

Data Centers: An Increasing Source of Air Pollution



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While major drivers of unhealthy air, such as power plants and traffic pollution, are well known, a newer, rapidly-growing contributor is gaining attention: data centers.

Data centers house servers and networking equipment that store and process vast amounts of information, powering everything from streaming videos and cloud computing to crypto-currency mining and artificial intelligence (AI). As demand for cloud services and AI grows, so too has the footprint of these facilities. In recent years, U.S. data centers have consumed roughly 4.4% of the nation's total electricity¹, and multiple projections estimate that this share could double or even triple by 2028 as new facilities are built to support AI workloads². In high-growth scenarios, data centers could account for up to 12% of total U.S. electricity demand within the next decade.³

Although most emissions of ozone precursors and fine particle pollution resulting from data center operation are not directly emitted on-site, they contribute to poor air quality through two main pathways:

Power Consumption Linked to Grid Emissions: Most data centers rely on regional electricity grids where fossil fuels like methane gas (also known as natural gas) and coal still make up a significant share of generation. Electricity generation from these sources emits fine particulate matter (PM_{2.5}) as well as nitrogen oxides (NO_x), and other ozone-forming pollutants, which are linked to asthma, heart attacks, stroke, and premature death. Additionally, many data centers are building their own new, on-site fossil-fueled plants. As electricity demand rises, particularly during peak usage, power plants emit higher levels of PM_{2.5} and NO_x, worsening regional air quality and contributing to ozone formation downwind of generation sites.⁴

Backup Generators: To ensure uninterrupted operation, many data centers install dozens of large diesel-powered backup generators, which are regularly tested and sometimes used during grid stress events. Diesel generators emit nitrogen oxides and carcinogenic diesel particulate matter. In major data center hubs such as Northern Virginia, analyses show that clusters of diesel generators can rival small power plants in total permitted emissions, raising concerns about cumulative local air-quality impacts.⁵

As a result, communities located near large data center clusters often experience higher localized pollution burdens than regional averages, particularly when facilities are sited in already overburdened or economically disadvantaged areas. Modeling studies that account for upstream power generation find that air pollution associated with data center electricity demand already imposes billions of dollars per year in public health costs in the United States, driven by increased healthcare spending and lost productivity.⁶

The recent boom in AI has further accelerated data center expansion. High-performance AI workloads require significantly more electricity than traditional data processing, increasing both baseline electricity demand and reliance on backup generators. Without major shifts toward clean energy technologies, some modeling suggests that the annual value of the public health harms associated with data-center-related emissions could reach \$167 million to \$266 million in California alone.⁷

With the increase in demand and development of new data centers, ensuring these facilities are powered by clean electricity, and transitioning to clean power and storage resources instead of diesel backup power, can play an important role in cleaner air for all.