That old chestnut- Food for thought…

By Simon Campbell-Whyte- Executive Director DCA

I RECENTLY HEARD from DG Connect the European Union focal point for the Digital Agenda and EU policy. There is of course much head banging to be done on how data centres manage, measure and control energy usage and it is likely that this wrestling has only just begun.

So what should we do as data centre owners and operators to ensure our house is in order? Well, perhaps we should think about what we look like from the "outside" of the industry?

Perhaps the regular Linkedin discussions about standards give us a clue - confusion, fragmentation and disagreement is abundant, does this paint a picture of an industry able to control these things without a badly aimed big stick?

It seems to me that the industry should work together to adopt the best practices we advocate as an industry and sort out the old chestnut of who should do it – how about the industry itself?

On the subject of standards, the DCA has released a directory, it perhaps demonstrates the point above, that of the commonly found standards and guidelines, there are twenty four; I'm sure others can be added but it just goes to show that harmonisation is the key to clarity right now. The directory is available for download and comment by both non-members and members alike from http://www.data-central.org/?page=standards

Keeping your UPS green and efficient

By Alan Luscombe, Sales Director at Uninterruptible Power Supplies Ltd, a Kohler Company.

AS UNINTERRUPTIBLE POWER SUPPLIES (UPS) systems became popular and then indispensable for data centres, users' expectations were simply focused; they wanted guaranteed and clean power. Today's business climate is changing this, as it exerts pressure on data centre operators to control rising energy costs and preserve their Green credibility.

In this article, Alan looks at how developments in UPS technology can help users optimize their energy efficiency while balancing power protection and energy efficiency. When UPS systems first became commercially available in the 50s, they appeared as rotary or 'no break' systems comprising a rectifier, charger, battery, DC motor and AC generator. As the power train relied on the mechanical link between the motor and generator, isolation from mains-borne events such as spikes was excellent, but efficiency was relatively low at typically 84 – 88%. However in those days, energy was relatively cheap and Green strategies were not yet a political or social consideration.

By comparison, today's users' expectations of their UPS have become far more stringent. As many organisations depend on online, real-time transactions and communications to remain in existence, the availability of clean, uninterrupted power is business-critical rather than merely highly desirable. Additionally, the pressure felt by UPS vendors to assure this availability is now matched by the pressure to do so efficiently, for both financial and Green reasons.

Financially, any shortfall in UPS efficiency gives rise to costs, both directly through energy losses and indirectly as these losses create a cooling requirement. This adds up to a significant financial burden as energy prices continue to rise, yet other efficiency-related pressures exist as well. If organisations fail to implement an effective Green policy they can fall foul of increasing legislation, and their public reputation can be damaged.

Fortunately, improvements in UPS technology mean that with the right UPS topology and configuration, users today can achieve up to 99% efficiency from their UPS installation. One of the first great advances arose from the development of static, semiconductor inverter-based systems to replace the rotary types.

These brought an improvement in efficiency, which however was limited because these systems required a transformer to match the inverter output to the 240 Vac needed by the critical load. This introduced inefficiency as well as adding physical size and weight to the UPS equipment.

However, further advances in semiconductor technology and the introduction of the Insulated Gate Bipolar Transistor (IGBT) have led to UPS designs that eliminate the transformer entirely. Fig. 1 shows the effect this has had on improving UPS efficiency. The graph shows an efficiency gain of around 5%, yielding a substantial reduction in energy running costs and heat loss.

The transformerless design also features an input power factor which is less load-dependant and much closer to unity than that of a transformer-based design. Improving a UPS's input power factor towards unity reduces the magnitude of the input currents, so reducing the size of the associated cabling and switchgear. Electricity running costs can sometimes also be reduced.

The reduction in size and weight achieved by eliminating the transformer is also important. For example a 120 kVA transformerless design weighs less than a third of its transformer-based equivalent, and occupies just over a third of its footprint. These physical reductions have allowed a fundamental new approach to UPS topology, in which flexible UPS systems of all sizes are configured using rack-mounting modules. Ranging in capacity from 10 kVA to 50 kVA, these modules can be incrementally added to the UPS rack, so that the UPS remains 'right-sized' to a facility's changing load. This flexibility maximises efficiency by keeping the UPS fully loaded, while also easing redundancy, availability and scalability.

These factors – transformerless design and modular topology – allow UPS users to achieve up to 96% efficiency. However, a data centre can now achieve further UPS efficiencies, right up to 99%, if its circumstances allow eco-mode operation. In eco-mode the UPS operates off-line during normal utility power availability, with the static switch conducting incoming mains directly through to the critical load.

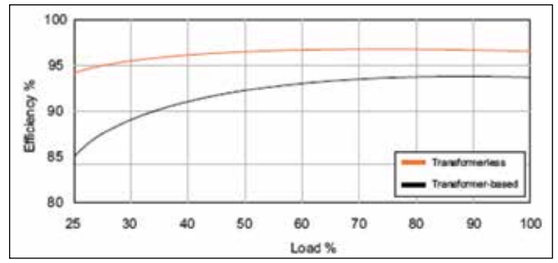

Fig 1: Transformerless and transformer-based UPS efficiency/load curves

The switch brings the UPS online if a mains fault is detected. The tradeoff for eco-mode's efficiency is that the load is exposed to any mains disturbances and frequency variations, as well as to complete power failure.

In practice, though, the capabilities of the ICT equipment that typically comprises today's critical load, together with the power quality available from mature utility networks mean that these external disturbances can be handled safely in many installations. Modern ICT equipment is typically expected to ride through power breaks of up to 20 mS, and UPSs can come on line well within this time. Similarly, ICT equipment's tolerance of mains frequency variations can exceed those experienced from a good utility. Transient voltage surge suppressor devices can protect against high energy voltage spikes.

As energy costs and Green pressures continue to rise, data centres will continue their drive to improve efficiency. Their choice of UPS will contribute to this if they choose systems with modern transformerless technology and modular topology that allows ongoing rightsizing of UPS to load, and operate these systems in Eco mode whenever it is safe to do so.

Steve hone, DCA Operations Director reflects on a very successful day at RAC data centre cooling question time

THE DCA was delighted to have the opportunity to support and sponsor the RAC Data Centre Cooling Question Time at the CBI Conference Centre in New Oxford Street on the 12th April. It was a perfect venue for the event which was very well organised and attended and RAC editor Andrew Gaved was the perfect host taking on the role of **David Dimbleby** for the day.

I was pleased to see the five panellists under the spot light was made up of many existing DCA members who are undisputed experts in their fields. DCA Technical Council Member Dr. Ian Bitterlin representing Emerson made an opening address and he was joined among others with well-known DCA panellists such as Dr. Robert Tozer from Operational Intelligence and Dr. Jon Summers from the University of Leeds who specialises in Thermo & fluid Dynamics and both added to what was a lively debate.

Audience questions came in thick and fast covering all aspects of Data Centre cooling which encompassed not only the solutions which are being commonly deployed today but also exploring new emerging technologies such as liquid cooling which are challenging the very way we currently cool and operate our Data centres and the IT which lives within, plenty of food for thought all round and I look forward to both supporting and attending the next event.