

First Look

Sustainability Benefits of Deploying LTO Technology in Modern IT Ecosystems

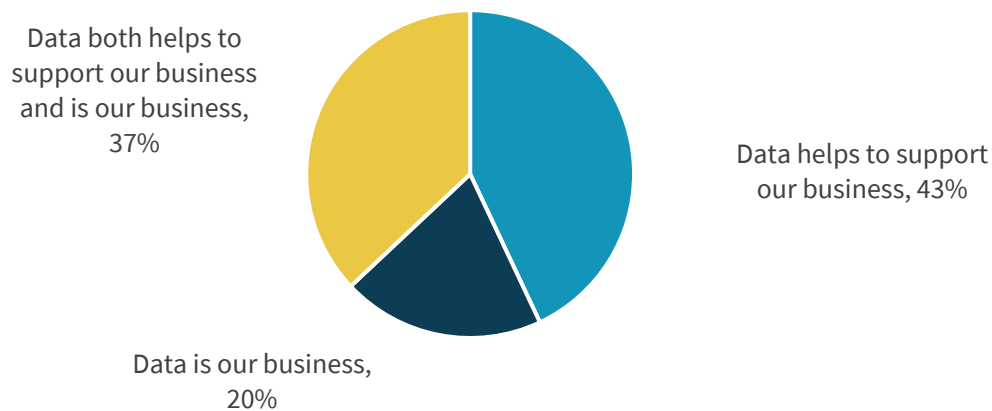
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Sustainable IT Challenges:

Businesses are becoming increasingly reliant on data. In addition, the acceleration of digital transformation has placed data at the heart of most organizations, private or public. In today's digital economy, most organizations leverage data as a product, a byproduct, or an enhancement of their offering. ESG research shows that one in five (20%) respondents report that data is their business (see Figure 1).¹ In addition, 37% of respondents indicated that data is their business or helps to support their business.²

Figure 1. Data-centric Future Ahead: Data Is, or Will Be, the Business

Which of the following statements best describes your organization's perspective on data? (Percent of respondents, N=150)



Source: ESG, a division of TechTarget, Inc.

Given the important role that data currently plays for many organizations (and is expected to play for many more in the near term), it makes sense that IT organizations are archiving considerable amounts of data. In fact, Figure 2 reveals that more than half (54%) of respondent organizations currently manage at least 1 PB or more of total archive data.³

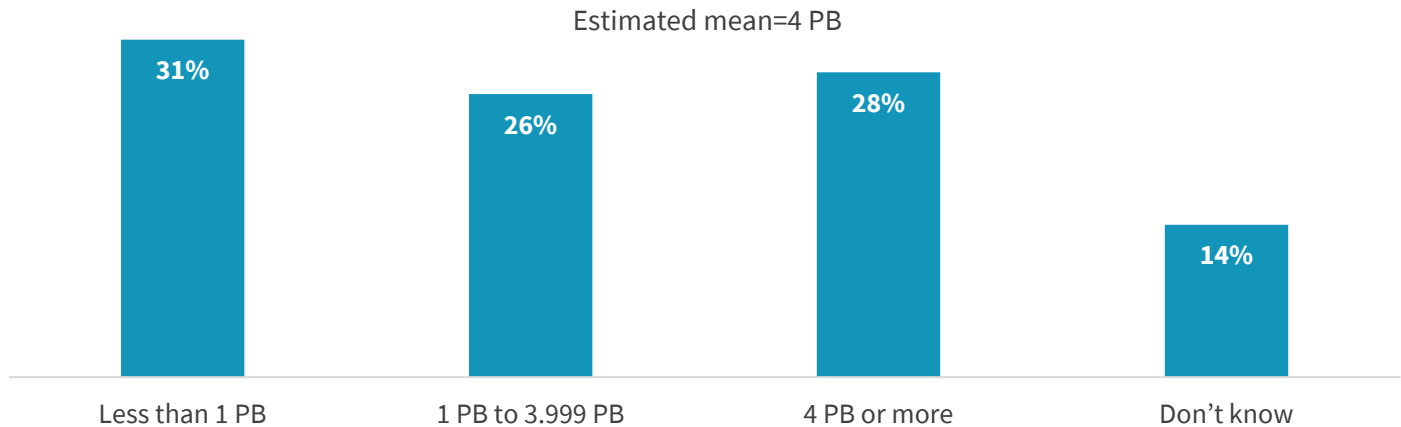
¹ Source: ESG Research Report, [The Transformational Rise of Active Archives](#), October 2021.

