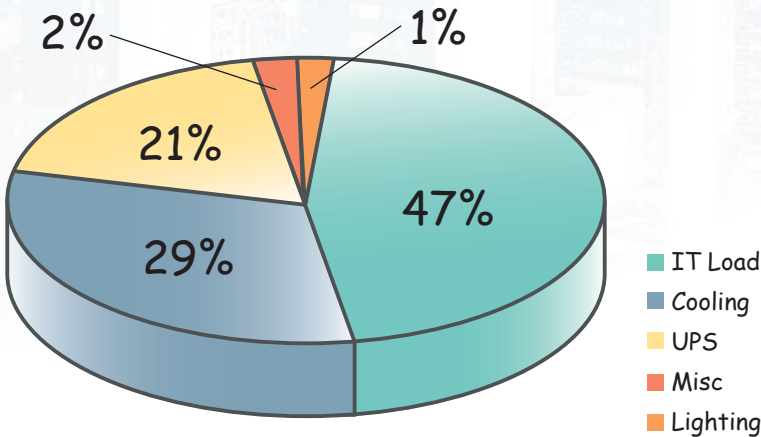# Increasing Data Center Energy Efficiency Begins with Understanding
The more you know, the more you $ave

Virtualization, consolidation, and cloud computing place additional demands on your power and cooling systems, often stretching them to operational limits and beyond.

In addition, IT and facilities have to respond to social responsibility initiatives, regulations, and the need to extend the life of the data center through power and cooling optimization. It's no surprise that, in recent years, improving the energy efficiency of data centers has become one of the top 5 concerns for CIOs;

Systems Considered for PUE Calculation

Pie chart legend:
- IT Load — 47%
- Cooling — 29%
- UPS — 21%
- Misc — 2%
- Lighting — 1%

Cooling is the second largest piece of the energy pie. Optimizing cooling will lower your PUE.

An energy strategy relies on granular monitoring to unlock and manage areas that are candidates to lower power utilization with the highest return-on-investment (ROI).
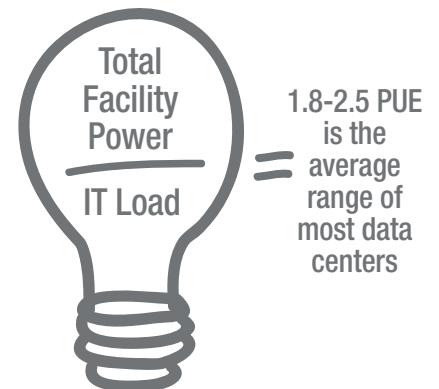
An energy audit is often the first step before we can be more prescriptive in identifying and recommending different power, cooling, and physical infrastructure improvements that will yield energy efficiency ROI.

The second step in an energy efficiency plan is to set the strategic direction for your energy efficiency initiative. To build or expand on an existing business case, we offer two levels of energy evaluations to either validate or adjust your energy efficiency strategy based on a thorough review of your facilities power and cooling systems, and processes.

Why Panduit?

- Energy efficiency improvements between 10-40%
- Proven 6 Zone™ Methodology
- Simplified executive dashboard views of all 6 zones
- Tailored, comprehensive solutions that include intelligent technologies, services and products

How to Calculate PUE

$$\frac{\text{Total Facility Power}}{\text{IT Load}}$$

= 1.8-2.5 PUE is the average range of most data centers

PANDUIT™
Advisory Services

Energy Efficiency Services: Energy Efficiency Evaluation and Energy Efficiency Power and Cooling Assessment

Energy Efficiency Evaluation

Our Energy Efficiency Evaluation is a one-day, visual assessment of the power and cooling systems from the building entrance down to individual racks in the data center. We lead a discussion and conduct a walk-through with both IT and Facilities to clearly understand and diagram power flow, and develop a data center thermal imaging study to uncover cooling inefficiencies. The findings are included in a report that offers details on potential ROI opportunities to improve PUE, including potential power monitoring and integration points.

Energy Efficiency Power and Cooling Assessment

In addition to the activities in the Energy Efficiency Evaluation, our Energy Efficiency Power and Cooling Assessment includes monitoring of up to 12 racks over a two-week period that are identified as high-power consumers and/or thermally challenged. The goal is to document trends, outliers, and differences that can be seen through power and temperature monitoring to thoroughly identify areas for energy savings to improve PUE.
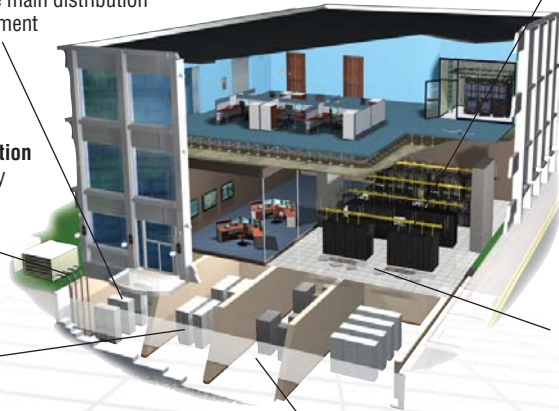
We also conduct a cooling assessment from three perspectives – room, row, and rack – to document specific areas, if remediated, which will yield energy savings. These findings are delivered in a comprehensive report that: outlines baseline PUE; documents trends from the rack monitoring; identifies room to rack cooling optimization opportunities; and, provides an ROI to build a business case for taking action to lower energy consumption.

Thermal Assessment and Optimization Service

Cooling is the second largest piece of the energy pie. Optimizing cooling will lower your PUE.

To maximize the efficiency of your cooling system, you must uncover the root causes of the cooling problems plaguing the data center. Without determining this, it can be impossible to choose the appropriate course of action to resolve cooling problems let alone improve your cooling efficiency. Trial and error fixes might make energy efficiency performance worse.

Using advanced computer modeling, Panduit can identify hot spots, improper room layout, problematic equipment placement, and other issues that interfere with efficient cooling. Panduit presents the results of each engagement in a detailed report that documents your compliance with industry standards and best practices and provides detailed recommendations for remediation. When combined with Panduit SmartZone™ Energy Management Solutions, you can measure the effectiveness of the implemented changes in real-time to accelerate your ROI and to achieve your energy efficiency business goals.

Zone 6: Device Level Monitoring
Automated connectivity patch field management, as well as monitoring and control of per outlet or device power

Zone 2: Switchboard Distribution Board
Monitors sub meters at the main distribution board for DC related equipment

Zone 1: Billing Reconciliation
Monitors the building utility metering "Point of Entry"

Zone 3: Plant Equipment
Distributed monitoring facility services, including individual chillers, AHU, CRAC, UPS and lighting circuits

Zone 4: Branch Circuit Monitoring of Data Hall Focuses on monitoring of total rack or cabinet IT loads and environmentals

Zone 5: Rack and Cabinet Level Monitoring
Intelligent monitoring and control of power, environmentals, and cabinet level security in addition to DCIM level asset tracking and capacity

Unified Physical Infrastructure

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