HPE Services

Business white paper

Strategies for achieving IT sustainability gains

Hewlett Packard Enterprise

Introduction

Research shows that 63% of organizations[1] worldwide consider sustainability a top business priority and 75% cite energy efficiency[2] as a key focus for their future IT strategies.

Still, IT organizations continue to struggle to meet both their own IT sustainability goals and the broader goals of the enterprise. Some estimates project that data centers' energy appetites could double[3] between 2022 and 2026, putting pressure on IT to find ways to use less power and wring more efficiencies out of the systems they have.

Are you facing this issue? Have you developed a plan to address the widening gap?

Figure 1. High-impact drivers for environmental, social, and governance[4] adoption

Figure 1 shows a survey by ESG to determine the top objectives of different organizations for driving sustainability and other ESG initiatives. The most common reasons include improving their brand, increasing profitability, meeting compliance and government mandates, improving staff retention, increasing in goodwill, lowering operational costs, reducing reputational risk, strengthening recruitment advantages, reducing liability and legal exposure, lowering capital expenditures, and increasing stock price. To read full report, visit Why Sustainability Matters and the Steps Organizations Can Take Now white paper.

[1] "Quantifying the Sustainability Benefits and Business Value of HPE GreenLake," IDC, IDC white paper sponsored by HPE, April 2024

[2] "Why IT infrastructure sustainability is becoming a top business priority" Flexential, September 2024

[3] "Electricity 2024—Analysis and forecast to 2026,", iea.org, January 2024

[4] "Why Sustainability Matters and the Steps Organizations Can Take Now," Enterprise Strategy Group, Enterprise Strategy Group white paper commissioned by HPE and distributed under license from TechTarget, April 2024

For organizations to meet IT sustainability goals, they have to make an overarching formal commitment to reducing energy consumption and, in the process, lower their carbon footprint. This forces them to think big, in terms of strategy, and small, in a tactical sense. Hewlett Packard Enterprise has identified five key levers that should be included in effective IT sustainability strategies: data efficiency, software efficiency, equipment efficiency, energy efficiency, and resource efficiency. This framework of five levers is described in Six steps for developing a sustainable IT strategy workbook from HPE. Many organizations implement their efficiency efforts in three key areas of their operations:

1. **Their workload portfolios**—Modernizing and optimizing, workload by workload, placement by placement
2. **Their equipment portfolios**—Modernizing, moving to anything as a service (XaaS), and managing their circular economies
3. **Their data center facilities**—Modernizing, moving to colocation facility and/or shifting to cleaner energy grids

Each of these components operates as a subset of an organization's IT operating model. In a traditional organization, IT is perceived as a cost function, the value of which is workload availability. Applying sustainability to a traditional organization's IT operating model consists of tech refreshes of more efficient equipment and drives sustainability of the asset footprint. For organizations where the IT operating model leverages information and technology to gain competitive advantage, value shifts toward the ability to develop and release new (digital) products and services. It is an operating model that embraces technology to the extent that it questions the underlying business model of the organization. This organization that seeks value creation would also seek to find sustainability gains through the much wider touchpoints of the IT operating model.

