

Metaverse: Could creating a virtual world build a more sustainable one? (PART 1)



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This is a critical moment in the environmental and social sustainability of the metaverse. Business leaders can't be spectators.

In brief

- ▶ Compute-heavy metaverse commerce raises climate concerns. Yet, substitution, digital twins and immersive experiences could bring sustainability benefits.
- ▶ While environmental sustainability is critically important, so is social sustainability. We must create an accessible, inclusive and equitable metaverse.
- ▶ Business leaders must engage now to ensure the metaverse develops in a way that is sustainable for planet and people, before exponential growth occurs.

In this liminal moment for the metaverse, new dimensions of sustainability are opening both significant challenges to global climate objectives and new opportunities for achieving them.

Concerns about energy consumption and carbon emissions have come to the fore as compute-intensive transactions skyrocket. For example, there is a chasm between the energy use and carbon costs of the relative few who participate in cryptocurrency transactions and the rest of the world.

Yet, the metaverse also holds the promise of substantial carbon reductions through the substitution of physical goods by digital ones and replacing real-world presence with virtual interactions. Digital twins will help us optimize the physical world, from the planet to individual humans. The immersive nature of metaverse experiences could help us overcome our behavioral barriers to climate action.

As critical as environmental sustainability is, so is social sustainability. We can't lose sight of the need to build a metaverse that is accessible, inclusive and equitable. Now is the time to build sustainability into the front end of virtual worlds rather than try to retrofit them after exponential growth.

All stakeholders, but especially business, must remember we have agency to build the metaverse we want and need, and not just be a spectator as it develops. As

businesses invest, develop new customer strategies, and transform to pursue the potential of the metaverse, better sustainability outcomes should be integral to the future vision and planning.

This article is part of our **Metaverse series**, in which we explore different dimensions of the metaverse. In this second article, we investigate how sustainability will be impacted by the introduction of new technologies within the metaverse and what this means for the future of our planet.

CHAPTER 1

The race to decarbonize metaverse data and commerce

Realizing the persistent virtual worlds and experiences promised by the metaverse will require a "superabundance of cloud-streamed data."1 Generating these data will require a lot more computing power, a thousand-fold increase by some estimates. So will growth in the compute-intensive blockchain transactions currently driving metaverse commerce. How these factors affect energy consumption, and, by extension, carbon emissions will depend in large part on data center efficiency and power sources.

Can data center decarbonization keep pace?

Over the past decade, efficiency gains have decoupled data center workloads from power consumption. From 2010 to 2020, internet traffic increased 16.9x and data centers 9.4x, yet power consumption grew only 1.1x. Excluding crypto currency mining, data centers represent about 1% of global electricity demand.

These efficiency gains were driven in large part by the shift to hyperscale data centers operated by large tech companies who have a strong interest in restraining energy costs and the capital to invest in continuous upgrades and optimal siting.

"The public cloud services providers design their hyperscale data centers from the ground up, everything from the siting, to the building construction, clean power source, server racks, cooling, software and processors, giving them incredible efficiency outcomes," says Amr Ahmed, EY Americas Infrastructure and Service Resiliency Leader.

Hyperscale infrastructure represented 45% of data center energy demand in 2021, up from 16% in 2015.

Most large tech companies also have a strong commitment to eliminating carbon emissions. Some already meet 100% of their electricity needs through renewable

energy power purchase agreements and are moving to "24x7 renewables", where data center energy demand is met by location-specific renewables at all times.

However, several factors could challenge these impressive efficiency and decarbonization achievements. Data privacy and localization requirements could persuade some companies to keep or reinstate their own data centers. In addition, lifelike and compelling VR experiences demand low latency, which could push data processing to the edge of networks, closer to users.

As a result, some data centers could come to be sited in energy markets where procuring renewables is difficult, or where operating conditions (e.g., heat, humidity, grid intermittency) cause loss in efficiencies or require carbon-intensive back-up generation. Continuing to green power grids globally and create resilient distributed data center solutions will be essential. ■

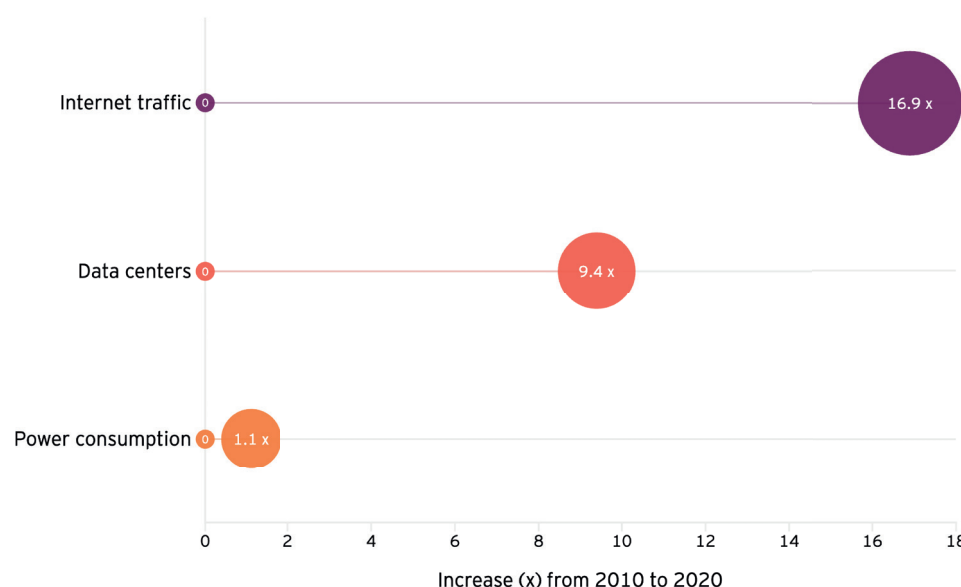
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Figure 1: Data center energy efficiency has kept pace with workloads and traffic



Source: IEA, Data Centres and Data Transmission Networks, November 2021.

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