

Business white paper

# Storage efficiencies that unlock green savings

HP Converged Storage



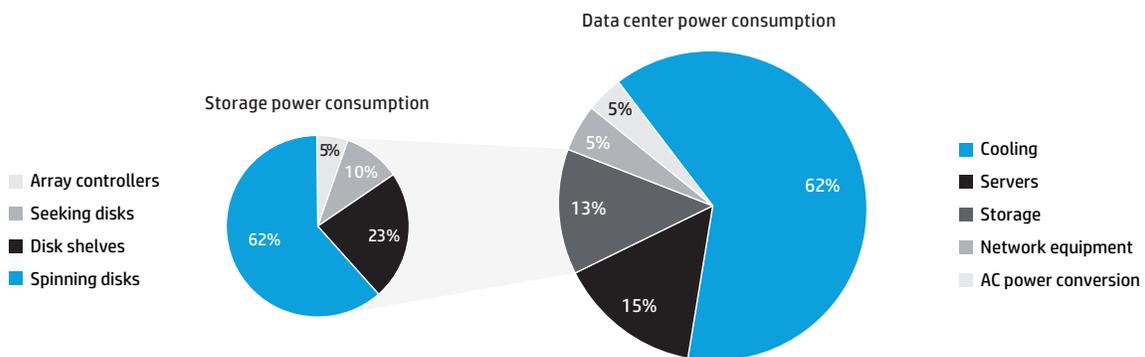
## Inefficiency impacts your bottom line

Many factors are causing IT organizations to look at their environmental scorecards. The rising worldwide demand for power, inherent complications of power creation and usage, the ongoing debate about global warming, and steady demand for more IT services at less cost are driving more focus on green IT. Other practical business reasons are not to be overlooked: data centers in general are running out of space, and data center sprawl typically goes hand-in-hand with management complexity and overall resource inefficiency—all of which impact bottom line.

Inefficient storage is a major contributor to data center sprawl. Traditional storage environments in particular are bulky, expensive, and complex, consisting of silos built alongside servers, networking, and power management gear. Most unified and monolithic storage systems deployed today were based on the needs of 20 years ago—before the predominance of the Internet, the ubiquity of smartphones, and the explosive growth of unstructured data. These legacy systems are not designed to accommodate such modern developments as virtualization, IT as a Service (ITaaS), and the rise of cloud computing. Instead, today’s storage environments have become isolated and inefficient, filled with underutilized hardware that can contain more unused space than actual data. Yet their disks keep spinning away, consuming more valuable resources than is really necessary.

### Data storage power consumption<sup>2</sup>

More than 60% of storage power goes into keeping disks spinning



<sup>1</sup> "Energy Star Rating for Enterprise Data Storage Servers Urgently Needed," David Scott, 3PAR CEO, Smart Energy News, June 13, 2010. <http://smartenergynews.net/opinions/>

<sup>2</sup> Sources: Preliminary assessment from Uptime Institute; IDC "Data Center of the Future U.S. Server Power Spend," for 2005 as a baseline (\$6bn); applied a cooling factor of 1; applied a 0.6 multiplier to U.S. data for WW amount; Belady, C., Malone, C., "Data Center Power Projection to 2014," 2006 IThERM, San Diego, CA (June 2006). *NetworkWorld* "Green storage means money saved on power," May 2007, EVA4400 power measurements.

IDC estimates that in today’s data centers, storage accounts for 37 percent of the total energy consumed<sup>1</sup>—and storage needs will only continue to grow. Combine that with these statistics: cooling represents more than 60–70 percent of data center power spend, and approximately 85 percent of the world’s data centers are over-provisioned by more than double. In other words, enterprises have been buying more capacity than they need, over-provisioning their storage, and overcooling their equipment.

Siloed architectures are not just inefficient but inflexible—thus preventing organizations from capitalizing on the benefits of emerging applications and services or unable to meet changing business demands. As IT executives continue to look for ways to do more with less and open up new revenue streams, infrastructure is a key component of the equation.

HP offers storage that helps organizations become more efficient—regardless of whether they are looking to optimize a traditional data center or transition to a converged infrastructure or cloud computing environment.

Within this portfolio, HP Converged Storage products are designed to help today’s organizations remove boundaries between storage silos and bring that storage closer to applications to improve not just power efficiency, but overall IT efficiency.

This radical increase in efficiency—the storage foundation for the HP Converged Infrastructure—frees up valuable resources, enabling them to be channeled into innovation instead of operations.



## Converged storage is green storage

More and more, people are demanding that everything be mobile, connected, interactive, immediate, and fluid. We rely on technology to connect us with others, and we expect it to do so simply and seamlessly.

