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EU green public procurement criteria for data centres, server rooms and cloud services

EU GPP criteria for data centres, server rooms and cloud services

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1 INTRODUCTION

EU green public procurement (GPP) criteria are designed to make it easier for public authorities to purchase goods, services and works with reduced environmental impacts. The use of the criteria is **voluntary**. The criteria are formulated in such a way that they can, if deemed appropriate by the individual authority, be (partially or fully) integrated into the authority's tender documents with minimal editing. Before publishing a call for tender, public authorities are advised to check the available offer of the goods, services and works they plan to purchase on the market where they are operating.

When a contracting authority intends to use the criteria suggested in this document, it must do so in a manner which ensures compliance with the requirements of EU public procurement legislation (see, for instance, Articles 42, 43, 67(2) or 68 of Directive 2014/24 and similar provisions in other EU public procurement legislation). Practical information on this can also be found in the 2016 handbook on buying green, available at http://ec.europa.eu/environment/gpp/buying_handbook_en.htm

This document lists the EU GPP criteria for data centres, server rooms and cloud services. An accompanying technical report provides the full rationale for selecting these criteria and gives references for further information.

The criteria are split into selection criteria, technical specifications, award criteria and contract performance clauses. The criteria are of two types:

- **Core criteria** — *which are designed to allow for easy application of GPP, focusing on the key area(s) of environmental performance of a product and aimed at keeping administrative costs for companies to a minimum.*
- **Comprehensive criteria** — *which take into account more aspects or higher levels of environmental performance, for use by authorities that want to go further in supporting environmental and innovation goals.*

The formulation 'same for core and comprehensive criteria' is inserted if the criteria are identical for both types.

1.1 Definition and Scope

The product group ‘data centres, server rooms and cloud services’ includes:

- **Data centres**, which means structures, or groups of structures, dedicated to the centralised accommodation, interconnection and operation of information technology and network telecommunications equipment providing data storage, processing and transport services together with all the facilities and infrastructures for power distribution and environmental control and the necessary levels of resilience and security required to ensure the availability of the desired service;
- **Server rooms**, also referred to as computer rooms or server closets, which are rooms or portions of a building serving a specific IT load, determined by the power density of the equipment in the room. Server rooms usually have ICT control and may have some dedicated power and cooling capabilities. Server rooms are enterprise data centres but on a smaller scale, usually housed in an area indicatively less than 46m² and consisting of indicatively up to 25 racks.
- **Data centres providing digital services in the cloud**, where the customer pays for a service and the vendor provides and manages the ICT hardware/software and data centre equipment required to deliver the service. This includes the co-hosting of multiple customers, which may take the form of a cloud application environment. Different business models are associated with cloud services but it is important to note that the scope only extends to the data centre component. The most common cloud services identified are:
 - Infrastructure as a service (IaaS): a service provider offers clients pay-as-you-go access to storage, networking, servers and other computing resources in the cloud.
 - Platform as a service (PaaS): a service provider offers access to a cloud-based environment in which users can build and deliver applications. The provider supplies underlying infrastructure.
 - Software as a service (SaaS): a service provider delivers software and applications through the internet. Users subscribe to the software and access it via the web or vendor Application Programme Interfaces.

Data centres can be classified by type, and these different types are included within the scope of the criteria:

- **Enterprise data centre**: a data centre operated by an enterprise whose sole purpose is to deliver and manage services to its employees and customers;
- **Colocation data centre**: a data centre facility where multiple customers locate their own network(s), servers and storage equipment;
- **Managed service providers (MSP) data centre**: a data centre offering server and data storage services where the customer pays for a service and the vendor provides and manages the required ICT hardware/software and data centre equipment. This management service includes the co-hosting of multiple customers, which may take the form of a cloud application environment.

1.2 Applicability of the green public procurement criteria

The most common routes for the public procurement of data centres, including server rooms, are based on examples of procurement practices in the EU.

The process of procuring a new data centre or service consists of a number of distinct routes, each of which has its own distinct advantages and disadvantages. The choice of route can have a significant influence on the extent to which the environmental performance is improved. This is because each route brings with it distinct interactions between the procurer, the data centre provider and equipment suppliers.

When public organisations procure data centre products and/or services, these products and services typically fall within one of the following routes:

1. Building / equipping a data centre:

- building a new data centre
- equipping a server room / data centre.

2. Expanding and consolidating the infrastructure or a new ICT project:

- expansion and/or consolidation of existing server rooms and/or data centres into new or existing data centres
- IT virtualisation services
- consolidation of the existing server rooms in a new enterprise data centre.

3. Outsourcing to a hosted and/or cloud application environment, which means procuring a service and not a physical product. For cloud services this includes:

- procurement of hosting services
- procurement of cloud services.

4. Operating and/or maintaining the facility, e.g.:

- enterprise data centre / server rooms operation and maintenance services
- arrangements to locate and/or operate ICT equipment from within a colocation data centre (colocation services).

