

TECHNICAL VALIDATION

Seagate Exos Hard Drives Powered by Mozaic™

Delivering extreme storage density at scale to keep pace with AI-driven innovation

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Contents

Introduction 3
Background 3
The role of hard disk drive (HDD) storage in AI use cases 3
Omdia Technical Validation 4
Seagate's Mozaic-enabled scalability 4
Seagate Exos Cost of Ownership 5
Seagate Exos sustainability 7
Conclusion 9

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Introduction

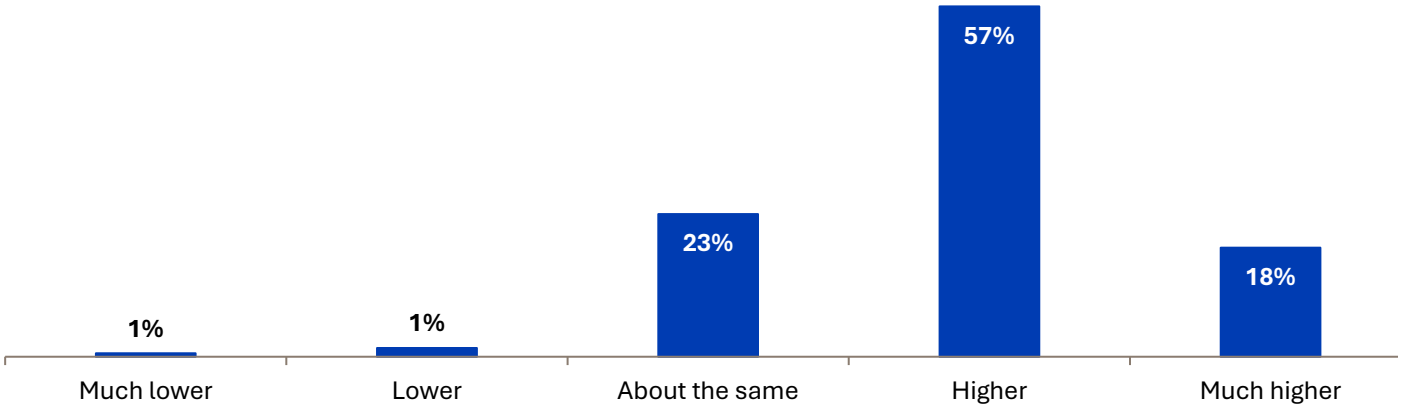
This Technical Validation from Omdia documents the detailed evaluation of Seagate Exos hard drives, powered by Mozaic™ technology, including scalability, cost of ownership, and sustainability.

Background

As mainstream organizations continue to adopt AI technologies and applications, they increasingly understand the effects of these technologies on the underlying infrastructure. Though the immediate focus of many AI infrastructure projects is on the compute layer, the data-intensive nature of AI will also make a significant impact on the enterprise storage environment. A majority of respondents to our research have 1PB or more of installed capacity across all locations, with almost one in five having 10PB or more.[1] Virtually no respondents (2%) are expecting a slowdown in data growth, and fewer than a quarter (23%) are expecting steady growth rates. Additionally, a wide majority is expecting to see accelerating growth (75%, see **Figure 1**).

Figure 1. Organizations face rapidly accelerating data growth rates

How will your organization's anticipated annual data growth rate over the next 24 months compare with its data growth over the past 12 months? (Percent of respondents, n=350)



Source: Omdia

Across the board, AI initiatives are comfortably the top driver behind data growth over the next 24 months in the forms of such initiatives creating more data (61%) and/or requiring longer retention (59%). Data is largely hybrid today, as most organizations report a mix of on- and off-premises locations. More than two-thirds of organizations report that over a quarter of their primary/active data capacity is on-premises, and more than one-quarter keep more than half of their data on-premises.

The role of hard disk drive (HDD) storage in AI use cases

AI use cases that are more prevalent on-premises often involve scenarios requiring low-latency processing, high data security, and real-time decision making. For example, machine vision for anomaly detection in manufacturing environments is a common on-premises AI application. In such cases, data from cameras and sensors is processed locally to identify defects or irregularities in production lines in real time. This

[1] Source: Enterprise Strategy Group (now Omdia) Research Report, *The Critical Role of Storage in Building an Enterprise AI Infrastructure*, September 2025. All research references and charts in this Technical Validation are from this report unless otherwise noted.

