ESG Economic Validation

Analyzing the Economic Benefits of Dell ECS

Economic Benefit Analysis of On-premises Object Storage versus Public Cloud

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Introduction

The advent of public cloud services initiated a wave of technological disruption, the impacts of which have been felt throughout the enterprise IT industry. The ability for IT to offload the headaches and daily firefighting of supporting the infrastructure to someone else is an enticing proposition. The rising interest level in public cloud services is understandable given a low-cost entry point and IT infrastructure that is already deployed and available for access to various resources.

These factors, along with the economies of scale promoted by public cloud service providers, have led to a perception that the public cloud is by nature less expensive than on-premises infrastructure. Although IT modernization is in full swing, more than one-third (34%) of organizations expect to focus investments in on-premises infrastructure (server, storage, networking, hyperconverged, or converged) in the near term. These organizations, along with the 37% that reported expecting to invest the most in hybrid cloud infrastructure (for a combined total of 71% of organizations) will focus a strong portion of their spending on refreshing on-premises data centers in the next 12-18 months. A majority of organizations (52%) indicated that they had repatriated workloads—moving them back to on-premises infrastructure—for an unplanned or unforeseen reason. Higher than expected costs were reported by 34% as a reason for moving the workloads back. [1]

Even though this research shows an interest in migrating existing applications to public cloud infrastructure, for some workloads, cloud is clearly not the best deployment model. Many factors should be considered in addition to cost, as new technologies can alter the on-premises versus off-premises cost paradigm.

- The physical separation between on- and off-premises sites presents a natural barrier to data mobility, limiting the speed at which data can move back and forth. This WAN latency introduced by cloud services limits application effectiveness while simultaneously increasing data costs and making them less predictable, as cloud providers can add per-transaction charges to the cost of network bandwidth.

- Innovations in storage technology over the past few years have brought a significant improvement in performance and a reduction in the cost of capacity, with technologies such as solid-state, software-defined storage (SDS), and object storage. With built-in management, many organizations are now able to host their own on-premises storage solution at a lower overall cost than with public cloud offerings.

- An ongoing rise in business intelligence, analytics, and AI/ML workloads is fueling data growth. This growth can significantly consume capacity and increase the time data sets are likely to remain active. This, in turn, increases the amount of WAN activity required for cloud-based content, as data sets typically thought of as cold or stagnant are serving a greater number of transactions than anticipated.

ESG recently conducted a study investigating Dell ECS. The analysis revealed that on-premises storage can provide a cost advantage over a leading public cloud services provider, ranging from 50% lower costs than cold archive storage to 76% lower than active storage, all while reducing data access latency. This analysis was performed using conservative assumptions and considerations, suggesting that more aggressive configurations may yield even greater savings. The details on the savings delivered by ECS are thoroughly discussed throughout this report.

ECS is a massively scalable, highly efficient, global object storage solution. With its software-based design, ECS is able to leverage industry-standard (and lower-cost) hardware to provide flexible deployment methodologies through a software-only solution, an appliance form factor, and Dell Technologies hosted dedicated solutions. ECS is designed to provide all the low-cost, ease-of-use, and scalability benefits provided by public cloud storage without the enterprise security risks and concerns. The benefits of object storage technology have spurred an increase in interest and adoption across the industry of late.

[1] Source: ESG Complete Survey Results, *Distributed Cloud Series: Application Infrastructure Modernization Trends*, March 2022.

A Paradigm Shift to Massive Scale with Object Storage

At the heart of this desire to investigate lower-cost data center designs is the ever-present challenge of managing, storing, and archiving the explosion of unstructured data. According to ESG research, 34% of organizations' data resides on unstructured storage, and 40% of their object storage capacity is estimated to be all-flash. Considering that the average active/primary unstructured data capacity estimated by organizations was 28 PB with an estimated mean annual growth rate of 38%, it's no surprise that data portability (36%) and protection (36%) were the top existing challenges reported for on-premises object storage.[2]

While this growth is largely tied to existing on-premises applications and workloads, repatriated workloads returning from the cloud are expected to have a similar impact on capacity demands. This is largely due to the need for AI/ML, business intelligence, and analytics to decipher meaning from all of the data captured. As demands for analytics insights have increased, it has become essential to provide a highly performing infrastructure that supports timely decision-making, hence the shift toward all-flash object storage.

