Seagate Technology Holdings plc (STX)

It's HAMR Time

We are long shares of Seagate Technology Holdings, a leading supplier of hard disk drives (HDDs). HDDs hold almost 90% of the data residing in large-scale data centers, and as a result over 80% of Seagate's revenue is derived from high-capacity, high-performance drives sold into the major hyperscalers (Amazon, Google, Meta, and Microsoft) and enterprise server and storage OEMs. The prospects for massive, sustained data growth are undeniable, and the incremental storage demand driven by the AI wave has barely begun.

Already benefitting from these secular tailwinds and its position in a dominant duopoly, Seagate is executing a generational technology transition to heat-assisted magnetic recording (HAMR) that promises to supercharge density gains and company profitability. Due to the foresight of Seagate management, they are years ahead of primary competitor Western Digital and will thus be the disproportionate beneficiary as HAMR ramps. Seagate has qualified its first hyperscaler (Google), and we expect to hear additional announcements in the coming weeks. Robust HDD demand continues to outstrip supply, so the market is primed for HAMR products.

Seagate's initial 30TB HAMR offering will ramp in earnest over the next several quarters, but it's the company's next-generation 40TB product in 2026 that will really transform HDD unit economics. With a 33% capacity gain and a likely reduction in bill of materials, Seagate's 40TB products will dramatically expand gross margins as they slash the company's production cost per terabyte relative to its two HDD peers. By contrast, Western Digital doesn't expect to ship its first generation 36TB HAMR drive until at least 2027, which is still likely overly optimistic.

HAMR ensures HDDs will remain the optimal technology for the bulk of data center storage for at least the next decade. On a cost/TB basis, HDDs are currently 6x cheaper than flash memory-based solid-state drives (SSDs). Given HAMR-fueled density gains, a flattening of the flash cost curve, and the 9x greater capital efficiency of HDD manufacturing, the value proposition of HDDs is secure, which is why forecasters see little change in HDD deployments.

The industry operates in an effective duopoly, with third player Toshiba hopelessly behind on the technological and cost curve. Price wars are a thing of the past, and the players are increasingly judicious about adding supply. Customer supply agreements now provide multiple quarters of visibility and enable improved supply chain planning, and HDD makers demand a proper return for value delivered. Seagate's capital allocation has been tremendous for a long time – the company has returned over $8 billion to shareholders over just the past five fiscal years, and there are clear signs that future returns will grow further.

Despite being an obvious beneficiary of the AI and data center boom – the most powerful secular trend of our time – and a clear technology leader, Seagate shares trade at an inexplicable 11x 2026 earnings. The market is failing to anticipate the massive gross margin upside and resultant rich future cash generation. Seagate shares are ripe for a major re-rating and are a double or triple from current levels.

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I. Investment Highlights

The Age of HAMR is Upon Us. Technology transitions in the HDD industry are infrequent but highly impactful. Seagate is on the cusp of ramping its new products based on heat-assisted magnetic recording (HAMR) technology. HAMR promises to re-accelerate HDD bit density scaling, shift product cost curves down, and drive a period of sustained profitability improvement. Relative to the ~10TB average capacity of nearline drives in Seagate's installed base, HAMR drives offer 3x the storage capacity while consuming about 70% less power per terabyte. For the customer, higher storage density results in more data on a given server, enabling fewer racks and reduced floor space for a given capability, which reduces aggregate power, cooling, compute, and floor space costs. Seagate's first generation 30TB HAMR drive has been qualified at Google (which arguably runs the most demanding process), and at least one other hyperscaler qualification should be announced in the coming weeks. HAMR shipments ramp in earnest in 2H 2025.

The next generation 40TB HAMR drive, expected to ship in mid-2026, should transform Seagate's unit economics and result in material additional gross margin expansion. The dramatic 33% increase in capacity will be accompanied by a likely reduction in (or at worst flat) bill of materials, allowing Seagate to offer customers a superior cost/TB and generate the richest gross margins in the company's history. With HAMR technology already qualified and accepted as viable by customers, hyperscalers will rapidly embrace these products. We think HAMR will account for over half of total exabytes shipped by 2027 and that Seagate's 2026 and 2027 profit and cash flow will shock analysts.

Given the current robust demand environment and a rational HDD oligopoly, Seagate gross margins have already been rising for the past eight quarters (even in the March quarter despite a $200 million revenue shortfall due to an anticipated supply chain issue). HAMR will supercharge that trajectory.

Importantly, HAMR also promises to transform the competitive landscape. Seagate has been working on HAMR for twenty years, meticulously solving some of the industry's most difficult engineering challenges and developing the requisite manufacturing expertise to ensure successful productization. By contrast, primary competitor Western Digital at one point abandoned HAMR for an alternative technology (since de-emphasized), has already seen roadmap slippage, and is not expected to begin shipping its first generation 36TB HAMR product until sometime in 2027. And given WD's lack of demonstrated progress to date, we are skeptical of their ability to close the gap anytime soon. Thus, while WD is coming to market with what it admits is its final generation of products using the older PMR technology, Seagate stands alone as the HAMR technology leader, poised to capture market share and benefit from gross margin expansion for years to come.

Seagate is a Data Center and AI Play. Almost 90% of all data stored in the cloud resides on HDDs, and the world is increasingly generating and deriving greater value from massive datasets and high-density video content. It is mindboggling to think that some of the most data-intensive applications, such as IoT sensors, video content and security, smart cities, and

autonomous vehicles, are still in their relative infancy. The coming exponential growth of data will require zettabytes of low-cost enterprise-grade storage. Revenue from the major hyperscalers represents an estimated 40%-50% of Seagate revenue, and well over 80% of exabytes are shipped in the form of high-density, high-performance HDDs targeting these growth applications.

And we haven't even mentioned the impact of AI. Many in the industry have struggled to try to size the impact of AI on storage demand, but the consensus is that it will be huge. High performance SSDs are central to model training and deployment (inference) to fully utilize expensive compute resources. But HDDs play a key role in storing massive datasets and saving interim model versions (checkpointing), and they will inevitably be the primary storage destination for model outputs and new content generated. Seagate has noted that, in just 1.5 years from 2022 to mid-2023, AI created 15 billion images, and, by 2028, image and video creation with AI models will grow 167 times. HDDs excel at this type of large object storage. AI training data is also retained on HDDs for the benefit of reanalysis by more powerful systems in the future. Ultimately, AI will utilize and produce tremendous amounts of data, and it will be a boon for both SSDs and HDDs.

HDDs Will Remain the Low Cost Per Terabyte Solution For a Very Long Time. Tech forecaster IDC predicts HDDs will continue to comprise almost 80% of storage used in hyperscale and cloud data centers through 2028. The main reasons are their dramatically lower cost/TB relative to flash drives and the practical reality that the vast bulk of storage is earmarked as "warm" or "cold" because it is accessed less frequently and less sensitive to latency concerns. SSDs are currently about 6x more expensive than HDDs on a cost/TB basis. IDC and others fully expect this price premium to persist, because the massive increase in areal density offered by HAMR technology will enable continued declines in HDD cost/TB, while the flash cost curve is potentially about to flatten. Additionally, the HDD industry is almost 90% more capital efficient than the flash industry, meaning they spend far less on capital equipment to grow their exabyte production capacity. The idea that the flash industry will choose to spend over $200 billion on the fab capacity required to displace HDD exabyte demand is laughable.

The HDD Industry is an Oligopoly. The HDD industry structure has never been so attractive. Through consolidation, the sector has been whittled down to an effective duopoly going forward. Number three player Toshiba is still used as a price cudgel by the hyperscalers, but their lack of vertical integration and history as a technology follower mean that they will almost certainly be an also ran as it regards HAMR. The new industry practice of seeking long-term supply agreements with its customers has given Seagate newfound demand visibility and enhanced its ability to manage its supply chain. More important has been the change in tone from managements, with Seagate and Western Digital focused on receiving due compensation for value delivered and maintaining stable and attractive profitability.

The AI Supercycle Could Delay the Next Cyclical Peak Until 2030. We think the sector's supply discipline, improved visibility, and rational competitive behavior can dampen deleterious business volatility when the industry hits its next downcycle. However, as we remain in the early innings of a data generation and AI supercycle, we believe that the industry's cyclical peak is

many, many years away. Seagate's last cyclical peak, defined as the last quarter before sequential exabyte growth turned negative, was in the June 2022 quarter. That cycle began in September 2019, translating to a cyclical upturn of three years. With AI poised to revolutionize much of global business, we anticipate the current cyclical upswing, which began a year ago in the June 2024 quarter, will be double the size of the last upturn. With a cyclical peak potentially as far away as 2029-2030, Seagate is poised to witness a lengthy runway of revenue growth.

Importantly, current Street consensus revenue projections for Seagate assume an industry downcycle sometime in 2026 to 2027. This is despite the complete absence of any evidence of demand slowdown. A delay in this cycle's peak by two years, in combination with HAMR-fueled growth and margin expansion, sets up Seagate for a period of sustained financial outperformance, both on the top line and particularly with gross margins, a focus metric historically. For fiscal 2027 (FYE June), we model Seagate exceeding consensus revenue and gross margins estimates by 25% and 456 basis points, respectively. This should catalyze significant share price appreciation.

HAMR Will Drive Expanded Capital Returns. Seagate has an impressive history of generating 30-40% returns on invested capital and returning significant amounts of cash to shareholders. In fact, Seagate annually pays out over $600 million in dividends and, in the decade prior to the post-COVID downturn, spent an average of $1.2 billion annually on share repurchases. Moreover, the company is largely expanding effective production capacity through areal density gains as opposed to massive incremental capital expenditures. Seagate management has also demonstrated sound financial management and stewardship of corporate resources, staying lean during upturns, remaining profitable during downcycles, and only pursuing selective, scale-enhancing M&A within its technology wheelhouse. Powered by HAMR-driven revenue growth and margin expansion and benefitting from a working capital normalization following the initial HAMR ramp, Seagate could generate over $8 billion in free cash flow over the next three fiscal years, spurring a re-initiation of massive share repurchases and substantial returns of capital to shareholders.

Seagate is Insulated From Tariff Issues. We see little risk of direct disruption to Seagate's business from the ongoing trade disputes and tariffs. Like many semiconductor products, HDDs have been included on exempt product lists, and most every category of technology hardware has been granted a reprieve from steep reciprocal tariffs. At the same time, despite being a key AI enabler, HDD sales to China have not become politicized like advanced processor technology or semiconductor capital equipment. Seagate fabricates drive heads in the US and Ireland and performs most drive assembly operations in Thailand and Malaysia, with separate operations in China to service local demand. Western Digital has a similar footprint, meaning neither company has an inherent advantage. Much of hyperscaler server assembly is performed by Taiwanese ODMs, many of which have significant Mexican operations that are currently insulated from tariffs on such products. In addition, we believe there are tariff escalators in Seagate's long-term customer supply agreements and that the company would be able to pass along any increased costs to its customers should the situation worsen. Seagate management said it expects minimal financial impact on June quarter financials from tariffs.

