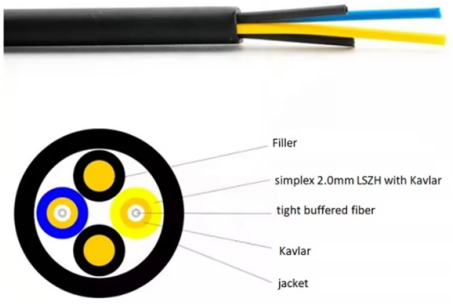
Data Center Special Effects



Overview

As data center development has accelerated, state and local governments have taken steps to address data-center impacts.

Key Takeaways

Data centers produce significant environmental and operational effects, including noise, light, heat, emissions, and ecological impacts, which can affect both local communities and ecosystems.

Noise and Light Pollution

Data centers generate constant noise from HVAC systems, diesel generators, and other equipment, often exceeding 90 decibels, which can harm hearing and contribute to stress and insomnia for nearby residents (Environmental Health Project),. They also produce light pollution due to all-night facility lighting, disrupting circadian rhythms in humans and affecting wildlife migration and habitat patterns, including birds, bats, and turtles. Heat and Energy EffectsLarge-scale data centers, especially hyperscale facilities, produce substantial heat, creating localized "heat islands" that can alter microclimates.

For example, a proposed 60-square-mile data center in Utah could significantly impact the surrounding climate and ecology due to waste heat from energy generation (KSL),. Data centers require massive energy inputs, often from fossil fuels, which can exacerbate these thermal effects and strain local power grids (Smithsonian Magazine),.

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Emissions and Water Use

Data centers emit nitrogen oxides, methane, volatile organic compounds, and fine particulate matter, particularly when powered by gas or diesel generators. They also consume large amounts of water for cooling, with AI-driven operations like ChatGPT increasing both electricity and water usage per query. These factors contribute to greenhouse gas emissions and water scarcity concerns.

Ecological Impacts

The construction and operation of data centers can disrupt local ecosystems. Heat, light, and noise pollution affect wildlife behavior, while large-scale energy consumption contributes indirectly to climate change (MIT Climate Impact),. Hyperscale centers can alter local hydrology and vegetation patterns, affecting biodiversity and ecosystem services.

Mitigation and Sustainability

Efforts to reduce these impacts include renewable energy integration, algorithmic optimization, and energy-efficient server design. The United Nations Environment Programme (UNEP) has released Sustainable Procurement Guidelines to help governments and organizations select energy-efficient data centers and servers, aiming to curb energy and water consumption while reducing greenhouse gas emissions. Technologies like Selective Catalytic Reductions (SCRs) can reduce nitrogen oxide emissions from diesel generators by up to 90 percent (Smithsonian Magazine),.

Summary

Data centers, while essential for modern computing and AI, have visible and measurable "special effects" on their surroundings, including noise, light, heat, emissions, and ecological disruption. Addressing these effects requires a combination of sustainable design, renewable energy adoption, and regulatory oversight to minimize environmental and social impacts.

Article Content

Investigating the Ecological Impacts of Data Centers

MCSC researchers are exploring these data centers'' ecological impact. In leading the MCSC''s work on Data & Computing, Noman Bashir has

Data centers are creating ''heat islands'' and warming

The vast data centers that power artificial intelligence guzzle huge amounts of energy but they also have another alarming impact, according to new

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As data center development has accelerated, state and local governments have taken steps to address data-center impacts. Various states including Florida, as noted above, have new or pending policies

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7 Ways Data Centers Affect US Communities | World Resources Institute

Energy prices and water use aren''t the only ways data centers affect U.S. communities. We break down the impacts — and how some states are dealing with them.

How data centers may lead to higher electricity bills

In an interview with Harvard Law Today, Peskoe explains the ways in which data centers sometimes obscure their effect on utility prices, and why state

Data centers are so hot their ''heat island'' effect is raising ...

Data centers are so hot their ''heat island'' effect is raising temperatures up to 6 miles away and impacting 343 million people worldwide, study finds

WHAT HAPPENS WHEN DATA CENTERS COME TO TOWN?

Policy Solutions: To mitigate data centers'' environmental impacts and align their growth with sustainability goals, policymakers should adopt model laws like the German Energy Efficiency Act,

Data Centers and Environmental Considerations

The data centers that power these tools require significant amounts of electricity and water, and local governments increasingly face challenges related to siting, infrastructure strain and meeting climate

Meta Built a Data Center Next Door. The Neighbors''

In the race to develop artificial intelligence, tech giants are building data centers that guzzle up water. That has led to problems for people who live

Data center

Utah Data Center (2013) A data center is a facility used to house computer systems and associated components, such as telecommunications and storage systems.

Server Room Ambience White Noise Data Center ...

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Welcome to the Data Center! Let the white noise hum of computer fan sounds help you go to sleep! 10 hours of non-stop server room ambience for sleep and relaxation. Enjoy! □□□□

Communities Are Raising Noise Pollution Concerns About Data Centers ...

Noise Reduction Solutions for Data Centers There are steps that data center developers and operators can take to reduce the noise generated by data centers and its impact on neighbors.

Executive summary – Energy and AI – Analysis

Consistent with its strong track record of identifying and exploring emerging issues in the energy sector, this new International Energy Agency (IEA) special report seeks to fill this gap with the most

AI Data Centers Impact on Electric Bills, Water, and More

AI Data Centers: Big Tech''s Impact on Electric Bills, Water, and More Massive data centers are gobbling up resources across the U.S.—and you may be paying for it

Current Status and Challenges for Liquid-Cooled Data

Data centers (DCs) are computing structures housing a large number of Information and Communications Technology devices installed for processing,

Disrupting the future: Quantum in data centers?

Explore how quantum computing integration is transforming data centers. Discover the opportunities as quantum data centers evolve from labs to commercial deployment.

The Int''l Man''s Hot Links Archive 2026: Jan 1

Hot Links Archive 2026 (1): January 1 - June 30 Climate Clock - " The science is clear: we are in a Climate Emergency. Decades of increasing

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