

Harmonizing Global Metrics for Data Center Energy Efficiency

The United States of America, European Union and Japan Reach Agreement on Guiding Principles for Data Center Energy Efficiency Metrics February 2, 2010

As business demands and energy costs for data centers rise, owners and operators have focused on the energy efficiency of the data center as a whole, frequently using energy efficiency metrics. However, the metrics are not always applied clearly and consistently at a global level. To address these inconsistencies, a group of global leaders met on February 2, 2010 to agree on data center energy efficiency measurements, metrics, and reporting conventions. Organizations represented were the U.S. Department of Energy's Save Now and Federal Energy Management Programs, U.S. Environmental Protection Agency's ENERGY STAR Program, European Union Code of Conduct, Japan's Ministry of Economy, Trade and Industry, Japan's Green IT Promotion Council, and The Green Grid.

Goal:

Share global lessons and practices with an objective of arriving at a set of metrics, indices, and measurement protocols which can be formally endorsed or adopted by each participant organization to improve data center energy efficiency globally. This includes the following specific goals:

1. Identify an initial set of metrics
2. Define each metric
3. Define the process for measurement of each metric
4. Establish on-going dialog for development of additional metrics

Desired Outcomes:

Effective energy efficiency metrics that:

1. Measure the actual IT work output of the data center compared to actual energy consumption. It is of note that in the process to define IT work output, the following interim measurements are being defined and / or validated:
 - a. IT - Measure the potential IT work output compared to expected energy consumption; and measure operational utilization of IT equipment
 - b. Data center facility and infrastructure - Measure the data center infrastructure efficiency (PUE)
2. Measure renewable energy technologies and re-use of energy to reduce carbon

Guiding Principles

The collective groups are in agreement on the following guiding principles, as an interim step toward the desired outcomes (1. b.). It is recommended that data centers begin to measure PUE according to these principles:

- Power Usage Effectiveness (PUE) using source energy is the preferred energy efficiency metric. PUE is a measurement of the total energy of the data center divided by the IT energy consumption
- The industry should improve the IT measurement capabilities to ultimately enable taking the measurement directly at the IT load (e.g. servers). At a minimum IT energy measurements should be measured at the output of the UPS
- For a dedicated data center, total energy measurement should include all energy sources at the point of utility handoff. For data centers in larger buildings, total energy should include all cooling, lighting, and support infrastructure, in addition to IT load

In addition to PUE, the bodies recognize the necessity of other metrics expressed in the desired outcomes (1.a. and 2.)

This guidance is meant to help drive a common understanding of energy efficiency metrics. With continued dialog and additional input by a variety of stakeholders, this guidance can be refined and expanded to maximize its impact on both energy consumption and operational efficiency

There is significant interest and work among the bodies represented to proceed with globally accepted metrics and measurement protocols, from minimum allowable to aspirational on the topic of data center efficiency.

A taskforce has been formed with representatives from each participating body. The entire group of participants will reconvene once the task force feels the time is appropriate based on progress.

For further details please contact:

- The Green Grid: gdcmetrics@lists.thegreengrid.org
- U.S. Department of Energy Save Energy Now Program: <http://www1.eere.energy.gov/industry/datacenters/contacts.html>
- U.S. Environmental Protection Agency's ENERGY STAR Program: [ENERGY STARdatacenters@icfi.com](mailto:ENERGYSTARdatacenters@icfi.com)
- European Commission – Joint Research Centre:
- Ministry of Economy, Trade, and Industry:
- Green IT Promotion Council: <http://www.greenit-pc.jp>