RF CODE

WHITE PAPER

Intelligent Data Center Monitoring Strategies

Reduce Costs, Increase Efficiency, and Avoid Unnecessary Downtime with Continuous Environmental Visibility

Executive Overview

Today's data centers, more than ever, process and house our daily lives. There are over 8 million data centers worldwide today, up from about half a million in 2015.[1] And these facilities are making a tremendous impact on the world, beyond the data they enable us to use. Data centers use three percent of the world's electricity and are on track to account for 3.2% of world carbon emissions by 2025.[2]

And because data center equipment generates enormous amounts of thermal energy, much of the electrical power – 30-50% of the total energy consumption – goes to cooling IT equipment.[3] Meaning data center owners and operators who aren't able to locate their data centers in cool environments, like Google's data center in Finland, are shoveling operational funds into cooling, as the world calls for better efficiency and sustainability and energy costs steadily climb.

> *"Most respondents did not know their data center Power Usage Effectiveness (PUE), the primary measure of data center efficiency, and often kept their data centers at needlessly cold temperatures – wasting large amounts of power."*
>
> *- The Data Center Dilemma: Is Our Data Destroying the Environment?*

There is increased pressure to save energy and reduce carbon emissions, at the same time as operational pressures intensify—from increasing operating speed to balancing growing stores of data with maintaining critical uptime levels. For most facilities, accomplishing each of these critical objectives leads to an increased thermal output, requiring further energy to cool the data center environment. How can data center owners and operators break this cycle—increase their energy efficiency and reduce costs?

1 The Data Center Dilemma, Data Center Knowledge, April 19, 2019, https://www.datacenterknowledge.com/industry-perspectives/data-center-dilemma-our-data-destroying-environment

2 Tsunami of data could consume one fifth of global electricity by 2025, The Guardian, December 11, 2017, https://www.theguardian.com/environment/2017/dec/11/tsunami-of-data-could-consume-fifth-global-electricity-by-2025

3 Cooling Energy Consumption Investigation of Data Center IT Room with Vertical Placed Server, May 2017, https://www.researchgate.net/publication/317308758_Cooling_Energy_Consumption_Investigation_of_Data_Center_IT_Room_with_Vertical_Placed_Server

The answer is simple: with the right intelligent environment monitoring to provide the insight needed to lower energy consumption. Advanced wireless environmental monitoring technology has the added benefit of optimizing data center infrastructure, reducing downtime risk, and providing the metrics needed to publicly demonstrate that your company has lowered its carbon footprint—all benefits that ensure return-on-investment (ROI) and increased savings.

Cost Savings: Lower Energy Expenditure and Beyond

Over the last several years, data centers have worked to eliminate the obvious and egregious inefficiencies, as evidenced by the fact that data center energy efficiency gains have stalled.[4] The Uptime Institute's shows a decrease in PUE in 2019: 1.67 versus 1.8 in 2011. This indicates that today's data centers are using more energy for computing processes instead of infrastructure. To further increase efficiencies now requires investing in tools like wireless environmental monitoring to fine tune operations.

Various methods to lower energy costs in data centers are usually based on a single metric: Lower energy expenses. Crunching the numbers on energy cost reduction can be a relatively simple exercise and the cost savings are significant. Yet this figure alone does not reflect the total sum of cost savings and benefits gained from installing an intelligent environmental monitoring system that enables a data center to easily manage air intake, heat output, and humidity levels. In fact, there are five ways data centers can measure the return on investment of environmental monitoring technology: lower installation costs, reduced energy expenditure, integrated infrastructure management, lower downtime risk, smaller carbon footprint.

Evidence

After deploying just $1500 worth of temperature sensors in a single data center, enhanced temperature monitoring enabled IBM to realize over $10,000 in energy savings per year.

Source: Automated Asset Tracking in the Data Center: How IBM Reduced the Time/Cost of Tracking Data Center Assets

4 The rise of cloud computing is having an impact on data center efficiency — and it's not great, Utility Dive, 17 December 2019, https://www.utilitydive.com/news/the-rise-of-cloud-computing-is-having-an-impact-on-data-center-efficiency/569183/

Lower Installation Costs

The installation stage typically requires weeks dedicated to coordination, physical installation, and training, meaning any cost savings rarely start right away. Wireless environmental monitoring systems start saving costs almost immediately. These easy-to-install monitors can be deployed and integrated with current software within hours or days. And then begin providing live data feeds in minutes, with only one additional working day for software configuration and training. This saves data centers hours in manpower and avoids costs associated with delays in installation and technical issues.

