GRID SOLUTIONS

# Electricity Trading Solutions

Grid Solutions, Inc.

# Overview of Electricity Trading Solutions (1/3)

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**JEPX**
- Revenue expansion
- Procurement of kWh in case of shortage

**Capacity Market /D&S Market**
- Revenue expansion

**TSO**
avoid imbalance

VEN

## Scope of our Solution

*We provide one-stop service to PPS and aggregators

### Forecast
Generate Forecast from resource performance and external API (weather info etc.)
- Demand
- PV panel (generation)
- Battery (SoC)
- EV battery (SoC)

- JEPX price

### Optimization
Generate a resource control schedule, with demand forecast and JEPX market price forecast, based on AI optimization logic
- Control schedule generation
- Payoff calculation
- Payoff optimization

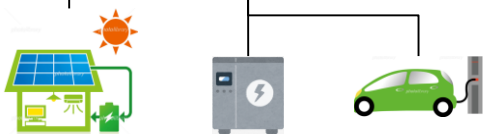
### Business Logic
- Create & Distribute Control instruction
- Imbalance check
- Baseline calculation
- Resource management
- Performance management
- System Configuration
- Cognitive Analytics of Demand Response

**Remote control of individual resources**

**Renewable Energy/Community Consumption**

**Household**

Gateway




**Factory Facility**

Gateway

**ESS**

Gateway

Gateway

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# Overview of Electricity Trading Solutions (2/3) ~Resource Control~

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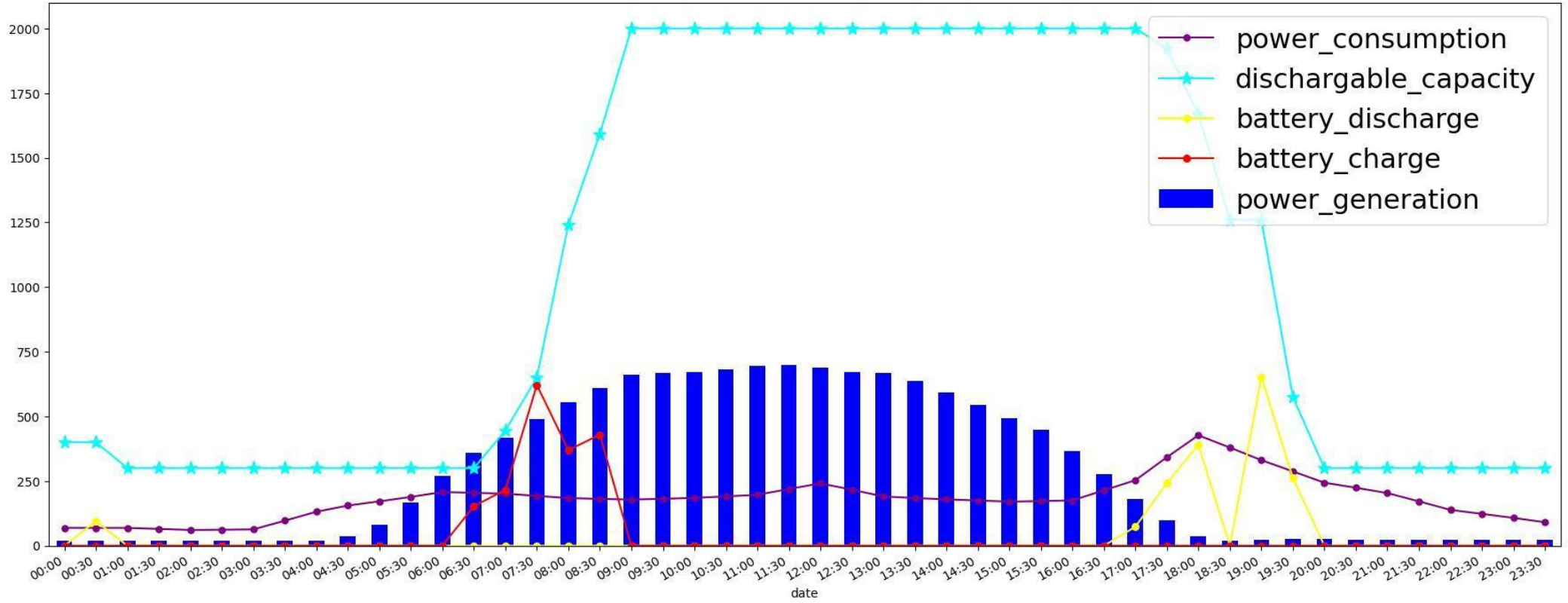
Based on the **demand, power generation**, and **price forecasts** by “Forecast Engine", “Optimization Engine" generates a **charge / discharge plan for the storage battery that avoids imbalance.**