An overview of the applicability of the criteria for the specific procurement routes that a public organisation may choose to follow is provided in the accompanying technical report. Cloud services raise specific issues in relation to verifying the performance of the data centres used to provide the service. Specific guidance on procuring cloud services is provided in section 1.4 of this criteria document.

The criteria presented in this document have been developed in a way to ensure coherence with certain requirements, testing and calculation methodologies introduced by the Commission Regulation (EU) 2019/424 laying down ecodesign requirements for servers and data storage products. The Code of Conduct for Data Centres developed by the Commission and the associated registration and participation process is also a key reference point for verification.

Note on requirements for Central Government procurement

Article 6 and Annex III of the Energy Efficiency Directive (2012/27/EU), which had to be transposed into national law by June 2014, set out specific obligations for public authorities to procure certain energy efficient equipment. This includes the obligation to purchase only those products that:

where a product is covered by an implementing measure under Directive 2009/125/EC purchase only products that comply with energy efficiency benchmarks specified in that implementing

'measure'

This obligation is limited to central government and for purchases above the thresholds set out in the procurement directives. Moreover, the requirements have to be consistent with cost-effectiveness, economic feasibility, wider sustainability, technical suitability and sufficient competition. These factors can differ between public authorities and markets. For more guidance on the interpretation of this aspect of Article 6 and Annex III of the energy efficiency directive regarding procurement of energy-efficient products, services and buildings by central government authorities, please see points 33-42 of the Commission guidance document¹.

1.3 General note on verification

For a number of criteria, the proposed means for verifying is to provide test reports – both for products and the operational performance of systems. For each criterion, the relevant test methods, based on internationally recognised measurement methods and standards, are indicated. In this way it can be ensured that the performance claims provided by the tenderers are verifiable, repeatable, auditable and above all comparable. It is up to the public authority to decide at which stage such test results should be provided. In general, it does not seem necessary to require all tenderers to provide test results from the outset. To reduce the burden on tenderers and public authorities, a self-declaration could be considered sufficient when submitting bids. Afterwards, there are different options for if and when these tests could be required:

a) At the tendering stage:

For *products that will form part of the data centre*, the bidder with the most economically advantageous tender could be required to provide this proof. If the proof is deemed to be sufficient, the contract can be awarded. If the proof is deemed insufficient or non-compliant then:

- i) where the means of verification concerns a technical specification, the proof would be requested from the next highest scoring bidder who would then be considered for contract award;
- ii) where the means of verification concerns an award criterion, the additional points awarded would be removed and the tender ranking would be recalculated with all the ensuing consequences applying.

A test report only ensures that a sample product has been tested for certain requirements, not the items actually delivered under the contract. For framework contracts, the situation may be different. This scenario is covered further in the next point on contract execution and in the additional explanations below.

b) During contract execution:

At this stage the criteria should relate to the measurement of operational performance, for example the monitoring of power usage effectiveness (PUE) input values. It is recommended that criteria relating to operational performance be explicitly set and linked to these contract performance clauses so that these performance aspects can be monitored. If the result of this monitoring shows that the delivered service does not meet the criteria, the contracting authority is entitled to apply penalties.

¹ COM/2013/0762 final, Communication from the Commission to the European Parliament and the Council, *Implementing the Energy Efficiency Directive – Commission Guidance*

For *framework agreements*, the point at which proof has to be provided will depend on the specific set-up of the contract:

- i) For framework agreements with a single operator where the individual items to be delivered are identified when awarding the framework agreement, and where it is just a question of how many units will be needed, the same considerations apply as for the one-off supply contracts described above;
- ii) For framework agreements that pre-select several potential suppliers with ensuing competitions among those pre-selected, tenderers will only need to show at this initial pre-selection stage their capability of delivering items meeting the minimum performance requirements of the framework agreement. For ensuing call-down contracts (or orders) that are awarded following the competition among the pre-selected suppliers, in principle the same considerations as under a) and b) above apply, if additional requirements have to be proven under the competition. If the competition is decided only on the basis of price, then a check at the contract execution stage should be considered.

Cloud services raise specific issues in relation to verifying the performance of the data centres used to provide the service. This has an influence on the type of verification that can be requested. Specific guidance on procuring cloud services is provided in section 1.4 of this criteria document.

Please also note that, in accordance with Article 44 (2) of Directive 2014/24/EU, contracting authorities must accept other appropriate means of proof. This could include a technical dossier of the manufacturer where the economic operator concerned had no access to test reports or no possibility of obtaining them within the relevant time limits. This is on the condition that the lack of access was not attributable to the economic operator concerned and that the economic operator concerned proves that the works, supplies or services provided by it meet the requirements or criteria set out in the technical specifications, the award criteria or the contract performance conditions. Even if there is a reference to a certificate/test report drawn up by a specific conformity assessment body responsible for performing the tests, the contracting authorities must also accept certificates/test reports issued by other equivalent assessment bodies.