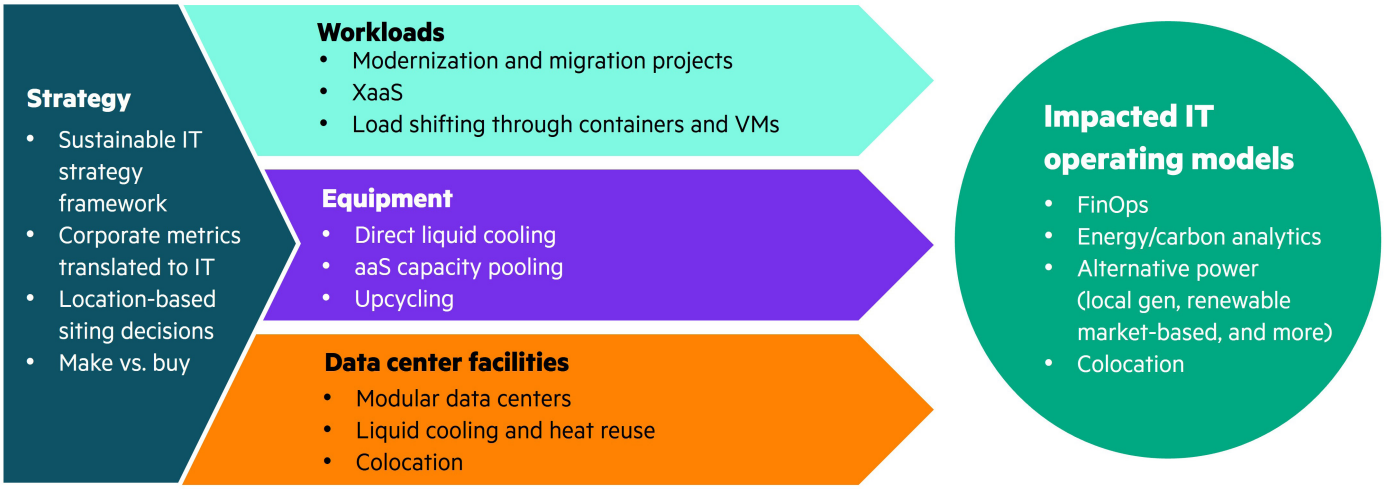


Figure 2. IT operating model stack for sustainability

There are several methods that organizations can use to help achieve sustainable IT. Starting with a documented strategy and metrics. The frameworks should consist of workloads, modernization, as-a-service options, load shifting through containers and virtual machines (VMs), equipment considerations such as direct liquid cooling, as-a-service capacity pooling, upcycling, and data center facilities choices including modular data centers, liquid cooling and heat reuse, and colocation (Figure 2).

Here are seven methods organizations can deploy to achieve their IT sustainability goals.

1. Build sustainability into your AI and data modernization programs

Most enterprises will be entering into a new phase of programs addressing AI and data modernization. This presents an ideal opportunity to build sustainability gains into those programs.

A common misconception among IT practitioners is the notion that energy consumption is controlled directly by application software logic, and how that logic exercises the resources of its host. Although there is a relationship between software logic and energy consumption, it is not nearly as direct, nor as intuitive, as many believe. In actual back-office data centers, HPE has metered systems with very low power consumption yet very high CPU utilization; conversely, other, identically configured systems with low CPU utilization yet high power consumption have been noted. This is due to the nonintuitive relationship between software logic and underlying circuit operation. Furthermore, the average power consumption of a system during normal operation does not vary as much as many people expect.

There is a simple relationship between application footprint and energy consumption. Rehosting 200 applications to run on 50 servers rather than 100 directly lowers consumption. But it's more complicated than that. In this case, it's important to consider the contents of the application portfolio and ways to more effectively share infrastructure among these workloads to reduce the infrastructure required to host them.

Typical modernization projects significantly reduce energy use and emissions, particularly in virtualized environments. The true drivers of this reduction, historically, are operating expenses (OpEx) and speed rather than sustainability. The enablers of this reduction tend to include the following:

1. The ability of newer technologies to host more VMs per system

2. The retirement of unneeded applications, and

3. The arrangement of workloads to better share fewer hosts, by exploiting their eccentricities

By eccentricities, we refer to combining memory-intensive VMs with compute-intensive VMs or storage-intensive VMs to maximize resource utilization across the portfolio. Reducing the number of systems allows organizations to use less energy and reduce their carbon footprint.

Upcoming sections of this white paper will expand on these practices.

2. Gain visibility into sustainability footprints

To make IT operations more efficient, organizations need more visibility not only into their IT infrastructures but also into their environment's overall sustainability footprints.

By integrating sustainability metrics into a unified management platform, IT leaders can accurately monitor and report their organization's environmental footprint with confidence. They can track power usage and carbon emissions without the need for manual intervention or guesswork. This level of visibility is crucial for enterprises that are under pressure to meet both regulatory requirements and the expectations of socially responsible investors.

Management platforms that track energy usage and emissions give IT teams the ability to directly contribute to their organization's environmental objectives while optimizing performance and costs. Integrating sustainability insights with operational data enables businesses to innovate sustainably without compromising efficiency or control.

The IT landscape continues to shift toward hybrid models, and the demand for both cost control and environmental accountability grows. By offering the operational visibility of cloud across IT environments and the tools needed to meet sustainability goals, unified management platforms deliver the agility, transparency, and environmental responsibility that today's IT leaders need to meet their sustainability goals.

3. Adopt a "hybrid-by-design" platform

Taking a platform approach can help organizations improve sustainability by gaining the visibility and control they need to maximize efficiencies.