Data growth on its own is no longer a standalone challenge; it will forever be tied to an increased demand for accessibility. This is one of the primary drivers in organizations looking for alternatives to the public cloud, such as on-premises object storage.

Driving Down the Cost Curve with Object Storage

Object storage architectures offer an alternative to the hierarchical tree structure of file systems. They store data in flat address spaces, offering unique identifiers to the applications for access to content. While this architectural difference may seem small to the end-user, the scalability provided by this efficiency translates into substantial total cost of ownership (TCO) savings. Built upon an object storage architecture, Dell ECS offers a number of advantages that significantly reduce the cost of storing, protecting, and accessing high volumes of data.

- ECS is designed to store active, massive, multi-petabyte, unstructured data in a single pool of storage.

- ECS provides a global namespace with strong consistency, which enables ECS' customers to store NFS file data on a globally distributed object infrastructure, eliminating cloud gateways.

- ECS' software-defined storage (SDS) architecture offers the ability to leverage industry-standard or commodity hardware to dramatically reduce the capital cost of storage infrastructure.

- ECS' software solution enables customers to repurpose their hardware and choose different software-defined solution vendors if needed so that they won't be locked into working with a certain storage vendor.

- ECS has the ability to mix and match different hardware types as well as to integrate new hardware into the storage pool, eliminating costly and disruptive data migrations.

- ECS provides automatic resiliency across nodes and geographically diverse sites via failure tolerance, triple mirroring, and erasure coding.

- ECS storage is highly efficient, with accelerated garbage collection methods and low metadata overhead.

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[2] Source: ESG eBook, *All-flash Object Storage*, February 2022. Unless otherwise stated, all ESG research references and charts in this Economic Validation have been taken from this eBook.

- ECS supports multiple unstructured storage-based protocols, such as File (SMB/NFSv3), REST APIs, S3, HDFS, and OpenStack Swift.

- ECS provides customers more control of their data assets with enterprise class object, file, and HDFS storage in a secure and compliant system. These capabilities will reduce storage overhead and improve efficiency.

- ECS can be placed in data centers close to the point of data creation and consumption, decreasing WAN traffic and bandwidth consumption while reducing latency associated with data access calls made across the WAN.
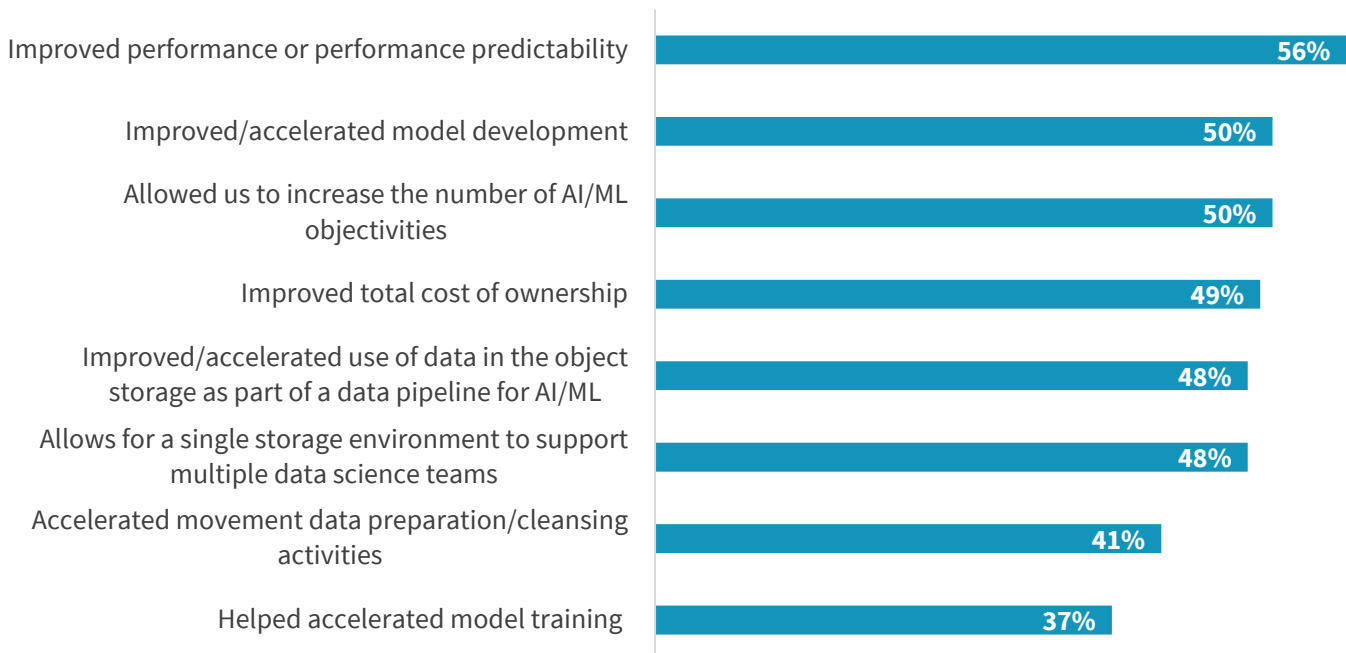
As part of the all-flash object storage research study mentioned previously, ESG asked storage leaders about the advantages their organization experienced using all-flash object storage. The most commonly cited responses included higher levels of performance (38%), flexibility and choice in hardware (36%), and better price-performance (36%).

