



**OPERATION
AND
MAINTENANCE
SERVICES**

Solar HQ is a leading provider of comprehensive solar solutions, specializing in the design, installation, operation, and maintenance of rooftop solar systems. With a passion for sustainable energy and a commitment to excellence, we have established ourselves as a trusted partner in the renewable energy sector.

We arrange all necessary maintenance as per manufacturer and industry recommendations.

O&M CONTRACTS

For peace of mind, we fully recommend all PV system operational and maintenance requirements be fully managed through a tailor-made O&M contract. Contracts can be 1-20 years and include daily monitoring, performance reporting and arrangement of PM & CM visits.

PERFORMANCE MONITORING

- ✓ Daily KPI monitoring of all PV assets in O&M portfolio.
- ✓ Comprehensive monitoring system fitted to SHQ built solar PV systems as standard.
- ✓ We use top gear and monitoring platforms.
- ✓ Alternatively, we can use any other monitoring platform.

PERFORMANCE REPORTING

Monthly, Quarterly or Annual performance reports showing:

- ✓ KPIs such as total kWh generated and exported, irradiance, PR and specific energy.
- ✓ Inverter output comparison.
- ✓ Financial assessment.
- ✓ Summary of main issues in period.
- ✓ Works completed in period.



PREVENTATIVE MAINTENANCE (PM)

"The periodic MOT inspection of your system"

- ✓ Annual / Bi-Annual or Quarterly PM visits for O&M contract clients, frequency suited to system capacity.
- ✓ Ad-hoc PM visits available for out-of-contract clients.
- ✓ PM works report provided, including tasks completed, photos, issues and recommended follow-up remedial PM works advised.

CORRECTIVE MAINTENANCE (CM)

"Remedial visits to fix faults"

- ✓ CM visits can either be included or excluded from O&M contracts.
- ✓ An agreed number of CM visits per year can be included in O&M contracts. Unused CM visits roll over into the next contract year.
- ✓ Ad-hoc CM visits available for all clients.
- ✓ CM works report provided, including tasks completed, photos, issues and recommended follow-up remedial CM works advised.



MODULES CLEANING

ROOFTOP:

We exclusively use UK's largest rooftop solar panel cleaners, our award-winning sister company "Clean Solar Solutions".

- ✔ Robot cleans - for large module arrays <26 degrees pitch.
- ✔ Manual cleans - for module arrays \geq 26 degrees, or small, complex fragmented arrays. Or arrays where lifting robot safely to roof is not possible.
- ✔ Standard cleans - using de-mineralised water only.
- ✔ Chemical cleans - to remove lichen. Using de-mineralised water plus biodegradable cleaning agent.
- ✔ Clean works report provided, including tasks, photos, issues and recommended follow-up remedial CM works advised.

PV PARK CLEANING:

- ✔ To give clients the best possible price, we only use specialist PV park cleaning contractors.
- ✔ Clean works report provided, including tasks, photos, issues and recommended follow-up remedial CM works advised.



“Keeping your modules clean,
for maximum output.”

AERIAL DRONE THERMAL INSPECTIONS:

- ✓ Aerial drone Infra-Red thermal inspections of both large ground-mound and large rooftop arrays.
- ✓ Comprehensive inspection works report provided, including tasks completed, photos, issues and recommended follow-up remedial CM works advised.
- ✓ Access to data analysis via online portal.

HAND-HELD THERMAL INSPECTIONS

- ✓ Hand-held Infra-Red thermal camera inspections of electrical equipment.
- ✓ Inspection works report provided, including tasks completed, photos, issues and recommended follow-up remedial CM works advised.

STRING TESTING

STANDARD

We use the industry standard PV test instrument Seaward PV150 or similar. Basic level DC string testing. Continuity, RISO, etc.

COMPREHENSIVE

We use the most advanced industry leading PV test instrument Emazys z200 PV analyzer.

- ◆ Measure position of a single ground fault in a PV string ($R_{iso} < 3M\Omega$).
- ◆ Measure position of a single disconnect in PV strings ($R_s > 10k\Omega$).
- ◆ PV string impedance curves (health and degradation check),
- ◆ PV string series resistance R_s .
- ◆ PV string open circuit voltage V_{oc} .
- ◆ PV string short circuit current I_{sc} .
- ◆ PV system isolation resistance R_{iso} .
- ◆ PV module voltage.
- ◆ PV module bypass diode check (open or short circuit).
- ◆ PV module shunting resistance R_{sh} (module/cell degradation).
- ◆ Integrated timer for periodic faults.
- ◆ Tone generator and tone tracer pickup.
- ◆ Build in report generator (PDF, CSV, JSON).
- ◆ Operated over WiFi using either smartphone, tablet, PC or MAC.
- ◆ Android app for raw data upload to the emazys cloud.
- ◆ Access to raw data with the emazys cloud.



INVERTER REPAIRS

For out-of-warranty inverters that have an issue we cannot resolve via visual inspection, electrical testing or by replacing manufacturer-provided parts, we work with top specialists who can repair completely inverters and bring them back to full operational status.

ADDITIONAL O&M SERVICES

Repowering

Replacement of old, inefficient, damaged, failed, or high fire-risk arrays.

Re-stringing of poorly installed, of high RISO DC strings across arrays.

Replacement of old, inefficient, damaged, failed, or out-of-warranty inverters.

REGO Submissions

We manage all REGO submissions for O&M contract clients whose systems are registered with Ofgem.

Warranty Management

We manage any failed product warranties for all clients.



