

# Structuring Competitive RFPs for Storage Bid Optimization Solution Providers

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Due to increasingly complex state-of-charge management requirements and power market product optionality, storage asset owners and managers have turned to automated bid optimization solutions to maximize revenues. This paper outlines five best practices that battery storage owners/operators should use in their Request for Proposal (RFP) processes to evaluate offerings from various solution providers. Specifically, we address the topics that are most relevant to the design of competitive bidding performance demonstrations using backcast and live trial techniques. The ideal outcome of any procurement process would be for the owner to make an informed and definitive selection of the solution that maximizes risk-adjusted returns for their organization.

## Key Takeaways

- Asset owners are understandably interested in evaluating realized revenues with respect to a perfect foresight scenario and then comparing percent-of-perfect (PoP) across vendors. However, perfect foresight dispatch definitions vary widely across platforms impeding the ability of owners to make an informed comparison. Owners should look at revenue generation in absolute terms and instead compare the ability of providers to outperform well known established baselines such as a simple TB4 Day Ahead strategy.
- In the highly dynamic US electricity markets, it's crucial for solution providers to ensure their bidding algorithms account for evolving market rules. RFPs should explicitly inquire about this capability to ensure consistent and transparent comparisons.
- Including detailed physical resource specifications such as location, charge/discharge capacities, min/max State-of-Charge (SOC), and cycling limitations in RFPs ensures that all solution providers employ consistent assumptions and serves to demonstrate that each platform can simulate the precise use case prescribed by the customer.
- Risk management evaluations matter for RFPs. Evaluating revenue distribution, Sharpe ratio, daily/weekly average losses, and \$/kW gains during critical periods of high volatility can help asset owners better assess risk-adjusted performance and identify deficiencies in a solution provider's co-optimization approach.
- Requesting data on operational reference projects is an additional measure that can help serve to demonstrate a provider has specific experience with an ISO or product mix. However, this introduces additional complexities and care should be taken to adjust for plant outages and de-rates to ensure that results can be evaluated solely on the merits of bidding strategy design and execution, not BESS mechanical availability.

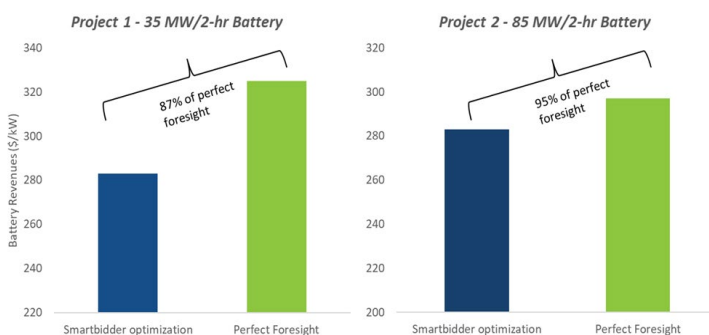
## Designing a Consistent, Transparent Procurement Process

Traditional approaches for bidding thermal assets or renewables provide extremely limited, if any, value in the context of flexible, fast ramping, and limited-duration battery resources. To maximize asset revenue, operators must navigate day-ahead and real-time forecasts and participation decisions, determine when to charge vs. discharge, manage battery state-of-charge (SoC), and comply with an Independent System Operator's (ISO) changing market rules. Even for sophisticated teams with deep experience in wholesale electricity markets, maximizing financial performance across a portfolio of battery energy storage and hybrid projects in real time requires novel approaches to co-optimization of market products, automated and programmatic decision making, and advanced data analytics. As a result, asset owners seek bid optimization partners to help them navigate battery energy storage deployment decisions in wholesale electricity markets. Choosing a bid optimization partner requires careful consideration of many factors; one of the most critical involves comparative performance evaluations, and especially a comparison of simulated

bidding performance using ex ante out of sample backcasts and ongoing live trials. To ensure that a procurement process advances the best value option, asset owners should employ a set of recommended best practices for conducting comparative performance evaluations. While this paper describes the key considerations, a template for an RFP technical exhibit containing detailed instructions for bidders is provided in Appendix A. Lack of specificity in defining evaluation requirements may result in solution providers making inconsistent interpretations or assumptions favorable to their respective solution, thus making it difficult for asset owners to evaluate proposals accurately or select solutions that deliver the best value and performance.