These benefits align directly with the challenges generated by data growth. If budgets were unlimited, businesses could simply continue to scale their existing traditional storage systems uninhibited, adding hardware, personnel, and data center space to accommodate growth. If data could be instantly moved from one location to the next without experiencing latency or incurring a cost per transaction, then moving massive data sets to and from the cloud based on need would be feasible. Budgets, however, are finite, and latency is not going away any time soon.

Shifting to an on-premises object storage architecture designed to meet the needs for modern workloads like AI/ML model development is attractive to many organizations. In the ESG study, organizations strongly indicated that they realized multiple significant benefits from utilizing all-flash object storage to support AI/ML model development (see Figure 1).

Figure 1. Factors Leading to Deployment/Consideration of On-premises Object Storage Technology

You identified your organization leverages/expects to leverage on-premises all-flash object storage to support artificial intelligence/machine learning (AI/ML) workloads. What benefits has your organization been able to achieve (or do you expect it will)? (Percent of respondents, N=143, multiple responses accepted)

Benefit	Percent
Improved performance or performance predictability	56%
Improved/accelerated model development	50%
Allowed us to increase the number of AI/ML objectivities	50%
Improved total cost of ownership	49%
Improved/accelerated use of data in the object storage as part of a data pipeline for AI/ML	48%
Allows for a single storage environment to support multiple data science teams	48%
Accelerated movement data preparation/cleansing activities	41%
Helped accelerated model training	37%

Source: ESG, a division of TechTarget, Inc.

Realities of Public Cloud Economics

In addition to the latency issues across the WAN discussed previously, the cost and complexity of migrating or moving data across the WAN adds an element of permanence to architecture design decisions. Once a workload moves to the cloud, it is difficult to shift it back to local resources if demands change. If data size or access rates increase or a data set simply experiences more activity than previously estimated, the costs of off-premises storage can increase suddenly and significantly, with the workload locked into a specific cloud provider. Compounding the more direct cost drivers are other considerations for cloud storage, such as pricing differences across data centers and regions, levels of support, service-level requirements, and data protection requirements. These are critical concerns to be addressed when evaluating off-premises services.

Factors Driving the On- versus Off-premises Decision

Key Economic Considerations

There are a number of quantifiable economic factors that influence the decision about whether to implement storage on-premises or off-premises. ESG identified the following elements as most significant:

- **Capacity utilization**—Since cloud service providers price storage by capacity, monthly costs increase with capacity utilized. On-premises object storage provides organizations with economies of scale that can reduce the cost of storage. As hardware evolves, higher capacity hard drives will further drive costs down.

- **Asset life**—The amortized cost of storage drops as the asset life is extended. For primary storage, a three-year asset life is considered standard, while organizations frequently assign an asset life of four or even five years for object/archive storage.

- **Performance and bandwidth fees**—Cloud service providers include factors such as performance and bandwidth to determine the cost of their storage. Storage to serve an active production workflow can be as much as four times the cost for the same capacity of cold archive storage.

