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Data Center Power Infrastructure Market - A Global and Regional Analysis: Focus on Power Supply Architecture, AI Specific Data Center Requirements, Cloud Infrastructure, Gan Applications

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Abstracts

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This report will be delivered in 7-10 working days.Introduction to the Global Data Center Power Infrastructure Market (Including Market in 2025 and Beyond)

The Global Data Center Power Infrastructure Market is expanding rapidly as organizations modernize their IT environments, add AI-specific workloads, and adopt cloud and hyperscale designs. By 2025, data centers will increasingly prioritize energy-efficient power distribution and supply architectures to handle higher rack densities, mitigate costs, and comply with sustainability mandates. Innovations in GaN-based power solutions, DC distribution, and advanced packaging (e.g., 3D stacking) are reshaping how data centers manage and convert power.

Looking further ahead, the drive to accommodate specialized compute (GPU servers, HPC clusters) will intensify the need for robust, flexible power systems. As more operators adopt green energy sources and push for low-PUE (Power Usage Effectiveness) targets, advanced power conversion and distribution solutions become critical to staying competitive and meeting environmental goals.

Segmentation by Application

Data Center Type

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Hyperscale: Massive cloud providers (e.g., AWS, Microsoft, Google) with large capital expenditures in power infrastructure.

Colocation & Retail: Multi-tenant facilities requiring flexible, scalable power solutions for varied workloads.

Enterprise Data Centers: Private, on-premises facilities focusing on in-house reliability and control.

Others: Edge or specialized data centers with unique power constraints.

Segmentation by Product

1. Power Supply Architecture

Distribution

Centralized: Traditional model with large-scale AC distribution.

Distributed: Modular or cluster-level power distribution offering localized control.

Power Supply

Rack-Level: AC-DC or DC-DC conversion at each rack.

Infrastructure Level: Bulk AC or emerging DC supply at data hall or facility scale.

Component

Power Supply: AC/DC and DC/DC converters, multi-phase VRMs, hot-swap modules, digital power control units.

Power Distribution & Management: PDUs (basic, metered, intelligent), busbar systems, ATS, switchgear.

Regional Overview

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North America

Dominant hyperscale providers drive large-scale expansions, focusing on advanced power designs for HPC and AI.

Retrofitting older facilities to meet sustainability targets spurs demand for newer, more efficient power systems.

Europe

Emphasis on green data center operation and tight efficiency standards.

Growing HPC/AI clusters in key countries (Germany, France, the Netherlands) raise power supply and distribution demands.

Asia-Pacific

Rapid data center build-outs in China, India, and Southeast Asia, fueled by cloud and e-commerce expansions.

Emergence of local HPC facilities adopting advanced power conversion technologies.

Rest-of-the-World

Middle East invests in large data centers leveraging renewables, while Latin America sees moderate growth.

Infrastructure expansions often incorporate modern, efficient power systems to optimize OPEX and comply with local regulations.

Trend in the Market

A prominent trend is the rise of distributed and modular power architectures, particularly in AI-oriented facilities. As compute density grows, data centers adopt local or “pod-level” power distribution models that minimize loss, simplify scaling, and accommodate diverse workload demands.

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Driver in the Market

Soaring AI and HPC workloads spur higher rack densities, intensifying the need for efficient, high-capacity power solutions. Operators expand power capacity at both the rack and infrastructure levels, adopting next-gen technologies like GaN-based converters to sustain performance and control energy costs.

Restraint in the Market

Complex integration and higher upfront expenses can slow adoption. Advanced power architecture (e.g., fully DC distribution) requires re-engineering data hall designs, staff training, and robust maintenance procedures, leading some operators to delay or opt for incremental upgrades over radical shifts.

Opportunity in the Market

Emerging edge data centers and specialized HPC facilities provide a fertile ground for adoption of cutting-edge power infrastructure. As computing moves closer to users (for low-latency services), smaller data centers will need robust, efficient power and distribution solutions customized for limited footprints and unique site conditions. Suppliers offering modular, future-proof architectures can capture these underserved segments.

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Contents

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2. DATA CENTER POWER INFRASTRUCTURE MARKET (BY APPLICATION)

3. DATA CENTER POWER INFRASTRUCTURE MARKET (BY PRODUCT)

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Note: 3.5 will be provided at global level. Section 3.5 is a Qualitative Chapter which does not have any forecast of Market size

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