1.4 Procurement of cloud services

The nature of providing cloud services means that providers may put forward multiple data centres for potential use under a contract. They may also be unable to commit in advance to a specific location from which all services will be provided. This means that the link between the performance of the data centres that will be used and the subject matter of a call for tender needs to be carefully considered depending on the procurement stage.

1.4.1 Pre-procurement/market evaluation stage

At the pre-competitive stage, contracting authorities can test the market potential for cloud service providers to respond to sustainability criteria. This can include performance aspects reported across a portfolio of data centres identified as being potential sites, which will be used to service contracts.

1.4.2 Competitive stage

If these criteria are to be applied in a competitive tender, then a concrete link needs to be made between the data centres evaluated and the services to be provided under the contract. For cloud services, this may have to include general corporate policies that extend across the data centres that will be used to service a contract. This does, however, raise specific legal challenges for ensuring compliance with Procurement Directive 2014/24/EU.

Although recital 97 of the Procurement Directive indicates that general corporate policies cannot themselves be required in a criterion, that does not mean that these policies cannot serve as evidence for assessment and verification of a specific criterion. As set out in Article 67(3) of the Procurement Directive, the link to the subject matter requirement encompasses a wide range of considerations, provided these are related to the works, supplies or services being purchased under the contract. If corporate level practices and policies are referred to as a form of verification in a criterion, then this should relate to the hardware/facilities to be used in delivering the specific contract, rather than policies and practices at an overall corporate level.

In addition to setting limits on the scope of requirements that can be applied in tender procedures, the Procurement Directive contains rules on the means of proof which can be required from operators. The main principle is that equivalent methods, certifications or labels must generally be accepted, and in very particular circumstances a self-declaration from the operator may need to be considered.

All requirements shall be related to and be proportionate to the size and subject- matter of the contract. For example, a provider with a very large number of data centres should not receive additional points if the capacity they have available exceeds what is needed under the contract, as compared to a provider with a small number of data centres, which is adequate to meet the demand under the contract.

It is also important to note that all requirements in tenders may be extended to subcontractors. The leased or co-located facilities used to provide cloud services should therefore be included, where relevant, in the scope of some answers to requirements.

1.4.3 Contract execution

Contractors may be reluctant to share confidential details on the operation of the sites used to provide the service. As a workaround, the call for tender could explicitly mention that the contractor shall commission audits from an independent third party, to check the compliance against the relevant GPP criteria, on a regular basis, and to provide reports to the contracting authority. Including this obligation in the call for tenders will also impose an obligation on the Contracting Authority. This obligation would, however, require some specific resources on the part of the Contracting Authority to define and follow this process.

2 KEY ENVIRONMENTAL IMPACTS FROM DATA CENTRES AND SERVER ROOMS

Based on the available scientific evidence, the main environmental impacts of data centres and server rooms from the lifecycle perspective are summarised in the tables below (for further details, see the technical report). The same table also presents the EU GPP approach to mitigate or reduce those impacts.

Key environmental aspects		GPP approach
<ul style="list-style-type: none">The electricity consumption by the IT systems (primarily due to operation of the servers).The electricity consumption of the mechanical and electrical (M&E) system required mainly to control the internal environmental conditions of the data centre.Generation of potential hazards from improper disposal of waste electronic equipment and the associated loss of valuable material resources, including critical raw materials.Consumption of energy and materials to manufacture the ICT equipment used.The use of high global warming potential (GWP) gases in cooling systems.Direct and indirect greenhouse gas (GHG) emissions linked to the data centres operations, including electricity consumption, refrigerants, the manufacturing of ICT systems and unexploited potential for waste heat reuse.		<ul style="list-style-type: none">Purchase energy efficient servers.Purchase services able to maximise the server's utilisation rate.Purchase products implementing a restricted substances control of hazardous constituents.Purchase products designed in a way that the key components can be repaired and/or upgraded.Require end-of-life management practices to maximise the recovery of resources.Procure design and construction services that can achieve high energy-efficiency performance, including maximum efficiency of the M&E system.Require energy-efficiency best practices to be implemented for operating the cooling systems, including monitoring and the use of free cooling.Require the highest possible share of renewable energy for the provision of data centre services.Avoid the use of refrigerants with high GWP for the provision of data centre services, unless it is proven that the use of close-to-zero GWP refrigerants would not be possible due to exceptional circumstances or would reduce the energy-efficiency of the system.Prefer products/services that ensure waste heat reuse, e.g. in building or district heating networks

The order of impacts does not necessarily reflect their magnitude.

Detailed information about data centres and server rooms, including information about related legislation, standards and technical sources used as evidence, can be found in the technical report.

