
MOXA
GreenPowerMonitor
a DNV GL company
Envisioning a Greener Future:
Achieving Real-time Monitoring and Control in Solar Power Plants
AT A GLANCE
BUSINESS CHALLENGE
SOLUTION
FORWARD

Transitioning to a Sustainable Energy Future

With policies aimed to limit the increase in the global average temperate to well below 2 degrees Celsius, along with concerns about rising fossil fuel prices, renewable energy resources have galvanized renewed interest worldwide as they are deemed the lowest carbon option. Australia is already rising to the challenges of producing half of its electricity from renewable energy sources by 2025. What's more, projections are that the whole country could be powered 100% by renewable energy sources by the early 2030s.

GreenPowerMonitor, a DNV GL company (GPM), is a world-leading independent vendor in the power energy sector and boasts a footprint in 75 countries. In Australia, especially, the company is playing a significant role in changing the energy landscape there. GPM is helping multiple utility-scale solar and wind farms, with a combined generation of 1,7 GW of renewable energy, to balance the supply-demand ratio in the power grid system. A recent project in the southeastern state of Victoria particularly showcases GPM's success, featuring an integrated solution for a combined 60 MW photovoltaic (PV) panel and 25 MW/50 MWh energy storage system.

GreenPowerMonitor, a DNV GL company

Founded in: 2008
Headquarters: Barcelona, Catalunya
Industry: Renewables & Environment
Number of Employees: 200
Website: www.greenpowermonitor.com

BUSINESS CHALLENGE

Optimizing the Demand-supply Balance

With regard to solar farms in Australia, GPM had to overcome a number of challenges. Most importantly, preventing data loss in a centralized platform that monitors and controls both solar power and energy generation. Operating in extreme temperatures specifically complicated GPM's task of delivering accurate and timely data. To ensure timely data, a power plant controller (PPC) with a response time of milliseconds was required. Therefore, GPM used Moxa's equipment to meet the requirements of a fast response time for the PPC.

According to Albert Carrera, Regional Manager for the APAC region at GPM, solar farms combined with battery storage systems are now commonplace in Australia, and the rest of the world has yet to catch up with this trend. He pointed out that storage of solar power in battery systems definitely helps stabilize energy output to the grid. As production of solar power is usually the highest around midday, it only makes sense to store the large volumes of produced solar energy as the demand during daytime is not so high. When energy consumption peaks at nighttime the stored solar energy is then available. Therefore, to achieve an optimal grid connection and to meet ever-changing set points for P (active power), Q (reactive power), voltage, and frequency (determined by utility companies at regular intervals) require a platform that guarantees data integrity so that operators know how much energy they need to generate and how much they need to store.

To achieve an optimal grid connection and to meet ever-changing set points for active power, reactive power, voltage, and frequency require a platform that guarantees data integrity.

SOLUTION

Intelligence Under One Roof

“Utility companies are sending you all the time these set points, and you have to modify inverters sometimes within a second to achieve different types of controls,” Albert elaborated on the pressures of controlling a solar farm. “Thus, it is expected for the Moxa controllers to process readings within 20 milliseconds and transfer the set points through the local network to the inverters to change their P and Q to match the set point requests at the connection point following the PPC commands.” P and Q are both the main parameters when regulating the quality of the electricity injected to the grid, and it allows to control other parameters, such as frequency, voltage, and power factor, to reduce the active power exchanged with the grid.

