

Optimizing Automated Trade Strategies

Carlos Zada, Manager of Product Management, NextEra Analytics

Sam Hile, Senior Policy Specialist, NextEra Analytics

Lauren Foley, Energy Risk & Resilience Manager, NextEra Analytics

Moderator: Lester Aponte, Technical Sales Lead, NextEra Analytics

KEY TAKEAWAYS

- Renewables can introduce challenges to grid operations that are best addressed with batteries.
- Forecasting software plays a key role in meeting requirements for renewables use cases.
- NextEra Analytics maintains forecasts with up-to-date regulatory information to ensure compliance.



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OVERVIEW

The variability of renewable energy sources, such as wind and solar, can make it challenging to predict output.

Forecasts and tools that help analyze and optimize the operation of assets are increasingly critical in today's variable energy landscape. NextEra Analytics develops solutions that enable forecasting and optimization for low-cost, sustainable power systems, giving energy providers the ability to capture value from their assets.

CONTEXT

The presenters discussed challenges created by the increase in renewable energy sources and how reliable forecasting software can help address those challenges.

KEY TAKEAWAYS

Renewables can introduce challenges to grid operations that are best addressed with batteries.

In addition to maximizing the value of renewable energy assets, batteries can offer energy reliability and cost savings benefits such as:

Arbitrage

Solar energy production is at its peak during daylight hours; however, energy demand at that time is relatively low. As the sun sets, energy production drops, but demand increases sharply. The rapid rise in demand can drive spikes in wholesale energy prices, but can also be difficult for the grid to handle, presenting an opportunity for batteries to capture real-time energy arbitrage.

Load shifting

As energy costs vary and depend on the type of tariff a business is on, using battery management tools in conjunction with reliable forecasting software can help keep overall energy costs low. For some businesses, their tariff type might follow a set fluctuation in energy costs; the costs will be low or high depending on a schedule provided ahead of time. Energy usage can be optimized through load shifting: charging batteries when prices are low and pulling load from the batteries when prices are high.

Peak shaving

For businesses with tariffs that include **demand charges** or **coincident peak charges**, there is no schedule for when energy costs are going to be high. Demand charges are based on the highest amount of power used at any one time during a billing period, regardless of overall use. Coincident peak charges are fees incurred when the highest usage coincides with the grid's busiest time. By leveraging forecasts to predict peaks in power consumption and/or when the grid is going to reach peak demand, batteries can be charged ahead of time to cover load during the forecasted period and reduce energy costs.

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“It’s not as simple as just charging a battery in the morning and then discharging it in the afternoon. There are a lot of factors that go into it, like tariffs, how an organization may be sourcing their energy—all of that needs to be taken into account to maximize savings.”

Lester Aponte, Technical Sales Lead, NextEra Analytics

Ancillary services

Large and sudden changes in electricity supplier demand can cause the North American grid frequency to deviate from 60 Hz. To support grid **frequency regulation**, the independent system operators (ISOs) or balancing authorities need assets that can be ramped up or down quickly, to offset sudden changes in electricity supplier demand. Batteries are an excellent fit for this use case, with the ability to rapidly adjust from charging to discharging and back again.

In some areas, voltage fluctuations can occur due to changes in load, especially from high-powered industrial equipment or from significant variations in distributed generation. In this use case, batteries provide **voltage regulation**, acting as a dynamic buffer within the grid by supplying or absorbing reactive power to manage voltage fluctuations.

Reactive power is another valuable ancillary service for both the transmission grid and distribution utilities.

Figure 1: Battery energy storage systems are valuable tools for energy optimization



