

# Data **CENTER**

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# CRITICAL POWER & COOLING

COOLING FAILURES AND POWER OUTAGES

HOT AISLE VS. COLD AISLE

SOCIAL NETWORKING SECURITY

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# Power and Cooling in the Data Center



With the tools available to us today, both IT and Facility managers have a chance to make a big difference. While having an enormous amount of resources around us to help quantify the go-forward strategy, finance will continue to be a hurdle. Power and Cooling do not help the company grow. Yet without it your infrastructure can not provide the things needed to support that growth. I am discussing some changes regarding Power and Cooling in the data center that will help justify your existence and the cost for change.

**T**he computer environment will only continue to increase in density. How is this ever changing technology going to help provide a flexible foundation for us? Just like SAN's allowed for tape library sharing and later expanded for spinning disk growth, NAS provided file sharing and ease of grow ...and the paradigm changed before our eyes. Virtualization allowed for mission critical abilities across multiple servers or more clients on one server...and the paradigm changed before our eyes. Tiered storage platforms allowing for high performance computer data to be ingested on the fly and migrated to lower cost disk platforms....and the paradigm changed before our eyes. The foundation that hosts these technologies and supports these ever important changes....the Paradigm is changing before our eyes. Power and Cooling. What is changing and how can I leverage?

These conversations take place daily. Utility costs will only continue to grow. Power grids have only been built in certain areas to support so much. Protecting your data center with smart decisions to allow your employees to work at an off site recovery center in case of a disaster (i.e. tornado, flood, earthquake, power outage, ice storm, security breach, etc.) is of paramount importance. Data centers are what will continue to allow us to grow and thrive. I say this because whether you are a company of one or a company of thousands, regardless of your market, you will not even be able to open your door without a functional data center.

This means that we need the most reliable, most efficient and most flexible Power and Cooling solutions. Just like any of the technologies mentioned above, flexibility was key. Not locking yourself into one solution is a very nice benefit. There are four key technologies in the area of Power and Cooling that allow us to build, support and grow with our ever changing data center demands.

First and foremost, why now? Well, I cannot tell you how many conversations I have on a daily basis concerning this very topic. These are several quotes that I have heard over just a few months.

"We just experienced a power failure and our facility is just so out of date."

"I'm experiencing a high number of power spikes and my equipment cannot afford the one time it is not protected."

"Our cooling is either working or not working and we cannot afford to over spend on large CRAC units when we aren't even sure what will be in our racks and what we need."

"After a study we did to lower our utility costs, we found that 80% of our cost were coming from our data center and 80% of that was from our CRAC units."

"We make so many changes in our data center that you wouldn't believe what we pay in whip changes."

"We do our best to charge back for power usage and we have no idea how close we are."

"We cannot grow because we are out of power."

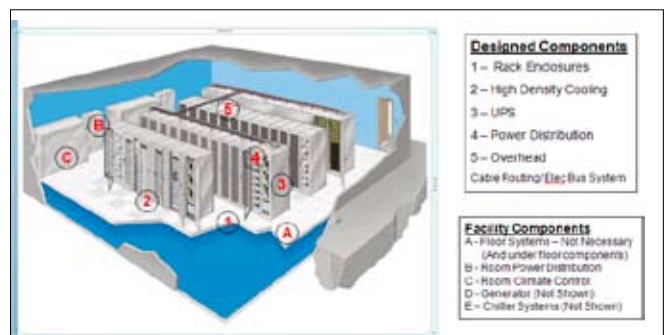
"We are doing our best to figure out how to direct cooled air where we need it."

Understanding your environment and the direction of your department or company is a key exercise in optimization and flexibility. One of the most important things to understand is your KW and CFM. Having this information is just as important as understanding your demand and availability needs. I have not even brought up mission critical data center Tiers. This is a factor you will consider when remodeling or constructing from scratch. A couple of topics we will not tackle at this point are LEED Certifications and Tiers from 5-1. Our clients and experiences come from all areas.

From ten square feet to 1,000 square feet to hundreds of thousands of square feet. From raised floor to concrete floors. From drop ceiling to none. We work with all of these clients to help tackle this challenge and need. Power and Cooling.

These next paragraphs will discuss some of the options that will significantly improve efficiencies in the data center. Let us start with where you are. What are your needs today and what are your needs going to be in the future? Don't know?