3 EU GPP CRITERIA FOR THE PURCHASE OF DATA CENTRES AND SERVER ROOMS

3.1 Selection criteria

Core criteria	Comprehensive criteria
<p>Subject matter:</p> <ul style="list-style-type: none">- purchase of IT virtualisation or consolidation services- Purchase of enterprise data centre or server room operation and maintenance services	
<p>SC1 Server utilisation <i>(same for core and comprehensive criteria)</i></p> <p><i>To be included when the data centre is operated by a third party.</i></p> <p>The tenderer must have relevant competencies and experience in optimising a server's utilisation. This must include server virtualisation services, utilisation management tools and software² and the consolidation of IT assets in data centres.</p> <p>Verification:</p> <p>Tenderers must provide evidence of previous projects with similar workloads to achieve, maintain and improve the utilisation of IT equipment. This includes descriptions of methods used to optimise utilisation. Evidence accepted includes information and references related to relevant contracts in the last 3 years in which the above elements have been carried out. This evidence may relate to either relevant contracts or key personnel who will be involved in providing the service. This must also be supported by CVs for personnel who will work on the project and their relevant project experience.</p>	
<p>Subject matter:</p> <p>Purchase of IT equipment with reduced environmental impact.</p>	<p>SC2 Control of hazardous substances – restricted substance in servers, data storage and network equipment</p> <p><i>To be included when IT equipment is to be procured.</i></p> <p>The tenderer must demonstrate the operation of restricted substance controls (RSCs) along the supply chain for the products to be supplied. The RSCs should, as a minimum, cover the following areas:</p> <ul style="list-style-type: none">- Product planning/design;- Supplier conformity;- Analytical testing. <p>Implementation should follow the guidelines in IEC 62476 and use the IEC 62474 material declaration database as the basis for identifying, tracking and declaring specific information about</p>

² This could include the virtualisation and optimisation of stored data by using compression, data de-duplication, thin provisioning, storage tiering and software defined storage systems.

	<p>the composition of the products to be supplied.</p> <p>The RSCs must apply, as a minimum, to the:</p> <ul style="list-style-type: none"> • REACH candidate list of substances, • Restricted substances and exemptions in the Restriction of Hazardous Substances Directive, <p>Supporting material declarations must be kept up to date for relevant materials, parts and sub-assemblies of the products to be supplied.</p> <p>Verification:</p> <p>The tenderer must provide documentation, which describes the system, its procedures and proof of its implementation.</p>
<p>Subject matter:</p> <ul style="list-style-type: none"> - Construction of a new data centre - Expansion of an existing facility with new data centre and server room infrastructure - Purchase of consolidation services for existing distributed server rooms in a new data centre - Purchase of enterprise data centre or server room operation and maintenance services 	<p>SC3 Cooling energy management</p> <p>(same for core and comprehensive criteria)</p> <p><i>To be included when the data centre is operated by a third party.</i></p> <p>The tenderer must have relevant competencies and experience in minimising cooling energy use, identifying opportunities to reduce energy use and to use any remaining waste heat (e.g. for heating adjacent buildings or district heating networks). In particular, bidders must provide information on:</p> <ul style="list-style-type: none"> • The capability and skills of the bidding organisation and any contractors to successfully identify and implement energy reduction and energy reuse measures. This shall include for the provision of a competent energy manager for each site covered by the contract. • The operational experience in using monitoring systems and software to inform energy reduction strategies, with particular reference to EU Code of Conduct³ / EN 50600 TR99-1 best practices on ‘cooling management’ and ‘temperature and humidity settings’. <p>Verification:</p> <p>Tenderers must provide evidence from previous data centre projects with similar characteristics that demonstrate how they have reduced or minimised the use of cooling energy.</p> <p>Evidence in the form of information and references for specific data centres sites that have been serviced in the last 3 years. This evidence may relate to either relevant contracts or key personnel who will be involved in providing the service.</p>

³ <https://e3p.jrc.ec.europa.eu/publications/ict-code-conduct-reporting-form-participants-and-endorsers-guidelines>

