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Supporting the code

By Steve Hone, CEO, Data Centre Alliance.

This month's journal theme focusses on Energy Efficiency best practices, such as the Code of Conduct and Standards, which is timely as we have recently returned from the latest EU Code of Conduct Best Practice Committee meeting in Amsterdam. On this occasion the meeting was held by DCA Trade Association as part of the Horizon 2020 EURECA Project Consortium, which we were delighted to host.

The meeting was jointly chaired by Paolo Bertoldi, DG JRC from the European Commission, and Mark Acton, Critical Services Director at CBRE and chair of the EUCOC committee. An article has been written by John Booth which highlights the main changes reviewed and covered by the meeting and Steve Bowes-Phipps has provided further commentary and thoughts on the Code of Conduct moving forward. During discussions I was struck by just how few data centre operators, be them commercially facing or privately operated, are taking advantage of this scheme.

Simple logic dictates that if you can save energy or by implementing the processed recommended in the Code it would enable you to do more with what you already have then why are not more data centre operators falling over each other to become participant of a the Code. All those that have already adopted the Code and have actually built it into their continual improvement business strategy have seen the benefits of doing so and that even before to take into account the CSR angle which should be seen as a shared reasonability by all to help reduce or minimise carbon emissions.

The DCA is one of the Codes biggest supporters and as Trade Association Endorsers we are committed to do all we can to promote wider adoption across its existing members and out to all date centre sector stake holders. Many existing members of the DCA already support the Code and the DCA has made a commitment that all 160 organisational DCA members become either endorsers or participants of the Code.

As mentioned the recent Code of Conduct Committee meeting was hosted the day before the 5th Horizon 2020 EURECA knowledge sharing event at the Amsterdam Science Park on the 29th Sept. The EURECA project, for those not familiar with its aims, is designed to help Public Sector Procurement and PS IT departments make better more informed energy efficient decisions when it come to their investment in data centre services and products. Esther Van Bergen from Green IT Amsterdam and fellow EURECA consortium partner Adel Noureddine from UEL have also kindly submitted an article in this month's journal reporting the highlights of the event and the toolset itself.

The next EURECA event will be in Paris and will be hosted within Data Centre World 2016 at the Paris Expo Porte de Versailles on the 29th and 30th Nov. So, by the time you read this there will be time to register your attendance. Finally I would like to personally thank Victor Avelar from Schneider Electric who submitted an article on the ASHRAE's new Energy Standard for data centres classed as Standard number 90.4-2016 which is extremely informative and well worth sharing with colleagues.

Achieving optimal performance in the data centre:
a european guide

By Stephen Bowes-Phipps, Senior Consultant, PTS Consulting.

I ORIGINALLY WROTE this article a year ago – but the industry moves so fast, that it felt like I needed to revisit this topic and highlight what has changed. I have been fortunate enough to be involved in a number of significant Data Centre projects at PTS that means not just scoping out the strategy and requirements for Data Centres, but seeing them through to operational readiness and handover. After that, we usually only get called in if there are capacity challenges or a need to re-evaluate a Data Centre's very existence!

When I attend conferences, seminars and networking events, I often meet fellow consultants in our industry who have a wealth of experience in the design and build of Data Centres, but have little or no experience of what it takes to operate a Data Centre and keep it running at 'optimal' performance. There is a world of difference between building an energy-efficient Data Centre and continuing to run that Data Centre at peak efficiency one, two or even three years hence. I looked up 'optimal' in the OED and arrived at the definition "Best or most favourable". Note that it doesn't say "lowest running costs" or "highest capacity utilisation", or even "most available". Your ideal Data Centre may be all these things, but the reality is that running

costs and management/business priorities often dictate which goals your organisation will strive for. Many organisations have never even considered what the goals are for their Data Centre and even fewer have ever written them down in a Data Centre 'strategy'.