To gain competitive advantage in the face of these new expectations requires that enterprises be at the very forefront of technology innovation and growth. Tomorrow's business leaders will be enterprises that leverage technology to capitalize on—rather than simply adapt to—changing customer expectations.

The efficient enterprise is built on the principles of a converged infrastructure, which delivers a systematic approach to accelerate time-to-business value for IT organizations. A converged infrastructure helps to overcome the inflexibility and high costs created by data center, application, and IT sprawl—and to shift resources away from operations so they can be channeled into innovation.

HP Converged Infrastructure provides a blueprint for the data center of the future. It accelerates the provisioning of IT services and applications by integrating servers, storage, networking, security, power, cooling, and facilities into shared pools of interoperable resources—all managed through a common management platform. The result is a model for delivering any workload—anywhere, anytime—to achieve better business results.

<sup>3</sup> *Network Computing*. [networkcomputing.com/data-center/hdss-yoshida-mounts-maid-assault.php](http://networkcomputing.com/data-center/hdss-yoshida-mounts-maid-assault.php).

Fundamental to this data center of the future is HP Converged Storage—built on modular, standardized platforms; federated, scale-out software; and converged management.

The goal of the converged data center is to utilize resources in the most efficient way possible so that fewer assets are needed to meet IT requirements. The result is a smaller data center footprint, less energy needed for power and cooling, and less equipment to downcycle when it reaches end of life. Information is stored and managed more intelligently, so these critical tasks also require fewer resources.

But it's not necessary to overhaul the entire data center to become more energy- and asset-efficient. Considering that storage is such a large consumer of data center energy—and that more than 60 percent of storage power goes into just keeping disks spinning<sup>3</sup>—it makes sense to:

- Take incremental steps, starting with optimizing legacy assets, in order to deliver the highest IT density possible with the least amount of energy
- Place storage high on the list of areas on which to focus

HP Converged Storage delivers innovations in the areas of thin technologies, storage tiering, data protection, energy-efficient hardware, storage federation, and storage built for virtual and cloud environments. These innovations, aimed at making storage more efficient and responsive to changing business needs, deliver powerful environmental sustainability benefits in the process.

## An environmental sustainability pioneer

HP has focused on providing sustainable data center solutions for decades. HP owns massive e-waste recycling plants where enormous shredders and granulators reduce four million pounds of computer detritus each month to bite-sized chunks—the first step in not just reclaiming steel and plastic, but also preventing toxic chemicals from leaching into the environment. HP machines are 100 percent recyclable—and, in the United States, the company will take back and recycle any brand of equipment.<sup>4</sup> HP also audits its top suppliers for environmentally sustainable practices, and its omnibus Global Citizenship Report sets the standard for detailed environmental accountability.

HP has been recognized many times over for its sustainability contributions:

In 2011, HP was named as the top electronics company in the Greenpeace Guide to Greener Electronics,<sup>5</sup> due largely to its reductions in greenhouse gas emissions from its own operations as well as its suppliers, and a procurement policy that excludes paper from companies linked with illegal logging and deforestation.

*Fortune* magazine has called HP one of 10 “green giants”<sup>6</sup> and “Silicon Valley’s longtime industry leader in eco-sensitivity,” naming HP one of the world’s most admired companies of 2010. Fortune has also said that HP is one of several companies that “have gone beyond what the law requires to operate in an environmentally responsible way.”<sup>7</sup>

*Newsweek* magazine ranked HP No.1 on its 2009 “Green Rankings of America’s 500 largest corporations.”<sup>8</sup> According to **environmentalleader.com**, “Hewlett-Packard earned its No. 1 position due to its greenhouse gas (GHG) emission reduction programs, and was the first major IT company to report GHG emissions associated with its supply chain...”<sup>9</sup>

HP took the top spot on *Corporate Responsibility Magazine’s* “100 Best Corporate Citizens” list for 2010.<sup>10</sup> The list is cited by *PR Week* as one of America’s most important business rankings. HP beat out other Russell 1000 Index companies for its leadership in seven categories, including environment and climate change.

HP collaborated with other members of the Storage Networking Industry Association (SNIA) to develop the SNIA Emerald Power Efficiency Measurement Specification introduced in 2011 and was one of the first storage vendors to submit test results as part of the program.

This type of sustainability leadership permeates HP’s corporate culture, as evidenced in the architecture and design of every solution it offers, from consumer to enterprise.

<sup>4</sup> “Citizenship in a Changing World.” [hp.com/hpinfo/globalcitizenship/index.html](http://hp.com/hpinfo/globalcitizenship/index.html).

