AI data center emissions to 2030: what a facility-level study projects

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Short answer: AI data center emissions are projected to rise from 20.4 million tonnes of CO2 equivalent in 2024 to 68.7 million in 2030 under current policies, according to a preprint by Xiaoyu Xie, John Bistline, Ming Xu and Sangwon Suh posted on arXiv on 14 November 2026. The authors built a facility-level global inventory of AI-oriented data centers. It matters because location and power supply choices change the outlook that infrastructure buyers face.

TL;DR The short version

- A preprint posted on 14 November 2026 projects AI data center emissions rising from 20.4 million tonnes of CO2e in 2024 to 68.7 million in 2030 under current policies.
- The authors built a facility-level global inventory of AI-oriented data centers.
- Location and power supply choices change the outlook, so factor grid carbon intensity into siting and procurement.

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What are AI data center emissions in this study?

The study estimates operational greenhouse gas emissions, meaning those linked to running facilities aimed at AI work. It resolves them geographically instead of giving one global total.

How the estimate works

The authors compiled AI-oriented data centers facility by facility, then extended the inventory to 2030 using documented expansion plans. Scenarios for grid policy set how clean electricity becomes. A Monte Carlo method, which samples uncertain inputs many times, gives ranges.

What is new compared with national electricity totals

Facility-level detail lets the same capacity produce different emissions depending on where it is built and whether it draws on the grid or on generation installed on site, called behind-the-meter supply.

Results reported by the authors

- Current policies: 20.4 MtCO2e in 2024 and 68.7 MtCO2e in 2030.
- Parameter uncertainty ranges (5th to 95th percentile): 19.3 to 21.0 for 2024 and 60.8 to 73.9 for 2030.

- Only six geographies, with less than 3% of projected capacity, avoided rising emissions.
- Grid decarbonisation consistent with net zero by 2050 lowers the 2030 figure to 48.3 MtCO2e.
- Fossil-based behind-the-meter generation erodes that benefit; under that scenario the US penalty from it exceeds the combined AI data center emissions outside the United States.

This is an arXiv preprint or workshop paper. Treat its numbers as the authors' own results, not as independently confirmed findings.

Limitations and open questions

- We read the abstract only; assumptions on utilisation, efficiency and plant choice are in the paper.
- The stated ranges reflect parameter uncertainty, not the chance that expansion plans change.
- Operational emissions exclude manufacturing and construction.
- Announced capacity may be delayed or cancelled.

Sources were read on 27 November 2026. Products, rules and data change, so check the linked originals before you rely on any detail.

How to use it in planning

1. Ask cloud and colocation suppliers where AI workloads run and how power is supplied.
2. Request location-based emissions figures alongside market-based claims.
3. Ask whether new capacity relies on on-site fossil generation.
4. Prefer movable batch work in regions with cleaner supply where latency and law allow.
5. Treat scenario values as ranges in business cases.
6. Review assumptions each year as plans change.

What it means for infrastructure and sustainability teams

Procurement can influence outcomes by asking about hourly and local supply. Our guide to granular energy certificates explains one tool for that, and IEA electricity demand projections gives wider context.

Frequently asked questions

- **How large could AI data center emissions be in 2030?** The preprint projects 68.7 MtCO2e under current policies.
- **What lowers the projection?** Faster grid decarbonisation, giving 48.3 MtCO2e in the net zero consistent scenario.
- **What is behind-the-meter generation?** Power produced on the customer's side of the grid connection.
- **Is the study peer reviewed?** It is posted as a preprint.

Related reading

- Granular clean energy certificates
- Data centres and electricity demand

- Data center workload flexibility
- Cloud Architecture Practitioner certification

> Related credential: Cloud Architecture Practitioner. Explore the exam facts and syllabus.

Sources and further reading

1. Xie, Bistline, Xu, Suh. AI climate trajectories shaped by growth, power choices and decarbonization. arXiv 2611.19080. 14 November 2026 (preprint). arxiv.org/abs/2611.19080

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