Reduced Energy Expenditures

A typical server, priced at $4,000, expends roughly the same price of energy to power and cool itself within its lifecycle.[5] These figures are even more astounding in markets boasting higher energy prices, like Japan. Furthermore, it's been argued that the actual cost for a server may be doubled or tripled when you factor in the energy required to power and cool it.[6] The price of cooling as a primary cost-driver has driven data centers to recently look to colder climates to house their data centers, like Microsoft's underwater center in the North Sea[7] and Facebook's data center in Sweden.[8]

Evidence

After deploying an environmental monitoring solution, HP's global data center RCI Index improved by 27%, ensuring that 99+% of all of HP's data center assets are consistently and reliably cooled within ASHRAE recommended ranges.

Source: Customer Case Study: HP Cloud Service

Which brings us to the most obvious and powerful benefit of environmental monitoring—the ability to manage the less costly air-intake temperatures versus the more costly air-cooling temperatures.

Even a 1-degree Fahrenheit increase in air intake can yield an annual savings of 2%, with a positive relationship between savings and the replacement of air cooling by air intake. Environmental monitoring metrics and infrastructure provide the critical information data centers need to fine tune these systems, maximizing savings while ensuring temperatures stay within designated guidelines.

Step 1: Calculate Current Data Center Energy Costs	
Energy Costs per Square Foot	$200
Total Square Footage	10,000
Total Number of Racks	500
Total Number of Rows of Racks	30
Total Number of CRACs (Computer Room Air Conditioners)	4
Annual Energy Cost	$2,000,000
Step 2: Calculate Cost of Environmental Monitoring Installation	
Average Cost for 10,000 Square Feet	$35,000
Step 3: Annual Savings Per 1 deg F Air Intake Temperature Increase	
Yearly Savings	$40,000

Projected energy costs savings

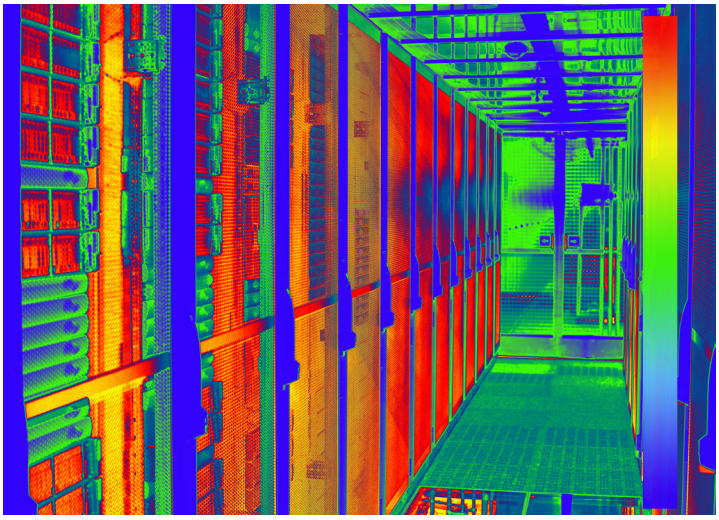
The cost savings of enabling an increase in air-intake temperatures of just 1 degree Fahrenheit, thanks to environmental monitoring, more than pays for the addition of the system within the first year after deployment. Going forward, the data center operator will be able to recognize with trends and identify obstacles, allow them to further

5 In the data center, power and cooling costs more than the equipment is supports, Electronics Cooling, February 2007, https://www.electronics-cooling.com/2007/02/in-the-data-center-power-and-cooling-costs-more-than-the-it-equipment-it-supports/

6 Cool it: Is the internet too hot for data centers to handle?, Scientific American, April 2013, https://www.scientificamerican.com/article/greening-the-internet/

7 Under the sea, Microsoft tests a datacenter that's quick to deploy, could provide internet connectivity for years, 5 June 2018, https://news.microsoft.com/features/under-the-sea-microsoft-tests-a-datacenter-thats-quick-to-deploy-could-provide-internet-connectivity-for-years/

8 Mark Zuckerberg shares pictures from Facebook's cold, cold data center, 29 September 2016, https://www.theverge.com/2016/9/29/13103982/facebook-arctic-data-center-sweden-photos



decrease costs by to increasing the air intake temperature versus air-cooling. This trend is aided by the monitoring software that enables fine tuning the equipment and infrastructure to further reduce energy costs.

