Energy Efficiency

How to improve **power usage effectiveness** the Colt DCS way

Bigger isn't always better.

Power usage effectiveness (PUE), a widely-used data centre metric employed by operators, exemplifies that mantra. The smaller the PUE number, the more efficient the data centre operations, which is the goal data centre managers strive to achieve.

At Colt Data Centre Services, we strive to achieve the lowest possible PUE scores across our vast data centre estate in Europe and Asia. Standard guidelines are followed by operations personnel to systematically ensure the lowest possible PUE score is achieved at each site.

We're aware of the need and advantages to the reduction of power consumption. As such, we decided years ago it's best to maintain a continued focus on efficiency.

What that meant was the creation of a standard set of guidelines for Colt DCS operations personnel to systematically ensure that from simple to more complex solutions, we make our data centres as efficient as possible.

This continual focus on energy efficiency has resulted in significant savings across our estate over the past decade. We've learned many lessons about lowering PUE along the way that we'd like to impart. This white paper will outline some of the measures we've employed across our estate that will allow you to improve your data centre's power usage effectiveness.

Planning data centre capacity is not always as straightforward as it should be. Traditional data centre planning cycles account for requirements that last 10 to 15 years. This makes it challenging to balance long-term planning given changing business requirements and the rapid pace of technological innovation.

Even the most thorough business plans are bound to change given that business and technology are in a constant state of flux. Trying to plan anything beyond two years is a challenge never mind forecasting requirements 15 years in advance.

Nevertheless, a greater emphasis on energy efficiency and the social responsibilities associated with running large data centre estates means efficiency gains at data centres are a top priority for operational management teams and data center operators at large. However, there are relatively small improvements to your facilities that can improve the bottom line if implemented correctly.
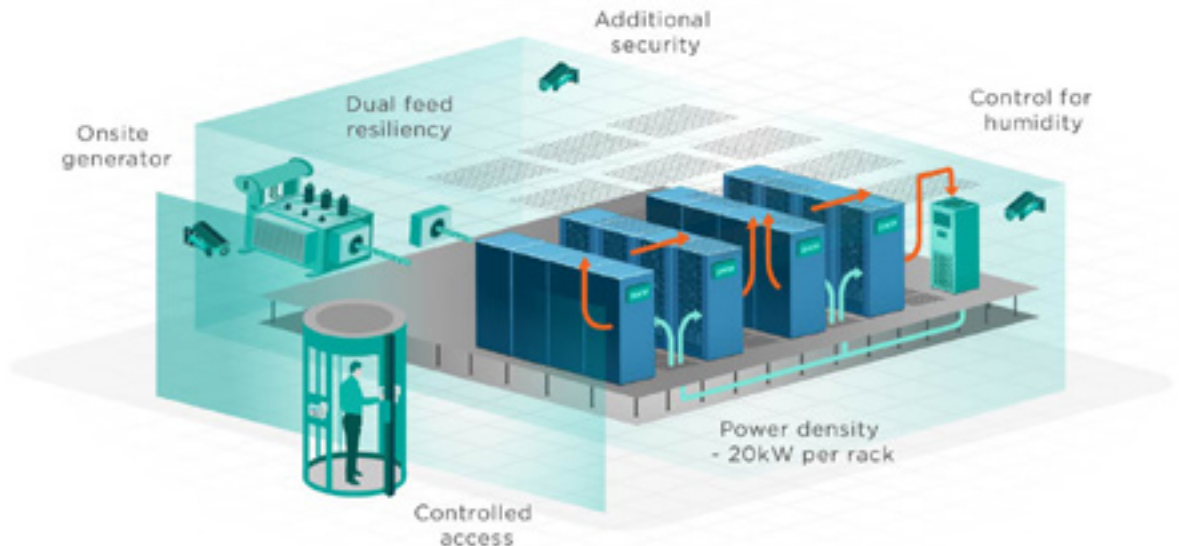
Here are a few of the tactics Colt DCS has taken to improve PUE:

✓ Measure power usage

Management guru **Peter Drucker** once famously proclaimed: 'If you can't measure it, you can't improve it'. Doing so regularly is the first step to a more efficient data centre.

