



Data Centers Can Be Green
Powersmiths Can Help

P O W E R F O R T H E F U T U R E

Reduce Electricity Waste with Powersmiths

In data centers, high electricity use creates the potential for high energy waste. By the same token, increasing efficiency can yield significant savings. Powersmiths transformers reduce electricity waste by as much as 74%.

Life cycle cost should be the key factor to look at when choosing transformers for your data center. The lowest first cost transformers or PDUs do not deliver the lowest life cycle cost. When you buy transformers and PDUs on the basis of lowest first cost, you embed higher operating costs for the life of their installation. This is because first cost is only approximately four percent of the total life cycle cost. The electricity lost by transformers and PDUs represents their operating cost and makes up the lion's share of their total cost of ownership. The front end savings of the lowest first cost transformer are quickly out-stripped by higher operating costs. In high intensity environments, electricity wasted by low first cost transformers can amount to millions of wasted kilowatt hours of electricity over their operational life.

Consider the Environmental and Economic Savings of Powersmiths

The example to the right illustrates the savings calculation for a recent Powersmiths data center client. In this case, the data center required eighty-eight 300 KVA transformers to power a 24/7 operation. The load factor is consistent throughout the twenty-four hour cycle at 45%, resulting in an annual power consumption of just shy of 102 million kilowatt hours. At this level of power consumption even a small increase in efficiency amounts to significant economic and environmental savings.



Data Center Case Study

In this data center the lifetime (32 year) economic savings of Powersmiths transformers are projected to be: **\$7,220,000** at current energy rates.

Environmental savings include the reduction of **42,250 tons of CO₂** emissions.

SYSTEM PARAMETERS

Transformers	88 - 300 kVA
Total Electrical System kVA	26,400 kVA
System Power Factor	0.98
Available Full Load kW (=kVA x PF)	25,872 kW
Equipment Operating Hrs/ Day	24
Equipment Operating Days/Yr	365
Load Factor	45%
Calculated Load in kW	11,642
Total Annual Consumption	101,987,424 kWh

POWERSMITHS C3 COMPARED TO STANDARD TRANSFORMER

Direct Savings

Reduction in Transformer kW losses	175.7 kW
kWh saved annually	1,538,774

Annual Direct Savings with Powersmiths \$153,877

** based on .10/kWh*

Indirect Savings

Reduced Cooling Costs	\$54,644
Savings from Reduced UPS Losses	\$17,097

Annual Indirect Savings \$71,741

Total Annual Savings \$225,618**

Annual Environmental Impacts

Eliminated Tons of CO ₂ emissions	1539
Tons of Coal not burned	4986
Avoided Kilograms of Sulfur Dioxide	12,065
Avoided Kilograms of Nitrous Oxide	5,194

** Actual savings are higher, because the overhead losses incurred by medium voltage transformers, generators and other distribution equipment have not been included in these calculations

Energy Efficiency – The New Imperative

For more than a decade Powersmiths has focused its research and development efforts towards the achievement of greater efficiency and improved reliability of electrical distribution systems.

Today Powersmiths transformers, PDUs, and energy protection and management solutions enable data centers to:

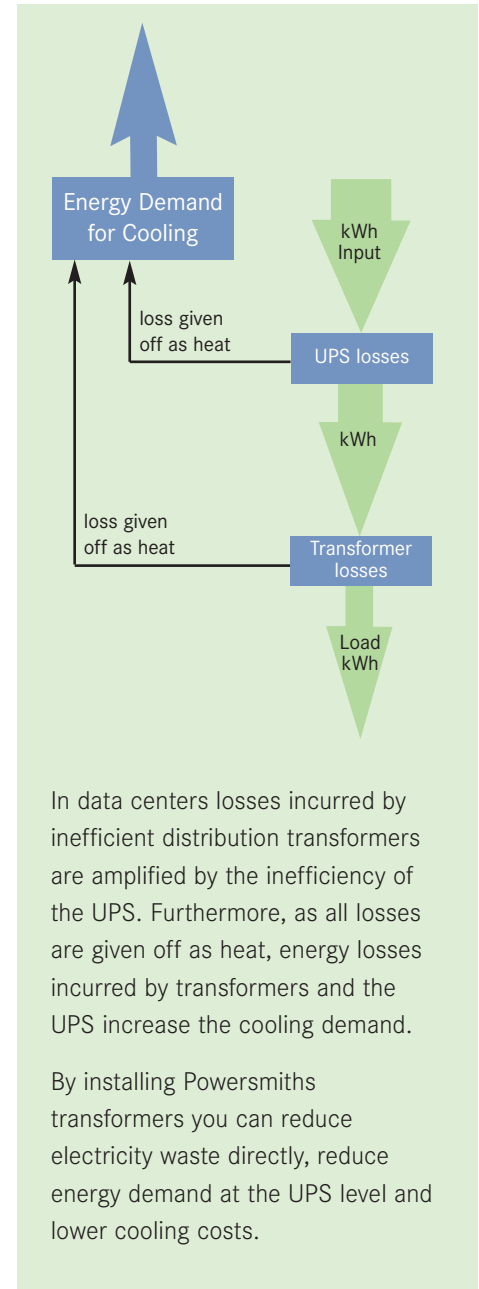
- Reduce electricity waste
- Lower operating costs
- Implement effective energy management and monitoring programs
- Develop education for sustainability programs
- Consume less power for a greener environment

Transformers are the bedrock of your electrical distribution system; don't forget to include them in your energy conservation strategy.

