

Marine Decarbonization in Operation Since 2017 | Solar Off-Grid Power on Nantai

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Overview

The Lake Chuzenji sightseeing vessel Nantai entered service in August 2017 with 4.2 kW of CIS solar generation, 2.4 kWh of battery storage, and Personal Energy with up to 3 kW AC output. The independent system supplies 52 passenger outlets, cabin LED lighting, and Wi-Fi, while the onboard generator can serve as an auxiliary input when solar generation is insufficient. The system remains in scheduled service in 2026 after nearly nine years of marine operation.

Case Answer

Separate onboard service loads from propulsion and make solar the primary source of an independent power system

On a passenger vessel, propulsion power does not need to share the same electrical architecture as cabin lighting, Wi-Fi, information systems, and passenger outlets. In this project, onboard service loads that could be separated from propulsion were placed on an independent power system.

The primary source is Personal Energy with 4.2 kW of CIS compound solar generation, 2.4 kWh of battery storage, and up to 3 kW of AC output. It supplies AC power to 52 passenger outlets, cabin LED lighting, and Wi-Fi by storing and converting generated DC power into electricity that can be used onboard.

When sunlight is insufficient during cloudy or rainy weather, power from the onboard generator is fed into Personal Energy, rectified, converted, and supplied to the same onboard loads. The design does not depend on solar alone; it uses the existing generator as an auxiliary input while maintaining power quality and availability for passenger-service loads.

From its entry into service on August 10, 2017 through 2026, the system has been integrated into routine passenger operation for nearly nine years. While the vessel is berthed, the relevant passenger-service loads can be supplied from solar generation and stored energy, allowing operation without running the diesel generator solely to provide that electricity.

Scope

- Onboard service power for passenger and sightseeing vessels
- Loads separable from propulsion, including passenger outlets, LED lighting, and Wi-Fi
- Marine power systems combining solar generation, battery storage, and an existing onboard generator

Constraints

- Configure the service-power system separately from the main propulsion engines
- Supply stable AC power to passenger equipment despite changing solar conditions
- Allow the existing onboard generator to be used as an auxiliary input
- Support long-term operation in a vessel environment that includes vibration, humidity, low temperatures, seasonal lay-up, and limited maintenance space

Evidence / References

Kei Communication Technology Inc., “ Japan ’ s First Solar Off-Grid Passenger Vessel Enters Service on August 10 ” (August 10, 2017; Japanese)

Published: 2017-08-10

Supports: Implementation of the solar off-grid power system on Nantai and its configuration and intended loads at entry into service

URL: <https://kyodonewsprwire.jp/release/201708074455>

Nikkei XTECH, “ Solar Off-Grid System Built for a New Sightseeing Vessel on Lake Chuzenji, Nikko ” (August 15, 2017; Japanese)

Published: 2017-08-15

Supports: Contemporary reporting on implementation of the solar off-grid power system on the new sightseeing vessel

URL: <https://xtech.nikkei.com/dm/atcl/news/16/081508773/>

Lake Chuzenji Cruise official website (Japanese)

Supports: Operating information for Lake Chuzenji sightseeing vessels

URL: <https://chuzenjiko-cruise.com/>

Ministry of Land, Infrastructure, Transport and Tourism, “ Energy-Efficiency Equipment for a New Ferry and Technology Development for Installing Perovskite Solar Cells on Vessels ” (March 31, 2026; Japanese)

Published: 2026-03-31

Supports: 2026 technology-development context for marine decarbonization and vessel integration of new solar-cell technologies

URL: <https://www.mlit.go.jp/maritime/content/001994240.pdf>

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<https://www.ieee802.co.jp/cases/case-006-nantai-solar-offgrid-en.php>

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