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DIRECTORATE-GENERAL JRC
JOINT RESEARCH CENTRE
Institute for Energy
Renewable Energies Unit

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Code of Conduct on Data Centres Energy Efficiency Version 2.0

Participant Guidelines and Registration Form

Valid as from 1.1.2010

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INTRODUCTION

This Code of Conduct has been created in response to increasing energy consumption in data centres and the need to reduce the related environmental, economic and energy supply security impacts. The aim is to inform and stimulate data centre operators and owners to reduce energy consumption in a cost-effective manner without hampering the mission critical function of data centres. The Code of Conduct aims to achieve this by improving understanding of energy demand within the data centre, raising awareness, and recommending energy efficient best practice and targets.

This Code of Conduct is a voluntary initiative aimed to bring interested stakeholders together, including the coordination of other similar activities by manufacturers, vendors, consultants and utilities. Parties signing up will be expected to follow the intent of this Code of Conduct and abide by a set of agreed commitments.

Environmental Statement

Electricity consumed in data centres, including enterprise servers, ICT equipment, cooling equipment and power equipment, is expected to contribute substantially to the electricity consumed in the European Union (EU) commercial sector¹ in the near future. Western European electricity consumption of 56 TWh per year can be estimated for the year 2007² and is projected to increase to 104 TWh per year by 2020.

The projected energy consumption rise poses a problem for EU energy and environmental policies. It is important that the energy efficiency of data centres is maximised to ensure the carbon emissions and other impacts such as strain on infrastructure associated with increases in energy consumption are mitigated.

Problem Statement

Historically, data centres have been designed with large tolerances for operational and capacity changes, including possible future expansion. Many today use design practices that are woefully outdated. These factors lead to power consumption inefficiencies. In most cases only a small fraction of the grid power consumed by the data centre actually gets to the IT systems. Most enterprise data centres today run significant quantities of redundant power and cooling systems typically to provide higher levels of reliability. Additionally IT systems are frequently run at a low average utilisation

Over provisioning, ensuring availability and associated costs were previously considered a negligible risk to business performance because energy costs were relatively small in comparison to the IT budget, and environmental responsibility was not considered to be the

¹ The commercial sector is also referred as the tertiary sector and it includes both private and public building hosting data centre. In this case energy consumption of data centres of companies in the industrial sector is included.

² This is based upon the Draft UK Market Transformation Programme European Enterprise Server installed base model, and assumes an upper bound ratio of 1:2 between electricity consumed by the server equipment within the data centre or server room, against that consumed by cooling equipment and through power losses. The lower bound ratio of 1:1 gives total electricity consumption close to 37 TWh. The upper and lower bound ratio is based on several different sources of measurements of electricity consumption in the data centre.

remit of the IT department. However, with rising energy prices this is no longer the case, and the issue of energy consumption at the individual data centre level is becoming increasingly important as operational energy expenditures and ecological impact of the energy consumed begins to play an ever important role in overall cost of ownership of data centres.

Preliminary evidence and the increasing willingness of manufacturers and vendors to compete on the basis of energy efficiency in data centres confirms that there are efficiency gains (for example simply by using existing power management technologies) still to be realised without prohibitive initial costs that can lower the Total Cost of Ownership (TCO).

Businesses are also becoming increasingly aware of their environmental impacts and the need to reduce these.

Many data centres operators are simply not aware of the financial, environmental and infrastructure benefits to be gained from improving the energy efficiency of their facilities. Even awareness does not necessarily lead to good decision making, simply because there is no framework in place for the operators to aspire to. Making data centres more energy efficient is a multidimensional challenge that requires a concerted effort to optimise power distribution, cooling infrastructure, IT equipment and IT output.

Many activities have been initiated within the industry³ and there are numerous vendor specific products and services on offer. However, there is a risk of confusion, mixed messages and uncoordinated activities. Independent assessment and coordination – tailored to European conditions such as climate and energy markets regulation – is required to lower the barriers of access to and application of these energy saving opportunities.