IT leaders are tasked with delivering exceptional customer experiences while managing tighter budgets and addressing growing regulatory, governmental, and environmental concerns. The challenge of balancing these priorities is exacerbated by the rapidly evolving nature of IT environments, which are increasingly hybrid in structure. Critical workloads often remain on-premises for competitive advantages or compliance reasons while noncritical workloads are being shifted to the cloud for greater flexibility and cost-effectiveness.

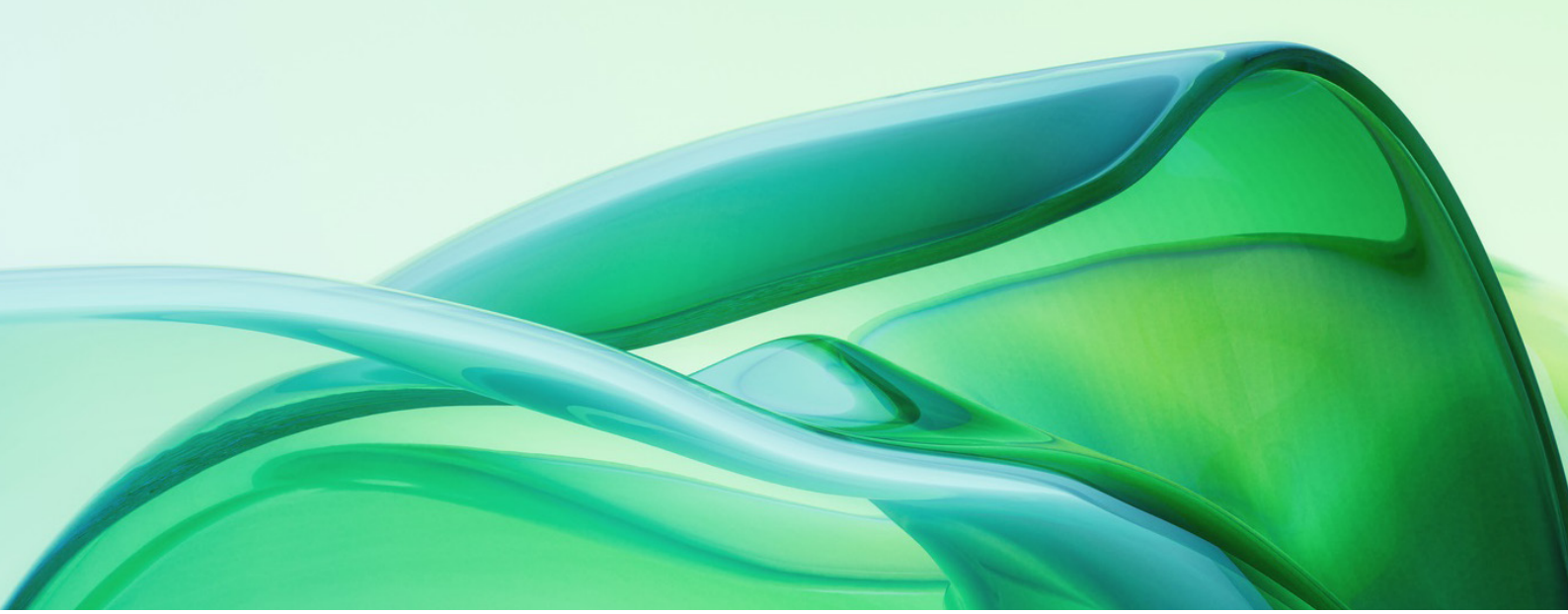
Amidst these hybrid cloud landscapes, leaders continue to grapple with operational complexity. The simplicity and visibility of cloud-managed operations—promised by hyperscale cloud providers—are attractive, yet IT teams frequently find themselves lacking similar transparency and control over their local data centers. This has long fueled the demand for a unified platform capable of managing private cloud environments, from network to storage to compute while offering the same level of ease and visibility available in public clouds.

For many, the allure of public cloud lies in its pay-per-use* model, avoiding the capital expenditures associated with up-front hardware costs and reducing ongoing maintenance. This consumption-based approach aligns well with the optimization strategies of today's enterprises, which prioritize operational efficiency and cost control. However, the challenge for hybrid and private cloud environments has been to replicate this streamlined management experience.

Consumption models of IT deployment address this gap. Consolidating management across edge, data center, and cloud workloads onto a single platform gives IT leaders cloud-like visibility and control across their entire hybrid environment. This can help them simplify operations while reducing the total cost of ownership. Gaining this cloud-like visibility and control can empower them to make smarter decisions and optimize their infrastructure in real time.

