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DATACENTER TRENDS

ADOPTING NEW DATA CENTER MODELS

Economic and environmental drives for new data center models

By Ali Fenn, President, ITRenew

Technological innovation is poised to help us solve the most pressing social challenges in the world, like climate change. And, yet, paradoxically, the information and communication technology (ICT) industry is headed in the wrong direction on carbon and climate mitigation.

Within the ICT industry, the goal should be to pump the brakes on where things are headed with carbon and climate mitigation to adjust not only for the sake of the environment but for economic scalability as well.

The Shift Project estimates that the ICT industry is on track to grow from around 4 percent of global greenhouse gas (GHG) emissions today to nearly 8 percent by 2025. According to prevailing wisdom, the gradual shift to renewable energy will be enough to offset the wider impacts of this growth. That's not the case. ICT manufacturing and discard cycles produce more than 50 million tons—and counting—of e-waste annually. Additionally, we're running out of the minerals required for electronic components.

Meanwhile, demand for data and digital services is expected to continue to boom. By 2025, the number of mobile Internet users is projected to increase from 3.8 billion in 2019 to 5 billion and the number of Internet of Things (IoT) connections is expected to double from 12 billion to 25 billion. By 2022, global Internet traffic is expected to double to 4.2 zettabytes per year. That's 4.2 trillion gigabytes.

The data centers that power the ICT industry are making this hyper-connectedness possible and engendering new platforms for commerce, communication and creativity. However, the incredible scale of their contribution to technological progress is matched by their environmental impact. Although global data-center electricity usage has remained flat from 2010-2020 at around 1 percent of total electricity, some models predict that they could end up consuming about 8 percent of the global electricity supply by 2030. Furthermore, lowering the power consumption of operating data centers does nothing to address the ecologically harmful resources that go into producing their vast arrays of short-lifecycle hardware.

With this big picture in mind, we now can begin to identify the broader implications and opportunities. Deriving more efficiency from operational-phase energy (i.e., Scope 1 and 2 GHG emissions) is essential, but it's only a small part of the equation. Scope 3 emissions—the systemic, less visible ones in the supply chain—are what require our focus.

This means rethinking the status quo. For the ICT industry, the new paradigm should be based on wholly circular, carbon-negative data centers created with the three opens of technology (open-source software, open hardware and open data). It's a mindset that cultivates mutual accountability, shared expertise and collective action.

And that's not nearly as radical as it might sound. Abandoning legacy approaches and adopting new data center models can be a natural migration that yields huge advantages—and, crucially, without the financial or environmental tradeoffs that we've come to expect.

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THE LEGACY APPROACH AND ITS DISADVANTAGES

It's important to revisit the shortcomings of the legacy models that have become so entrenched in our industry to better understand why new data center models are so urgently needed. Doing so makes it clear that building infrastructure is an old pattern we have to stop perpetuating; consuming infrastructure is the way forward.

For years now, data centers deployments have required enterprise IT teams to manage long planning cycles, which include significant upfront and ongoing time investment that teams of expert engineers and designers need to determine technical requirements down to the component level. Later come the armies of technicians to oversee painstaking integration, setup and support. At the same time, these data center operators have been beholden to opaque and proprietary supply chains, with little ability to be agile in their timelines and responsive to growth demands. All this risk and delay has a real impact on time to value (TTV).

The logistics involved in sourcing equipment are only part of the problem. There are also the outsized advantages that the world's largest cloud service providers enjoy by being able to design their own hardware. That exclusivity gives them a leg up in crucial areas like architecture and pricing. Those factors play out over the long term in bottom-line determinants like return on investment (ROI) and total cost of ownership (TCO).

Leveling the playing field means embracing trends that remove barriers to availability, efficiency and agility for all. Much like the Open Compute Project is turning the combined skill of an entire industry into a universal resource, the circular economic models also are challenging many of the long-held assumptions of proprietary, siloed thinking.

Outside the hyperscalers, other data center owners, service providers and enterprises typically have to pay a premium to acquire the latest hardware from OEMs, often winding up with systems overbuilt for their actual needs. Moreover, the technology used in this hardware is typically proprietary, which locks customers into those same OEM vendors for expensive maintenance, support and upgrades down the road, which further restricts customers' ability to pivot during down cycles.

The disparity between traditional data center management practices and the options available to hyperscalers has created a worrying and sometimes unbridgeable divide. Consequently, we see the data center industry becoming a microcosm of the world at large with advantage accruing exponentially to the most advantaged. In the area of sustainability, the captive nature of the broader market to proprietary, OEM solutions also prevents data center operators and enterprises to adopt more sustainable solutions and directly impact the supply chain practices that are critical to minimizing the carbon impact of IT hardware. Here too, the biggest opportunity is to left exclusively to the hyperscale cloud service providers.