A voluntary scheme within the EU such as the Code of Conduct will provide a platform to bring together European stakeholders to discuss and agree voluntary actions which will improve energy efficiency.

To help all parties address the issue of energy efficiency, data centre owners and operators, data centre equipment and component manufacturers, service providers, and other large procurers of such equipment will be invited to participate in the Code of Conduct, by signing this Code of Conduct.

This Code of Conduct proposes general principles and practical actions to be followed by all parties involved in data centres, operating in the EU, to result in more efficient and economic use of energy, without jeopardising the reliability and operational continuity of the services provided by data centres.

³ These include the US DoE, the US EPA Energy Star, the Green Grid association, Climate Savers Computing Initiative, the IEEE E-Server project

SCOPE

For the purposes of the Code of Conduct, the term “data centres” includes all buildings, facilities and rooms which contain enterprise servers, server communication equipment, cooling equipment and power equipment, and provide some form of data service (e.g. large scale mission critical facilities all the way down to small server rooms located in office buildings).

The focus of this Code of Conduct covers two main areas:

1. IT Load – this relates to the consumption efficiency of the IT equipment in the data centre and can be described as the IT work capacity available for a given IT power consumption. It is also important to consider the utilisation of that capacity as part of efficiency in the data centre
2. Facilities Load – this relates to the mechanical and electrical systems that support the IT electrical load such as cooling systems (chiller plant, fans, pumps) air conditioning units, UPS, PDU's etc..

However the Code of Conduct will consider the data centre as a complete system, trying to optimise the IT system and the infrastructure together to deliver the desired services in the most efficient manner.

In common with other industry bodies the Code of Conduct will initially use the ratio of IT Load to Facilities Load as the key metric in assessing infrastructure efficiency. This will be known as ‘facility efficiency’. The Code of Conduct will also be concerned with the efficiency with which the IT equipment utilises the power delivered, this will be known as ‘asset efficiency’. As efficiency metrics for data centres are further developed and agreed, it is expected that the Code of Conduct will adopt more comprehensive metrics which may also cover the IT system design, the IT hardware asset utilisation, and the IT hardware efficiency.

To understand the entire efficiency of a data centre both facility and asset efficiency should be considered.

The Code of Conduct has both an equipment and system-level scope. At the equipment level, this Code of Conduct covers typical equipment used within data centres required to provide data, internet and communication services. This includes all energy using equipment within the data centre, such as: IT equipment (e.g. rack optimised and non-rack optimised enterprise servers, blade servers, storage and networking equipment), cooling equipment (e.g. computer room air-conditioner units) and power equipment (e.g. uninterruptible power supplies and power distributions units), and miscellaneous equipment (e.g. lighting). At system level the Code of Conduct proposes actions which optimise equipment interaction and the system design (e.g. improved cooling design, correct sizing of cooling, correct air management and temperature settings, correct selection of power distribution), to minimize overall energy consumption.

The Code of Conduct covers both existing and new data centres (facility under construction or coming into service).

AIMS AND OBJECTIVES

To minimize energy consumption of data centres.

This Code of Conduct is a “multipurpose” document, allowing different stakeholders to commit to improve efficiency in their own areas of competence. The primary target of this Code of Conduct is the data centre owner / operator, who is encouraged to commit to undertake and implement energy efficient solutions in existing or new data centres, whilst respecting the life cycle cost effectiveness and the performance availability of the system.

The Code of Conduct aims to:

- Develop and promote a set of easily understood metrics to measure the current efficiencies and improvement going forward in conjunction with other industry thought leadership fora.
- Provide an open process and forum for discussion representing European stakeholder requirements.
- Produce a common set of principles to refer to and work in coordination with other international initiatives
- Raise awareness among managers, owners, investors, with targeted information and material on the opportunity to improve efficiency⁴. Suppliers of efficient services and equipment, as well as other organisations⁵ can become allied in and endorsers of these targeted campaigns.
- Create and provide an enabling tool for industry to implement cost-effective energy saving opportunities
- Develop practical voluntary commitments which when implemented improve the energy efficiency of data centres and in so doing minimise the TCO.
- Determine and accelerate the application of energy efficient technologies.
- Foster the development of tools that promote energy efficient procurement practices.
- Support procurement, by providing criteria for equipment (based on the Energy Star Programme specifications, when available, and other Codes of Conduct⁶), and best practice recommendations
- Monitor and assess actions to properly determine both the progress and areas for improvement.
- Set energy efficiency targets, for public and corporate data centre owners and operators (targets are differentiated according to the size and status of existing data centres, the geographical location, the return on investments, etc).