² Ibid.

³ Ibid.

Figure 2. Mean Volume of Archive Data Is 4PB

To the best of your knowledge, what is your organization's approximate total volume of archive data (including "active archive") stored on corporate servers and storage systems?
(Percent of respondents, N=150)



Source: ESG, a division of TechTarget, Inc.

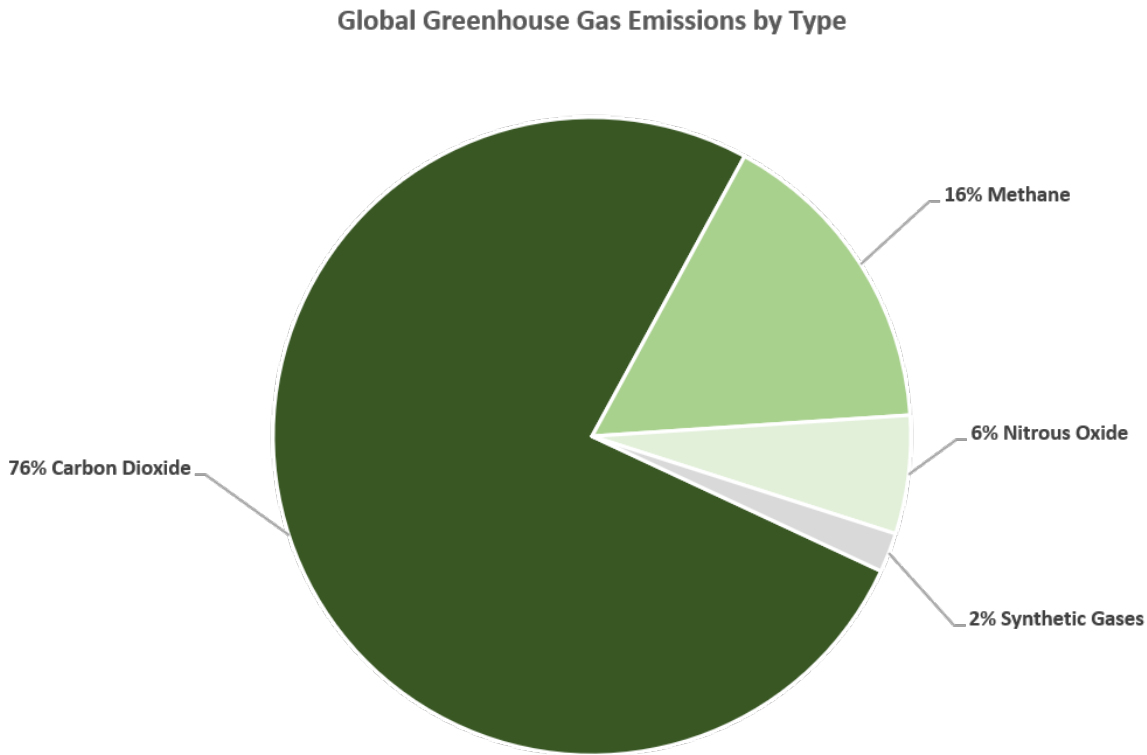
With this explosion of data archives, these figures are only expected to rise. Furthermore, without proactive steps to reduce data centers' energy consumption, the cost of energy will increase. Businesses need to do their part to drive down energy consumption without sacrificing the computing power needed to support innovation and deliver goods and services as promised.