It's an obvious step perhaps for some data centre operators. However, we've been surprised by the lack of measurement at many data centre sites. To assess any efficiency improvements, as a starting point, you need to be in a position to benchmark your existing energy usage against a comparable timeframe.

Use whatever resources are available for starters, even if they are considered rudimentary or incomplete. Starting to measure, record and track power use on a regular basis is the first step to a more efficient data centre.

Regularly check your current PUE; if you have measures month-on-month, assess it as a rolling average over the course of a year (by monitoring the monthly average from one 12-month cycle to the next, incremental improvements are easier to identify).

Continue to measure energy usage consistently and regularly but beware of making snap judgements on improvements. Seasonality and changes in outside temperature can have a significant impact on power usage and your anticipated energy savings.

Regulate airflow by preventing mixing of hot and cold air

Controlling airflow and limiting the mixture of hot and cold air, and the various steps to do so are crucial to the lowering of PUE in a data center. Mixing of hot air that's pumped out by servers and the flow of cold air in has to be managed correctly. Otherwise mixing will occur.

The mixing of hot and cold air – and the subsequent need to regulate the temperature – can be one of the most draining processes relative to your energy supply. It's important to prioritise the management of airflow given that it can substantially impact the PUE of a site.

Align hot and cold aisles

Ideally, all servers within the racks and rows should face the same direction. These rows can then be arranged into hot and cold aisles with the front of the servers facing one way to allow for cool air aisles to be created. Such a measure makes it possible for cold air to be blown to the front of the servers. Hot air will be directed to hot air aisles. It's essential to install the servers correctly as moving servers can be very labour intensive (with delicate older servers requiring particular care).

There's also the potential for service disruption if installation goes awry, so proper planning is critical. For those operating in a colocation or shared environment, it is important to plan and communicate effectively with all parties involved. They must understand the impact and benefits of the improvements for it to work smoothly.

Introduce aisle containment

The next natural step to introduce is containment to ensure separation between hot and cold air and improve the direction of airflow. Introducing roofs and in particular doors to the end of aisles can deliver a major improvement. Solid doors or Perspex dividers are effective, and even butchers curtains can be equally efficient, if not the most attractive option.

Reduce airflow leaks

Install blanking plates to fill the gaps where no equipment is present. Blanking plates are easy to install; they can stop air escaping by preventing it from falling between or around the servers within the rack.

Check flooring

Raised flooring is as important to consider for potential air leakage as the walls of a data centre. It's essential flooring be checked for gaps to generate efficiency gains. Air can escape behind and beneath air cooling units or through incorrectly placed floor grills ensure the cold air is distributed to areas where it's needed. The goal is to direct the cold air in one direction, through the racks and out the other side. Grill tiles should be placed in the planned cold aisle in front of racks for raised floor air distribution.

Control air temperature

You have tackled the flow of cold air in through the server equipment and directed the hot air out without mixing. The regulation of air temperature should be an easier task. The higher the temperature the data centre operates, the more efficient it is because less cooling is required. Steps to increase efficiency, such as turning off cooling units or increasing the temperature set points of water, and air cooling systems provide further savings.

Regulate humidity

It's a good idea to manage humidity as operators can then open up humidity levels to more efficiently manage their data centre. By operating to a slightly wider humidity banding, the need for humidification and dehumidification is reduced, which saves energy.
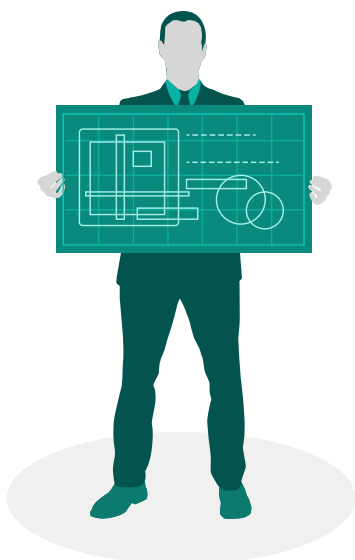
Turn off 'zombie' equipment