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requires high-performance storage solutions, such as HDD-based systems with advanced technologies like Seagate Exos, powered by Mozaic technology, which can handle large volumes of structured and unstructured data while ensuring low latency and high throughput. On-premises HDD-based storage is particularly advantageous in these environments due to its ability to provide cost-effective, scalable, and reliable storage for the massive data generated by industrial IoT devices and high-resolution imaging systems.

In contrast, cloud-based AI use cases often focus on large-scale data aggregation, analysis, and model training, where scalability and accessibility are critical. Unstructured data lakes in the cloud, for instance, are widely used for applications like natural language processing, sentiment analysis, and predictive analytics. These data lakes store vast amounts of unstructured data, such as text, images, and videos, which are processed using AI algorithms to extract insights. HDD-based storage in the cloud plays a crucial role in these scenarios by offering high-capacity, cost-efficient solutions for storing and managing the ever-growing volumes of data. Hyperscale public cloud providers often rely on HDDs to support these workloads, ensuring that organizations can scale their AI initiatives without incurring prohibitive costs. This hybrid approach, combining on-premises and cloud environments, enables organizations to optimize their AI strategies based on specific use case requirements.

Omdia Technical Validation

Omdia validated how Seagate Exos hard drives, powered by Mozaic technology, efficiently scales storage infrastructure while optimizing cost of ownership and sustainability goals for organizations.

Seagate's Mozaic-enabled scalability

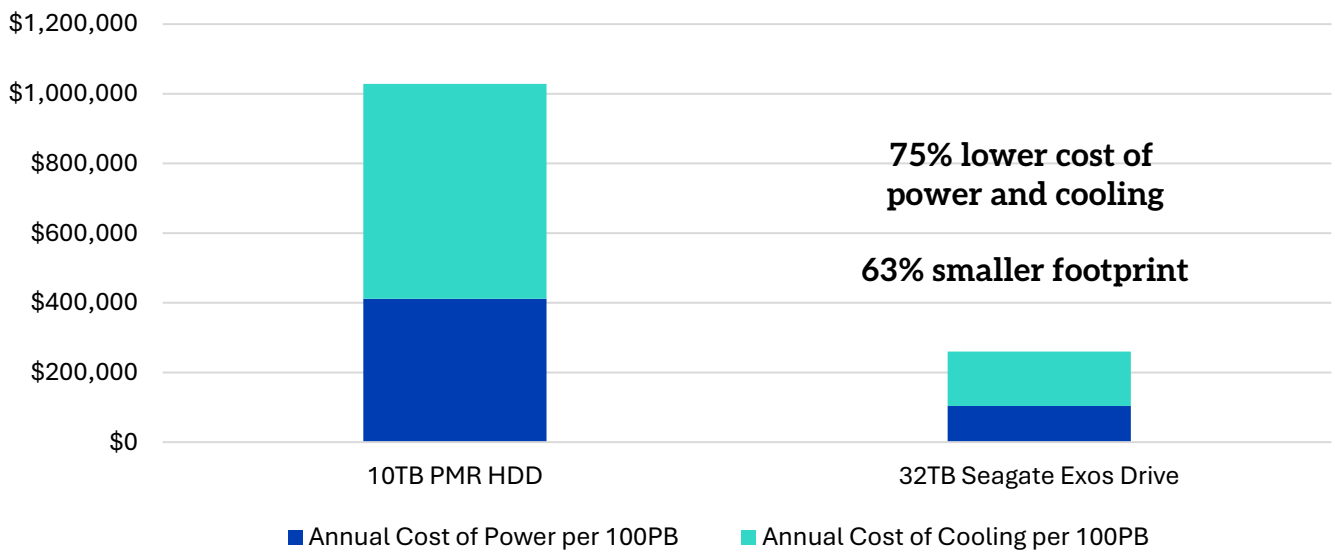
Mozaic is a hard drive platform that deploys heat-assisted magnetic recording (HAMR) technology to deliver mass-capacity storage at areal densities exceeding 4TB per disk inside a hard drive. This increases the number of bits that can be stored on a platter and enables organizations to store more data using the same rack space, whether on-premises or in the cloud. For example, organizations can upgrade from conventional perpendicular magnetic recording (PMR) drives to Seagate's Exos drives and support more capacity in the same footprint, while using less power per TB and requiring less cooling. Users can scale applications by maximizing storage in their existing infrastructure and retain and leverage more data (e.g., analytics data, archive data, etc.). Omdia created a simple model comparing 10TB PMR hard drives to 32TB Seagate Exos hard drives in terms of power, cooling, and space. The model is based on 100PB of total storage, using a typical power usage effectiveness (PUE) of 1.5, and the average cost of electricity for commercial users of $0.1348 per kilo-watt hour (kWh).[2]

