DATA CENTER OPTIMIZATION

A Playbook on Achieving a Higher Level of Energy Efficiency and Performance Improvement within the IT Facility

VERTIV.

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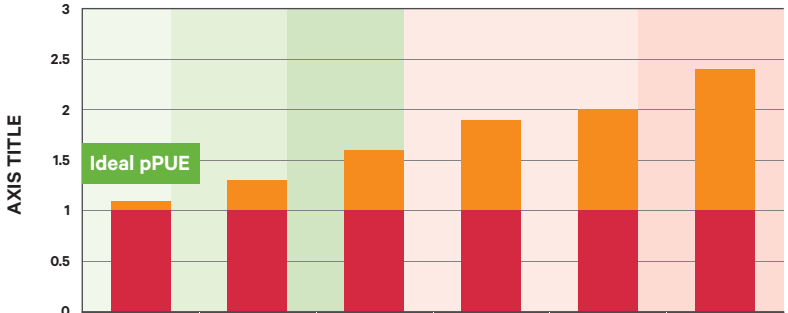
INTRODUCTION

With focus now on internet-connected devices and software-defined technologies, data centers are handling more computing power than ever before. More energy is needed to store, process and analyze data coming from multiple sources and to simply keep the 'lights on'. Recent research from Climate Change News revealed that the ICT industry is expected to be responsible for up to 3.5% of global emissions by 2020, with the data center industry using 20% of all available electricity in the world by 2025.

On the one hand, there is increasing pressure from organizations to reduce energy consumption; on the other hand, there is also a need to have an agile IT infrastructure that can be updated, reconfigured and expanded rapidly to meet changing business requirements. The challenge now is finding the balance between powering a data-hungry society and managing energy consumption, diminishing operational budgets and supporting dynamic IT requirements.

Mechanical Power Usage Effectiveness = pPUE



	PUE 1.1	PUE 1.3	PUE 1.6	PUE 1.9	PUE 2	PUE 2.4
CRAC kW	0.1	0.3	0.6	0.9	1	1.4
IT Load KW	1	1	1	1	1	1

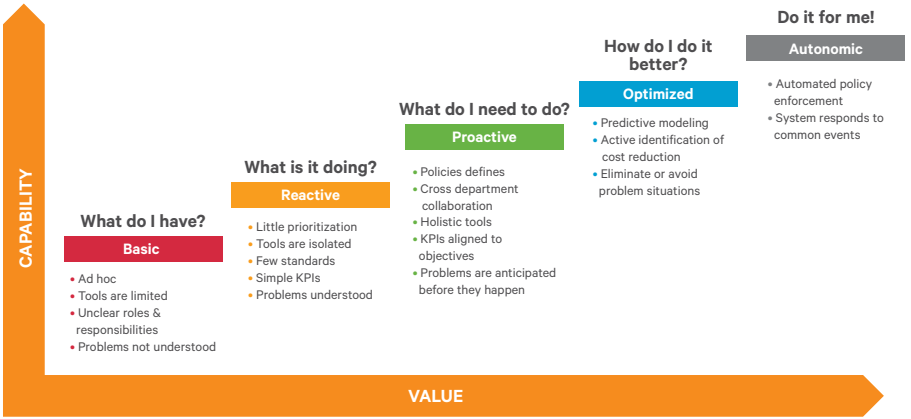
As data center operators, you need to understand where and how your energy is used at a granular level. An efficient data center would consume less energy while powering more load.

UNDERSTANDING DATA CENTER MATURITY

Different organizations face different challenges in their data centers. Some deal with legacy infrastructures, others manage IT resources in silos. To address this, a top-down data center improvement assessment must be undertaken within the organization to identify areas of improvement.

Using a **Data Center Maturity Curve** helps organizations identify where they are at, assess their current capabilities and benchmark their performance.

Here's what a path to building maturity within the data center looks like:

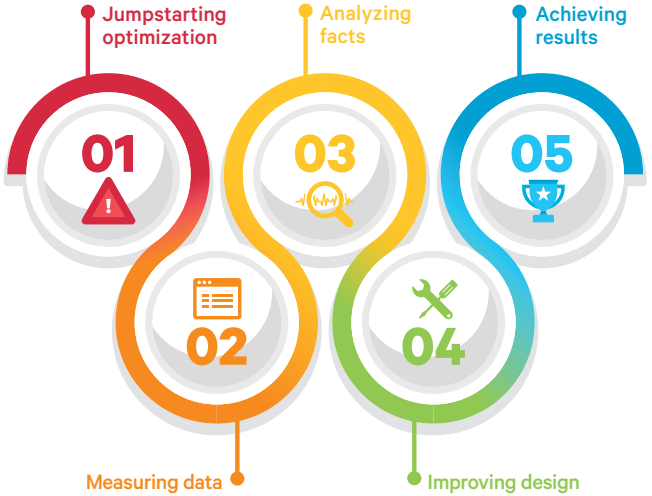


http://www.climatechangenews.com/2017/12/11/tsunami-da ta-consume-one-fifth-global-electricity-2025/

5-STEPS TO AN EFFICIENT DATA CENTER

In order to reduce costs within the data center and have a more agile facility, the goal is to reach an autonomic state of maturity. *Optimization* is one way of helping you reach that state of maturity by reducing operational costs through assessing your IT equipment, identifying gaps and areas of improvement. The idea is not to replace, but to make use of the existing equipment and improve it.