Let us assume that you are expanding a row or doing a little remodeling. Begin with the UPS. What vendor is going to give you the most efficiency? There are options available here to use batteries that are small, batteries that are large or even to use no batteries at all. Every environment is going to have different needs and will have the ability to take different risks, if you want to call it that. I have seen some companies use small batteries that will allow them to plug and



From failure risk to over spending. I am only as good as my batteries. The more small batteries you have, the more you will have to replace and the more risk you will have when a failure does occur. These solutions can cost two and even three times more over the life of the UPS. The other option is Flywheel. Get rid of the battery all together. This works in some environments depending on everything from budget to generator to load to foundation. One of the more important differences is efficiency. How is this done? Many UPS vendors are now or will be re-designing for this architecture. This ability is game changing and allows for real power savings on the bill and often very significant savings. This decision is critical and should be considered wisely. In the Data Center, we have all been shocked by service contract renewal costs. Make sure you have options. Can your UPS be supported by third party support? If not, we all understand how this can affect our operational costs. Clearly, all of this is for a larger data center. What if your data center is made up of a closet or a remote location without a generator? All you need is a UPS that will support your load for the amount of time that you need it running based on your outage experiences. These UPS's need batteries changed more often. They are smaller. The entire UPS needs to be swapped out more often as well.

Have you considered an Electrical BUS system? There have been so many great improvements in this area. Do your homework here and buy products that were made for the data center, not for another market vertical. These Electrical BUS systems allow for ever changing needs in the data center without having to run a whip every time a server requirement changes. Keep it simple and leverage these great new products. They are not for everyone or every environment. You know whether it is good for you. You pay a little more up front with huge flexibility and change cost savings on the back end. The overhead BUS more than pays for itself.

How about being able to monitor your power, temperature and humidity at the outlet? These tools are a great start to be deployed with your ever changing environment. You can monitor the entire bus, racks, servers and non-rackables. It is up to you. Once you have the information from your environment, you have the ability to learn and grow on demand the way you need to grow. Cost is a huge factor in this decision. Power Strip makers are offering these abilities that are very powerful and bring a tremendous amount of information to your fingertips. Want to offer credits to departments for power savings? Want to be confident in what you are charging clients back for their power usage? As a client being charged, have you asked to see your usage? Wrap this into a more broad capability and there are many new packages that allow for tying in security, HVAC and more. Now that these capabilities are here, we will all see Data centers leverage power usage in more creative ways. From government credits to charge-back capabilities, making the decision on this framework is important to your ever changing data center needs.

Now on to another HOT topic. Airflow and Cooling. The front of the racks server's intake must fill up with chilled air as quickly as the

server consumes the air. Otherwise hot exhaust air will circulate and cause overheating. Wouldn't it be neat to see what the air from your CRAC unit actually does when it comes out through the perforated raised floor? Well, I've actually seen these studies by some of the largest research institutes in North America. I am sure that many of you can imagine what I am about to say next. The overhead lights went out, the strobe lights came on and the smokeless spray was released. With the cold aisle having servers suck in air from the floor tiles, very little of the cold air was even inhaled into the rack. CRAC units of twenty years ago were fantastic. But in today's high growth and high density environments they are not for everyone. I am not saying they are not needed by any means. They just are not for every data center, I am saying that we can now optimize our power and cooling options to scale and grow on demand. We now have options that give you flexibility to procure what is needed, where it is needed and how it is needed. With products available today you now have the flexibility to use a completely self contained rack and cooling solution that is completely sealed. Whether with closed loop containment or with perforated doors, you can now even scale a data center on concrete floors. You have the ability to architect these environments to leverage variable speed blowers and direct airflow on demand to the server and storage products in the racks. Think about the power and cooling saving that this brings into your environment. Contain the Hot Aisle or Contain the Cold Aisle. With either as options, you have the flexibility to optimize your data center for its ever dynamic and changing demands.

I realize that there are other things that need to be in place to leverage any and all of this. The point is that these technologies are only going to continue to grow. But, they are here today. In data centers where CRAC units are the sole provider of cooled air to the racks, someone seems to be doing some sort of air flow/cooling study. There are many tools including CFD model capabilities that will help you justify some of these decisions. Identify the companies that will talk to you about these solutions. Be prepared to modernize your racks for vendor diagnostics. This is just one more decision, I realize, albeit, an important one. From size to working space inside the rack to accessories, making these decisions up front can be a deciding factor on the optimized strategy of your future.

Imagine when you have your facility architect-ed for completely optimized UPS's with an energy saving architecture. You have electrical overhead BUS systems where you can move, change and support any power outlet need on demand. You are monitoring all the power usage and cooling demands on the fly. You've saved your company \$\$\$ and given them the flexibility to grow into areas not even imagined at this very moment. Your job hasn't gone away. You've become a hero and now more important...all because of Power and Cooling.

I would like to thank all of our IT partners, general contractors, electrical Contractors, designers, suppliers and most importantly end users who have given us the experience to not only help them but to witness these needs. I would like to thank GE Power Quality, PDI BUS System and Rittal (Rack, Power Monitoring and Cooling) for these products and solutions that stand out above all others in providing flexibility and support to solve customer challenges for today and future needs.

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