It's Hard to Imagine a More Catalyst-Rich Set-Up. We see a plethora of potentially impactful stock catalysts over the next six to nine months as the HAMR story unfolds, including:

- The company's May 22nd investor day, its first since September 2019. We expect to hear about (1) additional hyperscaler qualifications of HAMR, and (2) an upward revision of the company's long-term target financial model, which should include material upside revision to target gross margins.
- The company's June 2025 earnings report, which should include (1) more HAMR qualifications, (2) an update on the HAMR volume ramp, and (3) evidence of a recovery in the video and imaging segment that suffered seasonal weakness in the March 2025 quarter.
- Initial FY2026 financial guidance, which will say a lot about the shape of the HAMR adoption curve and potential cyclicality.
- Execution on guided QoQ growth in revenue, gross margins, non-GAAP net income, and free cash flow throughout the year, which shouldn't be a problem to deliver given Seagate's capacity is essentially booked through the end of the year.
- Upward revision of the dividend at the October Board meeting.
- The release and commencement of qualification for the highly awaited 40TB HAMR product late in the year.
- Resumption of share buybacks in the first half of 2026, if not sooner.

Seagate Isn't Getting Sufficient Credit For Its Demand Drivers or Cash Generation; We See a Structural Re-Rating on the Horizon. Trading at a paltry 11x 2026 P/E, Seagate is notable for receiving little meaningful valuation benefit despite being nearly fully exposed to and a key enabler of the technology investment themes of the century: cloud computing and AI. We believe the stock has suffered from a lack of thoughtfulness regarding comparable company and valuation methodologies. HAMR-driven technology leadership and explosive gross margin expansion underpin a powerful bull thesis. Our proposed universe of defensible peer companies yields median 13x EV/EBITDA and 18x P/E multiples which, applied to our Seagate CY2026 forecasts, implies 96% and 80% stock price upside, respectively. Moreover, giving Seagate due credit for its highly cash-generative model, our discounted cash flow analysis suggests over 130% upside. We fully expect Seagate shares to experience a re-rating, as investors embrace the promise of HAMR and acknowledge the power of the company's competitive position and underlying financial model.

Share Price Upside Implied by Valuation Methodologies		
Methodology	**Price**	**Upside**
Discounted Cash Flow Analysis	$250	137%
Comparable Company Analysis	$198	88%
Average	**$224**	**113%**

Source: S&P Capital IQ, Kerrisdale analysis

II. Company Background

Seagate Historical Non-GAAP Financials, Consensus Estimates, and Valuation

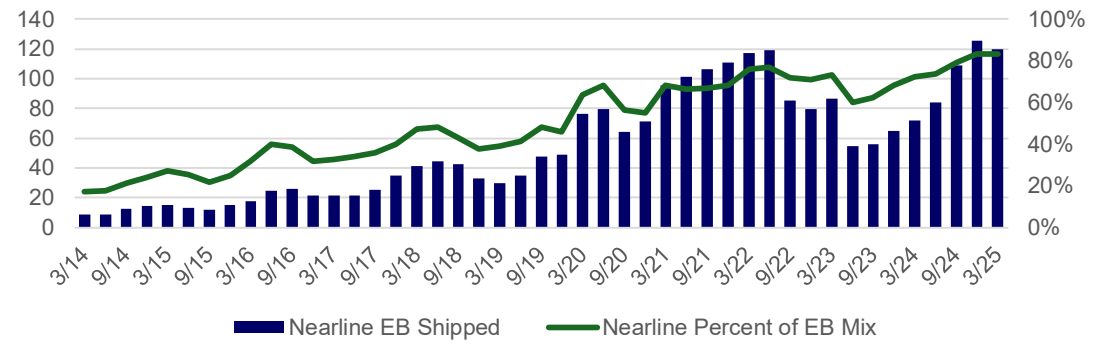
(FYE June; $ in millions except per share figures)

Valuation			2021	2022	2023	2024	2025E	2026E	2027E
Stock Price (as of 5/14/25)	$105.19	Revenue	$10,681	$11,661	$7,384	$6,551	$9,054	$10,128	$10,256
Shares Outstanding (1)	212	*YoY Growth*		*9%*	*(37%)*	*(11%)*	*38%*	*12%*	*1%*
Dilutive Shares (2)	3	EBITDA	$2,021	$2,562	$889	$915	$2,326	$2,981	$2,978
Fully Diluted Shares Out.	216	*Margin*	*19%*	*22%*	*12%*	*14%*	*26%*	*29%*	*29%*
Market Capitalization	$22,681	Net Income	$1,381	$1,833	$40	$272	$1,691	$1,980	$2,055
Cash	814	*Margin*	*13%*	*16%*	*1%*	*4%*	*19%*	*20%*	*20%*
Debt	5,146								
Enterprise Value	$27,013	EV/EBITDA					11.6x	9.1x	9.1x
		P/E					13.4x	11.5x	11.0x

(1) From cover of 10-Q dated 5/2/25
(2) Includes 3.4m unvested RSUs; excludes shares issueable related to 2028 exchangeable notes due to capped call transactions
Source: Seagate SEC filings, S&P Capital IQ, Kerrisdale analysis

Seagate was founded by data storage pioneer Alan Shugart in 1978. After inventing the 5.25-inch hard disk drive (HDD) for the emerging personal computer market in 1980, the company went public in 1981. The rise of PCs drove two decades of growth and Seagate's emergence as a global leader. The early 2000s brought structural change and technology shifts. Seagate was taken private and merged with Veritas Software in a transaction led by Silver Lake and Texas Pacific Group, only to return to the public markets in 2002. Longtime CEO and skilled operator Steve Luczo managed Seagate through two technology inflections, namely the rise of flash memory packaged into solid-state drives (SSDs) and the emergence of cloud computing. Unlike peer Western Digital (WD), Seagate made only small investments in technology for flash-based solutions, opting instead to consolidate the HDD business with the billion-dollar acquisitions of Maxtor (2005) and Samsung's HDD unit (2011). Today, Seagate is almost entirely exposed to and driven by cloud computing demand. Exabytes shipped in the form of nearline drives, high-capacity and high-reliability products built for 24/7 availability but less frequent access, have grown at a 24% 10-year CAGR and now account for 83% of total shipments. As a result, Seagate's largest and most important customers today are the major hyperscalers: Amazon, Google, Meta, and Microsoft. The remainder of nearline exabyte shipments target enterprise OEM systems and video and imaging applications (VIA).

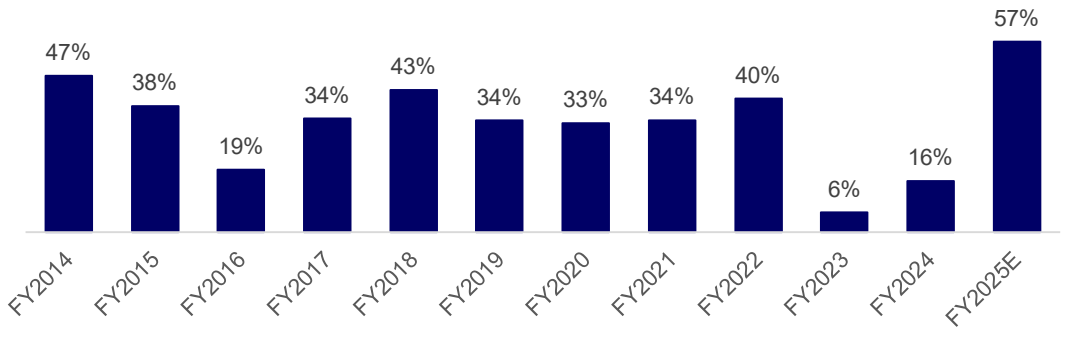
Nearline Drives Have Come to Dominate Seagate's Exabyte Shipment Mix



Source: Seagate

Seagate has an impressive history of generating attractive returns on invested capital well above most major technology hardware companies.

Seagate Historical and Projected Return on Invested Capital



ROIC defind as EBIAT / average (total assets - cash - current liabilities - other liabilities)
Source: Seagate SEC filings, Kerrisdale analysis

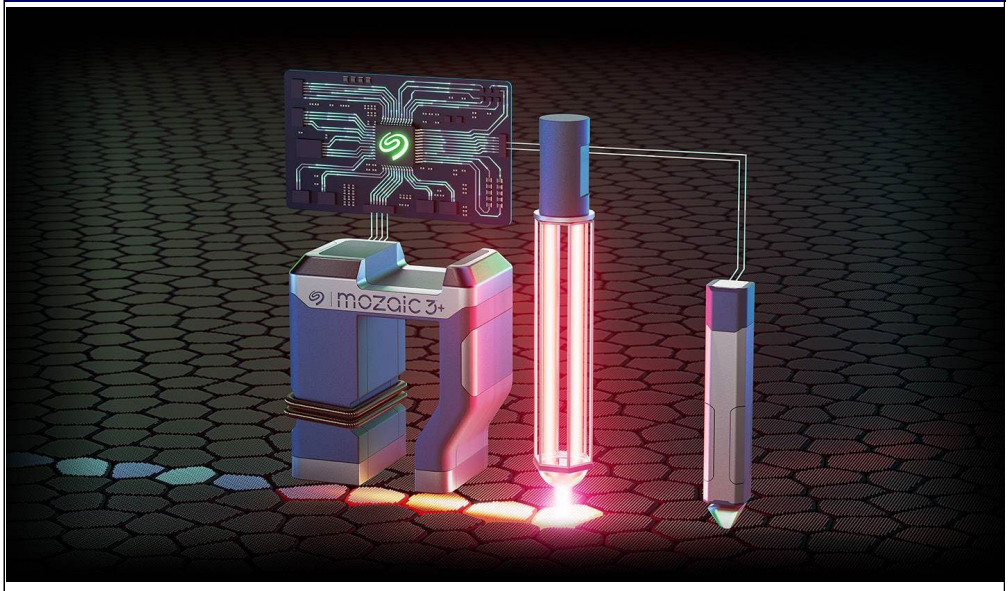
III. HAMR Heralds a Golden Age

HDDs are a marvel of materials science and mechanical engineering. Ultra-thin atomic layers of magnetic recording material, traditionally cobalt-chromium-platinum (CoCrPt), are deposited on a blank platter. Tiny individual grains are grouped and magnetized in different polarity directions by the read/write head, a component manufactured through a wafer fabrication process similar to that of semiconductors. Due to sensitivity limitations, the change in magnetic orientation between groups (as opposed to the specific polarity of a single group) represents either a 0 or 1 binary digit, allowing data to be stored. These groups are organized into tracks and sectors on the disk. The head flies only a few nanometers above the platter while a motor spins the disk at 7,200 rpm. HDD suppliers have employed two key techniques in their relentless march to increase storage density: increase the number of platters in the drive and improve areal density, or the number of bits stored per square inch. The first approach has physical limitations, as only so many disks (typically ten) can fit inside the standard 3.5-inch form factor drive. Thus, most of the industry's focus has been on scaling areal density, either by increasing the bits per track or the tracks per platter. One stopgap technology approach as an alternative to conventional magnetic recording (CMR) has been the implementation of shingled magnetic recording (SMR), which partially overlays tracks on the disk so that more data can be written to a given space. While effective at increasing density, usually on the order of 10-20%, SMR sacrifices write performance since any overlapping tracks need to be re-written elsewhere to accommodate new content. Existing perpendicular magnetic recording (PMR) technology has reached its practical grain size limit, enabling roughly 1 TB/in², below which the grain's magnetic polarity is unstable and information cannot be stored reliably.