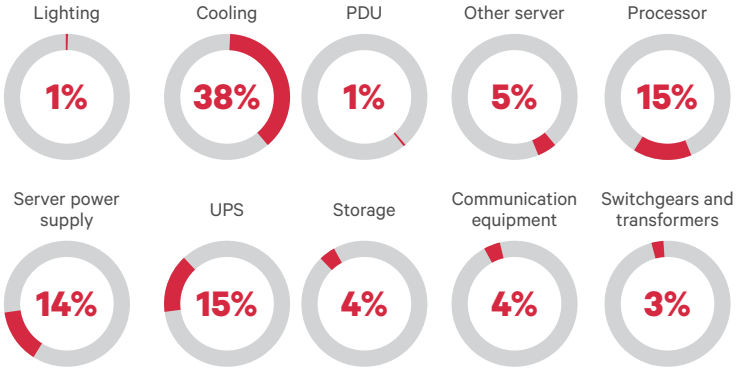
The 5 stages of optimization are:



1 JUMPSTARTING OPTIMIZATION

The first step in optimization is having a clear picture of the overall performance of the data center facility. A **Data Center Optimization report** helps identify how much energy each component of your data center consumes and spots areas for improvement.

Assessing the performance of each area of the data center should be done by a service expert. Below is a sample breakdown of energy consumption which will help you decide future steps to take in improving overall performance:



2 MEASURING DATA

Once you have an idea of how each equipment in the data center is consuming energy, the next step is for a qualified engineer to measure and analyze the data to spot opportunities for improvement. Key factors that need to be measured include:

Percent of IT capacity | **Power metering** | **PACU redundancy** | **Hot/Cold Aisle Configuration**

Some people rely on manual measurements and put the data in spread sheets. This works but is inefficient. Manual retrieval not only limits you in terms of how often you can gather data but you are also at risk of making errors in retrieving and/or calculating. If the measurement of data is wrong, then there is a high chance that you will be reacting the wrong way.

By investing in an optimization service, you can get a quality survey report that gives you a professional review of your data center performance. An expert can also provide you a detailed analysis of where energy is being used the most, leading to major efficiency, capacity and cost-saving benefits.

3 ANALYZING FACTS

Once a service expert has all the data needed, then he/she will be able to accurately and effectively identify problems in the data center and suggest areas for improvement. For example, if the main concern is to cut down on energy cost, there are a couple of things to focus on:

Metering and Verification – Metering/monitoring provides base line pPUE (mechanical Power Usage Effectiveness) of before and after the optimization process; it also provides real time and historical kWH consumption	Air flow management (Under the floor, within the rack, hot and cold aisle configuration, return air)	CRAC unit optimization – recommissioning of CRAC units, controlling air temperature and recalibrating sensors	Identifying hot spots – Utilizing thermal scanning to identify and eliminate hot air intake

DID YOU KNOW?
Cooling accounts for 35-45% percent of total energy consumption in a data center. This means that cooling is where the biggest efficiency impact can be made. Cooling adjustments, utilizing either hot aisle or cold aisles to rear-door heat exchangers, can significantly reduce energy costs and adaptive cooling architectures can give enterprises the flexibility to adjust to varying densities.

4 IMPROVING DATA CENTER DESIGN

Once the facts are laid out and the problem areas identified, the next step would be to improve overall data center design. Note that improving design doesn't necessarily mean overhauling the data center. It could simply mean changing the way your equipment is run.

All of the data gathered by the service expert would be used to:

- Identify different stress points
- Suggest different air flow management as needed (ie. Containment, intelligent controls and economization)
- Regulate temperature (hot aisle/cold aisle rack arrangement and sealing cooling gaps on the data center floor)

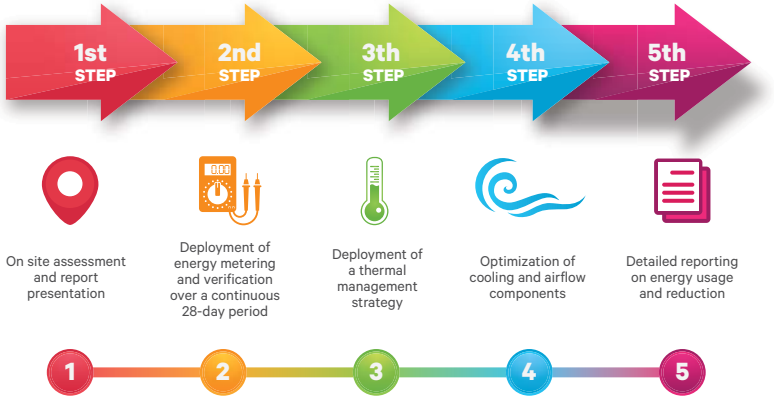
5 ACHIEVING RESULTS

The last step in the optimization process would be to determine the end results and how to effectively achieve this. This can be having a target PUE, cost savings, energy efficiency or other areas to cut down on energy cost and address gaps within the data center. At the end of the entire process, optimization makes sure that you get the results you expect based on your budget, requirements and expectations.