3.2 Technical specification

Core criteria	Comprehensive criteria																																												
Subject matter: Purchase of IT equipment with reduced environmental impact.																																													
TS1 Server active state efficiency For each server model deployed in the data centre, the calculated active state efficiency score (Eff_{ACTIVE}) must be greater than or equal to the minimum active state efficiency thresholds as listed below.	TS1 Server active state efficiency For each server model deployed in the data centre the calculated active state efficiency score (Eff_{ACTIVE}) must be greater than or equal to the minimum active state efficiency thresholds as listed below.																																												
<table border="1"> <thead> <tr> <th>Product type</th><th>Minimum Eff_{ACTIVE}</th></tr> </thead> <tbody> <tr> <td>1 socket</td><td></td></tr> <tr> <td>Rack</td><td>11.0</td></tr> <tr> <td>Tower</td><td>9.4</td></tr> <tr> <td>2 sockets</td><td></td></tr> <tr> <td>Rack</td><td>13.0</td></tr> <tr> <td>Tower</td><td>12.0</td></tr> <tr> <td>Blade or multi-node</td><td>14.0</td></tr> <tr> <td>4 sockets</td><td></td></tr> <tr> <td>Rack</td><td>16.0</td></tr> <tr> <td>Blade or multi-node</td><td>9.6</td></tr> </tbody> </table>	Product type	Minimum Eff_{ACTIVE}	1 socket		Rack	11.0	Tower	9.4	2 sockets		Rack	13.0	Tower	12.0	Blade or multi-node	14.0	4 sockets		Rack	16.0	Blade or multi-node	9.6	<table border="1"> <thead> <tr> <th>Product type</th><th>Minimum Eff_{ACTIVE}</th></tr> </thead> <tbody> <tr> <td>1 socket</td><td></td></tr> <tr> <td>Rack</td><td>13.0</td></tr> <tr> <td>Tower</td><td>11.0</td></tr> <tr> <td>2 sockets</td><td></td></tr> <tr> <td>Rack</td><td>18.0</td></tr> <tr> <td>Tower</td><td>12.0</td></tr> <tr> <td>Blade or multi-node</td><td>20.0</td></tr> <tr> <td>4 sockets</td><td></td></tr> <tr> <td>Rack</td><td>16.0</td></tr> <tr> <td>Blade or multi-node</td><td>9.6</td></tr> </tbody> </table>	Product type	Minimum Eff_{ACTIVE}	1 socket		Rack	13.0	Tower	11.0	2 sockets		Rack	18.0	Tower	12.0	Blade or multi-node	20.0	4 sockets		Rack	16.0	Blade or multi-node	9.6
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Verification The tenderer must provide the calculation of active state efficiency for each server model based on the EN 303470 measurement methodology. If different configurations of the server models are proposed for use, then the tested performance of the high-end and low-end configuration must be declared. Alternatively, verification can take the form of test results for a model with the specific configuration to be used. Test results obtained for the purpose of CE marking or label qualification, carried out according to equivalent test standards, may be used as verification.																																													
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<p>TS2 ICT Operating range – temperature and humidity</p> <p><i>Applicable in the case of air cooling and where the data centre is designed for economised and/or free cooling. Applicable operating condition classes are described in Appendix I.</i></p> <p>ICT hardware must support operation within the allowable humidity and dry bulb temperature range of operating condition class A2 of Ecodesign Regulation (EU) 2019/424 laying down ecodesign requirements for servers and data storage products.</p> <p>The equipment must be tested to function in the allowable range for a minimum of 16 operating hours (high temperature operation is not intended for continuous use). The testing must be designed to be representative of real operating conditions (see the accompanying explanatory notes). Testing methods contained in European standards on the operating condition class of servers, developed in reply to the draft standardisation mandate under the Ecodesign Regulation (EU) 2019/424, could also be suitable to this extent.</p> <p>The fan power consumption under normal and increased inlet temperatures must also be reported in order to validate that energy will be saved.</p> <p><i>Applicable in the case of liquid cooling</i></p> <p>ICT hardware must support operation within the facility supply water temperature ranges indicated in the tender with reference to classes W2 and W3 in Appendix II.</p> <p>Verification:</p> <p>The tenderer must provide manufacturer specifications and declarations for each piece of ICT equipment. The tenderer must declare that the server models have been tested to operate for an estimated number of hours during a specified time period in the allowable range. The test specification must be provided. Information and test results provided for the purpose of CE marking may be used as verification.</p>	<p>TS2 ICT Operating range – temperature and humidity</p> <p><i>Applicable in the case of air cooling and where the data centre is designed for economised and/or free cooling. Applicable operating condition classes are described in Appendix I.</i></p> <p>ICT hardware must support operation within the allowable humidity and dry bulb temperature range of operating condition class A3 of Ecodesign Regulation (EU) 2019/424 laying down ecodesign requirements for servers and data storage products.</p> <p>The equipment must be tested to function in the allowable range for a minimum of 88 operating hours (high temperature operation is not intended for continuous use). The testing must be designed to be representative of real operating conditions (see the accompanying explanatory notes). Testing methods contained in European standards on the operating condition class of servers, developed in reply to the draft standardisation mandate under the Ecodesign Regulation (EU) 2019/424, could also be suitable to this extent.</p> <p>The fan power consumption under normal and increased inlet temperatures must also be reported in order to validate that energy will be saved.</p> <p><i>Applicable in the case of liquid cooling</i></p> <p>ICT hardware must support operation within the facility supply water temperature ranges indicated in the tender with reference to classes W4 and W5 in Appendix II</p> <p>Verification:</p> <p>The tenderer must provide manufacturer specifications and declarations for each piece of ICT equipment. The tenderer must declare that the server models have been tested to operate for an estimated number of hours during a specified time period in the allowable range. The test specification must be provided. Information and test results provided for the purpose of CE marking may be used as verification.</p>
<p>Explanatory note: 1: Representative thermal testing of ICT equipment</p>	
<p>This note identifies the basis for the representative thermal testing of ICT equipment. In order for the testing to be representative of real operating conditions, it must be designed to simulate:</p> <ul style="list-style-type: none"> • short duration gradient changes influenced by the cooling equipment, for example the changeover from free cooling to a mechanical system; • short-term intense exposure periods influenced by ambient conditions, for example during prolonged summer heat waves; and • an indicative frequency of occurrence for both of the events above during an operational year. <p>Explanatory note: 2: Thermal performance and deployed power</p> <p>It is important to note that awarding extra points for A3 capable servers needs to be considered in the context of whether designating a A2 or A3 servers reduces the total power deployed. If the loss of capacity, driven by supporting the operating of servers at 40°C, results in more deployed servers, extra points should not be awarded.</p>	