⁴ This information could be disseminated through messages and information campaigns sponsored by governmental bodies at EU and national level, which are seen as independent and unbiased organisations.

⁵ e.g. the Green Grid association

⁶ e.g. the Code of Conduct for UPSs.

- Provides reference for other participants. The values of the Code of Conduct goes beyond the number of companies that sign and commit themselves, as the principles can be implemented also by other companies, which may not decide to make a public commitment. The existence of the European Code of Conduct introduces targets and guidelines which are open to every data centre.

COMMITMENTS AND MONITORING

The Code of Conduct is addressed primarily to the Data Centre Owners and Operators which may become Participant, and secondly to the supply chain and service providers which may become Endorsers. This document is addressed to Participants, the rules and the commitments for Endorsers are described in the Endorser Guidelines and Registration Form document.

The Code of Conduct is:

- flexible and open, so as to be applicable to the great variety of data centre situations;
- sufficiently precise to ensure that companies that carry out the commitment will achieve a significant part of potential energy savings, which are monitored and reported in a transparent manner
- adaptable to the large variety of national efficiency programmes, climates and energy infrastructures

The Code of Conduct will be continuously developed and updated in consultation with stakeholders to follow technological development.

a. Participants

Data centre owners and operators can become Participants by committing to a subset of the commitments described below and detailed in the Annexes, agreed with the secretariat, with an indicative timeline for implementing and completing actions where appropriate, and regularly reporting the result achieved in order to guarantee the energy and environmental soundness of the Code of Conduct. In order to maintain the credibility of the Code of Conduct, some minimum eligibility criteria are applied and these criteria will continue to be developed.

Though not entailing legally binding obligations, Participant status requires strong commitment and a substantial contribution to the objectives of the Code of Conduct. Participants can withdraw from programme at any time without any penalty.

Each participant will set the **areas of responsibility** (defining which parts of the data centre they are responsible for implementing the efficiency improvements), the **coverage** (defining the data centres / building / sites at which energy efficiency actions will be undertaken) and the **nature** (specifying the actions that the enterprise proposes to carry out at each location) of its commitment.

Areas of responsibility: many operators of data centres do not control the entire data centre but still wish to participate in the Code, for example colocation operators or their customers. In order to include these operators as Participants their partial control is recognised and they should implement the practices that fall within their control and endorse the practices outside of their control to their suppliers or customers as appropriate.⁷

Participants are grouped into categories according to which parts of each data centre they have control over and responsibility for possible efficiency improvements;

1. Operator
2. Colo Provider
3. Colo customer
4. Managed service provider
5. Managed service provider in Colo

This grouping assists both the operator and secretariat during the application process to understand which Practices are applicable. The identified type of operator will also be included in the applicant's entry in the listing of Participants

Coverage: commitment can be sought at single data centre level (building/site XY located at ZZ), or at corporate level, where over time a significant proportion of owned or operated data centres will⁸ (e.g. at least 40% of housed servers or total data centre floor space)) be improved to comply with the present Code of Conduct,

Nature: each participant shall undertake actions in the selected existing or new data centre (under construction or recently entering operation). Efforts to improve efficiency differ in the level of commitment and investment ranging from simple energy management practice and low cost solutions, to exploring alternative, energy efficient opportunities before specifying or replacing IT equipment and supporting infrastructure, to designing new highly efficient data centres or upgrading existing ones to very high level of efficiency. A list of the identified best practices can be found in the Best Practice supplement to this Code of Conduct. Participants are expected to select, adopt and implement a subset of these best practices as defined in Annex C.

