

Case Study: United States Postal Service Makes Power Highly Efficient



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Power conversion and distribution losses account for more than 10% of total delivered power and more than 20% of wasted power in data centers. Data centers can save energy by converting to high efficiency CSL-3 Power Distribution Units (PDUs). The United States Postal Service (USPS) replaced status quo PDUs with Powersmiths' new energy efficient models. The PDU transforms the power into a form (voltage and phase) consumable by the IT equipment. The efficiency of the transformation determines the PDU efficiency. After base-lining the lower efficiency model PDUs in place in the USPS data center and a commercial Yahoo! data center, Powersmiths installed and measured the impact of the new units

The US Department of Energy has classified transformer conversion efficiency. NEMA TP-1 is the minimal allowable efficiency by law under EPACT 2005. CSL-3 efficiency exceeds TP-1 and is deemed by the US DOE to provide the lowest life cycle cost. Powersmiths Energy Station™(PDU) and E-Saver-C3 transformers meet CSL-3 and significantly reduce electricity waste.

The Customer Case

The USPS operates five data centers and has a mandate to reduce energy consumption. Les Kapaun, Manager, Management Support Service Center, USPS, recognized the energy savings opportunities of higher efficiency PDUs. To date the Service has replaced all status quo PDUs with high efficiency Energy Stations in its Eagan, MN facility and is in the process of converting its San Mateo, CA facility (data center details set out below). Other facility conversions will follow.



For this study, Powersmiths measured the conversion losses of the three status quo PDUs still in place at the Service's San Mateo facility and compared their losses with those of the Energy Stations operating at the same facility. The status quo PDUs consisted of two newer models purchased within the past 2 years and an original model from the mid-1980s. Powersmiths measured efficiency for the status quo transformers with its Cyberhawk® Portable Meter, which measures input and output simultaneously. Energy Station measurements were automatically recorded by the Energy Station's integrated Cyberhawk meter.

Project Outcome

Average operating efficiency of the status quo transformers was 94.6%, compared with 98.4% for the Energy Stations. Aggregated over the entire facility this difference in efficiency reduces peak demand by 45.6 kW and reduces the cooling demand by 13.2 tons annually.

When the USPS completely changes to Energy Stations, it will achieve significant economic and environmental benefits. Improved efficiency will result in savings of more than 787,400 kWh annually and reduce cooling load by 13.2 tons.

Projected annual operational cost savings at 0.13/kWh are \$107,736. Lifecycle cost savings are estimated to be \$3,892,000 over 20 years and \$8,878,000 over 32 years.

Related climate change and air quality improvements derived from reduced electricity demand are considerable. Carbon emissions can be reduced by 480 tons annually while sulphur dioxide and nitrous oxides will decline by 3,800 and 1630 kilograms respectively.

Further Observations at Yahoo! Data Center

To corroborate the USPS findings, PDU electrical losses within a commercial Yahoo! data center were measured. The 30 PDUs installed at the Yahoo! facility are relatively new (commissioned in May 2006) and Powersmiths measured the efficiency of the PDUs to derive an average efficiency of 96.3%. By replacing all 30 status quo transformers with Energy Stations, Yahoo! could achieve annual savings on a facility-wide basis of over \$130,000, lower peak demand by 59 kW and reduce consumption by more than one million kWh annually.

USPS—San Mateo, CA

- Facility Size—160,000 sq.ft.
- Data Center—33,000 sq. ft.
- Connected Load (PG&E)—3030- kVA
- Original UPS—985KVA
- New UPS—250 KVA
- 200 kVA connected to unprotected utility power

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Projected Facility-Wide Savings USPS—San Mateo Data Center

Energy Savings

Peak Reduction in kW	45.6 kW
Annual Reduction in KWh	787,400 kWh
Reduction in Air Conditioning Load	13.2 tons

Annual Environmental Savings

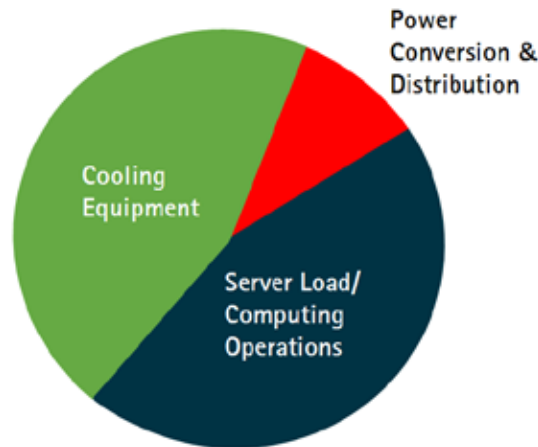
Carbon Reduction in Tons	480
Sulphur Dioxide Reduction (kgs.)	3800
Nitrous Oxide Reduction(kgs.)	1630

Operational Cost Savings

Annual Operating Savings	\$107,736
Projected Lifecycle Savings (20yrs)	\$3,891,888
Projected Lifecycle Savings (32yrs)	\$8,878,248

assumes 3% annual energy cost increase above inflation

Typical Data Center Energy End Use



About the Energy Efficient Data Center Demonstration Project

The project's goal is to identify key technology, policy and implementation experts and partners to engage in creating a series of demonstration projects that show emerging technologies and best available energy efficiency technologies and practices associated with operating, equipping and constructing data centers. The project aimed to identify demonstrations for each of the three main categories that impact data center energy utilization:

- operation & capital efficiency
- equipment (server, storage & networking equipment)
- data center design & construction (power distribution & transformation, cooling systems, configuration, and energy sources, etc.).

The project also identified member organizations that have retrofitted existing data centers and/or built new ones where some or all of these practices and technologies are being incorporated into their designs, construction and operations.

About Accenture Technology Labs

Accenture Technology Labs, the dedicated technology research and development (R&D) organization within Accenture, has been turning technology innovation into business results for 20 years. The Labs create a vision of how technology will shape the future and invent the next wave of cutting-edge business solutions. Working closely with Accenture's global network of specialists, Accenture Technology Labs helps clients innovate to achieve high business performance. The Labs are located in San Jose, California; Chicago, Illinois; Sophia Antipolis, France; and Bangalore, India. For more information, please visit our website at www.accenture.com/accenturetechlabs.

Accenture Technology Labs compiled the final report supporting with analytics, background research, and project management.

About The Silicon Valley Leadership Group (SVLG)

The SVLG comprises principal officers and senior managers of member companies who work with local, regional, state, and federal government officials to address major public policy issues affecting the economic health and quality of life in Silicon Valley. The Leadership Group's vision is to ensure the economic health and a high quality of life in Silicon Valley for its entire community by advocating for adequate affordable housing, comprehensive regional transportation, reliable energy, a quality K-12 and higher education system, a prepared workforce, a sustainable environment, affordable and available health care, and business and tax policies that keep California and Silicon Valley competitive.

About Accenture

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