<sup>5</sup> “HP Tops Greenpeace Green Electronics Table.” [eweekurope.co.uk/news/hp-tops-greenpeace-green-electronics-table-45097](http://eweekurope.co.uk/news/hp-tops-greenpeace-green-electronics-table-45097).

<sup>6</sup> “10 Green Giants,” CNN-Fortune, April 2010. [http://money.cnn.com/galleries/2007/fortune/0703/gallery.green\\_giants.fortune/10.html](http://money.cnn.com/galleries/2007/fortune/0703/gallery.green_giants.fortune/10.html).

<sup>7</sup> Ibid.

<sup>8</sup> “Hewlett-Packard—Green Rating,” *Newsweek*, retrieved September 22, 2009.

<sup>9</sup> “HP Leads 100 Best Corporate Citizens List,” March 2010. [environmentalleader.com/2010/03/03/hp-leads-100-best-corporate-citizens-list-in-2010/](http://environmentalleader.com/2010/03/03/hp-leads-100-best-corporate-citizens-list-in-2010/)

<sup>10</sup> “CR’s 100 Best Corporate Citizens 2010,” [theCRO.com](http://theCRO.com), CRO Corp., June 1, 2010.

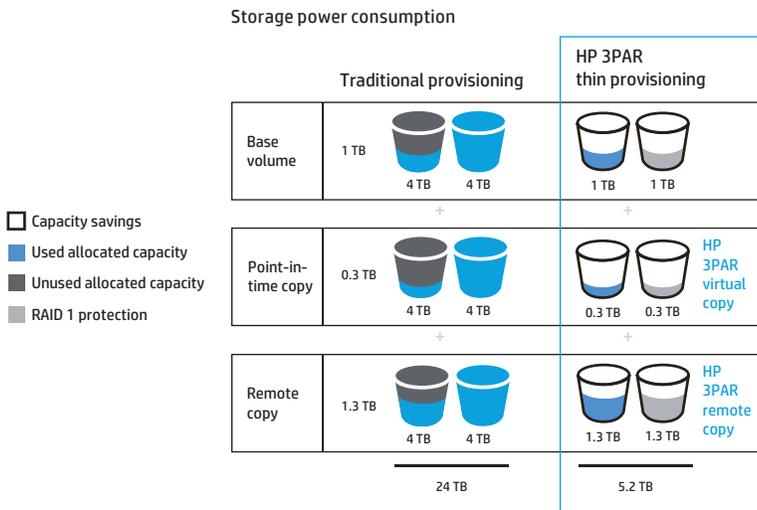
## Next-generation hardware: building in energy efficiency from the start

Providing energy-efficient solutions—from the server chips to the data center air chillers and everything in between—is a philosophy embedded deeply in the HP approach to developing innovative technologies. It is also evident in every one of the company’s hardware and management solutions. From dynamic data center cooling solutions to thermal service expertise, HP delivers a total solution to create a more efficient data center through reduced power and cooling without sacrificing performance.

This built-in energy efficiency is evident in the DNA of HP Converged Storage, which encompasses several product families that leverage or have plans to leverage such proven HP industry-standard hardware as HP ProLiant servers—including the latest generation, ProLiant Gen8, featuring automated energy optimization—and HP BladeSystem, both of which offer dramatic power-efficiency benefits.

The hardware backbone of HP Converged Infrastructure, power-optimized HP ProLiant servers feature low-power Intel® Xeon® and AMD Opteron processors that deliver high performance while using only about half the power of processors that drive competitors’ servers. These Intel and AMD processors also contain power-state hardware registers that allow IT organizations to control performance and power consumption. SFF (2.5-inch) serial-attached SCSI (SAS) drives such as those deployed within HP LeftHand Storage Systems generate nine watts of power compared to 18 watts for a 3.5-inch drive. SSDs including those available with HP Converged Storage systems such as HP 3PAR Storage Systems consume approximately 40 percent of the power with 30 times greater read performance than more resource-intensive spinning disks. For example, the new all-SSD version of the HP 3PAR P1000 Storage Array enables the system to deliver the same industry-leading performance as other 3PAR models, but with a fraction of the number of drives to reduce client data center footprint and energy costs.