## Charge / Discharge Plan



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# Overview of Electricity Trading Solutions (3/3) ～Trading plan～

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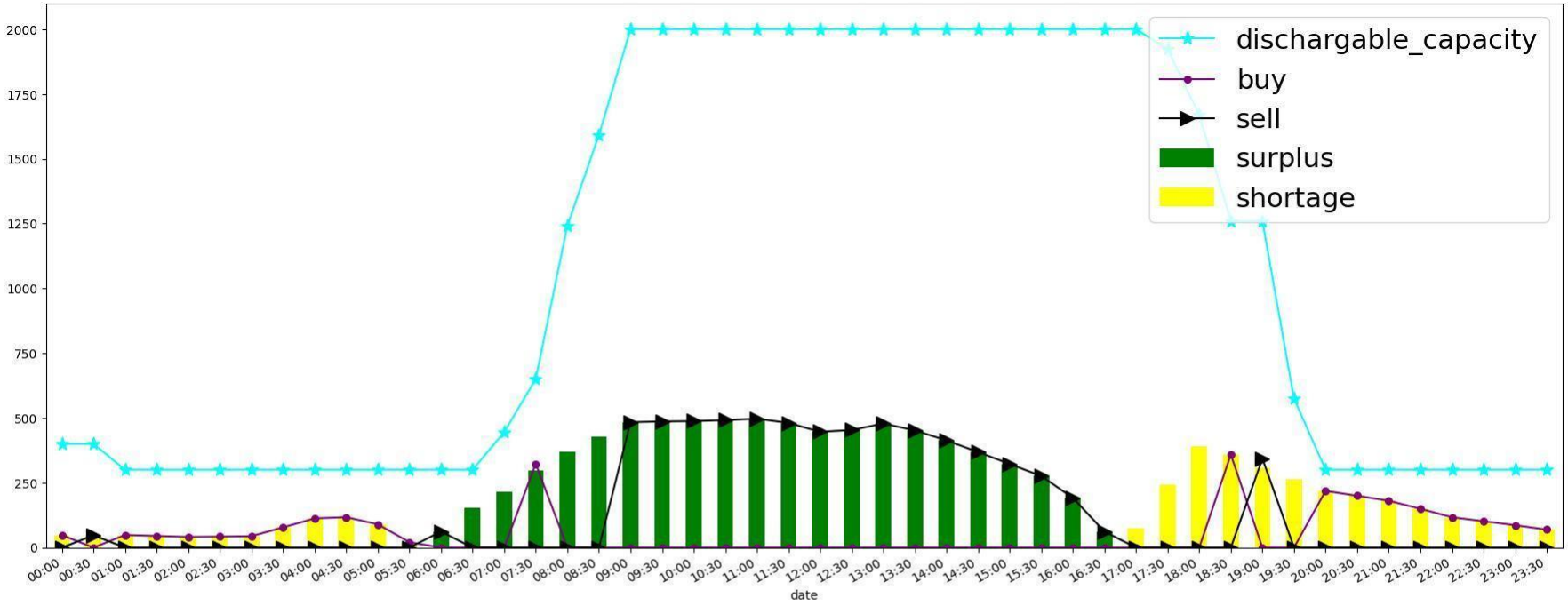
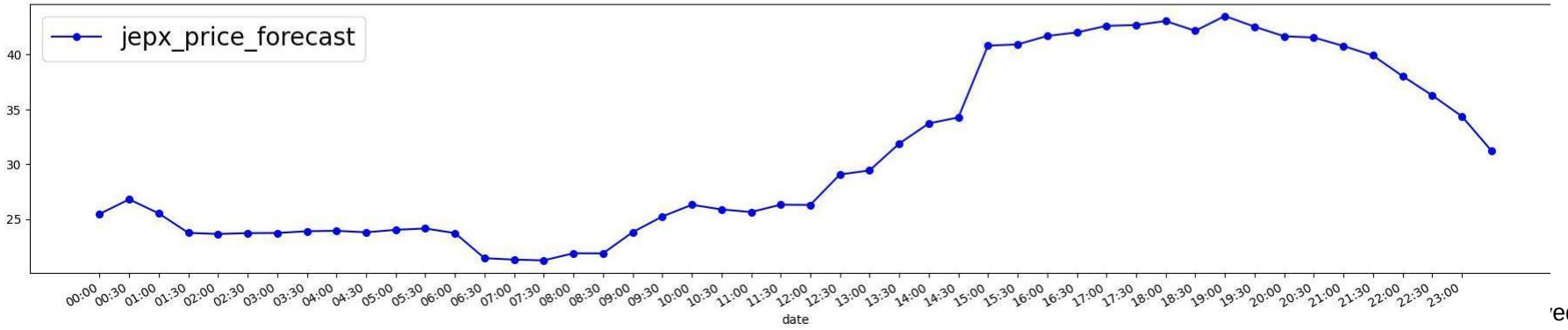
Based on **power generation and spot price forecast** by “Forecast Engine", “Optimization Engine" creates a **transaction plan at JEPX for the next day.**




