

Determining the Power Efficiency of Your Data Center

Best Practice Brief

- Are you concerned about the rising energy costs associated with your data center?
- Are there hot spots in your server room even though you have excess cooling capacity?
 - Would you like to better control your data center environment?

Benefits of Improving Data Center Power Efficiency

- Make the best use of existing cooling resources
- Increase cooling capacity
- Allow for data center growth and accommodate new IT equipment
- Improve equipment reliability by reducing hot spots
- Reduce energy bills and operating costs

Quick Calculation

$CoE = \text{total power} / \text{critical power}$

Overview

IT environments have undergone significant changes as server densities have risen dramatically over the past decade. Servers require increasingly high levels of power and cooling resources, and IT managers and personnel need new metrics for measuring and improving data center efficiency.

Calculating your data center's Coefficient of Efficiency (CoE) offers a valuable baseline and provides insight into your facility's power usage.

Determining Your Data Center's Coefficient of Efficiency

Calculate your facility's CoE by dividing the total power required to support your data center by the critical load ($CoE = \text{total power} / \text{critical power}$).

A Few Definitions

- Critical Power is the power that is consumed by servers and other computer communication equipment in your data center. Calculate your critical power by adding up the sum of the UPS/PDU loads in your facility.
- Total Power is the power that is required to support both the electrical (UPS) and Mechanical systems. Calculate your Total Power by determining your building service entrance usage.

Example:

If the critical load required by the IT equipment in a data center is 6,000 KW, and the data center has a utility service entrance load of 14,210 KW, this is a ratio of 2.4. Thus, it takes more than two times as much power to run the facility than to support computer equipment in it.

A Few More Specifics

For a standalone facility, the CoE should be fairly straightforward: (CoE = Building service entrance usage /sum of PDU loads.) However, for a mixed-use facility, with associated office space or any other functions that aren't directly supporting the data center, for an accurate calculation, it may be necessary to install metering and monitoring equipment in the switchgear that supports just the computer room.

How Does Your Data Center Compare?

Typical Data Center CoE	2.4 to 2.8 and higher
Target CoE	2.0
Ideal CoE	1.6

What Does the CoE Tell You?

- In general, the lower the number, the more efficient your operation.
- The need for redundant components, concurrent maintainability, and fault tolerance affects the coefficient of efficiency that can be achieved.
- A CoE of 2.4 or greater means that much power is being used for mechanical equipment, such as the chillers, pumps, and fans. Improving cooling efficiency often offers the greatest opportunity for improving the CoE, and reducing operating costs.
- As the CoE increases, the environment in the computer room can deteriorate.

What Can You Do To Improve Data center Efficiency?

- Utilize best practices related to the proper management and configuration of computer rooms.
- Take steps to reduce bypass airflow (conditioned air that is not getting to the air intakes of computer equipment).
- Identify factors that may be contributing to thermal incapacity, which is the difference between the installed cooling capacity, and the amount of cooling that is actually occurring in the computer room. Thermal incapacity can often be inexpensively recovered by "tuning up" mechanical systems.
- Evaluate all your options before adding additional cooling units. Many data centers have two or more times the cooling capacity they should need and still have "hot spots."
- Consider a professional data center efficiency assessment and cooling audit.

42U—A Valued Partner

42U's team of IT Infrastructure Consultants provide unbiased, independent expertise and solutions for Data Center infrastructure. In partnership with Upsite Technologies, (www.upsitetechnologies.com), DirectNET offers Upsite's Kold-Works services, a series of data center cooling assessments that measure the cooling, airflow, critical power, and general room conditions of an existing data center. To arrange a complimentary 15-minute cooling evaluation, please send an e-mail to rebecca.mccue@directnet.us

Visit <http://www.42u.com/datacenter-solution-webinars.htm> & <http://www.42u.com/data-center-white-papers.htm> to view web seminar replays & download data center related white papers.