### Example thin storage savings with HP 3PAR Storage



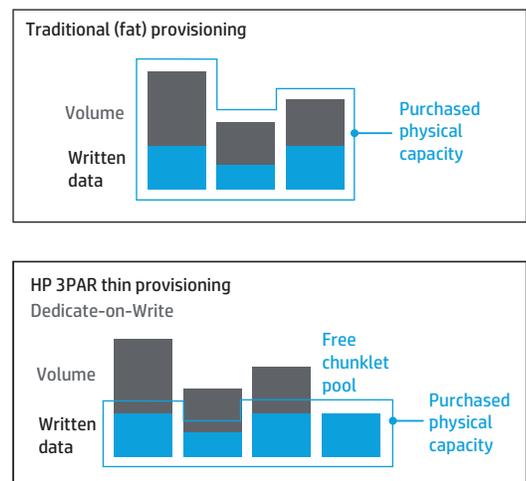
## Thin technologies: cut storage footprint in half

One key area in which HP Converged Storage excels in efficiency is its innovative, industry-leading thin technologies. Before thin provisioning, traditional storage provisioning methods essentially forced IT managers to buy additional capacity upfront—even if that capacity would ultimately never be necessary. Now a staple of the storage industry, thin provisioning removes this inefficiency by eliminating the need to pre-dedicate capacity. As a result, thin provisioning can dramatically increase storage utilization rates—enabling organizations to purchase less storage capacity, defer storage capacity upgrades, and cut power, cooling, and footprint costs. However, not all thin provisioning implementations are equal.

### Calculate your savings

The HP 3PAR Savings Calculator, available at [hp.com/storage/3PARsavings](http://hp.com/storage/3PARsavings), is a third-party tool provided to help estimate the potential savings of migrating existing storage capacity to an HP 3PAR Storage system—including savings related to improving carbon footprint.

### Reducing capacity purchases



HP 3PAR Storage is built to be extremely energy-efficient by design, providing excellent opportunities to reduce data center sprawl as well as capital and operating expenses. 3PAR arrays also offer the industry's most innovative, efficient, and comprehensive thin technologies. According to an independent study conducted by Wikibon, 50 percent of 3PAR users achieved additional capacity benefits of 150 percent or more with HP 3PAR Thin Provisioning Software—meaning that they would have had to install 2.5 times the amount of storage capacity with traditional arrays in order to meet the same business needs.<sup>11</sup> However, with HP 3PAR Storage, thin provisioning is only the start of the thin savings.

A pioneering thin technology platform since its introduction more than 10 years ago, HP 3PAR Storage features a multi-faceted approach to being “thin” that enables storage not only to start thin by using thin provisioning, but to get thin and stay thin with advanced hardware and software capabilities unique to the platform. Proprietary thin processing capabilities are even built into the platform's DNA via the highly customized HP 3PAR Thin Built In ASIC—an innovation that no other storage product on the market can claim. This silicon-based thin processing mechanism drives the rapid thinning of storage volumes by identifying and removing unused disk capacity, then keeps those volumes thin over time by reclaiming unused space.

## Energy savings

The fast track to energy savings:  
HP Data Center Smart Grid

To increase the energy efficiency of the data center as a whole, improving cooling efficiency is the quickest and most impactful way to reduce power usage. Finding and using trapped power, after all, can extend a data center's life by years and save millions of dollars. As one example, HP Data Center Smart Grid—a key management component of the HP Converged Infrastructure—creates an intelligent, energy-aware environment across IT and facilities to automate energy management and reduce energy use. A “sea of sensors” monitors energy consumption and heat dissipation so that workloads can be balanced across energy zones. Learn more at [hp.com/go/datacentersmartgrid](http://hp.com/go/datacentersmartgrid).

Results like this are behind the HP Get Thin Guarantee Program for new 3PAR customers who use HP 3PAR Thin Conversion Software to migrate “thick” data volumes from legacy storage to “thin” volumes on any model HP 3PAR array.<sup>12</sup> This guarantee promises a minimum 50 percent storage capacity savings—or HP pledges to make up the difference with free hardware, software, and support.<sup>13</sup>

To augment thin provisioning and thin conversion savings, the 3PAR platform's optional thin reclamation and thin persistence software also enable thin volumes to stay lean for ongoing savings over time. This is made possible by leveraging the HP 3PAR Thin Built In ASIC to reclaim unused space associated with deleted data—simply, quickly, and non-disruptively. This space reclamation helps organizations maintain sustainability targets by keeping down data center power and cooling needs.

## Storage federation with Peer Motion

HP Peer Motion Software, a recent addition to the HP Converged Storage portfolio, has the ability to make thin provisioning even more effective. IDC estimates that by 2012, 85 percent of new applications will be specifically designed to be accessed in the cloud.<sup>14</sup> Agile delivery of these virtualized and cloud-based applications requires linking multiple storage systems together to act as a single entity. Known as storage federation, this capability delivers increased pooling of resources and, as a result, can multiply the benefits of thin provisioning and further reduce storage footprint, cost, and administration overhead.