WORKMANSHIP

- ▲ We only install high-quality equipment.
- ▲ We install IMO true-DC DC isolators to allow safe isolation of strings.
- ▲ To reduce all potential future water ingress faults, we carry out connector pull tests, plus torque check all sealing glands.
- ▲ We clip and tie all exterior cables and connectors up off roof and under modules to reduce water ingress and weather degradation faults. This also reduces return trips to carry out expensive remedial works.
- ▲ We torque tightened module clamps to ensure they shouldn't work loose.
- ▲ We fit suitable cable containment to provide adequate support and reduce unnecessary UV degradation and abrasion.
- ▲ We fit siphons where possible as standard on all modules <math><20^\circ</math> to reduce soiling to maintain performance.



FIRE RISK ASSESSMENTS

- ▲ We have developed an industry leading comprehensive Solar PV system site Fire Risk Assessment based on recommendations as published in Fire Protection Association-RC62-Recommendations for fire safety with PV panel installations.
- ▲ Fire RA inspection report provided, including tasks completed, photos, issues and recommended follow-up remedial CM works advised.



WORKS REPORTS

- ▲ All completed tasks are recorded in a works report which is shared with clients either via email or via a SharePoint link on O&M client dashboards.
- ▲ Works reports record completed tasks, photos, outstanding issues and recommended follow-up remedial CM works.



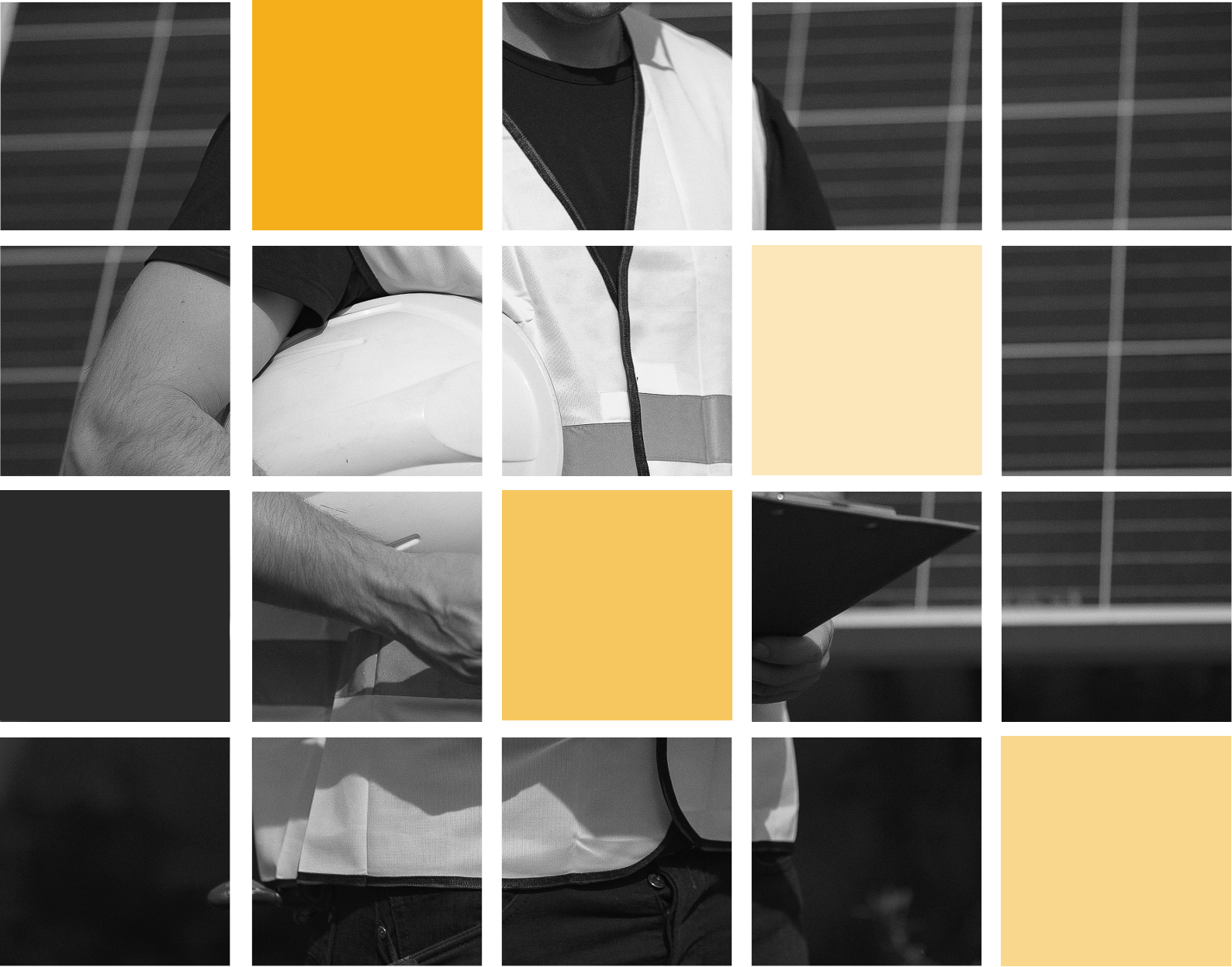
MAINTENANCE WORKS SCHEDULE TRACKING

- ▲ We record all site visits in a works schedule tracker.
- ▲ We are fully transparent and share live site-specific filtered reports with our O&M contract clients via a bespoke dashboard link, so they can view all recent and upcoming scheduled visits.



MAINTENANCE ISSUE TRACKING

- ▲ We review all works reports and meticulously record all completed tasks, outstanding issues, and recommended works in a maintenance tracker.
- ▲ We categorise and assign associated issues and risks to each piece of work including whether the item is a fire risk and/or affecting performance.



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