PI System, mechanics were only able to perform inspections while on the water, navigating tumultuous ice conditions on the fly. Now, as part of the Digital Utility Worker program, NYPA is deploying unmanned aircraft systems to conduct tactical reconnaissance and pinpoint exactly where boats need to go before they embark on a mission. While boats are out working, the operations superintendent can use PI Vision to see the flow to downstream equipment, validating the ice breaking activity in real time. Not only is this process more efficient, it's safer for personnel.

THE FUTURE IS BRIGHT

NYPA's digital strategy has been a great success — but the team is not even close to done. They recently became the first utility in North America to achieve the prestigious ISO 55001 certification, which is a standard for managing asset life cycles. Certification is a complex process, but with the help of the PI System, NYPA is quickly moving towards its goal. All of this demonstrates the utility's commitment to learning and improving while finding ways to become more agile and better serve its customers.

Watch this 2-minute video to learn more about NYPA and the PI System.

For more information about NYPA and the PI System, watch the presentation here.

Raman, Kedaar. "New York Power Authority: The Journey to World Class Asset Management"
<https://www.osisoft.com/Presentations/The-New-York-Power-Authority-s-Journey-to-World-Class-Asset-Management/>