

Green Data Center: Myth vs. Reality

by Dan Fry

JANUARY 2012 — This article is the second in a three-part series exploring current myths in the data center. Part one explored DCIM myths. Part three will explore the myths surrounding convergence in the data center.

What's a Green Data Center – and how do you measure how 'green' it really is? Ask 10 IT executives and you'll undoubtedly get 10 different answers.

'Green IT' is defined in many different ways, from the source of energy to how efficiently it is consumed. But as I compare notes with customers, partners, and pundits around the world – including some of the most innovative thinkers in data center design and management today – two truths are abundantly clear:

1. *Managing and reducing energy costs continues to be mandate number one.* Energy is averaging 12 percent of a data center's overall operating costs and those energy costs are increasing by more than 20 percent a year, according to Gartner. Energy is not a problem to solve but a constant in the data center that must be managed.
2. *Everyone understands the need to be green – but what they really need is to be efficient.* The more efficient the IT operation, the higher the value delivered to the business. In the case of energy, this means ensuring that every kilowatt consumed contributes to the delivery of quantifiable value to the business (measurable business output) rather than merely supporting the environment. The driver is efficiency. The result is 'green.'

Which brings me to the first conventional wisdom, which may not be so wise after all:

Myth: You need to be green. Reality: You need to be EFFICIENT.

Efficiency is all about *doing the most with what you already have – or making do with less.*

So how does this apply to green IT? As one of my customers says, "Focus on efficiency and green will follow."

This is easier said than done, of course. In a recent Gartner survey, 33 percent of IT executives indicated that their number one problem in the data center was energy consumption. Eighty-four percent admitted they were running energy-inefficient data centers. Yet only 14 percent were attempting to use metrics to address the power challenge. Energy consumption is keeping data center executives awake at night, *yet many lack of a clear plan of attack to drive the efficiency they seek.*

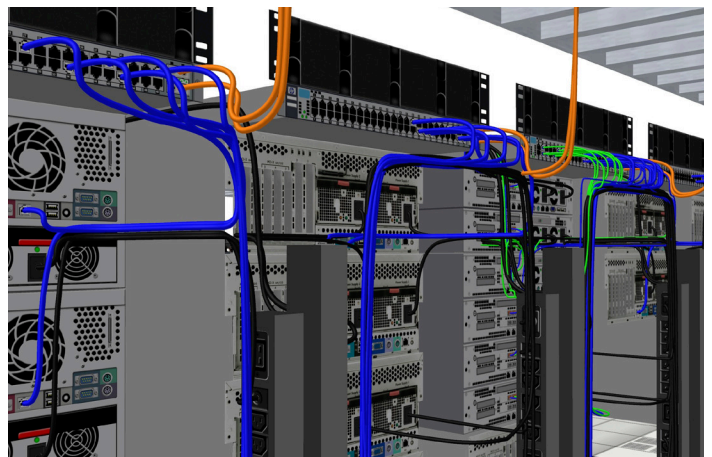
In most data centers, the problem is an absence of robust, accurate information about where efficiency improvements can be achieved without putting the operation at risk. Many data centers are using power monitoring tools, but these are typically point-products, offering fragmented, device-level data that is very difficult

to work with and remains just that – discrete data, not meaningful, actionable information.

Efficiency is About Information – You Either Have it or You Need it

To improve energy efficiency inside the data center, IT executives need comprehensive information, not isolated data. They need to be able to 'see' the problem in order to manage and correct it because, as we all know, you can't manage what you don't understand.

The modern data center is an extremely complex environment supporting a dense web of interrelationships between what have traditionally been three operational silos – IT, Facilities, and Building Management Systems. No single approach confined to any silo can effectively address the energy problem. What's needed is a centralized approach that integrates and presents a "single pane" view of the entire interrelated physical infrastructure so you can see and understand the whole picture.

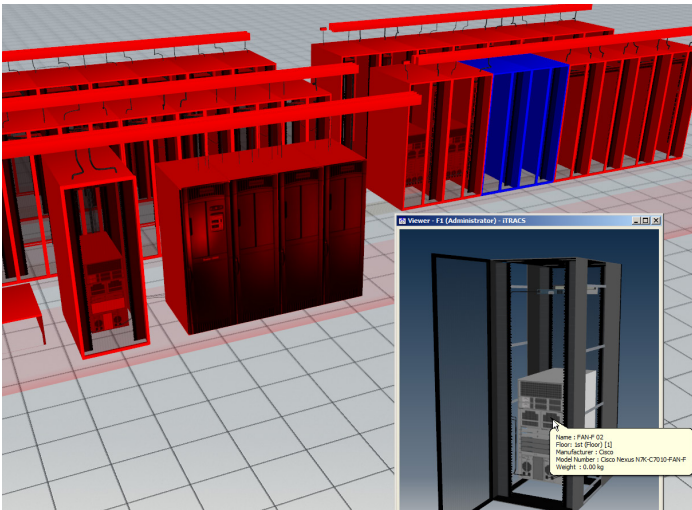


A complex web of millions of interconnected assets, devices, and systems in a fluid state of change, growth, and evolution. This is the data center – one of the most complex entities on earth. DCIM with Interactive 3D Visualization helps keep it as green as possible.

