

PV Monitoring System Market – Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Type (Hardware, Software), By Application (Residential, Commercial, Utility), By Deployment Type (On-site Monitoring, Cloud-based Monitoring), By Region, By Competition, 2020-2030F

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Abstracts

Market Overview

The Global PV Monitoring System Market was valued at USD 1.7 billion in 2024 and is projected to reach USD 3.4 billion by 2030, growing at a CAGR of 11.9% during the forecast period. This growth is fueled by the rapid expansion of global solar energy capacity, driven by favorable government policies, renewable energy incentives, and the urgent transition towards sustainable power. As solar panel costs continue to decline, the accessibility and affordability of solar systems have surged, amplifying the need for efficient monitoring solutions to ensure optimal energy output. Technological advancements—particularly in Artificial Intelligence (AI), Internet of Things (IoT), and Machine Learning (ML)—are enhancing PV system capabilities by enabling real-time performance analytics, predictive maintenance, and anomaly detection. Rising interest in energy efficiency and smart grid systems further strengthens market demand, as PV monitoring facilitates effective grid integration and reduces energy losses. Informed consumer awareness and increasing corporate investments in green technologies are also contributing to market expansion.

Key Market Drivers

Rapid Expansion of Solar Energy Capacity and Favorable Government Policies

A major force driving the global PV monitoring system market is the rapid rise in installed solar energy capacity, backed by robust government initiatives promoting renewable energy. Countries across the globe are introducing supportive policies such as tax incentives, subsidies, and feed-in tariffs to boost solar energy deployment. These regulatory frameworks are accelerating residential, commercial, and utility-scale solar installations, directly increasing the demand for monitoring systems to ensure performance optimization. PV monitoring systems are critical for tracking energy output, identifying inefficiencies, and maintaining asset longevity, which helps solar energy stakeholders maximize returns and meet energy goals effectively.

Key Market Challenges

High Initial Investment and Cost Concerns

Despite long-term benefits, the adoption of PV monitoring systems faces hurdles due to the high initial costs associated with hardware, software, and integration. The technology involves advanced components such as sensors, communication devices, and real-time analytics platforms, which can significantly increase upfront project expenses. While large commercial and utility-scale installations can justify the investment due to their scale, smaller residential or SME users often find these costs prohibitive—especially in regions with limited financial incentives. For such users, the cost burden may outweigh the perceived value, slowing adoption and creating entry barriers in cost-sensitive markets.

Key Market Trends

Integration of Advanced Technologies like AI, IoT, and Big Data Analytics

A defining trend in the PV monitoring market is the integration of next-generation technologies like AI, IoT, and Big Data into system operations. These innovations are transforming how photovoltaic assets are managed, enabling smarter, more efficient solar power systems. AI-powered algorithms enhance fault detection and predictive maintenance by analyzing large datasets from solar modules, inverters, and environmental sensors. Meanwhile, IoT-enabled devices ensure real-time connectivity, allowing operators to remotely monitor and control performance across multiple sites. Cloud-based platforms provide centralized data access and advanced analytics, supporting decision-making and improving operational reliability. These developments are particularly valuable for utilities and large-scale operators seeking scalable,

intelligent energy solutions.

Key Market Players

SolarEdge Technologies, Inc.

Enphase Energy, Inc.

SMA Solar Technology AG

Huawei Technologies Co., Ltd.

ABB Ltd.

Fronius International GmbH

Sungrow Power Supply Co., Ltd.

Delta Electronics, Inc.

Report Scope:

In this report, the Global PV Monitoring System Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

PV Monitoring System Market, By Type:

Hardware

Software

PV Monitoring System Market, By Application:

Residential

Commercial

Utility

PV Monitoring System Market, By Deployment Type:

On-site Monitoring

Cloud-based Monitoring

PV Monitoring System Market, By Region:

North America

United States

Canada

Mexico

Europe

Germany

France

United Kingdom

Italy

Spain

Asia Pacific

China

India

Japan

South Korea

Australia

South America

Brazil

Colombia

Argentina

Middle East & Africa

Saudi Arabia

UAE

South Africa

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global PV Monitoring System Market.

Available Customizations:

Global PV Monitoring System Market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

Contents

1. PRODUCT OVERVIEW

- 1.1. Market Definition
- 1.2. Scope of the Market
 - 1.2.1. Markets Covered
 - 1.2.2. Years Considered for Study
 - 1.2.3. Key Market Segmentations

2. RESEARCH METHODOLOGY

- 2.1. Objective of the Study
- 2.2. Baseline Methodology
- 2.3. Key Industry Partners
- 2.4. Major Association and Secondary Sources
- 2.5. Forecasting Methodology
- 2.6. Data Triangulation & Validation
- 2.7. Assumptions and Limitations

3. EXECUTIVE SUMMARY

- 3.1. Overview of the Market
- 3.2. Overview of Key Market Segmentations
- 3.3. Overview of Key Market Players
- 3.4. Overview of Key Regions/Countries
- 3.5. Overview of Market Drivers, Challenges, and Trends

