

Grid sustainability

Data center companies—third-party developers, operators, and hyperscalers among them—typically have far stricter carbon reduction commitments than do municipalities themselves.

- The top five hyperscalers have a combined renewable energy portfolio totaling more than 45 gigawatts (GW) worldwide, the equivalent of roughly 118,215 Tesla Model 3 motors¹¹ running on full power—and that figure doesn't include on-site generation.¹² Roughly 57 percent of global corporate wind and solar capacity tracked by S&P Global Commodity Insights is tied to these five companies alone.
- Amazon first committed to powering all of its operations, including AWS data centers, with 100 percent renewable energy by 2025. As of 2023, Amazon reported achieving this goal early, with 100 percent of its electricity consumption matched with renewable energy sources. The company also set a goal to reach net-zero emissions by 2040.¹³
- Microsoft committed to designing and operating data centers that are carbon negative, water positive, and zero waste before 2030, procuring 100 percent renewable energy on a global scale by 2025, and significantly expanding and decarbonizing local electricity grids.¹⁴
- Apple has committed to becoming carbon-neutral across its entire supply chain and product life cycle by 2030. This effort includes using nearly 10 GW of existing renewable energy and investing in new renewable generation.¹⁵
- Google, meanwhile, announced its goal in September 2020 to operate carbon-free, on clean local electricity, 24 hours a day, 7 days a week, 365 days a year by 2030. From 2010 to 2023, the company signed more than 115 agreements totaling in excess of 14 GW of clean energy generation capacity.¹⁶

- Meta committed to net zero emissions for its supply chain and to becoming water positive by 2030. The company plans to power all of its data centers with renewable energy by 2025.¹⁷

The methods through which hyperscalers and data center developers are working toward these goals include:

On-site generation: Some data centers have solar panels or other renewable energy sources installed directly on their premises. Wind and solar require a lot of land, however, and on-site land is usually scarce. As such, these projects typically provide only a small portion of data centers' total energy needs.

Power purchase agreements (PPAs): In a PPA, data center companies (the buyers) sign long-term contracts with renewable energy providers (the sellers) to purchase electricity from specific wind or solar farms. PPAs often support the development of new renewable energy, thus contributing to overall grid decarbonization and improving the grid mix for local residents and businesses.

Renewable energy certificates (RECs): Companies purchase RECs to offset their energy consumption, which supports the economics of clean energy development. RECs are not necessarily tied to the specific municipalities where data centers are located, though.

Investment in renewable projects: Hyperscalers often invest directly in the development of new renewable energy projects.

Diesel generators

The role of diesel generators at data centers is often misunderstood. As we [discussed elsewhere](#), these generators are present only as a backup power source.

Also worth noting is that diesel generators are subject to a comprehensive regulatory framework. The Environmental Protection Agency (EPA) sets federal standards implemented and enforced at the state level for generators, and states may

11 U.S. Department of Energy, "How Much Power is 1 Gigawatt?" Office of Energy Efficiency & Renewable Energy, <https://www.energy.gov/eere/articles/how-much-power-1-gigawatt>.

12 S&P Global Market Intelligence, "Datacenter Companies Continue Renewable Buying Spree, Surpassing 40 GW in US," S&P Global, <https://www.spglobal.com/market-intelligence/en/news-insights/research/datacenter-companies-continue-renewable-buying-spree-surpassing-40-gw-in-us>.

13 Amazon, "Climate Solutions," Amazon Sustainability, <https://sustainability.aboutamazon.com/climate-solutions>.

14 Microsoft, "Microsoft's Datacenter Community Pledge: To Build and Operate Digital Infrastructure That Addresses Societal Challenges and Creates Benefits for Communities," Microsoft Blog, accessed September 15, 2024, <https://blogs.microsoft.com/blog/2024/06/02/microsofts-datacenter-community-pledge-to-build-and-operate-digital-infrastructure-that-addresses-societal-challenges-and-creates-benefits-for-communities/>.

15 Apple Inc., "Apple's Climate Roadmap," Apple Newsroom, <https://www.apple.com/newsroom/2021/07/apples-climate-roadmap/>.

16 Google, "Build a Carbon-Free Future for Everyone," Google Sustainability, accessed September 15, 2024, <https://sustainability.google/projects/carbon-free-24x7/>.

17 Meta, "The Next Stage of our Climate Commitment: Net-Zero Supply Chain Emissions by 2030," Facebook Newsroom, <https://about.fb.com/news/2021/10/the-next-stage-of-our-climate-commitment-net-zero-supply-chain-emissions-by-2030/>.