



# You Can't Manage What You Don't Measure: **A Predictive Approach to Energy Efficiency**



**RIISING ENERGY COSTS ARE A FACT OF LIFE.** The need to control those costs requires data center managers to increase energy efficiency not only in the data center, but to work with facilities management to improve efficiency across the entire organizational estate. For a majority of organizations, improving energy efficiency is about saving money. Therefore, managing power consumption and optimizing cooling are at the top of their to-do list.

Managing power consumption could involve deploying new energy-efficient equipment, but due to the expense, most companies put that off until it is time for a scheduled technology refresh. As a result, cooling is the single-largest data center operational and energy cost that can generate a return on investment when remediated. So, optimizing cooling is one of the first areas data center managers should look to in order to reduce costs and increase efficiency.

## Energy Efficiency Metrics

Many data center managers are lacking the visibility on rack power capacity utilization along with the tools to identify opportunities to improve energy efficiency due to unmonitored or partially monitored systems that are leaving them with an incomplete picture of the data center. Few legacy data centers have automated energy and environmental management systems, and others rely on outdated manual data collection and documentation creation. The increasing demand for energy efficiencies has led organizations to investigate or implement data center infrastructure management (DCIM) tools to automate the creation of documentation and the collection of energy and environmental data upon which optimization decisions can be made.

In search of better insight into their company's energy efficiency, some data center managers who have implemented DCIM solutions use their facility's Power Usage Effectiveness (PUE) rating as an indication of energy efficiency. PUE was established in 2009 as a metric for measuring and reporting data center energy performance. The perfect PUE rating is 1, but it is impossible to achieve. The average PUE rating is 1.8 to 2.5, but the rating depends on the type and size of facility. Most data centers use just as much or more non-computing or "overhead" energy (like cooling and power conversion) as they do to power their servers, which reflects in a higher PUE. A high PUE number means you are operating at less than optimum efficiency and that there are opportunities to improve. But what, exactly, should you do?



That uncertainty was the problem with the first iteration of PUE, according to Robert Chernesky, Panduit Solutions Development Manager, Advisory Services. By itself, your PUE rating doesn't go far enough in pointing toward improvements your organization can make to increase energy efficiency. With a standard PUE rating, "you can't do anything about it," says Chernesky. "PUE is analogous to knowing your miles per gallon (MPG) in a car. For example, 30 mpg might be your efficiency rating, but you need to keep your car tires inflated and change your driving habits to increase it. When it comes to energy efficiency, you need to optimize systems and processes to *decrease* your PUE," he explains.

Due to this weakness, the Data Center Efficiency Task Force (which originally created the PUE standard) released an update, PUE 2, in 2011, aimed at being more helpful to the cause of increasing energy efficiency. PUE 2 establishes three different types of PUE measurement: Levels 1, 2 and 3, labeled Basic, Intermediate and Advanced.

PUE 2 Category 3, the advanced level, entails a consumption-based calculation and considers power consumption beyond the four walls of the data center to include the broader estate. The IT load is represented by a 12-month total kWh reading taken at the point of connection of the IT devices throughout the organization's estate—not just the data center—to the electrical system. This is a cumulative measurement and requires the use of kWh consumption meters at all measurement points. This monitoring method provides the highest level of accuracy for measurement of the IT load reading by removing all impact of losses associated with electrical distribution components and non-IT related devices.

"The new PUE 2 Category 3 makes sure people are monitoring it down to the rack or granular level so that you have detailed or granular-level information you can drill into to find the inefficiencies, and by finding those you can reduce PUE," says Chernesky. "PUE 2 contains more data. In essence, it's more prescriptive. PUE used to be a high-level measure. PUE 2 takes it to the next generation. You can use that information to find savings opportunities. Now, it is detailed enough so that you can make conclusions."

"Only when accurate, granular information on energy use is benchmarked and monitored over time (as under the PUE 2 Category 3 metric) does PUE provide an accurate measurement. Not only will this value be accurate, but analysis of the granular information will show the energy flow within the data center and pinpoint inefficiencies and resilience issues," adds Alistair Hunt, Director of Estate Energy Management for Panduit.

