

WHITE PAPER

Tape Sustainability

The new future of magnetic tape storage

April 2023

Executive summary

The IT industry is facing multiple challenges, including the strain on data centers due to remote work and learning, supply chain disruptions, and the surge in energy costs triggered by global conflicts.

Climate change and sustainability are now critical issues, with Environmental, Social, and Governance (ESG) at the forefront of corporate concerns globally. This is especially true in the IT industry, which generates enormous amounts of data due to the emergence of cloud computing, AI/ML, big data, and 5G networks. Analysts predict that data storage may reach 17 zettabytes (ZB) by 2025¹, with most of this information residing on disk or tape storage systems. By migrating less frequently accessed data (cold data) from hard disk drive (HDD) to modern tape storage, organizations can reduce their carbon footprint, improve sustainability, and cut expenses. An evaluation of disk-resident data to identify "cold data" is the first step in this process, followed by a project to migrate it to tape storage.

Introduction

Environmental sustainability is rising on CEO agendas, and 9% of CEOs put it among their top 3 business priorities. Nearly 70% of surveyed CEOs plan to invest in new sustainable products and in making existing products more sustainable. 74% of supply chain leaders expect circular economy (sustainability) activities to positively impact profitability between now and 2025².

Reducing carbon emissions is a significant global challenge, with organizations incorporating carbon reductions into their strategies and announcing green initiatives. Meanwhile, data centers consume as much as one percent of the world's electric power. Data storage represents a significant portion of total energy usage, with disk systems serving as the primary driver of energy consumption. To reduce their carbon footprint, companies must focus on reducing energy use per unit of computing power, mitigating environmental impact, and fighting against global warming.

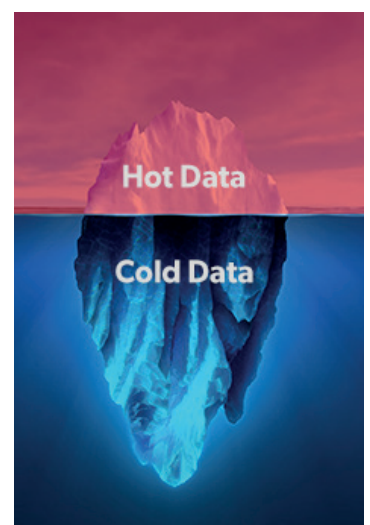
Switching data from HDD to SSD does improve performance efficiency, but will still generate more CO₂e per TB per year. IT organizations can achieve meaningful carbon emissions reductions while lowering operational and capital expenses with tape storage.

Ever growing Data

As society becomes more conscious of climate change, the exponential expansion of digital information has led to a growing concern for the environmental impact of digital storage. It is estimated that the amount of corporate data would grow to 7.5 ZB by 2025³, doubling every two to three years through 2025. This growth is attributed to a wide range of factors including video, medical imaging, video surveillance, logistics data, the Internet of Things (IoT), artificial intelligence, analytics, scientific research, expanding internet usage, and 5G networks, among others. Over time, a substantial portion of this data becomes infrequently accessed, with up to 60% remaining untouched after 30 days.

“Up to 80% of data stored by organizations is cold, which means it's not required to support day-to-day operations. Storing a single Zettabyte of data would require 62.5 million 16 TB hard drives. Consequently, tape storage is an ideal fit for this type of data with the benefit of a lower carbon footprint and lower TCO compared to HDD systems.”

- Eric Kelly, Chairman & CEO at Overland-Tandberg.



Why move cold data to modern tape storage?

Interestingly, storing cold data on tape storage can significantly contribute to reducing an enterprise's carbon footprint and impact on the environment. Unlike hard disk drives, tape storage does not require frequent replacement and has a longer lifespan, resulting in a substantial reduction in electronic waste.

Carbon Emission of Tape Storage ⁴

- LTO FULL HIGH TAPE DRIVES** – Lifecycle of around 7 yrs, 1.4 metric tons of CO₂e emissions, majority of that energy being operational energy.
- LTO HALF HIGH TAPE DRIVES** - Lifecycle of around 6 yrs, 0.9 metric tons of CO₂e emissions, computed at 80%
- STACKABLE LIBRARY MODULE, 40 media slots, 3U** - Lifecycle of around 8.4 yrs, total impact of global warming, 12.1 metric tons of CO₂e emissions, majority coming from operational energy.
- STACKABLE EXPANSION MODULE, Adds up to 3 tape drives and 40 media slots** - Lifecycle of around 8.4 yrs, 0.7 metric tons of CO₂e emissions.

LTO tape cartridge and media are built with 99% recyclable materials ⁴. Disposing them correctly can help companies Lower carbon footprint, Minimize e-waste, get Net Carbon Offset credit and Secure data and overall create a sustainable circular economy. Adopting Overland Tandberg's NEOseries LTO technology can help address these concerns by reducing carbon footprint, enhancing sustainability, and reduce expenses.

Apart from the environmental benefits, storing cold data on tape storage also has financial advantages.

