Data Centers and the Cloud

Building a Sustainable and Responsible Digital Future

White Paper by

OVHcloud®

INTRODUCTION

Data center sustainability is becoming an essential requirement from a business, regulatory, and operational perspective for several reasons.

The first relates to the increasing climate risk and the growing impact of greenhouse gas emissions stemming from the data center industry. As facilities grow in size and number, governments are responding to the scientific community's recommendations with new guidelines for data center managers, leading them to redouble their efforts to improve their environmental impact. More and more technologies and new design approaches are being implemented in data centers to minimize their carbon footprint while reducing costs, with a particular focus on optimizing water consumption.

The adoption of strategies to reduce environmental impact is being recommended by global regulators and is an increasingly important part of the sustainability strategy of many service providers. As a global cloud services provider, OVHcloud was one of the first to develop such an approach.

OVHcloud is implementing short-, medium-, and long-term strategies to reach a NetZero 2030 commitment, including improvements in resource use, renewable energy, customer accountability, the circular economy, sustainable supply, as well as carbon capture approaches.

At the same time, the company is engaging in other innovations by leveraging the circular economy processes currently in place to become a zero-waste facility by 2025. OVHcloud is collaborating with its wider community of customers and suppliers to encourage an ecosystem approach that promotes sustainability across the entire IT supply chain.

This white paper looks at strategies to reduce the environmental footprint of information and communication technologies (ICTs), drawing from OVHcloud's actions in its own data centers as well as the general digital ecosystem.

> **"** *As for the future, your task is not to foresee it, but to enable it."*
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> **— Antoine de Saint Exupéry,**
> **Citadelle, 1948**

Sustainability at the heart of digital issues

The environmental impact of the digital sector

As early as 2018, the international scientific community warned about global warming levels of 1.5°C above pre-industrial levels and the potential greenhouse gas emissions trajectories that could follow. To reduce the effects of global warming, these same experts called for a goal to reach carbon neutrality targets by 2030 and zero carbon by 2050. These ambitious climate targets require significant investment in sustainability strategies by governments and business leaders in all sectors.

While industry and transport are widely recognized as the primary sources of greenhouse gas emissions, ICTs also have a significant role to play. Historically, researchers have estimated that the information and communication technologies (ICTs) industry accounts for 2% of global emissions, which is roughly equivalent to the carbon footprint of the airline industry.

> **According to the International Energy Agency, the energy efficiency gains associated with the transition to cloud computing, including hyperscale, are offsetting the rise in consumption levels.**

In a widely circulated forecast of ICT's proportion of global electricity consumption, researchers demonstrated that the data center industry would consume an increasing share of global electricity, rising from 0.9% in 2015 to 4.5% of the total in 2025.[1] Research firm Gartner noted that enterprise sustainability responsibilities are increasingly being "cascaded down" to infrastructure and operations leaders to improve IT's environmental performance, particularly around data centers, including colocation, edge, and cloud.[2]

The environmental impact of digital technology is offset by its potential for sustainable development

The balance that ICTs establish between their carbon impact and their ability to decarbonize other sectors was described in great detail in GeSI's SMARTer 2020 study, while Allianz's Climate Risk 2023 study found that while the ICT footprint is to reach 830 MtCO2e by 2030, their abatement potential is several times greater.

As the key technologies that can contribute to this abatement, data centers and the cloud are at the heart of ICT sustainability challenges. By powering customer devices and relying on extensive global networks, the data center and cloud industry can help companies optimize their processes to meet their sustainability goals.

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[1] Forecast for ICT share of global electricity usage 2015 - 2025

[2] Bob Violino, "What IT Needs to Know about Energy-Efficiency Directives for Data Centers," Network World, October 2, 2023

The cloud sector: A catalyst for green IT best practices

Thanks to continuous innovations, the cloud computing and data center sector is working successfully to meet the key recommendations of the UN SDGs, particularly Goal 7, which recommends the use of clean energy; Goal 9, which calls for industrial and infrastructure innovations; Goal 12, which calls for responsible consumption and production; and Goal 13, which calls on organizations and individuals to take urgent action to combat climate change.

