SYSTEM RATING

The audit for independent evaluation of PV power plants in accordance with international rating procedures

meteo control
Energy & Weather Services

CONTENTS

BASIS

To date, meteocontrol has overseen and supervised photovoltaic projects with a total investment volume of more than 10 billion Euros. This expertise goes into the rating of PV systems and provides operators, project planners and investors with a key performance indicator for an independent assessment of the system and the means to minimise risk.

STRUCTURE AND OBJECTIVE OF THE RATING

The rating system is designed to allow independent and objective technical analysis of photovoltaic systems and projects. PV projects are divided into five categories: Planning, EPC Agreement, Implementation, O&M Agreement and Operational Phase. The assessment process also includes a comprehensive onsite technical acceptance of the system, a review of the technical aspects of all contracts and a performance check (comparison of yield forecast with current yields from the operational phase to date). At the end of the system audit, a rating is given. This rating assesses the quality of the PV system, the risk of yield failures and therefore provides the operator, project planner and PV system investor with a well-founded estimate of the likelihood of yield losses. A very good PV system rating improves the chances of obtaining outside capital for financing purposes and allows the system or parts thereof to be sold on better terms, benefiting investors, project planners and operators alike.

The meteocontrol system rating goes beyond existing rating services currently available on the market. There is generally no (yield) failure risk assessment, although this is of crucial importance, especially for financing institutions.

THE STRUCTURE OF THE SYSTEM ASSESSMENT IS BASED ON THE RATINGS OF INTERNATIONAL RATING AGENCIES.

Rating	Profile	Explanation
AAA	Prime	A supremely good PV system. The system's risk of yield failures is almost zero.
AA	High Grade	An exceptionally good PV system. The risk of yield failures is low.
A	Upper Medium Grade	A very good PV system. Only in the event of unforeseen incidents is there a risk of major yield failures.
BBB	Medium Grade	A good PV system. In rare cases, there can be major yield failures as a result of typical operating faults.
BB	Lower Medium Grade	An average PV system. There is a risk of major yield failures as a result of typical operating faults.
B	Highly Speculative	A below-average PV system. Major yield failures are likely in the event of typical operating faults.
CCC	Substantial Risks	A poor PV system. Only under favourable conditions during the operational phase is the risk of yield failures low.
CC	In default with little prospect for recovery	A very poor PV system. Only under very favourable conditions during the operational phase is the risk of yield failures low.
C	In default	An exceptionally poor PV system. The risk of yield losses is very high, even during normal system operation.

ASSESSMENT CATEGORIES

The categories that are taken into account when assessing a PV project are explained in the following chapter. These categories are subdivided into five areas which reflect the key phases in the lifecycle of a PV project: Project Planning, EPC Agreement, Implementation or Construction Phase, O&M Agreement and Operation.

1. PLANNING

The foundations for the successful implementation of the entire project are laid during the planning phase. The overall technical concept and the choice of technical components are important factors for successful planning. The general contractor, the documentation and the quality assurance concept also play an important role. Finally, the basic principles of the commercial and legal concept are incorporated into the assessment of the first planning phase of a PV project.

1.1 TECHNICAL CONCEPT AND TECHNICAL COMPONENTS

Relevant criteria during the planning phase include the PV system's technical concept and the technical components used. The solar modules and inverters are particularly important, as they account for a large part of the project's costs and have a significant influence on the yields. The quality of the yield report also plays a major role. The report forms the basis for meaningful financial planning. The predicted result and the standardised Performance Ratio as a location-independent key indicator of system performance are also incorporated into the assessment. The PV system's security concept is another very important consideration.

Yield Reports

First and foremost, the meteorological data for the yield report must be of high quality as they are the main factors that influence the forecast result. The planned system components – with the correct configuration – must be taken into account in the report. Furthermore, location-specific data on the PV system such as the shading situation must be incorporated. The procedure for calculating the forecasted electricity yield should be based on established algorithms. In addition, the results of the yield report should have been verifiably validated by the assessor on the basis of actual yields.

Standardised system Performance Ratio

The PV system's standardised Performance Ratio should lie within the typical values that apply when the system is set up. As far as a PV system's PR in its first year of operation is concerned, technical developments have led to an improvement of approx. 1 % per year in recent years. At the same time, however, the PR is not fully independent of the system's location, which means that the typical PR values must be adjusted for the project. A Performance Ratio of approx. 83 % can be expected for very good crystalline ground mounted systems that are located in Central Europe and went into operation in 2010.

Technical components

As essential components of the PV system, the PV modules and inverters are examined during the assessment of the technical components. Cabling, wiring and mounting system are also included in the assessment. Finally, remote monitoring components are rated to determine the extent to which they can be used to identify operating faults.

Security concept

The fourth stage of the technical evaluation involves carrying out checks to determine whether the security concept to protect the PV park against unauthorised access or component theft is adequate.