Figure 2 shows that the Seagate Exos hard drives can save up to 75% in annual power and cooling, in a 63% smaller footprint. This is due to less than half the number of servers, hard drives, and racks needed for 100PB of storage with the Exos hard drives. Every organization is different, and it's safe to say that most, if not all, environments will contain a mix of hard drive sizes, so savings will scale up or down based on the average capacity of drives being replaced.

[2] Source: U.S. Energy Information Administration, *Average Price of Electricity to Ultimate Customers*, April 2026.

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Figure 2. Seagate Exos scalability (power, cooling, and space savings)



Source: Omdia

Why this matters

Data growth is a serious challenge; 55% of organizations surveyed by Omdia have a petabyte or more of installed capacity, and 75% of those same organizations said they are expecting to see accelerating data growth over the next two years. Organizations need to massively scale their storage, which traditionally has come with higher operational costs, as the only way to do that has been to add more drives.

Seagate Exos hard drives, built on Mozaic technology, significantly increase capacity in the same footprint as legacy 3.5" hard drives. In our calculations, organizations can save up to 75% in power and cooling consumption replacing 10TB drives with Seagate Exos 32TB drives. This is important since data storage is increasing annually on-premises, in the cloud, and at the edge, and data storage is one of the largest consumers of data center power and cooling.[3]

Seagate Exos Cost of Ownership

Omdia reviewed how Mozaic enables Seagate Exos hard drives to optimize cost of ownership as compared to flash solid-state drives (SSDs).

Hard drives and SSDs have always worked together in a typical data center. They each have their own unique benefits. Hard drives typically cost less per TB than SSDs. Because SSD prices are volatile and largely dependent on supply, hard drive systems generally provide lower cost of ownership on a per-TB basis.

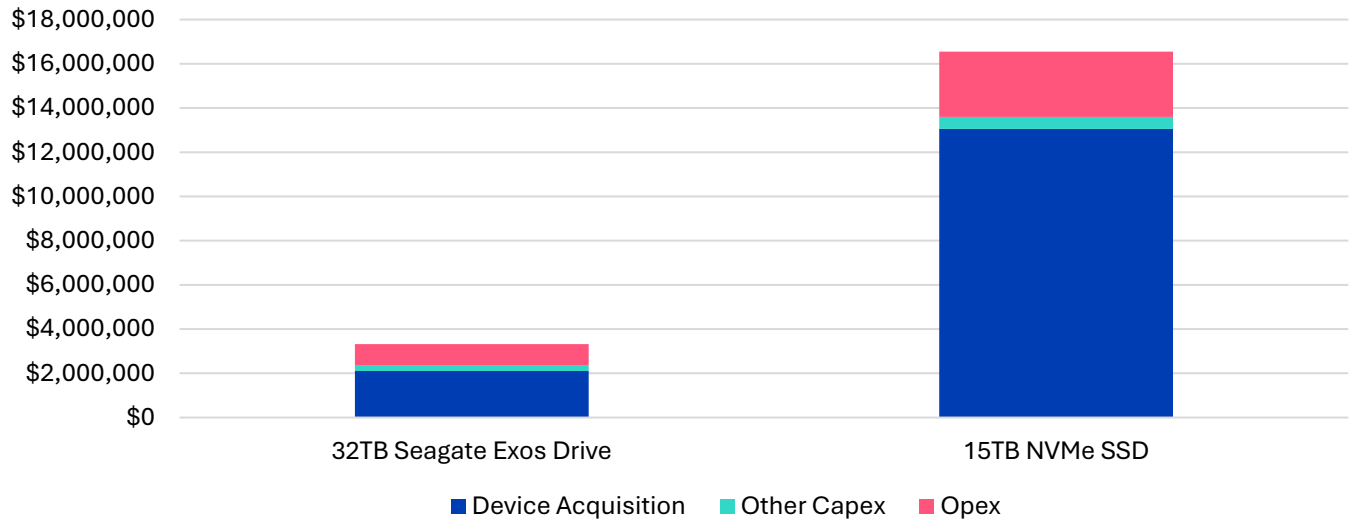
[3] Source: Enterprise Strategy Group (now Omdia) Research Report, *Navigating the Cloud and AI Revolution: The State of Enterprise Storage and HCI*, March 2024.