Take the power chain, for example. Tremendous design and engineering can go into the construction of the power chain. However, if you place inefficient or underutilized servers at the end of it, you lose all of the gains that went into the implementation of the facilities equipment leading up to those servers. Furthermore, if you move up-stack, no amount of physical efficiency optimization will overcome inefficient software.

The challenge is to understand all of the complex interrelationships between data center assets and how those interdependencies affect efficiency, energy usage, and energy cost. This explains the growing popularity of DCIM with Interactive 3D Visualization. DCIM with Interactive 3D Visualization is a gateway to seeing and understanding the whole of the physical infrastructure, in context. It gives IT decision-makers holistic, actionable information that visualizes where inefficiencies exist so they can be driven out of the operation while mitigating the risks associated with change.

Data center owners and operators can proactively use "what if" scenarios and future views to take decisive action



based on knowledge, not guesswork or intuition. By doing this, they can:

- Identify and decommission unused or underutilized assets;
- Identify and swap energy-guzzling assets for energy-efficient assets;
- Retrofit the data center to improve energy efficiency and cooling capacity;
- Align services to infrastructures with the appropriate redundancy to match operational SLAs;
- Reduce physical footprint and shorten power chain for higher efficiency; and
- Add – when expanding – ‘right-sized’ assets which deliver the largest ROI for energy consumed.

It all comes down to finding opportunities to drive efficiency and then capturing the improvements to be presented back to the business.

This brings me to the second conventional wisdom, which may not be so wise after all:

Myth:
Efficiency is about Power Usage Effectiveness (PUE).
Reality:
Efficiency is about BUSINESS VALUE DELIVERED.

Since its introduction by the Green Grid, PUE has been an extremely valuable facilities-centric metric, acting as a guidepost for measuring the percentage of energy going to facilities assets (cooling, etc.) vs. the amount of energy going to IT assets (servers, etc.). But facilities is only half of the problem, and now that our industry has embraced PUE, it is time to focus on the other side of the house – the IT side. IT executives need a way to measure and compare the efficiency of their IT assets throughout the stack.

As the writer of a recent *wired.com* article noted, “What’s the best way to measure the efficiency of a data

center? No one really knows. But there’s no shortage of IT minds trying to figure it out.”

Some of those attempting to figure it out include the folks here at iTRACS. Our focus on the IT side of the house is an attempt to capture not just energy efficiency, but something more elusive – what we call DCIM Business Output™, or *the efficiency with which IT delivers value to the business.*

DCIM Business Output™ attempts to measure the ratio between business output delivered by IT assets and the energy/cost required to deliver it: business value achieved vs. the energy/cost to achieve it.

In other words – what are the specific business results generated by IT infrastructure and what is the energy/cost required to generate those results?

Below are two potential metrics within this approach, utilizing energy as the primary cost factor. Energy is the appropriate centerpiece of any discussion about the Green Data Center. However, as the metrics around DCIM Business Output™ evolve, additional cost factors such as space, personnel, etc. can be incorporated to reflect the true TCO of an IT asset over its lifecycle.

Metric #1: Asset Efficiency

The first proposed metric in the DCIM Business Output™ series is Asset Efficiency. This compares CPU utilization vs. power usage at the individual device level, creating an opportunity to conduct asset-to-asset comparisons to determine which asset is delivering business value at the highest efficiency.

DCIM Business Output™ Asset Efficiency

$$\text{Work Per Kilowatt} = \frac{\text{Realized Business Output Per Asset}}{\text{Energy Consumed By Asset}}$$

Realized Business Output Per Asset = How much work the device is actually doing (*realized output*). At the physical level, this is measured by computing utilization (actual output) vs. capacity (potential output). As we climb the stack, this number can be refined to capture the business work the application is producing, whatever that happens to be.

Energy Consumed By Asset = Amount of energy (energy costs) required to run the asset.