> ## ⓘ Why This Matters
>
> ESG research revealed that activities tied to data portability—data movement across hybrid could environments—and data protection—backup to and from object storage, ensuring data availability—are top existing challenges for on-premises object storage. Organizations are moving to on-premises all-flash object storage with the hope that they will be able to reduce operational expenditures (OpEx) through increased efficiency and increase return on investment.
>
> While public cloud storage offloads storage management and administration to reduce OpEx costs, Dell ECS eliminates data access expense (i.e., users don't pay fees for data egress or API accesses (puts and gets). When the overall cost of storage is considered, Dell ECS comes out solidly ahead for active, archive, and even cold-archive storage.

Other Considerations

Economic factors, while very important, are only one aspect to be considered. Numerous other considerations will influence the on-premises versus off-premises decision.

- **Ownership/reduced lock-in**—The organization owns the infrastructure and is not beholden to a service provider who might choose to increase prices.

- **Security**—If the storage infrastructure lives inside an organization's data center, there are no concerns about data discovery requests that might go directly to a cloud provider.

- **Agility**—Should new workloads need to access the data in storage, the location of those workloads and the class of storage on which the data resides are critical factors.

- **Rack utilization**—While not a concern with public cloud storage, partially populated racks cost more per square foot to host in a traditional data center and will have an impact on overall TCO.

- **Misperception of cloud pricing**—While public cloud infrastructure-as-a-service (IaaS) prices have been declining over the past several years and are expected to continue to do so, major cloud storage providers have not substantially changed the pricing of their most popular tiers in years. In contrast, as the cost of the underlying hardware drops, so too does the cost of Dell ECS capacity.

The Bottom Line

ESG validated an economic model used by Dell Technologies to compare the TCO of a leading cloud storage provider to the TCO of Dell ECS to determine which factors have the most relevance when weighing on-premises storage against cloud storage. The model uses a simple yet detailed formula to calculate the cost of on-premises object storage: the upfront investment added to the total operating expenses, divided by the number of gigabytes utilized, divided by the number of months of utilization. This calculation yields the cost expressed as cents per gigabyte per month, which provides a clear comparison to public cloud storage provider costs. ESG examined the model in detail and found it to be a fair and complete representation of the costs associated with public cloud storage and Dell ECS.

ESG's analysis was based on an enterprise with a requirement to store 3 PBs of data with a five-year asset life and a requirement to retrieve 3% of that data for processing per month, or approximately 92 TB, with an average object size of 0.5 MB. The cloud service provider was priced using a standard access model to accommodate modern applications and Internet of Things (IoT) data. As seen in Figure 2, Dell ECS was able to satisfy these requirements at 0.58 cents per GB per month, 76% lower than the cost of the public cloud storage provider's active storage offering. In addition, the cost of the ECS configuration was considerably lower than the public cloud storage provider's archive (-63%) and cold archive (-50%) offerings.

Figure 2. Expected Monthly Costs of Deployment of Dell ECS versus Public Cloud Storage over Five Years
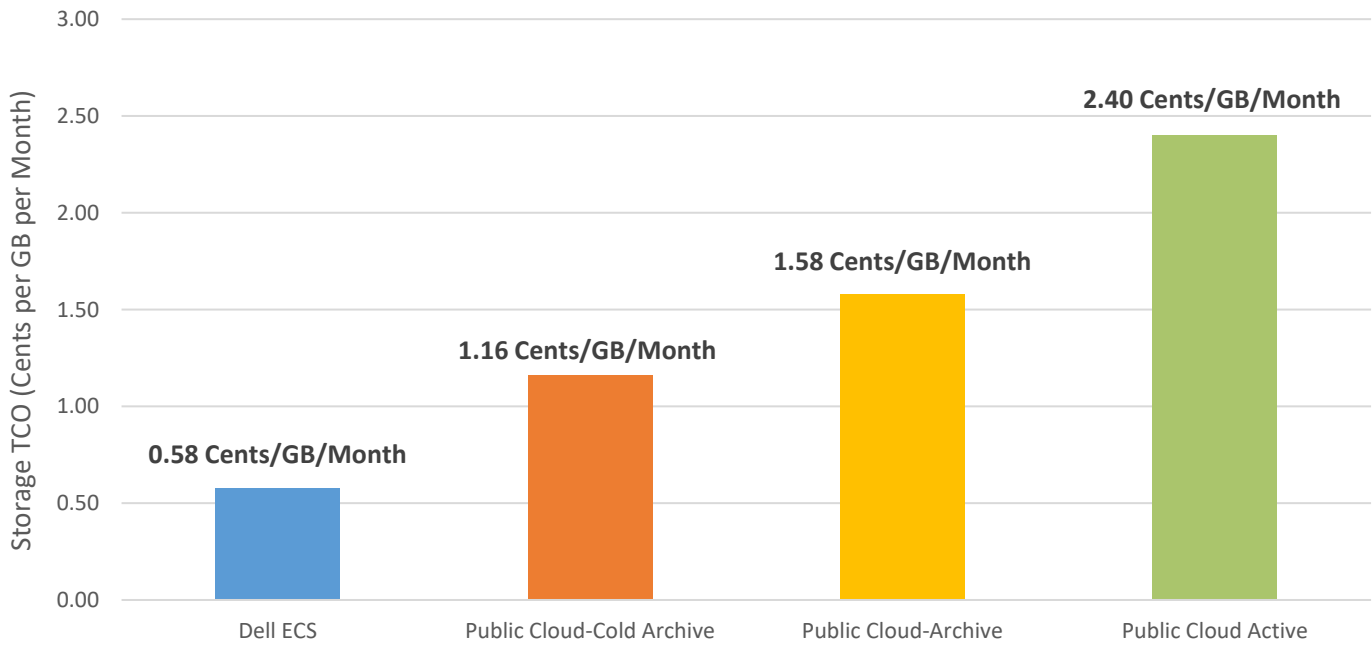
Source: Enterprise Strategy Group