Seagate began developing a new technology, heat-assisted magnetic recording (HAMR), over 20 years ago. HAMR involves using a nanophotonic laser to heat the platter surface to the Curie

point (about 450 degrees Celsius) for a nanosecond before the head passes over in order to reduce the coercivity of the grains, increasing their sensitivity to the magnetic field created by the head and thus using fewer grains to store one bit. Compared to PMR, HAMR can reduce the bit regions to enable a massive step function increase in density to at least 4 TB/in². Implementing HAMR required numerous fundamental technology innovations. Head development for HAMR represented arguably the biggest materials science challenge the industry has ever faced, since the head needs to withstand the higher energy density from the concentration of laser energy being focused on the media. In addition, a plasmonic near-field transducer (NFT) that focuses the laser energy must control the size of the heat bubble generated in order to minimize track width while avoiding adjacent track corruption, and the design has to address new chemical reactions that occur at the interface between the head and media surface. And both the laser and NFT need to be integrated into head assemblies that are just a few square millimeters in size. HAMR also required the switch from aluminum, favored for its low vibration, to glass platters to improve durability, as well as the development of a new iron-platinum (FePt) alloy for the magnetic layer. Beyond raw technology innovation, Seagate faced the massive challenge of productization: the ability to achieve low-cost, high-yield manufacturing at scale. Moreover, Seagate's major hyperscaler customers needed to expend significant time and resources to qualify the new technology, as any new drive architecture comes with new types of product issues or failures that need to be identified, understood, and resolved. As a result, HAMR qualification stretched from the typical 3-6 months to years.

Depiction of Seagate HAMR Read/Write Head



Source: Seagate

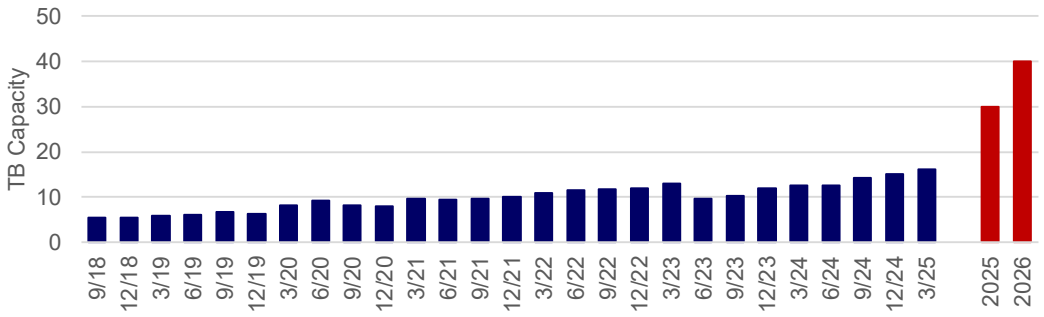
Naturally, given the complexity of the engineering problems that needed to be solved to make HAMR a reality, Seagate's effort has been marked by delays. But now the technology is here, qualified, being shipped and already operating in data centers. HDD technology transitions are powerful, as step function changes in density will shift cost curves down and enhance margins. For example, after Seagate led the industry's last major transition, from longitudinal magnetic

recording (LMR) to PMR, the company saw about 600 bps of gross margin expansion that opened up a near 800 bps advantage relative to competitors from mid-2006 through late 2007.

The HAMR Ramp: It's Going to Be Real and Spectacular

The implications of HAMR are enormous. Relative to the ~10TB average capacity of nearline drives in Seagate's installed base, each data center slot loaded with one of its HAMR Mozaic 3+ drives offers 3x the storage capacity in the same data center footprint and consumes about 70% less power per terabyte. For the customer, higher storage density results in more data on a given server, enabling fewer racks and reduced floor space for a given capability, which reduces aggregate power, cooling, compute, and floor space costs.

Seagate Historical Quarterly Mass Capacity Average TB Density vs HAMR Near-Term Roadmap (CMR)



Source: Seagate, Kerrisdale analysis

Seagate's initial HAMR products received their first major hyperscaler qualification, widely acknowledged to be Google, in December 2024. While the process took longer than expected, Google has arguably the most rigorous and demanding qualification process among its cloud peers, subjecting HDDs to some of the harshest operating environments. The lengthy Google qualification should enhance confidence in Seagate's HAMR products and the company's likelihood of achieving successful qualification at other hyperscalers. In fact, Seagate has stated that additional hyperscaler qualifications are imminent, and it is likely that at least one of these new qualifications will be announced at the company's planned May 22nd investor day. The company has also qualified HAMR at several customers that span other nearline market segments, such as enterprise and video and imaging applications. Specifically, Dell and Dropbox executives have been effusive in their praise of HAMR's potential. Seagate has also indicated that it has begun HAMR qualification with major Chinese cloud companies. Of note, we expect subsequent qualification periods for higher capacity points will revert to the traditional 3-6 month time frame.

Initial HAMR volumes began ramping in 1H 2025. Seagate recently disclosed for a March WSJ article that two large cloud providers have each ordered an exabyte worth of HAMR drives, equating to over 65,000 units assuming an initial 30TB capacity. But it is the major hyperscalers that will drive the HAMR adoption wave, as they are Seagate's largest customers and those most sensitive to minimizing cost/TB by moving to higher densities. Seagate expects hyperscaler demand to ramp through 2H 2025 and reach meaningful scale in 1H 2026. As a

result, we estimate that HAMR will account for 18% of exabytes shipped in FY2026 and 55% in FY2027.

Kerrisdale HAMR Ramp Assumptions						
	FY2025E	FY2026E	FY2027E	FY2028E	FY2029E	FY2030E
EB Shipped	8	142	585	1,084	1,421	1,363
YoY Growth	-	1760%	310%	85%	31%	-4%
% of Total	1%	18%	55%	80%	85%	90%
Average Price/TB	$ 12.50	$ 11.47	$ 10.25	$ 9.50	$ 8.50	$ 7.75
Revenue ($M)	$ 96	$ 1,634	$ 5,994	$ 10,300	$ 12,081	$ 10,565
YoY Growth	-	1607%	267%	72%	17%	-13%
% of Total	1%	15%	47%	72%	77%	82%
Average TB	30.5	33.4	38.0	43.0	47.0	52.0
Implied Units (M)	0.3	4.3	15.4	25.2	30.2	26.2
Gross Margin	38%	43%	48%	48%	48%	47%

Source: Kerrisdale analysis

Seagate's initial HAMR product is a ten-disk 30TB drive, but this first-generation product is largely a proof of concept, and there is no technical reason for HAMR scaling to not progress rapidly. Seagate is moving quickly to higher incremental disk capacities, having already announced the release of 32TB CMR and 36TB SMR products.

The move from PMR to HAMR adds two primary incremental costs. The first is the cost of the lasers, which we believe will add $0.50 to $1 per device. Assuming a standard ten-disk drive, which has two heads per platter, the incorporation of lasers represents an incremental $10-20 of COGS per drive. In addition, HAMR drives require the deposition of additional and more costly metal layers, which will add marginally to costs. Seagate management has repeatedly stated that HAMR products will be accretive to gross margins, but without much specificity as to the reference point or time period. The initial 30TB product is unlikely to offer much gross margin accretion near-term versus the HDD average. That's because the 30TB product will have relatively lower yields in the early stages of its production ramp. Moreover, given the smaller commercial window for the first generation of HAMR products, due to extended qualifications and the company's continued development of next-generation drives, Seagate's primary focus is getting it qualified, accepted, and valued by customers rather than achieving full cost optimization.

HAMR Drives Material Gross Margin Uplift at 40TB

The move to 4TB/disk 40TB products – expected to be released in late 2025 and ramp in 2H 2026 – is where the transformational economics of HAMR will be most evident. As 40TB products ramp and HAMR comprises a growing portion of Seagate exabyte shipments, we anticipate a dramatic expansion in company-level gross margins. The potential for HAMR to catalyze new levels of profitability remains underappreciated and is a critical element of our bullish investment thesis on Seagate shares.

Illustrative Improvement in HDD Unit Economics Moving From PMR to HAMR			
Metric	**24TB PMR**	**30TB HAMR**	**40TB HAMR**
TB Capacity	24	30	40
Estimated Price/TB	$15.00	$13.00	$11.00
Implied Drive ASP	$360	$390	$440
Estimated Gross Margin	40%	38%	48%
Implied Gross Profit	$144	$148	$211
Implied COGS/Unit	$216	$242	$229
Implied Cost/TB	$9.00	$8.06	$5.72
Change			
COGS/Unit		$26	-$13
Price/TB		(13%)	(15%)
Cost/TB		(10%)	(29%)
Source: Kerrisdale analysis			

Seagate will have a dominant leadership position in drive capacity and cost/TB when it releases its 40TB HAMR product in late 2025. At that time, Western Digital will still be ramping its 32TB ePMR drive. When Seagate begins shipping 40TB HAMR drives in 2H 2026, WD may still be a year away from ramping its initial 36TB HAMR product. Seagate's capacity, and thus cost/TB, leadership, coupled with the market's acceptance of its implementation of HAMR technology, should result in a highly attractive pricing environment, and the 10TB jump in capacity translates into meaningfully higher revenue per drive.

