The European Union Code of Conduct on Data Centres Energy Efficiency

A summary brought to you by Capitoline LLP

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After some years in the making a department of the European Union has released a Code of Conduct on improving data centre energy efficiency for both existing data centres and new build projects. An associated document describing best practice operation in more detail has also been released to accompany the Code of Conduct.

The EU, and its member states, decided that some action was needed after realising that data centre energy consumption in the EU was set to rise from 56 to 104 TWh (terawatt hours) between 2007 and 2020. This accounts for 3% of EU electricity production and is set to overtake the aviation industry in terms of energy consumption and CO_2 output. 104 TWh is equivalent to one hundred million 100 watt bulbs burning 24 hours a day for a year!

The average 600 mm floor tile in the average data centre now represents 1.2 tonnes of carbon dioxide output per year.

Energy consumption and efficiency in the UK has been under the auspices of DEFRA (Department for the Environment, Food and Rural Affairs) but with input now from the Department of Energy and Climate Change, DECC, and the Department of Business Enterprise and Regulatory Reform, DERR.

Lord Hunt, Minister for Sustainable Development and Energy Innovation, welcomed the launch of the EU Code of Conduct for Data Centres and encouraged data centre operators to adopt the Code, saying:

“If we are to tackle dangerous climate change, we need to reduce emissions and the decision businesses make play a key role in meeting this challenge. By signing up to this new code of conduct companies can save energy and save money too, which goes to show that what’s good for the environment is good for business.”

The UK is the first country in the world to set legally binding targets for reducing greenhouse gas emissions. In order to achieve the ambitious target of an 80 per cent reduction in greenhouse gasses by 2050, everyone must play a part.

Data centres are responsible for almost three per cent of electricity use in the UK and this is expected to double by 2020. Within the next 12 months Defra will be seeking compliance by the main Data Centres used for Defra systems.

Signatories to the Code will be expected to implement the Code of Conduct’s energy efficiency best practice, meet minimum procurement standards, and annually report energy consumption. This might mean that companies decommission old servers, reduce the amount of air conditioning they use, or maximise the use of a server by running multiple applications.

The Government’s work through its Market Transformation Programme (MTP) was instrumental in the development of the Code, which should help save 4.7 million tonnes of CO_2 over the next six years.

This is equivalent to taking more than a million cars off the road. Over the next six years a successful implementation of the Code would allow UK businesses to save almost £700 million in electricity costs. DEFRA has already stated that whereas data centres were previously classified as industrial processes and exempt from the EPBD (EU Energy Performance of Buildings Directive), recent changes now require Member States to set energy performance standards for data centres. The articles most relevant to a data centre are:

• Article 4 - Every Member State must set standards for energy performance in buildings. Exceptions are made but this is unlikely to affect data centres.
• Article 5 - New large buildings over 1,000 m^2 must have an evaluation for alternative options for design and fit-out (e.g. CHP).
• Article 6 - Existing buildings over 1,000 m^2 must undergo energy performance upgrades alongside any major renovation.
Articles 4-6 are transposed through the Building Regulations 2006 in England and Wales (Part L). Similarly, these are transposed in Scotland (Section 6) and Northern Ireland (Part F) through building standards.

The Code of Conduct for Data Centres is the only planned policy that aims to address these areas.

The Code deals with the requirements for energy monitoring and subsequent calculation of energy efficiency metrics, in particular the ratio of power used by ICT equipment compared with the overall power consumption of the whole data centre. At present this is only averaging about 45%. The adoption of best practices should allow this to rise to over 75%.

The associated Best Practices document lists the operational areas of a data centre, such as cooling, power supplies etc., and lists a range of improvements that can be applied at any time or at times of new build or major refurbishment. The 'value' of such improvements, when comparing capital outlay against energy efficiency improvements, is rated from 1 to 5, with 5 being the best score.

The original documents are available from the EU or from the Capitoline website. The Code of Conduct and Best Practice documents will be a source of major influence over the coming years in data centre design and operation and with the pubic sector expected to show major leadership and example.

Capitoline is a specialist independent design consultancy offering audit, design and project management capabilities for new or refurbished computer rooms and data centres. We are qualified under the Government-recognised CIBSE Low Carbon Consultant scheme to design or approve IT infrastructure projects for energy efficiency.

We have aligned our design and audit service alongside the EU Code of Conduct to follow the principal areas of;

Design.

1. Optimised room layout for most efficient use of air conditioning
2. Optimised rack layout for optimised use of air conditioning
3. Optimised use of cabling and cable containment to minimise air loss
4. Correct design and sizing of underfloor plenum spaces to reduce air loss
5. Sizing and selection of air conditioning for minimum energy usage, e.g.
    a. Ideal location of CRAC units
    b. Correct sizing of CRAC units
    c. Design for operation at wider temperature ranges (new ASHRAE recommendations)

   d. Design for operation with wider humidity levels (new ASHRAE recommendations)
   e. Selection of low energy A/C components e.g. scroll compressor, variable speed fans, dual compressors etc
   f. Use of chilled water racks where appropriate
   g. Use of chilled water 'header tanks' to even out energy requirements
   h. Use of air bypass/airside economiser/heat exchangers/dry coolers where appropriate
6. Selection and sizing of UPS and generators for maximum efficiency
7. Selection of all equipment with high efficiency power supplies and unity power factor
8. Power factor correction in main power supply input
9. Use of low energy lighting and automatic 'lights out' procedure
10. Use of Building Management Systems, BMS, to monitor power consumption and to use sophisticated control to minimise energy usage

In addition we can calculate

- Power consumption per rack (average and peak)
- Total power consumption
- Optimised UPS and standby generator sizing
- Power consumption per square metre
- $C0_2$ equivalent output per sq m
- Theoretical DCiE for the design (Data Centre Efficiency)

For audits then we will compare the ideal models mentioned in lines 1 to 10 with the actual observed installation and comment and report on where improvements can be made. We will also make the same calculations as described above. Audits will include temperature and humidity readings plus airflow measurements at strategic locations. As an additional service we also do an infra red thermographic analysis of the installation to identify actual temperatures and all hotspots.

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