From measurements to bankability: the power of high quality solar data

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As the solar industry continues to grow rapidly, precise solar irradiance data is more essential than ever. From the initial stage resource assessment to long-term photovoltaic (PV) system monitoring and solar asset management, reliable solar data drives every decision. It enables precise energy yield forecasting, performance evaluations and financial planning. But while the value of this data is well understood, its quality is often overlooked.

Having the best instruments or using the most expensive satellite data doesn't guarantee reliability. Data is only as good as the process behind it. Without proper care, solar measurements can become compromised, lost or misleading, putting entire PV projects at risk. A better approach is needed.

Beyond measurement accuracy

Accurate instruments are just one piece of the puzzle. Ensuring data quality requires precise installation, regular maintenance, robust data acquisition systems and consistent quality control.

Recognizing the industry's need for reliable and validated data, EKO has developed an advanced software analysis tool called EKO Q that automates solar data quality checks to support its pyranometer users in obtaining high quality data. By providing automated validation and insightful data analysis, it enables users to assess the integrity of their measurement data just like experts would.

With this innovation, operators can ensure their data meets the highest quality standards, making it suitable for critical applications such as performance monitoring, solar resource assessment and financial modeling. By following rigorous validation processes, EKO ensures that users can rely on their instrument data as 'bankable' data; a crucial factor for securing investments and maintaining operational efficiency. This advancement enhances the overall reliability

of performance assessments, giving users the confidence that their solar data is accurate, consistent and fully compliant with industry standards.

Data accuracy extends beyond just using high quality sensors and measurement systems. To truly ensure the reliability of solar measurements, the business aims to support solar sensor users by sharing its expertise and providing them with advanced analytical tools. Its newly developed solar data analysis tool offers an innovative approach to validating and cross-checking large solar data sets.

This tool enables users to compare their pyranometer measurements against data from others in the same PV park and physical or satellite irradiance models. By leveraging these cross-validation techniques, operators can detect anomalies, improve data accuracy and gain deeper insights into measurement consistency. Through this advanced capability, users can be confident that their solar irradiance data meets the highest industry standards, ensuring more precise resource assessments, performance evaluations and investment-grade 'bankable' data.

Field conditions can be unpredictable and even small mistakes, like improper sensor tilt, poor maintenance or incorrect sample intervals, can distort results. Data compromised in this way is not only expensive to recover or replace but can lead to major uncertainties when substituted with estimates or satellite data. The cost of inaccuracy is high: undetected issues, reduced

confidence, delayed insights and potential financial losses.

Satellite irradiance models have improved greatly and can be valuable supplements, especially for large-scale or historical analysis. However, the two data sources are fundamentally different.

These two data sources must not be considered substitutes for one another. Depending on the application, it may be preferable to rely on one source over the other or, ideally, a combination of both.

Not having reliable solar data is very expensive

How to ensure the quality of irradiance data

The recipe is straightforward: follow industry standards, vendor recommendations and best practices and integrate quality control procedures. Industry standards such as IEC 61724 and extensive guides by respected international organizations, explain concepts and specify concrete steps for many critical aspects: what needs to be done and how to ensure a healthy PV system.

The following examples highlight how even simple oversights can lead to poor quality data.

Poor quality data often goes undetected. Many existing tools only flag missing records or extreme outliers, overlooking subtle but serious issues. For bankable data, more rigorous validation is essential.

