

Introducing Resilient Base That Supports Head Office of Maintenance Business: Meiko Building

Keywords Resilience, Sustainability, Multi-PCS

Abstract

Our products support society's critical infrastructure by supplying electricity. Field service engineers under the Field Service Engineering Division of Meiden Engineering Corporation ("Meiden Engineering") work day and night to operate and maintain that infrastructure. To fulfill this heavy responsibility, a resilient base of operations is essential. Meiden Engineering made the state-of-the-art Meiko Building as a head office location of the company. It provides safety and security of infrastructures to its customers.

The Meiko Building is a mid-sized building with various resilience features that enable it to withstand increasingly severe torrential rains (intensely heavy downpours) and large typhoons due to climate change, as well as the upcoming Nankai Trough earthquake and Tokyo metropolitan earthquake. The building's sustainability features, which contribute to preventing global warming, have earned it high praise and recognition, including various awards from the government and academic societies.

1 Preface

As part of Meiden Kosan Corporation's 50th anniversary celebrations, the Meiko Building was rebuilt as the company's headquarters and tenant building, and construction was completed on March 1, 2022.

Initially, the building was planned as a conventional one, but it was decided to house the Maintenance Division of Meiden Engineering Corporation ("Meiden Engineering"). This division protects critical social infrastructures in Japan. Design changes were made to improve resilience so that the headquarters functions could be maintained even in emergencies such as major disasters. Furthermore, by aiming to balance sustainability with societal demands such as preventing global warming, the building was designed to operate in harmony with the local community. Thorough energy-saving attempts and renewable energy introduction were made, resulting in a net-zero emissions building. This paper introduces the Meiko Building's high resilience and sustainability initiatives.

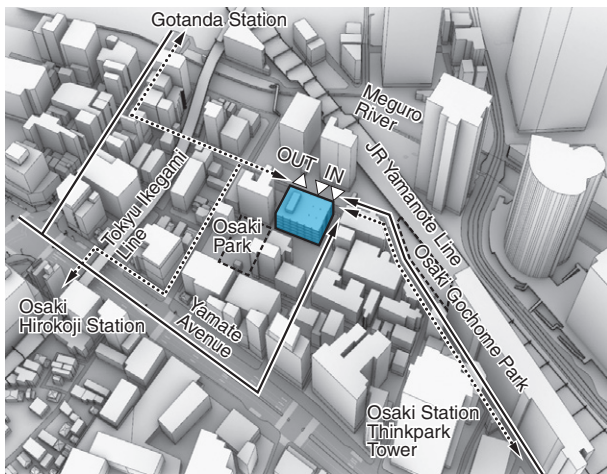
2 Outlines of Construction

The construction site is located in a Category 1 low-rise residential district, a five-minute walk from Meiden's head office building – ThinkPark Tower. It is a three-minute walk from JR Gotanda Station. It offers excellent convenience and a favorable environment with several parks nearby. **Fig. 1** shows the construction overview.

3 Resilience Performance

The Business Continuity Plan (BCP) of this construction is as follows:

- (1) Building anti-seismic performance: Class II, based on the Ministry of Land, Infrastructure, Transport and Tourism's anti-seismic standards. The building has a tolerance of more than 1.25 times the required strength during an earthquake.
- (2) Various earthquake-resistant preventing tools or devices are used to reduce the risk of equipment and finishing materials tipping over or falling.
- (3) 60 cm-high water stops and rising walls are used to prevent inland flooding (inside levees flooding).



◀---▶ : Traffic lines of pedestrians (Access from public transport)
 ←→ : Traffic lines of vehicles

Site and Project Outlines

Location: 5-5-5 Osaki, Shinagawa-ku, Tokyo
 Client: Meiden Kohsan Co. Ltd.
 Purpose of the building: Office
 Site area: 1,593.36 m²
 Building area: 1,170.45 m²
 Gross floor area: 5,680.56 m²
 No. of floors: 5 floors above the ground
 Construction: Steel construction
 Construction period: 1 April 2021 to 1 March 2022
 Design/construction: Takenaka Corporation

Fig. 1 Construction Overview

A construction overview is shown.