The potential energy savings through cloud usage is significant. In general, it is easier to save energy using large data centers because they can achieve higher levels of sharing and consolidation through economies of scale. They also have the resources to invest in modernization to meet the essential needs of businesses through technologies such as custom-made chips, high-density storage, virtualization, software-defined data center solutions, and customized ventilation and cooling systems.

Studies, including those by the Lawrence Berkeley National Laboratory, estimate that if all U.S. business users moved their email, productivity tools, and customer relationship management software to the cloud, the primary energy footprint of these applications would be reduced by 87%.

Another study by the International Energy Agency stated that the energy efficiency gains associated with the transition to cloud computing, including for hyperscale, are offsetting the increase in consumption levels expected in the future thanks to a surge in digital usage.
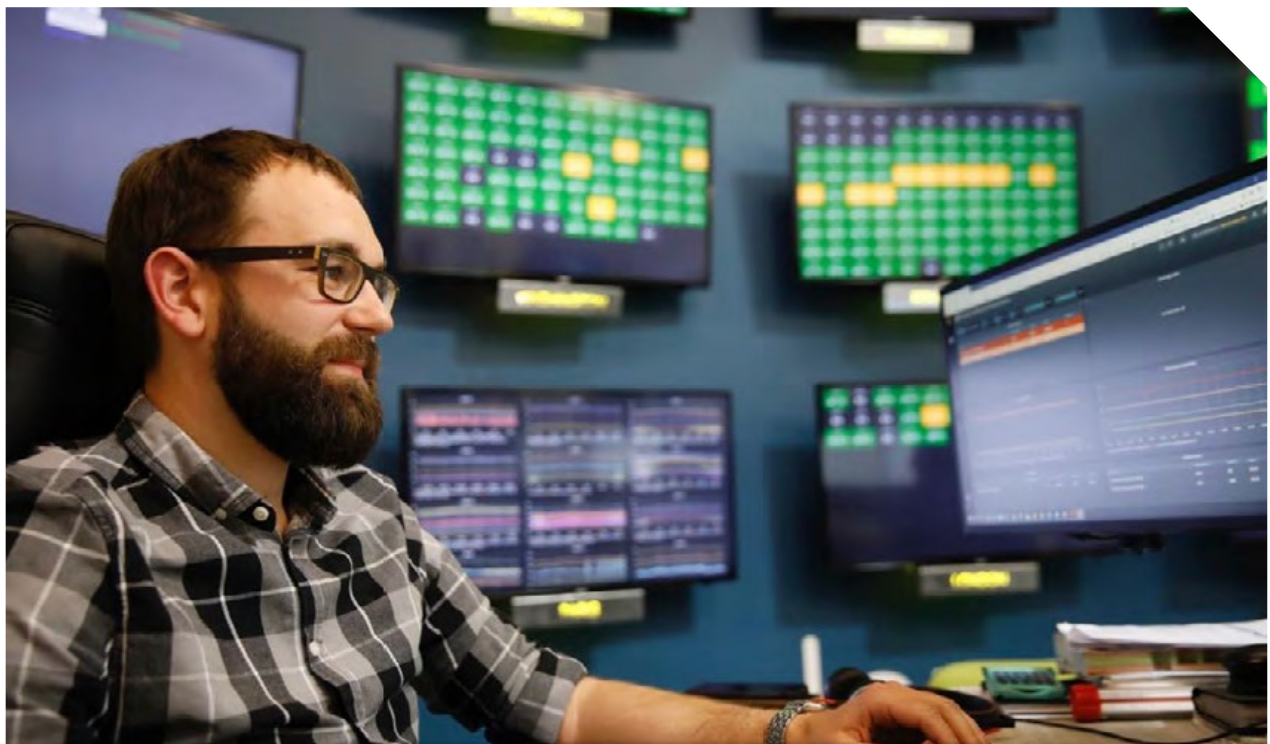
Four OVHcloud strategies for sustainable data centers

Data center operators who are determined to tackle the challenge of sustainability need thoughtful planning, institutional structures, state-of-the-art technology, and clear objectives. OVHcloud has established a timeline for achieving carbon neutrality and has identified key business areas for green data centers. In this section, you will find an overview of the choices made by the hosting provider and the considerations undertaken by its experts to guide the entire digital ecosystem in an environmentally responsible way.