A goal that most organisations can relate to though, and would probably find favour in the harshest of trading conditions or economic climate, is the desire to keep operational costs as low as possible. Wouldn't it be great if a Data Centre Manager had a set of guidelines that he/she could review each year and check that they are doing

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everything reasonable to keep costs down, while improving the sustainability of their Data Centre? This is exactly what the EU Code of Conduct for Data Centres (CoC) was designed to do, and it recognises the challenges of availability versus sustainability, which need not be mutually exclusive targets. Remember that all organisations have different goals and different depths of pockets. A bank will spend hundreds of thousands of pounds building resiliency and redundancy into their Data Centre because a business manager can put a huge price ticket on even one minute of downtime.

A university Data Centre Manager, however, may feel it is more important to run a slightly riskier level of architecture, but emphasise the lower cost and 'greener' Data Centre that this enables for its current and future student stakeholders. The canny Data Centre Manager will recognise the value in both – saving energy, while keeping the IT constantly in play.

My old employer, the University of Hertfordshire, had a significant interest in keeping the total Carbon cost of the Data Centre down, which could be achieved through driving down operational costs. That had a large positive impact on freeing up budgets for teaching and learning. Our flagship Data Centre won three international awards for sustainability through best practice, saving at least £180,000 a year,

despite having a footprint of only 75m^2. My personal guide to those savings and the 3rd party suppliers' commitment for highly-efficient Data Centre projects came from the guidelines that are the CoC.

The CoC is not a management book; it is a set of guidelines that seek to achieve the greatest efficiency from the infrastructure and use of the Data Centre. This makes it very accessible, particularly when you are considering the requirements of Data Centre improvements or enhancements. Referencing the CoC in your Request For Proposals (RFP) or Invitation to Tender (ITT) not only saves time and effort for you, but is also a

standard way of levelling the playing field between different suppliers – distinguishing between those that really understand the Data Centre against those that see it purely as another source of construction income. And now referencing best practice is even easier and more widely recognised since the CoC became a TR (Technical Report) of the CENELEC BS EN50600 Standard.

When was the last time you made being an "Endorser" of the CoC a pre-requisite of doing business with your Data Centre? Or referencing compliance against EN50600 on your RFP for a new Data Centre provider? Maybe next time you should.

EU Code of Conduct for data centres (Energy Efficiency) & standards

By John Booth, Managing Director, Carbon3IT

It has been a busy year for the eucoc and standards committees. The EUCOC best practice committee met in Amsterdam on the 28th September for their annual review of the EU Code of Conduct for Data Centres (Energy Efficiency). The event was kindly hosted by the EURECA project **(www.eureca-project.eu)** and a number of consortium members attended.

There were approximately 25 attendees and the main focus of the day was to update the best practices that are contained within Section 10 & 11, those familiar with the EUCOC will know that there are "Practices to become minimum expected" and "Items under consideration" In the 2016 Best Practice guidelines there were 7 items and I can advise that 6 of them will become "minimum expected" in the 2017 edition, they are as follows:

3.2 5 Environmental Management - DC operators will be expected to introduce an Environmental Management Plan based upon either the ISO 140001 standard or EMAS (EU); information available on address: **http://ec.europa.eu/environment/emas/index_en.htm**
There is an "experts" meeting on the findings and way forward for EMAS in November 2016 at the EU-JRC and the content will be incorporated into the EUCOC if required.

3.2.6 Energy Management - DC operators will be expected to introduce an energy management plan based upon either the ISO50001 or equivalent. My view on this is that the Energy Efficiency Directive Article 7& and in the UK at least, the ESOS as well as the CCA means that the majority of operators will be able to comply.
3.2.8 Sustainable Energy Usage - the best practice asks operators to

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consider the proportion of energy used in the data centre that comes renewable or sustainable energy sources. This is clearly going to be a problem for all operators located in countries with varying amounts of renewables in the grid mix unless you have entered into agreements to use 100% renewable energy.