HP Peer Motion Software delivers the industry's first peer-to-peer storage federation capabilities to span virtual storage arrays (VSAs)—such as the HP StoreVirtual VSA—midrange, and high-end storage systems. Peer Motion enables seamless movement of data and workloads between any model HP 3PAR Storage array or between HP LeftHand Storage systems. It works with HP thin provisioning technologies to enable the transparent movement of application data to systems with available capacity—thereby reducing the need for future storage purchases to accommodate data growth. This is another example how intelligent data placement can reduce storage footprint and increase savings.

<sup>11</sup> Case Study: Evaluating the virtualization and thin provisioning benefits achieved by 3PAR customers,” by David Floyer, June 29, 2010. [http://wikibon.org/wiki/v/Case\\_Study:\\_Evaluating\\_the\\_virtualization\\_and\\_thin\\_provisioning\\_benefits\\_achieved\\_by\\_3PAR\\_customers](http://wikibon.org/wiki/v/Case_Study:_Evaluating_the_virtualization_and_thin_provisioning_benefits_achieved_by_3PAR_customers).

<sup>12</sup> The HP Get Thin Guarantee Program is available to clients globally through HP or HP-authorized channel partners. Under the terms of the program, qualifying participants may purchase any model of HP 3PAR Storage System with HP 3PAR Thin Conversion and HP 3PAR Thin Provisioning Software.

<sup>13</sup> For details, refer to the Get Thin Guarantee Terms and Conditions. More information is available at [hp.com/storage/getthin](http://hp.com/storage/getthin).

<sup>14</sup> “Five Steps to Successful Integrated Cloud Management,” IDC White Paper sponsored by HP, IDC No. 228116, May 2011.

## Optimizing traditional environments with thin provisioning and tiering

HP EVA Storage offers an excellent option for optimizing traditional environments while addressing the need to reduce power, cooling, and footprint costs. The HP EVA P6000 offers fifth-generation EVA hardware that inherently operates more efficiently and software that optimizes storage capacity to reduce the number of disks needed. With the EVA P6000, application data can be consolidated to reduce administration time and total cost of ownership (TCO). Array-based virtualization capabilities significantly speed storage administration while increasing storage utilization.

The HP EVA P6000 features built-in thin provisioning for greater energy efficiency that surpasses that of the platform's previous generations. This built-in thin provisioning technology improves capacity utilization while dynamic storage tiering capabilities ease data migration.

HP EVA Dynamic Capacity Management (DCM) automates storage provisioning and improves capacity utilization for thin provisioning with HP EVAs. DCM uses advanced automation to "right-size" the supported file system and the EVA virtual disk (Vdisk) storage volume to the needs of an application. This dramatically improves capacity utilization by allowing the administrator to simply specify a capacity utilization range for each Vdisk. The result: reducing the operational costs of powering and cooling unnecessary storage by up to 45 percent.

The latest-generation HP EVA also features built-in dynamic storage tiering for increased efficiency and ease of migration. The new dynamic LUN migration feature provides the ability to alter service levels associated with a storage volume without incurring downtime. In addition, the EVA P6000 delivers the following green benefits:

- Uses small form factor (SFF) drives to deliver a 40 percent energy savings and enable 100 percent more enterprise capacity to be deployed in the same rack space<sup>15</sup>
- Eliminates stranded storage to improve utilization and reduce power and cooling demands
- Enables capacity to be purchased as needed to shrink operational costs and carbon footprint
- Increases scalability with added capacity of up to 480 terabytes through using large form factor (LFF) drives, enabling organizations to grow while purchasing less equipment that must eventually be downcycled

Like the HP EVA, HP XP Disk Arrays including the P9500 are not only ideal for optimizing existing environments, but also feature storage tiering capabilities. The P9500 uses software to improve storage performance while controlling costs and energy consumption by migrating data to the appropriate storage tier within the array. The platform's software places the host volume's data across multiple tiers of storage contained within a pool and then determines which tier to use based on data access levels. The result is more efficient, more sustainable storage.

<sup>15</sup> "Hewlett-Packard—Green Rating," *Newsweek*, retrieved September 22, 2009.

## **Tape: the greenest way to store data long-term**

As game-changing as HP's advanced StoreOnce deduplication technology is, tape is still the greenest, most cost-effective way to store data for long periods of time to satisfy compliance requirements as well as to meet other archiving needs. After all, tapes that are sitting on the shelf use little to no power and cooling.