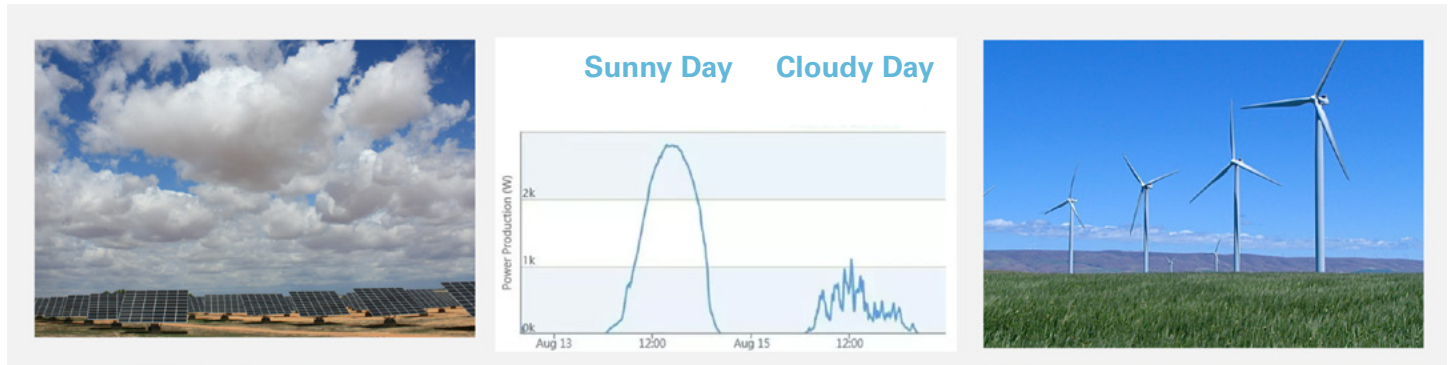
Forecasting software plays a key role in meeting requirements for renewables use cases.

Forecasting software and tools, such as the NextEra 360 SaaS platform, provide analytical and predictive capabilities to optimize effective arbitrage, load shifting and peak shaving, and ancillary services. NextEra 360 forecasting software is especially useful when working with batteries because of the variability and differences in response capabilities.

NextEra Analytics develops forecasts for energy and ancillary prices, renewable resources, and points of interconnect availability. In some cases, NextEra 360 also forecasts load for co-located premises. Together, these forecasts are leveraged to model a battery’s power capability and determine how much energy will be stored over time. Then, complex optimization algorithms that are designed to fit the use of the battery or other source, also accounting for energy price forecasts created by the NextEra Analytics quantitative team, are applied to produce a strategy for maximizing revenue.

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Figure 2: Dynamic forecasting is especially useful when forecasting solar or wind power



NextEra Analytics offers a robust solution for three key use cases:

1. **Dynamic forecasts.** Software plays a crucial role—tools such as NextEra 360 take in real-time data and automatically update forecasts to increase accuracy. To provide further support, the NextEra Analytics quantitative team is dedicated to building forecasts, conducting market research, and creating trade strategies.
2. **Battery management.** Reaping the benefits of batteries, such as real-time energy arbitrage, peak shaving, and others, requires strong forecast capabilities and algorithms for energy optimization over several value streams.
3. **Customized monitoring.** Every customer has a different risk tolerance. NextEra 360 software maximizes revenue across products within the boundaries of an individual customer's risk-mitigation requirements. NextEra Analytics reviews every customer's operational and financial performance characteristics and risk posture—including warranty constraints, for example—against various strategies. NextEra Analytics will recommend a strategy and continually monitor performance.

"It really boils down to two metrics: First, how much of the theoretical maximum revenue did we capture? And second, how much above a baseline is our performance?"

Carlos Zada, Manager of Product Management, NextEra Analytics

NextEra Analytics maintains forecasts with up-to-date regulatory information to ensure compliance.

In addition to managing the influx of renewable energy sources and batteries to the grid, operators must adhere to changing regulations from agencies such as NERC and FERC. As the market continues to evolve and more batteries come online across various ISOs, there is an exponentially growing need for software that can optimize ISO market participation and help operators remain compliant in the ever-evolving regulatory landscape.

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“These markets are constantly evolving, and many are still even adapting to batteries as a newer resource that we’re seeing on the grid. It’s critical that our quantitative team work closely with our regulatory and policy specialists . . . to make sure we’re compliant with market rules.”

Lauren Foley, Energy Risk & Resilience Manager, NextEra Analytics

One area that NextEra Analytics is closely watching is resource adequacy (RA), which is a critical topic in all ISOs and in all markets. RA plays a key role in maximizing value, yet it complicates system planning, as it depends on calculating the estimated reliability of a renewable resource’s capacity over a decade or more.

“Resource adequacy is definitely a hot topic in all ISOs and all markets . . . RA really is an important revenue stream to many resource types. Renewables are certainly no exception.”

