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# DATA CENTER

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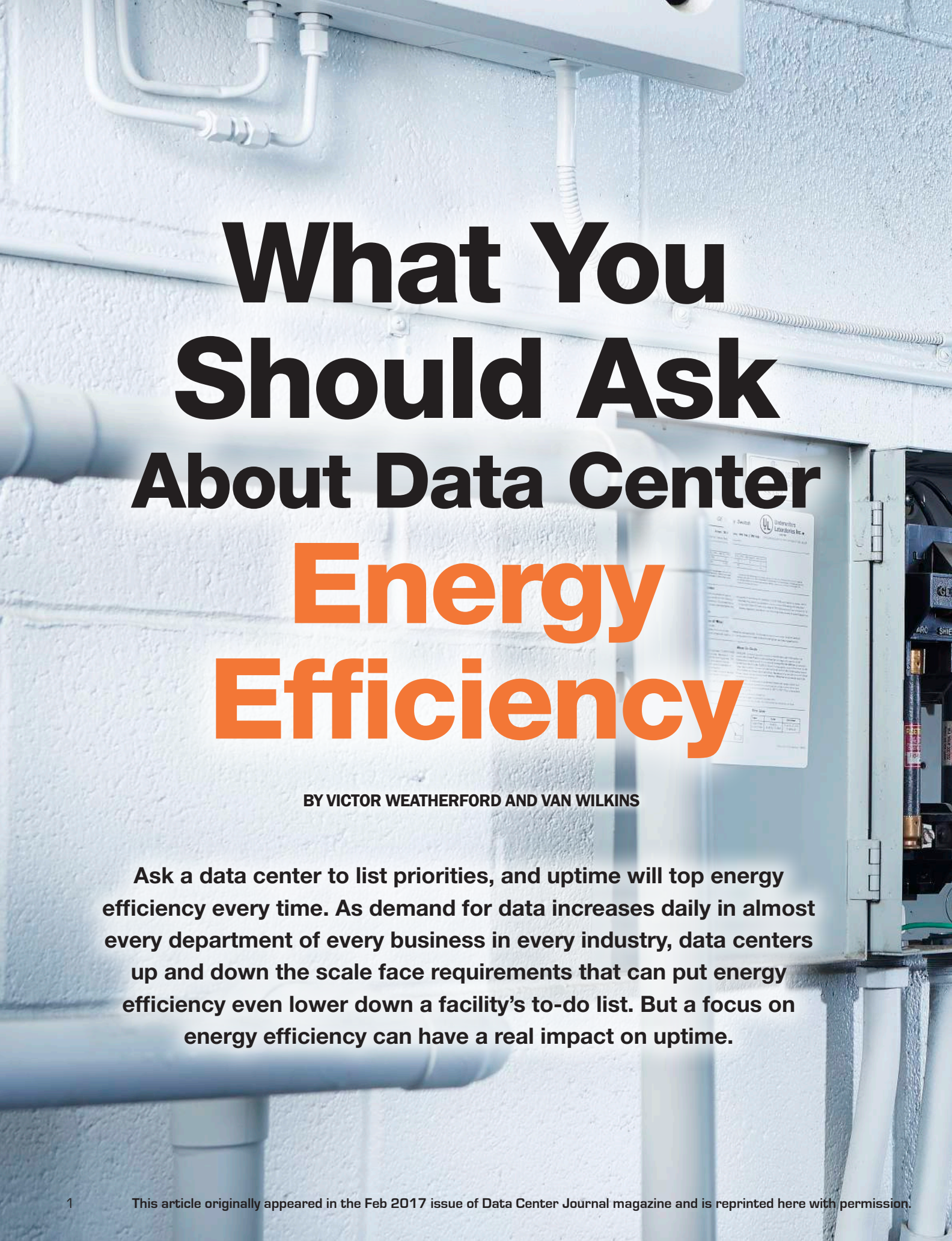
# Data Center Energy: Out of Control?

**5 Ways DCIM  
Can Increase Data Center  
Energy Efficiency**

**What You Should Ask About  
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# What You Should Ask About Data Center Energy Efficiency

BY VICTOR WEATHERFORD AND VAN WILKINS

**Ask a data center to list priorities, and uptime will top energy efficiency every time. As demand for data increases daily in almost every department of every business in every industry, data centers up and down the scale face requirements that can put energy efficiency even lower down a facility's to-do list. But a focus on energy efficiency can have a real impact on uptime.**







## YOU AREN'T JUST SAVING ENERGY

**T**he tools that a data center energy-efficiency expert uses to diagnose waste throughout the facility also identify conditions that contribute to instability and early equipment failure. Because uptime is such a result-oriented concern, it can pull focus from details and decisions that could, individually or together, benefit operations on multiple fronts. A new CRAC may crank out more cold for less cash or fix one hot spot, but it's one unit—and one problem. The lens of energy efficiency can spotlight major strategies that not only reduce cost but also insulate the facility overall from short- and long-term risks.

The key is a holistic, investigative look that takes every aspect of facility energy use into account—from power quality to airflow—alongside your performance, safety and reliability goals. Here are a few questions you can ask service providers or prospective energy-efficiency partners to help you decide whether an approach fully delivers on the interdependent goals of efficiency, cost and uptime protection.

### 1. HOW CAN I ADDRESS AIRFLOW ISSUES AS THEY STAND IN MY FACILITY?

Physics doesn't run updates nearly as often as the software world. Airflow issues are still critical to cooling, and cooling is still the best, first target for energy savings. Cooling solutions can sound deceptively simple, so you should look for experience with site-specific implementation. Cables can create blockages that completely nullify investments in airflow control. Hot spots can result from equipment changes or operational procedures unforeseen by your facility design.

