



AT A GLANCE

SOLAR MONITORING

SOLAR PHOTOVOLTAIC (PV) PANEL MANAGEMENT SOLUTIONS

Sustainability can only be achieved through the continuous improvement of operational efficiency. Common to any sustainability programme and its associated energy reporting, is the need for detailed measurement data.

As part of its Estate wide monitoring capability, MPL offers an unrivalled level of highly accurate and granular reporting of Solar PV installations.

The Solution has been designed to maximise operational efficiencies and provide the early detection of potentially costly failures.



PV ARCHITECTURE

Photovoltaics is the direct conversion of light into electric power using semiconducting materials to produce power based on the photoelectric effect. There are three different types of solar panels, namely monocrystalline (offering the highest levels of efficiency), polycrystalline and thin film.

In most instances PV systems are deployed in a grid-connected configuration.

Grid-connected PV systems allow users to consume less power from the grid and supply unused or excess power back to the utility grid.

Typical residential grid-connected PV systems are rated to less than 20kW, commercial systems are rated from 20kW to 1MW and utility energy-storage systems are rated at more than 1MW.

Off-grid PV systems use arrays of solar panels to charge banks of rechargeable batteries during the day, for use at night. They are generally used to cover the electricity needs of remote buildings which have no access to the grid.

Solar panels are wired together in series to form strings, and strings of solar panels are wired in parallel to form arrays.

The performance of a solar panel will vary, but in most cases, life expectancy is circa 10 years for the inverter and 25 years for the panels, with the power output measured in watts.

Larger installations will use PV Combiner Boxes which are normally installed close to the panels and before inverters. The Combiner box receives the outputs of several solar panel strings and consolidates this output into one main power feed to the inverter. The boxes can include overcurrent protection, surge protection, pre-wired fuse holders, and preconfigured connectors for ease of installation to the inverter. The Inverter device receives DC power and converts it to AC power. String Inverters are in the high voltage range (600V to 1500V) and are used with large PV systems.

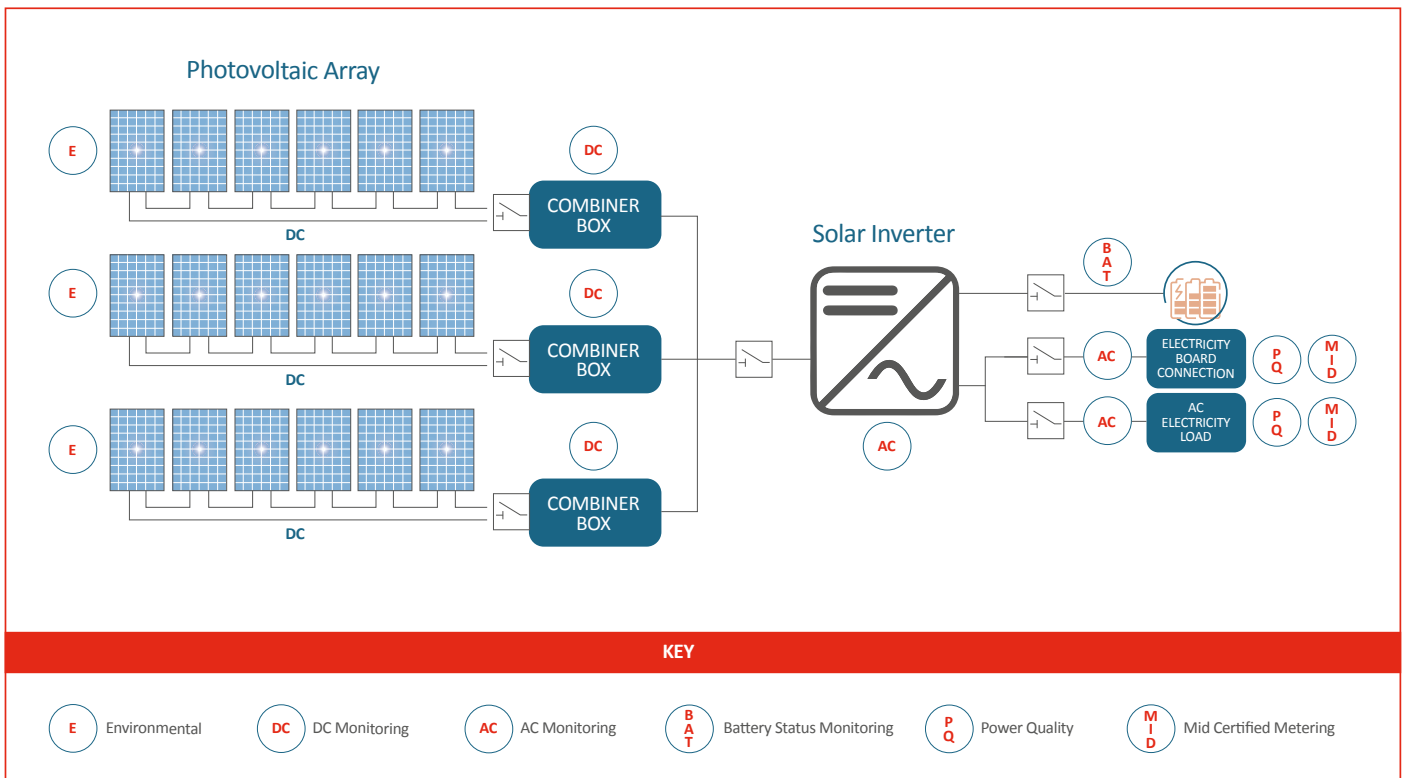
Why should Solar PV panels be monitored?

