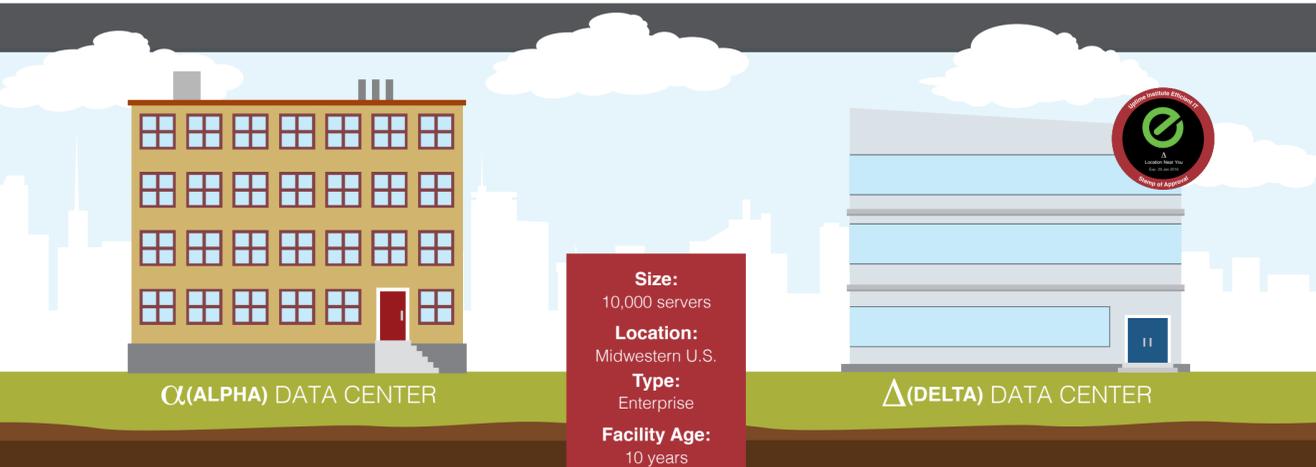


# A Tale of Two Data Centers: Contrast in Efficiency

In the United States and around the globe, there is **explosive growth** in the number of installed servers. **More and more** are deployed each year. Yet most data centers are **not** getting the most out of the servers they have. They're wasting energy running inefficiently at low utilization, or keeping servers on line that aren't in use any more—known as "comatose" servers that suck up energy while placing ongoing demands for the cooling, staffing, and facility infrastructure required to support them. Not to mention, these comatose servers rack up additional associated costs such as hardware maintenance and server licenses, **which can often dwarf** energy expenditures.

**Consolidating and decommissioning unused equipment** requires effort and organizational commitment, but the rewards are great: **millions of dollars saved**, thousands of kW hours in reduced energy consumption, and a smaller carbon footprint. You can achieve results like these in your data center...or you can be a cautionary tale...



**Α (ALPHA) DATA CENTER**

**Size:**  
10,000 servers  
**Location:**  
Midwestern U.S.  
**Type:**  
Enterprise  
**Facility Age:**  
10 years

**Δ (DELTA) DATA CENTER**



## Line Up

**Culture:** Risk-averse management approach, fiscally conservative, focused on quarterly profit margins. They wait for the crowd to prove the value of any new technologies and approaches before adoption. Moderate interest in running greener due to market pressures.

**Background:** Α started measuring PUE a few years back and made some mechanical infrastructure improvements. Management seemed happy with the results, and since the IT team doesn't ever see the power bill, things look fine from their perspective.

Like most data centers, Α has a huge source of energy waste hiding on nearly every rack in the facility: comatose and underused servers.

**Situation:** Α's VP of Operations believes (like 86% of data center owners<sup>1</sup>) that Α has only a small number of comatose servers, although there's no scheduled auditing in place to verify this. He chooses to proceed with business as usual.

**Culture:** Forward-looking management team, understands the value of making long-term investment in more efficient and better technologies; an early adopter. Committed to lowering energy use and CO<sub>2</sub> emissions for environmental benefit.

**Background:** Δ took on the challenge of energy efficiency in a holistic way. First, they improved PUE. With executive level commitment, they began to foster more information sharing and collaboration between the IT and Facilities departments.

Like most data centers, Δ has a huge source of energy waste hiding on nearly every rack in the facility: comatose and underused servers.

**Situation:** Δ's VP of Operations charges his team to keep rooting out inefficiencies. They launch a new initiative: to conduct annual audits and decommission unused servers.

**Approximately 20% of servers in large data centers are comatose: they are idle, obsolete or unused, but are still plugged in, "on," and drawing power<sup>1</sup>**

## Year 1



**2,000 (20%) servers comatose**

**cost for power alone \$500,000<sup>+</sup>**

Source/Calculation: Assuming each server draws about 300 watts/hr per server.<sup>2</sup> At an electricity rate of \$0.10 per kWh, each server is costing Α \$263 per year (300 W x 24 hrs x 365). With 2,000 comatose servers, that's \$525,600 spent on power.