Yet, despite the 33% increase in capacity, the 40TB HAMR drives should see a slight decrease in the bill of materials as compared to the 30TB HAMR drive. With the benefit of process maturation and the company's plan to monolithically integrate the laser into the head (reducing reliance on current supplier Sony), Seagate can drive cost reduction. In addition, Seagate should be able to fully leverage its full menu of cost optimization actions as 40TB products ramp. This should result in significant gross margin improvement even after sharing some portion of the cost/TB reduction benefit with customers. Note that Seagate isn't alone in calling for high HAMR gross margins, as WD has stated that its HAMR products could exceed 38% even in the event of an industry downturn.

Seagate's 40TB drives are currently in advanced development and expected to be released and begin customer qualification later this year, meaning they could begin ramping by mid-2026. While Seagate is riding a wave of profit maximization, Western Digital in contrast will be sparing no expense to ensure that its first generation HAMR product is viable.

Additionally, extending HAMR technology to lower capacity applications outside the data center transforms the margin profile for those segments as well. For example, a 20TB application that used to require ten 2TB disks will be replaced with a HAMR enabled drive that has just five 4TB disks, representing material cost savings, as media costs typically represent 20-25% of HDD bill of materials. Seagate has indicated that, should they enjoy a material areal density advantage as expected, they may let competitors offering higher cost legacy configurations set prices for such products, thereby allowing the company to capture premium margins in these applications. Seagate should begin targeting these applications with HAMR in 2026 after they scale HAMR to high volume with hyperscaler demand.

HAMR doesn't stop there. Seagate is already demonstrating 6TB/disk capabilities in its labs, giving the company high confidence it has clear line of sight to 60TB+ drive capacities with existing technologies, meaning that the primary gating factors come down to process maturation as opposed to the need to invent new technology. Longer term, assuming typical scaling advancements (which may require some new developments in media patterning), the industry sees HAMR scaling drive densities up to 100TB, thus extending the HDD technology runway for at least another decade before an alternative technology will need to take up the banner.

HAMR Can Shift the Competitive Landscape in Seagate's Favor

The different HAMR technology strategies of Seagate and Western Digital will someday make for a great business school case study. Despite acknowledging the scaling limitations of existing PMR technology, WD pursued the strategy of extending its life through a variety of enhancements rather than fully embracing HAMR. WD developed its energy-assisted "ePMR" technology, which uses an electrical current to create an additional magnetic field to facilitate improved write head performance. WD also placed heavy focus on shingled magnetic recording (SMR). We would argue that, at a given capacity with all else equal, a CMR HAMR drive is better than an SMR drive, as we have heard that some hyperscalers are less interested in deploying SMR drives due to the write performance penalty. WD also implemented its OptiNAND technology, which offloads drive management functions to embedded flash memory to free up disk space for storage, which was a reasonable approach at the time given WD had spent $18 billion on SanDisk to acquire a captive flash business. Future benefits from the incorporation of flash may be harder to capture, or at the very least more expensive to implement. WD also addressed the scaling challenges of PMR by adding an eleventh platter, an approach that both increases costs and power consumption. While these efforts represented a more cost-effective migration path to incrementally higher drive capacities, they have reached their limit, as WD has announced that its current 28TB CMR and 36TB SMR drives will be its final generation of PMR products.

While yielding HAMR leadership to Seagate may have temporarily delayed Western Digital's investment burden and resulted in some market share gains, it was a strategic misstep. WD's decision to focus on technologies other than HAMR has led to a material technological gap between it and Seagate. As shown below, based on each company's stated plans, Seagate will continue to expand its lead over WD, even ignoring WD's checkered history with HAMR development.

Seagate Should Have a Capacity and Time-to-Market Lead Based on Announced Timelines

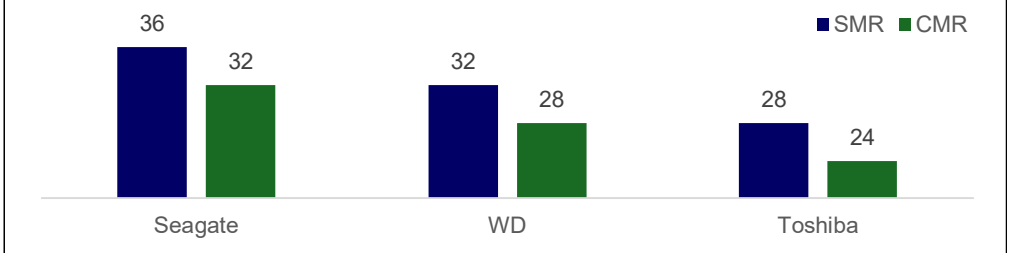
Seagate		Western Digital	
Current	Multiple hyperscalers qualifying HAMR	Current	Have 2 hyperscale cutomers "testing" HAMR
1H 2025	Begin 30TB+ HAMR volume ramp	Q1 2025	Complete 32TB ePMR qualification
Mid-2025	Qualify additional major hyperscalers		
Late 2025	Release 40TB HAMR product	2H 2025	32TB ePMR ramp to 1m units/quarter
1H 2026	Complete 40TB HAMR qualification	1H 2026	Complete 28TB CMR/36TB ePMR qualification
2H 2026	Begin 40TB+ HAMR shipments	YE 2026	Complete 36TB CMR/44TB UltraSMR HAMR qualification
2H 2027	Sample 50TB HAMR product?	1H 2027	Begin HAMR volume shipments

Source: Seagate, Western Digital, Kerrisdale analysis

WD also spent years on HAMR research. But after initially touting HAMR's potential, WD pivoted to microwave-assisted magnetic recording (MAMR) from roughly 2017 to 2020. This wrong turn may have been evidence that WD struggled with the innovation required to successfully implement HAMR. However, the MAMR grass was not greener, and WD gradually ceased referencing the technology and turned its attention back to HAMR. Seagate has been criticized for slippage in its HAMR roadmap, but WD has also failed to meet stated goals. For instance, at the BAML conference on 6/6/23, WD CFO Jabre stated that they were "1 year to 1.5 years plus" away from volume production, implying by year end 2024. By contrast, at its recent investor day, WD updated its HAMR timeline, stating its goal was to achieve volume production of a 36TB product in 1H 2027. We would not be surprised if WD's HAMR development and qualification took even longer than expected. Unlike Seagate, who strategically transitioned to glass platters years before HAMR productization in order to refine its production processes, we believe WD has yet to make such a transition in volume. It took Seagate three years to take HAMR from an R&D ready disk to production, and we believe WD has yet to achieve this milestone. In addition, integration of the laser into the head presented clear challenges for Seagate that shouldn't simply be dismissed. Add to that a lengthy qualification process, and we suspect WD is unlikely to meet even their revised HAMR timing. As a result, Seagate could have a technology lead of two years or more.

The hyperscalers are heavily influenced by total cost of ownership (TCO) math. Given Seagate's growing density advantage and the concomitant reduction in cost/TB, coupled with the reality that the industry has long maintained an approximate 40/40/20 share mix among the HDD vendors, it is reasonable that HAMR could drive at least a 5% share shift in Seagate's favor. And the record shows that the hyperscalers have sole sourced in the past when justified by comparative advantage, first with WD's introduction of helium-filled drives and then with Seagate's dual actuator products. Seagate has already retaken the areal density lead, as its current 3.6TB/platter is 24% higher than WD's 2.91TB/platter and 29% higher than Toshiba's 2.8TB/platter (all SMR).

HDD Manufacturer Current Maximum TB Capacities



Source: Blocksandfiles.com

Toshiba faces even greater challenges. It generally sells less advanced, lower performing drives, and is less vertically integrated, making the company unable to control its own destiny with HAMR development. It has historically been used as a pricing cudgel by the hyperscalers to counteract the oligopoly power of the big two, for which Toshiba has received 10-20% market share in return. Toshiba hasn't updated its HAMR roadmap since 2022 and will almost certainly

be last to market with HAMR, which should enhance Seagate's relative pricing power for an extended period of time.

By taking a leadership role in HAMR, Seagate has been first to discover and solve the various challenges of productizing the technology in high volumes. We suspect these insights are what drove the company to acquire thin film deposition company Intevac in a transaction that closed March 31st. Intevac's sputtering systems are used to apply ultra-thin layers of material on platters to create magnetic layers with high uniformity and fewer defects, which are key enablers for improving areal density. As much as 65% of the world's disk output is made using Intevac tools. The acquisition may signal Seagate's confidence in its HAMR manufacturing roadmap. The transaction may also restrict competitor access to technology important for HAMR development.

The Future of HDDs

With the shift to HAMR complete, the fundamental enablers of further areal density gains are well understood. While the absolute TB capacity gains seem large compared to the meager mid-single-digit gains PMR was eking out, HAMR promises to accelerate areal density gains to a 15-20% CAGR. Seagate has high confidence in the roadmap to 60TB, and incremental innovation should take HAMR to 100TB over the next decade.

Even as HAMR solidifies the value proposition of hard disk drives, Seagate and the HDD industry are already working on what comes next. It is widely anticipated that the industry will next adopt heated dot magnetic recording (HDMR) in the mid-to-late 2030s to achieve capacities over 100TB. Traditional methods have grouped multiple grains to represent a bit and have thus been reliant on grain size miniaturization, but bit-patterned media seeks to store 1 bit with a single magnetic grain. The IEEE predicted in 2023 that the use of patterned media will be combined with HAMR technology to achieve 10 TB/in² areal density within the next 15 years, which compares favorably to the ~2.6 TB/in² for a 40TB HAMR drive. Seagate is driving other innovations that could facilitate this next revolution in HDD technology. For example, in a 2024 paper, Seagate and Japanese researchers demonstrated a proof of concept for a multi-layer recording method that used HAMR technology to write each pass at a different Curie temperature, which could double or triple existing drive capacities. Finally, there are efforts underway to explore the use of DNA for data storage: Seagate partner CATALOG recently announced a proof of concept. In short, the HDD industry isn't going anywhere.

IV. HDDs Are a Data Center and AI Growth Story

Riding the Data Wave

IDC estimates that global data generation will grow from 132ZB in 2023 to 394ZB in 2028, representing a 2023-28 CAGR of 24%. Numerous highly data-generative applications such as IoT sensors, video security, and smart automobiles are just beginning to ramp. For example, Kaleido Intelligence estimates that smart cities will produce 143PB of data per day by 2027, and

IoTforall estimates that a single self-driving vehicle can generate up to 20TB per day. It is estimated that only 2% of data generated today is stored, but as the value of AI is recognized and the technology is applied to an ever-increasing array of datasets, it is logical that this figure will expand in the future, further accelerating the need for low-cost bulk storage capacity. And the practical reality is that the prospect of using massive datasets for AI means that "old" data retains value and that retention periods are only growing. Just considering the data storage requirements of a few major applications is staggering. About 3.7 million videos are uploaded daily to YouTube. 95 million photos and videos are shared daily on Instagram. 625 million videos are viewed every minute on TikTok. Most, if not all, of this information is stored on HDDs and will live in perpetuity. Finally, given its ability to drive superior engagement, high-capacity video content now represents over half of internet traffic and will likely see continued strong growth. As a result, IDC sees nearline HDD exabyte shipments growing at a 23% CAGR from 2024 to 2028, with AI uplift contributing about 800bps of that growth.

