

Computer Technology Review®

Intelligent Strategies & Solutions for the Storage Industry

HOME	CTR EXCLUSIVES	WHITE PAPERS	STORAGE TECHNOLOGY	STORAGE NETWORKS	DATA CENTER	DATA MANAGEMENT	HOT COMPANIES	SPECIAL DEPARTMENTS
------	----------------	--------------	--------------------	------------------	-------------	-----------------	---------------	---------------------

Home > CTR Exclusives > Cost Control and Green Initiatives

Cost Control and Green Initiatives

WEDNESDAY, 08 SEPTEMBER 2010 10:02 |

Tape Evangelism



By Jon Hiles

As organizations look for ways to reduce costs while doing what's best for the environment, many are recognizing that tape is the greenest storage technology—and the most cost-effective. Because of this, and because of a decade's worth of continuous advancements in tape technology, tape is once again becoming a data center favorite and is emerging as a key component of all truly green data centers.

All definitions of green IT include some aspect of reducing power usage. The Green Data Project web site sums up the importance of green IT: "Given the compelling evidence of a causal relationship between carbon effluents produced by burning petroleum and coal based fuels and global climate change, reducing the carbon footprint of data center operations is becoming a modern battle cry." As it stands, the IT industry has an enormous carbon footprint—2% of the world's carbon emissions¹—thanks to the power-hungry nature of computing. The amount of power consumed by data centers is significant, illustrated by the fact that data centers, if classified as a stand-alone industry, would constitute the sixth largest² industry in terms of electricity consumption.

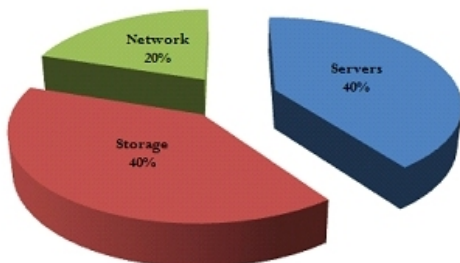
Tape's energy efficient data storage is unmatched and inarguable. Once data has been written to tape, tape uses exactly zero watts to preserve data for years. The data can be stored, with integrity intact, for up to 30 years and possibly longer without consuming another watt. Disk cannot make any similar claim, given the nature of spinning disk. And tape's low acquisition costs fit into recession-limited IT budgets.

With a growing awareness of the importance of green data, tape's importance to the data center will continue to grow. Financial factors are also driving the use of tape as rates of data creation accelerate, energy supplies decrease while energy demand increases, and cost containment remains a significant IT priority.

How Power is Used in the Data Center

Power use in the data center falls into roughly three key categories:

Data Center Power Use



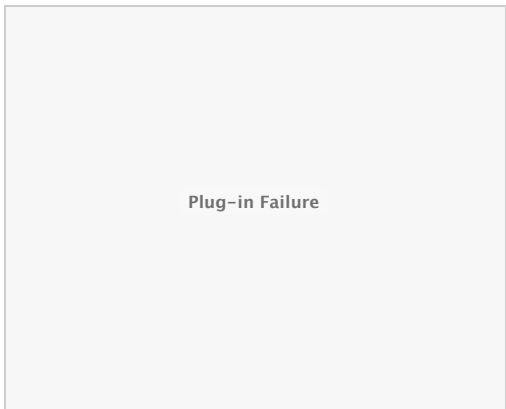
Storage power use will soon exceed³ that of servers, making storage the #1 power drain in the data center. Energy demands are further exacerbated by the continuing growth of digital data that must be stored and managed.

Researchers project that half of data centers in operation today will have insufficient power and cooling by the end of the decade.

With these as incentives, alternatives to spinning disk grow in their appeal. Tape is first in line.

Reducing How Much Power is Used in the Data Center

Search CTR



White Papers

[Achieving Rapid Data Recovery for IBM AIX Environments](#)

[The Benefits of Data Replication in HACMP/PowerHA AIX Cluster Management Implementations](#)

[Introduction to High Availability for IBM System i High Availability](#)

[Five Reasons Why Smaller Organizations Should Consider High Availability](#)

[The Benefits of Continuous Data Protection \(CDP\) for IBM i5/OS and AIX Environments](#)

[State of Resilience of IBM Power Systems \(AIX and i5/OS\)](#)

