



Reduce Carbon Emissions by up to 70%

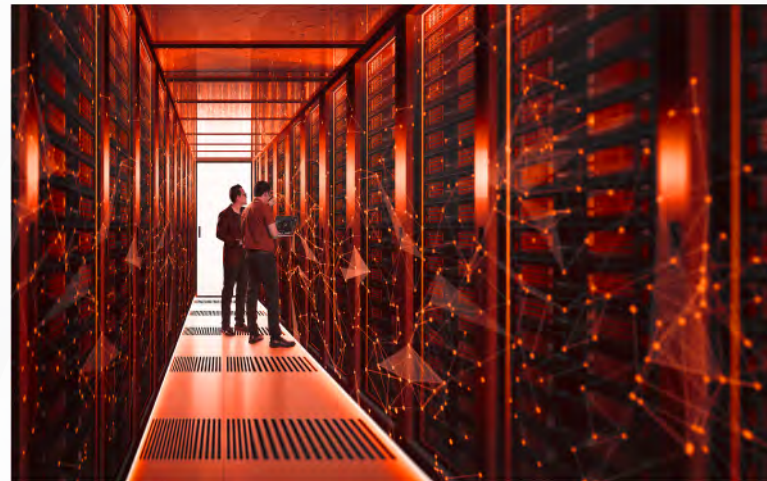
How using the Nyriad® UltraIO™ storage solution can save power and reduce carbon emissions

The data storage industry has been a fast growth industry for decades. With the ever-increasing importance of data in our economy, the need for more capacity and performance has no end in sight. Users frequently defer to extraordinary power needs of large data centers, and the damaging environmental effects caused by their associated carbon emissions. As the world continues to consume more and more data storage, it is becoming increasingly prohibitive to simply scale out with more units using decades old technology like RAID.

Hyperscale architectures banished RAID long ago to enable the use of the more efficient high-capacity drives. They can do this by employing specialty protocols and multi-site / multi-copy architectures. However, array vendors providing on-premises solutions are not able to take advantage of the same tactics in a cost-effective way and thus have been forced to stick with RAID.

While most storage vendors support large capacity drives, in reality they mostly sell lower-capacity drives. Using larger capacity drives in a RAID6 array can mean weeks to rebuild a failed drive, leaving the user with only one drive to prevent data loss through the entire rebuild process! This extended data loss exposure is an unacceptable enterprise risk to most customers. So, it is not surprising that the current norm for RAID designs is the use of 4, 6 and 8 TB drives, even though the industry is shipping 18 and 20 TB drives.

The Nyriad UltraIO storage solution is different and does not use RAID – instead, it uses the combined power of GPUs + CPUs to do erasure coding. The UltraIO storage can lose up to 20 drives (in a



204-drive system) with no data loss, and less than five percent performance degradation¹. This provides better data protection without the need for additional drives for protection or performance, as with RAID. Additionally, the UltraIO storage has much faster rebuild times which are measured in hours versus RAID systems with rebuild rates measured in days or weeks. Hence, the UltraIO storage system uses larger, more economical and environmentally efficient drives without worry about data protection or lengthy rebuild times.

Let's use a simple example to illustrate the difference between using large and small capacity drives from a power and carbon emissions perspective. Using smaller drives results in a larger physical footprint based on the need for more drives and physical enclosures to achieve the desired capacity. This increases both power and cooling requirements and generates more carbon dioxide (CO₂) emissions. The increased power usage makes sense but how big is the carbon emission impact?

A typical 4 TB hard disk drive consumes 12.1 watts, whereas a new large capacity 20 TB drive filled with Helium consumes only 8.8 watts. Surprisingly, a 20 TB drive consumes 3.3 watts less power than the 4 TB drive, but (1) 20 TB HDD also replaces (5) 4 TB HDDs (See Figure 1). Hence, 60.5 watts can be replaced with 8.8 watts for the same capacity. This is an 85% reduction in power and an 85% reduction in CO₂ emissions! That's an annual reduction of 462 pounds of CO₂ emissions² for just this one 20 TB drive example.