AI "Should" Supercharge Data Growth

It seems relatively intuitive that AI will create a massive cycle of data consumption and generation that magnifies demand for low-cost storage. On the front end, HDDs play a crucial role in storing the massive archives of raw data and content that represent the essential fuel for AI engines. SSDs are primarily used for data preparation, ingestion, and model training, as their high performance is required to ensure full utilization of expensive compute resources (GPUs, the star of the show). However, HDDs play a little recognized role during model training: checkpointing or snapshotting, the process of saving periodic model versions for fault tolerance, model debugging, model evaluation, and to allow the restoration of the model to any previous version. This is critical, since Alibaba once disclosed a 43% failure rate for LLM training tasks. Increasing model sizes drives higher failure probabilities, requiring more frequent checkpointing and commensurately larger storage requirements. Although high performance SSDs are central to model deployment (inference), model outputs and new content generated will primarily be stored on HDDs. Seagate has noted that, in just 1.5 years from 2022 to mid-2023, AI created 15 billion images, and, by 2028, image and video creation with AI models will grow 167 times. Finally, AI training data is also retained on HDDs for the benefit of reanalysis by more powerful systems in the future. A recent survey of storage buyers by Recon Analytics highlights the strategic importance of storage in the age of AI.

Findings From Recon Analytics November 2024 Survey of Storage Infrastructure Buyers (n=1,062)
- 61% expect AI storage requirements to at least double by 2028
- Storage ranks as the second most important component of AI infrastructure, behind only security
- 90% believe longer data retention improves the quality of AI outcomes
- 73% say AI training is driving increased data storage
Source: Recon Analytics

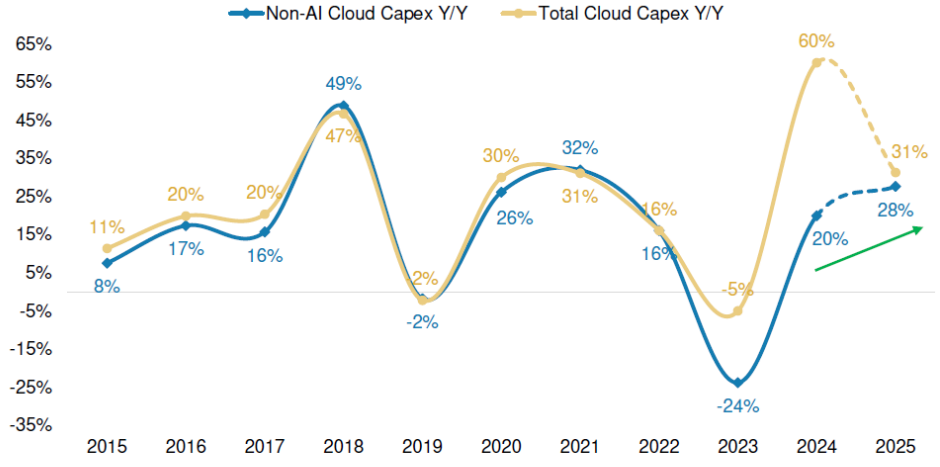
While much of the focus of AI model training to date has centered on text or quantitative data, the next stage of the AI revolution will involve the application of AI on images, video, and audio. This "multimodal" approach holds the promise of giving AI, like humans, the ability to process different sensory modes to enhance generative intelligence. First available in GPT-4 in 2023,

the market for multimodal AI is poised for strong growth given its ability to deliver more advanced reasoning, problem-solving, and higher value insights that data alone cannot deliver. For example, applications involving the analysis of healthcare imaging, autonomous driving, industrial robotics, or security video footage analysis could offer strong returns on investment and revolutionize big data analytics. Not only are these data file sizes large, requiring more aggregate storage capacity to accommodate, but HDDs excel versus flash for this type of large file-size object storage. According to a forecast from Bloomberg Intelligence, IDC, eMarketer, and Statista, by 2032, the AI storage market is projected to reach $92 billion.

New Data Center Construction is a Primary HDD Demand Driver

We believe about 70% of nearline HDD demand is generated by new hyperscaler data center openings. As Morgan Stanley research has noted, there is a 0.73 correlation between Seagate mass capacity revenue YoY growth and cloud data center YoY capital expenditure growth. Based on recent data center build cycles, we expect a large number of new facilities to come online in 2H 2025, and the equipping of these facilities should support nearline HDD demand. Despite DeepSeek related concerns about AI spend and widely published fears of data center digestion at Microsoft and Amazon, Street projections for cloud capital expenditures only increased in the wake of March quarter earnings reports. In response to surging AI demand, the five hyperscalers are expected to more than double their quarterly capital expenditures from the end of 2023 through 2026, with total spend over that period approaching $1 trillion. Thus, there is no evidence of a slowdown.

Top Ten Cloud Provider YoY Capital Expenditure Growth



Source: FactSet, Morgan Stanley Research estimates. Note: Non-AI cloud capex = cloud capex - AI GPU/ASIC revenues from NVDA/AMD/INTC/AVGO/MRVL.

Source: Morgan Stanley as of 4/23/25

There is also a material replacement cycle for HDDs, as drives typically have five-year service lives, and hyperscalers are continuously replacing dated IT infrastructure with newer, more powerful, and higher storage density equipment in order to optimize their physical footprint. This means that equipment first deployed during the Covid-era cloud craze is facing replacement. As evidenced by the Morgan Stanley data above, hyperscaler storage spend is likely to see a

period of catch-up activity after several years of relative underinvestment due to the myopic focus on adding compute resources during the GPU craze.

V. HDDs Have a Bright Future

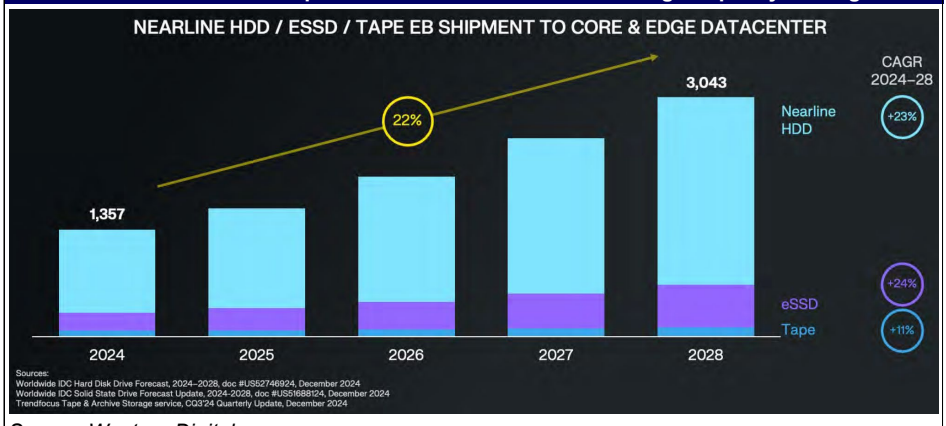
HDDs' Cost/TB Advantage Preserves the Undeniable Logic of the Storage Pyramid

The storage pyramid is a conceptual model that organizes data storage requirements based on the often-conflicting parameters of speed, access frequency, cost, and capacity required. Data centers are designed employing this logical tiering of storage, whereby performance-sensitive "hot" data requiring faster or more frequent access is stored on expensive SSDs, and the massive stores of less frequently accessed "warm" or "cold" data that is often sequentially accessed is best stored on cost-effective enterprise-class HDDs. This storage technology decision is increasingly becoming application or workload specific. The reality is that SSDs and HDDs are complementary technologies that each have their own compelling value proposition and will continue to coexist in the data center. And even when low-latency applications such as transactional data migrate to SSDs, much of this data is ultimately returned to HDDs for longer term storage. While high performance applications get a lot of attention and SSDs have arguably pushed HDDs lower down the pyramid, data stored in the cloud is much "colder" than most believe. That is, the base of the pyramid is both massive and growing. Heck, tape still comprises about 10% of all data center storage capacity.

Don't take our word on it? Listen to how a major hyperscaler matches workloads to the most cost-effective storage media. In its March 2025 blog post, Google Cloud made the following statement:

> *"However, SSD-only storage still poses a substantial cost premium over a blended storage fleet of SSD and HDD. The challenge is putting the right data — the data that gets the most I/Os or needs the lowest latency — on SSD while keeping the bulk of the data on HDD."*

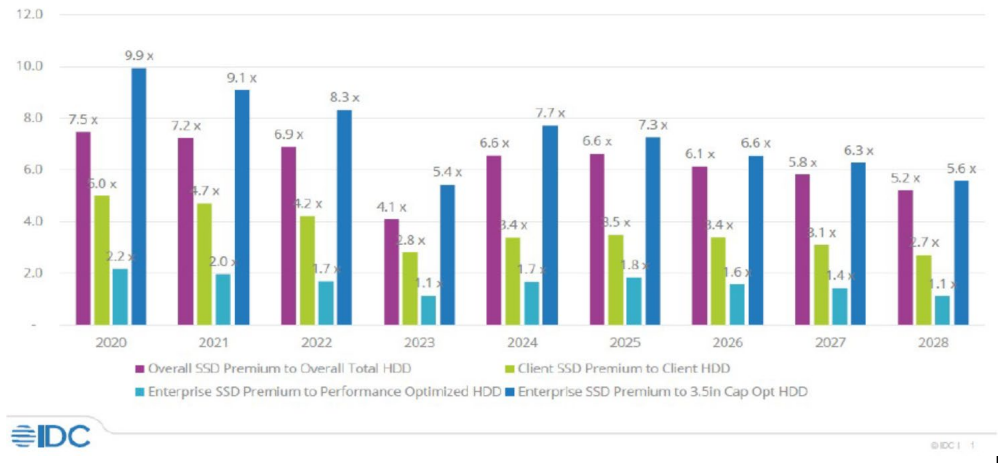
IDC Forecasts HDDs Will Capture the Bulk of Data Center Storage Capacity Through 2028