Integrated Infrastructure Management

Too often, data centers managers do only minimal infrastructure planning—the focus is more often on the IT equipment itself. This lack of foresight invariably leads to mishaps such as thermal hot spots, lack of uninterruptible power supply rack power, system overloading, and other critical issues. Even in data centers with poor infrastructure planning, the addition of an environmental monitoring system and software with trend reporting capability provides the insight to proactively configure the layout of data center equipment for maximum efficiency, minimum energy consumption, and optimized power distribution.

When integrated with other enterprises services such as asset management or the data center infrastructure management software, this gives data center operators the ability to integrate into other enterprise services such as asset management—to track the entire system, from the lifecyle of physical assets to the full picture of the data center on a single dashboard.

Lower Downtime Risk

The risk for a partial or total systems failure is always present—it's not a question of if, but when. Consider a power outage that brings down the CRAC units. Without wireless monitoring to keep track of the rack temperatures, it is impossible to know if they are exceeding warranty specifications. In that case, the IT team has only one choice to protect the servers: power them down until the environmental infrastructure is repaired. This results in hours of unnecessary downtime.

Downtime incidents have a major impact on a company's bottom line, with every minute of downtime costing thousands of dollars. Direct costs can range from $301,000 to $5 million[9] per hour the servers are unavailable, depending on the business impacted. This doesn't take into account lost customers, lost productivity for the organization, or damage to the brand's reputation. Data centers can proactively prevent downtime risks with intelligent environmental monitoring by monitoring temperatures and receiving immediate notification when any heating issues arise, such as a hotspot.

Evidence

In the two weeks following their environmental monitoring solution deployment, Mitre Corporation was able to raise the set points in their data center 6 degrees. The results? An immediate $4000 return on their investment.

Smaller Carbon Footprint

Data center carbon emission has been a growing global concern for the past several years. Leading environmental policy organizations, such as the U.S. Environmental Protection Agency, the European Environment Agency, and the

9 The Steep Cost of Outages and Subpar Data Center Management, vXchnge, 21 June 2019, The Steep Cost of Outages and Subpar Data Center Management

European Commission (EC) Code of Conduct on Data Center Energy Efficiency,[10] have each weighed in on the issue, establishing their own minimum guidelines. The U.S. Environmental Protection Agency, for example, established an Energy Star[11] rating in 2010, for which data centers must be in the top quartile of energy efficiency among reported facilities in order to qualify

Environmental monitoring provides data centers the power to benchmark their metrics against competitors in the market. Google and other best-in-class corporations make it a point to publicize their energy metrics in order to gain the public relations benefits of an environmentally friendly image. By taking advantage of environmental monitoring metrics, Google is able to publicly claim that on average their data centers are twice as energy efficient as a typical enterprise data center, with a trailing twelve-month PUE of 1.11 across their large-scale data centers.

10 EC Code of conduct on data center energy efficiency: https://ec.europa.eu/jrc/en/energy-efficiency/code-conduct/datacentres
11 Energy Star benchmarking: https://www.energystar.gov/buildings/tools-and-resources/energy-star-score-data-centers

RF Code CenterScape

RF Code's CenterScape software suite, thoughtfully addresses environmental monitoring needs (power and cooling, access and activity), as well as physical assets (servers, networking devices, storage, and peripherals) holistically and at scale. This combined hardware/software approach provides value beyond monitoring just the enterprise data center by bringing visibility into all locations to single dashboard. It's designed to address the unique challenges and complexity of all types of computing environments, from enterprise data centers to edge deployments. The rF Code solution increases operational efficiency, improves the organization's security posture, reduces the costs of managing equipment, and delivers the simplicity, savings, and visibility needed to effectively operate a data center.

Specifically designed with the unique requirements of data center environments, CenterScape provides real-time insight and control over operations risks, costs, and compliance. This quick-to-deploy and easy-to-manage solution, accurate to the rack level and collecting data 24x7, provides reporting and accountability for compliance, regulatory requirements, and service level agreements. As an open platform, the solution is designed to easily integrate with your existing software deployments like IT systems management tools (ITSM), building management systems (BMS), and data center infrastructure management (DCIM) platforms.

Data centers only bring that value when they're working efficiently, effectively, and at scale. To do so requires granular, real-time intelligence and alerts for each of your facilities. As data centers take on ever more or the world's vital operations, RF Code empowers enterprises to leverage their data centers effectively and make informed decisions faster.