- Commonly, most installations only monitor the output from the inverter through an import/export meter and by default, will only see an overall drop in kWh readings.
- When solar panels are connected in series, the current will remain the same for each panel in that string. Therefore, if one panel is faulty, then the current in the string is reduced to that of the least efficient panel.
- Since photovoltaics are adversely affected by shade, any shadow can significantly reduce the power output of a solar panel.
- Solar equipment can cause high voltage, transients and harmonics. This is relevant when feeding excess electricity back to the grid and supplying the estate. It is recommended to monitor the installation with a Power Quality meter on the AC side of the inverters.
- Panel performance can be negatively impacted by a number of factors which include microcracks, hot spots due to the accumulation of dirt or debris, potential induced degradation (PID), delamination and the ingress of water. It is estimated that panel efficiency drops by circa 1.5% per annum.

THE MPL SOLUTION

To maximise operational efficiencies and provide early detection of any failures, the MPL solution focuses on five key areas, namely:

- i. DC voltage and current monitoring (at the combiner or recombiner boxes) of each string to track and compare efficiencies and detect any degradation in the performance of any one string
- ii. AC monitoring at the inverter – tracking power/energy parameters and thresholds for alerting purposes
- iii. Power Quality metering of electricity loads consumed by the estate and potentially fed back to the grid
- iv. Environmental monitoring of key parameters including temperature, wind and solar irradiance
- v. Battery status monitoring including the option of gas detection



READY-2-RUN SOLUTIONS

To simplify site deployment, MPL offers a standard range of pre-configured, ready-2-run enclosures for both AC and DC circuit monitoring. This 'building block' approach offers truly scalable configurations delivering the granular monitoring of multiple circuits, reporting all power, energy and environmental parameters. The solution range is pre-configured into IP rated, wall or ground mounted metal enclosures.

At the heart of the system, is the wireless MPL Gateway Datalogger, which centralises data collection from all measuring devices and securely transmits the data to the cloud based management platform (N-GEN Estate). The client benefits from highly accurate real-time and historical reporting with the added benefit of alarming/alerting against user defined thresholds.