4. VOICE OF CUSTOMER

5. GLOBAL PV MONITORING SYSTEM MARKET OUTLOOK

- 5.1. Market Size & Forecast
 - 5.1.1. By Value
- 5.2. Market Share & Forecast
 - 5.2.1. By Type (Hardware, Software)
 - 5.2.2. By Application (Residential, Commercial, Utility)
 - 5.2.3. By Deployment Type (On-site Monitoring, Cloud-based Monitoring)
 - 5.2.4. By Region (North America, Europe, South America, Middle East & Africa, Asia)

Pacific)

5.3. By Company (2024)

5.4. Market Map

6. NORTH AMERICA PV MONITORING SYSTEM MARKET OUTLOOK

6.1. Market Size & Forecast

6.1.1. By Value

6.2. Market Share & Forecast

6.2.1. By Type

6.2.2. By Application

6.2.3. By Deployment Type

6.2.4. By Country

6.3. North America: Country Analysis

6.3.1. United States PV Monitoring System Market Outlook

6.3.1.1. Market Size & Forecast

6.3.1.1.1. By Value

6.3.1.2. Market Share & Forecast

6.3.1.2.1. By Type

6.3.1.2.2. By Application

6.3.1.2.3. By Deployment Type

6.3.2. Canada PV Monitoring System Market Outlook

6.3.2.1. Market Size & Forecast

6.3.2.1.1. By Value

6.3.2.2. Market Share & Forecast

6.3.2.2.1. By Type

6.3.2.2.2. By Application

6.3.2.2.3. By Deployment Type

6.3.3. Mexico PV Monitoring System Market Outlook

6.3.3.1. Market Size & Forecast

6.3.3.1.1. By Value

6.3.3.2. Market Share & Forecast

6.3.3.2.1. By Type

6.3.3.2.2. By Application

6.3.3.2.3. By Deployment Type

7. EUROPE PV MONITORING SYSTEM MARKET OUTLOOK

7.1. Market Size & Forecast

- 7.1.1. By Value
- 7.2. Market Share & Forecast
 - 7.2.1. By Type
 - 7.2.2. By Application
 - 7.2.3. By Deployment Type
 - 7.2.4. By Country
- 7.3. Europe: Country Analysis
 - 7.3.1. Germany PV Monitoring System Market Outlook
 - 7.3.1.1. Market Size & Forecast
 - 7.3.1.1.1. By Value
 - 7.3.1.2. Market Share & Forecast
 - 7.3.1.2.1. By Type
 - 7.3.1.2.2. By Application
 - 7.3.1.2.3. By Deployment Type
 - 7.3.2. France PV Monitoring System Market Outlook
 - 7.3.2.1. Market Size & Forecast
 - 7.3.2.1.1. By Value
 - 7.3.2.2. Market Share & Forecast
 - 7.3.2.2.1. By Type
 - 7.3.2.2.2. By Application
 - 7.3.2.2.3. By Deployment Type
 - 7.3.3. United Kingdom PV Monitoring System Market Outlook
 - 7.3.3.1. Market Size & Forecast
 - 7.3.3.1.1. By Value
 - 7.3.3.2. Market Share & Forecast
 - 7.3.3.2.1. By Type
 - 7.3.3.2.2. By Application
 - 7.3.3.2.3. By Deployment Type
 - 7.3.4. Italy PV Monitoring System Market Outlook
 - 7.3.4.1. Market Size & Forecast
 - 7.3.4.1.1. By Value
 - 7.3.4.2. Market Share & Forecast
 - 7.3.4.2.1. By Type
 - 7.3.4.2.2. By Application
 - 7.3.4.2.3. By Deployment Type
 - 7.3.5. Spain PV Monitoring System Market Outlook
 - 7.3.5.1. Market Size & Forecast
 - 7.3.5.1.1. By Value
 - 7.3.5.2. Market Share & Forecast

- 7.3.5.2.1. By Type
- 7.3.5.2.2. By Application
- 7.3.5.2.3. By Deployment Type

8. ASIA PACIFIC PV MONITORING SYSTEM MARKET OUTLOOK

- 8.1. Market Size & Forecast
 - 8.1.1. By Value
- 8.2. Market Share & Forecast
 - 8.2.1. By Type
 - 8.2.2. By Application
 - 8.2.3. By Deployment Type
 - 8.2.4. By Country
- 8.3. Asia Pacific: Country Analysis
 - 8.3.1. China PV Monitoring System Market Outlook
 - 8.3.1.1. Market Size & Forecast
 - 8.3.1.1.1. By Value
 - 8.3.1.2. Market Share & Forecast
 - 8.3.1.2.1. By Type
 - 8.3.1.2.2. By Application
 - 8.3.1.2.3. By Deployment Type
 - 8.3.2. India PV Monitoring System Market Outlook
 - 8.3.2.1. Market Size & Forecast
 - 8.3.2.1.1. By Value
 - 8.3.2.2. Market Share & Forecast
 - 8.3.2.2.1. By Type
 - 8.3.2.2.2. By Application
 - 8.3.2.2.3. By Deployment Type
 - 8.3.3. Japan PV Monitoring System Market Outlook
 - 8.3.3.1. Market Size & Forecast
 - 8.3.3.1.1. By Value
 - 8.3.3.2. Market Share & Forecast
 - 8.3.3.2.1. By Type
 - 8.3.3.2.2. By Application
 - 8.3.3.2.3. By Deployment Type
 - 8.3.4. South Korea PV Monitoring System Market Outlook
 - 8.3.4.1. Market Size & Forecast
 - 8.3.4.1.1. By Value
 - 8.3.4.2. Market Share & Forecast