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When considering cost of ownership, one needs to consider operational costs such as power consumption, cooling, depreciation of equipment, maintenance, repairs, IT software licensing, and data center staff costs.

Omdia created another simple model of a 100PB environment comparing the costs of building and maintaining the environment with 32TB Exos hard drives versus 15.36TB NVMe SSDs over a five-year period. The costs were broken down into three categories: device acquisition (cost of hard drives and SSDs), other capital expenditures (drive enclosures, racks, servers, and networking), and operational expenditures (power, cooling, and failure replacement). The model did not take into consideration capacity and performance growth requirements, depreciation of equipment, maintenance, repairs, IT software licensing, or data center staff costs. This analysis was based on the cost of enterprise 32TB Exos hard drives at approximately $17 per TB and 15.36TB NVMe SSDs at approximately $131 per TB—7.88x the cost per TB of Exos drives. Costs were averaged from publicly available commercial sources. **Figure 3** shows an 87% reduction in storage device acquisition costs with 32TB Exos hard drives versus 15.36TB NVMe SSDs. Additional savings include other capital expenditures, such as servers and racks, and operational expenditures, such as power, cooling, and failure replacement. Including these factors yields an 83% aggregate cost of ownership reduction.

Figure 3. Hard Drive and SSD cost of ownership comparison



Source: Omdia

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Why this matters

AI is profoundly affecting nearly every facet of how businesses operate today. Enterprise storage infrastructure is no different, facing heightening requirements for massive data storage capacity to support AI projects while keeping the environment secure and meeting performance demands. On-premises and cloud-based HDD storage is particularly advantageous in these environments due to its ability to provide cost-effective, scalable, and reliable storage for AI-driven data growth.

Omdia validated that Seagate's Mozaic-enabled scalability can help organizations drive greater performance along with more simplicity, power efficiency, and reduced cost of ownership across the stack to support the most capacity-hungry workloads and applications.

Our cost of ownership analysis considered both capital expenditures like storage device acquisition, cost of servers, and racks, along with operational expenses like power and cooling and failed drive replacement. Our calculations show an 83% cost of ownership advantage when comparing 32TB Seagate Exos hard drives with 15TB NVMe SSDs. It is critical to note that our comparison used pricing for devices generally available from public, commercial sources.

Seagate Exos sustainability

Omdia reviewed how Seagate Exos hard drives support enterprises' data center sustainability efforts. IT sustainability practices, which reduce the negative impact that businesses can have on the environment, are increasingly important to organizations. Driven by a combination of worldwide government mandates, rising energy costs, and an urgency to act, sustainability is at the core of environmental, social, and governance (ESG) initiatives. A key principle driving sustainability in the digital world is the need to achieve more with less, which often results in cost savings. For example, many organizations have committed to lowering carbon emissions across their data centers, including storage, which is a major contributor to data center carbon emissions from file storage to application messaging.

In addition, the deployment and consumption of AI infrastructure resources, including the power-hungry computational resources required for training and running AI models, have the potential to exert a significant environmental impact. From the energy consumption of data centers housing AI infrastructure to the embodied carbon footprint associated with manufacturing, shipping, and disposing of hardware, organizations increasingly recognize the moral and strategic imperative to align AI initiatives with sustainability goals.

