Beyond PUE:

Data center efficiency in the AI era

MULTIDIMENSIONAL

PUE

WUE

ERE

CPE

CUE

GAE

Building and operating data centers more intelligently, responsibly, and resiliently

PUE and the metrics that complement it form a multidimensional framework that gives data center operators a more refined lens through which to evaluate efficiency and drive improvement across their facilities. Partnership and co-innovation will drive efficiency as technologies and standards evolve.

FRAMEWORK

Power usage effectiveness

As hardware, infrastructure, and thermal solutions advance, AI and high-performance computing (HPC) are challenging the value of PUE as a standalone data center efficiency metric. It is still a valuable part of the operational equation, but there are other factors that come into play in the AI era.

Water usage effectiveness

As data centers proliferate, concern about the amount of water they consume is growing. Data centers compete with humans for fresh water and use significant volumes to cool chips, servers, and other IT equipment. Higher rack densities are driving adoption of more water-wise cooling solutions.

Energy reuse effectiveness

Heat from data centers can take a toll on local electrical and water resources. With the right infrastructure in place, however, it can be distributed elsewhere through pipes that deliver hot water, steam, and chilled water. The key is intentional, coordinated design.

Compute power efficiency

CPE has moved into the fiscal arena, measuring how much useful work gets done for each unit of energy consumed — tokens per watt. It rests on more efficient chips and data center architectures that maximize hardware without negatively affecting computing output, availability, or reliability.

Carbon usage effectiveness

With demand for compute capacity skyrocketing, innovation in power and cooling solutions has taken on greater urgency. PUE captures how efficiently a data center uses power. CUE provides insight into how much carbon is used in doing so. Smarter energy use and design decisions influence both.

Grid-aware efficiency

The huge, spiky power draws of AI workloads are hard for utilities to plan for and balance. Assuring power quality and reliability is a shared responsibility. Data centers should get high-interpretive IAE metrics for all energy consumption data with real-time grid conditions to help make that possible.

Tackle AI-era data center efficiency with Flex.

Read the eBook

flex