- For existing data centres Participant application starts with an initial energy measurement of at least one month as defined in the monitoring section data requirement (B.2 in Annex 2), and energy audit or assessment to identify the major energy saving opportunities. The applicant should prepare an Action Plan and supply a completed Reporting Form⁹ with their application. The reporting form should identify the best practices already

⁷ See the Best Practice guide for further details of the Practices, types of operator and areas of responsibility.

⁸ Based in the EU or other European countries (e.g. Norway, Switzerland, Iceland)

⁹ Available on the website

implemented and those to be adopted within three years of the application date with a description of the action plan to achieve this.

- From 2010 onwards new data centres (under construction or recently completed) should identify in the Reporting Form the practices adopted to make the data centre "best in class" for their application. New data centres should implement all of the expected practices applicable to the type of operator including those identified for build or retrofit 2010 onwards from the date of application and should not require an action plan to achieve Participant status..

The Code of Conduct Secretariat will assess and approve the plan and information submitted or explain its reasons for not approving within 40 working days.

If the plan and/or the information submitted is approved, the European Commission Directorate General Joint Research Centre (JRC) will grant Participant status to the organisation, with all the attending benefits. This Participant status will last for three years at which point the Participant will be re-assessed against the Participant standards and requirements in force at the time. This allows the Code to be updated to track changes in technology and the data centre market.

Once the application is accepted and Participant status is granted¹⁰, and the Participant must implement the Action Plan according to the agreed time table. Energy consumption must be monitored regularly, as described in the monitoring section (B.2 in Annex 2). Progress over time is expected in the data centre energy efficiency indicator(s).

The participant should update their list of practices implemented at each annual reporting interval to allow the JRC to track the implementation of actions against the commitments given.

The JRC will review the Participant's report, and check whether it corresponds to the Action Plan. If the execution of the organisation's action plan is notably weaker than agreed upon, or if the organisation does not honour its reporting requirements, the JRC reserves the right to terminate the organisation's participation in the Code of Conduct. Prior to this step the JRC will try to discuss and resolve the matter with the Participant in an amicable manner.

All Participants have the obligation to continuously monitor energy consumption and adopt energy management in order to look for continuous improvement in energy efficiency. One of the key objectives of the Code of Conduct is that each Participant benchmark their efficiency over time, using the Code of Conduct metric(s) (or more sophisticated metrics if and when available) in order to produce evidence of continuous improvement in efficiency.

¹⁰ The criteria for acceptance or rejection of plans or information received are described in Annex C "List of Best Practice for Data Centre Owners and Operators"

In addition each Participant shall make all reasonable efforts to **abide by the General Principles contained in Annex A.**

DATA COLLECTION AND ANALYSIS

Monitoring will enable the Code of Conduct to assess progress, set benchmarks and further develop and refine the best practice guidelines.

All Participants will periodically report their activities towards achieving their commitments directly to the Code of Conduct secretariat (Annex D). All data is treated in a highly confidential manner, and any publication of data in any report will be anonymous.

To qualify as a Participant, applicants must submit the Reporting Form describing simple physical and operational characteristics of the data centre, and the most recent one month facility and IT energy consumption data. Participants will then log the Facility and IT energy consumption at least monthly. This should then be reported once per year using the Reporting Form.

Energy will be measured in line with the reporting requirements. At a minimum, the facility energy will be measured at the utility for a stand alone data centre, or the data centre sub meter¹¹. IT energy consumption is measured at the UPS outputs (excluding CRAC units etc).

It is understood that some operators may not be able to immediately obtain the full facility energy consumption, for example an operator whose data centre is in a shared office building and uses the “house” chilled water system for cooling may not be able to meter the data centre part of their cooling system energy consumption.

Operators unable to provide both the total facility energy and IT energy should provide the information available and an action plan to achieve metering where feasible.

