Transformer Monitoring System Market to Reach USD 8.56 Billion by 2035, Driven by Grid Reliability Mandates

Hardware held 64.8% of Transformer Monitoring System Market revenue in 2025, led by multi-gas DGA modules and fibre-optic winding probes



Transformer Monitoring System Market Size

NEW YORK, NY, UNITED STATES, September 8, 2026 /EINPresswire.com/ -- The Transformer Monitoring System Market reached USD 3.40 Billion in 2025 and enters the forecast window at USD 3.71 Billion in 2026, climbing to USD 8.56 Billion by 2035 at a 9.75% CAGR. Two catalysts anchor that trajectory. Utilities across the OECD are recovering sensor capex through reliability-linked rate mechanisms, while the IEA's estimate that global grid spending must roughly double to USD 600 billion annually by 2030 has moved substation instrumentation from discretionary to planned capital. A single averted forced outage on a 230 kV unit avoids roughly USD 1 million in replacement power and restoration costs, which is why the transformer monitoring system market clears investment committees even in rate-regulated territories.

> Partial-discharge services post the highest service-line growth in the Transformer Monitoring System Market at an 11.3% CAGR”
>
> *Anshula Mandaokar*

Market Overview

Transformer monitoring systems are integrated hardware and software solutions designed to continuously assess the health, performance, and operational integrity of power transformers. These systems employ sensors to track critical parameters including dissolved gases in oil, winding temperature, partial discharge, bushing condition, and load history. By providing real-time data and predictive diagnostics, these systems enable condition-based maintenance, extend asset life, and prevent catastrophic failures in one of the

most critical and expensive components of the power grid.

The market is experiencing robust growth driven by several key factors. Grid reliability mandates and rate-base recovery mechanisms have transformed monitoring from discretionary expenditure to revenue-protecting investment. Regulators are linking transmission operator returns to quantifiable availability, with frameworks like Ofgem's RIIO-2 driving tens of millions in outage-minute savings per price control cycle. Fleet aging is a balance-sheet problem, with the median age of transmission transformer failures near 33 years and large power transformer lead times stretching to 80-120 weeks, making early fault detection a planning necessity.

Industry trends indicate a decisive shift from annual laboratory oil sampling and periodic thermographic surveys to continuous dissolved-gas, hot-spot temperature, bushing capacitance, and partial-discharge sensing streamed into asset performance platforms. Grid digitalization programs, including the EU's EUR 584 billion grid action plan, are funding this transformation directly. Software is now outgrowing the sensors it depends on, with recurring analytics revenue approaching one-third of total market value by 2035.

Technological developments are reshaping the market landscape. AI-assisted diagnostics in asset platforms are beginning to issue failure-mode classifications rather than threshold alarms, with autonomous maintenance work orders expected by 2030. Falling sensor and edge-gateway unit costs have reduced hardware prices roughly 30% since 2021, while software subscriptions now carry gross margins above 60%. IoT-enabled monitoring systems are enabling real-time data streaming and predictive analytics, enhancing operational efficiency and grid resilience.

Policy and regulatory influence continues to shape market dynamics. FERC Order No. 1920 mandates long-term regional transmission planning, indirectly accelerating diagnostic budgets tied to new interconnection assets. The EU Grid Action Plan commits EUR 584 billion of grid investment through 2030. NERC's long-term reliability assessment has flagged elevated transformer failure exposure, strengthening the internal case for monitoring capex. Sustainability disclosure frameworks like CSRD are extending transformer service life to avoid embodied carbon of replacement, cited as a quantified Scope 3 avoidance measure.

Asia-Pacific dominates with 38.5% of 2025 revenue and also grows fastest, at an 11.2% CAGR. North America follows at 25.4%, propelled by FERC Order No. 1920 transmission planning obligations and data-center load growth. Europe sits third at 23.6%, where regulated performance frameworks reward measurable reliability gains.

