

Global PV Module Lifetime Prediction System Market 2026 by Company, Regions, Type and Application, Forecast to 2032

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Abstracts

According to our (Global Info Research) latest study, the global PV Module Lifetime Prediction System market size was valued at US\$ 98 million in 2025 and is forecast to a readjusted size of US\$ 313 million by 2032 with a CAGR of 16.8% during review period.

A PV module lifetime prediction system is a software or analytics platform that combines module design information, bill-of-materials data, laboratory reliability testing, outdoor exposure data, plant operation data, meteorological data, IV curves, EL/PL/IR images, energy yield data and string-level monitoring signals to estimate PV module degradation, performance loss rate and remaining useful life. Its purpose is to diagnose degradation modes, forecast lifetime, evaluate warranty risk, support asset valuation, improve maintenance decisions and guide module design optimization. Unlike a conventional PV monitoring or SCADA system, a lifetime prediction system focuses on long-term degradation, reliability and future performance rather than only real-time operating status.

Based on our research, a PV module lifetime prediction system is not just a monitoring dashboard, but a reliability analytics layer built on top of module design data, laboratory testing, field operating data, climate stressors, IV curves and EL/PL/IR imaging. Its value lies in estimating degradation rates, identifying dominant failure modes, predicting remaining useful life, assessing warranty risk and supporting asset valuation. For utility-scale PV assets, even small differences in annual degradation assumptions can materially affect long-term energy yield, project valuation and warranty exposure. From the supply perspective, the market is still fragmented and not yet a fully standardized software category. Research institutions such as NREL, Sandia and DuraMAT provide important methods, open-source tools and long-term field data. Testing and certification

organizations such as Kiwa PVEL, TÜV Rheinland, TÜV SÜD, UL, DNV and Fraunhofer ISE hold valuable reliability testing and field performance datasets. Commercial software and analytics providers such as Power Factors, Raptor Maps, Heliolytics, 3E and GreenPowerMonitor are closer to operational asset health analytics, drone-based inspection and portfolio-level performance management. Module manufacturers also operate internal reliability platforms that combine BOM, accelerated testing, field data and warranty models, but these systems are rarely sold externally. From the demand perspective, the strongest use cases are module manufacturer reliability analytics, utility-scale asset health assessment, warranty claim support, technical due diligence, insurance risk evaluation and repowering decisions. As the installed PV base ages, owners and investors increasingly need to distinguish normal degradation from abnormal failure, quantify remaining useful life and determine whether underperformance is caused by module degradation, soiling, inverter issues, clipping, shading or system design. This is especially important for large portfolios, where degradation uncertainty directly affects cash-flow forecasts and refinancing decisions. From the technology roadmap perspective, the industry is moving from simple linear degradation assumptions toward multi-source, mechanism-aware lifetime prediction. Useful systems will need to combine operational data, weather data, module BOM information, accelerated reliability tests, IV curve parameters and image-based diagnostics. The most valuable platforms will not only estimate performance loss rate, but also explain whether degradation is driven by encapsulant browning, solder fatigue, cell cracking, PID, corrosion, glass or backsheet issues, bypass diode failures or thermomechanical stress. Over time, hybrid physics-AI models and digital twins are likely to become the preferred approach, because they can combine field data with degradation mechanisms and uncertainty quantification. Looking forward, PV module lifetime prediction will become increasingly important as new technologies such as TOPCon, HJT, BC, lightweight modules, bifacial glass-glass modules and perovskite tandem modules enter the market. These technologies have less long-term field history than conventional PERC modules, which increases uncertainty around degradation and warranty risk. Platforms that can combine laboratory reliability testing, early field performance, defect imaging and large-scale portfolio data will be better positioned to support bankability, insurance pricing, warranty management and lifecycle asset optimization.

This report is a detailed and comprehensive analysis for global PV Module Lifetime Prediction System market. Both quantitative and qualitative analyses are presented by company, by region & country, by Analytics Method and by Application. As the market is constantly changing, this report explores the competition, supply and demand trends, as well as key factors that contribute to its changing demands across many markets.

Company profiles and product examples of selected competitors, along with market share estimates of some of the selected leaders for the year 2025, are provided.