1. Optimizing water, energy, and carbon use

In order to expand the benefits of efficiently delivering cloud-based IT services, OVHcloud has improved its water, energy, and carbon (WEC) profile through the use of exclusive water-cooling technology that introduces **liquid cooling for processors**. Combined with open-air cooling, this water system has enabled the company to achieve very competitive PUE and WUE scores. Thanks to its closed-loop cooling system, water use is very moderate.

Developed in 2003, OVHcloud deployed its cooling technology on an industrial basis–optimized and standardized for use in servers assembled by the company–across its entire 40-data center portfolio. Using the heat exchangers that cool the processors and other heat-emitting components, the proprietary system introduces liquid inside the servers to ensure precision cooling. Approximately 70% of the heat generated by the servers is captured and then transferred to a closed-loop system that transports the heated liquid outside the building for cooling. By eliminating the need for server air-cooling infrastructures, such as server fans, air channels, and filters, this approach can save a significant amount of energy. This technology has resulted in a low carbon footprint for OVHcloud in most of the countries in which it operates.

2. Enhancing PUE

Developed by the Green Grid to measure the energy efficiency of a data center, the PUE was adopted in 2016 as a global standard under ISO/IEC 30134-2:2016 and continues to be the most common measure for calculating the energy efficiency of a data center facility.

To ensure the reliability of its PUE data, OVHcloud adheres to Category 2 of the PUE standard, which involves measuring the load at the power distribution unit to generate a value of instant power consumption.

> Along with the PUE, the WUE provides a fairly complete picture of a data center's efficiency.

Another factor that may affect the energy measurement of a data center is the use of servers: the PUE estimations are less reliable when servers are not operating at their full capacity. While the customer controls the IT load, as a cloud provider, OVHcloud operates at maximum efficiency, reducing the potential for PUE variation.

> **To measure the footprint of all components, the company has implemented a lifecycle analysis, which uses a multi-criteria examination that identifies the primary impact of each component.**

Across all of its sites, OVHcloud reports a PUE range of 1.1–1.3. These results put the company at the forefront of the hyperscale providers in terms of energy efficiency.

3. Linking PUE to WUE

Water usage effectiveness (WUE) measures the relationship between the water used by the data center–mainly for cooling towers–and the electricity supplied to the hardware. According to a Department of Energy report, the average WUE for a data center is 1.8 liters per kilowatt-hour.

A WUE value that is less than 1 liter or even 0.4 liters per kilowatt-hour is considered to be a good value. Along with the PUE, the WUE gives a reasonably complete picture of a data center's efficiency.

4. Analyzing Component Lifecycles

OVHcloud builds its data centers in existing facilities to reduce carbon emissions from building new structures. It also produces its own racks and servers based on an industrial model that standardizes component assembly, helping to reduce waste.

To measure the footprint of all components, the company has implemented a lifecycle analysis, which uses a multi-criteria examination that identifies the primary impact of each element. Using this information, along with the industrial model, the company can analyze servers and capitalize on its reverse supply chain by reusing, repairing, or recycling each of the server components. This gave rise to their **ECO range of servers**, consisting of powerful refurbished dedicated servers available at a low cost. The ECO range of servers is great for startups and small businesses looking to reduce their environmental impact without sacrificing high performance and affordability. Additionally, the company intends to eliminate its landfill waste by 2025 and strengthen traceability in its program for reselling used materials.

Eight actions to adopt for a more conscientious IT

Ultimately, cloud service providers have little control over their customers' usage patterns. To encourage best practices, OVHcloud is committing to a series of measures to optimize workloads and reduce energy consumption.

1. Increasing the lifespan of IT equipment and applications

After the data center itself, the IT equipment has the second-highest environmental impact. Increasing the lifespan of IT equipment is sometimes an underestimated challenge.

