Where Money Leaves the
Data Center

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The rules and special procedures needed to clean a cleanroom, and how they differ from ordinary cleaning.

There are two reasons why few data center managers focus on the financial aspects of running their facility. For one, bills related to energy consumption go to the CFO, not the data center manager. The CFO pays the bills, but often has little idea of how much of the cost is attributable to electrical usage. Even if the financial people did determine how much of the cost stemmed from electricity, they likely wouldn't know if that usage was high or low.

Secondly, most data center managers do not closely analyze electricity costs because they are not part of their operating budget. Despite a tight economy in which CFOs are asking their data center managers to do more with less, the data center manager rarely sees the power bill. As a result, data center managers don't often feel pressure to maximize power consumption and minimize wasted air. This is unfortunate because nearly every data center can save significant dollars by implementing five simple steps to save electricity.

A 15,000 sq foot data center spends about $100,000 on electricity per year. Arecent Uptime Institute and Upsite Technologies study found that about 60% of available cooling in a typical computer room is wasted due to bypass airflow. On average, electricity costs data centers more than hardware, so anything that makes airflow more efficient reduces costs. Moreover, the environmental and green impact of lowering power consumption and carbon footprints offer global benefits.

If discussions among financial people about the costs of operating their data center do occur, these conversations rarely get to the point where data center managers avail themselves of very simple techniques to save money and trim electrical costs. CFOs must become aware of the aforementioned disconnects, and become proactive in encouraging their data center managers to increase efficiencies.

AIR ENTERS, MONEY EXITS

Power Usage Effectiveness (PUE) calculates how much power is going into a data center and how much is actually cooling equipment, versus how much is actually powering the equipment. A lot of electricity is used to cool air, and a lot of it is wasted due to how the data center is constructed. Let's review how money is typically lost at a data center.

Money leaves and evaporates into the air through:
1. Perforated tiles and grates in hot aisles
2. Perforated tiles and grates in open areas of the server room
3. Too many perforated tiles and grates in cold aisles
4. Unsealed cable openings behind and under cabinets
5. Open areas,under power distribution units (PDUs)
6. Unsealed oeenings around conduit penetrations
7. Unsealed sub floor wall penetrations
8. Out of calibration return air sensors on cooling units
9. Running more cooling units than necessary
10. Cooling unit set points being too low
11. Higher than normal IT failure rates due to excessive intake temperatures resulting from exhaust air circulating through open spaces in cabinets

WHY COLD IS COSTLY

Another problem is that most data centers are simply too cold. Data center managers fret so much about overheating their equipment that they set temperatures well below the optimal level. Most data centers don't need to be so cold. Pumping in too much cold air is wasteful and costly. Data centers that are poorly configured and maintained usually cannot get their server rooms cold enough, so they add more Air Conditioning (AC) units to compensate. Not only does this add to costs, it doesn't solve the underlying problems ether.

A WELL BUILT DATA CENTER ISN'T ENOUGH

Data centers that do not allow dollars to seep out don't have holes in their foors nor significant bypass airflow But even well built and maintained data centers can still bleed money. In one data center that Pegasus Cleanroom Services serviced there was so much air going in that it raised the temperature of the server room 10 degrees. Just adjusting the temperature settings, or turning one or two AC units of completely, would have lowered the temperature 10 degrees to the correct temperature and saved on power cost. Despite its sound construct, this data center was still wasting lots of money.

CFO TO DC MANAGER: LOWER POWER COSTS

Many data center managers are running facilities with $100 million budgets, so making small adjustments do not seem capable of delivering big savings on electrical bills. But according to Upsite Technologies, the Total Cost of Ownership for housing, powering, and cooling data center infrastructure has increased by 500% since 2000. In most cases, all data center managers need to do is some simple reconfiguring. A "tune-up° from professionals with expertise in airflows can redirect airflows and properly set AC units. A data center "tune-up" requires little capital outlay, and the return on investment is generally realized within a month.