**+\$473,000 on cooling and facility infrastructure**

Source/Calculation: One watt-hour of energy savings at the server level results in roughly 1.9 watt-hours of facility-level energy savings from reducing energy waste in the power infrastructure (power distribution unit, UPS, building transformers) and reducing energy needed to cool the waste heat produced by the server.<sup>3</sup> For their 2,000 comatose units alone, that's an additional \$473,040 in power costs per year.



**2,000 (20%) servers comatose**

**Decommissioned 1,000 servers (first year)**

**Power consumption for servers and associated infrastructure reduced by 4.8 million kWh**

**Power cost reduced by \$528,263**

**+ \$143,770 additional savings for reduced hardware maintenance cost and asset resale/scrap**



## Year 1 Bottom Line

**~\$1.0 million wasted** for every comatose server in Α's installed base, that's **~\$1,000 down the drain every year**



<sup>2</sup> Assuming power usage of roughly 300 W on average.  
<sup>3</sup> New Strategies for Cutting Data Center Energy Cost and Boosting Capacity, Emerson Network Power presentation, 2012, p.8. [http://www.emersonnetworkpower.com/documents/en-us/latest-thinking/led/documents/White%20paper/en603947\\_2012\\_energylogic\\_fin.pdf](http://www.emersonnetworkpower.com/documents/en-us/latest-thinking/led/documents/White%20paper/en603947_2012_energylogic_fin.pdf)

**Saved more than \$672,000** for every server they decommissioned that's **\$672** in cost savings and this number would be **even higher** if they'd calculated savings on other costs such as server licenses

## Year 2



These costs don't even include the fact that Α's not only keeping old servers in use, but is actually adding new ones to meet IT demand

**Another ~\$1.0 million wasted**



**And that's not counting maintenance costs and licensing fees.**

All those useless or near-useless servers are also taking up rack space and ports that could be used by more productive servers to expand IT capacity and revenue without having to expand Α's facility footprint.



**Decommissioned**

**Now \$1.34 Million saved**

In year 2, Δ decommissioned another 1,000 servers.

**As a result of their 2-year initiative, Δ also:**

- **Reduced carbon emissions by nearly 3.9 metric tons**
- **Freed up more than 100 server racks, 4,300 network ports, and 650 SAN ports**



## Prediction: 5 Years Later



And still more servers every year . . .

**By the end of 2020 Α will have wasted more than \$6.5 million<sup>4</sup>**



**Underutilized servers are costing Α an additional \$1.68 million per year.** Comatose servers aren't the only energy drain in data centers: the average server operates at only 12-18% of capacity<sup>5</sup> while typical server clusters average 10-50% utilization.<sup>6</sup> About 50% of server power draw comes from just turning it on. By applying some energy efficiency measures Α could improve cluster utilization and achieve an average 5:1 compression, reducing 8,000 active servers down to just 1,600 performing the same workload. Running as is, they're wasting 16.8 kW of power = \$1.68 million per year. **And that's just the energy cost. They're also wasting untold thousands—or even millions—on hardware maintenance, server licenses, manpower, and other costs of running all those excess servers.**

Source/Calculation: Compression ratio of 5:1 = 8,000/1,600 servers, therefore 6,400 servers could be eliminated. Assuming each server draws about 300 Watts/hr per server means 2,628 kWh per year per server ((300W x 24hrs x 365) / 1000 = 2,628). At an electricity rate of \$0.10 per kWh x 6,400 servers = \$1,618,920

<sup>4</sup> Using the growth rate of 3.6% CAGR in U.S. data center space as a stand-in for the growth in server installs. [http://www.america'sgeophysical.com/GE-CA\\_Document/Data\\_Center\\_Monitor\\_September\\_2013.pdf](http://www.america'sgeophysical.com/GE-CA_Document/Data_Center_Monitor_September_2013.pdf)

<sup>5</sup> Appendix 2' of Data Center Efficiency Assessment, Issue Paper from the National Resources Defense Council, August 2014.  
<sup>6</sup> LA Barroso and Urs Hölzl, The Data Center as a Computer: An Introduction to the Design of Warehouse-Scale Machines, 2nd ed., Morgan & Claypool, 2013. Research by Google



**Decommissioned**

**Saved \$4.02 million**

**Invested those cost savings into facility and equipment upgrades and new initiatives that increased profitability**



**Δ Data Center's cost savings aren't just a tall tale:**

These figures are the average real-world results of 7 server decommissioning initiatives undertaken by some of the world's leading data centers

**Which pathway is your data center on—wasting resources like Α?**

**Or is your tale going to be a success story like Δ's?**

If you're ready to rein in spiraling energy costs, Uptime Institute can help you launch a decommissioning effort and root out other inefficiencies hidden throughout your data center that cost you money every day. To improve resource utilization, optimize performance, reduce your carbon footprint, and achieve significant cost savings while effectively delivering IT services to your end users, call **The Global Data Center Authority®**—we'll help you get started.

**UptimeInstitute®**

See how much you can save. Download our comatose server calculator:

<https://uptimeinstitute.com/comatosecalculator>

For more information, please contact your regional representative online: <http://uptimeinstitute.com/contact-us> or email us at: [info@uptimeinstitute.com](mailto:info@uptimeinstitute.com)