Better use of resources, particularly virtualization technologies, is a critical element in controlling energy expenditure by limiting the number of terminals and increasing the occupancy rate of active servers. Keeping dormant servers in your data center is the worst-case scenario, as their manufacturing impact is not being offset at all.

> With more resources available "on demand," developers who are faced with choosing a framework or language tend to be drawn in by go-to-market strategies and fall out of the habit of measuring performance.

2. Limiting the impact of code on energy consumption

In developing its lines of code, OVHcloud strives to take the associated energy consumption into account to minimize the carbon footprint, which will ultimately benefit customers. As Germain Masse, who is responsible for energy efficiency at OVHcloud, says, "It goes without saying that high-performance code runs faster for identical resources."

As an algorithmist, Germain has an important role in the quality of the code issued–but he also wears the hats of architect and building block assembler. Very often, Germain ends up relying on application building blocks or SaaS or PaaS services. With more resources available on demand, developers who are faced with choosing a framework or language tend to be drawn in by go-to-market strategies and fall out of the habit of measuring performance.

3. Optimizing software management

Software requirements–in terms of memory, CPU power, and disk space–determine the service life of a piece of computer hardware. By looking for lighter alternative tools that meet the real needs of users, the CIO is helping to extend the lifespan of the hardware. This also raises questions about the choices we make around governing applications and data. In today's environment, higher amounts of data automatically increase the number of hardware devices needed to ensure their performance and availability.

4. Streamline usage

IT decision-makers need to consider the possibility of staggering certain processes in batches in order to smooth out usage and ensure that not all resources are consumed at the same time. For example, an organization that issues and processes its invoices on the first day of each month may consider spreading out these transactions.

> Considering whether high levels of availability are appropriate for certain applications, or how many copies of data are kept online, is a good start.

5. Choosing a suitable infrastructure

It is also important to ensure that your infrastructure is suitable for hosting your application environment. OVHcloud offers a wide range of options, including **Hosted Private Cloud**, **Public Cloud**, and a wide variety of **Bare Metal servers**.

With hundreds of Bare Metal options and models, OVHcloud partners can precisely adjust their ratios (RAM per core ratio, storage per RAM or core, etc.) and ensure they are using the best virtual machine for every workload.

6. Choosing the right storage model

While the storage trend favors flash memory technologies–which have a relatively high environmental impact–it's important to highlight the value of so-called "cold" archiving solutions.

OVHcloud offers an array of **storage solutions**, including those based on IBM 3592 tape cartridges. This low-power storage technology offers security and resilience so that sensitive data can be preserved in the long term.

Trends are moving towards lower-cost but more conscientious archiving solutions. As organizations look for ways to store, manage, and enhance ever-increasing amounts of data, tape technologies will also play a strategic role in addressing storage infrastructure challenges. In addition to their reliability, magnetic tape data storage consumes no power when not in use, unlike magnetic and flash hard disks.

It's up to you to choose the right storage model to suit your situation. Do you need a real-time archiving solution? Should the recovery time for your data be near-instantaneous, or do you have a few hours or even days to set up your backups? Beyond the matter of the budget, these questions should provide food for thought for any CIO who is committed to reducing their organization's environmental footprint.

7. Making the right choices when it comes to data redundancy

The relevance of replicating multiple copies of data and their online retention should also be considered. The higher the level of redundancy, the higher the cost, and the higher the environmental impact. Think about various use cases and distinguish contexts that require a high level of redundancy (e.g., hosting healthcare data) and those where the level of redundancy can be reduced.

Studies have shown that advancements in algorithms can reduce hardware redundancy levels while maintaining appropriate levels of logical redundancy. For example, the data protection method of Erasure Coding allows you to reduce the level of physical redundancy while using coding algorithms to guarantee the same level of logical redundancy. As a result, while the CPU usage is slightly higher due to the computing involved, it is largely offset by the energy savings.