Key Features:

Global PV Module Lifetime Prediction System market size and forecasts, in consumption value (\$ Million), 2021-2032

Global PV Module Lifetime Prediction System market size and forecasts by region and country, in consumption value (\$ Million), 2021-2032

Global PV Module Lifetime Prediction System market size and forecasts, by Analytics Method and by Application, in consumption value (\$ Million), 2021-2032

Global PV Module Lifetime Prediction System market shares of main players, in revenue (\$ Million), 2021-2026

The Primary Objectives in This Report Are:

- To determine the size of the total market opportunity of global and key countries

- To assess the growth potential for PV Module Lifetime Prediction System

- To forecast future growth in each product and end-use market

- To assess competitive factors affecting the marketplace

This report profiles key players in the global PV Module Lifetime Prediction System market based on the following parameters - company overview, revenue, gross margin, product portfolio, geographical presence, and key developments. Key companies covered as a part of this study include NREL, Sandia, DuraMAT, Kiwa PVEL, T?V Rheinland, UL Solutions, DNV, Fraunhofer ISE, Raptor Maps, Heliolytics, etc.

This report also provides key insights about market drivers, restraints, opportunities, new product launches or approvals.

Market segmentation

PV Module Lifetime Prediction System market is split by Analytics Method and by Application. For the period 2021-2032, the growth among segments provides accurate calculations and forecasts for Consumption Value by Analytics Method and by Application. This analysis can help you expand your business by targeting qualified niche markets.

Market segment by Analytics Method

Empirical Degradation Modeling

Physics-based Reliability Modeling

Statistical Lifetime Prediction

Machine Learning Prediction

Computer Vision-based Diagnosis

Digital Twin-based Prediction

Warranty Risk Modeling

Hybrid Physics-AI Modeling

Market segment by Module Technology

PERC Module Lifetime Prediction

TOPCon Module Lifetime Prediction

HJT Module Lifetime Prediction

BC / IBC Module Lifetime Prediction

Glass-glass Module Lifetime Prediction

Market segment by Prediction Object

PV Module Lifetime Prediction

PV Module Degradation Prediction

Cell-level Degradation Prediction

String-level Health Prediction

Array / Block-level Lifetime Prediction

Portfolio-level Lifetime Prediction

Warranty Curve Compliance Prediction

Market segment by Application

Module Manufacturer Reliability Analytics

Third-party Testing and Certification

Utility-scale PV Asset Health Analytics

Distributed PV Portfolio Analytics

Warranty Claim and Dispute Support

Insurance and Finance Risk Assessment

Market segment by players, this report covers

NREL

Sandia

DuraMAT

Kiwa PVEL

T?V Rheinland

UL Solutions

DNV

Fraunhofer ISE

Raptor Maps

Heliolytics

Power Factors

GreenPowerMonitor

3E

PVsyst

PVcase

Enertis Applus+

PI Berlin

Clean Power Research

Intertek

RETC

Market segment by regions, regional analysis covers

North America (United States, Canada and Mexico)

Europe (Germany, France, UK, Russia, Italy and Rest of Europe)

Global PV Module Lifetime Prediction System Market 2026 by Company, Regions, Type and Application, Forecast to...

Asia-Pacific (China, Japan, South Korea, India, Southeast Asia and Rest of Asia-Pacific)

South America (Brazil, Rest of South America)

Middle East & Africa (Turkey, Saudi Arabia, UAE, Rest of Middle East & Africa)

The content of the study subjects, includes a total of 13 chapters:

Chapter 1, to describe PV Module Lifetime Prediction System product scope, market overview, market estimation caveats and base year.

Chapter 2, to profile the top players of PV Module Lifetime Prediction System, with revenue, gross margin, and global market share of PV Module Lifetime Prediction System from 2021 to 2026.

Chapter 3, the PV Module Lifetime Prediction System competitive situation, revenue, and global market share of top players are analyzed emphatically by landscape contrast.

Chapter 4 and 5, to segment the market size by Analytics Method and by Application, with consumption value and growth rate by Analytics Method, by Application, from 2021 to 2032.

Chapter 6, 7, 8, 9, and 10, to break the market size data at the country level, with revenue and market share for key countries in the world, from 2021 to 2026. and PV Module Lifetime Prediction System market forecast, by regions, by Analytics Method and by Application, with consumption value, from 2027 to 2032.

Chapter 11, market dynamics, drivers, restraints, trends, Porters Five Forces analysis.

Chapter 12, the key raw materials and key suppliers, and industry chain of PV Module Lifetime Prediction System.

Chapter 13, to describe PV Module Lifetime Prediction System research findings and conclusion.

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