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Sustainable & Green Strategies

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Healthy people, healthy planet: Supporting Sustainability in Healthcare with the Cloud

If the health sector were a country, it would be the [fifth-largest emitter of carbon dioxide](#) equivalent (CO2e) on the planet. To become more sustainable, the health sector is turning to the cloud.

A sustainable healthcare system is one that “improves, maintains, or restores health, while minimizing negative impacts on the environment and leveraging opportunities to restore and improve it, to the benefit of the health and well-being of current and future generations,” [according to the World Health Organization \(WHO\)](#).

While sustainability in healthcare encompasses environmental sustainability, it also considers how to design a sustainable care delivery system. This includes solutions to address equitable access to high-quality healthcare, clinician burnout, cost and resource strain, and targeted therapies to improve effectiveness of all forms of resources deployed. In terms of technology, researchers are seeing

that computing power demands are now [doubling approximately every two months](#), as compared with every 24 months prior to 2012. Likewise, as the healthcare industry begins to leverage advanced technologies like artificial intelligence (AI) and machine learning (ML), emissions related to healthcare IT workloads will continue to increase.

To address these needs, studies show that cloud technology is a key enabler of sustainable healthcare systems. A 2022 World Economic Forum report recommends health systems to consider [shifting to the cloud](#) to save on the materials needed for on-site enterprise hardware and reduce CO2 emissions. [Studies by 451 Research](#) found that Amazon Web Services (AWS) can lower customers’ IT workload carbon footprint by nearly 80% compared to surveyed enterprise data centers. This will rise to 96% as [Amazon drives toward being powered by 100% renewable energy by 2025](#).

Optimizing healthcare IT infrastructure

Healthcare organizations looking to operate more sustainably may consider a data-driven approach to reduce the environmental impact of their physical estate, including their IT infrastructure. AWS provides customers with [best practice guidance and tools](#) to examine and optimize carbon emissions associated with their AWS usage.

[Illumina](#) is a biotech company with a mission to improve human health, and it’s committed to operating responsibly and sustainably. Illumina uses the [AWS Customer Carbon Footprint Tool](#) to track the carbon emissions of its AWS usage. This tool uses simple-to-understand data visualizations to provide customers with their historical carbon emissions, evaluate emission trends as their use of AWS evolves, approximate the estimated carbon emissions avoided by using AWS instead of



an on-premises data center, and review forecasted emissions based on current use. Across a 12-month period ending in November 2022, the tool reported that Illumina achieved an 89% reduction of carbon emissions—estimated at 2,367 metric tons of carbon dioxide equivalent (CO₂e) saved—by using AWS as compared to running the workloads on premises.

Leveraging data and analytics to build more sustainable anesthesia-related practices

Beyond optimizing workloads in the cloud, healthcare organizations can use AWS's broad set of data and analytics services to intelligently derive insights for driving sustainability initiatives.

[Practice Greenhealth](#), an organization that delivers environmental solutions in healthcare, [reports](#) that gases used to produce general anesthesia are extremely potent greenhouse gases. For example, the anesthetic gases nitrous oxide and desflurane respectively trap 310 times and 2,540 times more heat than carbon dioxide.

Using [AdaptX's Adaptive Clinical Management](#) analytics solution, built on AWS, the sustainability team at Seattle Children's Hospital used data captured from their electronic medical systems, which includes gas flow data from their anesthesia-gas machines, to examine sources of anesthesia-gas related emissions in near real-time. The AdaptX solution helped them visualize current and historical emissions, as well as monitor emissions as they implemented reduction interventions over a

five-year period. This led to evidenced-based protocol changes, including removing desflurane vaporizers, unplugging nitrous oxide hoses, and decreasing the default anesthesia machine fresh gas flow. Over five years, these data-driven efforts led to a [87% reduction in their anesthesia-gas related emissions](#), or 500,000 kg CO₂e per year, without any impact in patient outcomes. Furthermore, these improvements are saving the hospital [more than US\\$175,000 per year](#) in reduced costs for anaesthesia gases.

Transforming care delivery to support sustainability in healthcare

Around the world, there has been a significant shift in care delivery—moving from resource-intensive clinical facilities to networked, lower-cost settings and at-home care. There is a great potential to optimize efficiency of clinical delivery in these settings using cloud-supported technologies like telehealth, AI-driven clinical decision support, improved diagnostic tools, precision and personalized treatments, and more.

[Induction Healthcare](#) is one example of an organization using technology to provide these services. Their Attend Anywhere telehealth consultation solution is hosted in the AWS Cloud and is used at scale across the United Kingdom National Health Service (NHS) in more than 70% of NHS Trusts. [A year-long independent study](#) of these video consultations estimated that they have saved 78 million miles (126 million kilometers) of patient travel, which approximates 14,200 tons of greenhouse gas emissions—not to mention the

collective 530 years saved in travel and waiting times for patients and clinicians. Fewer in-person visits also resulted in [11 million fewer single-use personal protective equipment](#) (PPE) items, such as face masks, creating further cost savings for the NHS.

Learn more about sustainability in healthcare

By using cloud technology to optimize processes, reduce waste, and improve collaboration, healthcare systems can become more sustainable while also improving patient outcomes and reducing costs.

As a first step, healthcare stakeholders can [learn about cloud computing](#), so they can facilitate effective collaboration and make data-driven decisions in deploying the limited physical and human resources available to deliver the right services, at the right time, and to the right people.

AWS's infrastructure is [3.6 times more energy efficient](#) than the median of surveyed US enterprise data centers, and up to five times more energy efficient than the average in [Europe](#) and [Asia Pacific](#). Plus, AWS continues to innovate at the chip-level to drive energy efficiency. For example, AWS launched [AWS Trainium](#), a high-performance ML chip designed to make training of generative AI models more cost-effective and power-efficient, in 2022. AWS Trainium is up to 29% more energy-efficient and can reduce costs by up to 62% versus comparable instances.

Beyond energy efficiency, running operations sustainably also means reducing the amount of water



used to cool AWS data centers. AWS is already well on the path to becoming [water positive by 2030](#). According to the [2022 Amazon Sustainability Report](#), AWS's global water use efficiency metric of 0.19 litres of water per kilowatt-hour is a 24% improvement from 2021.

To gain an overall understanding of AWS's sustainability transformation, explore [Sustainability Transformation with AWS](#), a 45-minute, fundamental self-paced course. Learn about the commitments of Amazon and AWS to sustainability, how to optimize workload architectures for sustainability, and AWS as a technology partner for sustainability transformation.

AWS is the trusted technology and innovation partner to the global healthcare and life sciences industry, providing unmatched reliability, security, and data privacy. Healthcare and life science organizations around the world use AWS to reinvent how they collaborate, make data-driven clinical and operational decisions, enable precision medicine, and decrease the cost of care. Learn more at [AWS for Health](#).