Though PUE 2 Category 3 is useful in helping data center managers drill down into what is happening at the cabinet and rack level, other metrics for data center power efficiency can also be used in certain cases. The PUE metric cannot be used to compare one data center with another, for example. A Tier 3 data center has higher built-in resilience compared with a Tier 2 data center. "This will include additional fixed costs for supporting services and equipment, so the PUE is likely to be higher," cautions Hunt.

Other metrics address this issue:

- Fixed energy overhead metrics can be used to identify an energy base line.
- Proportional energy overhead metrics can be used to identify energy based on proportional/variable energy use (i.e., the energy used based on varying IT payload and associated supporting services). This measures energy use based on capacity.

These new metrics can be calculated relatively easily in the case of new build/greenfield sites. For legacy sites, a fixed and proportional energy overhead can be approximated by recording energy use over a period of time with variation in IT energy use.

While the focus is mostly on energy inefficiencies, additional energy/carbon footprint efficiencies to consider should include monitoring and managing gas, water and oil usage.

## Value of a DCIM Tool

Data center managers often turn to Data Center Infrastructure Management (DCIM) software and hardware in the fight to automate the capture, processing and documentation of data more efficiently so as to gain better insight into data center operations. By monitoring the data center environment, an effective DCIM solution will provide accurate and actionable information to optimize energy and physical infrastructure efficiency.



**WHEN IT COMES TO ENERGY EFFICIENCY, YOU NEED TO OPTIMIZE SYSTEMS AND PROCESSES TO *DECREASE* YOUR PUE.**

Data center managers can implement an energy management tool to give greater visibility into energy consumption over time in the data center, as well as the primary business office building workspace and even throughout the broader estate of all buildings owned by the organization, enabling a proactive approach to energy optimization.

A DCIM tool can provide up-to-the minute and historical views of energy efficiency. Usage data can identify historical trends in energy consumption to make more proactive energy management decisions.



**“IT’S ABOUT HOW WE CAN ACCOMMODATE THE BUSINESS AND MAKE IT MORE COST EFFECTIVE. PANDUIT SMARTZONE™ SOLUTIONS ARE A CRITICAL PART OF SUPPORTING THIS BUSINESS.”**

—Financial service organization’s data center manager

## DCIM Energy and Environmental Management Tools: Key Capabilities

The primary functions of energy and environmental management solutions are to:

- Provide detailed information on power consumption and environmental conditions
- Accurately and dynamically map a holistic view of the energy flow within the facility, from the point of entry to an individual payload or supporting plant
- Provide easy-to-use, easy-to-understand reporting, tailored to customer-specific requirements
- Provide accurate energy consumption performance metrics
- Allow multiple departments to input and view data collaboratively

In many cases, data center energy management tools are used in isolation from the total estate energy performance, leading to siloed information. At the same time, estate energy management tools do not include or have access to detailed data center energy use, which can be a major contribution to the total estate energy usage. The data center should be considered an important subset of the entire estate energy usage, rather than the end point of analysis. That was the case with a major international bank, which uses Panduit SmartZone™ Solutions based on a Panduit® 6 Zone™ Methodology in its 5,000-square-foot U.K. data center while also monitoring power consumption in several co-location sites.

## 6 Zone™ Methodology Enables Global Bank to Monitor Power Usage Proactively

The Panduit 6 Zone™ Methodology is a logical, step-by-step framework for assessing simplified views of distinct enterprise, data center and facility zones. The 6 Zone™ Methodology separates a data center building or enterprise facility into distinct “zones” that contain different building systems or operational functions. By then instrumenting each zone with SmartZone™ Solutions to monitor, capture and process real-time operational and performance data in each zone, IT and facilities managers can gain a holistic view of energy, environmental and connectivity parameters in the data center and extended enterprise. The 6 Zone™ Methodology allows companies to focus on the granular knowledge from each zone, beginning from the building point of entry for utilities through to the individual IT payload, making the optimization process more manageable.