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Market Segmentation
By Component
Hardware: Held 64.8% of market revenue in 2025, led by multi-gas DGA modules and fibre-optic

winding probes

Software and Analytics Platforms: Fastest-expanding component at 12.7% CAGR, driven by fleet analytics and AI diagnostics

By Monitoring Type
Online Continuous Monitoring: Contributed USD 2.04 billion in 2025 for transient fault signature capture

Offline/Periodic Monitoring: Represents 40.1% share for distribution-class cost sensitivity

By Phase
Three-Phase: Held 75.4% share for transmission and industrial substations

Single-Phase: Growing at 9.1% CAGR for North American distribution networks

By Deployment Type
Edge Architecture: Accounts for 47.7% share due to cyber isolation requirements

Cloud/Hybrid: Fastest-growing deployment at 13.5% CAGR for multi-site fleet benchmarking

On-Premise Server: Valued at USD 0.48 billion for legacy SCADA integration

By Transformer Type
Power (>72.5 kV): Dominant segment at 55.8% share, supported by high replacement cost and lead times

Distribution: Valued at USD 1.10 billion, driven by smart meter data convergence

Specialty (HVDC, Traction): Fastest-growing at 12.8% CAGR from converter station build-outs

By Service Type
Oil/Dissolved-Gas Analysis: Largest service segment at 35.1% share, driven by established diagnostic standards

Partial-Discharge Monitoring: Fastest-growing at 11.3% CAGR for insulation defect detection

Thermal/Winding Temperature: Represents 21.4% share for dynamic rating applications

Bushing and Other Services: Valued at USD 0.54 billion, addressing bushing failure share of outages

By End User

Power Utilities: Account for 60.5% of end-user demand, driven by regulated reliability obligations

Industrial: Advancing at a 10.4% CAGR, driven by process continuity economics

Transport, Data Centers and Others: Valued at USD 0.50 billion for uptime-critical facility loads

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Regional Analysis
Asia-Pacific
Asia-Pacific leads the transformer monitoring system market with 38.5% revenue share and also grows fastest at an 11.2% CAGR. China accounts for 44.8% of regional revenue, driven by its ultra-high-voltage corridor programme and new-type power system guidance embedding condition-based asset management into provincial grid company targets. India's transmission plan calls for roughly 191,000 circuit kilometres of new lines, making it the highest-velocity national opportunity. Japan's post-restart nuclear reliability standards and ASEAN's cross-border interconnection projects contribute to regional growth.

North America
North America follows at 25.4%, propelled by FERC Order No. 1920 transmission planning obligations and data-center load growth. The United States accounts for 81.4% of regional revenue, with interconnection backlogs dominating planning discussions. Utilities have prioritized instrumenting critical-path units, focusing on autotransformers feeding data-center clusters in Virginia, Ohio, and Texas. Canada's Hydro-Québec transmission renewal and Mexico's industrial nearshoring load contribute to regional demand.

Europe
Europe sits third at 23.6%, where regulated performance frameworks reward measurable reliability gains. Germany leads with 23.1% of regional revenue, driven by offshore corridor converter stations. The EU Grid Action Plan has earmarked EUR 584 billion through 2030, with national regulators aligned behind availability outcomes. The UK's RIIO-2 reliability incentives and France's nuclear fleet transformer renewal contribute to steady demand.

Rest of the World
South America holds 6.2% share, with Brazil's ANEEL transmission auction cycles bundling monitoring with concession terms. The Middle East & Africa is growing at a 10.6% CAGR, driven by Saudi Arabia's NEOM and desalination substations, UAE's nuclear and solar integration, and South Africa's Eskom fleet reliability recovery.

Competitive Landscape / Key Players
The transformer monitoring system market exhibits moderate concentration, with the top five

suppliers holding roughly 44-52% of global revenue. Competition increasingly hinges on installed-base incumbency, open data interfaces, and software-led service revenues.

Hitachi Energy (~10-13% revenue share): Offers the TXpert ecosystem and digital bushing sensors with the broadest OEM-integrated portfolio.

ABB (~9-12%): Provides CoreSense multi-gas and condition assessment services with sensor chemistry leadership.