Data Center Energy Requirements and Greenhouse Gases

Overall, data centers are not the worst offenders when it comes to CO₂ emissions. However, these facilities do account for up to 5% of global greenhouse gas emissions, which trap heat in the atmosphere. Subtle architectural changes could reduce their impact on the environment. Figure 3 shows the breakdown of greenhouse gas emissions by type, with carbon dioxide (76%) being the major contributor. Carbon dioxide enters the atmosphere as a byproduct of burning solid waste, trees, and other biological materials, as well as fossil fuels (coal, natural gas, and oil). These are often used to produce the energy required to power data centers that support modern businesses. Methane (16%) is emitted during the production and transportation of coal, natural gas, and oil. Nitrous oxide (6%) is emitted during agricultural, land use, and industrial activities. Synthetic gases (2%) like hydrofluorocarbons and perfluorocarbons are emitted from a variety of industrial processes (see Figure 3).⁴

⁴ Source: United States Environmental Protection Agency, [Global Greenhouse Gas Emissions Data](#).

Figure 3. CO2 EPA CO2e Global Emission Estimates



Source: US Environmental Protection Agency (EPA)

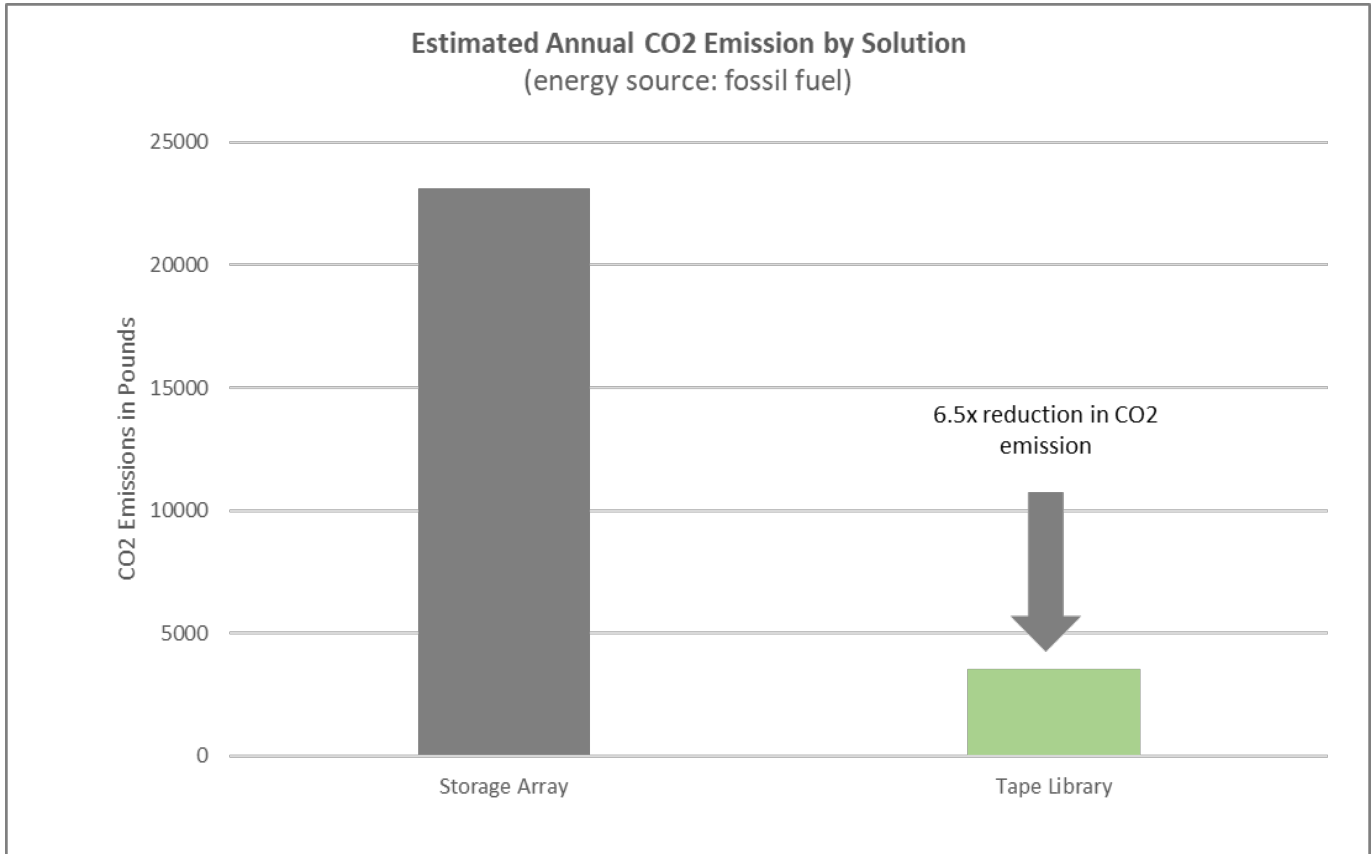
LTO Sustainable Architecture Benefits Overview