Operators in a shared building who have a shared power delivery path or shared HVAC system and insufficient metering to be able to extract and report the facility energy should

1. Provide an explanation of the issue preventing metering of the facility energy
2. Provide IT electrical energy measurements
3. Present an action plan to improve the metering
4. Provide any meter data available for the building including a description of exactly what parts of the data centre or other loads are on each meter

¹¹ It is important to consider the Facility energy consumption only, which may not always be easy to measure, particularly in shared use buildings. For example, a data centre in an office building may have a common cooling system, so measuring the electrical supply to this will include both.

In addition to the energy consumption, optional reporting criteria are also included in the reporting form for future study purposes. Participants are invited to provide more detailed metering reports where these are available to assist in the development of the Code and understanding of the benefit of the best practices for example;

1. Meters on individual parts of the data centre such as
 - a. Chiller systems
 - b. CRAC units
2. Meters allowing the efficiency of devices to be measured such as
 - a. Power to and from the UPS system

All data will be kept confidential and will not be disclosed to any third party outside the secretariat. Data will be used in an anonymous format to report on successful implementation of energy efficiency in data centres to further promote the aim of the Code of Conduct. Reporting will consist of data drawn from multiple data centres, neither the best practice nor energy consumption data will be published for any individual data centre.

The Data Collection Working Group will collate the data and perform analysis to establish how energy efficiency data from different data centres and server rooms can be cross-compared and correlated, and whether data centre energy efficiency targets can be set. This will be collated and reported back through the Code of Conduct periodically.

Annex A GENERAL PRINCIPLES

Participants of this Code of Conduct should endeavour and make all reasonable efforts to ensure:

- A.1. Data centres are designed so as to minimise energy consumption whilst not impacting business performance.
- A.2. Data centre equipment is designed to allow the optimisation of energy efficiency while meeting the operational or service targets anticipated.
- A.3. Data centres are designed to allow regular and periodic energy monitoring.
- A.4. Energy consumption of data centres is monitored; where data centres are part of larger facilities or buildings, the monitoring of the specific data centre consumption may entail the use of additional energy and power metering equipment.
- A.5. Data centres and their equipment are designed, specified and procured on the basis of minimising the TCO¹².
- A.6. When the Energy Star programme has set specification for servers and other IT equipment, these specifications must be followed by Participants when procuring equipment. For UPS the specifications of the European Code of Conduct on Energy Efficiency and Quality of AC Uninterruptible Power Systems (UPS)¹³.
- A.7. Data centres should preferably use free cooling technologies (no compressor required), where technically and economically feasible.

¹² Energy considerations shall be integrated into existing company policies and practices, concerning each phase of system life cycle: design; component choice; installation. Policies and practices should be evaluated according to the following criterion. "Does this policy take into account long term operating costs in general, and energy costs in particular? Does the current practice optimise service rendered as compared to long term costs?". This includes: Explicitly integrating energy performance criteria into internal design procedures. Integrating life cycle costing into competitive bidding processes. Requiring equipment suppliers and service providers to specify the energy performance of their equipment or service. Instituting company wide purchasing policies on specific energy efficient technologies. Specify these technologies in calls for tender offers. Integrating energy considerations into operation & maintenance practices.

¹³ Excluding those UPS technologies that are not included in the UPS Code of Conduct such as rotary.

Annex B DEFINITIONS AND METRICS AND MEASUREMENT

B. 1 Metrics and measurements

The Code of Conduct will apply the following metric:

1. Data centre infrastructure efficiency (DCiE):

$$\text{DCiE} = \frac{\text{Main IT equipment energy consumption}}{\text{Total facility energy consumption}} \times 100 \%$$

The metric reports how much of the energy consumed by the data centre is used by the equipment that is producing useful IT services. Higher figure indicates better energy efficiency of the data centre.

The following metrics are under development for future versions of the Code of Conduct;

2. IT productivity metric: An advanced metric providing an indicator of how efficiently the IT equipment provides useful IT services.
3. Total energy productivity metric: Similar to the IT metrics but relating the useful IT services to the total energy consumption of facility.