- (4) 30 mm/10-minute rainwater drainage capacity for torrential rains and automatic switching to a natural discharge system when the rainwater runoff control tank is full.
- (5) The first floor is 5 m high, with important communication control equipment located on the second and third floors and power equipment on the roof, to prevent the risk from the Meguro River flooding.
- (6) Flood-resistant elevators allow operation on floors 2 through 5 even if the first floor is flooded.
- (7) A disaster prevention warehouse to stock up on food and water for evacuation (for 96 people × 3 days per floor) is there on each floor for people having difficulty returning home after a disaster.
- (8) Solar power generation, stationary batteries, Electric Vehicles (EVs), chargers, and a mobile genset enable to share backup power sources.
- (9) Manually operated windows allow for natural ventilation, enabling continuous ventilation even without a power source.
- (10) Self-powered sanitary fixtures are installed in the first and second floor restrooms, and the stormwater runoff control tank can be used as a temporary emergency drainage tank in the event of



EV charger (to be installed this year)
 Mobile genset parked on the ground floor parking lot
 Mobile genset and connector panel for the genset

Fig. 2 Conditions of Equipment Installation

Situation is shown about installation of solar power generation, stationary batteries, EV battery chargers, mobile genset, and others.

a sewerage infrastructure disruption.

As mentioned above, numerous resilience features are implemented to support the functions as a head office of the Maintenance Business.

4 Sustainability

Our efforts to achieve both resilience and carbon neutrality are as follows:

- (1) Envelope performance^{*1} that combines views with high insulation.
 - (2) Promoting greenery on the ground and rooftop.
 - (3) Active use of recycled materials.
 - (4) Reducing equipment capacity by optimizing power supply and air conditioning heat load setting.
 - (5) Adoption of high-efficiency air conditioning units and energy-saving controls.
 - (6) Adoption of a highly efficient renewable energy system linking solar power generation, stationary batteries, and EV chargers using our newly developed Multi-PCS (Power Conditioning System).
- Fig. 2** shows the Multi-PCS installation. **Fig. 3** shows its configuration.

As a result of these efforts, the building achieved the highest rating of ☆☆☆☆☆ and ZEB (Net Zero Energy Building) Ready under the “Building-Housing Energy-efficiency Labeling System (BELS)” Certification. **Fig. 4** shows the certification plaque. Furthermore, by receiving all of the remaining energy from a wind farm operated by

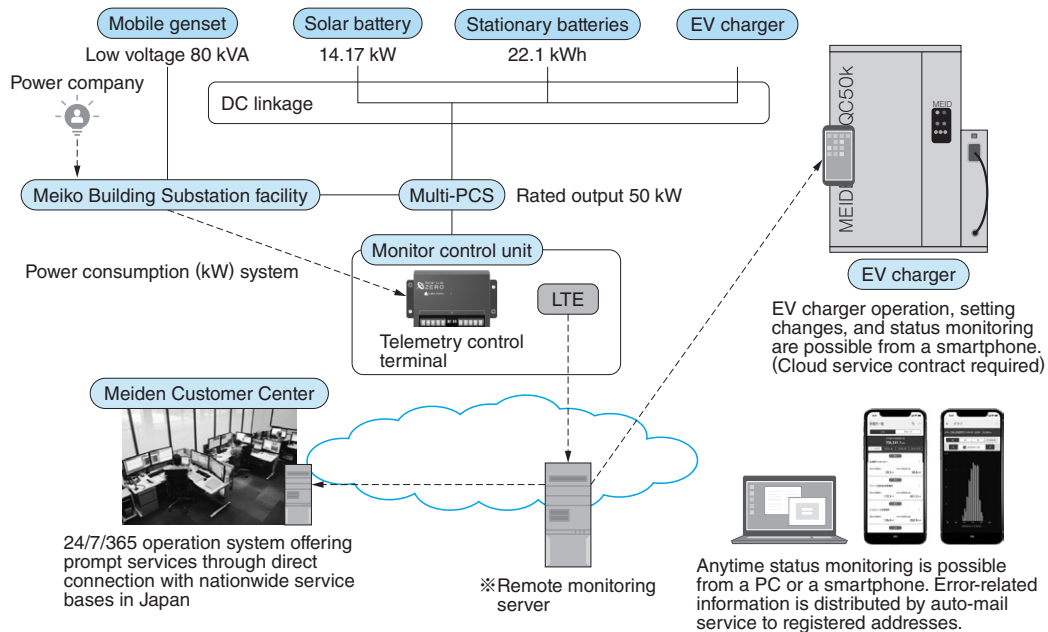


Fig. 3 Multi-PCS System Combines Renewable Energy Utilization and Emergency Power Supply

By consolidating the PCSs previously required for one-to-one connections into a single unit, we have enabled a DC link, improving efficiency. Furthermore, we have made it possible to connect a mobile genset and emergency generators, which have previously been difficult to integrate with other companies' PCSs.

