STORA™

Solar + Storage Optimization for Optimal Results

White Paper

TEA
THE EnergyAuthority

INTRODUCTION

Solar energy has proven to be a cost-effective source of electricity. Still, it remains a challenge to manage the variability of solar energy production due to changing weather conditions and the overgeneration at certain times of day that come with increasing solar penetration. There is a compelling need for utility-scale battery energy storage systems, yet storage comes with its own challenges. One such challenge is determining how to best optimize a storage asset for financial value and other objectives like reliability, carbon reduction goals, and resilience.

In response to the need for battery optimization, The Energy Authority (TEA) built STORA, its market-facing optimization solution for hybrid, co-located, and standalone storage resources, to help public power realize the full value of energy storage investments. This white paper explores the role of solar + storage optimization software in the renewable energy industry, highlights the key attributes that set STORA apart from the competition, and shares how TEA's clients benefit from STORA's unique capabilities.
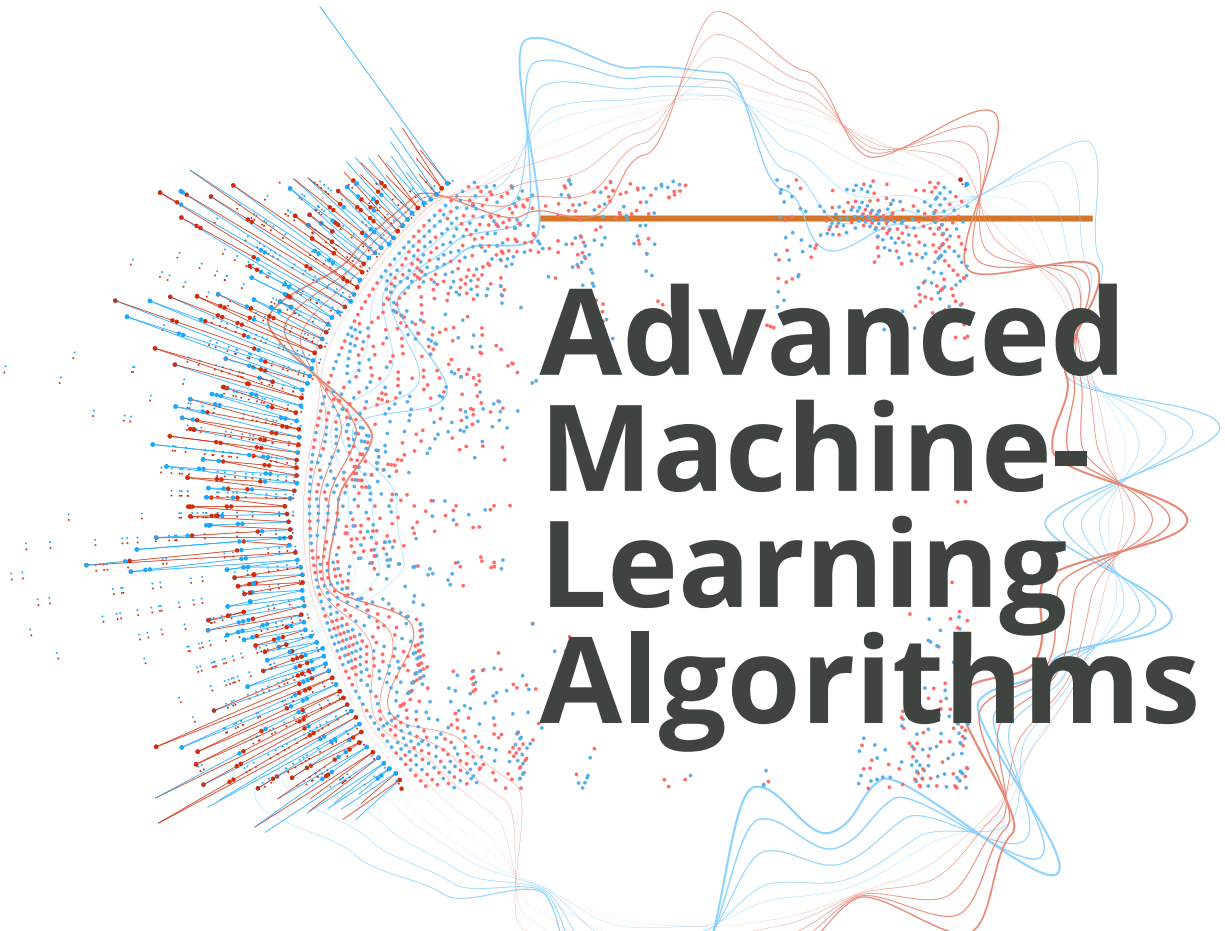
SOLAR + STORAGE = STORA

With trading operations in both western and eastern interconnections, and a customer base that spans coast-to-coast, TEA has the unique ability to capture first-hand insight into emerging energy trends across the US and respond to those changes accordingly. The push to "green the grid" led to TEA's development of STORA, a state-of-the-art solar + storage optimization solution for hybrid, co-located, and standalone storage resources to help public power realize the full value of energy storage investments.