Sam Hile, Senior Policy Specialist, NextEra Analytics

NextEra Analytics continuously monitors requirements from regulators and ISOs across the country, incorporating changes into its forecasting algorithms. In addition to maintaining compliance in each market, the NextEra Analytics quantitative team is constantly working to help customers hit their revenue performance targets.

ADDITIONAL INFORMATION

To learn more about NextEra Analytics’ comprehensive energy management software, **NextEra 360** visit www.nextera360.com

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BIOGRAPHY

**Lester Aponte**

Technical Sales Lead, NextEra Analytics (Moderator)

Lester Aponte is a technical sales lead for NextEra Analytics, Inc. (NEA), a subsidiary of NextEra Energy Resources, the world's largest generator of renewable energy from the wind and sun, a world leader in battery storage. NEA develops forecasting and optimization solutions that enable low-cost sustainable power systems. Mr. Aponte focuses on sales of NextEra 360™, the software platform for end-to-end energy management and decarbonization needs. He was appointed to this position in August 2022.

Mr. Aponte has spent his 10-year career with NextEra Energy, having held roles with both NextEra Energy Resources and Florida Power and Light Company (FPL). Most recently, Mr. Aponte was a senior real-time trader for NextEra Energy Resources, where he managed the company's portfolio of assets across multiple Regional Transmission Organizations including PJM, ERCOT, MISO, CAISO, SPP and NYISO. Previously, he was in system operations with FPL as an engineer working with both distribution and transmission relay as well as real-time generation and transmission dispatch.

Mr. Aponte holds an MBA from Florida International University and a bachelor's degree in electrical engineering from the University of Miami. He is also a member of the Eta Kappa Nu Honor Society of Electrical Engineers.

**Carlos Zada**

Manager of Product Management, NextEra Analytics

Carlos Zada is the manager of product management for NextEra Analytics, Inc. (NEA), a subsidiary of NextEra Energy Resources, the world's largest generator of renewable energy from the wind and sun, a world leader in battery storage. NEA develops forecasting and optimization solutions that enable low-cost sustainable power systems. Mr. Zada leads an energy management product team that is committed to aligning with customer's energy and sustainability goals through high-quality renewable energy software products.

Prior to joining NextEra Energy Resources, Mr. Zada worked as a product management professional specializing in renewable energy.

Mr. Zada holds a bachelor's degree in operations research and industrial engineering from Cornell University and is a CFA® charterholder.

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**Sam Hile**

Senior Policy Specialist,
NextEra Analytics

Sam Hile is a senior policy specialist for NextEra Analytics, Inc. (NEA), a subsidiary of NextEra Energy Resources, the world's largest generator of renewable energy from the wind and sun, a world leader in battery storage. NEA develops forecasting and optimization solutions that enable low-cost sustainable power systems. Mr. Hile focuses on wholesale market strategy and regulatory compliance for energy storage resources managed by NextEra 360™, the software platform for end-to-end energy management and decarbonization needs. He was appointed to this position in May 2023.

Prior to joining NextEra Energy Resources, Mr. Hile was an energy industry analyst at the Federal Energy Regulatory Commission with a focus on SPP and MISO market design and generator interconnection tariff filings. Previously, he was a grid modernization consultant at ICF.

Mr. Hile holds a bachelor's degree in physics and energy policy studies from Rice University and a master's degree in environmental management from Duke University.

**Lauren Foley**

Energy Risk & Resilience Manager,
NextEra Analytics

Lauren Foley is a Manager of Energy Risk & Resilience for NextEra Analytics, Inc. (NEA), a subsidiary of NextEra Energy Resources, the world's largest generator of renewable energy from the wind and sun, a world leader in battery storage. NEA develops forecasting and optimization solutions that enable low-cost sustainable power systems. Ms. Foley focuses on trade strategy performance and risk management for energy resources managed by NextEra 360™, the software platform for end-to-end energy management and decarbonization needs. She was appointed to this position in April 2023.

Ms. Foley has spent 5 years of her career with NEA, having held roles as a senior quantitative analyst and senior product manager. Prior to joining NEA Ms. Foley worked in supply chain analytics and sales analytics roles.

Ms. Foley holds a bachelor's degree in mathematics from Centre College and a master's degree in Analytics from the Institute for Advanced Analytics at North Carolina State University.

This summary is based on a January 24, 2024 live webinar.