	<p>TS3 Design for the repair and upgrading of servers and data storage</p> <p><i>This criterion is only applicable to the procurement of new servers and data storage in an enterprise data centre</i></p> <p>The tenderer must provide clear instructions to enable a non-destructive repair or replacement of the following components:</p> <ul style="list-style-type: none"> - data storage devices, - memory, - processor (CPU), - motherboard, - expansion cards/graphic cards, - power supply unit (PSU), - fans, - batteries <p>As a minimum, the instructions should include for each necessary repair operation and component:</p> <ol style="list-style-type: none"> 1 the type of operation; 2 the type and number of fastening technique(s) to be unlocked; 3 the tool(s) required. <p>The instructions must be made available to authorised third parties, including brokers, spare parts repairers, spare parts providers, recyclers and maintenance providers via registration on the manufacturer's webpage. These instructions must be made available for a minimum of 8 years after the server product is placed on the market.</p> <p>Verification:</p> <p>The tenderer must provide access to the repair instructions for the purpose of verification.</p> <p>Repair information must be provided according to the EN 45559:2019: Methods for providing information relating to material efficiency aspects of energy-related products. Test results obtained for the purpose of CE marking may be used as verification,</p>
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Subject matter: Purchase of end-of-life services for servers, data storage and network equipment
TS4 End-of-life management of servers, data storage and network equipment
(same for core and comprehensive criteria)
<i>This criterion should be used in conjunction with contract performance clause CPC3.</i>
Tenderers must provide a service for:
<ul style="list-style-type: none"> - the re-use and recycling of the whole product and/or - the selective treatment of components in accordance with Annex VII of the WEEE Directive for equipment that has reached the end of its service life - the recycling of components in order to recover Critical Raw Materials.
The service must comprise the following activities:
<ul style="list-style-type: none"> - collection; - confidential handling and secure data erasure (unless carried out in-house); - functional testing, servicing, repair and upgrading to prepare products for re-use⁴; - the remarketing of products for re-use; - dismantling for component re-use, recycling and/or disposal.
In providing the service, they must report on the proportion of equipment prepared or remarkedeted for re-use and the proportion of equipment prepared for recycling.
Preparation for re-use, recycling and disposal operations must be carried out in full compliance with the requirements in Article 8 and Annexes VII and VIII of the (recast) WEEE Directive 2012/19/EU and with reference to the list of components for selective treatment [<i>see accompanying explanatory note</i>].
Tenderers must also provide evidence of all the actions performed in order to improve the recycling of the Critical Raw Materials cobalt (in batteries) and of neodymium (in hard disks), in line with the available information on Cobalt and Neodymium content, as foreseen in Annex II.3.3.a to the Ecodesign Regulation (EU) 2019/424.
Verification:
The tenderer must provide details of the arrangements for collection, data security, preparation for re-use, remarketing for re-use and recycling/disposal. This must include, during the contract, valid proof of compliance of the WEEE handling facilities to be used and the separation and handling of specific components that may contain Critical Raw Materials.
Explanatory note: components requiring selective treatment
The following are components requiring selective treatment in accordance with Annex VII of the WEEE Directive:
<ul style="list-style-type: none"> • mercury containing components, • batteries,

⁴ Some Member States have developed standards and/or schemes that public authorities may wish to refer to in order to provide greater detail on how equipment is to be made suitable for reuse and resale.

- printed circuit boards greater than 10 cm²,
- plastic containing brominated flame retardants,
- chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons (HFC), hydrocarbons (HC),
- external electric cables,
- polychlorinated biphenyls (PCB) containing capacitors,
- components containing refractory ceramic fibres,
- electrolyte capacitors containing substances of concern,
- equipment containing gases that are ozone depleting or have a global warming potential (GWP) above 15,
- ozone-depleting gases must be treated in accordance with Regulation (EC) No 1005/2009

Subject matter:

- **Construction of a new data centre**
- **Expansion of existing building with new data centre and server room infrastructure**
- **Consolidation of existing server rooms and/or data centres into new or existing data centres.**

TS5 Environmental monitoring

(same for core and comprehensive criteria)

To be used in case of new build or retrofit of data centres

The tenderer must demonstrate that the facility has environmental control facilities and infrastructures that are in line with the requirements and recommendation of standard EN 50600-2-3 and are capable of measuring:

1) Computer room temperatures:

- a) supply air temperature;
- b) return air temperature;
- c) cold aisle temperature (where used);
- d) hot aisle temperature (where used).