Adopting a hybrid-by-design approach helps organizations improve each of the three tiers in their IT sustainability stacks. They can move workloads with less friction and centrally manage across their hybrid environments reducing operational complexity. They can put less wear and tear on equipment by moving to a circular economy model and establishing an agreed-upon upgrade program. And they can maximize energy efficiency by shifting away from old-line, power-draining data center infrastructures.

* May be subject to minimums or reserve capacity may apply



4. Manage workload placements

In today's dynamic and competitive IT landscape, managing workload placement effectively is crucial for maximizing performance, minimizing costs, and reducing carbon footprint.

Determining where to place a workload begins by evaluating several factors, including performance needs, cost implications, and the characteristics of the workload. Specifically, workloads need to be analyzed based on resource requirements such as CPU, memory, and storage, along with usage patterns, latency, and bandwidth requirements which aid in identifying which tasks are critical and which can afford some latency. For example, latency-sensitive applications may be better suited for on-premises environments while less time-critical workloads can thrive in cloud settings where resources can be dynamically scaled or distributed across SaaS, colocation using hybrid approach. Such classification enables IT teams to make informed decisions about the suitable environment for each workload.

Optimal resource allocation is another key aspect of effective workload management. Assessing CPU- and memory-intensive tasks and identifying static and periodic workloads facilitates appropriate resource allocation. Rightsizing resources to meet each workload's needs prevents overprovisioning, and reducing resource wastage, costs, and carbon emissions. For example, rightsizing compute resources and deploying based on demand fluctuations helps reduce the environmental impact of compute-intensive workloads such as AI and high performance computing (HPC). IDC research[5] indicates that HPE GreenLake has reduced server needs for equivalent workloads by 36%, resulting in a 53% decrease in energy consumption and a 45% drop in operational costs.

With growing environmental concerns, utilizing energy-efficient infrastructure and encouraging data centers to prioritize renewable energy can significantly reduce the carbon footprint of IT operations and support sustainability goals. Additionally, adopting virtualization facilitates workload consolidation, enabling multiple applications to run on fewer physical servers, thereby lowering energy consumption and hardware usage.

Performance monitoring tools that track resource usage and metrics in real time are essential for proactive workload adjustments. Furthermore, implementing auto-scaling techniques that dynamically adjust resources based on real-time needs is especially beneficial in hybrid cloud environments, where workloads are strategically positioned.

Strategic management of workload placement while ensuring optimal performance, minimizing costs, resource wastage, and carbon footprint is key.

[5] "Quantifying the Sustainability Benefits and Business Value of HPE GreenLake," IDC, IDC white paper sponsored by HPE, April 2024

5. Consider alternative data center formats

Container-based data centers

As IT teams work to keep pace with growing demands from the business, they've increasingly looked for creative solutions to deploy capacity. Container-based data centers are prefabricated modules, which are then deployed and commissioned either at the edge or to augment existing data centers. Teams have seen real value in these solutions as they have the potential to cut time to deployment.

Their advantages extend beyond the sustainability benefits:

- **Rapid deployment and scalability:** Scaling to meet the increasing demand for data processing and storage, can help avoid the lengthy construction times associated with traditional data centers.
- **Cost efficiency:** Lowering capital and operational costs, they offer a streamlined approach[6] for expanding data center capacity with minimal disruption.
- **Edge computing:** Their small scale and speed of delivery make them ideal for deploying data centers closer to end users to reduce latency and improve performance.

With all this, container-based data centers also generate IT sustainability benefits. By default, they are designed to be energy efficient. They often use advanced cooling technologies such as direct or dual liquid cooling and close-coupled cooling, which reduce the energy required to maintain optimal temperatures for IT equipment. They can be optimized for local climate conditions, reducing waste, allowing for better quality control, and minimizing the environmental impact of construction on-site, helping to reduce their overall carbon footprint.

As we enter the age of AI, we've already seen AI workloads steadily increase system temperatures, causing many teams to rethink their mindset around cooling. Due to their fully contained nature, container-based data centers are recognized to improve cooling efficiency.

In terms of renewable energy integration, many modular data centers are designed to integrate with renewable energy sources, such as solar or wind power, further reducing the reliance on fossil fuels. And from a lifecycle management perspective, they are often designed with a focus on the entire lifecycle of the facility, from construction to decommissioning. This includes using recyclable materials and designing for easy upgrades and maintenance, which extends the life of the data center and reduces waste.