1.2 GENERAL CONTRACTOR/PLANNER

The assessment of the general contractor and the PV system planner provides a basis for estimating risks. The extent to which the general contractor can successfully carry out the project is assessed here. The GC's experience is rated for this purpose on the basis of reference projects and the competencies of the relevant parties involved.

1.3 DOCUMENTATION AND QUALITY ASSURANCE CONCEPT

The documentation check is designed to ensure that the relevant documents for the entire project are up to date and available at all times. The aim of assessing the quality assurance concept is to demonstrate that the necessary checks relating to construction progress are carried out during the implementation phase etc.

1.4 COMMERCIAL CONCEPT

Although the rating procedure is designed to assess the technical aspects of the PV system, the commercial concept is also checked both in general terms and with focus on the payment plan and relevant lead times.

1.5 BASIC LEGAL CONCEPT

In addition to the commercial concept, the legal concept is also assessed. This includes presentation of a plan for swift response in the event of faults and other unforeseen events, quintessential insurance policies and the necessary approvals for the PV system. Furthermore, the EPC and O&M Agreements are assessed from a technical point of view.

2. EPC AGREEMENT

The evaluation of the EPC Agreement as part of the rating procedure serves as a legal contractual review of all relevant technical content. Flaws or imprecise details in the EPC Agreement can cause delays during the technical acceptance and the official handover of the system by the general EPC contractor to the owner.

2.1 BASIC PRINCIPLES IN THE EPC AGREEMENT

The basic conditions set out in the contract are reviewed.

2.2 TECHNICAL CRITERIA

The technical criteria include a detailed project description (along with all necessary documents that must be attached to the EPC Agreement (see item 2.5)) as well as all relevant key performance indicators for the PV park.

Project description

A complete project description includes a scope and specifications of the plant, defines all components used and itemizes important data as an annex to the contract. Furthermore, an EPC Agreement includes details of the general conditions of contract such as explanation definition of the feed-in point or a site description.

Key performance indicators

Parameters such as the PV park's rated power (including the underlying calculation and the Performance Ratio) should be explained in the overview of key system performance indicators. Evidence of feed-in approval serves as a criterion when deciding whether the EPC Agreement should be rated as poor independently of other assessment criteria.

2.3 QUALITY ASSURANCE CONCEPT

The assessment of the quality assurance concept verifies that checks of the PV park during the construction phase and a technical acceptance procedure are planned. This is important to ensure a smooth handover of the park by the EPC contractor to the owner.

2.4 ECONOMIC ASPECTS

Economic aspects are checked with regard to a payment plan, possible contractual penalties and get-out scenarios for all contractual parties.

2.5 ANNEXES

The annexes to the agreement must be complete and linked in the agreement text. The annexes include schedules, land lease agreements, scope and specifications of the plant and the feed-in approval from the energy supplier.

3. IMPLEMENTATION

The evaluation of the implementation phase is designed to check the entire PV system set-up procedure right through to the point where it is connected to the grid. As is the case during the planning phase, the technical concept and technical components, the documentation, the quality assurance concept and the operational management concept are assessed. Regardless of these criteria, feed-in operation must be possible when the system is connected to the grid. The PV park must also be free of faults at the point of technical acceptance so that it can be assessed during the rating procedure.

3.1 TECHNICAL CONCEPT AND TECHNICAL COMPONENTS

The technical concept must ensure that the PV system generates the greatest possible yields and that the risk of operating faults is minimised. In addition to a review of the yield report and park performance, the technical components are assessed in detail and onsite measurements are taken to confirm that the park is functioning properly.

Yield Reports

The yield report from the planning phase presented here is compared with the actual system. This ensures that the system configuration stated in the yield calculation has not been changed during implementation. This helps to prevent false assumptions being made when making calculations for the report.

Performance Check

The performance check shows whether or not the system achieves the yield forecast by comparing the planned and actual yield values measured at that point in time.

Technical components

The assessment of the technical components includes checking the solar modules (including the cabling, wiring, inverters and rack) and the remote monitoring concept with a view to ensuring trouble-free operation and swift rectification of faults.

Security concept

A correctly installed access control and theft protection system is the main focus during the inspection of the PV system's security concept.

3.2 DOCUMENTATION AND QUALITY ASSURANCE CONCEPT

Part of the documentation and quality assurance concept assessment involves ensuring that all necessary documents and agreements are stored and filed correctly. In addition, all technical records and logs must be available in full. The technical acceptance of the PV system is checked separately and must have been successfully granted.

3.3 OPERATIONAL MANAGEMENT CONCEPT

The planned operational management concept is assessed to ensure that the PV system operates trouble-free. This includes the basic concept and the assessment of the operational management company that is responsible for the system during the operational phase.

Concept

The concept presented must prove that all measures will be taken to ensure trouble-free system feed-in. In the event of an operating fault, a mechanism for swiftly rectifying the problem must also be provided to prevent major failures.

Operational management company

The operational management company must prove that it meets the requirements as regards professional monitoring and repairs management. A company that is not properly prepared may not be able to meet such requirements, thus increasing the risk of yield failures.