2) Relative humidity:

- a) external relative humidity
- b) computer room relative humidity

3) Air pressure under the access floor (if an access floor is installed)

4) Coolant flow rates (if the design of the environmental control system relies on the movement of fluids, e.g. water cooling)

They must also report on the granularity of the measurement regime that they are proposing to install.

Verification:

The tenderer must provide designs and technical specifications for the monitoring system that they will install and identify how this provides the reported measurement regime granularity in accordance with EN 50600-2-3. The contracting authority reserves the right to request a report of a suitable third party audit of the data centre to verify implementation of the best practices.

	<p>TS6 Cooling system best practices – new build or retrofit of data centres</p> <p>The tenderer must demonstrate that the design incorporates the 'expected' best practices listed for the following design aspects in the most recent version of [EU Code of Conduct / EN50600 TR99-1]:</p> <ul style="list-style-type: none"> • air flow management and design • the cooling plant • computer room air conditioners / air handlers <p>In addition, free cooling and economised cooling practices must be implemented where there is the opportunity (see also the accompanying explanatory note) and a future climate vulnerability and risk assessment must be carried out on the cooling systems.</p> <p>Verification:</p> <p>The tenderer must provide designs and drawings that incorporate Code of Conduct / EN 50600 TR99-1 best practices. The contracting authority reserves the right to request a third party audit of the data centre to verify implementation of the best practices.</p> <p>In case of participation in the EU Code of Conduct, the tenderer must provide the filled-in reporting form⁵ submitted for registering with the EU Code of Conduct, including the description of the implementation plan for the expected practices. Proof of the participation status granted by the European Commission DG Joint Research Centre must also be provided.</p> <p><i>Acceptance as a participant in the EU Code of Conduct and implementation of the best practices will also be monitored under a contract performance clause.</i></p>
<p>Explanatory note: free cooling and economised cooling practices</p> <p>Free cooling / economised cooling are cooling plant designs that take advantage of cool ambient conditions to meet part or all of the facilities' cooling requirements so that the dependency on any form of mechanical cooling including compressors is reduced or even removed entirely, thus allowing for a significant reduction in energy consumption.</p> <p>The opportunities for utilising free cooling are increased in cooler and dryer climates and where increased temperature set points are used.</p>	

⁵ <https://e3p.jrc.ec.europa.eu/publications/ict-code-conduct-reporting-form-participants-and-endorsers-guidelines>

Subject matter:

- Expansion of existing building with a new data centre and/or server room infrastructure
- Purchasing of co-location services
- Purchasing of hosting services
- Purchasing of cloud services

TS7 Cooling system best practices – existing colocation or hosting data centres

The tenderer must demonstrate that the data centre incorporates the 'expected' best practices listed for the following design aspects in the most recent version of [EU Code of Conduct or EN50600 TR99-1]:

- air flow management and design
- the cooling Plant
- computer room air conditioners / air handlers

In addition, free cooling and economised cooling practices must be implemented where there is the opportunity (see also the accompanying explanatory note).

Verification:

The tenderer must demonstrate [*up to date participation in the EU Code of Conduct or third party verification of implementation of the expected practices as listed in EN50600 TR99-1 reference*].

The tenderer must provide the filled-in reporting form⁶ describing the implementation status of the expected best practices for the design aspects listed above.

The contracting authority reserves the right to request a report of a suitable third party audit of the data centre to verify implementation of the best practices.

Justification for omitting any of the listed 'expected' best practices must be provided.

Explanatory note: free cooling and economised cooling practices

Free cooling / economised cooling are cooling plant designs that take advantage of cool ambient conditions to meet part or all of the facilities' cooling requirements so that the dependency on any form of mechanical cooling including compressors is reduced or even removed entirely, thus allowing for a significant reduction in energy consumption.

The opportunities for utilising free cooling are increased in cooler and dryer climates and where increased temperature set points are used.

⁶ <https://e3p.jrc.ec.europa.eu/publications/ict-code-conduct-reporting-form-participants-and-endorsers-guidelines>

Subject matter:

- Construction of a new data centre
- Expansion of existing building with new data centre and server room infrastructure
- Consolidation of existing server rooms and/or data centres into new or existing data centres.

TS8 Waste heat reuse readiness

It is recommended that this technical specification only be set if there is ready demand on or near site for the heat or if the public authority has identified a clear planned or potential opportunity on or near the site.

The data centre or server room must provide for routings for future heat transfer pipework or other layout features to fit, or facilitate retrofitting of, a facility water system reaching each row of server rack so that liquid cooling of these could easily be retrofitted at a later stage.

Verification:

The tenderer must provide design engineering drawings showing that a facility water system with branches to each row of server row will be fitted or that the layout is so designed that it could be easily retrofitted.

The contracting authority reserves the right to request a report of a suitable third party audit of the data centre to verify implementation of this criterion.