Energy consumption definitions:

Main IT equipment:

- Servers
- Storage
- Network equipment within the physical data centre

Cooling system: All cooling related units within and outside the data centre that take part in providing cooling to the data centre.

Miscellaneous infrastructure equipment: All other equipment in the data centre such as monitors, lighting, uninterruptible power supplies, power distribution units, etc.

Total facility energy consumption = Main IT equipment consumption + cooling system consumption + miscellaneous infrastructure equipment consumption.

¹⁴ Total facility energy consumption for data centre loads only, not other roles of the facility

B. 2 Obligations

Participants of this Code of Conduct shall endeavour and make all reasonable efforts to ensure the following obligations:

The following data should be collected monthly and reported annually in a data sheet to the JRC by 28 February at the latest for the previous year;

- Energy consumption for main IT equipment. If meters are not installed to provide the level of detail indicated in the definition (B.1), energy consumption at the UPS output can be reported. A description of equipment included in the measured IT energy consumption should be provided.
- Total facility energy consumption
- If more meters are installed, data should be reported for these including a description of equipment included in the energy consumption.
- IT rated electrical load capacity of the facility
- Target inlet temperature for IT equipment (optional)
- External monthly average ambient temperature (optional)
- External monthly average dew point temperature (optional)

B.2: Input is provided for supporting the development of an IT productivity metric and a total energy productivity metric.

Annex C LIST OF BEST PRACTICE FOR DATA CENTRE OWNERS AND OPERATORS

C.1. Role of Best Practices

The Best Practice Supplement (v2.0.0) is provided as an education and reference document as part of the Code of Conduct to assist data centre operators in identifying and implementing measures to improve the energy efficiency of their data centres. A broad group of expert reviewers from operators, vendors, consultants, academics, professional and national bodies have contributed to and reviewed the best practices.

The Best Practice Supplement is a full list of the identified and recognised data centre energy efficiency best practices within the Code of Conduct. The best practice list provides a common terminology and frame of reference for describing an energy efficiency practice, to assist Participants and Endorsers in avoiding doubt or confusion over terminology. Customers or suppliers of IT services may also find it useful to request or provide a list of Code of Conduct practices implemented in a data centre to assist in procurement of services that meet their environmental or sustainability standards.

C.2. Expected Minimum Practices

To help ensure that Participants to the Code of Conduct are recognised as having committed to a useful and substantial level of energy saving effort, a subset of the best practices are identified in the supplement as being the expected minimum level of energy saving activity for Participant status.

The less disruptive or intrusive of the practices are identified as being applied to the existing data centre and IT equipment, retrospectively where necessary. It is accepted that a number of the practices identified as expected are inappropriate or present an unnecessary burden when applied to the existing facility and equipment. These practices are identified as being expected either when new IT equipment is sourced and deployed or for a data centre built or retrofitted from 2010 onwards. These practices provide substantial benefits and are intended to achieve efficiency improvements through both improvement in operational practices and the natural churn of equipment and facilities.

C.3. Application and Assessment

The Code of Conduct Secretariat will assess applicants on the best practices identified in their application as implemented or endorsed or due to be implemented in the case of an action plan item.

An applicant for Participant status should identify in their Reporting Form the set of practices they have already implemented or have committed to implement within each facility and whether they plan to apply them to their existing facility and equipment, new IT equipment or data centre refits.

Applicants should provide a target date for implementation of practices not yet implemented that they commit to implementing.

Applicants who implement all of the expected practices will have met the best practice assessment criteria.

C.4. Areas of Responsibility

It is understood that not all operators are responsible for all aspects of the IT environment defined within the best practices. This is not a barrier to Participant status but the Participant should act as an Endorser for those practices outside of their direct control. An example of this would be a collocation provider who does not control the IT equipment should actively endorse the practices relating to IT equipment to their customers, possibly through the provision of services to assist customers in adopting those practices. Equally an IT operator using collocation should request their collocation provider to implement the practices relating to the facility.