HP is the leading supplier of tape solutions with a full line of LTO-based tape products to meet these needs. This line starts with single tape drives and expands up to the enterprise-class ESL G3 Tape Library.

For most organizations, a combination of tape, disk, and deduplication provides the best approach and offers the following low-TCO and green benefits:

- Ability to store up to 20 times more data while consuming the same disk space through efficient deduplication
- Flexibility to accommodate even massive growth in the amount of data requiring protection without adding storage devices, thanks to HP StoreOnce deduplication technology
- Industry-leading energy efficiency offered by HP ProLiant servers, which are leveraged by HP StoreOnce appliances
- Elimination of the costs and energy consumption associated with physically transporting data from site to site thanks to deduplication-enabled, low-bandwidth replication technology
- Reduction in the number of backup devices per site (and associated power and cooling) through the use of disk-based appliances that support multistreamed backup
- Elimination of the power and cooling requirements associated with storing archival data on spinning disks

## **HP Eco Case cartridge**

The unique HP Eco Case cartridge packaging is manufactured from pulp injection moulded paper derived from 100 percent recycled materials. It is also 100 percent recyclable, bleach and chemical free, and, once disposed of, fully biodegradable within six months.

The origins of the Eco Case cartridge lie in a staggering statistic that emerged back in 2008: that each polypropylene LTO Ultrium cartridge case requires a kilogram of oil to manufacture. With over 22 million LTO tapes shipping that year, clearly there was an opportunity to reduce the environmental footprint of a relatively mundane, but important, element in HP tape drive packaging.

After a significant investment in researching different materials and methods, the Eco Case was born: the first tape media storage case for customers who want to combine product utility with high environmental principles. Compared to the traditional, polypropylene (PP) cartridge case, the LTO Eco Case reduces manufacturing oil consumption by two thirds and carbon dioxide emissions by half. Crucially, however, the Eco Case has been exhaustively tested by HP to ensure it offers protection from shock, vibration, and debris contamination to demonstrate its equality with the polypropylene case. It's important that using an Eco Case to store and archive data cartridges offers a more environmentally sustainable alternative that will never put users' data at risk. For more information, visit [hp.com/go/tape](http://hp.com/go/tape).



## Autonomic storage tiering: intelligent and automatic capacity optimization

Storage tiering is a strategy for boosting storage efficiency by intelligently optimizing the placement of data on various storage tiers with different types of physical capacity in order to balance cost and performance. For example, data used less frequently can be moved to lower-cost, high-capacity drives that consume less energy, and active data can be escalated to a high-performance tier composed of premium capacity such as that provided by solid state drives (SSDs). In this area, HP Converged Storage offers not just tiered storage, but autonomic storage tiering that intelligently and automatically optimizes the use of capacity resources to deliver both cost and energy savings.

With storage tiering, the creation of multiple drive tiers within the same system delivers power savings by moving data onto more energy-efficient nearline and SSD tiers as appropriate. When compared to traditional rotating media, SSDs have been demonstrated to reduce power requirements by roughly 40 percent. Nearline drives, by virtue of their increased size and reduced speed, are also more power efficient than the high-performance Fibre Channel drives typically used for online storage.

Developed for virtual and cloud data centers, HP 3PAR Adaptive Optimization and Dynamic Optimization Software for HP 3PAR Storage Systems provides reliable, nondisruptive, cost-optimized, in-the-box tiering that is also autonomic. Autonomic tiering delivers the right quality of service (QoS) to the right data at the right time—intelligently, and without administrator intervention.

Multiple enterprise systems no longer need to be purchased and maintained to serve the needs of different data types (for example, online versus archival). As a result, improvements in energy efficiency are delivered automatically, without consuming administrative resources.

## Data protection: promoting sustainability from multiple angles

HP uses several approaches to data protection that also reduce power and cooling demands, further promoting data center sustainability.

For example, changing economics have made disks a viable alternative to tape, which has permitted the creation of disk-based backup appliances that feature a data reduction technology called data deduplication. Deduplication eliminates redundant data and thereby reduces physical storage requirements. Data deduplication can save a tremendous amount of storage capacity and, therefore, significant data center resources. In the company's experience, deduplication can reduce the need for backup storage space by 10 to 50 times.<sup>16</sup> HP StoreOnce Backup Systems are a leading example of such appliances.

These appliances draw on next-generation technology delivered in HP StoreOnce software, which can scale from client to back-end data center with multiple applications and data types. When applied across a converged infrastructure, HP StoreOnce software delivers the only technology that deduplicates data only one time.