Turning off redundant uninterruptible power supply units could represent a simple step to significant energy saving given the energy drain the groups represent.
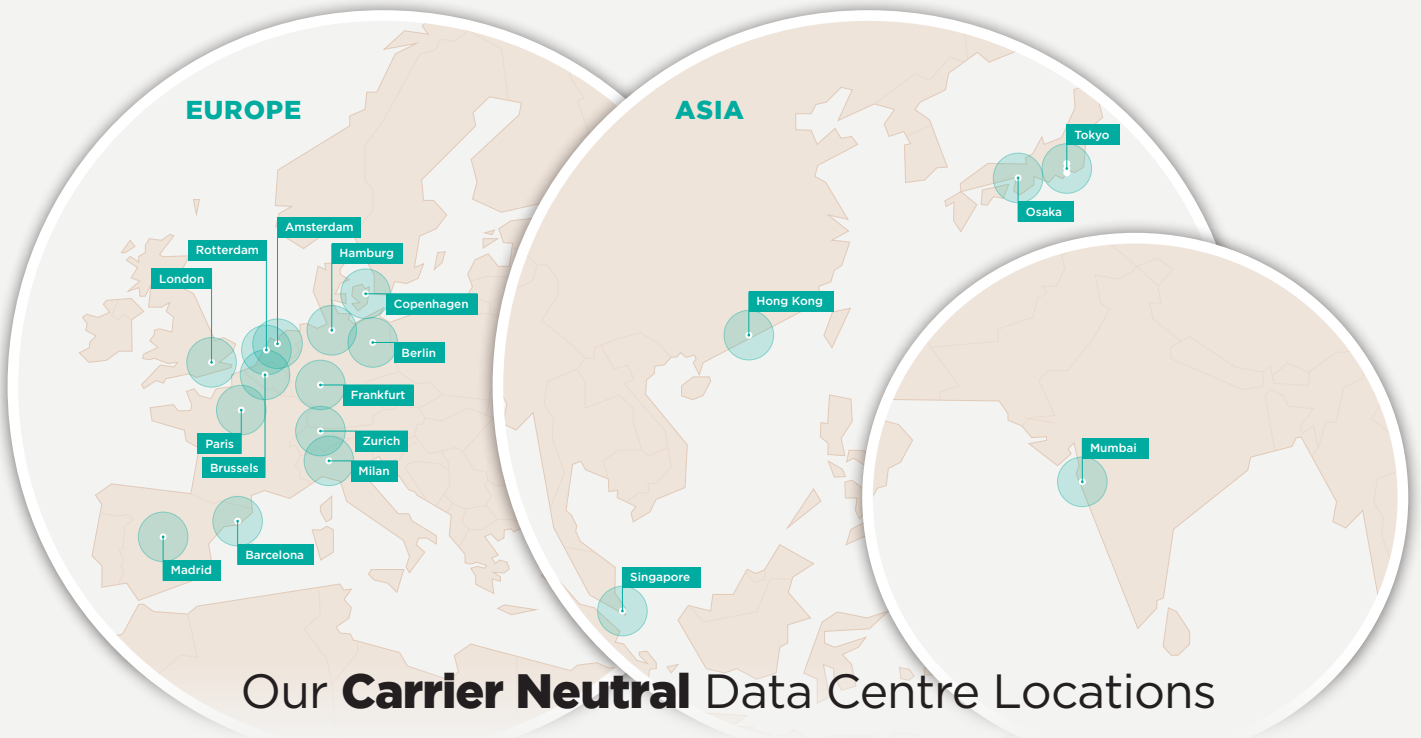
Measure at regular intervals

A year's worth of monthly data should help operators determine whether the effort has been worth the trouble.

We've established a number of steps to boost the efficiency of our data centres over several years. Regular measurement is necessary to determine whether the actions you've taken have been worth the effort.

The measures noted in this document are ones you can implement as well irrespective of the long-term plans for your data centre.

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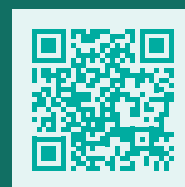
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At Colt Data Centre Services this is our business. Colt Data Centre Services offers flexible and affordable colocation and IT infrastructure solutions. Our connectivity and colocation solutions allow our customers freedom to plan effectively for the growth of their business, knowing that their data centre strategy is future-proof.

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Colt Data Centre Services has over 20 years' experience in designing, building and operating energy-efficient, reliable data centres - hosting significant financial, media, corporate and cloud wholesale providers across the world.

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