See the Best Practice guide for further information on the types of operator and areas of responsibility. Also note that the Reporting Form provides guidance on which practices an applicant should Implement or Endorse based upon their selected areas of responsibility on the “Data Centre Information” tab.

C.5. Tracking Practice Compliance

There will be instances where it is overly burdensome or inappropriate for a Participant to follow one of the practices they have agreed to implement. In these instances the Participant should log the non compliance and the reason; if the reason is transitory this provides the opportunity for later correction. If the reason is permanent and recurs then this should be appended to their report to provide feedback on issues implementing the practices.

For example a new server whose business impact only justifies N+1 resilience may have to be deployed in a data centre with 2N resilience due to a lack of available capacity in N+1 facilities.

C.6. Applicability of Expected Practices

It is understood that not all operators will be able to implement all of the expected practices in their facilities due to physical, logistical, planning or other constraints. In these instances an explanation of why the expected action is not applicable or practical should be provided within the application for Participant status, alternative best practices from the supplement may be identified as replacements.

C.7. Alternate Combinations for Expert Applicants

Whilst the expected practices function as a guide to operators, expert operators may choose to determine an alternate combination of the best practices to improve the efficiency of their data centre. This alternative set should be identified in the same way in their application as expected minimum practices. Practices should be identified as already implemented or committed to implement by a specified date within each facility and whether they plan to apply them to their existing facility and equipment, new IT equipment or data centre refits. A reason for not implementing each of the expected practices should be given, this may involve reference to other optional practice(s).

These applicants will be assessed on a case by case basis to determine whether they meet the minimum expected level of energy saving measures for participant status.

Annex D SECRETARIAT AND WORKING GROUPS ,

SECRETARIAT AND WORKING GROUPS

Three Working Groups have been established by the Code of Conduct to establish and monitor commitments, and oversee the Code. These will be lead by the JRC and independent bodies:

- a. **Best practice** – Chaired by Liam Newcombe. Explore and exploit energy saving opportunities in the data centre. *Subgroups such as new facility design, power load balancing, cooling, virtualisation, electric distribution and UPS could be created.*
- b. **Energy efficiency metrics and measurements** – Chaired by Jan Viegand–representing the Danish Energy Agency and the Danish Electricity Saving Trust. To develop a method to measure the electricity consumption and energy efficiency of data centres and server rooms.
- c. **Data collection and analysis** – Chaired by Anson Wu, UK MTP¹⁵ – representing UK Department for Environment (Defra). To measure the energy consumption, calculate the energy efficiency of data centres and establish performance benchmarking.

The Secretariat is composed by representatives of the JRC and the chair persons of the 3 working groups.

All stakeholders are invited to join the above working groups. Working groups will work mainly through email and teleconferences.

¹⁵ Market Transformation Program

CODE OF CONDUCT ON DATA CENTRES SIGNING FORM

The organisation/company

.....

signs the Code of Conduct on Data Centres and commits itself to abide to the principles described by the Commitments and Monitoring section for the data centre it owns or operates. The company attach a detailed description of the efficiency best practices adopted, and the technical or economic justification why any expected practices cannot be adopted. The company is signing the Code of Conduct:

1. For a specific data centre located at:.....

Or

2. At corporate level, committing to have at least 40% of its data centres¹⁶ to fulfil the present Code of Conduct.

The organisation, through regular update reports, will keep the European Commission DG JRC informed on the implementation of the Code of Conduct on Data Centres.

For the organisation

Director or person authorised to sign:

Name:

Managerial function:

Address

Tel. / Fax. /

Email

Signature

Please send the signed form to:

Paolo Bertoldi

European Commission - DG JRC

TP 450, I-21020 Ispra (VA) , Italy

Tel. +39 0332 78 9299 (secretary 9145); Fax. +39 0332 78 9992

E-mail: paolo.bertoldi@ec.europa.eu

¹⁶ Based in the EU or other European countries (e.g. Norway, Switzerland, Iceland). Alternative interpretation of 40% criteria can be proposed, such as 40% of the total number of servers, etc.