AI: Impacts Beyond the Digital Landscape

The rising cost of AI data centers and their negative effects on local populations

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Introduction

The increasing use of AI has created a surge in demand for data center construction. These centers require a large amount of energy and water to function and impact energy infrastructure, water management, and the surrounding environment. The increasing resource consumption of these centers drives energy demand up, which passes rising prices on to local populations in the areas where these centers are being built. Governments, Corporations, and local communities all have a stake in the future of AI data centers.

The rapid growth of AI data centers increases strain on water resources and energy grids, and these increased demand costs are passed directly to the consumer. Without stronger regulatory bodies, zoning regulations, capacity planning, and company transparency, the costs of energy and its effects on the environment will increasingly fall to local communities. While the benefits of AI are global, the costs are highly localized.

Electric Costs

Data centers are the foundation of the digital ecosystem. They contain the servers that power almost every aspect of daily online life, from cloud storage and digital transactions to video streaming and social media. According to Landon Marston, these

facilities are crucial for businesses and governments, and the AI boom has significantly accelerated their expansion. Training large AI models requires immense computational power, meaning that as AI systems grow, the scale of the infrastructure that supports them must grow alongside them.

As these centers expand, the energy costs drastically increase. According to a report by Matteo Wong, these data centers by xAI will require two gigawatts of power, roughly twice the electricity usage of the city of Seattle. The same report found that OpenAI has proposed a data center that will require more than 30 gigawatts of power, exceeding the peak demand for all of New England. This level of consumption places significant strain on local grids rather than an even distribution.

According to Landon Marston, data centers accounted for about 5 percent of total U.S. electricity demand in the last year. This is projected to rise between 6.7 and 12 percent by 2028. In Virginia alone, they already consume roughly one-quarter of the state's electricity. This rapid increase shows how the infrastructure that was built around gradual city growth is now being forced to adapt to exponential demand. According to data collected by Grid Status and reported by Bloomberg, seventy percent of nodes that recorded price increases were located within fifty miles of significant data center activity. This suggests that energy costs are not rising evenly across the country, but are instead directly tied to the geographic clustering of these facilities.

These increases in price are not paid for expressly by the corporations that cause them, but rather are picked up by the communities surrounding the centers. A study by researchers at Carnegie Mellon University found that residential electricity bills could

increase by upwards of 25 percent. According to Bloomberg reporting, higher wholesale energy prices in regions of high data center activity translate directly into higher consumer bills, even though they are driven by private industry.

Along with the damage of rising electricity bills, little economic benefit reaches the local populations. According to a report by Arabella Bennet, while about 1,500 workers are needed during construction, fewer than 200 workers operate a completed facility that can span hundreds of acres. To meet the energy demands of these centers, older and more pollutant energy infrastructures need to be reintroduced. According to CBS Chicago, diesel generators are being used to support data center operations. This raises concerns about the air pollution and public health issues that are starting to arise in these small communities. According to a report by David Gelles, utilities are expanding natural gas infrastructure to meet AI-driven demand, further linking data center growth to fossil fuel dependence. This expansion shows the environmental costs that are deeply tied to the rapid growth of the AI digital economy.

Hydrologic Costs

As well as energy usage, data centers consume vast amounts of fresh water and place stress on local hydrological systems. According to Landon Marston, large facilities can consume millions of gallons of fresh water per day, sometimes exceeding the usage of tens of thousands of households. A study led by Yuelin Han found that U.S. data

centers could require up to 1500 million gallons of water of additional water capacity per day through 2030. The scale of this demand is comparable to New York City's average daily supply of roughly 1,000 million gallons. This shows the enormous consumption rate of data centers, rivaling traditional urban consumption.

Research by Pengfei Li and associates shows that a single company's data centers consumed billions of gallons of freshwater in one year, with nearly 80 percent of the usage being potable water. Much of this water is lost through evaporation during cooling, meaning it cannot be reused locally. This shows a key issue with these centers. Drinking water is being used for industrial-scale cooling and is effectively removed from the locality from which it was drawn. In regions that are already water-stressed, this creates a deficit in technological growth versus basic human resources.

According to the World Resources Institute, two-thirds of the data centers being built since 2022 are located in water-stressed regions in the U.S., such as Arizona and Texas. A report from the Harvard Political Review noted that in Reno, Nevada, data centers consume twice the annual water usage of San Francisco. Because water and energy are geographically constrained, increasing the supply requires costly infrastructure expansion. This leads to nonlinear price increases, where scarcity rapidly drives up the costs rather than them increasing gradually.

Community Costs

Rural communities bear most of the burden of these costs while having the least decision-making power. According to a report compiled by Anthony Pipa and Adam Aley for the Brookings Institution, these areas that are targeted for data center development are chosen due to lower costs and favorable policy incentives, but the local governments often lack the technical knowledge and expertise necessary to assess the long-term consequences of the developments. According to Landon Marston, without proactive planning, infrastructure systems can become strained, increasing costs for residents.

Counterargument

Some argue that data centers are essential for innovation and that companies are working to reduce their impact. According to Brad Smith, Microsoft aims to develop a "community-first" infrastructure and offset costs. However, according to Landon Marston, planning strategies and efficiency improvements are not keeping pace with the rapid growth in demand associated with AI centers. Research by Li and associates also suggests that while efficiency gains are possible, overall consumption continues to increase. This indicates that improvements alone to infrastructure are insufficient without broader regulation and accountability.

Solutions and Future Methods

Mitigation requires a coordinated policy and infrastructure reform. Transparency in water and energy usage is essential for effective planning. There needs to be an integration of data center demand into municipal water systems and strategic siting policies that avoid regions that are already water-stressed. Research from Li and associates recommends methods such as water recycling as well as alternative cooling methods. Companies can also contribute through investment in sustainable infrastructure.

Moving forward, rural communities, policymakers, and local governments must demand greater transparency and accountability. Ensuring companies pay their fair share for the costs of infrastructure and resource usage is critical for preventing costs from being passed on to residents. Without action, the expansion of AI infrastructure will continue to externalize its costs onto the communities that are least equipped to fight them.

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