A number of considerations influenced these results, detailed in Table 1.

Table 1. Economic Model Analysis: Public Cloud versus Dell ECS

Assumptions and Considerations	Selection	Impact
Asset life	Five years	Dell Technologies reports that customers typically deploy ECS with a five-year planned asset life.
Data egress	3% (92TB) per Month	Cloud service providers charge for data that traverses the internet. To change providers or repatriate workloads, *ALL* of the hosted data must be extracted.
Cloud service provider region	East coast	The cost of space and power varies in different regions, which affects service provider rates. ESG selected the lowest cost option.

The Bigger Truth

There is a common misconception among IT managers that the public cloud is always the best option for reducing cost and improving return on investment. While the agility and cost-effectiveness of the public cloud is great for modest and transient application workloads, an ESG audit of a Dell Technologies total cost of ownership model has confirmed that Dell ECS on-premises all-flash object storage in a customer-owned or hosted colocation facility is a more cost-effective solution for existing and emerging workloads at scale. While collecting, protecting, and using data is important, developing a data-centric IT architecture is invaluable. In this context, "data-centric" refers to an architecture where data is the primary and permanent asset and applications are transient. In the data-centric architecture, the data has precedence over the implementation of any given application; systems and architectures need to be optimized for this new era of data consumption.

The agility of the public cloud is well suited for ramping up new services and transient workloads, but over time as the data set grows, the costs for storage-intensive workloads can increase very rapidly. As applications and workloads continue to move to the public cloud, a growing number of IT managers struggle to justify alarmingly high monthly public cloud storage bills. Monthly bills of tens of thousands of dollars are common. ESG spoke with an IT manager at a Fortune 500 company that was trying to reduce a monthly public cloud bill of more than $500,000; for that company, moving the data off the cloud and back in-house presents a bitter pill to swallow, thanks to data egress fees, but will provide a more cost-effective strategy in the long-term.

Who Should Consider ECS?

Table 2. Economic Model Analysis: Key Attributes for Considering ECS

Attribute	Who Should Consider ECS?
Asset life	Organizations that keep and use their assets for three or more years
Capacity	Organizations that need 400TB or more of data storage
Monthly data access	Organizations that need to access 1% or more of their data per month
Object size—particularly important for cold archive use cases because the cost of gets and puts is high	Organizations with an average object size smaller than 1MB

Your mileage will vary depending on a number of factors, including the nature of your applications, which public cloud provider and purchasing model you're considering, and data center/colocation costs. The level of savings will vary, but if you're consolidating workloads and data at scale, then ESG is confident that the economic benefits described here will hold true.

If your organization is using a public cloud storage service, check your bill. You should definitely consider the economic benefits of on-premises object storage. If you're considering implementing new workloads or hosting IoT data off-premises, use the lessons learned here to compare the costs of hosting that data on your own on-premises object storage to the costs of renting storage in the public cloud. If you'd like to learn more about the model that was used in this report and the economic implications for your business, contact Dell Technologies. To learn more about ECS, visit Dell.com/ECS.

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