5.1.15 Installation of Free Cooling – the wording has been changed on this one, previously it was "require" the installation of free cooling in all new builds and retrofits including cooling systems, the change is "consider". Now in my mind almost every location in the EU can adopt free cooling as the default condition for cooling systems, so when you consider whether or not to include free cooling it should be a very short process as in "Should we be using free cooling?" Answer "Yes, We should".

5.2.2 Shut down unnecessary cooling equipment - the wording is currently "If the facility is not yet fully populated or space has been cleared through consolidation non variable plant such as fixed speed fan CRAC/CRAH units can be turned off in the empty areas". The change is to the word "can" which is replaced with "should".
5.2.5 Review CRAC/CRAH Settings - the change here will be to "calibrate" your CRAC/CRAH equipment (if you can) prior to your review. The actual wording will be available once the 2017 version is published.

The final best practice in this section relates to the use of the ASHRAE Class A3 for 4.1.3 New IT hardware – Expected operating temperature and humidity range. The committee has decided against including this best practice in the 2017 edition and the overall use of ASHRAE will be reviewed. The reason of this review is to incorporate the latest ASHRAE 90.4 2016 changes as necessary at a later date (the 90.4 2016 document has only recently been released)

The Section 11 Items include two best practices relating to software and these will remain under consideration. Readers should be aware that the EUCOC best practices are also available as a Technical Report under EN50600, the full title is CLC/TR 50600-99-1:2016

The committee was advised that additional resource has been made available to the EU-JRC and as a result, some of the data collected can be anonymised, collated and prepared for publication, Participants, Endorsers and other interested parties are requested to contact the author or the EU-JRC if they have any specific requests and we will try and facilitate them.

Today there are over 120 Participants with over 300 Data Centres in the Scheme and some 245 endorsing organisations ranging from NGO's, Industry Specific Organisations, Consultants and Supply Chain. Not all of these bodies originate from EU and it is refreshing to see other countries, indeed continents, are signing up to become endorsers or participants.

A final note, whilst BREXIT may cause some short term angst in the industry, all operators should be under no illusion that data centres across the EU and UK indeed globally will be facing some issues from both climate change and energy and that the best way to deal with them is to adopt the EUCoC formally, this will both provide the information to prepare mitigation actions and to indicate to your clients that you are serious about helping them meet their CSR goals.

New efficiency standard will spur energy innovation in data centres

By Victor Avelar, Director and Senior Research Analyst at Schneider Electric's Data Center Science Center

BY FOCUSSING ON the trade offs between mechanical load and electrical losses as a means to ensure energy efficiency, ASHRAE's new Energy Standard for data centres is paving the way for industry best practices and a standards-based approach to data centre design.

Earlier this week a UK news article publicised a long awaited Energy Standard for Data Centres by the American Society of Heating,

Refrigerating and Air-Conditioning Engineers (ASHRAE). Classed as Standard number 90.4-2016, it establishes the minimum energy efficiency requirements for data centres and includes recommendations on their design, construction, operation and maintenance as well as on the use of on-site and off-site renewable energy.

ASHRAE's earlier 90.1 standard applies to energy efficiency in buildings generally and

is widely referred to in building regulations. 90.4 is a performance-based design standard and takes account special considerations affecting data centres, including variations in both mechanical load and electrical losses across different climate zones.

Calculations for both electrical and mechanical components are made and then compared to the maximum allowable values for the appropriate climate zone. Compliance

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with the standard is achieved when the calculated values do not exceed the values contained in the standard.

Crucially the new standard does not require a Power Usage Effectiveness (PUE) rating to ensure compliance, although this was considered at an earlier stage of the drafting process. In this, the Society clearly recognises that energy management in data centres is a more complex problem than can be resolved with a single metric such as PUE, useful though that figure certainly is in guiding energy-efficiency efforts.

Recent research detailed in Schneider Electric's White Paper 221, 'The Unexpected Impact of Raising Data Centre Temeperatures', found that only a full understanding of the cooling and power infrastructure of the data centre AND the operational requirements of the IT equipment itself will yield optimum results in terms of efficiency and power consumption.

