Data Center Energy Consumption Indicators



Overview

Energy performance of data centres A European database, prepared by the Commission, collects and publishes data, which is relevant for the energy performan.

Key Takeaways

Data centers are major electricity consumers, with servers, cooling, and infrastructure driving energy use, measured through metrics like PUE, electricity intensity, and total consumption projections.

Key Metrics

Power Usage Effectiveness (PUE): PUE is the ratio of total facility energy to IT equipment energy. Global averages in 2022 were around 1. 4, while top-performing facilities achieve 1.

05–1. 1, indicating significant potential for energy savings through efficient cooling and power management. Cooling alone often has a PUE of 1.

5, highlighting its substantial contribution to overall energy use. Electricity Consumption: In the U. S., data centers consumed approximately 176 TWh in 2023, representing about 4.

4% of total electricity use. Servers account for roughly half of this demand, with the remainder largely for cooling and supporting infrastructure. Standalone data centers are projected to consume 581 BkWh by 2050 in high-demand scenarios, with servers alone potentially representing 22–33% of commercial building electricity use.

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Energy Intensity: Commercial data center floorspace requires significantly more energy than non-data center areas. Space cooling in data centers can be up to 2. 9 times as energy-intensive as typical commercial floorspace.

Electricity intensity, measured in kWh per square foot, is projected to exceed historical highs by 2031–2032 due to growing server and cooling demands. Water Usage: Cooling strategies also impact water consumption. A 100 MW U.

S. data center may use as much water as 2,600 households, depending on the cooling method employed.

Trends and Projections

Global Energy Demand: Data center energy demand reached 206 TWh in 2021 and is projected to grow at a 5. 5% CAGR through 2025, with total global consumption potentially reaching 400 TWh by 2030. Efficiency Improvements: Leading facilities are reducing PUE and implementing innovative cooling solutions, such as seawater cooling, to mitigate energy and water use.

Future U. S. Projections: By 2050, server electricity use in commercial buildings could range from 446 BkWh to 818 BkWh, depending on growth scenarios.

Data center energy use is expected to continue rising due to increasing IT demand, AI workloads, and cloud services.

Summary

Data center energy consumption is driven by IT equipment, cooling, and infrastructure, with metrics like PUE, electricity intensity, and water usage providing insight into efficiency. While global and U. S. consumption is rising, efficiency improvements and innovative cooling strategies can significantly reduce energy and water impacts, making these metrics critical for planning and sustainability in the data center industry.

Article Content

Energy performance of data centres

A European database, prepared by the Commission, collects and publishes data, which is relevant for the energy performance and water footprint of data centres

Building Accurate Energy-Use Statistics for Data Centers

With the rapid expansion of cloud computing and large-scale artificial intelligence models, building accurate and transparent energy-use statistics for data centers has become a critical

Share of total electricity demand used by data centers

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This indicator shows what share of a country''s or region''s total electricity demand comes from data centers. It covers total data-center electricity use (including cooling and other support

Data centre electricity consumption, 2015-2025 – Charts – Data ...

Data centre electricity consumption, 2015-2025 - Chart and data by the International Energy Agency.

Data centres & networks

As the world becomes increasingly digitalised, data centres and data transmission networks are emerging as an important source of energy demand.

Data and statistics

The IEA collects, assesses and disseminates energy statistics on supply and demand, compiled into energy balances. In addition, the Energy Data Centre has

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Energy Efficiency Directive (EED) : Essential Guidelines for Data ...

As Data Centres continue to power our digital economy, the EU Energy Efficiency Directive (EED), led by the European Parliament, introduces critical compliance requirements for facilities exceeding

Energy Efficiency Directive

First adopted in 2012, the directive was updated in 2018 and 2023, setting rules and obligations for achieving the EU''s ambitious energy efficiency

2024 United States Data Center Energy Usage Report

The Energy Act of 2020 (U.S. Congress 2020) calls for the Department of Energy to make available to the public an update to the United States Data Center Energy Usage Report from Lawrence Berkeley

Best Practices Guide for Energy-Efficient Data Center Design

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This guide concludes with a section on metrics and benchmarking values by which a data center and its systems energy efficiency can be evaluated. No design guide can offer “the most energy-efficient”

Has the Market Peaked? Can Token Lose Its Momentum? The Most

Since major suppliers such as OpenAI, Anthropic, and Google mostly charge customers based on Token consumption, Token spending directly links AI usage to the demand for GPUs,

Data Center Statistics in US 2026 | Data Center Facts

The force driving this expansion is artificial intelligence. The shift from traditional cloud computing workloads to AI training and inference infrastructure has transformed data center

Data Center Energy Optimization 2026 Action Plan: A Practical

Energy efficiency is now a data center capacity strategy.If you''re searching for a Data Center Energy Optimization 2026 Action Plan, the goal is simple: measure accurately, optimize

The EU''s Energy Efficiency Directive and Its Impact on Datacenters

The European Commission to assess, by May 15, 2025, the data and report to the EU Parliament and Council, potentially proposing further energy efficiency measures, including minimum performance

Climate Data for Action | Climate Watch | Emissions and Policies

Climate Watch is an open online platform designed to empower users with the climate data, visualizations and resources they need to gather insights on national and global progress on climate

AI Data Center Power Surge: Shifting Trends Toward

Executive Summary Rapid growth in artificial intelligence (AI) data center power demand is driving a resurgence in fossil fuel investment,

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