While the Panduit 6 Zone™ Methodology provides a way to determine PUE, the data calculated is dependent upon intelligent software and devices that monitor power and energy in each zone. These results can then be used to optimize operations or to investigate ways to assess cooling and environmental factors that may be preventing optimal thermal efficiencies, capacity recovery or efficient use of capital by over-designing resilience. This is the first step in an overall program to improve energy efficiency.

According to the financial service organization’s data center manager, the ability to monitor and validate power consumption was “critical with our co-locations because we are being charged for those sites.”

Meanwhile, for its owned and operated data center, the manager can leverage the data to make better decisions. “We wanted to be more proactive than monitoring using clipboards and other manual methods,” he says. His team is currently in the process of integrating the data from its DCIM tool with its power management tool.

“Data center capacity is a key issue in the global financial company’s business growth,” says the manager. “It’s about how we can accommodate the business and make it more cost effective,” he says. “Panduit SmartZone™ Solutions are a critical part of supporting this business.”

Taken together, data from each of the six zones within the 6 Zone™ Methodology helps provide a complete understanding of a company's power consumption throughout its operations. This view allows organizations to build an energy efficiency strategy that relates to the organization as a whole in accordance with PUE 2 Category 3.



**MANAGING POWER CONSUMPTION AND MAKING BETTER COOLING DECISIONS IS YOUR PATH TO GREATER ENERGY EFFICIENCY, ALLOWING YOU TO STAY AHEAD OF RISING ENERGY COSTS.**

## Energy Management from the Data Center to the Entire Estate

The same metric principles and 6 Zone™ Methodology can be applied to energy management for the entire estate. The 6 Zone™ Methodology can be applied to manufacturing, retail and office sites. Depending on the type of estate function, additional measures can be used to provide meaningful energy performance metrics.

### External Metric Variations

When comparing the performance of a facility or facilities, it is also important to consider external variations that can affect calculations. For example, the external temperature will have a significant effect on data centers with respect to free-air cooling days.

Comparing performance over time should take into account the effect of seasonal variations. So, a facility located in Oregon is likely to come up as more efficient than one based in Florida. For offices or retail locations, seasonal variations should also be taken into account with respect to heating/cooling by using degree-day temperature analysis.

## Comprehensive Solutions and Services for Proactive Power and Energy Management

As discussed above, the data center is a subset of an organization's total assets, just one part of the total estate energy consumption picture. To enable proactive energy optimization, the organization needs to look at energy efficiency holistically as referenced in PUE 2 Category 3.

Panduit SmartZone™ infrastructure management software and hardware can help you optimize your current environment and guide future deployments of capacity for highest reliability and energy efficiency.

Panduit SmartZone™ Solutions can be used to help understand power and energy consumption in both legacy and new-build environments, pointing the way toward improvements that flow directly to your organization's bottom line. You can also use the data extracted from the existing facility or from a model to determine the best direction for a new design or design change.

## Staying Ahead of Increasing Energy Costs

The best way to contain mounting energy costs is by boosting your energy efficiency, not just in the data center, but throughout your company's estate. Managing power consumption and making better cooling decisions is your path to greater energy efficiency, allowing you to stay ahead of rising energy costs.

DCIM tools can help in your quest for greater energy efficiency by automating the creation of documentation and the collection of energy and environmental data. This data is the basis for making smarter decisions.

Panduit SmartZone™ Solutions deliver comprehensive energy and physical infrastructure efficiency through a range of intelligent products, systems and services. SmartZone™ Services include assessments, design and implementation services to help companies understand their requirements, guide them through optimization and help them get the most out of the SmartZone™ Solutions. ■



For more information on the Panduit SmartZone™ Solutions, please visit [www.panduit.com/DCIMSimplicity](http://www.panduit.com/DCIMSimplicity)