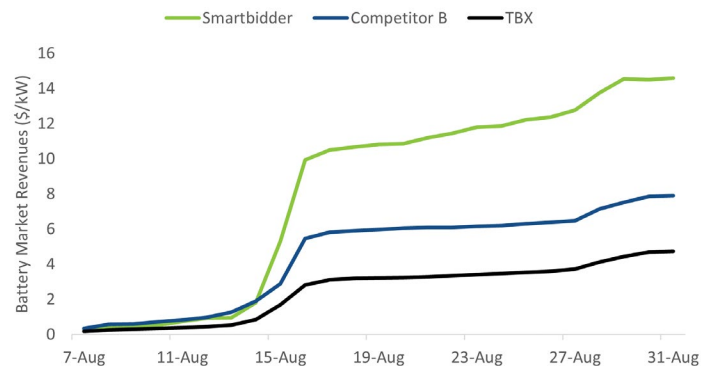
### 1. Establish Clear Performance Benchmarks

Proposal evaluations often use a perfect foresight scenario, which makes optimal bidding decisions based on complete knowledge of realized prices to understand the theoretical maximum revenue possible in a given evaluation period. However, the definition of perfect foresight differs across solution providers. Some solution providers consider bidding strategies inclusive of energy and ancillary participation, while others may use energy arbitrage between day-ahead (DA) and real-time (RT) in their perfect foresight simulations, and yet others may only include DA markets but not RT markets. Based on these differences in the perfect foresight benchmark, the percentage of perfect foresight (PoP) metric may vary greatly between different providers. SmartBidder, uses a perfect foresight strategy co-optimizing between RT Energy and DA Ancillary product participation to produce bidding strategies that can achieve 85-95% of perfect foresight revenue, as shown in **Figure 1**.



**Figure 1:** The Ascend Analytics SmartBidder platform's perfect foresight case is an aggressive valuation that bases AS/Energy decision on realized prices with unique decisions for each market hour of each day.

A second common benchmarking method involves the use of a baseline strategy, often a 'naïve' or 'risk free' bidding strategy such as a 24-hour spin-only strategy or simple energy arbitrage between the highest and lowest-priced DA hours. Bid optimization performance can then be measured as an uplift in performance above these baselines. Again, asset owners must ensure that these benchmarks are consistently defined and applied across performance comparisons. For example, the 'simple energy arbitrage' should uniformly consider cycles per day, charge and discharge efficiency, and feasibility with regards to state-of-charge as described in the previous section on developing consistent project parameters. These definition decisions can significantly impact approaches to setting baselines. **Figure 2** shows SmartBidder's performance for an asset in CAISO compared to a competitor and naïve TBX strategy (normalized in \$/kW) during a critical period in August 2023 driven by tight reserve margins and high load conditions due to a heat wave.



**Figure 2:** SmartBidder's strategy with a focus on ancillary services and asset-backed DA arbitrage delivered 85% and 208% more cumulative revenue than the competition and the naïve TBX strategy, respectively, during the critical month of August 2023.

### 2. Ensure Providers Account for Evolving Market Rules

Highly dynamic US electricity markets often contain rapidly changing market rules, especially with the introduction of battery and hybrid storage assets. These market rule changes, such as track 1, track 2, day-ahead market enhancements in CAISO or Nodal Protocol Revision requests (NPRR1014 or NPRR1186) in ERCOT impact how energy storage resources (ESRs) participate in the market and hence, the overall revenue these resources can generate. To mitigate this issue, RFPs should ask solution providers if their bidding algorithms account for these rule changes. Ascend's SmartBidder™ platform fully supports all the latest energy storage enhancements implemented across different ISOs. Ensuring consistent

treatment of ISO penalties for SOC management deviations is another important consideration when evaluating simulations from different providers. For example, SASM penalties in ERCOT can be evaluated as occurring all the time, consistent with ISO penalty estimates, or neglected entirely. RfP instructions should clearly indicate how the owner prefers to model the impact of these penalties and deviations.

### 3. Develop Consistent Project Parameters

While most RFPs include information about battery size and duration, they do not always include detailed physical resource requirements such as charging/discharging efficiency, min/max SOC limits, daily/annual cycle limits, energy and ancillary variable operations and maintenance (VOM) prices. This oversight results in varied assumptions made by solution providers in their proposals, which results in disparities and thus inaccurate comparisons. For example, an assumption of 365 annual cycles for a battery while warranty constraints limit it to 300 can result in an overestimation of revenue performance, as shown in **Figure 3**. Another issue that commonly results in biased comparisons involves the definition of battery size/power capacity. If not properly defined, battery power capacity could mean both 'nameplate capacity' as well as 'usable capacity at the point of interconnection (POI) inclusive of losses.' Failure to clarify these parameters in the RFP often results in different assumptions by solution providers, and negatively influences evaluation results for asset owners.



