



Optimizing performance,
reliable returns on your investment

OPERATION AND MAINTENANCE
CAPABILITIES AND SERVICES





COMPREHENSIVE ASSET MANAGEMENT IS THE KEY TO RELIABLE, EVENT-FREE INVESTMENT RETURNS

Maximizing energy yield and electrical power production by optimizing plant operational performance: 24 hours a day, 7 days a week, 365 days a year.

Phoenix Solar's comprehensive Asset Management Program is designed to optimize your investment in our proven design engineering, supplier management, procurement, construction and commissioning programs.

Power plant life-cycle Asset Management starts early as we work with you during the planning and preliminary engineering phases of your power plant. Phoenix Solar's reputation as a leading system integrator and plant operator is built on our commitment to comply with all applicable national and local codes, engineering standards and permit regulations. Moving forward with project execution, our detailed design processes and supply chain management (SCM) qualification and acquisition procedures serve as the backbone for a strong plant technical basis. Once in the field, our site construction and plant commissioning programs are backed by a corporate commitment to Quality Assurance.

Phoenix Solar's Control Center is the hub for deployment of our proprietary remote plant data acquisition and monitoring systems. Located in Ulm, Germany, the Phoenix Control Center houses hardware and software systems that operate "real-time", with minimal data latency or "lag". These data acquisition and monitoring systems provide trained and experienced operators with critical component, sub-system and plant-level operational performance and trend data. As a Customer, you too have online access to this critical plant performance data.

We are not new to this business. Over the last 11 years in Germany and Europe we have built industry-leading technical and operational know-how with almost every cell and module manufacturer.

Our relationship with international engineered equipment suppliers allows us to firmly back our contractual warranty and performance commitments.

Today, Phoenix Solar provides operation and maintenance services to over 60 customers and some 70 individual power plants.

SERVICES – À LA CARTE OR BUNDLED

Service options

Phoenix Control Center

- 24x7x365 monitoring
- Monitoring reports (monthly/quarterly/yearly)
- Access with own login

Annual inspection & maintenance

Medium voltage maintenance

PV site maintenance

Inverter maintenance

Repair costs-flatrate

Low voltage supply for PV plant operation

Site security

Can be taken individually or combined as a package

Service packages

| | Monitoring | Basic | Comfort | Premium |
|-----------|------------|-------|---------|---------|
| | x | x | x | x |
| | | x | x | x |
| | | | x | x |
| | | | | x |
| | | | | x |
| | | | | x |
| | | | | x |
| on demand | | | | |

Version 09/2010



Phoenix Control Room monitoring system

24x7x365 monitoring

Our seamless remote monitoring system with automated error analysis ensures steady-state operation. In case of an emergency, we can implement immediate measures drawing on our local service network. Our goal is to be on-site before an incident can happen.

Monitoring reports

(monthly/quarterly/yearly)

Uniform, standardized reporting with in-depth analyses shows the actual yield and the effective capacity utilization of your photovoltaic power plant whatever the weather. The reports are issued monthly, quarterly and year-on-year. This guarantees total transparency at all times.

Your own login

Your online access to the Phoenix Control Room allows you to view all key performance data and all components whenever you need and in real time. Operating data and statistics are updated at 10-minute intervals and logged.



Annual inspection

The inspection requirements placed on photovoltaic power plants are very stringent with regard to occupational health and safety or fire safety management. Our experts are trained to carry out annual inspections and maintenance. They check all the hardware and coordinate with the certified subcontractors and the utility company involved. We also make sure you are in compliance with all regulations and that all statutory audits have been performed and documented.



Medium-voltage maintenance

All grid-connected photovoltaic power plants are linked up to the high-voltage network and therefore represent danger zones. Only qualified personnel are permitted access. Extensive regulations govern the switching station itself. Maintenance must be carried out every two years and any measures taken must be documented – changing the transformer oil, checking resistance to short-circuiting, etc. If this is not done, the power company is authorized to disconnect the power plant. In addition to lost revenue due to downtime, this can also entail hefty fines.



PV site maintenance

High grass on the site and bushes and trees in the immediate vicinity can impact performance. Therefore, site maintenance involves cutting the grass and clearing weeds. All work must be carried out in compliance with occupational health and safety regulations and applicable zoning ordinances, even if entrusted to a sub-contractor. If requested, we will also clean the modules.



Inverter maintenance

The inverter is the heart of the solar power plant. An ideal operating environment improves its efficiency and is the precondition for asserting any warranty claims

against the manufacturer. Consequently, the inverter station must be equipped with proper heating and cooling systems. Regularly exchanging the filter mats is also recommended, along with software updates and the cleaning of the inverter's components. This is part of Phoenix Solar's tasks.



Repair costs flat rate

Instead of reserving large amounts of cash for potential repairs, our customers have the option of paying a flat rate. As a result, the costs are calculated for the plant's life cycle and can be included in profitability projections.



Low-voltage supply

The same solar electricity you produce can also run your own operations. Depending on prevailing regulations in the respective jurisdiction and the plant's own technical configuration, we can feed the electricity required through the plant's own cable connected up to the main grid. We will negotiate the best possible conditions with the local power company and support you in all administrative tasks.



Site security

From simple fencing solutions to intricate video surveillance, Phoenix Solar can meet the many site security needs of our diverse clientele and individual requirements on the project.



READY TO SERVE AT ALL TIMES

Our track record speaks for itself – you can count on Phoenix Solar.

- The fleet of solar power plants we manage average greater than 97 percent uptime on an annual basis
- Over 140 MWp in peak capacity of power plant
- Currently, more than 60 Customers are taking advantage of our seasoned, professional Asset Management Services

What makes our Operations and Maintenance services stand apart as a solar industry leader?

- The proprietary software solution deployed out of the Phoenix Control Center is capable of monitoring even multi-vendor systems in “real time” and provides for SQL archiving of critical plant performance data for the expected life-of-plant
- Preventive maintenance management: constant failure monitoring ensuring fastest possible response and elimination without shutdown
- Performance test: 14-day performance test of the entire plant at full solar irradiation, with detailed log
- Expert know-how: our specialists carry out all technical operations and maintenance and repair work