PYRANOMETER MEASUREMENT DATA	ASPECT	SATELLITE-BASED MODEL DATA
Measures local irradiance, then aggregates them into hourly, daily, monthly, and annual data	Approach	Models large-scale atmopsheric conditions interpolates for specific sites
Physical limitations, and incorrect usage	Main Uncertainties	Modeling assumptions, estimation errors, limited ground truth data
Uncertainty of individual measurements compared to a reference instrument	Accuracy Claims	Long-term statistical bias compared to trusted measurement data in select locations
Soiling, mechanical damage, incorrect tilt, data loss	Common issues	Systematic biases, poor resolution over complex terrain
Intermediate cloud cover, moderate temperatures, high sun elevation, adequate maintenance	Best Conditions	Clear skies, high sun elevation, flat terrain, minimal atmospheric disturbance
Site-specific monitoring, daily operations	Best use cases	Regional analysis; multi-year statistical estimates

KEY FEATURES

In-depth technical documentation

Correlation with satellite and model data

Detection of common issues and inconsistencies

Data integrity verification

Cross-checks of multiple sensors on site

Sanity checks based on environmental conditions

Why high quality solar irradiance data matters

Reliable solar irradiance data is the cornerstone of a successful solar project, supporting every phase from initial development to long-term operation. Ensuring high-quality, validated data enables

better performance tracking, financial certainty and overall system reliability.

System owners rely on data to verify system performance, detect underperformance and maximize return on investment. High quality solar data contributes to maximizing the asset value.

PV developers use reliable irradiance data to assess site feasibility, reduce uncertainty in energy yield forecasts to minimize financial costs and optimize project planning and design.

Engineering, procurement and construction (EPC) teams rely on quality solar irradiance data to define system specifications, select

Topic	Recommendations	Reality	Impact
Data Granularity	Log data every 1-5 minutes per IEC 61724	Data is often logged every 10, 15, or even 60 minutes	Low granularity data, Missed short-term fluctuations, lost insights
Sensor Installation	Tilt aligned within ±0.5° and checked regularly	Installed imprecisely or using unstable mounts	An error of 1° in sensor tilt can result in bias up to 1% or more
Shading	Clear setup, no obstructions	Systematic or seasonal shading effects	Underestimation of solar irradiance, overestimation of PR
Sensor Cleaning	Cleaned at least weekly	Irregular, cleaned roughly, typically when the panels are cleaned	Soiling and mechanical damage can lead to systematic underestimation or malfunction of instruments

EKO Q is designed for professionals involved in every phase of the solar project lifecycle, from initial assessments to long-term operations.

components and meet contractual performance guarantees. This data helps reduce project design risks and ensures efficient implementation.

System integrators require quality irradiance data to align system components and optimize performance. From configuring tilt angles to commissioning trackers, data reliability directly influences system functionality.

Operations & maintenance (O&M) providers use high quality data for effective monitoring and rapid fault detection. Quality solar data improves maintenance planning, minimizes downtime and helps extend system lifespan.

Data analysts depend on clean, consistent data sets to evaluate system trends, predict output and identify anomalies. Poor data quality can lead to incorrect conclusions, making accuracy critical for sound analysis.

Ultimately, reliable solar irradiance data benefits all stakeholders, enabling better

decisions, optimized systems and long-term project success.

Confidence in every measurement

EKO Instruments developed EKO Q, an innovative software analysis platform that automates quality control of irradiance data. Built on international standards and our deep expertise, EKO Q answers the crucial question: can I trust my solar data?

The ultimate question is: can I trust my solar data?

EKO Q is designed for professionals involved in every phase of the solar project lifecycle, from initial assessments to long-term operations. It analyses irradiance data measurements using physical models, satellite data and cross references with ClearSky models. It automates your data analysis and identifies patterns, flags anomalies and quantifies uncertainties. The result is a detailed, professional report that offers actionable insights and a clear picture of the data quality.

Why Integrate EKO Q?

Incorporating EKO Q quality control early in your project routines allows you to identify and address issues promptly, reducing risk and strengthening the value of your PV assets data foundation.

Ensuring data accuracy is backed by EKO's Class A pyranometers and expert software, EKO Q turns raw measurements into trusted, actionable intelligence.

It closes the gap between excellent hardware and great outcomes, ensuring your data isn't just collected but counted on.

Trust your data. Trust EKO Q.

Stay tuned, we have an exciting roadmap ahead.

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