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Improving Data Storage Sustainability and TCO with modern tape

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About Me

- 40+ year IT career started with IBM in 1978 as a sales trainee for the Data Processing Division.
- Career includes management and project management positions in marketing, consulting and sales.
- Last fourteen years with IBM included storage marketing and product management in Tucson, Arizona.
- My teams launched the second-generation Virtual Tape Server, LTO tape drives and libraries, TS1120 Tape Drive with Encryption and IBM's ProtecTIER De-duplication offerings.
- President of Brad Johns Consulting LLC assisting data storage technology companies develop and implement Total Cost of Ownership and Sustainability assessments.
- Holds a Master in Business Administration and Bachelors degree in Economics from the University of Arizona.

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Rapid digital data growth has made TCO an important issue

- Initial Fujifilm TCO tool developed in 2016
- Periodically updated for new generations of LTO, higher capacity HDD's and cloud storage
- Evolved to include new functionality:
 - Tape vaulting cost
 - Systems management cost
 - Network bandwidth cost
 - Larger capacity scenarios
- Latest function estimated CO2 emissions
 - Based on energy consumption estimates



Source: https://www.fujifilm.com/us/en/business/data-storage/resources/tco-tool

Worldwide Focus on Climate Change

- Climate change a clear priority for the new US administration
- IPCC 2021 Summary for policy makers It is unequivocal that human influence has warmed the atmosphere, ocean and land.
- SEC developing new disclosure requirements
- Over 90% of S&P 500 have published Sustainability Requirements



The challenge is to reduce carbon emissions in the most cost-effective manner possible

Data Centers are large users of power and storage is a significant component

- Rapid growth of data center power consumption in the early 2000's resulted in studies of data center power
- Data centers consume approximately 1.8% of all power in the United States
- The rate of growth flattened in the 2010-2020 decade. Hyperscale data centers contributed to significantly improved overall Power Usage Effectiveness (PUE) over the period
- Storage consumes approximately 19% of the data center power including infrastructure



Source: Arman Shehabi et al 2018 Environ. Res. Lett. 13 124030

Storage media suppliers are now providing information on CO2e emissions over the product lifecycle



Includes estimated tape drive energy

*Source: https://www.seagate.com/global-citizenship/product-sustainability/exos-x18-sustainability-report/ ** Source: Fujifilm

Two scenarios highlight the environmental and cost benefits of tape storage

- ▶ 100 PB to be retained for 10 years
 - Scenario 1 Implement an Active Archive, store 60% of the data on tape and the active 40% on HDD
 - Scenario 2 All 100 PB of data moved from HDD to tape
- Only includes the CO2e impact of the storage media (HDD and Tape)
 - Does not include controllers, networking, tape libraries, tape drives (except energy), cooling and electrical

Updated to include LTO 9 and Exos X18!

Moving cold data from HDDs to tape media dramatically reduces ten-year CO2e



Electronic waste is also reduced

100 PB ten years of eWaste



There are also substantial TCO savings for migrating cold data to tape



Ten-year TCO savings range from over \$8 million to over \$13 million

Globally - there is significant potential for CO2e reductions



Moving 60% of the worlds HDD resident data to tape would save over 72 million tons of CO2e

In conclusion

Companies of all sizes are looking to improve sustainability

The amount of stored data is very large and projected to grow to 17 ZB by 2025

Storage is a significant consumer of data center energy

Much of the data stored on HDDs is "cold data"

Carbon emissions and electronic waste can be dramatically reduced by moving cold data to tape media

Organizations can also reduce TCO while reducing CO2e and electronic waste