Effective January 2007, EPACT 2005 sets the minimum efficiency level for transformers – known as TP1. But this minimum level efficiency standard does not deliver the lowest lifecycle cost.

Powersmiths does not take exemption to EPACT 2005 and goes one better with affordable higher efficiency-class transformers that deliver the lowest life cycle cost, according to the US Department of Energy.

Given the enormous amount of electricity consumed in your data center, can you afford to channel your electricity through anything but the lowest life cycle cost transformer?



Lowest Life Cycle Cost Leads to Lower Operational Costs and a Healthier Environment

Powersmiths C3's are the Green Transformers

The US Department of Energy has established Candidate Standard Level -3 (CSL-3) as the efficiency level at which transformers deliver the lowest life cycle cost.

Powersmiths C3 transformers and PDUs meet CSL-3. Whether standing alone or integrated into the Powersmiths ENERGY STATION™, Powersmiths C3's reduce electricity waste, lower operating costs and decrease your data center's environmental footprint.

E-Saver-C3™ and T1000-C3™ Transformers

Powersmiths C3 transformers have been proven to reduce electricity waste by as much as 74%*. By reducing direct energy waste, Powersmiths C3 transformers also require less cooling, an important consideration in high density power environments.

The E-Saver-C3 is available in two models optimized for heavy or light loading. The T1000-C3 delivers the same efficiency levels as the E-Saver while maintaining low harmonic distortion levels under non-linear loading.



Migration to 230 Volt Power Supplies

Powersmiths C3s support the emerging trend to migrate to 230V ("high line") to achieve higher power densities. Powersmiths E-Saver-C3 transformers can be configured with dual voltage outputs (208V/120V and 230V) offering you the flexibility to migrate to 230V over time and run both standard and higher voltages simultaneously through the same transformer in any combination up to the full rating of the transformer.



The Energy Station™

The Powersmiths Energy Station integrates a Powersmiths C3 transformer, a main breaker, electrical distribution panels and a Cyberhawk™ power management meter into a single compact unit. Designed to minimize energy losses and streamline space, Powersmiths Energy Station provides convenient front and side

access. The Energy Station can be ordered with E-Saver-C3 transformer or the harmonic correcting T1000-C3 transformer. Either way, the Energy Station will cut electricity waste by as much as 74%.

Energy Management is becoming increasingly important as data centers seek to control burgeoning power consumption. Powersmiths Energy Station comes with an integrated Cyberhawk™ power management meter to help you monitor manage and control electricity use.



Compact Energy Station™

With multiple distribution panels, a built-in 30 to 50 kVA transformer and a 24 by 24 inch footprint, the Compact Energy Station minimizes space requirements. Critical loads with dual input capabilities are easily supplied by the Compact Energy Station. Available with Powersmiths Cyberhawk power management meter as an option, the Compact Energy Station provides quality, ease of use and rugged design at a competitive price. The Compact Energy Station is also available without the transformer as a Remote Load Center.

** Overall savings will be higher when reduced cooling demand and recouped UPS losses are factored in.*

Maximize Efficiency with Effective Power Management

The Uptime Institute* cites inefficient energy management as one of the key factors driving the skyrocketing operational cost of data centers.

To meet your need for effective energy management, Powersmiths has introduced the Cyberhawk™ family of advanced web-enabled power and power protection meters. Cyberhawk watches and reports on every kilowatt hour consumed, providing you with real-time and historical data to:

- Benchmark and trend building electrical performance
- Identify cost avoidance opportunities by load profiling
- Correlate equipment malfunctions to power quality anomalies
- Validate and enhance energy savings
- Support education for sustainability programs



Cyberhawk MPC™ Energy Management and Protection System

Cyberhawk MPC combines the most advanced features of energy and power monitoring with a superior system for protection against lightning, transients and over-voltage conditions. Use it to protect your data center's mission critical environment, monitor and manage energy use and selected load groups. Cyberhawk MPC provides real-time

and historical data over the Web to energy managers, facility managers and power quality specialists. Data can also be ported to Powersmiths Interactive Learning Systems to help you broaden the scope of your energy management programs to include all your stakeholders.



Cyberhawk 300™ Multi Port Meter

The Cyberhawk-300 is an advanced Web enabled power management meter that provides an extensive array of power and power quality measurements. With one, two or three, 3-phase ports, Cyberhawk 300 can simultaneously measure up to three independent points in the system, effectively taking the place of three

meters. Data from all three circuits can be viewed over the network in real time or trended over time, for further analysis. Cyberhawk 300's multiple ports enable it to accurately measure the efficiency of 2-port devices such as transformers or UPS systems with revenue class accuracy.

Eliminating electricity waste is the best way to reduce consumption. Powersmiths transformers and PDUs reduce electricity waste and provide you with a non-disruptive means to gain continued savings over decades of use. To help you identify your savings possibilities Powersmiths will send you our "Energy Savings and Payback Calculator"; a spreadsheet application that automates optimum efficiency calculations for you. Contact Powersmiths and we will send you an ESP calculator at no charge.

To find out more about Powersmiths lowest life cycle cost transformers and PDUs and Cyberhawk energy management systems contact Powersmiths at 1-800-747-9627 or datacenters@powersmiths.com

* www.uptimeinstitute.org "The Invisible Crisis in the Data Center"



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