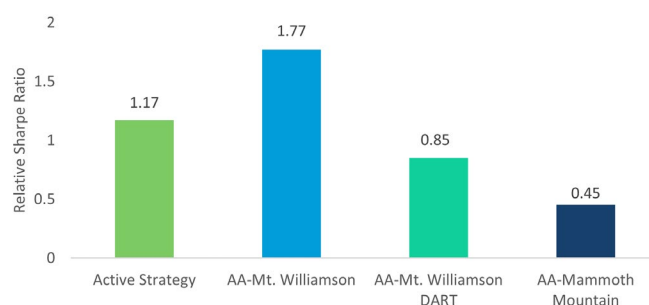
**Figure 3:** 20% over-estimation in yearly revenue performance when the bid optimization algorithm did not account for the battery cycling constraints.

A detailed intake form offers a valuable way to prevent these issues. For example, Ascend Analytics uses an intake form that contains more than 80 detailed questions about the resource, physical battery parameters, market participation preferences/requirements, hybrid/co-located renewable asset specifications, battery warranty, contracts,

hedges, or offtake agreements that limit the battery's full capacity from being optimized. This holistic approach helps establish a clear and objective set of evaluation criteria to minimize bias and ensure accuracy of results.

### 4. Include Risk Management in the Evaluation

In addition to including a performance evaluation, RFPs should contain a robust risk management evaluation. Evaluators often look at head-to-head revenue comparisons when making decisions on software solutions. However, metrics such as revenue distribution, relative Sharpe ratio (as shown in **Figure 4**), daily/weekly average losses, and \$/kW gains during critical periods of high volatility, can help evaluators better assess risk-adjusted performance and identify deficiencies in a solution provider's co-optimization approach. Ascends' SmartBidder provides all these risk metrics in the user interface to allow for an easy evaluation of competing bidding strategies.



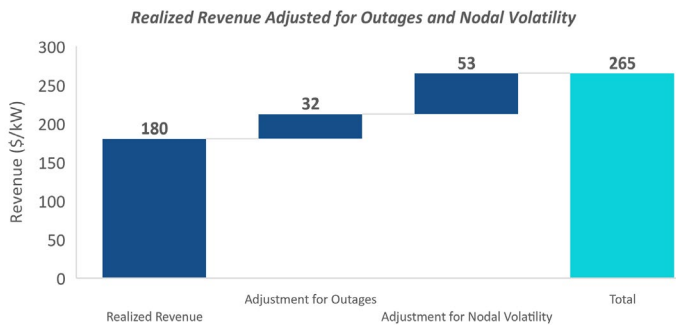
**Figure 4:** SmartBidder shows the relative Sharpe ratio for different bidding strategies. Sharpe ratio measures the risk-adjusted returns for a strategy compared to a risk free / naive strategy.

### 5. Normalize Operational Reference Asset Comparisons

RFPs often consider evaluation against operational reference assets to determine the solution provider's prior experience and the competitiveness of the platform via in-market performance. In these situations, ensuring consistency is even more important, as operational battery behavior can differ drastically from simulations due to physical plant issues such as outages (the plant is fully offline), derates (a portion of the plant's AC capacity is unavailable), varied risk profiles of specific clients, and differing price dynamics across nodes, to name a few. In addition, normalizing results from operational reference projects may warrant scaling results back to a common reference node thus requiring further methodological instructions to be communicated. An example of this is

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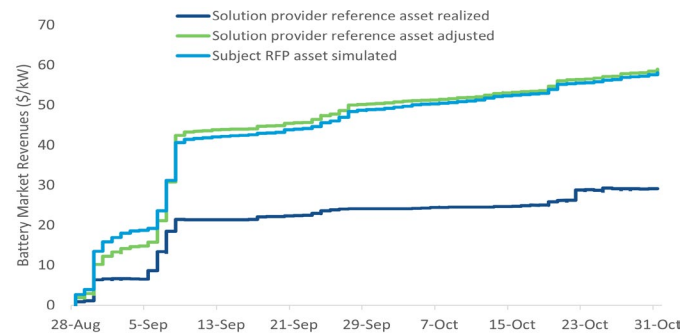
shown in **Figure 5**, where actual realized revenues for a reference project provided by Solution Provider B, are adjusted to correct for BESS plant outages and derates and scaled by energy price volatility (RTB120) to the reference node's volatility. This normalization approach allows a buyer to see how revenues from various solution providers would look at their future project's node.