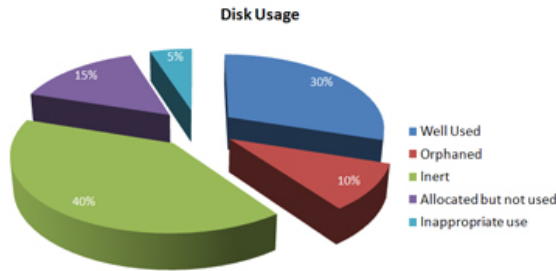
[Journaling and High Availability - Understanding IBM i Data Protection](#)

[Breakthrough Data Recovery for IBM AIX Environments - How New Technologies Are Making Data Protection, Recovery and High Availability Easier and More Affordable](#)

[High Availability in an SAP Environment- Keep mission-critical SAP operations running no matter what](#)

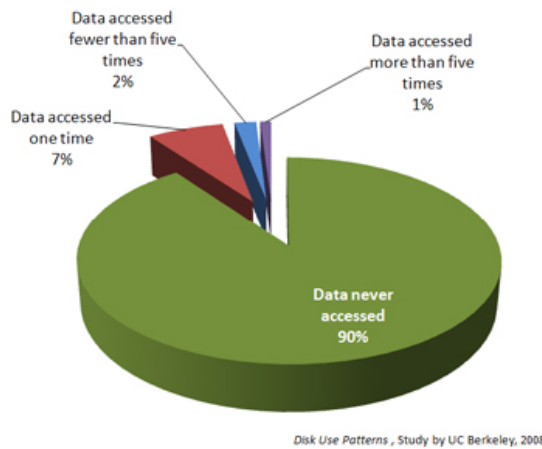
Much of the storage that currently consumes about 40% of data center electricity can be freed through the use of power-efficient tape. Tape can even play a role in reducing the additional 40% power use by servers, if administrators can find the time and tools to manage their disk more carefully. This opens the possibility of an enormous decrease in data center demands for power.

A recent study⁴ shows that less than one-third of data stored on disk is well used. This study is based on analyses of thousands of sites, and reveals that disk mismanagement is the rule rather than the exception.



The 70% of disk used unwisely includes a category referred to as inert, which refers to data access that has dropped to zero. This is data that is certainly a candidate for storage on tape. Another category of allocated-but-unused space is disk space reserved by applications (typically by the disk vendor) for future use—so some of the purchased disk is never truly available to the disk purchaser. This is an overlooked fact that, once widely understood, should encourage users to demand access to all the disk they purchase and power, rather than accepting fine-print restrictions on their own disk. The category of disk use referred to as inappropriate includes contraband data, such as non-business related MP3 music files, video, and other junk data. This can simply be deleted.

The data on disk that is frequently used amounts to only a small percentage of the disk that is constantly spinning. A study carried out by the University of California, Berkeley, analyzed disk access patterns for a network of a large local business storing over 22TB of disk-based data. This 2008 study showed that 90% of the data on disk in these operations was never accessed.



These assessments reveal a real opportunity to reduce disk use and free up disk space. By deleting data that is inappropriate or orphaned, moving data that is rarely used to tape, and reallocating disk properly, disk use can be optimized—using less disk overall, which automatically reduces power use and cost. It also reduces capital expenditures on new disk, which currently claims⁵ 35% to 70% of every dollar spent on IT hardware annually.

Managing Data Stored on Disk

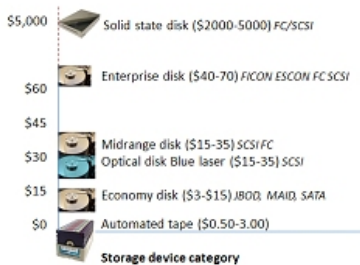
Tools are emerging to help administrators manage data. These tools include data classification, policy-based management, intelligent archiving and information lifecycle management. Regardless of the method used to manage data, tape is the logical destination of much of the data currently kept on disk.

About Tape

Along with tape's green attributes in terms of reducing energy use and therefore the carbon footprint of storage, tape provides considerable advantages in terms of cost—both acquisition and total cost of ownership.