THE NEW DATA CENTER MODEL: OPEN, OPTIMIZED AND ACCESSIBLE

Today's data center hardware industry pioneers are taking a page from the software industry and implementing innovative building block models. These modular approaches leverage the principles of efficiency, flexibility and customizability prevalent in open computing. Plus, they give data center operators the freedom to dynamically add server capacity and scale their operations along with the speed of their business.

This new generation of hardware marks an important break from the one-size-fits-all attitude that has proved to be so limiting. Instead, these engineered systems are designed and optimized for critical workloads that can include Kubernetes orchestrations, AI/ML applications, hyper-converged infrastructure (HCI) or even a combination of all of the above. This newfound agility enables faster growth, shorter upgrade cycles and fluid responses to changing business demands and priorities.

In the past, tailored hardware always has carried a premium. These new systems, however, are inherently more cost effective. Their higher-density configurations pack up to 50 percent more compute, storage and networking capacity into a standard footprint. Centralized rack-level power and cooling increases their energy efficiency. And, on top of that, their modular design and open architecture simplify maintenance and eliminate OEM vendor lock-in.

CONSUMING INFRASTRUCTURE

Theoretically, these factors mean that organizations of any size can fully preconfigure and integrate this equipment, including any related software. They can transition their systems from crate to connected in minutes, virtually eliminating the specialized engineering resources that typically go into rack-and-stack processes. But there is a gap that prevents this – the ODMs that serve the largest cloud service providers are not well situated to meet the more extensive needs of the enterprise. The reality is that democratizing access to the hyperscale innovation and model demands a new approach altogether.

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CIRCULARITY

In the data center industry, circularity empowers smaller players and wider paths to access by creating new sustainable supply chains that make hyperscale tech both accessible and affordable to everyone. At ITRenew, for example, we're applying circular economics and sustainable tech to change how the data center industry sources, designs, uses and reuses IT hardware. With our rack-scale Sesame systems, we're able to design e-waste and CO2 right out of new infrastructure by transforming gear from the world's leading global cloud companies into compute and storage solutions any data center operator can use. The essential connective tissue being the right level of solution integration and transformation, and required levels of support and service layered on top of the hyperscale building blocks.

As a result, Sesame delivers the same superior performance, durability and reliability you'd expect from best-in-class OEM equipment—all without generating any new carbon, pulling scarce resources from the ground or firing up factories. Circular models like this close the loop and make data centers inherently self-replenishing. By our estimates, for every 5 million servers decommissioned and given second lives, 3 million tons of CO2 production are avoided. That's equivalent to cutting the emissions of 670,000 cars on the road.

This is how the new circular data center model reconciles competitiveness and sustainability. When organizations opt for circularity, they're able to reduce complexity, accelerate growth and achieve significantly better compute and storage economics. Beyond gaining a competitive edge through the cutting-edge tech that the hyperscalers always have had at their disposal, organizations that choose circularity keep more e-waste out of landfills and defer manufacturing responsible for up to 75 percent of IT Scope 3 emissions (i.e., CO2).

THE NEW DATA CENTER IS HERE NOW

The new data center model isn't a hypothetical exercise. Throughout the world, data center operators, service providers and enterprises are all too aware of the drawbacks of the legacy approach, and already have begun moving toward open, flexible hardware and circular economic solutions. They've realized that operating outside of the hyper-scale class doesn't mean having to settle for second-rate solutions.

There's still considerable room for progress. The Circularity Gap Reporting Initiative (CGRi) estimates that only 8.6 percent of the world's economy is circular, which leaves an opportunity waiting for that remaining 91.4 percent. The efficiency, affordability and agility of the new data center model can help close that gap, while enabling more customers to tap into unprecedented levels of computing power. Just as importantly, for the sake of our planet as well as your organization's bottom line, the new model can transform sustainability and competitiveness from an either/or proposition into a both/and certainty.

About the Author

Ali Fenn is President of ITRenew. She leads the creation of new circular data center models and sustainable technology solutions that are changing how the industry designs, sources, uses and reuses IT hardware. Her work with hyperscalers, service providers and enterprises worldwide brings the financial, carbon and materials advantages of open hardware and circularity to the broader market. Fenn graduated from Yale and the London School of economics and has more than 20 years of cloud and enterprise biz dev expertise. She has served as a UN Technology Innovations Labs advisor, founded Rethink: Circular and has been named to the iMasons IM100 as well as one of Silicon Valley Business Journal's 100 Women of Influence.