<sup>16</sup> "HP Leads 100 Best Corporate Citizens List," March 2010. [environmentalleader.com/2010/03/03/hp-leads-100-best-corporate-citizens-list-in-2010/](http://environmentalleader.com/2010/03/03/hp-leads-100-best-corporate-citizens-list-in-2010/)

## HP Energy and Sustainability Management Services

HP Energy and Sustainability Management (ESM) Services offers a complete portfolio to increase business value from energy and resource efficiency. It is a new way for organizations to measure, manage, and optimize energy consumption throughout IT in order to reduce emissions and to create and maintain a sustainability plan that is both financially and environmentally beneficial.

From HP Energy and Sustainability Discovery Workshops to its Energy and Carbon Reporting Service, HP ESM promotes a strategic approach and deep technical transformation to enable growth, innovation, and transparency. HP ESM helps enterprises integrate sustainability directly into their business plans and gain control over their consumption of energy resources.

There are four key steps in the HP ESM approach:

- **Assess:** discover your options and establish a baseline
- **Plan:** create a roadmap for short-term wins and long-term success
- **Transform:** implement your vision and realize gains throughout the enterprise
- **Optimize:** leverage new insights and communicate results

Learn more at [hp.com/go/ESM](http://hp.com/go/ESM).

## Taking an innovative approach to energy conservation

HP offers several revolutionary energy-saving technologies for improving resource consumption, both in the converged data center and in traditional IT environments:

- **HP Dynamic Smart Cooling** can deliver up to 45 percent in cooling cost savings. HP Dynamic Smart Cooling changes data center energy costs from a fixed to a variable cost, significantly increases IT scaling headroom, and enables a much more efficient data center.
- **HP Thermal Mapping** provides a three-dimensional model of exactly how much and where data center air conditioners are cooling. As a result, organizations can arrange and manage air conditioning for optimal cooling, increased energy efficiency, and lower costs.
- **HP Insight Power Manager (IPM) and Integrated Lights-Out (iLO) 2** use regulators to reduce power consumption by up to 10 percent. HP IPM enables the consolidation of power consumption data for multiple servers to a central location. This information can be used to charge business units or third parties with the actual energy operational costs associated with workload processing. HP iLO 2 enables uncompromised, remote centralized power management.

## HP PODs: a simplified approach to the green data center

HP Performance Optimized Data Centers (HP PODs) are breakthrough, modular, environmentally efficient data centers. Compared to traditional brick-and-mortar data centers, HP PODs help organizations scale capacity on demand, reduce capital expenditures, and increase energy efficiency.

Featuring HP Converged Storage, HP PODs provide an innovative, energy-efficient alternative to traditional brick-and-mortar data centers. They can be customized to meet the specific capacity, climate, and site requirements of organizations around the world. HP PODs are also designed to appeal to enterprises seeking to expand their data center capacity and meet increasing service level agreements quickly, as opposed to evolving in a more incremental approach. HP PODs are designed to:

- **Accelerate deployment:** an HP POD can be up and running in as little as 12 weeks<sup>17</sup>
- **Reduce costs:** with their modular design and supply chain economies, HP PODs can save an organization up to 75 percent over a traditional data center<sup>18</sup>
- **Increase efficiency:** HP PODs offer up to 95 percent greater energy efficiency than a brick-and-mortar data center
- **Shrink footprint:** a high-density rack design can reduce a data center footprint by up to 88 percent<sup>19</sup>
- **Save energy:** HP PODs can save an individual data center enough energy to help power more than 1.8 million U.S. homes for a year<sup>20</sup>
- **Reduce cooling:** each HP POD is air-cooled and automatically adjusts to the most efficient cooling method

Learn more at [hp.com/go/POD](http://hp.com/go/POD).

<sup>17</sup> Compared to planning construction and deployment of 24 months for a monolithic data center. Uptime Institute—"Why Thrifty Isn't Nifty," Brill. Dan Golding Tier 1 Research, "Top Datacenter Trends for 2010." Planning construction and deployment of HP POD is 12 weeks total. The total time may vary depending on volume, configuration, and customer location.

<sup>18</sup> Based on a 1.2-megawatt brick-and-mortar data center construction at \$26.19 per watt (cost estimate based on Uptime Institute—"Cost Model, dollars per kW plus dollars per square foot of computer floor," Turner & Brill, 2010). Compared to estimated \$6.62 per watt cost estimate for HP POD 240a including power house and installation.

<sup>19</sup> Typical data center design powers and cools up to 10 kW in a rack; HP POD 240a has average rack densities of 44 kW per rack.