ESG evaluated the impact Linear Tape Open (LTO) technology could play in delivering sustainable IT solutions. This technology, also known as the LTO Ultrium format, is a powerful, scalable, adaptable open tape format optimized for high capacity, maximum storage density and performance. LTO technology remains unrivalled in terms of cost to capacity, reliability, portability, and security, and it continues to play a crucial role in data protection and archive/active archive solutions. In addition, with stored data growing exponentially year-over-year, many organizations are looking for technologies to reduce their energy consumption and carbon footprints. We concluded that organizations could save on energy consumption, CO2 emission, and disposal costs in their production storage environments by adding tape as a storage tier and replacing spinning HDDs with tape media for the less active data.

CO2 Emission by Storage Type

As mentioned above, carbon dioxide (CO2) is the primary greenhouse gas emitted when producing energy. Electricity generated by fossil fuel is a significant source of energy across the world. Electricity is used to power homes, businesses, and industries. As shown in Figure 4, storage arrays emit considerably more CO2 annually than tape libraries. By migrating data that is less active from disk drives to tape drives, organizations can achieve significant reductions in CO2 emission. Figure 4 represents a 6.5x reduction in CO2 emissions resulting from running approximately 500 TB of less active data on tape versus HDD in an ESG modeled production environment. The model shows the results of the data workload shift from disk to tape over a twelve-month period.

