

Niamey data center energy storage

(Data Center), internet?????

?The Datacenter as a Computer?,",?

IEA (2024), What the data centre and AI boom could mean for the energy sector, IEA, Paris https://, Licence: CC BY 4.0

Investment in new data centres has surged over the past two years, driven by growing digitalisation and the uptake of artificial intelligence (AI), which is expected to continue accelerating. Much of the spending is concentrated in the United States, where annual investment in data centre construction has doubled in the past two years alone, although other major economies, such as China and the European Union, are also witnessing an increase in activity. In 2023, overall capital investment by Google, Microsoft and Amazon, which are industry leaders in AI adoption and data centre installation, was higher than that of the entire US oil and gas industry - totalling around 0.5% of US GDP.

Average data centres are quite small in power terms, with demand in the order of 5-10 megawatts (MW). But large hyperscale data centres, which are increasingly common, have power demands of 100 MW or more, with an annual electricity consumption equivalent to the electricity demand from around 350000 to 400000 electric cars.

It is important to put this in perspective: Global sales of electric cars will reach 17 million in 2024. Today, data centres account for around 1% of global electricity consumption, and annual electricity consumption from data centres globally is about half of the electricity consumption from household IT appliances, like computers, phones and TVs. However, as the sector expands, it is important to examine the consequences for the energy sector, which we analysed in the 2024 edition of the IEA''s World Energy Outlook and will continue to explore in the months to come, including through a Special Report focused on energy and AI in the first half of 2025.

Additionally, data centres will be a key focus of the IEA''s forthcoming Global Conference on Energy & AI. The event, which will take place at our headquarters in Paris on 4-5 December, will bring together high-level decision makers from governments, the tech sector, the energy industry and civil society to discuss the ways in which AI could transform energy systems in the future.

In part because of expectations for AI, the next few years will see a substantial rise in the number and size of data centres. This growth will be partially mitigated by continued efficiency improvements at both the hardware and software level. Nonetheless, electricity demand from data centres is set to grow strongly to 2030 under today"s policies settings and trends.



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However, when considered in a broader context of total electricity consumption growth globally, the contribution of data centres is modest. Global aggregate electricity demand grows by 6 750 terawatt-hours (TWh) by 2030 in our Stated Policies Scenario, equivalent to more than the combined demand from the United States and European Union today. While growing digitalisation, including the rise of AI, is one factor, continued economic growth, electric vehicles, air conditioners and the rising importance of electricity-intensive manufacturing are all bigger drivers.

In large economies like the United States, China and the European Union, data centres account for around 2-4% of total electricity consumption today. But because they tend to be spatially concentrated, their local impact can be pronounced. The sector has already surpassed 10% of electricity consumption in at least five US states. In Ireland, it now accounts for over 20% of all electricity consumption.

For comparison, large data centres can have a power demand equivalent to that of an electric arc furnace steel mill. However, steel plants are less likely to be clustered in the same geographic area.

The growth of data centres could therefore lead to considerable strain on local power networks, exacerbated by the huge mismatch between rapid data centre construction times and the often sluggish pace of expanding and strengthening grids and generation capacity. There have already been instances of jurisdictions pausing new contracts for data centres due to a surge of requests. For regions or countries that are particularly affected, rising electricity consumption from data centres could make meeting their climate targets more difficult.

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