**Figure 5:** Adjusting realized revenues for operational reference projects.

Accurately comparing the performance of unrelated solution providers' operational reference projects with the simulated performance of future projects considered by the RFP requires proposals to clearly spell out all assumptions they are making in these comparisons. To mitigate this issue, Ascend computes normalized revenues between operational reference and RFP simulated assets based on actual availability inclusive of outages and derates during operational hours. For example, if an operational reference asset's available capacity in an hour was 0 MW, those hours would be removed from simulated cumulative revenue for the RFP asset being evaluated. Similarly, if an operational reference asset's available capacity in an hour measured 50%, the reference asset's revenues would correspondingly scale up by a factor of two to compare with the RFP simulated asset in the proposal. As shown in **Figure 6**, a solution provider reference asset's realized revenue is approximately 50% of the adjusted revenue due to physical challenges experienced by the battery, forcing the asset to be on outage for roughly half of every day in the first few months of operation, and from using a sub-optimal strategy because of delays in ancillary service approval from the ISO post-COD. Comparing the reference asset's adjusted revenue with the RFP asset's simulated performance (shown in green and light blue lines respectively), however, reveals a consistent performance across assets. These examples provide relevant context for RFP evaluators, underscoring the importance of including specific details on what assumptions they would like solution providers to consider when comparing operational reference asset's realized/adjusted revenue vs Subject RFP asset simulated

data. Doing so helps to reduce overall bias in the assessment process and adjusts for these common startup issues.



**Figure 6:** Solution provider reference asset's realized revenue is ~50% of the adjusted revenue due to physical challenges of the battery forcing the asset to be an outage ~12 hours every day in the first few months of operation and using sub-optimal strategy because of delay in ancillary service approval process.

Finally, other factors remain crucial when evaluating bid optimization platforms. While some RFPs do consider the ability of the platform to customize bidding strategies and the overall level of control the solution can provide its users as an evaluation criterion, many RFPs do not account for this. Using a tool like Ascend's SmartBidder provides users with multiple levels of control, including custom strategy formulation and evaluation, default/fallback bid submission in case of software malfunctioning, and an option for users to override model-generated bids if they do not agree with the optimization algorithm or if they are forced to manually manage the asset because of certain physical or financial constraints during certain hours. This flexibility empowers SmartBidder users and their teams to leverage their market insights alongside those provided by the SmartBidder platform and the Ascend team to ensure full alignment with their risk-return profile. With these evaluation components and their consistent application included in the RFP, asset owners have the right tools to accurately assess the competitiveness of proposals, and ultimately make the best decision for their asset.

### SmartBidder: Bid Optimization and Scheduling Services for Energy Storage and Renewables

SmartBidder uniquely offers a unified platform for custom bid optimization combined with scheduling services to manage asset performance and operations for storage, renewable, and hybrid assets. The solution enables users to develop their own customized bid strategies based on nodal specific forecasts, asset specific constraints, and risk-based optimization for day-ahead and real-time bids.

## Appendix A: Performance Demonstration Instructions

Please request a copy of Appendix A in writing from Ascend Analytics by emailing [info@ascendanalytics.com](mailto:info@ascendanalytics.com).

Ascend Analytics, an innovative leader at the forefront of the energy transition, offers advanced software and consulting services that capture the evolving and real-time dynamics of energy markets. Unlike any other solution providers in the renewable energy industry, Ascend Analytics provides its customers with optimized and comprehensive decision analysis that covers everything from long-term planning to real-time operations in the electric power supply industry.

Leveraging its proprietary software and more than 20 years of expertise mapping physical conditions with financial outcomes, the company provides critical insights to steward capital investments and manage operations, making it an invaluable and key partner to utilities, developers, financiers, and corporate off-takers in managing the complexities of energy portfolios and markets. The company's unique ecosystem - which includes planning, valuation, risk management, and ISO operations - is trusted by more than 150 leading-edge businesses and is the platform-of-choice that fuels more than \$6 billion in independent economic assessments.

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