Source: Western Digital

IDC forecasts that HDDs will continue to comprise almost 80% of storage used in hyperscale and cloud data centers through 2028. One of the primary reasons for HDDs' continued storage dominance is their dramatically lower cost/TB. SSDs are currently about 6x more expensive than HDDs on a cost/TB basis, and IDC, among others, fully expects this price premium to persist. There are two primary explanations. First, the massive increase in areal density offered by HAMR technology will enable continued declines in HDD cost/TB. Second, many believe that the flash cost curve is about to flatten. The industry's move from single-level to multi-level cell architectures achieved through the vertical scaling of stacked layers was effective at increasing bit density and reducing cost/bit. However, this route was pursued because the traditional method of achieving smaller cells through geometry shrinks had reached its limit. Although adding layers does scale bit density, it is less cost effective than a lithography shrink. And as the industry contemplates a slower move from quad- to penta-level cells and faces the prospect of increasing layer count from 200-300 to over 800, development costs and manufacturing complexity are expected to materially increase. In addition, adding more bits per cell reduces reliability and endurance. As a result, while QLC flash has been widely adopted in enterprise SSDs, its lower reliability has meant limiting these products to read-intensive applications, reducing their applicability across all high-performance workloads. In addition, we also note that there has not always been a strong correlation between lower flash pricing and increased SSD adoption, as spot flash pricing, like that of any commodity, can be volatile in the short term, while flash production planning and data center hardware architectural decisions are much longer term in nature. Finally, industry projections for bit density, the driving factor of production cost, favor HDDs. In its Q3 2024 report, Tech Insights predicted flash bit density will increase at a CAGR of 18.2% from 2023-2029. By contrast, the Advanced Storage Research Consortium predicts that the adoption of HAMR can facilitate a 20% bit density CAGR through 2030.

IDC Expects SSDs to Maintain a Material Price Premium to HDDs Through at Least 2028



Source: IDC, Morgan Stanley

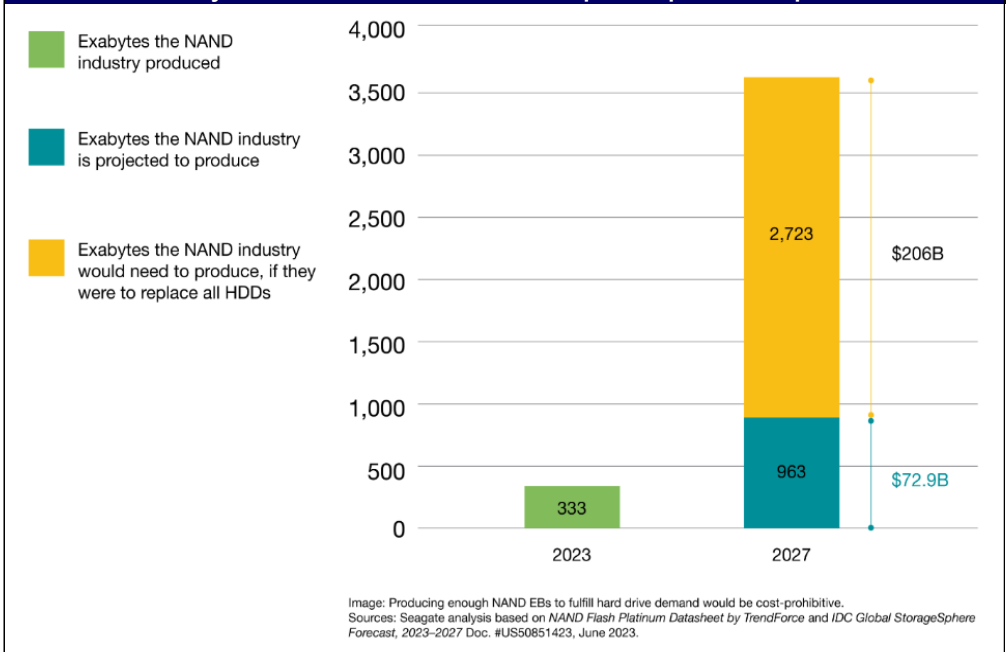
Finally, the extent to which cloud customers are frustrated with the high cost of storage is underappreciated. The 2025 Wasabi Global Cloud Storage Index recently reported that 62% of respondents (n=1,600) reported they exceeded their budget for cloud storage spending in 2024, an increase of nine percentage points over 2023, with one-quarter experiencing "massive" cost overruns. In particular, 84% of respondents accessed cold storage more frequently than

expected, which resulted in commensurately higher costs. These cost pressures are causing cloud customers to evaluate migrating some level of storage back on premise. Whether or not that occurs in meaningful volume, an important takeaway for this discussion is that further increasing storage costs by migrating more data to high-cost SSDs is highly unlikely to be a good business decision.

Replacing HDDs With Flash is Practically Impossible

Nothing reveals the pro-flash argument for the pipe dream that it is faster than a sober assessment of the realities of flash memory manufacturing capacity. Yole Intelligence estimates that, from 2025 to 2027, the flash industry will spend about $73 billion to increase its capacity to 963EB. However, assuming a constant cost/EB ratio, the industry would have to spend an additional $206 billion in order to replace forecasted HDD exabyte shipments that year. And this doesn't even include the cost to replace the current 10ZB of installed HDD capacity. Such levels of capacity expansion and capital expenditure border on insanity in the best of times, but we would note that the major flash manufacturers are currently in the process of reducing capacity in an attempt to stabilize prices. SSD evangelists often note that an extended flash downcycle could further pressure pricing, which could theoretically reduce the SSD price premium and accelerate HDD replacement. However, this ignores the fact that flash manufacturers are highly unlikely to pursue a massive capital investment program in the depths of a downcycle when rock bottom prices make the ROI of such spend highly questionable. Flash manufacturing involves multi-year planning horizons, and this is simply not how the industry has ever acted. And all flash manufacturers will always contend with the reality that flash memory is a key input to other high growth markets such as mobile handsets, which will compete for any incremental capacity added.

Flash Exabytes of Production and Related CapEx Required to Replace HDDs



Source: Seagate

More fundamentally, this analysis highlights just how much more capital efficient the HDD industry is compared to the flash memory industry. Over the past ten years, the HDD leaders have each spent 5% of revenue on capital expenditures, demonstrating almost 90% lower capital intensity, and have, on average, spent 98% less per exabyte produced.

Flash vs HDD Average Capital Intensity, 2015-2024			
	Flash Industry	STX HDD	WDC HDD
Cumulative CapEx ($B)	$ 225.9	$ 4.8	$ 4.7
Cumulative EB Shipped	4,557	3,856	3,811
CapEx $/EB ($M)	$ 50.7	$ 1.2	$ 1.2
CapEx Intensity	44%	5%	5%

Source: Seagate SEC filings, Western Digital 2025 Investor Day Presentation

Don't Believe the Hype: Pure Storage is Full of It

Pure Storage (PSTG) is a supplier of software and all-flash storage solutions for enterprises and hyperscalers. As recently as June 2024, the company had the audacity to predict that no HDDs will be sold into data centers by 2028. The crux of Pure's argument is that the total cost of ownership (TCO) of flash, at least as they implement it using commodity flash in an ultra-high-density array, is lower than that of HDDs. But their math doesn't add up.

First, the up-front acquisition cost of drives remains the dominant driver of the TCO equation, and on that criteria SSDs sell at a 6x price premium on a dollar per exabyte basis. As for the other elements of TCO, Pure Storage's presentation of the TCO math lacks credibility, as most of their assumptions are vague and lack full disclosure. For example, although HDDs may consume more watts/TB than SSDs, their overall power footprint in a data center is not significant enough to warrant an architecture change that costs 6x more. In addition, enterprise SSDs typically remain in an active mode, in which their power consumption is about on par with a mass capacity HDD. And HDDs are hardly in the crosshairs of data center architects when it comes to energy consumption given that a single GPU can consume up to 700 watts, roughly 100x more power-intensive than an HDD operating at maximum performance (and large-scale deployments can involve up to 100,000 GPUs). Additionally, while SSDs can offer approximately 3x the storage density of HDDs, the cost implications for space savings are a minor contributor to overall TCO. At its recent investor day, Western Digital stated that it believes SSDs are ~3.6x more expensive than HDDs in modern data centers on a TCO basis.

We don't question that all-flash arrays are a viable product that can be an attractive solution for certain high-performance workloads, but we do note that Pure Storage product revenues have grown at a -3% CAGR over the past three years and that the company, unlike the HDD players, fails to disclose exabytes shipped. Moreover, based on PSTG's recent earnings, BAML Research estimates that gross margins for its E-series product that competes with mass capacity HDDs are just 40%, strikingly similar to those of nearline HDDs and suggestive that Pure Storage doesn't seem to be adding much incremental value to the flash memory in its boxes. We conclude the company's pessimistic view of HDDs doesn't hold water. In fact, when we recently spoke with a current hyperscale sales executive at Pure Storage, he couldn't endorse his employer's marketing spiel:

> *"From my perspective, there will always be a place, really for the next 10 years, for HDDs in what I would call tier-one hyperscale data centers because there will always be a need for colder, more archival type storage."*
>
> — Pure Storage Hyperscale Sales Executive

In March, a post entitled "A case for QLC SSDs in the data center" appeared on Meta's Engineering blog. The post highlights that (1) HDD access density can be an issue for certain "hot" workloads, and (2) QLC flash presents an attractive price/performance trade-off versus TLC flash. Despite the attention it garnered with respect to HDDs, the discussion reads as more an indictment of TLC flash than anything else.

Subsequently, Pure claimed that Meta has adopted its technology as the foundation of its storage infrastructure. That's misleading, because in reality Meta plans to license Pure's controller software but contract with an ODM to build its own high-density all-flash arrays using commodity flash (as opposed to purchasing Pure products off the shelf). We make three observations. First, the Meta supercluster meant to adopt this architectural approach is primarily targeted toward its AI initiatives, which have very different workload characteristics than the cost-optimized service delivery business model of the major hyperscalers. Second, it strikes us that, if anything, Pure is perpetuating the further disintermediation of OEM hardware development that we have already seen in other markets. That is, rather than remaining a slave to Micron's SSD and Pure's AFA product roadmaps, Meta is simply building their own. We don't believe this impacts HDDs as much as it presents a potential threat to OEMs, including arguably Pure Storage itself. Finally, Pure has said that Meta has the potential to be a double-digit exabyte customer. Even if you assume that figure can grow massively to, say, 50EB, it represents just a tiny sliver of the ~1.6ZB of HDDs to be deployed in 2025. And that assumption still doesn't solve the question of where all this extra flash is going to come from. The flash industry would need to spend an additional $2.5 billion just to meet that incremental Meta demand.