Currently optimizing numerous solar + storage assets with several more in the pipeline, STORA is an innovative AI solution that reflects TEA's advanced analytical capabilities and broad understanding of today's complex energy markets. Built in-house, STORA uses advanced machine-learning algorithms to forecast solar production and market pricing to give TEA trading teams a critical edge in navigating the value streams available to our clients and helps inform dispatch and bidding strategies consistent with each client's objectives.

Advanced Machine-Learning Algorithms

HOW STORA WORKS:

STORA software is made up of multiple components that are orchestrated to work together: live data processing, forecasting, optimization, market bidding, and an interactive user interface.

To effectively optimize a battery storage asset, it is essential to use accurate and dynamically-adjusted forecasts that reflect the correct state of assets and markets in a timely fashion. STORA ingests live asset- and market-specific data, along with weather forecasts and other information. A stochastic machine-learning price forecast engine for Locational Marginal Prices and ancillary services prices provides day-ahead and real-time pricing and captures the correlation among prices and on-site generation. The stochastic forecasts capture uncertainties of the forecasted data through multiple scenarios, which can take extreme market volatility into account.

STORA's co-optimization for energy and ancillary services is achieved through its stochastic optimization engine, which sorts through the complexity of multiple objectives and constraints, including generation, price, award, and ancillary services dispatch uncertainties. Furthermore, the constraints of the optimization engine are highly customizable based on asset types, specific clients' resiliency and carbon goals, and risk tolerance.

STORA's software and user interface is highly configurable and enables the setting of asset-specific parameters which may be detailed in a storage asset's warranty or contractual requirements, such as state of charge minimums and cycling limits. This configurability ensures that the energy storage system operates efficiently and effectively, with TEA's experienced traders providing additional hands-on support in translating power purchase agreement terms or the manufacturer's warranty requirements into STORA's optimization parameters.

Lastly, STORA provides live operational and prior performance views, allowing custom report generation tailored to clients' needs. This allows TEA to identify opportunities for improvement and further optimize the system's performance.

> "TEA's STORA optimization solution provides an essential service to manage the day-to-day nuances of energy market participation, allowing our agency to provide the cleanest energy to our constituents at the best possible price. STORA expands RCEA's capacity to gain 24/7 oversight and expertise for our renewable energy and storage facility. A main benefit is the ability to collaborate with TEA on core goals which they then execute using STORA to identify optimal bidding strategies. This provides us with in-depth insight into trends and events and enhances our ability to identify and manage risk, deliver clean energy assets into the highly volatile energy market, and maximize financial viability."

CUSTOMER INSIGHTS

- REDWOOD COAST ENERGY AUTHORITY

In use since 2021, STORA has proven invaluable to TEA customers who are seeking to improve their battery storage optimization and meet their renewable energy goals, while also maintaining unique program requirements such as utilizing the resiliency benefits of a utility-scale solar + storage microgrid.

Currently, TEA is helping optimize over 95MW solar/320MWh batteries with over 70MW solar/114MWh batteries set to go live this year. Some of our current projects include:

- Live August 2023: Resurgence I, a 90 MW solar/300 MWh battery co-located resource in CAISO that was developed by NextEra and purchased via a power purchase agreement (PPA) by Valley Clean Energy Alliance (VCE).
- Live May 2023: Putah Creek, STORA's second solar + storage asset, a 3 MW solar/12 MWh battery hybrid CAISO resource, went live in Q2 of 2023.
- Live December 2021: RCAM, a 2.3 MW/9.2MWh hybrid resource owned by Redwood Coast Energy Authority.

Our clients have benefitted greatly from working with TEA's service, powered by STORA. Our team leverages proven market knowledge and a fully automated optimization and bidding platform to provide our clients with the best possible results. We constantly monitor and adjust system constraints based on prevailing system and market conditions. To ensure the quality of STORA performance, TEA monitors multiple quantitative metrics; one of which is Percent-of-Perfect (POP) metrics. TEA has achieved 78% POP and is still improving.

Additionally, our location-specific generation, price, and award uncertainties help to further optimize customer outcomes. This reduces the risk and ensures a customer gets the best possible price for their generation with feedback from our Portfolio Managers, who work to optimize the rest of our clients' power portfolios.

CONCLUSION: OPTIMIZATION IMPROVES OPERATION

TEA, a company that believes in the potential of advanced renewable technologies, is optimistic about the future of public power's adoption of solar and storage assets. As part of their effort to support the ongoing renewable energy transformation, TEA developed STORA, a powerful solution for public power utilities seeking to maximize the benefits of renewable energy. With STORA, your utility can reduce energy costs, increase energy independence, and promote sustainability by controlling and optimizing renewable generation through battery storage in a customized way that aligns with your utility's unique risk tolerances and portfolio goals. STORA enhances your scheduling and market participant services and empowers you to take full advantage of the opportunities presented by renewable energy.