Laying undue emphasis on a single metric such as PUE for efficiency, or on simple strategies such as allowing ambient temperatures to rise as a means of reducing overall power consumption are insufficient in themselves. The theory supporting raised temperatures is that cooling equipment can operate in economy mode and will not need to be used as frequently, resulting in a lower energy requirement.

However, experience shows that the results of this strategy have been mixed.

PUE has the advantage of simplicity, in that it represents efficiency as a single metric allowing data centre operators to measure the effectiveness of the power and cooling systems over time. However, it is quite limited as it measures only the relative difference between power consumed on IT equipment and the energy consumed on IT and infrastructure combined.

Therefore, lowering your PUE rating does not necessarily mean that your overall energy consumption has been reduced. In fact, PUE is only a measure of how efficient the physical infrastructure systems are in providing power to the IT load. It says nothing about the total energy being consumed by the data centre and is more indicative of a ratio, not a value that indicates a quantity of energy.

In essence your PUE can improve (i.e., power and cooling systems are more efficient) but your energy use throughout the data centre might be the same or higher. By allowing chillers to operate in economiser mode for a greater part of the year does indeed produce immediate energy savings, these are offset by the greater burden placed on other parts of the cooling infrastructure. Air coolers for example, must operate when the chillers are in economiser mode and the fans both in the server racks themselves and in the CRAH (computer room air handlers) units have to work harder, and use more energy, as temperature rises.

Schneider Electric has completed studies of data centres in very different climactic regions and the consequences of allowing temperature to rise can vary greatly depending on the location and whether or not a data centre is operating at full load. When the data centre was operating at full load and temperatures were allowed to float between 15.6 and 25.7C, rather than be maintained at the lower level, energy efficiency and total cost of ownership were both improved in Seattle; energy efficiency improved slightly but total costs were unchanged in Chicago; and in Miami, a hotter climate, both efficiency and total costs were worsened.

At half load, energy and total costs were improved in both Chicago and Seattle but they increased again in Miami. One reason for increased overall cost at high temperatures is the effect on the reliability of IT equipment. Servers and storage products tend to have higher rates of failure when operating at higher temperatures.

The team at Schneider Electric's Data Center Science Center concluded that although operating at higher temperatures can be a useful strategy, care must be taken when implementing it to ensure optimal effects. Necessary steps include the adoption of air-management practices, such as the use of hot or cold-aisle containment systems, to reduce the risk of hot spots; the cooling architecture of a data centre should be designed to handle elevated temperatures; and the design should also take into account the business growth plan as data centre behaviour may vary as the IT load changes. In addition, greater collaboration with IT equipment maufacturers is necessary to gain a better understanding of how the operational IT load and how its reliability is impacted at high temperatures.

By allowing greater latitude to data centre designers to build their facilities to their specific requirements and by taking into account the differing load and cooling strategies that must be deployed in differing climactic regions, ASHRAE's new 90.4 standard will encourage innovation in the development of efficient data centres, resulting in more reliable, efficient and cost effective IT services.

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EURECA platform launched at Green ICT & Tendering event in Amsterdam

By Esther van Bergen, Programme manager at Green IT Amsterdam Region and Adel Nouredinne, from the Project Coordinating team at UEL (University of East-London)

THE 29TH SEPTEMBER saw the 5th EURECA Project event; Green IT Amsterdam Region organised the event which focussing on 'Procurement and a Green Digital Infrastructure'. The event was held at the Conference Centre of the Centre for Mathematics and Computer Science (CWI) at the Amsterdam Science Park. The CWI is a research centre in the field of mathematics and theoretical computer science, which is part of the Netherlands Organisation for Scientific Research.

The Green IT Amsterdam Region is a non-profit consortium (of public and private organisations) dedicated to enabling the energy transition for the wider Amsterdam Metropolitan Region. Its mission is to scout, test and showcase innovative IT solutions for increasing energy efficiency and decreasing carbon emissions.