<sup>20</sup> IDC 2011: "Market Analysis Perspective: Worldwide Datacenter Trends and Strategies."

## Storage built for virtualization and the cloud

HP Storage supports not just reduction in storage infrastructure, but also in server infrastructure through a wide array of virtualization solutions.

### HP 3PAR Storage

HP 3PAR Storage delivers 100 percent of the agility and efficiency demanded by today's virtual and cloud data centers by leveraging key technologies developed to support data center virtualization and cloud computing. HP 3PAR Storage is designed from the ground up to exceed the economic and operational requirements of today's most demanding IT environments—simply and efficiently. As an HP Converged Storage platform, HP 3PAR Storage delivers the performance, scalability, and availability required of Tier 1 storage along with unique technology benefits not available with traditional platforms. With HP 3PAR Storage, organizations can purchase up to 75 percent less storage capacity—meaning less equipment to house, fewer disks to power and cool, less hardware to downcycle after it has reached end of life, and a reduced carbon footprint.

HP 3PAR Storage is also designed to enable massive consolidation by supporting mixed workloads and secure administrative segregation of users, hosts, and application data. This next-generation capability enables both internal and external service providers to deliver higher performance levels, greater availability, and next-generation functionality to multiple user groups and applications from a single storage system with a reduced carbon footprint.

### HP VirtualSystem

The HP VirtualSystem is a highly optimized, turnkey solution that gives organizations an expedited path to virtualized infrastructure and provides a foundation for cloud computing. HP VirtualSystem for VMware includes virtualized HP networking solutions, HP Converged Storage, HP BladeSystem servers, and HP Insight software with onsite installation services.

### HP CloudSystem

HP CloudSystem is a complete cloud offering based on HP Cloud Service Automation software and HP Converged Infrastructure. HP CloudSystem is powered by Converged Infrastructure solutions including HP BladeSystem Matrix, which integrates servers, storage, and network resources with unified management. HP 3PAR Storage technology is also included within HP CloudSystem and connected by a high-performance HP networking fabric. HP CloudSystem delivers broad application support and helps businesses package, provision, and manage cloud services to users regardless of where those services are sourced. Automated management capabilities allocate private and public cloud resources based on an organization's pre-defined business policies in order to meet performance, compliance, and cost targets. This enables businesses to create and deliver new services in minutes.

Enterprises already invested in HP Converged Infrastructure technologies such as HP BladeSystem, HP BladeSystem Matrix, HP 3PAR Storage, and Cloud Service Automation can easily expand their current architectures to achieve a private, public, or complete hybrid cloud environment with HP.

## Becoming more competitive as a business

Two major challenges facing today's data centers are the ability to cope with massive growth—particularly in unstructured data—and the need for sustainability. Gartner Research determined that in 2010, enterprises spent more on power than on hardware—and it projected that by 2013, half of all existing data centers will either run out of space or will have inadequate power and cooling equipment. Meanwhile, market intelligence firm IDC estimates that 70 percent of new server costs are spent on power and cooling.<sup>21</sup> And it's no secret that IT plays a significant role in carbon emissions, with an impact nearly equal to that of the airline industry, according to various research.

Governments around the world understand that IT should play a major role in driving these power and emissions numbers down. The United States government has mandated that all server equipment be ENERGY STAR® certified by 2012. In Europe, the Waste Electrical & Electronic Equipment (WEEE) continues to enforce strict guidelines for recycling electronics. And in China, several laws have been enacted to reduce and control pollution emanating from data centers.

However, these mandates are not enough. HP has been a longtime champion of developing and delivering environmentally conscious IT solutions and has designed a variety of solutions built into HP Converged Storage with this philosophy in mind. And while it is no longer news that enterprises need to embrace "Green IT" in order to become sustainable, organizations have been less likely to focus on implementing green storage solutions because they have failed to make the essential connection between sustainability and becoming more competitive as a business. HP Converged Storage not only helps organizations become more power efficient, but more operationally efficient and more flexible. The data center of the future is a converged data center, and this convergence has the power to transform businesses.

HP Converged Storage is about doing more with less through a new model that eliminates boundaries and simplifies IT. HP makes storage not just more energy-efficient, but more efficient in general—in terms of utilization, capacity, management, agility, and overall simplicity. HP will continue to innovate Converged Storage products that help enterprises make the most of limited resources, minimize environmental footprint, and increase their ability to meet swiftly changing customer and market demands. This model enables more resources to be shifted away from operations and towards innovation.

<sup>21</sup> "CR's 100 Best Corporate Citizens 2010," theCRO.com, CRO Corp., June 1, 2010.

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