4. O&M AGREEMENT

The content of the O&M Agreement forms the basis for the operational management company's work and defines its services. These services must be described in full in order to prevent uncertainties and unresolved issues between the contractual parties.

4.1 BASIC PRINCIPLES IN THE O&M AGREEMENT

As in the EPC Agreement, the basic conditions of the contract must be listed.

4.2 DEFINITION OF SERVICES

The description of the services defines the operational management company's duties and how they must be performed. This includes a description of the remote monitoring system, carrying out repairs and maintenance and reporting.

Remote monitoring

Remote monitoring is the tool with which the operational management company ensures the PV system's feed-in operation and via which it is informed about operating faults. The remote monitoring concept must therefore be fully described and explained in the O&M Agreement. The maximum response time for faults must also be defined.

Repairs/maintenance

All services to be provided by the operational management company in order to rectify defects and operating faults must be set out in full.

Maintenance/servicing

The maintenance and servicing of the PV system helps to prevent defects in components and the resulting yield failures.

Reporting

The report intervals and content must be defined in order to inform the PV system operator about the PV park's status.

4.3 YIELD AND AVAILABILITY GUARANTEES

As the operational management company has taken on responsibility for the PV system, the guarantees for the yields and the feed-in availability of the components (especially the inverters) must be regulated in the O&M Agreement. Liability for failings on the part of the operational management company must also be defined.

Guarantees

To ensure maximum yields, the operational management company should guarantee minimum yields, taking into account irradiance and the technical availability of the inverters. The basis for calculations as well as the methods used to determine measurement values must be described for this purpose.

Liability

In the event of non-compliance with response times or guarantees, the O&M Contract must define how the operational management company is to be liable and the compensation payments it will make.

Insurance for the PV system

The insurance policies taken out for the PV system (e.g. all risks or yield failure cover) must be included as an annex to the contract.

4.4 COSTS/PRICES

The costs for all services provided by the operational management company must be defined. Details of any regular price adjustments must also be given.

4.5 ANNEXES

All annexes listed in the contract must be included with the O&M Agreement.

5. OPERATIONAL PHASE

The last phase to be checked as part of the rating procedure is the operational phase. During this phase, steps must be taken to ensure that any operating faults are identified and rectified quickly. The remote monitoring concept, the documentation and the operational management concept are assessed in order to estimate the risk of yield failures. Naturally, the PV system must be feeding in to the grid and the park's status must be confirmed as fault-free.

5.1 REMOTE MONITORING

The remote monitoring concept serves to identify operating faults and manage repair and maintenance measures. The PV system's hardware and software must be suitably adjusted for this, and a control mechanism for assessing the yields must be provided.

Remote monitoring system

The remote monitoring system must be equipped to detect faults at module or string level. Furthermore, the sensors must meet the required criteria for recording all relevant measurement data.

Remote monitoring portal

The software for remote monitoring must allow the operational management company to offer professional support services for the PV system and provide all required functions for this purpose.

Performance check

The performance check is used to assess the system's actual power yields in comparison with the yield forecast during a specific observation period. The PV system's target yield should be determined annually on the basis of irradiance levels and compared with the actual yields so that deviations can be identified early on.

5.2 DOCUMENTATION AND QUALITY ASSURANCE CONCEPT

All documents relating to the system and the quality assurance concept for the PV park must be available and complete.

5.3 OPERATIONAL MANAGEMENT CONCEPT

The aim of reviewing the operational management concept is to carry out a risk assessment by determining how quickly possible system malfunctions can be identified and rectified. The concept itself, the companies involved in operational management, the service and the defined procedures in the event of faults are rated for this purpose.

Concept

The overall operational management concept must ensure that operating faults are prevented and any faults are rectified swiftly.

Security concept

The security concept is designed to ensure that all measures to protect the PV system against unauthorised access and theft have been carried out.

Operational management company

The operational management company must be able to meet the requirements for overseeing the PV system. Any failings on its part can lead to greater yield failures.

Service company

As with the operational management company, the service company for repair and maintenance work must also prove that it can respond quickly and rectify faults properly.

Inspection intervals

Frequency of visual inspections or maintenance must be agreed to prevent operating faults.

Reporting

Reporting serves to document the work carried out by the operational management company and the service company. This includes regular reports with details of incidents and measurements relevant to the yield.

Procedures in the event of operating faults

A review of the procedures put in place in the event of malfunctions ensures that the risks of yield failures are minimised as much as possible. Response times and competence when dealing with various incidents during feed-in operation are rated.

As a leading solar energy specialist, meteocontrol has provided independent consultancy services for solar projects for more than 30 years now.

meteocontrol is the market leader for professional remote monitoring of PV systems with a total output in excess of 7.1 GWp. The know-how this requires, combined with exceptionally high-quality weather data, ensures the greatest possible precision during all project phases: from producing yield reports, technical due diligence and quality assurance during the construction phase to system monitoring and technical operational management.

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