VERTIV OPTIMIZATION SERVICES

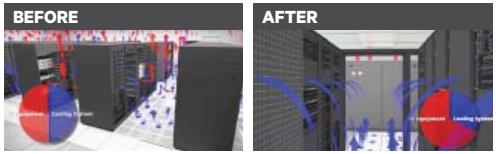
Optimization services from Vertiv help organizations reduce overall cost in the data center by examining the existing cooling infrastructure and determining opportunities for energy savings within the data center. By viewing real-time energy consumption and collecting historical energy consumption patterns, experts can give you the best assessment to cut down on energy spending.

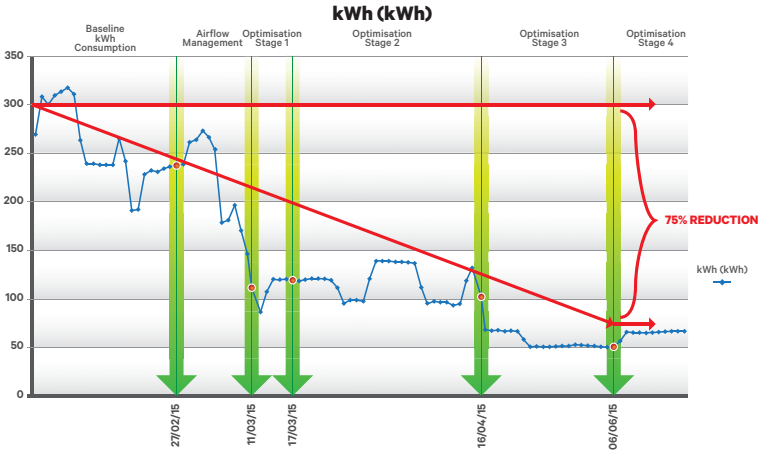
The Process

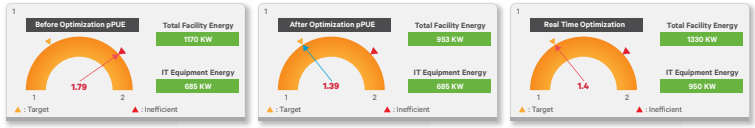


The Key is Managing your Airflow

Have the capability to optimize the cooling capacity and manage the airflow within your data center.



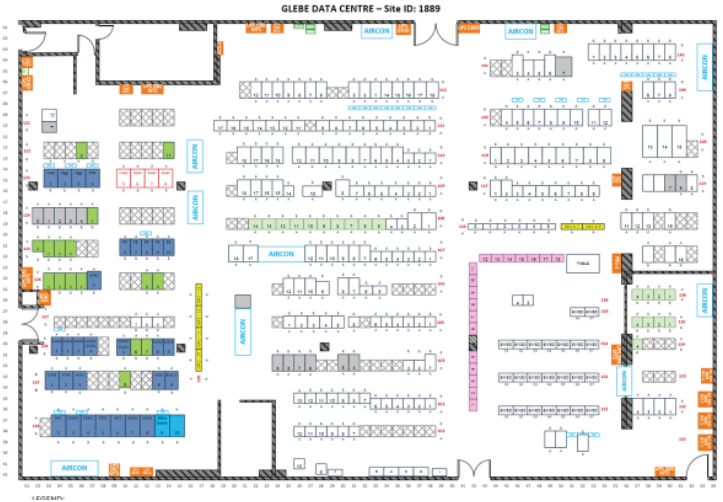




Multiple benchmarks have consistently delivered significant energy savings between 30% to 50% on cooling costs and reduced overall facilities power costs between 10% to 25%.

Here is a real-life example of optimization at work:
Customer Focus: Australian Telecom Provider
Critical Needs: The customer wanted to identify areas of potential energy savings in its IT facility so it could better plan for efficiency and cost-saving.
The Solution: Vertiv performed an optimization service. The process starts by monitoring how energy is consumed throughout the entire data center to establish a baseline, with power metering deployed across all key devices to achieve this. Armed with this data, Vertiv then set out to 'retune' the room. This was performed by Vertiv's customer engineering team who ensured no impact to the day-to-day operation of the data centre and the business it supports.

Original Layout of Room Before Optimization



Results:

Applying Vertiv's Optimization service, the customer was able to:

- Reduce data center cooling electrical operating cost by 37%
- Reduce annual power bill by $56,000
- Increase data center capacity by 57%
- Deliver 57% more business services from existing infrastructure
- ROI in 22 to 36 months

Optimised Layout of Room After Optimisation with the blue aisles representing Containment PODS 4 CRAC on standby, recalibrated.

Learn more about our Optimization Services, visit **www.VertivCo.com**

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