

Energy-efficient configuration solutions for data center racks



Overview

This essay explores four primary topologies: perimeter cooling, in-row cooling, in-rack cooling and hot-aisle/cold-aisle containment. The guide helps you ensure the resilience, efficiency, and scalability of your IT infrastructure. Refined from extensive literature, from core principles to in-depth comparisons of air. This guide provides an overview of best practices for energy-efficient data center design which spans the categories of information technology (IT) systems and their environmental conditions, data center air management, cooling and electrical systems, and heat recovery. Data centers are the digital backbone of our modern world, powering everything from cloud computing to artificial intelligence. However, they are also among the most. Rack cooling systems have therefore emerged as one of the most essential and effective thermal management solutions in modern data centers. In traditional data centers, cooling was primarily handled by room-level air conditioning systems (CRAC/CRAH) that lowered the overall room temperature. Based upon benchmark measurements of operating data centers and input from practicing designers and. Global data center energy consumption is expected to double by 2030, driven by AI workloads, edge computing, and cloud infrastructure.

Article Content

Rack-level cooling technologies for data centers - A comprehensive ...

Therefore, a systematic review is given to provide the reference for the design, operation, control, and energy efficiency improvement of the rack-level cooling system in data centers.

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Optimizing Cooling Efficiency in Modern Data Centers

Cooling systems in data centers account for roughly 30% to 40% of total energy consumption. As rack densities grow and sustainability targets

Comprehensive Guide To Rack Cooling In Data

Rack cooling vs. traditional room cooling: Unlike conventional cooling, rack-level solutions prevent hot spots, improve airflow efficiency, and reduce

Best Practices Guide for Energy-Efficient Data Center Design

This guide provides an overview of best practices for energy-efficient data center design which spans the categories of information technology (IT) systems and their environmental conditions, data center

Liquid vs Air Cooling for Data Centers 2026: Cost & Efficiency Analysis

At Energy Solutions Intelligence, we analyze operational data from hyperscale operators, colocation providers, and enterprise deployments to benchmark liquid immersion cooling economics

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800 VDC Architecture for AI Data Centers | NVIDIA

Optimize AI data centers with 800 VDC power distribution. Reduce energy loss, copper usage, and conversion stages while enabling higher compute density and efficiency.

Why liquid cooling will dominate AI data centres in 2026

AI supercharges the race for liquid cooling solutions: what's in store for 2026? key takeaways. Liquid cooling is essential for AI-driven data centres,

Data Center Cooling: Trends and Insights for 2026

Explore key data center cooling trends for 2026, including liquid cooling, AI demands, and energy-efficient strategies.

Infineon collaborates with NVIDIA on industry-first 800V power

AI data centers will require power outputs of 1MW and more per IT rack before the end of the decade. The HVDC architecture, coupled with high-density multi-phase solutions, will therefore

How to Design and Build a Data Center

Take on data center design by factoring in these considerations, including space, power, cooling, performance, security, management and future

Comprehensive Guide to Rack Cooling in Data Centers

Whether for new AI training centers or upgrading traditional facilities, Attom delivers efficient, safe, and sustainable rack cooling solutions that help data centers stay cool, stable, and high-performing in the

Top 20 Global Data Center Rack Companies Ranked in New 2025 Data

Data center racks are crucial for organizing IT infrastructure, and with increasing demand for high-density deployments, there is a shift towards more space-efficient and energy-efficient

Data Center Rack Cooling Guide to Efficiency and Performance

Below is a detailed breakdown of the most effective solutions, organized by rack density, with pros, cons, and real-world applications.

Data center cooling efficiency | Eaton

According to studies by TDI Data Centers, hot-aisle/cold-aisle configurations can reduce energy use up to 20%. Eaton's SmartRack™ enclosures (SR42UB and SR48UB) are optimized for hot-aisle/cold-aisle.

Best Practices Guide for Energy-Efficient Data Center

This guide delves into comprehensive best practices for designing and operating energy-efficient data centers, focusing on key areas such as IT

Air vs. liquid cooling: Pick the right strategy for AI data

Explore air vs. liquid cooling for AI data centers. Learn how hybrid cooling strategies support high-density racks and optimize energy efficiency.

Data Center Best Practices Guide Energy efficiency solutions for high ...

This Data Center Best Practices Guide has been created to provide viable alternatives to inefficient data center design and operating practices and address energy efficiency retrofit opportunities.

Data Center Cooling Topologies: Perimeter, In-Row,

Data center cooling topologies—perimeter, in-row, and in-rack—offer a spectrum of solutions to balance cost, efficiency, and density requirements in

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