

EXECUTIVE SUMMARY

Efficient IT Infrastructure Saves More Than Just Energy Costs

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Sustainability and space efficiency concerns are increasingly driving information technology (IT) infrastructure decisions. Awareness of energy and space consumption for IT equipment like servers, networking, and storage has historically been higher in Europe than in other markets. However, American buyers are becoming increasingly aware of rising energy costs and restrictions that limit data center floor space expansion and are even comparing vendors' watts per terabyte and storage density specifications. An IDC survey released in early 2022 showed that 25% of IT organizations in North America during 2021 had experienced delays in IT deployments due to power and/or space constraints. As data volumes continue to grow at 30% to 40% per year for most enterprises, energy and floor space consumption will become increasingly important factors in storage infrastructure decisions, in particular for growing businesses.

According to the International Energy Agency, data centers consumed 1% to 1.5% of all electricity generated globally in 2022. Storage infrastructure generally accounts for 20 to 25% of data center energy usage. In 2022, that meant roughly 68 terawatt hours (22.7% of the 300 terawatt hours total for data center energy consumption that year). Although energy costs vary the world over, if we assume a \$0.20 per kilowatt hour cost for energy, 2022 enterprise storage-related energy costs would have amounted to roughly \$13.6 trillion.

When it comes to energy consumed by storage infrastructure, we are clearly dealing with very large numbers. But how much energy and floor space can really be saved by buying more efficient storage infrastructure? Pure Storage® enterprise customers typically reduce their power and rack space consumption by up to 85% when they replace competitive systems with Pure Storage on technology refresh. If, just to make a point, we assume that all enterprise storage consuming energy in 2022 was Pure Storage, then the

total energy costs for storage in 2022 would have been just over \$2 trillion, a savings of \$11.6 trillion over what it actually was (using the typical 85% reduction we see in competitive situations).

How can this be true? The industry-leading sustainability metrics of Pure Storage are based on a unique product strategy. Our competitors buy commodity off-the-shelf (COTS) solid-state disks (SSDs) that by design emulate hard disk drives (HDDs). This makes them easier to integrate into storage systems that were originally designed for HDDs, but there are trade-offs. The flash translation layer (FTL) that COTS SSDs employ to emulate HDDs (in other words, to make NAND flash media look and act like spinning disks) negatively impacts the performance, storage density, effective capacity, and endurance of the flash media, ultimately increasing the cost of a system configured to meet certain performance and capacity objectives.



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Our product strategy, on the other hand, is based on flash storage devices that are purpose-built for enterprise use (rather than the consumer designs that COTS SSDs are based on) and are significantly denser in terms of capacity. We then place these devices into storage systems specifically designed only for flash, and they are the largest flash devices in the industry. Currently, we ship a 48TB flash storage device (which we call a DirectFlash® module or DFM) and will be shipping a 75TB DFM by the end of 2023, a 150TB DFM by the end of 2024, and a 300TB DFM by 2026. The largest COTS SSDs available today are 30TB, but those are still relatively low volume. The 15TB COTS SSDs are the ones shipping in volume on our competitors' systems.

We also manage the flash media both directly and globally at a system level with our storage operating system Purity, which manages flash as flash, not as HDDs. By managing the flash media directly with a global awareness of what the I/O looks like across the entire system, we get significantly better performance, higher storage density, much higher effective capacity, and better endurance and reliability than COTS SSDs.

The fact that we can use extremely large capacity storage devices means that we need far fewer devices to hit a given performance and capacity objective—up to 70% fewer. And we

require less supporting infrastructure—controllers, enclosures, power supplies, fans, cables, etc.—to hit that objective. That's how our systems use up to 85% less rack space and need far less energy.

What it boils down to is that our combination of extremely dense flash storage devices and a software-driven storage operating environment that manages the flash media both directly and globally enables storage system designs that our competitors can't easily or quickly duplicate. Even if the SSD vendors ship larger devices, the inefficiencies of the FTL and management of the media at the device, rather than the system, level raise concerns about how much of the capacity can be used while still meeting performance SLAs—and how long device rebuild times might be.

We have addressed those concerns, and we can tell you how we do that.

Today, Pure Storage sells the industry's most efficient storage infrastructure in terms of energy and floor space consumption, and our leadership in this area will only increase over the next two to three years as we introduce larger DFMs. We can help you substantially lower energy costs, reclaim data center space you may be running out of, or start you off with the industry's most efficient storage solutions for the enterprise.

If You'd Like to Learn More

Read our white paper "[Efficient IT Infrastructure Saves More Than Just Energy Costs](#)," or contact us to discuss what the world's most efficient storage infrastructure can mean for your business.

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