

TGG Performance Indicator - Why Use It?

PUE™ is a recognized measure of data center efficiency, capturing how effectively power is used for IT. But if you improve PUE by reducing the power applied to cooling - for example, by raising temperatures - can you still use the data center to its full potential? To answer this, The Green Grid (TGG) brought together industry experts to create the Performance Indicator (PI) for cooling - a novel approach to assessing data center cooling performance. The PI uses three key metrics to visualize facility performance, allowing businesses and technologists to determine where improvements can be made, see the effect of changes before implementation, and track facility progress over time.

Facility and IT management are driven by constantly changing business and technological requirements.

A data center must perform for the business, but also for the wider industry, as increasing pressure on energy consumption pushes us towards being more environmentally friendly and cost effective.

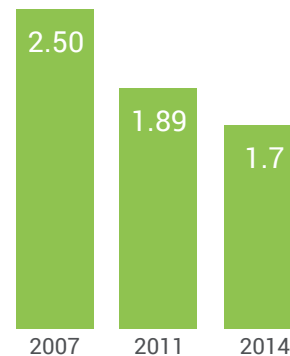
Resource efficiency is one of The Green Grid's goals. To date, performance assessment has been focused on how much of the energy used goes to IT, but this alone does not guarantee an effective data center. To make the next step towards the truly efficient data center, there is a growing need to consider other aspects of its performance. By identifying these aspects and looking at them in relation to one another, The Green Grid aims to provide a broader industry platform. Businesses can use this to assess current performance, and select the best data center strategy for their individual needs.

Efficiency

Power Usage Effectiveness (PUE) has been widely adopted as a suitable measure of energy efficiency. PUE has positively impacted industry energy targets by helping data center operators to understand where and how energy can be saved. It is currently

the only metric for data center performance in common use, and is an international ISO/IEC standard.

Self-reported PUEs from 2007-2014



Uptime Institute's 2014 data center industry survey results (left) show that average PUE has improved dramatically between 2007 - 2014. But could improved PUE have an impact on facility performance?

Important Performance Aspects

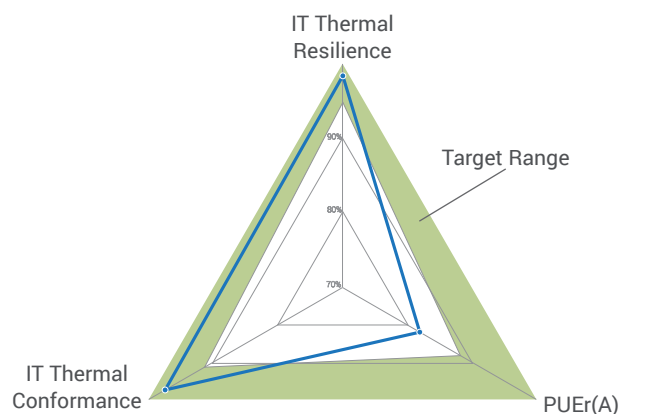
However, low power consumption does not guarantee high productivity, which can be defined as the business's ability to install the equipment it needs and use it to its full potential. For high productivity, you need to maximize cooling effectiveness and minimize failure risk. The Performance Indicator adds these vital aspects alongside PUE to further the ongoing improvement of data center performance.

Efficiency gains are often found in data center cooling by reducing the amount of air circulating, or by increasing the temperature of cooling water or air. This means that in the bid to improve efficiency, the thermal operation of installed equipment may be put

in jeopardy.

To maintain the focus on cooling performance, it is clear that there is a need to define metrics for cooling effectiveness and to visualize how they relate to one another and to energy efficiency.

The Green Grid's Performance Indicator helps to visualize the data center's performance. It aims to achieve effective cooling during normal operation (IT Thermal Conformance) and sufficient cooling during failure or maintenance within the design's parameters (IT Thermal Resilience), without compromising efficiency (PUE ratio).



An example PI (above) displays the three calculated performance metrics compared with the target range.

Assessing Performance in Relation to Business Targets

Business demand dictates how far an organization will compromise data center efficiency, thermal conformance or thermal resilience in order to meet their performance goals. Once these goals have been set, facility operators can ensure they are achieved by using the Performance Indicator's metrics to assess, improve and maintain facility performance. The Green Grid's white paper on the [Performance Indicator](#) discusses target ranges for both mission-critical and non-mission-critical data centers.

As well as measuring and monitoring current performance, the Performance Indicator can also be used to display the metrics for future points in the facility's lifetime, such as at full capacity and at different load distributions.

Levels of Assessment

The Performance Indicator offers four levels of assessment, so getting started is easy. To benefit from adding cooling effectiveness measurements to efficiency, you can start with only a thermometer and a calculator or spreadsheet. To get the full benefit of PI, you can progress through to advanced utilization of monitoring systems and simulation.

Benefits of PI

The Performance Indicator can be used to:

- △ Visualize the balance between the three metrics.
- △ Assess a facility's performance in relation to the company's target range.
- △ Track a facility's progress over time, as and when changes to the facility and IT are implemented.
- △ Assess the performance effects of changes before actual implementations, from IT deployments to the installation of containment.
- △ Compare alternative configuration options for improved operational planning.

Conclusions

Since business and technological requirements are constantly changing, the Performance Indicator must also be flexible. Target ranges can be adapted, configurations can be tested, and, over time, new metrics can be added when TGG defines them.

The Performance Indicator maintains the spirit of PUE; an assessment of performance intended for the betterment of the business, rather than competition between facilities. As a result, it has been designed to accommodate all business types through the defining of business-specific target ranges. The TGG PI tool and whitepaper can be downloaded from the Green Grid website: <http://www.thegreengrid.org/en/resources/library-and-tools>