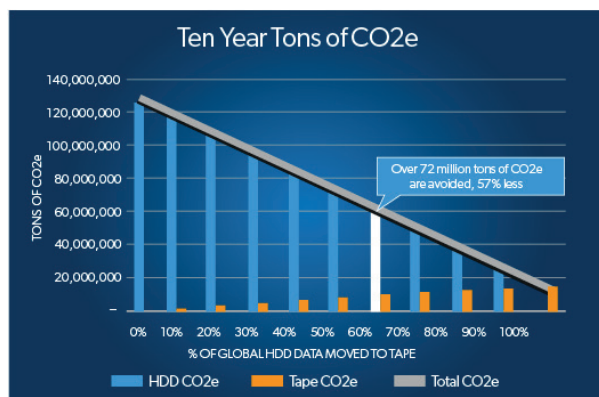
“Simply incorporating modern automated tape systems in an active archive environment can reduce energy consumption by 87% and CO₂e by 97% compared to equivalent HDD capacity.”

- Rich Gadomski, Tape Evangelist, FUJIFILM Recording Media, USA Inc.



Reduction in Total Cost of Ownership (TCO)

Significant reductions in carbon dioxide emissions are accompanied by equally impressive cost reductions in power consumption. However, cost savings are not limited to power usage alone. In fact, the total cost of ownership (TCO) for tape storage over a ten-year period is considerably lower. Calculate TCO for data storage solution using the comprehensive cost comparison tool, [LTO TCO calculator](#), it takes into account factors such as acquisition, maintenance, software licenses, extended warranties, administration, connectivity, floor space, and power expenses.



Source: IDC

Potential Worldwide Effect

The potential benefits of sustainable and cost-effective practices for a single company are significant. However, if organizations worldwide assess their operations and migrate cold data to modern tape storage, the impact could be monumental. The IDC Global DataSphere report estimates, 62% of the 8.3 ZB of data stored globally in 2021 was residing on HDDs. By migrating 60% of this data to tape, CO₂e emissions could be reduced by 72 million tons, resulting in a savings of 57%.

LTO Tape Highlights

The LTO program has gained significant momentum over the past decade through robust technological advancements. Its role in traditional backup, active archive, and disaster recovery applications remains critical, and it has successfully adapted to address new large-scale storage demands. Consequently, the advantages of tape storage are consistently broadening into new domains.

- Tape has the lowest carbon footprint compared to other archive solutions.
- TCO for tape low and is less expensive to acquire, on a per-TB basis, than HDDs.
- Tape's 10-year LTO roadmap is well-defined with virtually limitless potential.
- Scaling up capacity is easily achieved by adding cartridges, while HDDs require additional drives
- Tape's superior ROI and longevity make it a sound investment.
- Intelligent tape libraries with exabyte capacities, object storage and LTFS support for faster access make it an attractive option for large-scale archival and cloud deployments.
- Tape's air gap provides valuable protection against direct cybercrime attacks.
- While disk arrays are energy hogs, tape storage offers a way to greatly reduce power and cooling requirements. Unlike disks, tape cartridges sit idle in automated libraries, consuming no energy until the time they are accessed.
- LTO Tape is compact: Once you scale to hundreds of TBs, disk storage loses feasibility. It eats up far more floor space than tape storage.

“The fear of a ransomware attack is on the mind of most storage managers. Nearly 80% surveyed said they have been attacked. It is not a matter of if but more a matter of when a cyberattack will occur. Be ready. Use LTO air gap technology to separate your critical data from the system so that it is out of reach of cyber-criminals.”

- Natalie Kremer, Global Product Marketing Manager at Overland-Tandberg.



Overland-Tandberg Tape Solutions

Overland-Tandberg provides a full range of LTO tape products. Starting with internal and external stand-alone tape-drives to tape-autoloaders to midrange and highly scalable tape libraries, Overland-Tandberg offers the right solution for every business environment. With the use of different LTO tape generations, the solutions can be individually tailored to capacity and performance requirements. Customers with unpredictable data growth are best served with the scalable libraries of the NEOxl series. Suddenly occurring capacity changes can be satisfied by simply adding additional expansion modules.

Conclusion

Global warming continues to be a pressing issue, prompting governments to impose stricter regulations and consumers to favour environmentally friendly policies. To address sustainability, in response, organizations of all sizes are implementing methods to manage the impact of their products on the environment and improve sustainability. For enterprises with a significant amount of stored data, moving cold data from disk to tape storage is an ideal sustainability program that will significantly reduce carbon footprint and e-waste, minimize a product's impact on the environment, reduce expenses, and can be easily implemented.

Besides lowering data center energy usage and costs, modern tape provides other substantial benefits for inactive data, including high capacity, 30-year media life and the highest reliability rating of any storage medium. Also, since tape media can be easily removed from the network and stored off-line, it can be protected from malware via "air gap" protection.

Given the confluence of events and focus on global warming, clearly, now is an excellent time to evaluate IT data storage strategies and move infrequently accessed data to modern tape storage.

References

¹ DC, Seagate Analysts Day 2021,

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² Gartner, Sustainable Business Strategy 2022, <https://www.gartner.com/en/insights/sustainable-business>

³ Goodwin, Phil. 2019. Tape and Cloud: Solving Storage Problems in the Zettabyte Era of Data. IDC.

⁴ LTO.org: TECHNOLOGY AND SUSTAINABILITY LTO: SAVING THE PLANET,

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