Discover Why SunWize Selected GenStar for a Demanding Cold Climate Site Upgrade

Legacy 10-year-old design

Upgraded design

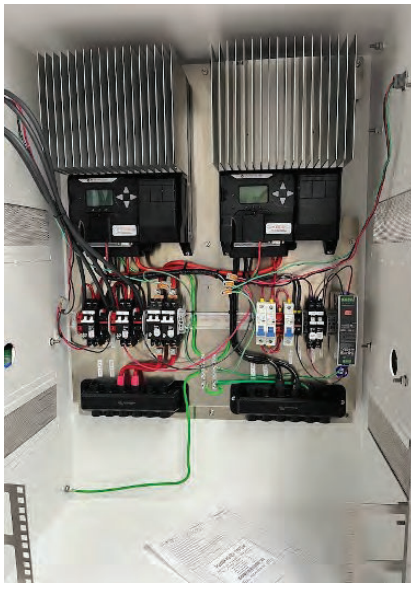
Summary

Morningstar's products function as a part of a solution for a project's solar energy needs. Exceptional and knowledgeable system designers look at a specific project's needs, goals, constraints, and environment and create an efficient and comprehensive solution for the solar energy system. In this case study, the engineering design team is from SunWize, working on a project with several environmental and space limitations while designing a system modernization with more power.

Project Overview

Project Needs and Goals

SunWize's case involved an already existing 10-year-old system that needed an update to keep up with increased power demand. The system is designed for a communications and remote monitoring application. The client required an increase in power output by three to four times the established system's power, increasing from 1,500 to over 5,000 watts. The most straightforward solution is an increase in solar array size. However, due to the environmental limitations, the SunWize team was required to get innovative about the system renovation.



Inside of the controls cabinet

Project Constraints and Environment

The project's solar energy system is located in a helicopter-only accessible region of North America with limited space. Winter performance was another key concern for this off-grid system, and this project required a solution that produced power even when snow partially buried the arrays. The updated solution needed to be close in physical size to the current system but significantly more powerful. Finally, the design team faced budget constraints as the project's funding would not be secured early enough for timely completion.

Project Development and Solutions

Phase 1: Design

The terrain characteristics limited accessibility so system parts were shipped in small, manageable parts.

For space maximization, SunWize developed a solution that utilized existing mechanical infrastructure while modernizing the electrical system with all-new components. This approach not only maintained the footprint but also optimized the overall installation process. A significant modernization included the use of bifacial solar modules that capture sunlight from both sides.

The power system was designed for simplicity, using solar energy and batteries as the sole power source and adding other cold weather protections during installation to minimize climate impact.

SunWize selected Morningstar charge controllers, specifically the GenStar GS-MPPT-100, known for their reliability, versatile programming capabilities, and ability to handle solar arrays up to 150% of the controller's rated power. The integrated communication capabilities and the controllers' successful completion of a rigorous cybersecurity test—marking the first time a solar charge controller had passed such a test—enabled remote monitoring for the first time in this environment. Ultimately, the integrated design consolidated charge control, load management, and communications, streamlined production, and reduced component complexity.

Finally, the design phase was funded separately and completed before final project approval to navigate budget constraints.

Phase 2 and Phase 3: Material Procurement and Final Assembly

Items with long lead times were identified early and purchased during a separate phase to prevent any delays.

Once design approval and materials were in place, SunWize was able to build and deliver the complete systems within two weeks of receiving full funding.

The final design of the solar energy system increased the array size without violating client space restrictions. The new system design allowed for final assembly without any concrete work.

During assembly, all digging was done manually and was mixed on-site, utilizing existing ground penetrations to accommodate the rocky terrain. Because of the segmented shipping methods, assembly and testing occurred on-site.

Additionally, to winterize the solution, SunWize incorporated bifacial solar modules, which capitalize on reflected light from snow and generate power even when the front of the array is snow-covered. This ensured greater power production during winter months, a crucial factor in maintaining system reliability. Winter protection through battery insulation and temperature monitoring ensured system performance in the cold climate. The MPPT controllers, paired with multiple solar module strings, allowed for power generation even when snow partially covered the array.

Conclusion

SunWize successfully overcame significant logistical, environmental, and technical challenges to upgrade the solar power systems in a remote, off-grid location. Through innovative design, the integration of advanced bifacial modules, reliable charge controllers, and a phased funding approach, SunWize delivered a solution that not only increased power capacity but also improved winter performance and enabled remote monitoring for the first time. The project showcases SunWize's ability to adapt to complex conditions and deliver high-quality, efficient solar power solutions in even the most challenging environments.

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