VI. The HDD Industry Has Improved in Structure and Business Practice

Over 200 companies have manufactured HDDs in the industry's history, but the landscape has been reduced to just three suppliers that generally maintain a 40/40/20 share split. While we don't discount the importance of Toshiba in influencing industry pricing, realistically they are decreasingly competitive at the leading edge, meaning that their influence on the competitive landscape only further diminishes as the industry moves to HAMR. WD and Seagate management increasingly acknowledge that the industry has effectively become a duopoly characterized by largely rational competition.

This rational approach has led to structural improvements within the sector. The HDD industry experienced a particularly sharp demand correction in the wake of the Covid-related IT buying

frenzy, with industry revenue declining well over 40% from 2021 to 2023. While painful, it catalyzed a newfound focus on gaining demand visibility, enforcing supply discipline, receiving due compensation for value delivered, and maintaining stable and attractive profitability. A key pillar of this approach has been the negotiation of long-term build-to-order (BTO) supply agreements with major customers. Seagate now receives firm customer demand forecasts that provide multiple quarters of forward visibility, and they use pricing incentives to ensure customers provide accurate forecasts. In return, the company is better able to meet contracted customer demand through disciplined and stable production and supply chain planning. Seagate claims the days of chasing quarter-end deals to move units at any price are gone. Moreover, these agreements have been used to codify management's focus on value pricing. Through the use of periodic price escalators, Seagate has been able to enact small yet consistent price increases, historically significant for the industry. Though perhaps even more heartening has been the change in management tone regarding the importance of managing the business to generate attractive and stable profitability.

While the agreements represent customer commitments to take a defined amount of exabytes (in some cases specifying product mix), they have yet to be tested in a serious downturn. Practically speaking, Seagate would probably offer customers some flexibility to help them navigate a demand downturn (as opposed to pursuing legal remedies), which would suggest that these commitments are less than "firm", but we also expect that the greater visibility and communication afforded by these arrangements would enable Seagate to see demand issues on the horizon and more thoughtfully manage its own capacity planning, WIP flow, and supply chain. By addressing periods of demand weakness through improved supply matching as opposed to aggressive price actions designed to move inventory or fill excess capacity, Seagate should be able to dampen the deleterious effects of a downcycle.

VII. The Next Cyclical Peak is Far, Far Away

Storage has always been a cyclical sector, and naturally it makes sense to explore where we are in the cycle. Reference to historical average cycle lengths isn't a terribly credible methodology for predicting the next downcycle, as each has its own unique set of drivers and circumstances, and it seems pretty clear that AI is fueling a generational wave of cloud storage demand. As expected due to an extensively discussed supply chain issue, Seagate's string of six quarters of mass capacity exabyte sequential growth ended with March quarter results. However, Seagate management made clear that the demand landscape is only strengthening and guided up next quarter revenue. BTO agreements are indicating strong demand through the end of the calendar year, and some hyperscalers have even provided visibility into 2026. Pricing remains strong as demand continues to outstrip supply, resulting in Seagate reporting its eighth consecutive quarter of gross margin expansion, even despite the anticipated revenue shortfall. Seagate has been gradually reducing production capacity for more than a decade. Not only did the company take ~25-30% of capacity offline in recent years, but management has consistently messaged that they are seeking to increase exabyte production capacity through areal density gains as opposed to heavy capital spending on the addition of new lines. Thus, with new data

center builds continuing and recent commentary from enterprise IT OEMs supportive of AI spending longevity and durability, there is no indication of a potential downturn.

There are no material indications of a slowdown from the HDD supply chain either. On their January and May (transcript not yet posted publicly) earnings calls, glass platter blanks supplier Hoya noted that they have been both expanding the number of lines in their Laos facility and evaluating the need to operate through holidays to ensure supply and that they see no signs of an HDD slowdown. Similarly, motor manufacturer Nidec noted each quarter that data center-related nearline demand continues to fuel strong HDD revenue growth. To be clear, the HDD industry will inevitably encounter a period of declining demand, but improved business practices should aid cycle management and dampen volatility. With the AI boom likely in early innings, we don't anticipate a cyclical peak for HDDs anytime remotely soon.

VIII. The Street is Underestimating the Transformational Impact of HAMR on Seagate's Financial Model

Current Street consensus revenue projections for Seagate generally assume an industry downturn during the company's 2027 fiscal year, as indicated by just 1% implied YoY growth. Yet, many of the analysts themselves freely admit that they have relatively low confidence in that assumption given the robust current demand picture and strong underlying growth drivers for cloud storage. By contrast, in our model, we forecast the current upcycle will hit its peak in 2029. The last cycle lasted three years, and the current cycle only began a year ago. If we assume AI demand extends this cycle to five years instead of three, that means this cycle won't turn until almost 2030.

Seagate non-GAAP gross margins have staged a healthy recovery from their post-Covid trough of 18.7% in the March 2023 quarter, driven by strong hyperscaler demand, reduced legacy product mix, and a robust pricing environment. Corporate gross margins exceeded 36% in the recent March quarter, and we believe HDD gross margins likely reached 39%, with the highest capacity nearline drives likely garnering 40%-plus gross margins. There has been some concern about low yields on early HAMR production, but management has assured investors HAMR will be margin accretive. Thus, where we stand today, Seagate has blown through its longtime 30-33% target for gross margin. We have confidence in continued gross margin accretion as (1) HAMR accounts for an increasing percentage of mass capacity revenue mix, (2) Seagate expands its capacity lead over WD, resulting in additional price support, (3) HAMR technology is extended into lower capacity points, (4) Seagate benefits from material reductions in cost/TB as the bill of materials stays the same or even declines as they execute on their cost reduction roadmap at 40TB, and (5) Seagate optimizes its existing manufacturing capacity to build the highest density, highest margin drives. As a result, we anticipate Seagate management will raise their target model range to the mid-to-high 30s, a bullish signal for the shares.

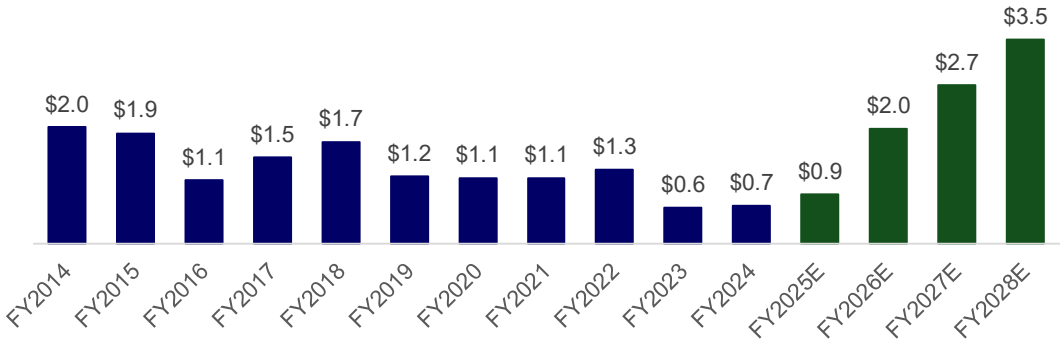
Kerrisdale Variance Versus Street Consensus ($M)								
	FY2026E				FY2027E			
	KCM		Street	Var.	KCM		Street	Var.
Revenue	$	11,081	$ 10,128	9%	$	12,791	$ 10,256	25%
Gross Margin		38.9%	37.5%	142bps		42.4%	37.8%	456bps
Non-GAAP Net Income	$	2,310	$ 1,980	17%	$	3,059	$ 2,055	49%

Source: S&P Capital IQ, Kerrisdale analysis

The full transition to HAMR will also likely drive improved operating leverage. Seagate has essentially been maintaining two technology stacks, PMR and HAMR. Management has already guided to R&D synergies and headcount reduction as HAMR becomes the sole technology platform going forward.

It is also important to note that the non-mass capacity business at Seagate has been largely de-risked at this point. While many of its legacy products are in secular decline, several product areas, such as consumer drives and mission critical drives, have some modest positive demand drivers in the intermediate term and are likely to have longer tails than some expect. And with HAMR competing for capacity, we believe Seagate will be ever more disciplined on price for these products.

Seagate Historical and Projected Free Cash Flow ($B)



Source: Seagate SEC filings, Kerrisdale analysis

Finally, we forecast a material improvement in Seagate's free cash flow generation over the next 2-3 years. Beyond the operating margin expansion detailed above, we anticipate the company will undergo a working capital normalization as the HAMR ramp matures. In addition, we believe that capital expenditures will remain at the low end of the company's guidance range. Seagate has been planning the HAMR manufacturing transition for some time, and there is almost 95% commonality with existing tools, saving the company from any elevated capital expenditures to support the HAMR ramp.

IX. Seagate is Also a Compelling Capital Allocation Story

Due to the structural improvements heralded by the HAMR ramp, we expect Seagate to generate an aggregate $8.2 billion in free cash flow over the next three fiscal years, paving the

way for a marked increase in capital returns to shareholders and substantial debt paydown. Seagate has returned an average of $650 million to investors annually via dividends over the past ten years and currently pays an annualized $2.88/share dividend. The implied 2.7% dividend yield places Seagate in the top echelon of dividend payers in the technology industry. Seagate will likely increase this payout at its October board meeting, and there is ample capacity to increase the dividend even higher in coming years, which should draw additional investor attention.

Potential Seagate Avenues of Capital Return and De-Leveraging		
		$ Millions
Total Forecasted Free Cash Flow, FY2026-2028	$	8,200
Increase Dividend 10% per Year	$	(397)
Repurchase 15% of Current Shares Outstanding	$	(3,348)
Retire June 2028 Exchangeable Notes	$	(1,500)
Remaining Free Cash Flow	$	2,954
Source: Kerrisdale analysis		

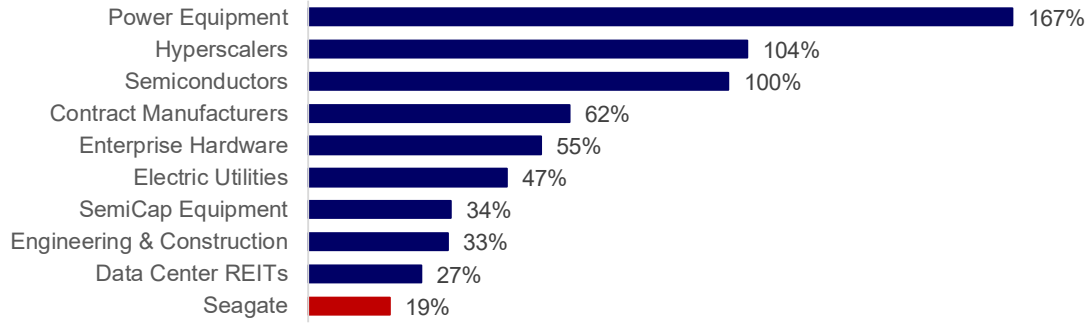
Seagate spent an average of $1.2 billion annually on share repurchases in the ten years prior to the post-Covid downturn, during which the company ceased buybacks to preserve financial flexibility. The existing share repurchase authorization stands at $1.9 billion, and the company has guided investors that it is likely to resume repurchases in the first half of 2026. It is reasonable to expect that Seagate could reduce its shares outstanding by 15% over the next three years, resulting in attractive EPS accretion given the low opportunity cost on cash.

