Turn **BESS** into an integrated **portfolio value driver**

Your assets. Your rules.

The **next evolution** of BESS optimization

Generation 1

- Fixed FCR strategy
- Revenue maximization per asset
- External optimizer

Next-gen BESS Optimization

- Multi-market optimization
- Portfolio-aware decisions
- Asset owner owns optimization capability

Optimization is becoming a core capability - not a service to outsource

Two **operating models**

Outsourced optimization	In-house optimization
External optimizer decides	Asset owner defines strategy
Black-box algorithms	Transparent optimization
Shared roadmap	Tailored to portfolio
Limited flexibility	Full control
Margin shared	Economics retained
Vendor dependency	Internal capability

Tokwise enables the second model with GuardianTrade

GuardianTrade BESS - **build your in-house optimization**

One Platform for All Your Assets

Connect BESS assets to your trading landscape. We empower portfolio-centric trading without fragmentation.

Profit-first optimization with built-In battery protection

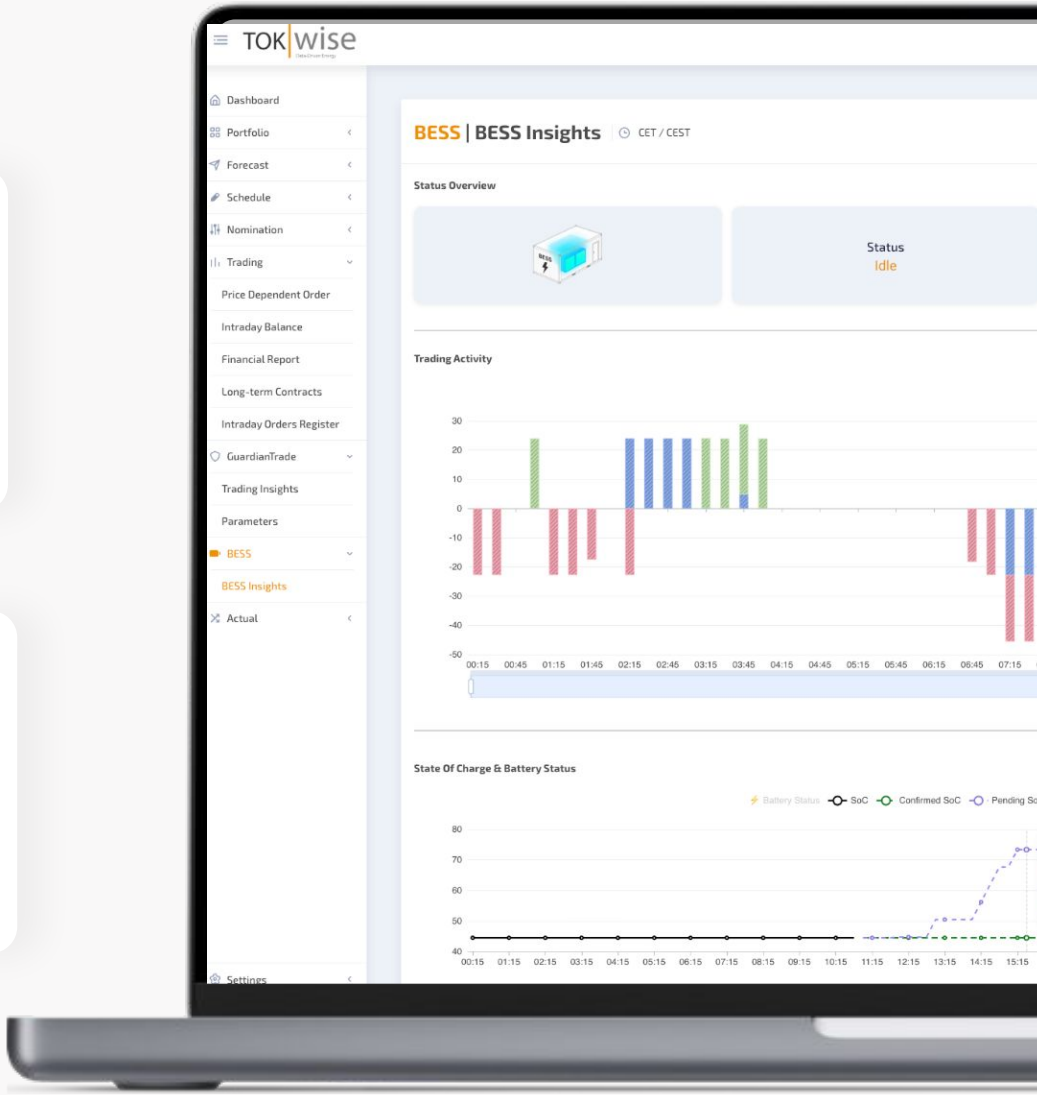
Define your optimization objective and configure battery constraints. Every strategy respects warranty limits, cycle economics and degradation cost.

