



Tilda Japan Co., Ltd.

Development and Demonstration of an AI Solution for Real-Time Control of Storage Batteries in Self-Consumption Solar Power Systems Aimed at Reducing Electricity Consumption in the Manufacturing Sector

Purpose of the Project

■ Project Summary

This project focuses on behind-the-meter solar PV systems at factories. By introducing an AI-powered battery control and EMS, it enables the integrated and optimized operation of solar power generation, battery storage, and grid power. The goal is to reduce peak power demand and thereby lower electricity costs.

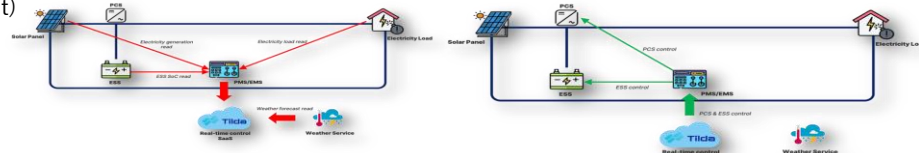
■ Challenges and Needs

Against a backdrop of rising energy prices, reducing electricity costs and mitigating peak demand have become critical challenges. Conventional self-consumption solar systems typically use simple battery control, failing to fully utilize its potential. Consequently, there is a growing need for AI-based real-time battery control.

■ Expected Results and Uniqueness of the Solution

Conventional systems rely on simple battery control and are often ineffective in reducing peak demand. This project uses AI-driven EMS to optimize battery operation based on weather data and historical electricity consumption data, reducing peak grid usage and saving electricity costs by more than 20%.

Tilda's AI solution gathering information (left) and controlling the battery storage system in real time based on that information (right)



Details of Demonstration

■ Roles and Collaboration with Partner Companies

Our partner is Tilda Co., Ltd. , which is responsible for AI development. In addition, an NDA was signed with Think i Inc. to secure a demonstration site, and the development of the EMS and gateway systems, as well as the demonstration testing were carried out jointly with the company.

■ Schedule

From June to September 2025, Tilda Japan collected data required for AI training and EMS/gateway development. From August to November 2025, Tilda Corp. developed the AI algorithms and began integrating a weather data API in September. In December, communication testing with the completed gateway was finalized, followed by a field test at a demonstration site in January 2026.

■ Details of Demonstrations

We selected a factory already equipped with an EMS as the demonstration site and replaced only the EMS control system with our proprietary AI-integrated system, without modifying hardware configuration, including solar panels, storage batteries, and PCS. This enabled a comparison between conventional control and the AI-based solution, allowing quantitative evaluation of electricity cost savings and operational feasibility. We integrated weather data and historical electricity consumption data into the AI system and identified communication protocols between the gateway and devices. Following communication testing, real-time control was implemented at the demonstration facility.



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Project Outcome

■ Design Optimisation of behind-the-meter solar PV systems

Based on the factory's historical electricity demand, solar radiation data at the installation site, and the customer's energy cost reduction targets, AI can determine the optimal capacities of solar panels, PCS, and battery energy storage system within two minutes.

■ AI-Based Prediction of Electricity Demand and Solar Power Generation

AI analysis enables the prediction of electricity demand at the demonstration plant and solar power generation up to 72 hours in advance. This also enables the prediction of the most efficient battery operation strategies.

■ Development of a Gateway

We developed a gateway after identifying the information of the communication protocols of storage batteries and PCS to enable real-time control of the solar power generation system at the demonstration plant.

■ Real-time Control and Optimisation of the Solar Power Generation System at the Demonstration Plant

By successfully establishing communication with various devices via a gateway with the "AI Solution for Forecasting Electricity Demand and Solar Power Generation," real-time AI-based control was achieved. This enabled more efficient operation of both the solar power generation system and battery storage. As a result, peak demand was efficiently managed, leading to more than a 20% reduction in electricity costs.

Challenges and Solutions

■ Challenges

Going forward, gateways compatible with a wider range of devices will be required. However, since communication protocols for solar panels and battery storage systems differ by manufacturer, they must be identified on a case-by-case basis. For future business expansion, cooperation from manufacturers in disclosing their communication protocols will be essential. However, as many manufacturers do not design their products for third-party control, gateway development may take time.

■ Solutions

At this stage, developing a gateway compatible with devices from all manufacturers is difficult due to cost and resource constraints. Therefore, we will initially focus on major manufacturers and expand compatibility in a phased manner.

Future Plans

■ We have begun acquiring customers to monetize this project. The solution has been well received by the market, and an increasing number of companies are considering its implementation. In parallel, we are improving its accuracy while finalizing the pricing model for initial deployment and annual subscription fees.

■ Going forward, we aim to expand into overseas markets such as Vietnam, Luxembourg, Germany, Australia, South Korea, and Thailand. To achieve this, collaboration with local subsidiaries is required to collect various data. However, the necessary development data is not yet fully available. Therefore, securing such data remains a challenge.