ed.

# Main functions provided by Electricity Trading Solutions (1/2)

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## Forecast Engine

### PV Generation Forecast

- Since the amount of power generated by renewable energy resources is constantly changing, it is necessary to improve the forecast accuracy. Our AI-powered engine predicts PV power generation through external APIs such as resource performance data and weather information, and links the forecast data to business logic.
- Our AI-powered forecast engine is a tool that **uses machine learning algorithms and deep learning** to automatically make forecasts based on time series. This algorithm trains predictive models and handles outliers and missing data sets.
- Our engine provides 2-day forecasts and the interval can be set on request (ex.30 min)

### JEPX Price Forecast

- Provides price forecasts for the JEPX Spot Market.
  - ✓ Prices : System price, Area prices
  - ✓ Period : Day, Week, Month
- Since the data pattern of the Spot Market is different from PV generation, and that the price forecast time period is 1 day ahead, we have revised the logic of data modeling, model algorithms, and config from the PV Forecast Model.
- Some of our price forecasts are available free of charge on our website.
  https://gridsolutions.co.jp/en/ai/



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# Main functions provided by Electricity Trading Solutions (2/2)

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## Optimization Engine

### Schedule Optimization

- Our Optimization Engine creates a **demand and supply plan to avoid imbalance**, based on the actual resource performance and the power generation forecast provided from the forecast engine. At that time, the optimization engine can **autonomously create control instructions for resources without relying on control instructions from the grid**.
- Our business logic checks for supply and demand imbalances every 30 minutes, and if imbalances occur, returns a response to the optimization engine, which recreates the demand and supply plan.

### Payoff Optimization

- Our Engine also creates a trading plan for the JEPX spot market based on the 48-hour optimized schedule. For the time of the successful bid, the Engine creates a control instruction for the amount of the successful bid.
- The transaction price can be set in the following two ways
  - ✓ **AI-based Optimal price logic**: Optimization engine directs buying and selling at a price that maximizes payoffs
  - ✓ **Arbitrary threshold price**: Instruct to buy or sell at the threshold set by the customer



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# Company Overview

GRID SOLUTIONS

- Company　Grid Solutions, Inc
- Location　Suite 311 5-26-8 Kamata Ota-Ku Tokyo 144-0052
- Founded　April 2012
- CEO　Yohei Takahashi
- Bank　SMBC Kashiwa Branch
- Business　Development of Smart grid, Demand Response, VPP solutions
  - ✓ OpenADR solutions
    - OpenADR2.0b certified（VTN, VEN）
  - ✓ VPP solutions
  - ✓ AI-based forecast engine
  - ✓ Participated in the Capacity Market, and Demand and Supply Adjustment Market



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