Studies have shown that taking steps to decrease bypass airflow and improve data center power consumption efficiencies do lower costs. Upsite Technologies analyzed the cooling efficiency of a 6,996 square foot data center, and then used simple techniques that improved its bypass airflow 60% and reduce hotspots to zero. This allowed the facility to place two cooling units in inactive standby mode, and reduce its utility load by 30 kW. A 25 kW (kilowatt) load reduction represents a cost sailings of $21,900/year (kWh combined with CO_2 reduction of 193 tons/year), plus annual maintenance savings for cooling units of ac soximately $6,000 total. To read the full case study, click on the following link: http:/lupsitetechnologies.com/images/stories/pdf/PartnerMarketing/koldprofile%20financial%620impact%20study*20-%20usa.pdf)

SIMPLE AUDITING STEPS & WHERE MONEY ESCAPES

The cooling infrastructure of a data center consumes the largest portion of its total power usage. Therefore, improvements to cooling efficiencies represent the greatest opportunity for reducing operating costs. Employ the following tips to improve the cooling efficiencies of your data center.

1. REDUCE BYPASS AIRFLOW

The space occupied by PDUs (power distribution units) often cover holes in raised floorings where air escapes. Begin improving cooling efficiency by reducing bypass airflow to less than 10%. Even in well managed computer rooms 35% bypass airflow can be generated just by PDUs.

PERFORATED TILE PLACEMENT REVIEW

The following recommendations may seem obvious and rudimentary. However, most data centers have too many perforated tiles installed, and better managing perforated tiles and grates is the easiest step to improving the airflow and environment for IT equipment Using too many perforated tiles reduces the air pressure that is split among all the tiles, so not enough air gets distributed where it's needed. Place every single perforated tile or grate with purpose. Don't overdo it.

a. Perforated tiles and grates should only be located so that conditioned air from the tile or grate is consumed by IT equipment.
b. Remove perforated tiles and grates from Hot Aisles and all open surfaces.
c. Seal openings under PDUs and all cable and conduit penetrations.
d. Remove excess perforated tiles or grates from Cold Aisles. Bypass airflow can result from too many perforated tiles or grates in Cold Aisles.

2. Cooling Unit

The calibration of cooling unit return air sensor can fluctuate over time. Out of calibration sensors can cause units to work against each other. Be sure to calibrate cooling unit return air sensors for both temperature and relative humidity.

3. Use Blanking Panels

Open spaces allow hot exhaust air to circulate the front of IT cabinets. This can lead data center managers into thinking they need to reduce, or maintain, relatively low cooling unit set points. To avoid this problem, install blanking panels in all open spaces in IT cabinets. Effectively sealing off hot air exhaust using blanking panels has been shown to decrease operating expenses by as much as 29%.

4. Raise Cooling Unit Set Points

Once conditioned airflow management is improved, cooling unit set points can often be raised, so now the room doesn't have to be as cool as previously anticipated. Set points should be as high as possible without causing any IT equipment intake temperatures to exceed ASHRAE recommendations of 80.6 degrees Fahrenheit.

5. Turn Off Cooling Units

Many computer rooms have more cooling units running than are necessary to support the load. Comparing the installed cooling unit capacity to the IT electrical load will reveal an opportunity to turn off some cooling units. Turning off cooling units represents a significant opportunity to save money on reduced electrical consumption and maintenance.

The total $27,900 annual ($2,325 monthly) in decreased costs reported by Upsite Technologies for its data center client is consistent with Pegasus Cleanroom Services' estimates of potential savings from implementing the above techniques. A 15,000 square foot data center that spends $100,000 in annual power costs can expect to trim its costs by 20-25%, or about $20.000.

CFO Call to Action

It is more imperative than ever for CFOs to reduce costs. CFOs must ask their data centers to operate as efficientiy as possible. Improving operational efficiency is often much easier than many data center managers might anticipate. As a value-added service, Pegasus Cleanroom Services' has its on-site cleaning crew provide a free Thermal Efficiency Audit for all of our data center customers. The audit offers visual evidence of any thermal efficiency issues, and enumerates simple solutions that are not costly.

Pegasus Cleanroom Services has worked with over 100 data centers, including the biggest most recognizable private and public data center providers in the industry in several counties of Los Angeles, and San Diego, and throughout California, Oregon, Arizona, Washington and even Canada. We understand how critical operational efficiency and controlling contamination is to the success of data centers, medical device, nanotechnology, pharmaceutical, biotech and semiconductor companies. Expertly trained technicians, and the latest technologies, are employed to make 100% certain that cleanroom environments exceed the industry's highest regulations for contamination control, cleanroom control, maintenance and safety in line with federal and ISO standards compliance.

For a Thermal Efficiency Audit or Cleanroom Audit, contact Pegasus Cleanroom Services at 800-734-3878 or visit www.pegasusdatacentercleaning.com to more about our services, expertise and experience.