Figure 4. CO2 Emissions of Disk Arrays Versus Tape Libraries

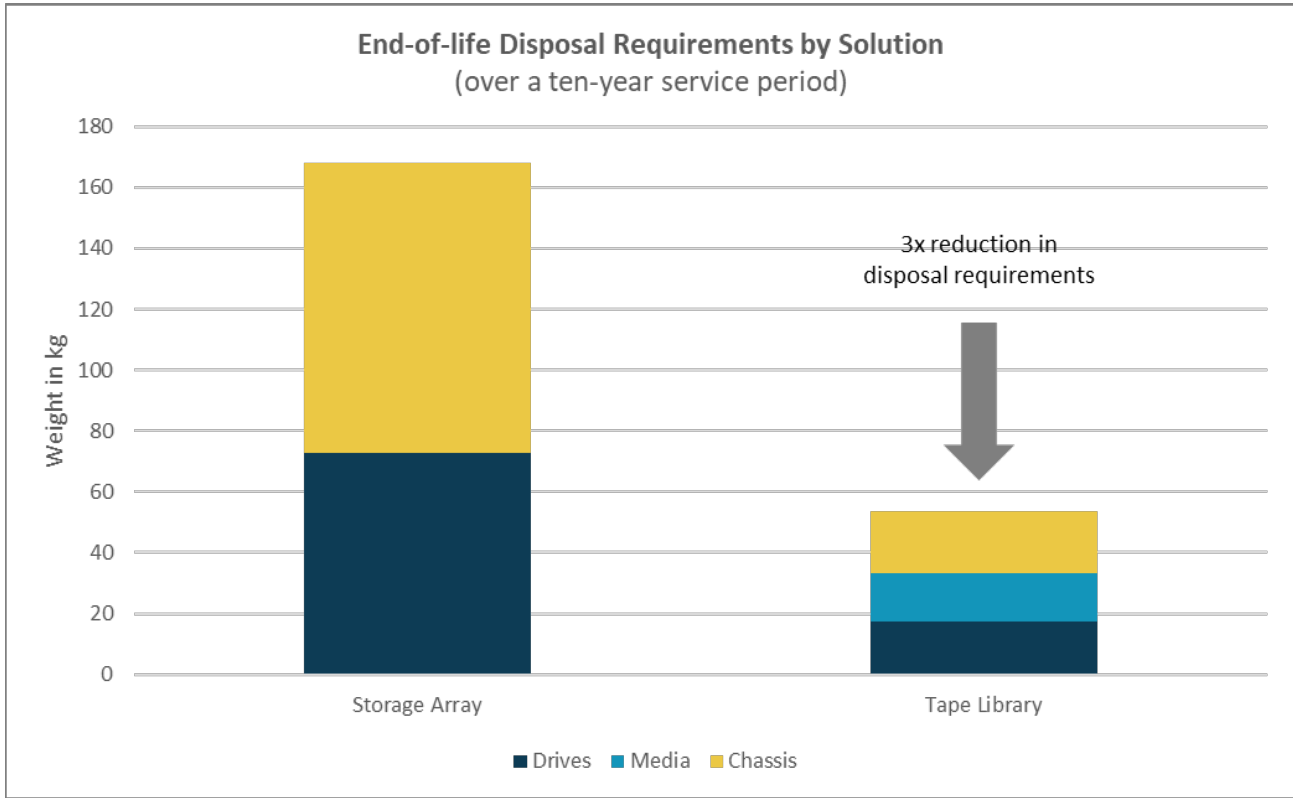


Source: ESG, a division of TechTarget, Inc.

Disposal Requirements by Storage Type

As shown in Figure 5, ESG also explored the end-of-life disposal requirements over a ten-year period for the same two solutions used in the previously detailed CO2 modeling exercise supporting approximately 500 TB of data. The data presented here represents the typical three-to-five-year refresh cycle for the disk array versus the typical ten-year or more service period of a tape library. For the storage array, we included the initial deployment and a forklift refresh upgrade between year three and year four. For the tape library solution, we included a next-generation LTO drive and media upgrade at year five. Organizations can achieve a 3x reduction in disposal requirements by using tape drives instead of disk drives due to a reduction in the weight being disposed (drives, media, and chassis) and the reduction in e-waste such as circuit boards, which are highly polluting components.

Figure 5. Disposal Requirements by Solution Type



Source: ESG, a division of TechTarget, Inc.

First Impressions

Tape capacity is outpacing disk, with its current limitations, which has the fundamental building blocks to continue well into the future. At this point, with the ability to store so much data on a single cartridge, and head technology that can easily keep up with the reads/writes, the industry has come to a point where it is possible for organizations to store huge amounts of data on smaller, server-sized autoloaders right up to multi-frame automated libraries, delivering major efficiency impacts to their storage data management, equating to a much enhanced sustainability posture.

In addition, sustainable IT covers the manufacturing, use, management, and disposal of information technology in a way that minimizes its impact on the environment. Sustainability and IT are generally at odds. For example, data centers, the backbones of every internet search completed, and email sent, require a large amount of energy to power. Still, there are ways companies can be more sustainable when it comes to IT. Specifically, organizations looking to leverage LTO technology to reduce their carbon footprints can do so by simply converting appropriate disk storage to tape storage to save on CO2 emissions, disposal costs, and energy costs.

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