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Efficient Data Centres

How to make them and why they matter



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Efficient Data Centres

Why they matter

Energy efficiency has long been on the agenda of IT directors and data centre owners.

The introduction of the Carbon Reduction Commitment (CRC) in 2010 was a real wake up call for the industry. And although the Chancellor of the Exchequer has since announced the closure of the scheme, rising energy prices guarantee that the issue will remain front of mind for all but the smallest operators.

But for all that the issue can generally be found on the agenda, it's still not always as near the top as it might be – and nor is it always clear how the IT professional can best respond.

To see exactly why efficiency deserves a top spot in every IT director's priorities, it is worth considering exactly what is at stake, the different that data centre efficiency can make, and the key design principles that can ensure efficiency is built into the DNA of any database.

The Challenge

CRC was introduced in 2010 as a mandatory requirement for all companies purchasing more than 6,000 MWh of electricity per annum. Depending on the price you paid for electricity, this roughly equated to an annual bill of £500,000. Companies which qualified were required to purchase carbon allowances at £12 for every tonne of CO₂ emitted, rising over time to beyond £15.

Obviously this represented a significant cost for any business facility using as much energy as the modern data centre (see tables opposite). But while some may have welcomed the March 2016 announcement by the Chancellor of the Exchequer that he was closing the scheme from the 2018-19 compliance year, this was balanced by a commitment to a 'revenue neutral' increase in the Climate Change Levy.

And perhaps just as important, it is worth noting what has happened to energy prices since CRC was introduced. For large non-domestic users, the cost of electricity has risen 42% during that period – and since 2004 it is up 170% (Dept. of Energy and Climate Change / National Statistics, June 2016). There is no sign that this trend is due to abate any time soon.

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The Datacentre Contribution

The typical UK datacentre PUEs (Power Usage Effectiveness) is between 2.5 and 3.0, which means that more electricity is consumed in cooling than in powering the IT equipment. Plenty of case studies now exist to show that it is perfectly possible to bring the PUE of even legacy datacentres (with equipment more than two years old) to 1.8.

What impact would this have in practice?

Well, the majority of enterprise level corporations that Excel typically works with have multiple datacentres consuming 1MW to 5MW per site. The table below gives an indication of the potential cost savings that this reduction in PUE could deliver in legacy datacentres ranging from 1MW to 10MW load.

Total Load KW	£/KWh	Annual Energy Costs with PUE 2.5	Annual Energy Costs with PUE 1.8	Total Annual Savings	Reduction in CO2 tonnage
1,000	0.12	£1,051,200	£756,864	£294,336	1,857
2,000	0.12	£2,102,400	£1,513,728	£588,672	3,714
4,000	0.10	£3,504,000	£2,522,880	£981,120	7,428
6,000	0.08	£4,204,800	£3,027,456	£1,177,344	11,143
8,000	0.08	£5,606,400	£4,036,608	£1,569,792	14,857
10,000	0.08	£7,008,000	£5,045,760	£1,962,240	18,571

The level of these savings means that any expenditure on datacentre efficiency almost inevitably delivers a return on investment in less than 12 months. And alongside the clear financial and environmental gains are a host of associated benefits – increased reliability of business critical IT systems and increased capacity within the datacentre.



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Efficient Data Centres

How to build them

Designing the Efficient Data Centre

So for all these reasons and more, efficiency should always be near the top of the data centre agenda.

The next challenge is making this a reality. Unfortunately experience suggests that solutions can be more easily sought than found, with varying levels of 'expertise' on offer across the sector. There are certainly plenty of data centres out there with an energy performance which suggests not all promised 'efficiency best practice' is 'best' by any means.

These are the four areas which we believe every operator should be able to address – and evidence – in a genuinely best practice approach.

1. Airflow

Managing temperature and airflow distribution means more than simply putting the AC units in the right place (perpendicular to the hot aisles, since we're on the subject).

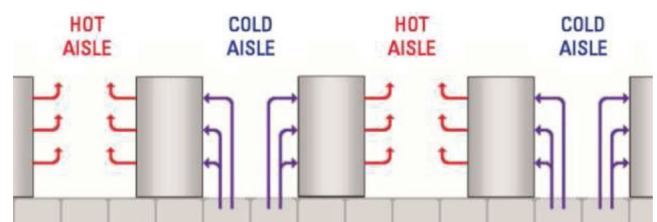
Additional considerations include whether the designer / installer has:

- Calculated the balance of IT equipment airflow vs CRAC airflow;
- Considered the importance of uniform static air pressure (using raised floors)
- Calculated the impact of vent tiles in the overall design (adjustable vent tiles throughout, and removing any next to AC units).

2. Hot and Cold Aisles

The principle of eliminating the mix of hot and cold air by employing hot aisles and cold aisles should be standard by now, but it is a principle which can be, and should be, refined and built on.

Additional details include eliminating gaps in rows; using longer rows; and deploying cabinet blanking panels and cable entry seals throughout. God really is in the detail where airflow is concerned.



3. Equipment Rack and Containment Design

It's amazingly easy to destroy a great principle such as hot and cold aisles with some good old-fashioned bad practice.

It might seem obvious that cabinets and racks should be arranged in an alternating row pattern (with fronts facing each other) to create those hot and cold aisles, but it's all too common to find a very different reality.

And once you've got that right, you're really into the detail.

- Do PDU cables only run under cold aisles?
- Are perforated floor tiles located only in cold aisles?
- Are trays for data and telecom cabling located under hot aisles?
- Has the design provided adequate clearance for equipment to be mounted in racks and cabinets from the front?
- Are cabinets aligned with one edge along the edge of the floor tile?

There's much more, but you get the picture – this is a whole-room process, with every cabinet and every rack making a real difference.

4. Monitoring and Control

If you haven't got sufficient monitoring and control systems in your datacentre then you simply won't be able to make informed decisions concerning its day to day operation and performance.

As a bare minimum you will need monitoring tools to capture and compare performance, temperatures and power usage (make sure your operator is taking advantage of advances in thermal imaging as well – they can deliver an immediate and powerful insight into key issues).

These tools must include capabilities such as: measuring server temperatures in real time; creating historical graphs for trends; and enabling departmental billing based on energy usage rather than RU space.

And finally, once you've checked what a service provider knows about best practice for efficient datacentre design, make sure you check how much they know about putting it all into practice. Because ultimately, that's where great ideas turn into efficient data centres, reduced energy bills and a shrinking carbon footprint.

If you would like to talk to a datacentre efficiency specialist about pushing energy management and reduction further up the agenda at your company, call Excel today on 01708 865855, or email sales@excelit.com



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Get in touch

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