DCIM Business Output™ Asset Efficiency Example

	Server A	Server B
Capacity (what it can handle)	100 business operations/sec	150 business operations/sec
Utilization (how hard it's actually working)	87 ops/sec (87% utilization)	75 ops/sec (50% utilization)
Energy consumed by asset	10 units	10 units
How efficient?	8.7 business operations per energy unit consumed	7.5 business operations per energy unit consumed

Server A vs. Server B. This “asset vs. asset” example demonstrates how a data center owner or operator might use the Asset Efficiency metric. In this example, Server B, which has the potential to deliver higher business output, is actually running less efficiently than Server A. This is a problem for both the business and the planet. Using this information, the data center might take steps to increase server utilization, or, if necessary, swap out older energy-guzzling assets for newer, more energy-efficient ones.

Metric #2: IT Efficiency

The label, “PUE of IT” is meant to build on the industry’s growing understanding and usage of PUE. Just as PUE measures the ratio of facilities to IT, this proposed new metric would help determine how much energy is going into IT assets that work directly for the business (servers, etc.) vs. IT assets that support this work but do not contribute directly to it (storage, switches, etc.).

DCIM Business Output™
IT Efficiency

$$\text{PUE of IT} = \frac{\text{IT Load}}{\text{Business Output Load}}$$

IT Load = The total amount of energy required to run all IT assets: the servers (generating the business output), storage (storage and maintenance of data), and network equipment (communications paths between IT assets).

Business Output Load = Total amount of energy that is going specifically into the IT assets delivering Business Output – the assets *working directly for the business*.

The goal is to minimize the amount of energy consumed by assets that aren’t working for the business so you can put more energy into assets that ARE working for the business.

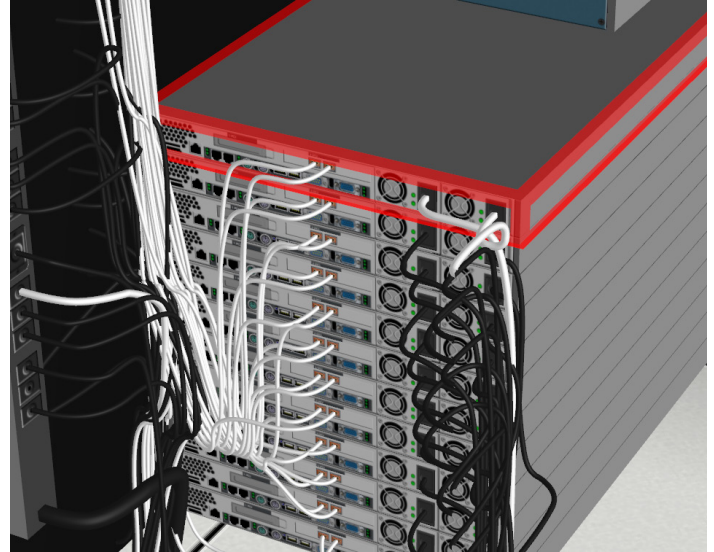
A Step In a New Direction

So what’s been the response so far to the concept of DCIM Business Output™?

The customers and analysts I’ve shared this with like it. They are intrigued. They especially like how flexible the approach is. The “business output” used in the metrics could be whatever each data center owner or operator wants it to be, depending on the organization’s business model and mission. An e-commerce company might measure “business output” as transactions per second or customer revenue per minute. A social media company may look at ad revenue or the number of social transactions. A cloud provider might look at services delivered or “compute power” charged to customers.

In this way, DCIM Business Output™ is not a competitive benchmark like PUE where specific numbers are targeted. It’s a comparative measurement where your organization

evaluates its own step-by-step improvements in energy efficiency - and gains another perspective into the business value of your IT investment.



DCIM Business Output™ is by no means offered as a definitive metric. It is a step in a new direction. The journey is an iterative one.



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iTRACS is the leading provider of enterprise-class Data Center Infrastructure Management (DCIM) solutions that drive efficiency, performance, cost savings, and strategic value in the data center. iTRACS’ best-in-class portfolio, Converged Physical Infrastructure Management™ (CPIM™), features the world’s first and only holistic view of enterprise infrastructure using an interactive, navigable 3D environment. [Interactive 3D Visualization – The Efficiency Engine™](#) unleashes new opportunities to create efficiency and business value in the design, management, and optimization of IT physical infrastructure. iTRACS is proud to be included by Gartner as a [2011 Gartner Cool Vendor in Data Center Infrastructure Management](#). We are also proud to be named an IDC Major Player Worldwide in Data Center Infrastructure Management in IDC’s January 2012 report, [IDC MarketScape: Worldwide Datacenter Infrastructure Management \(DCIM\) 2011 Vendor Analysis](#). www.itracs.com.

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