Automated trading - your control

Algorithmic trading and dispatch with human-in-the-loop oversight. You choose the level of automation - we guarantee execution quality.

Your assets. Your rules

Clear strategies, explainable decisions, live PnL, asset status, and override controls.



TOK|wise

How does TokWise **enhance your algo trading for BESS**

TOK|wise
Data-Driven Energy

	Conventional Algo Trading	GuardianTrade
	Point in Time decision, optimal execution of single position	Multi-stage and forward looking optimization of chain of dependent positions
Decision Unit:	Single position - price, volume, risk and aggressiveness of execution	**Decision Unit:** Full trajectory across all markets and time horizons Value depends on ability to take future decisions
Dependency:	Each trade is self contained, independent from next actions	**Dependency:** Every decision impacts next available position Every position carries an opportunity cost that propagates forward in time across next market windows
Physical Constraint:	You can always buy or sell regardless of prior decisions	**Physical Constraint:** Physical coupled decision chain SoC connects every trade

Multi-market optimization - GuardianTrade BESS

Value Allocation (D-1 before 08:00)

OBJECTIVE

Allocate battery flexibility to its highest-value uses per time block.

INPUTS

- Starting SoC
- DA / ID / FCR / aFRR price forecasts
- Expected activation
- Grid & EMS constraints

OPTIMIZATION LOGIC

Use DA, ID and FCR/aFRR price forecasts to evaluate arbitrage value and opportunity cost, and optimally allocate battery flexibility to maximize expected revenue, subject to all physical and market constraints.

OUTCOME

- FCR/aFRR bid matrix
- Remaining flexibility for DA/ID
- Initial SoC corridor

Ex: BESS 10 MW / 20 MWh · SoC: 52% → aFRR attractive 06–14 → 6 MW bid

Reserve Clearing (D-1 before 11:00)

OBJECTIVE

Lock reserve commitments and translate them into time-varying SoC and MW constraints.

INPUTS

- Accepted FCR/aFRR bids & directional requirements
- Remaining flexibility
- DA price forecast

OPTIMIZATION LOGIC

Convert reserve commitments into SoC corridors.

OUTCOME

- Updated SoC corridor
- Remaining flexible MW/MWh

Ex: aFRR accepted: 6 MW (06–14) · SoC corridor at 6am: 40–60%

DA Optimization (D-1 before 12:00)

OBJECTIVE

Build optimal DA position considering already-cleared reserves and DA/ID arbitrage opportunities.

INPUTS

- Cleared reserve constraints
- DA price forecast

OPTIMIZATION LOGIC

Optimize DA trades within remaining flexibility, with DA primarily used to place SoC correctly for reserve windows.

OUTCOME

- DA bid matrix
- Charge/discharge schedule
- Reference SoC corridor

Ex: Charge 4 MW (02–05) to reach ~55% SoC at 06:00 · Limited DA discharge during reserve hours

Reserve Activation (Intraday)

OBJECTIVE

Deliver reserves and update real state.

INPUTS

- Activation signals
- Real SoC

OPTIMIZATION LOGIC

Automatic delivery — no trading decision required.

OUTCOME

- SoC updated
- ID flexibility recalculated

Ex: aFRR up at 7:00 → 3 MW × 15 min → 0.75 MWh · SoC: 55% → 51%

Intraday Re-Opt. (every 15 min)

OBJECTIVE

Actively manage SoC, recover from activations, and exploit short-term volatility.