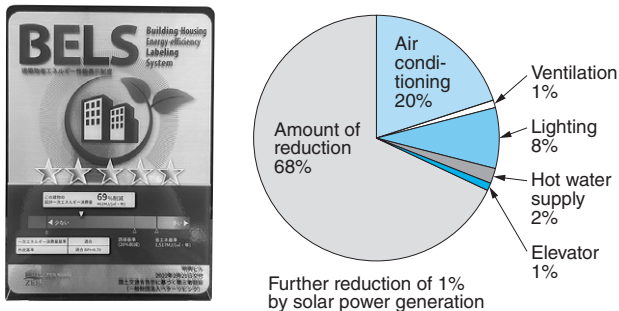


Fig. 4 BELS Authentication ☆☆☆☆

The ZEB Ready BEI value (reduction rate) is 0.31 (69% reduction).



Fig. 5 Scheme of CO₂-Free Power Made in Meiden

The system receives 100% of its electricity from the Choshi Shiosai Wind Farm, operated and managed by M-Winds Co., Ltd.

M-Winds Co., Ltd., a Meiden Group company, the building is a net-zero emissions and has become a zero-emissions building. Fig. 5 shows how this works.

5 Social Communication

As part of its further efforts to foster coexistence with local stakeholders, Meiko Building has signed a disaster prevention agreement with a nearby nursery school and is hosting evacuation drills with the school. Furthermore, to support tenant livability, work efficiency, and workstyle reform, the building has implemented Activity Based Working (ABW)^{※2} and a facial recognition system for entrance. Fig. 6 shows the facial recognition system manufactured by Meiden System Solutions Corporation.

(1) Minister of the Environment Award for Fiscal 2022 Climate

Change Actions: Advanced Implementation/Active Practice Category (Mitigation/Adaptation Category) ABW and our multi-PCS were installed in Meiden Kosan's new head office building.

(2) Excellence Award for Zero Carbon Challenge Cup 2023

Contributing to carbon neutrality throughout our group value chain

(3) 35th Institute Award organized by Electrical

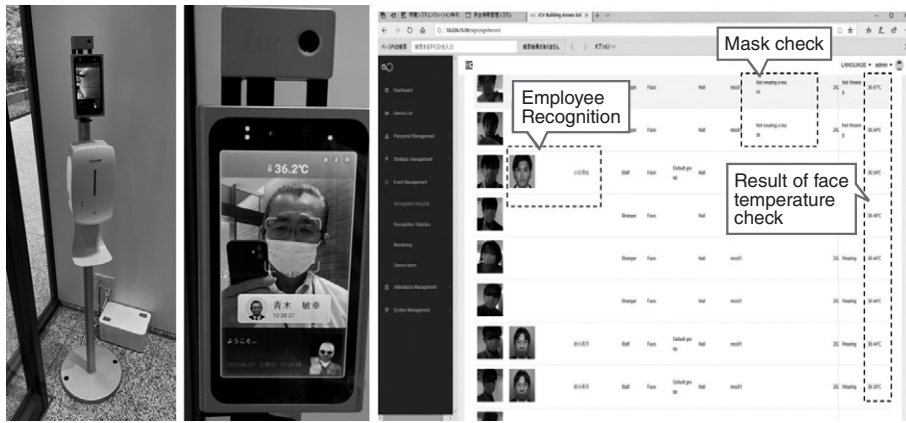


Fig. 6 Face Recognition System Developed by Meiden System Solutions Corporation

Features include access control, temperature measurement, facial recognition security door unlocking, and disinfection. Time clocking will also be possible in the future.

Installation Engineers of Japan – in particular, Technology Promotion Category Promotion Award Meiko Building’s electrical equipment

6 Postscript

We believe that the Meiko Building, through a variety of creative ideas, starting with a rational building facility plan, has been constructed as a pioneering building that will realize a society that is both resilient and carbon-neutral. We hope that this article will contribute to the creation of a better society in the future.

- BELS is the registered trademark of Housing Quality Assessment and Display Association.
- All product and company names mentioned in this paper are the trademarks and/or service marks of their respective owners.

(Notes)

- ※1. The performance of a building’s envelope indicates how well the exterior walls, windows, roof, floors, etc. prevent heat from entering or leaving the building, and how energy efficient it is.
- ※2. ABW means a flexible work model where employees choose their work location and environment based on the specific activity or task they are performing, rather than being tied to a fixed desk or workstation. These wide-ranging initiatives were recognized and awarded.