Tape Reduces Costs: Low Acquisition Cost

Compared⁶ to disk pricing, tape inarguably remains the most affordable media in terms of cost per gigabyte:



Over time, tape has continuously provided a lower total cost of ownership than disk. Experts in the storage industry

How to Solve Downtime Challenges to Manufacturing and Supply Chain Operations

Information Availability: What Every Health Organization Should Know



See [current issue](#) or subscribe below



Visit Our New UNIX Section



Ads by Google

Clean Coal Technology
Advancing coal methods to produce electricity with near-zero emission
AmericasPower.org

The Autoloader Experts
Professional Repairs & Sales AIT, DAT, DLT, SDLT, LTO, SLR, 8mm
www.toptenrepair.com

Ads by Google

Virtual Tape Solutions
Mainframe technology for virtual tape backup. Read a free whitepaper
www.BusTech.com

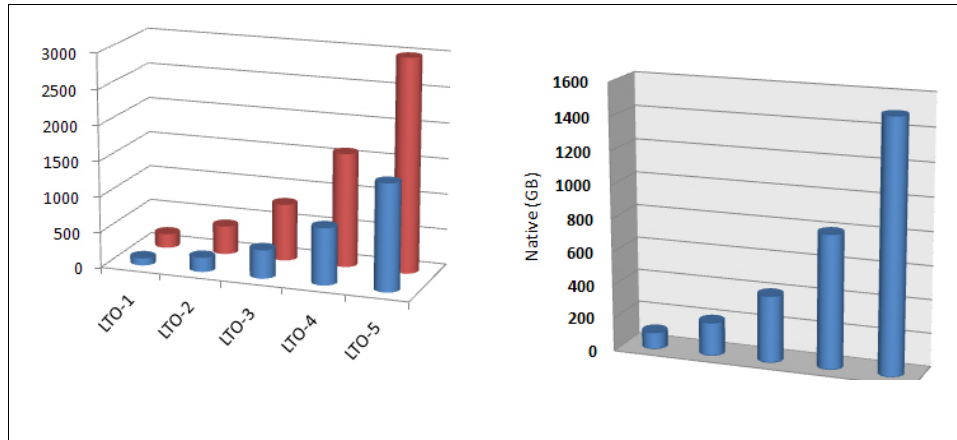
Switch to Clean Solar
Do Your Part to Help the Planet and Save Money At the Same Time!
www.SolarCity.com/GetIt

The Storage Anarchist
Get News & Tips On Advanced Data Storage From An Industry Pro.
thestorageanarchist.type

AIT Data & Cleaning Tapes
8mm / AIT 1, 2, 3, 4 & 5 AME Tapes 8mm AIT Tape, 8mm SAIT Tape
www.datatechstore.com

predict that this will continue as new generations of tape and disk are released. It is worth noting that, in the preceding chart, the disk and library costs per gigabyte assume working systems, to take into account otherwise hidden infrastructure costs. Typically, disk vendors include only the cost of a single gigabyte of disk without including the cost of controllers and other components required to actually use of a gigabyte of disk. When using this method to determine tape cost per gigabyte, the value drops to about 4 cents per gigabyte for an LTO-4 cartridge⁷

Tape is also continuously increasing in capacity and performance. Each generation of LTO cartridges has roughly doubled in capacity, as shown in the following charts, with one chart showing generations up through LTO-5, with compressed and native capacities. The second chart shows the native capacity of released LTO generations.



Recently IBM in partnership with Fujifilm announced a 35 TB native tape (70 TB compressed) that sets a new record⁸ in data density in linear magnetic tape storage. As digital data creation continues at increasing rates, the commercial debut of this or a similar high-density tape is only good news for green IT. This is especially important in light of the constantly increasing stream of data to protect.

Tape Reduces Costs: Low Energy Demand

As storage journalist Mark Ferelli puts it, “disk drives are enthusiastic consumers of power.” Disk uses power even when at rest, unlike tape:

Technology	GB/w at rest	Power use of 1 gigabyte, over a year
Fibre Channel disk	64 w	560,000 w
SATA disk	15 w	130,000 w
Tape	0 w	0 w

This data alone is enough move a data center or facilities manager to increase the use of tape in a backup environment.

Long-term Power Demands of Disk v Tape

A Clipper Group analysis compares real-world costs of powering similarly configured tape and disk systems. The difference in cost, with expenses that include power, is startling.