Finally, Seagate will likely emerge from the HAMR transition with a strengthened balance sheet. The company retired $479 million of debt in January, and net leverage stood at 2.1x exiting the March quarter. Although the company's next major debt maturity is not until 2028, a more substantial paydown of either the 2028 exchangeable notes or some of its more expensive tranches of senior debt with 8-9% coupons is likely.

X. Valuation: Not Getting Credit Where It's Due

The recent tariff-induced market crash notwithstanding, most companies with even remote exposure to the AI spending wave (ie. electric utilities) have received investor love over the past two years. Most types of AI beneficiaries, from REITs to contract manufacturers to power systems companies, have seen their forward revenue multiples expand far more than that of Seagate. Yet, Seagate is 80%+ exposed to the cloud / AI demand, sells critical hardware to AI data centers, and is the technology leader in a tight oligopoly.

"AI Premiums" as Measured by Percent Change in NTM EV/Revenue Multiple, 1/1/2023 vs 1/1/2025



Power equipment (ETN, VRT), hyperscalers (AMZN, GOOGL, META, MSFT), semiconductors (AVGO, MRVL, NVDA), contract manufacturers (FLEX, JBL, SANM), enterprise hardware (CSCO, DELL, IBM, NTAP), electric utilities (CEG, ETR, NEE, SO, VST), semicap equipment (AMAT, KLAC, LRCX), engineering & construction (J, PWR), data center REITs (EQIX, DLR)
Source: S&P Capital IQ

This analysis suggests Seagate suffers from chronic undervaluation relative to its exposure to one of the most powerful investment themes. The simple average of the AI premiums ascribed to the sectors above is 70%, several times higher than the premium experienced by Seagate.

Seagate is often short-changed in traditional comparable company analyses. Western Digital is a natural point of comparison, but this presents complications. Since WD's acquisition of SanDisk fundamentally changed the company's business mix and risk profile, any reference to WD since 2016 isn't a viable comparable. Street estimates for WD are now in flux due to the recent spin-off of SanDisk in February. But most importantly, both HDD makers are dramatically undervalued and the sector's strong fundamentals are underappreciated by the market. In a situation where investors believe two companies are each others' primary comparable, it creates a form of circular logic that can depress target multiples for both companies. Between the two, we prefer Seagate for the many reasons discussed.

We feature the optical module companies in our comparable companies analysis because they share a number of similarities with Seagate, including (1) an R&D-intensive component technology that depends heavily on materials science and wafer fabrication processes (some would consider the HDD companies as really "head" companies), (2) wide yet largely underappreciated technology moats, (3) a fundamental technology that is most commonly delivered in a standard module form factor, facilitating high volume production, (4) despite low gross margins are able to generate attractive EBITDA margins, (5) face the constant overhang of being displaced by new technologies (currently co-packaged optics in the case of the optical transceiver companies), (6) are key enablers of data centers, AI, and other advanced computing applications, (7) are long-lead time products that are subject to demand cyclicality. For additional comparison, we also show an array of moderate revenue growth, 30-40% gross margin and 20-25% EBITDA margin technology hardware companies that deliver value in the form of modules or specialty components.

Seagate Comparable Company Analysis ($M)

	Market Overview				LTM		YoY Rev Growth		CY2026E Multiples		
Company	Stock Price	1-Year Return	Market Cap	Revenue	Gross Margin	EBITDA Margin	CY2025E	CY2026E	EV/Rev	EV/EBITDA	P/E
Seagate	**$ 105.19**	**9%**	**$ 22,681**	**$ 8,540**	**34%**	**24%**	**20%**	**6%**	**2.7x**	**9.1x**	**11.0x**
Western Digital	$ 49.20	-	$ 17,165	$ 8,919	38%	-	-	-	2.1x	7.5x	9.6x
Optics											
Coherent	$ 80.70	42%	$ 12,544	$ 5,595	34%	21%	15%	7%	2.8x	11.5x	16.4x
Lumentum	$ 78.29	75%	$ 5,433	$ 1,473	30%	10%	33%	20%	3.2x	14.2x	15.8x
Novanta	$ 131.41	(20%)	$ 4,727	$ 952	45%	22%	4%	8%	4.8x	19.1x	31.8x
Median		**42%**			**34%**	**21%**	**15%**	**8%**	**3.2x**	**14.2x**	**16.4x**
Modules / Sub-Systems											
Advanced Energy Industries	$ 118.92	14%	$ 4,478	$ 1,559	37%	14%	13%	8%	2.5x	12.9x	18.3x
Amphenol	$ 85.63	33%	$ 103,578	$ 16,777	34%	27%	33%	7%	5.0x	17.8x	28.2x
Belden	$ 112.89	21%	$ 4,459	$ 2,550	38%	17%	7%	5%	2.0x	11.6x	14.5x
Enphase Energy	$ 48.27	(59%)	$ 6,333	$ 1,423	37%	30%	9%	12%	3.8x	11.9x	13.9x
TE Connectivity	$ 160.74	8%	$ 47,667	$ 16,026	35%	25%	7%	6%	2.8x	11.6x	17.7x
Vertiv Holdings	$ 109.48	11%	$ 41,723	$ 8,409	36%	21%	18%	13%	4.1x	17.6x	24.6x
Zebra Technologies	$ 299.27	(7%)	$ 15,219	$ 5,114	49%	22%	6%	6%	3.0x	14.0x	18.1x
Median		**11%**			**37%**	**22%**	**9%**	**7%**	**3.0x**	**12.9x**	**18.1x**
Overall Median		**12%**			**37%**	**21%**	**11%**	**8%**	**3.1x**	**13.5x**	**17.9x**

Source: S&P Capital IQ, Western Digital LTM financials from FQ3 2025 earnings presentation

If we take the median multiples across these two peer groups, we get 13x EBITDA and 18x P/E multiples based on CY 2026 metrics. These stand in stark contrast to Seagate's 9x and 11x multiples, respectively. Applying these peer company profit multiples to our Seagate projections yields $207/share and $189/share price targets for Seagate. Those translate to 80% to 96% upside from current levels, for an average of 88%.

Given Seagate's highly cash-generative financial model and our bias for old-fashioned cash flow-based valuation methodologies, we believe a DCF analysis yields the most defensible price target. It also highlights the extent to which Seagate's powerful financial model is underappreciated. We use our detailed product category-level forecast through FY2030 and then ramp annual revenue growth down to 5% and assume EBIT margins settle back to 28% in the terminal year. Calculating a 10.5% WACC and assuming a 15x EV/LTM EBITDA exit multiple (versus a comparable company median of ~23x), we derive a $250 per share price target for Seagate, representing 137% upside from current.

Seagate Discounted Cash Flow Analysis

	Historical			Projected									
($ in millions, FYE June)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Revenue	7,384	6,551	9,074	11,081	12,791	14,309	15,612	12,881	14,169	16,295	17,924	18,820	19,761
EBIT	298	550	1,921	2,810	3,712	4,520	5,045	3,777	4,251	4,888	5,377	5,458	5,533
Income Tax Expense	(39)	(62)	(69)	(408)	(540)	(668)	(754)	(562)	(638)	(733)	(807)	(819)	(830)
EBIAT	259	488	1,853	2,402	3,172	3,853	4,291	3,215	3,613	4,155	4,571	4,639	4,703
Plus: Depreciation & Amortization	513	264	275	388	448	501	546	451	496	570	627	659	692
Less: Capital Expenditures	(316)	(254)	(267)	(388)	(512)	(572)	(624)	(515)	(567)	(652)	(717)	(753)	(790)
Less: Inc./(Dec.) in Working Cap.	1,162	386	(934)	(330)	(219)	(148)	(127)	267	(142)	(163)	(179)	(188)	(198)
Unlevered Free Cash Flow	(706)	112	2,794	2,732	3,327	3,929	4,340	2,884	3,684	4,237	4,660	4,733	4,802
Discount Period (mid-year)				0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5
Discount Factor				0.95	0.86	0.78	0.70	0.64	0.58	0.52	0.47	0.43	0.39
Present Value of Unlevered FCF				2,599	2,863	3,059	3,057	1,838	2,124	2,210	2,200	2,021	1,855

Valuation	
Terminal Value	93,373
PV of Terminal Value	34,314
PV of Cash Flows	23,827
Enterprise Value	58,141
Less: Total Debt	5,146
Plus: Cash and Equivalents	814
Equity Value	53,809

Per Share Derivation	
Basic Shares Outstanding	212.2
Dilutive Shares	3.4
Fully Diluted Shares Outstanding	215.6
Price Per Share	$ 249.56
Current Price	$ 105.19
Premium/(Discount) to Current	137%

Assumptions	
Risk-free Rate (10yr T-Note)	4.5%
Equity Beta	1.32
Equity Risk Premium	5.5%
Cost of Equity	11.8%
Cost of Debt	5.8%
Marginal Tax Rate	15.0%
After-tax Cost of Debt	4.9%
Target Percent Equity	81.5%
Target Percent Debt	18.5%
WACC	10.5%
Terminal Multiple (LTM EBITDA)	15.0x

Source: Seagate SEC filings, S&P Capital IQ, Kerrisdale analysis

Our valuation analysis and the resulting Seagate target share prices yield massive upside regardless of the methodology employed.

Share Price Upside Implied by Valuation Methodologies		
Methodology	**Price**	**Upside**
Discounted Cash Flow Analysis	$250	137%
Comparable Company Analysis	$198	88%
Average	**$224**	**113%**

Source: S&P Capital IQ, Kerrisdale analysis

XI. Conclusion

HDD technology transitions are powerful generational events for shareholder wealth creation. Seagate is about to embark on a path of revenue, margin, cash flow, and capital return growth inflection that will surprise many buyside and sellside analysts. With a rich array of stock catalysts over the coming months, and an amazing setup for 2026 and 2027, a greater appreciation of the HAMR transition and Seagate's powerful cash generation should catalyze a re-rating of the company's valuation multiple. We see (a) gate(way) to a much higher stock price.

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