

Environmental & Solar Radiation Monitoring for Optimized Solar Plant Performance at Photon Solar



INTRODUCTION

Photon Solar Plant, located in Bollaram, Hyderabad, Telangana, is a solar energy generation facility dedicated to renewable energy production. The plant has generated approximately 300 million kWh of clean energy, making reliable environmental and solar radiation monitoring central to understanding and optimizing plant performance.

To strengthen its environmental monitoring and solar-energy-related analysis, Photon Solar deployed two Oizom AQBOT PM monitoring devices equipped with PM, UV, and light/solar radiation sensing capabilities, integrated directly with the plant's centralized PLC-based communication system.



02 AQBOT Monitors
Deployed

06 Parameters*
Per Station

24/7 Real-time Data
To Envizom

Note: 06 parameters denote that the PM range covers PM1, PM2.5, PM10, and PM100, along with external UV and radiation sensor modules.

THE CHALLENGE

At a solar power plant, the surrounding environment directly shapes generation potential. The solar resource available at the site and the dust that settles on photovoltaic module surfaces both influence how much sunlight actually reaches the cells.

Photon Solar uses a Class-B solar radiation sensor to measure light and solar radiation. However, the sensor had no integrated data logger, meaning solar radiation data could not be continuously recorded, analyzed, or communicated to a central system. Measurements existed in the moment, but not as usable, historical, connected data.

Photon required a solution that could:

- Continuously monitor solar radiation and light intensity at the site.
- Record and transmit the measured data digitally, without depending on a standalone data logger.
- Compare solar radiation, light, and UV index conditions with other environmental parameters.
- Integrate the monitoring system with the site's centralized PLC/automation system.
- Support analysis of environmental conditions such as airborne dust that may affect solar power generation.

WHY OIZOM DEVICES

Photon Solar needed more than a replacement sensor; it needed a connected monitoring system that could measure multiple environmental parameters and feed them into the plant's existing automation architecture.

Oizom's AQBot met these requirements through:

- **Multi-parameter monitoring in a single device**, combining PM, UV, and light/solar radiation measurement, allowing dust conditions and the available solar resource to be evaluated together on one platform.
- **Reliable performance under high-light conditions**. During the initial proof of concept, AQBot continued capturing light levels of around 80,000 lux during peak daylight, giving the team a broader view of high-light conditions and greater confidence in data continuity.
- **Continuous digital data availability**, with measurements recorded and transmitted without reliance on a separate standalone data logger.
- **PLC integration capability**, allowing the AQBot to connect with the plant's centralized communication and automation architecture.
- **PM monitoring as a soiling indicator**, providing an environmental signal for dust conditions that can lead to deposition on PV module surfaces.

THE DEPLOYMENT

Two Oizom AQBot devices are now deployed at the Photon Solar Plant, both operating on AC power supply and integrated into the plant's centralized communication system through the existing PLC architecture.

The deployed configuration gives Photon Solar continuous visibility into the environmental conditions surrounding its solar panels:

CATEGORY	PARAMETERS MEASURED
Particulate Matter	PM (dust and particulate conditions around the plant)
Radiation	UV index
Solar Resource	Light / Solar Radiation



These parameters are evaluated together to understand the environment around the PV modules. Elevated PM levels indicate increased airborne particulate loading, and dust deposition on module surfaces can reduce the sunlight reaching the photovoltaic cells, potentially affecting energy generation. PM monitoring therefore serves as a useful environmental indicator for potential soiling conditions, while solar radiation and light measurements characterize the available solar resource at the site.

Through the PLC integration, the collected data flows into the site's centralized monitoring and analysis framework, supporting an analysis chain of:



Solar Radiation /
Light Conditions



Environmental
Conditions



PM/Dust
Conditions



Potential
Soiling Risk



Solar Plant
Performance

RESULTS

The two AQBot devices provide Photon Solar with a centralized environmental monitoring solution, combining PM, UV, and light/solar-condition monitoring in a single platform connected to the plant's automation system.

KEY OUTCOMES

Better Visibility Under High-Light Conditions

- During the POC, the Oizom sensor measured about 80,000 lux under maximum daylight, while the existing third-party Class-B sensor remained around 60,000 lux, demonstrating a broader response range in the conditions that matter most at a solar plant.

Continuous, Connected Solar and Environmental Data

- Continuous monitoring of light/solar radiation, UV, and particulate matter around the solar plant.
- Continuous digital data availability without depending on a standalone data logger, solving the core limitation of the previous sensor.

Centralized PLC Integration

- Both devices integrate with the plant's PLC-based centralized communication system, making environmental data part of the site's overall monitoring and analysis framework.

Environmental Insight into Soiling Risk

- PM monitoring acts as an environmental indicator for dust and potential PV module soiling, helping the team correlate environmental conditions with solar plant performance.

IMPACT

By replacing a standalone Class-B sensor with two connected, multi-parameter AQBot devices, Photon Solar has moved from isolated light readings to a centralized environmental intelligence layer for its plant. Solar radiation, UV, and dust conditions are now continuously measured, digitally recorded, and fed through the PLC architecture into the site's monitoring framework, giving the team a more comprehensive understanding of the environmental factors that may influence solar energy generation at one of Hyderabad's renewable energy facilities.

Oizom specializes in real-time environmental monitoring solutions designed to help organizations measure, manage, and improve environmental performance. Our comprehensive portfolio includes air quality, weather, noise, and emission monitoring systems, powered by advanced sensor technology and cloud-based analytics. Trusted across industries, governments, and smart city initiatives, Oizom's solutions enable continuous monitoring, regulatory compliance, and actionable environmental intelligence.

Note:

PM, UV, and light measurements are environmental indicators and should not be considered direct measurements of PV energy generation, which also depends on panel efficiency, panel temperature, module condition, inverter performance, orientation, shading, and other plant-level factors.