Exhibit 6 - Yearly Electrical Costs With A 10% Increase In Electricity Each Year

	Year 1	Year 2	Year 3	Year 4	Year 5
Tape Systems	\$4,238	\$4,662	\$5,128	\$5,640	\$6,205
Disk Systems	\$109,745	\$120,720	\$132,792	\$146,071	\$160,678

Source: Clipper analysis

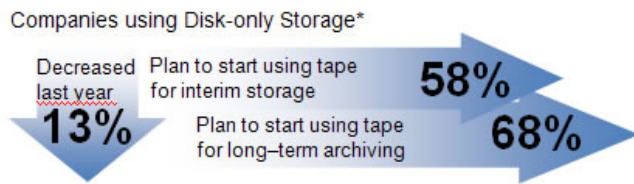
This report compares using disk to an always running car, “Storing infrequently-accessed data on disk is equivalent to keeping your car running constantly in the driveway. The car is always ready to go... [but] keeping a car constantly idling burns a lot of gasoline [...] Most people would consider this illogical – and wasteful. It is just as illogical (and expensive) to keep infrequently used data spinning on disk because you may need to access it later.”

When this same calculation was made using one of the power-efficient libraries by Spectra Logic, the savings were even greater. With the constant real-time power monitoring feature, Spectra libraries provide a method key to

reducing power use—you can't reduce power use if you don't know where you're using it.

Tape is the Way to Green

Administrators who are worried that tape is retro can relax. It turns out that, among users who have implemented disk as their only backup solution over the last few years, the majority—68 percent—plan to add tape back into their data protection environment. Although disk is a very valuable asset in protecting data, it is not a utopian solution. Tape's indispensability is increasingly acknowledged and recognized for its importance to the data center, both for its cost and for its green advantages.



Source: Fleishman-Hillard Research for the Linear Tape Open (LTO) Program

Geoff Mordock, a spokesman for the LTO Consortium, sums up tape's cost and green advantages: "Tape is the lowest cost form of digital storage. In a five-year TCO study comparing the costs of a SATA disk system vs. an LTO-4 tape library system for long-term data retention, the disk system was 23 times more costly than the tape system. In addition, tape's low energy consumption can help address green energy initiatives, delivering significant savings in energy costs over alternative data storage approaches."

A New Approach that Integrates Tape and Disk—Intelligently

The Active Archive consortium, a group formed in spring of 2010, is promoting the use of a file system front end to all data at an organization—both disk and tape—to make the data online and accessible. This idea is supported by alliance members SGI, QStar, FileTek, Compellent, Spectra Logic, and Atempo—companies that support hardware, applications, tape, and disk. Integrating tape and disk into an intelligently managed, unified set of information that is not divided up by how the data is stored makes good sense, optimizing disk use, increasing tape use, and reducing overall costs.

Tape's use in the data center is only going to increase, and that's good news for cost containment, data accessibility, and for reducing the industry's carbon footprint.

Jon Hiles is Senior Product Manager at [Spectra Logic](#)

[1] Pike Research. "Green Data Centers," Research Report, 2010. www.pikeresearch.com/green-data-centers

[2] "Eco-Friendly Data Center First to Use Wind for Cooling," Scientific Computing, <https://www.scientificcomputing.com>

[3] The Green Data Project, referring to IDC study at UC Berkeley, <http://www.greendataproject.org/>

[4] Chalfant, Randy. "Wasted Disk Space," Green Data Project, <http://www.greendataproject.org/>

[5] <http://www.datainstitute.org/portal/>

[6] Moore, Fred. Storage Navigator, Horizon Information Strategies, 2008.

[7] Beech, Debbie. "The Evolving Role of Disk and Tape in the Data Center," Sylvatica White Paper, 2009.

[8] Athow, Desire. IBM & Fujifilm Partner to Product 35TB Tape, 22 January, 2010. <https://www.itportal.com>

[9] Ferelli, Mark. "Tape's Role in the Green Data Center." Enterprise Systems, 3/31/2009. <http://esj.com/>

[10] Adams, Wayne M. "Advancing Storage Industry Standards and Relationships for Enterprise and Cloud Computing" SNIA presentation, Data Storage Expo 2009, Tokyo Japan.

[11] McAdam, Dianne. Tape and Disk Costs—What It Really Costs to Power the Devices Report #TCG2007014 The Clipper Group Explorer, 2007.

[12] [www. ActiveArchive.com](http://www.ActiveArchive.com)

[About.CTR](#) | [Editorial.Calendar](#) | [Writers.Guidelines](#) | [Contact.Us](#).

Copyright © 2010 Computer Technology Review - Data Storage, Networking and Data Center Solutions. All Rights Reserved. Designed by [JoomlArt.com](#).