- 8.3.4.2.1. By Type
- 8.3.4.2.2. By Application
- 8.3.4.2.3. By Deployment Type
- 8.3.5. Australia PV Monitoring System Market Outlook
 - 8.3.5.1. Market Size & Forecast
 - 8.3.5.1.1. By Value
 - 8.3.5.2. Market Share & Forecast
 - 8.3.5.2.1. By Type
 - 8.3.5.2.2. By Application
 - 8.3.5.2.3. By Deployment Type

9. MIDDLE EAST & AFRICA PV MONITORING SYSTEM MARKET OUTLOOK

- 9.1. Market Size & Forecast
 - 9.1.1. By Value
- 9.2. Market Share & Forecast
 - 9.2.1. By Type
 - 9.2.2. By Application
 - 9.2.3. By Deployment Type
 - 9.2.4. By Country
- 9.3. Middle East & Africa: Country Analysis
 - 9.3.1. Saudi Arabia PV Monitoring System Market Outlook
 - 9.3.1.1. Market Size & Forecast
 - 9.3.1.1.1. By Value
 - 9.3.1.2. Market Share & Forecast
 - 9.3.1.2.1. By Type
 - 9.3.1.2.2. By Application
 - 9.3.1.2.3. By Deployment Type
 - 9.3.2. UAE PV Monitoring System Market Outlook
 - 9.3.2.1. Market Size & Forecast
 - 9.3.2.1.1. By Value
 - 9.3.2.2. Market Share & Forecast
 - 9.3.2.2.1. By Type
 - 9.3.2.2.2. By Application
 - 9.3.2.2.3. By Deployment Type
 - 9.3.3. South Africa PV Monitoring System Market Outlook
 - 9.3.3.1. Market Size & Forecast
 - 9.3.3.1.1. By Value
 - 9.3.3.2. Market Share & Forecast

- 9.3.3.2.1. By Type
- 9.3.3.2.2. By Application
- 9.3.3.2.3. By Deployment Type

10. SOUTH AMERICA PV MONITORING SYSTEM MARKET OUTLOOK

- 10.1. Market Size & Forecast
 - 10.1.1. By Value
- 10.2. Market Share & Forecast
 - 10.2.1. By Type
 - 10.2.2. By Application
 - 10.2.3. By Deployment Type
 - 10.2.4. By Country
- 10.3. South America: Country Analysis
 - 10.3.1. Brazil PV Monitoring System Market Outlook
 - 10.3.1.1. Market Size & Forecast
 - 10.3.1.1.1. By Value
 - 10.3.1.2. Market Share & Forecast
 - 10.3.1.2.1. By Type
 - 10.3.1.2.2. By Application
 - 10.3.1.2.3. By Deployment Type
 - 10.3.2. Colombia PV Monitoring System Market Outlook
 - 10.3.2.1. Market Size & Forecast
 - 10.3.2.1.1. By Value
 - 10.3.2.2. Market Share & Forecast
 - 10.3.2.2.1. By Type
 - 10.3.2.2.2. By Application
 - 10.3.2.2.3. By Deployment Type
 - 10.3.3. Argentina PV Monitoring System Market Outlook
 - 10.3.3.1. Market Size & Forecast
 - 10.3.3.1.1. By Value
 - 10.3.3.2. Market Share & Forecast
 - 10.3.3.2.1. By Type
 - 10.3.3.2.2. By Application
 - 10.3.3.2.3. By Deployment Type

11. MARKET DYNAMICS

- 11.1. Drivers

11.2. Challenges

12. MARKET TRENDS AND DEVELOPMENTS

12.1. Merger & Acquisition (If Any)

12.2. Product Launches (If Any)

12.3. Recent Developments

13. COMPANY PROFILES

13.1. SolarEdge Technologies, Inc.

13.1.1. Business Overview

13.1.2. Key Revenue and Financials

13.1.3. Recent Developments

13.1.4. Key Personnel

13.1.5. Key Product/Services Offered

13.2. Enphase Energy, Inc.

13.3. SMA Solar Technology AG

13.4. Huawei Technologies Co., Ltd.

13.5. ABB Ltd.

13.6. Fronius International GmbH

13.7. Sungrow Power Supply Co., Ltd.

13.8. Delta Electronics, Inc.

14. STRATEGIC RECOMMENDATIONS

15. ABOUT US & DISCLAIMER

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