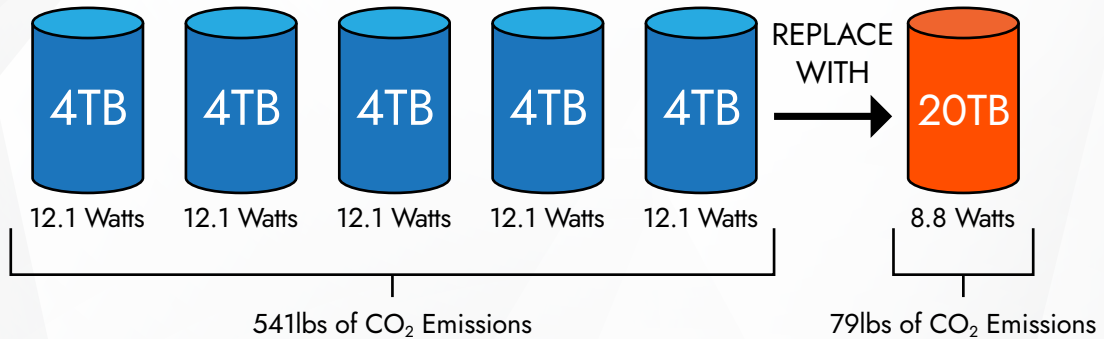
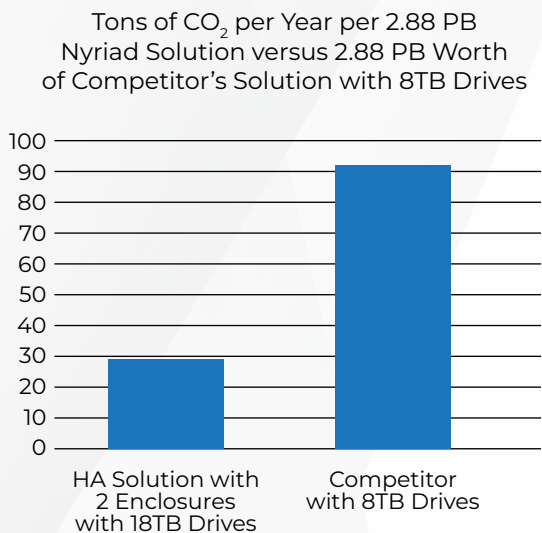


Figure 1 - 60.5 watts and 541 lbs of CO₂ versus 8.8 watts and 79 lbs of CO₂ for the same capacity point.

Extrapolating this out to a 2.88 PB storage array for a more real-world comparison, a competitor's RAID-based array using 8 TB drives emits 92 tons of carbon dioxide annually versus Nyriad's UltraIO storage platform using 18 TB drives only emits 28 tons per year which is 70% less! Imagine the reduction in CO₂ emissions you can have at your data center or even at an industry level by using the UltraIO storage platform – this could have a profound impact on our environment, and help organizations meet their sustainability goals and green initiatives.



Summary

The Nyriad UltraIO platform is a revolutionary storage solution that provides an outstanding opportunity to reduce CO₂ emissions while improving data protection and resilience, with no sacrifice to your performance or capacity needs. Customers can improve the economics of their storage by utilizing larger capacity, more efficient drives as well as progress their company's sustainability goals. If you care about your data and the environment, the Nyriad UltraIO system provides a solution that shines at both.

Figure 2 - Nyriad's UltraIO storage platform emits 70% less CO₂ emissions annually compared to a competitor's RAID based array.

1. Drive-pull IOR bandwidth on UltraIO v1.0 and BeeGFS 7.2.5, test performed by System Fabric Works.

2. Approximating 1.021 pounds of CO₂ per kW hour, which assumes the bulk of power usage comes from fossil fuels with some rare occurrences of non-CO₂ emitting sources used.