Siemens Energy (~8-11%): Features Sensformer connected transformers, bundling monitoring with new units.

GE Vernova (~7-10%): Delivers Perception fleet software and Kelman DGA with an analytics-first go-to-market strategy.

Qualitrol (Fortive) (~6-9%): Specializes in bushing, PD, and fibre-optic temperature systems as a retrofit and aftermarket specialist.

Other notable players include Doble Engineering, Schneider Electric, Camlin Group, Dynamic Ratings, Weidmann Electrical Technology, and Mitsubishi Electric.

Latest Industry News & Developments
Hitachi Energy (March 2024): Expanded TXpert Hub interoperability to third-party sensors, signalling a shift away from closed OEM architectures and widening the addressable retrofit pool.

FERC (May 2024): Issued Order No. 1920 mandating long-term regional transmission planning, indirectly accelerating diagnostic budgets tied to new interconnection assets.

Siemens Energy (September 2024): Reported record transformer order backlog, with connected units shipped as standard on selected transmission ranges.

European Commission (November 2023): Launched the EU Grid Action Plan committing EUR 584 billion of grid investment through 2030.

Camlin Group (June 2024): Announced a multi-year fleet monitoring agreement with a Southeast Asian transmission operator covering several hundred units.

GE Vernova (February 2025): Released updated fleet analytics with AI-based fault-mode classification, targeting utilities running mixed-vendor sensor estates.

Market Challenges & Opportunities
Key Restraints

Upfront capex versus rate recovery lag presents challenges, particularly in developing grids where monitoring loses out to capacity expansion in capital queues. Retrofit complexity and outage window scarcity cap fleet coverage at 40-60 units per operator annually. Cybersecurity and OT/IT integration risk slows cloud adoption, with security reviews adding six to nine months to procurement timelines. Fragmented interoperability standards and diagnostic workforce shortages further constrain growth.

Emerging Opportunities

Software-led attach in existing installed bases, where thousands of transformers already carry first-generation sensors feeding nothing but a local alarm, represents the highest-margin near-term expansion path. Monitoring-as-a-Service in emerging grids shifts diagnostics into operating budgets, with Southeast Asian and African utilities responding well to per-asset subscription pricing. Data monetization through fleet benchmarking supports actuarial-grade failure models, creating a second revenue line independent of hardware. HVDC and traction specialty assets represent the fastest-growing niche at 12.8% CAGR. Interoperability as competitive positioning through open IEC 61850 and MQTT interfaces wins multi-vendor fleet tenders.

Future Potential

Autonomous diagnostics will see leading platforms auto-generate maintenance work orders by 2030, with human engineers reviewing exceptions instead of raw trends. Platform economics will reshape vendor margins, with recurring software revenue approaching one-third of total market value by 2035. The electrification supercycle, with IEA projections of global electricity demand growth above 3.5% annually, will convert diagnostics from prudence into necessity. Sustainability disclosure pulls data forward as utilities cite monitored asset-life extension as a quantified Scope 3 avoidance measure.

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Final Market Summary

The global Transformer Monitoring System Market is positioned for strong growth, with projections indicating expansion from USD 3.71 billion in 2026 to USD 8.56 billion by 2035, registering a 9.75% CAGR. Market dynamics are driven by the convergence of grid reliability mandates, aging infrastructure, and the renewable integration challenge. The shift from periodic laboratory sampling to continuous, AI-driven monitoring is transforming asset management practices.

Asia-Pacific leads with 38.5% share, driven by China's UHV corridor programme and India's transmission expansion, while North America follows at 25.4%, propelled by FERC Order No. 1920 and data-center load growth. Europe holds 23.6%, where regulated performance frameworks reward measurable reliability gains. While challenges including retrofit complexity and cyber risks persist, the long-term industry outlook remains robust, supported by the essential role of monitoring in extending transformer life, preventing costly outages, and

enabling grid digitalization. The decade ahead will reward vendors who combine open interoperability, software-led service models, and data analytics to capture value across the expanding global fleet of instrumented transformers.

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+1 855-661-4441
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