8. Using indicators to measure progress

Implementing indicators will measure progress while providing a basis for planning the sustainability goals that can be set for a data center, keeping the aim of reducing the environmental impact in mind. These indicators can be shared internally with employees and externally with investors, partners, customers, and authorities. In fact, they raise awareness among all stakeholders and provide a quantified environmental record to illustrate the company's sustainable development initiatives.
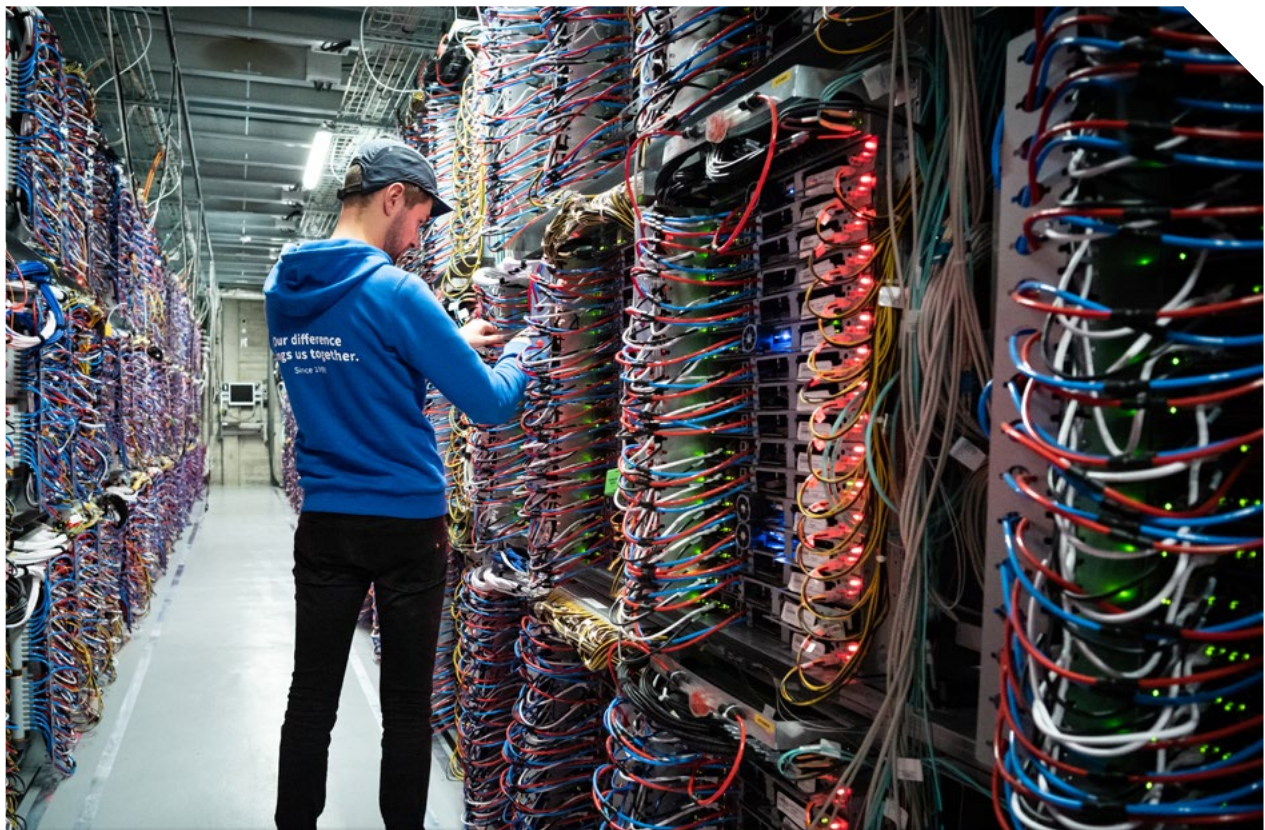
OVHcloud US is a subsidiary of OVHcloud, a global player and Europe's leading cloud provider operating more than 400,000 servers within 43 data centers across four continents. For over 20 years, the company has relied on an integrated model that provides complete control of its value chain, from the design of its servers to the construction and management of its data centers, including the orchestration of its fiber-optic network. This unique approach allows it to independently cover all the uses of its 1.6 million customers in more than 140 countries. OVHcloud now offers latest generation solutions combining performance, price predictability, and total sovereignty over their data to support their growth in complete freedom.

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