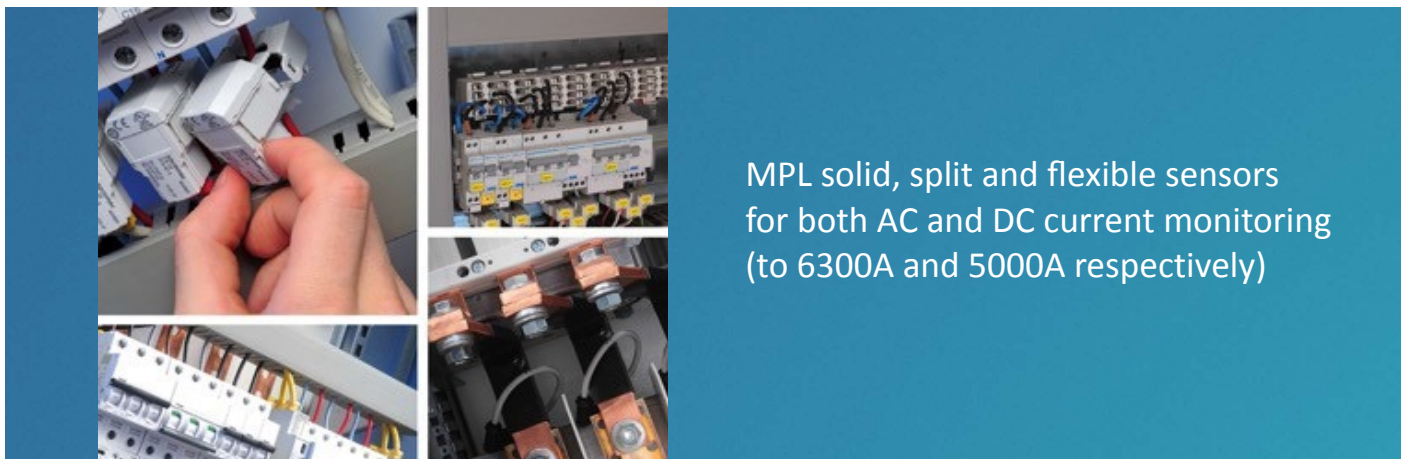


The ready to run solutions are configured to meet the specific requirements of a site and can accommodate circuit and power quality monitoring plus environmental management in the one enclosure.

The enclosures simplify the installation in legacy environments and are factory pre-wired and tested before installation.

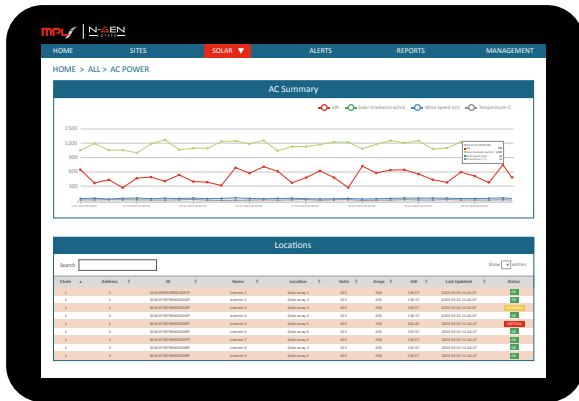
MPL has a wide range of AC and DC sensors to global accuracy Class 0.5 in accordance with IEC61557-12 (2-120% nominal load). The Split and flexible sensor versions are particularly useful in legacy environments where non-invasive installation may avoid unwanted power downtime.

All power quality monitoring (THD) is in accordance with IEC61000/IEEE 519:2014, with the option of individual harmonics in accordance with EN50160.



VISUALISATION

The N-GEN Estate cloud based management platform provides and displays real-time monitoring and historical reporting of all monitored parameters.



AC Power



DC Power



Power Quality



Energy Overview

N-GEN ESTATE DELIVERS:

- Scalable intelligence which includes metering, monitoring and power analysis
- Power and Energy parameters measured for the entire AC and DC electrical network
- Monitoring and reporting of individual PV Arrays
- Early detection of failures through the alerting and alarming against pre-defined thresholds
- Instantaneous alerts and alarms transmitted via SNMP, SMS or via email
- Alarms sorted by type, nature, criticality or state
- Power Quality monitoring of the estate electrical supplies
- Displays Voltage, Current, kVA, kW, kWh, Power Factor plus environmental conditions
- Full audit trails
- Date range driven business reporting
- Option to combine the monitoring of all utilities including electricity, gas and water
- Carbon Reporting
- Integrated environmental monitoring
- Tailored configurations to suit client specific requirements
- Operational efficiencies



Delivering Simplified Business Intelligence