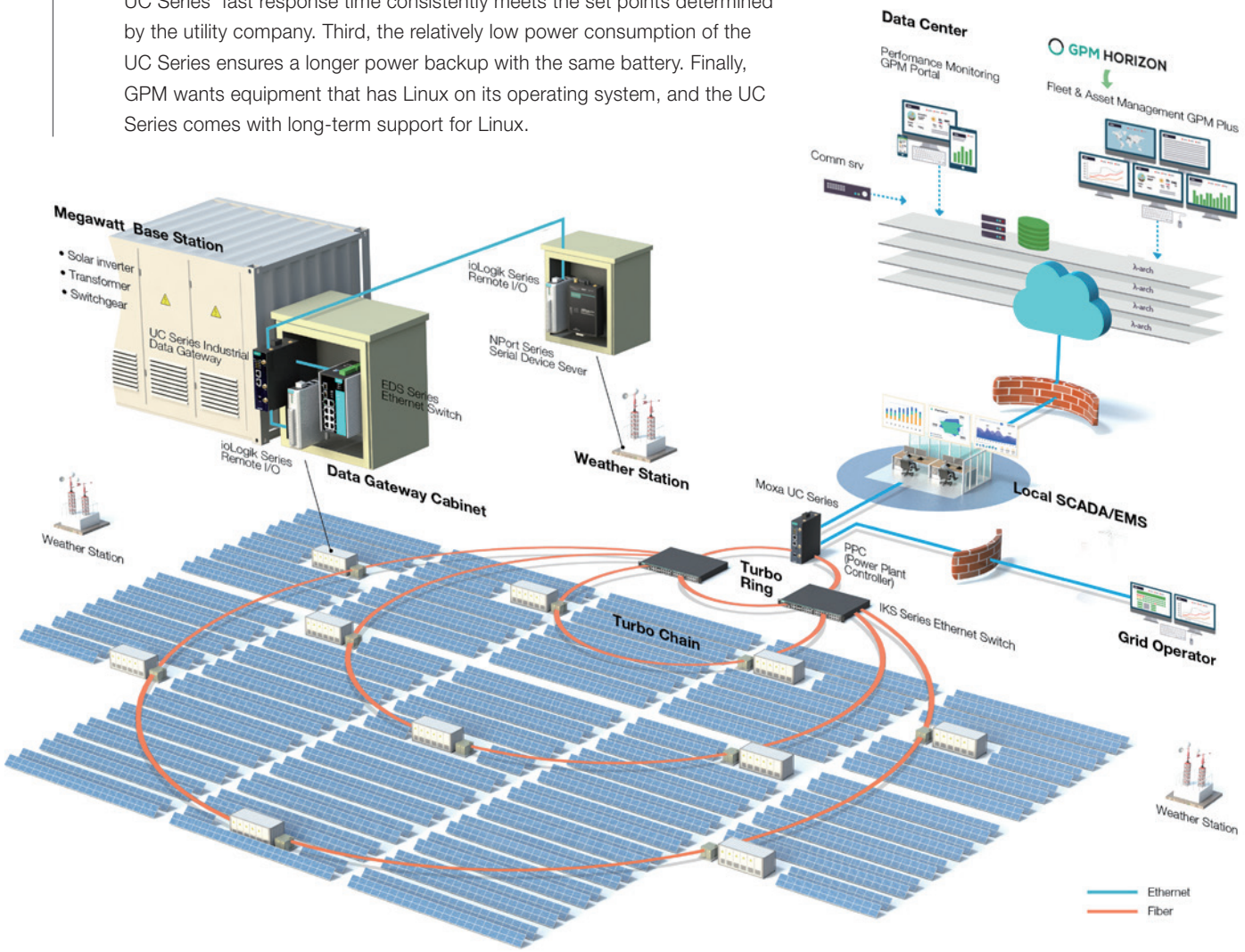
In addition, the Artificial Intelligence (AI) and machine learning applications of GPM Horizon enable users to transform their data into actionable insights.” It’s the world’s first data monitoring platform with full integration of current and future renewable energy systems, including solar PV, wind, and energy storage assets”, Albert said."The platform gives asset operators a comprehensive control-room experience for their renewable assets with key information delivered through dashboards tailored to the needs of each user type. Also, the “Noc Experience” function allows engineers to set up a tailored alarm system that will autonomously evaluate and notify operators when something is not performing as expected.

Just Not Survive But Thrive

As the equipment in the data acquisition cabinets particularly required a robust design, GPM approached Moxa, with whom they have collaborated successfully over the past ten years, to provide them with devices for their GPM SCADA solution. “Of course, the durability of the devices plays a major part in our choice of device vendor as the equipment has to withstand harsh conditions. Moxa’s reputation as far as the reliability of its products makes it a good brand for us,” affirmed Albert. Another favorable consideration was Moxa’s global presence. “For us, having a partner that has distributors worldwide to provide support is very important. Moreover, we at GPM want long-term support. Solar power infrastructure is built to last more than 20 years, so we want long-term support for this kind of project, and we can rely on Moxa in this regard,” he continued.

Committed to their promise of no data loss, achieving a redundant network infrastructure for in-plant data acquisition and network communication was of utmost importance to GPM. To ensure seamless communication between the different inverters, Moxa’s Turbo Ring was employed as it supported superfast fault recovery of under 20 ms. A typical recovery time in the solar field is 50 to 80 ms.

Additionally, a reliable industrial embedded computer was required to perform two roles in the solar plants. One unit act as a PPC to process readings within 20 milliseconds and transfer the set points to the inverters to change its P & Q, and the second unit act as a data gateway to bring in-plant data to the control center. This data needs to be pushed every five minutes to data centers. Moxa’s UC series of industrial embedded computers brought many benefits to this project. First, in case of a failure, the UC Series is programmed to log and store the incoming data, and then feed the backed-up data to the system once communication has been restored. Second, due to a higher CPU, the UC Series’ fast response time consistently meets the set points determined by the utility company. Third, the relatively low power consumption of the UC Series ensures a longer power backup with the same battery. Finally, GPM wants equipment that has Linux on its operating system, and the UC Series comes with long-term support for Linux.



Better Together for a Greener Future

GPM has been extremely pleased with the results, Albert noted. The solar farms have been in operation for more than two years in Australia without experiencing any major issues with downtime and replacements. With their eyes set on the future, GPM is looking at simultaneously monitoring diverse renewable energy sources in a combined centralized platform to enable asset owners to maximize their asset's performance and minimize downtime. Extending their successful collaboration with Moxa is very much part of GPM's roadmap to the future. "We are thrilled to announce the enhanced relationship between GreenPowerMonitor and Moxa. This will be the perfect advantage of global synergies between our organizations and will allow both teams to better serve the global marketplace and promote a cleaner and greener future," Juan Carlos Arévalo, CEO of GreenPowerMonitor metioned.