



HOW AI DATA CENTERS ARE POWERED

A CRITICAL PUBLIC HEALTH AND CLIMATE ISSUE

Artificial intelligence (AI) is everywhere. To meet the frenzy, hyperscale data centers are rapidly expanding across the United States. These gigantic spaces that house the supercomputers and infrastructure needed to power, train, and deploy AI are driving unprecedented electricity demand. While there's no federal registration requirement for data centers, there are said to be over 5,000 in operation. Virginia and Texas are notable hubs, with more now planned in Pennsylvania, California, and other states at warp speed. These AI data centers require so much power that they often exceed the capacity of local electricity grids—the networks that deliver electricity to users.

Data centers' electricity problem

Data centers already use around 4% of U.S. electricity demand, and by 2030, that could climb to at least 9%. Generating this tremendous amount of electricity can lead to massive amounts of air and climate pollution. Just how much pollution depends on the energy source. Fossil fuels, like coal, diesel, and methane gas, pollute the air, worsen climate change, and harm public health.

By 2030, air pollution from fossil-fuel-powered data centers is expected to cause 1,300 premature deaths annually and cost the U.S. \$20 billion from cancers, asthma, lost productivity, and more. Children and developing babies plus people living closest to data centers—often low-income communities and communities of color—are most at risk. Data centers powered by renewable energy are better for our health and climate.

The current mix of energy in the U.S. electric power grid includes renewables like solar and wind power, as well as nuclear, coal, and methane gas. Some utilities now have years-long waits for data centers to connect to them. So data center operators are avoiding this bottleneck by creating their own power generation.

How each data center gets enough power to run differs by site. Some of the known ways to power “behind-the-meter” are with private, on-site, or local power generation.



Off-site power generation

Some AI data center operators build their own power source, either totally separate from or only partially connected to a public utility grid. This includes building new or repurposing old facilities. In New York and Pennsylvania, for example, decommissioned coal-fired power plants have been brought back for private use.

Air pollution associated with off-site power generation depends on the power source. Without strong renewable energy requirements in place, two-thirds of the extra electricity needed to power data centers will likely come from fossil fuels, despite growth in renewables.

On-site power generation

Options for on-site data center power generation include methane gas turbines that may not be properly outfitted with pollution controls, fuel cells, and reciprocating engines—large gas-powered piston engines. While some pollution protections exist, they may not be enforced.

Backup diesel and gas generators are intended for emergencies, like power outages. But they're often used far more than that; many facilities run them routinely to avoid expensive electricity during high demand times and even to sell electricity back to utilities. They're also used while waiting to connect to the electric grid and during routine maintenance.

The amount of air pollution generated to power data centers varies; some may have hundreds of backup generators at a single site.

In Boxtown, Tennessee, Elon Musk's massive xAI supercomputer facility installed a large cluster of gas-burning turbines to deliver immediate power. Boxtown residents, the majority of whom are Black, now contend with turbine pollution on top of air pollutants from the local oil refinery, steel mill, and chemical plants. This pollution has been linked to higher asthma rates, lower life expectancy, and cancer rates four times the national average.

Methane turbines, diesel generators, and methane generators all release nitrogen oxides (NOx), carbon monoxide (CO), soot pollution, volatile organic compounds (VOCs), and greenhouse gases into the air.

Renewables

Growing energy demand and fossil fuel use from data centers are threatening climate goals in states nationwide.

One solution has been for some tech companies to power specific centers with cleaner energy: solar, wind, and battery storage, proof positive it's possible.

More information on data centers:

momscleanairforce.org/issues/ai-data-centers

For sources, please visit:

momscleanairforce.org/sources-how-data-centers-powered

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Less-polluting technologies in the works

Innovations to power AI data centers include advances in battery storage technology that demonstrate real potential. One startup's novel iron-air battery, which stores energy for much longer time frames than conventional lithium-ion batteries, is now slated for use in a 30 gigawatt-hour battery plant in Minnesota with capacity to deliver clean energy around the clock to data centers.

Small nuclear modules are a big part of the plan for powering the world's largest concentration of data centers in Virginia, though they may be a decade in the making and present their own concerns.

Get involved

AI data center growth often comes at the expense of clean air and healthy families. How these centers source enough energy to operate is a critical public health and climate issue. Regulations, pollution controls, and oversight are urgently needed.

If a data center is coming to your community, attend town meetings, ask questions about how it will be powered, and advocate for clean energy sources that will help protect public health.

And join Moms Clean Air Force to demand elected officials at the local, state, and federal levels commit to building safe, sustainable, and affordable AI infrastructure. Corporations—not families—should pay the full cost of AI's massive energy suck.