In an almost fully packed room the day was kicked off by Green IT Amsterdam Region's director Jaak Vlasveld, who provided the audience with a bird's eye view of the many things that are going on when it comes to Green IT, whether it is the core infrastructure, the design and configuration of software platforms or the IT equipment, there are many initiatives ongoing, with the Amsterdam Region as one of the hotspots in this area. Despite the (ongoing) growth in ICT a lot of advances have been made in recent years to curb the accompanying energy use and environmental footprint of an every digitising society, including the public sector.

In the good old days ICT was primarily used for administrative support, it quickly evolved to supporting city services and is now more and more being used to improve the quality of (citizen) life as well. The efforts made by the ICT and datacentre industry has proven that the growth of ICT use can be decoupled with a corresponding growth of energy use. Several research reports in both Europe and the US have proven this decoupling trend is real. There is already a lot of innovative technology available to further limit the energy and environmental footprint of the digital infrastructure. However, the uptake of such technologies is not keeping pace with its availability.

As the two key-notes of the event showed, there are already good public sector examples out there. Dennis Kerssens, programme director of the Dutch government Cloud programme showcased this ongoing programme of a consolidation effort from 64 datacentre environments to 4 Cloud based datacentres, of which 2 are new built datacentres and 2 are renovated existing buildings. This effort is estimated to half the energy consumption by the time it is completed in 2020. Another specific example was shared by Pieter Duijves, Director EMEA, HP Enterprises, who zoomed in on one of the government datacentres, the ODC in Rijswijk. This location was previously used as a national archive. The building underwent a redesign to be used as a government data centre location, serving 5 ministries and other government departments. The design had to find a design-solution that was in harmony with the existing architecture of the building, inside and out. In the end, the design-solution uses 'free cooling', adiabatic assistance, DCIM and carries a PUE of <1.12'. It was a co-design and bid effort by HP and a construction company, sharing responsibility.

The public sector represents a large part of the consumers of digital services. At the same time it also has a huge buying power. Although there are indeed good examples, there is an even larger opportunity for the public sector to increase the uptake of innovative solutions in the procurement of ICT and datacentre related products and services. This is where the EURECA project comes in.

The EURECA project, a European Horizon 2020 funded project, officially launched the EURECA Tool on September 29th. The launch was held during a EURECA workshop event in Amsterdam in the Netherlands. With over 50 public and private sector participants, from public procurers to suppliers and data centre professionals, the EURECA team presented the tool and provided training sessions on energy efficiency in data centres. The work carried out by the EURECA project addresses the problem of ICT growth and the lack of uptake and adoption of energy-related certifications and labels in data centres. Therefore, there is a shortage of adoption of innovative solutions and certifications which make us wonder why data centres are not being certified for energy efficiency? Whether it is from a data centre perspective or a consumer and public sector perspective, the lack of certifications, adoption of standards and best practices or limited assessment and awareness of energy efficiency innovative solutions, is a major problem the EURECA project is tackling.

The tool is a web-based platform to help public procurers and data centre professionals self-assess the energy efficiency and profile of their data centres, and provides improvements and suggestions. The latter are based on the latest standards and research and industry outputs. In particular, the tool maps the Data Centre Maturity Model (DCMM) to the EU Code of Conduct for Data Centres (EUCoC) to provide tailored recommendations for data centres energy efficiency. This mapping connects two of the most relevant and important data centre energy related industry-class approaches in a way to increase practical usability for both. The mapping in the tool is therefore more user-friendly in real-life application as it is tailored to the specific assessment of a particular data centre.

The tool was well received by attendees from the public sector with interesting feedback and suggestions from the audience for improving the tool and further enhancing its features to provide even more value to procurers and data centre professionals.

The EURECA platform is already available online to be tried out by anyone interested to try it out, particularly public procurers and data centre professionals or suppliers of energy efficient or environmentally sound data centre products and services. You can find the platform at **https://tool.dceureca.eu**