Airflow strategies should take into account how your operations

work, and recommendations should help your team keep efficiency a priority as you incorporate needed changes. Blanking plates must be in place. Physical air barriers to avoid losing energy through air mixing can make a big difference. Sealing rooms and pressurizing the data center increases control.

Note that many solutions can make a big difference but still mask inefficiencies. Just like in real estate, what matters is location, location, location—and in this case, it's the location of cold air and how much of that air is reaching your servers instead of being wasted. Monitoring and controls can also be a big factor. You may not need to add another unit if you pinpoint how to best handle airflow as well as when it needs to dial up and dial down.

Your provider should be able to navigate the relationship between HVAC best practices and the needs of power-distribution systems, in addition to having strategies on hand for minimizing or completely avoiding the downtime needed to address blockages or change configurations.

### 2. HOW CAN I ADDRESS EFFICIENCY ON THE POWER SIDE?

In a power-distribution system, resistance and heat means more waste. A qualified power-system service provider can analyze the configuration and find ways to reduce excessive energy losses while improving overall reliability and safety. Unnecessary resistance and excess heat not only reduce energy efficiency in a facility, but they also indicate a greater risk of catastrophic equipment failure, leading to unplanned outages, fires, and serious—even fatal—injury. Finding ways to reduce energy losses through analyzing the power-distribution system (and related assets) also boosts overall system reliability and safety.

Reliability is also affected by power-quality issues, which have dramatically increased with the rapid rise of microprocessor-based equipment, electronic power equipment, digital circuitry, variable-frequency drives (VFDs, often used to save energy on the HVAC side) and other nonlinear loads. Although these systems and devices are the major source of power-quality problems, they're also the most susceptible to them. Attention to power quality can uncover and mitigate issues that weaken and damage a system over time.

Mitigation for changes made to a system over time is possible, but replacing electrical equipment can save time and money in the long term. When introducing new efficiency and stability strategies across your electrical system, state-government and utility incentives can greatly shorten the payback period. Your service partner should know what incentives apply to your facility.

But one of the biggest areas for power, just like cooling, is maintenance. Properly maintained contacts and connections have less resistance and produce less heat. Monitoring your system can help you stay ahead of normal wear and tear on electrical systems and keep your team in the driver's seat, scheduling work that protects your uptime.

If you're wondering how often you should need electrical-distribution maintenance, the minimum NETA recommendation is de-energized maintenance at three years. And if you have redundant power distribution, don't neglect its maintenance. You need your equipment to perform, not create new challenges.

### 3. SPEAKING OF NETA, WHAT KIND OF STANDARDS ARE YOUR TEAMS TRAINED TO?

There's no dishonor in on-the-job training, but standards are standards

for a reason. NETA and NFPA 70 training best promotes safe work and avoids costly damage to your data center. NFPA 70E compliance for arc flash and other safety standards are established and developed in detail, offering clear procedures and rules for professionals to follow. NETA-accredited companies have certified technicians trained to major OSHA, NFPA, ASHRAE and other guidelines and standards. Your energy-efficiency partner should be happy to share with you their technicians' certifications and safety training, not to mention best practices specific to data centers.

#### 4. WHAT TEMPERATURE SHOULD I SET FOR MY DATA CENTER?

ASHRAE famously let recommendations on data center temperatures float a little higher a few years ago. The longevity of hot-aisle and cold-aisle strategies points the way: it's different for different equipment. Containment is a strategy that doesn't just work for server racks, but also for transformers, uninterruptible power supplies and any other sources of waste heat.

One thing to keep in mind on the power-distribution side is that warmer equipment experiences more resistance. In a small system it may matter less, but in a large one you'll see an effect. For instance, cold-aisle containment that leaves the room too hot could be keeping part of the power-distribution system warmer than is ideal.

#### 5. HOW BEEFY SHOULD MY BUSES BE?

When you think efficiency, you normally think about right sizing. This is definitely true on the cooling side, where running oversize units, or over-taxing undersize ones, causes waste. But when it comes to your power-de-



livery capacity, you don't want to right size conductors too close to the load. Resistance is the enemy of efficiency, and conductors operating too close to capacity are less efficient than those with a lighter load. More capacity also makes it easier to navigate changes down the road without adding more overhaul.

#### 6. HOW DO I DEAL WITH PEAK POWER COSTS?

It's clear that energy efficiency is worth more to an operating budget when the price of energy rises. When peak pricing for electricity is at odds with performance choices, smaller efficiencies across the system can add up to a better balance in the equation.

Monitoring is critical to responding to financial triggers. The cost of cooling during peak pricing time can also be a factor. Your solutions provider should be able to suggest changes to your daily cycle.

#### 7. CUT TO THE CHASE; WHAT'S THE SOLUTION?

If you ask this question and get an answer straight out of the gate, you might need to cool more than your server room. Sure, some ideas are big and bold and bring the biggest

percentages with them, and an expert will be able to speak to how practical they are for your space. But the answer you want is, let's find out. Your facility and your goals are unique, and your best option will depend on detailed measurements of airflow and power quality.

Your provider should be able to balance the needs of each piece of equipment against the others and deliver strategies that take your whole facility, and how your team operates it, into account. Energy efficiency is a blended discipline, and you want to avoid managing that conversation. You want solid recommendations that multiply the efficiencies each side can bring, and you want the project-time savings from shared expertise in planning and execution. Work with data center experts that have experience managing the dialog between the cooling and electrical infrastructure—or better yet, bring on a team that has experts on both sides who are used to dovetailing efficiencies for data centers. ■

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