INPUTS

- Updated SoC
- ID prices & spreads

OPTIMIZATION LOGIC

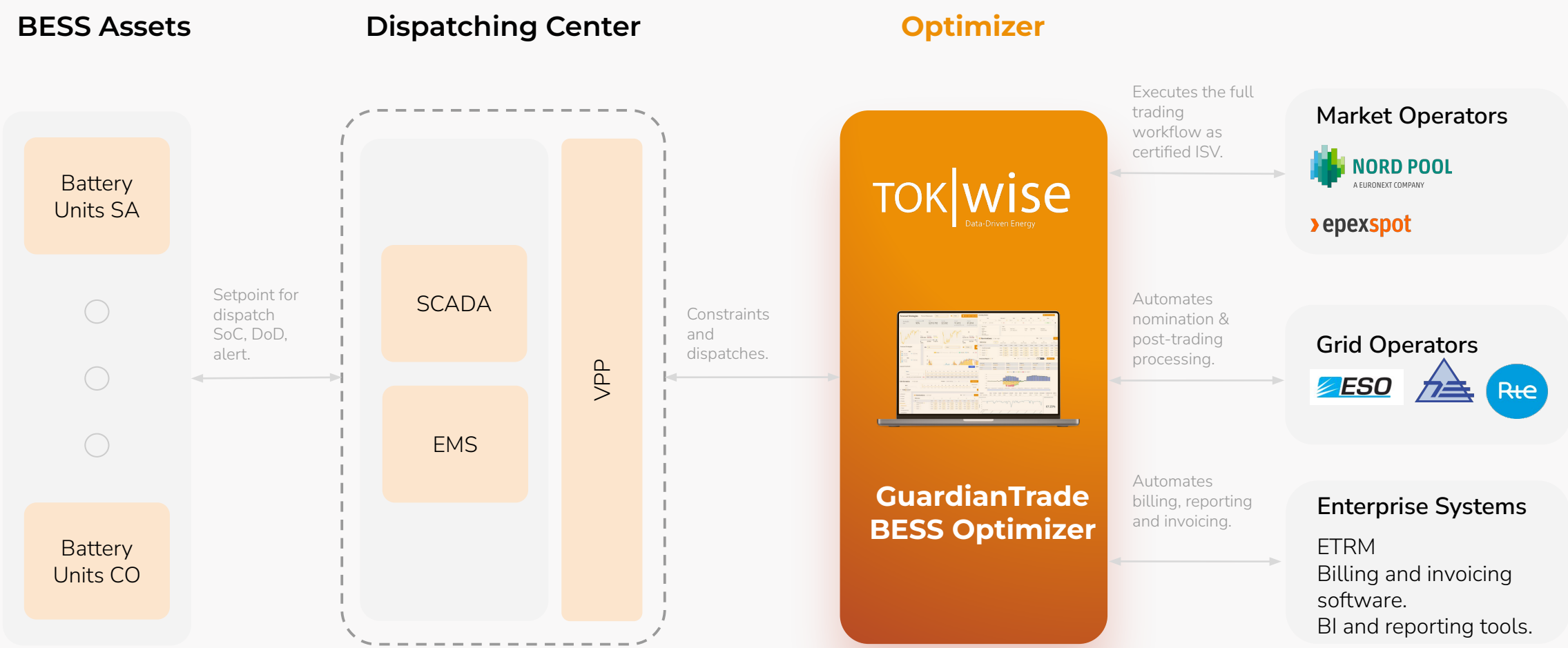
Continuous re-optimization to maintain reserve readiness, recover SoC after activations, and capture short-term volatility when spreads exceed marginal cycle cost.

OUTCOME

- ID orders executed
- Charge/discharge schedule

Ex: ID discharge +2 MW × 30 min → SoC rebalanced

TokWise in the BESS architecture - **your in-house optimization engine**



Colocated BESS use cases depend on Client optimization goal

Configuration	Optimization scope	Key questions to ask	Driver
1. Split optimization + aggregated reporting	Photovoltaic and battery energy storage system optimized independently. Nominations and trades are aggregated at portfolio level.	Do balancing group rules require a joint nomination?	Revenue
2. Grid-fee co-optimization	Optimizer can charge battery energy storage system from grid. Grid tariff included in the objective alongside market revenue.	What tariff regime applies? Is there a hard capacity limit? How is avoided grid cost reflected in profit and loss?	Revenue
3. Grid-charge cap (regulatory)	Same as above, but grid charging is capped at a defined percentage of total battery energy storage system charging — typically a subsidy or offtake condition.	What is the exact cap and measurement period? Is it a hard constraint or penalty term? What is the audit requirement?	Constraint
4. Portfolio imbalance optimization	Battery energy storage system closes photovoltaic imbalance in real time (passive) and/or takes deliberate long/short positions on the imbalance market (active).	Passive only or active positioning? How to prioritize versus other battery energy storage system revenue streams?	Revenue or Constraint
5. Curtailment reduction	Battery energy storage system absorbs photovoltaic output that would otherwise be curtailed, storing it for dispatch at a later time.	What is the source of curtailment — grid connection limit, transmission system operator instruction, or negative prices? Is there additional benefit to not curtailing the park (avoided costs)?	Both