

SPOF Mitigation for 72-Hour Whole-Facility Continuity During Power and Infrastructure Outages | Energy Multiplexing of Gas and Power

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Overview

At a building housing Hakujuen Special Nursing Home, Sakura Day Service Center and Nishimuko Minori Nursery School, utility and on-site power, city gas and LP gas, high-voltage receiving equipment, two 54 kVA-class LP gas generators, a 980 kg disaster-response bulk storage tank, smart metering and 24/7 monitoring were integrated to support whole-facility continuity for at least 72 hours under planned load, fuel and operating conditions.

Case Answer

Installing a generator alone does not create 72 hours of facility continuity

This project built a BCP power system for a single building that houses three social-welfare services: a special nursing home, a day service center and a nursery school. The requirement was to maintain facility functions including air-conditioning, elevators, kitchens, communications, water supply and drainage during power and wider infrastructure outages.

Long-duration continuity cannot be achieved simply by installing an emergency generator. If fuel supply, high-voltage receiving and transfer, actual load, monitoring or staff operation becomes a single point of failure, the facility can lose function even while the generator itself is running.

The implemented system combines utility power and on-site generation, city gas and LP gas, high-voltage receiving and transfer equipment, two 54 kVA-class LP gas generators with a combined capacity of 108 kVA, a 980 kg disaster-response bulk storage tank, smart metering, 24/7 monitoring and staff operations as multiple operating paths across power, fuel, monitoring and operation.

Against a contracted demand of 151 kW, generator capacity was selected using a normal daytime average load of approximately 60 kW as the basis. The whole-facility load of the three services was included in the measurement and control scope. Within the planned load, fuel and operating conditions, the design targets at least 72 hours of facility continuity, while normal-time demand-control operation also serves as a live disaster drill under actual load.

Scope

- Special nursing home, day service center and nursery school
- Social-welfare facility with high-voltage electrical service
- Facility BCP requiring whole-facility load backup

Constraints

- Maintain facility functions including HVAC, elevators, kitchens, communications, water supply and drainage during power and infrastructure outages
- Make 72-hour continuity viable through actual load, transfer, monitoring and staff operation—not fuel volume alone
- Avoid dependence on a single supply path such as utility power or city gas

Evidence / References

Kei Communication Technology Inc. construction and operating records for this case

Supports: Implementation of two 54 kVA-class LP gas generators, a 980 kg disaster-response bulk tank, whole-facility transfer, smart metering and 24/7 monitoring

URL: <https://www.ieee802.co.jp/cases/case-009-energy-multiplexing-en.php>

Yomiuri Telecasting Corporation, Kansai Joho Net ten., broadcast record dated January 16, 2019

Supports: Broadcast record on autonomous distributed power that led to the start of consideration for this project

URL: <http://www.ytv.co.jp/ten/feature/archive/201901.html>

Kei Communication Technology Inc. technical paper, “ What Is the Basis for 72 Hours During a Power Outage? ”

Supports: Technical review of 72-hour facility continuity based on fuel, continuous operation, load management and self-reliant power conditions

URL: <https://offgrid.box.com/s/uywf9g8f6t44o9euk4irl1ww1u29zbqz>

Kei Communication Technology Inc., “ Reviewing BCP 72 Hours from the 2026 Kumamoto Earthquake ”

Supports: Related analysis of outage, water interruption and loss of welfare-facility functions across the first 72 hours of an actual disaster

URL: <https://www.ieee802.co.jp/articles/article-207-kumamoto-earthquake.php>

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