The motivations for ESG initiatives vary by organization and include the following:

- Benefits from reducing carbon footprint and promoting social equity.
- Expectations from customers, peer organizations, employees, and shareholders.
- Proactive pursuit of ESG compliance in anticipation of it becoming or already being a regulatory requirement.
- Financial goals, such as financial incentives, taxes, and government regulations.

These drivers are propelling many organizations to act. In addition, IT suppliers and customers will influence organizations' ESG investments to reflect an increased commitment to fairness and environmental concerns.

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Seagate recognizes that it must address the environmental impacts created by its operations. Its goals include lowering greenhouse gas emissions in its operations, designing products that use less of the earth's finite resources, and expanding its product takeback programs for drive reuse and materials recycling. Specifically, Seagate is looking to power its manufacturing and R&D sites with renewable energy by 2030 and achieve carbon neutrality by 2040.

Seagate uses lifecycle assessments as a management tool for appraising and quantifying the total environmental impact of its products and packaging over the entire lifecycle of materials, processes, products, technologies, services, or activities. This helps reduce embodied carbon when the hard drive is built and helps reduce operational power used.

The Seagate Circularity program creates a secure, sustainable way to retire Seagate hard drives, moving toward a more responsible and efficient model that reduces carbon emissions and electronic waste by extending the product lifecycle. The program enables the secure reuse of storage hardware with self-encrypting drives and instant secure erase; extends product life through repair, refurbishment, parts extraction, and materials recovery; and places refurbished drives back into the market. Reusing materials cuts e-waste and helps conserve finite resources.

Based on Omdia analysis, Seagate Exos hard drives provide numerous ESG benefits over previous-generation PMR-based hard drives, including the following:

- The 32TB Exos drive reduces power usage by 63 %/TB compared to the Exos X10, making it 2.7 times more power efficient per terabyte.
- The 32TB Exos drive reduces embodied carbon by 73.4%/TB compared to the Exos X10, making it 3.8 times more efficient in terms of embodied carbon per terabyte.
- It is made with 30.7% recycled material by weight.
- It reduces packaging and shipping impact due to a lower weight.
- It stores more data without increasing consumption of space, power, and natural resources.

Why this matters

Organizations with strategic sustainability goals can accelerate their progress by making the move to more efficient and sustainable IT. This should include careful consideration of the acquisition, use, management, and disposal of IT in a way that minimizes its impact on the environment.

As of this writing, Seagate is leading the way with implementation of HAMR technology in its Exos hard drives. Omdia validated that the Seagate Exos hard drives, powered by Mozaic technology, help organizations meet their sustainability goals by dramatically reducing both their use phase—power and cooling—and embodied—manufacturing, shipping, and disposal—IT carbon footprint.

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Conclusion

As AI/ML's significance continue to grow in organizations' business strategies, it's no surprise that these projects are so prominent in new storage initiatives. Building, maintaining, and evolving ever-expanding storage infrastructures continue to challenge even the most seasoned IT organizations. Yet the potential business benefits of getting it right have never been more exciting.

To address these challenges, extensible mass storage is more crucial than ever, and, with its Exos hard drives, powered by Mozaic technology, Seagate is delivering a breakthrough in areal density per disk that enables greater scalability, lower cost of ownership, and improved sustainability for less impact on the planet.

Omdia validated how Seagate Exos hard drives efficiently scale storage infrastructure, while optimizing cost of ownership and sustainability goals for organizations. The latest generation Exos hard drive platform increases capacity in the same footprint and can save up to 75% per TB in power and cooling consumption compared to legacy 10TB drives, while reducing cost of ownership by up to 83% compared to SSDs. Additionally, it helps organizations meet their sustainability goals by reducing their use phase and embodied IT carbon footprint.

As we look to the future, the capacity to store, access, and leverage large quantities of data will be integral to organizations looking to drive innovation. The Seagate Exos hard drive platform is driving the advancement of storage solutions toward the future to help organizations manage their ever-growing data. If your organization is looking to modernize its storage solution to gain the benefits of today's most highly scalable storage technology, you should consider Seagate Exos hard drives.

For more information on Seagate Exos hard drives, please visit: https://www.seagate.com/products/enterprise-drives/exos/. For more information on Mozaic technology, please visit: https://www.seagate.com/innovation/mozaic/.

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