Colocation

Colocation data centers can also offer a range of sustainability benefits that align with the environmental goals of modern IT operations. Colocation, which involves leasing physical space within a third-party data center, allows organizations to potentially reduce their environmental impact using shared resources.

Colocation facilities are often designed with advanced technologies that optimize cooling and associated power usage. These off-site data centers can use more efficient cooling systems, such as liquid cooling or air economizers, and invest in energy-efficient hardware. Because colocation centers serve multiple clients, they achieve economies of scale that make it possible to implement large-scale facilities-related energy-efficient practices. This can significantly reduce the amount of energy required to maintain the facility compared to stand-alone, on-premises data centers.

[6] "Containerized Data Center Market - By Container (20 Feet, 40 Feet, Customized), By Organization Size (SME, Large Organization), By Tier (Tier I & II, Tier III, Tier IV), By Application & Forecast, 2024 – 2032," Global Market Insights, September 2024

6. Pursue XaaS options

Many organizations are turning to XaaS models to meet the growing demand for digital transformation and AI workloads. XaaS provides greater flexibility, allowing organizations to cut the time it takes to modernize their mounting technical debt.

Several factors inherent within the working models of many XaaS offers can help organizations advance their sustainability agendas.

- **Built-for-purpose, well-architected infrastructures:** They're tested and optimized for specific workloads resulting in a shortened time to deployment and top performance.
- **Sustainable and energy-efficient IT operating models:** Organizations can choose partners for whom sustainability is a part of their DNA.
- **Proactive support and management:** They reduce downtime, shorten time-to-incident resolution, and help organizations deal with skill shortages.
- **Built-in monitoring and telemetry capabilities:** They provide real-time feedback about operational efficiency, sustainability, and scalable resources and infrastructure assets designed to help eliminate overprovisioning and improve energy consumption/efficiency.

Although XaaS provides solutions to some efficiency priorities, organizations need to balance their infrastructure choices based on their individual needs.

There are multiple XaaS options, but you need one that serves the needs of each of the tiers in organizations' sustainability stacks—their data centers, equipment, and individual workloads.

Striking a balance between the need to meet strategic objectives including data privacy, sovereignty, compliance, and performance, and achieving a sustainable hybrid cloud requires selecting the optimal infrastructure. Whether the choice is a public cloud, on-premises XaaS, colocation, on-premises data centers, or hybrid mix, organizations must weigh the trade-offs between environmental considerations and strategic imperatives.

7. Choose sustainable IT-focused partners

Once organizations have implemented their IT sustainability plans—building sustainability into their modernization initiatives, creating a hybrid-by-design platform, strategically managing workloads, optimizing data center performance, and tapping the benefits of XaaS—they still have work to do.

To drive their vision to fruition, they can't do it alone. They will need partners. It takes a team to achieve IT sustainability goals. Organizations need to start with partners that are committed to sustainable IT, are investing in continual technological improvements, and will meet them where they are on their IT journeys. Partners that deliver a full range of services, from data center design to asset upcycling to reusing waste heat and putting it back into the grid, are difficult to find.

Partners should be able to

- Drive strategy sessions and workshops to develop and document a sustainable IT plan
- Understand workloads and where to place them
- Possess hybrid and multicloud IT tools and expertise to help architect and operate an IT environment optimizing performance, costs, and energy usage

Seeing the organization's full IT infrastructure is the first step to managing and optimizing. Partner with vendors with management platforms that aggregate the data and provide the insight needed to make informed decisions. This will empower the organization to optimize and achieve its performance and sustainable IT goals.

When choosing an XaaS vendor, consider their ability to offer flexibility, protection against technology obsolescence, prescriptive workload infrastructure (designed for specific use cases), access to services and consulting, and end-of-life recovery options for IT assets.

Success in achieving sustainable IT goals starts with a solid strategy and is implemented by a capable, focused team.

Additional resources

- Sustainable IT framework and free resources from HPE
- One-Day Sustainable IT Workshop
- AI workloads: Driving sustainable IT
- HPE Sustainability Insight Center Demo
- HPE Sustainability Insight Center Chalk Talk
- HPE Sustainability Insight Center User Guide
- HPE GreenLake cloud
- Find out how the sustainability benefits of HPE GreenLake can help you achieve your goals
- HPE Data Center Modernization Services—Performance Optimized Datacenter (POD) brochure

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