TS8 Waste heat reuse

The criterion should be adapted to the local availability of district heating systems and networks, which may include heat reuse on the same site. It is recommended that a comprehensive technical specification be set if there is ready access.

The data centre must be connected to and supply a [percentage to be specified by the contracting authority] % of the data centre's waste heat expressed as the energy reuse factor (ERF) to local heat consumers⁷.

The ERF must be calculated for each facility according to EN 50600-4-6:2020 or an equivalent standard.

Verification:

The tenderer must provide calculations and design engineering drawings for the heat reuse systems and connection. Evidence of contractual arrangements or letters of intent must be obtained from the network operator.

The contracting authority reserves the right to request a report of a suitable third party audit of the data centre to verify implementation of this criterion.

A third party verification of the ERF can be accepted as evidence.

Third party verified energy management systems (based on the ISO 50001) or environmental management systems (based on EMAS or ISO 14001) reporting the calculated ERF can also be accepted as evidence.

⁷ This may include consumers on the same site or linked to the data centre via a district heating network

	<p>TS9 Renewable energy factor (REF)</p> <p><i>To be included when the data centre is operated by a third party. The Contracting Authority is suggested to test the market with potential providers and local availability of supply before using this criterion.</i></p> <p>The Renewable Energy Factor, of the data centre must be equal to 1 (100% renewable). The REF for energy supplied and consumed in the data centre must be calculated according to EN 50600-4-3.</p> <p>The electricity contributing to the REF must come from renewable sources as defined by Directive 2009/28/EC.</p> <p>Verification:</p> <p>The REF and the electricity supply and usage data and load profiles on which the calculations are based must be declared.</p> <p>A third party verification of the REF can be accepted as evidence.</p> <p>Third party verified energy management system (based on the ISO 50001) or environmental management systems (based on EMAS or ISO 14001) reporting the calculated REF can also be accepted as evidence.</p>
	<p>TS10 Global warming potential of mixture of refrigerants</p> <p><i>To be included when the data centre is operated by a third party</i></p> <p><i>See also AC11</i></p> <p>The global warming potential (GWP) weighted average for the mixture of refrigerants that will be used in the data centre cooling system must not exceed 10, unless it is proven that those refrigerants cannot be used for exceptional reasons or would reduce the energy efficiency of the cooling systems.</p> <p>Verification:</p> <p>Tenderers must report the calculation of the global warming potential weighted average, including for the inventory of the refrigerants used at the sites or to provide the service, and show consistency with the method described in Annex IV of Regulation (EU) No 517/2014.</p> <p>Third party verified energy management system (ISO 50001) or environmental management system (EMAS or ISO 14001) reporting the use of refrigerants can be accepted as evidence.</p> <p>Exceptional circumstances preventing the used of refrigerants with a GWP weighted averages in the range of 0 to 10 are documented.</p>

3.3 Award criteria

Core criteria	Comprehensive criteria
Subject matter: Purchase of IT equipment with reduced environmental impact.	
AC1Server idle state power <i>(same for core and comprehensive criteria)</i>	
<p>This criterion should only be used in combination with TS1. Servers that comply with TS1 may then be awarded additional points for their idle state power performance.</p> <p>It is only applicable if the product type (e.g. rack or tower servers, 1-socket or 2-sockets servers) and the system characteristics affecting power consumption (e.g. CPU performance, server with or without power redundancy, memory, drives, additional devices) are described in the technical specification.</p> <p>With the exception of resilient servers, HPC (high performance computing) servers and servers with integrated APAs (auxiliary performance accelerators) may be awarded a maximum of x points [to be specified]. Points are to be awarded to server models based on the level of improvement upon the minimum performance thresholds, as calculated for a server type in accordance with Commission Regulation (EU) 2019/424 laying down ecodesign requirements for servers and data storage products..</p>	
Verification The tenderer must detail the calculation of the individual server idle power based on EN 303470 testing and in line with Commission Regulation (EU) 2019/424 (see also the accompanying explanatory note). If different configurations of the server models are proposed for use, then the tested performance of the high-end and low end configuration must be declared. Alternatively, the tenderer can demonstrate compliance by providing a test report for a similarly configured server of the same model.	
Explanatory note: calculating the idle state power according to Commission Regulation (EU) 2019/424 EN 303 470 is based on the SERT version 2 testing methodology and includes a specific idle power test, active power calculation and active efficiency metric. Under the Ecodesign requirements, this information must be made publicly available by manufacturers In order to use the core criteria, the minimum threshold for each server type must be calculated based on the additional server components that are to be included in the offer and included in the call for tender. The Ecodesign method is detailed in Appendix III of this criteria document. Each threshold must be determined according to the following equation: $P_{idle} = P_{base} + \sum P_{add_i}$ where P_{base} is the basic idle state power allowance in Table 3, and $\sum P_{add_i}$ is the sum of the idle state power allowances for applicable, additional components, as determined per Table 4. For blade servers, P_{idle} is calculated as the total measured power divided by the number of installed blade servers in the tested blade chassis.	

	<p>AC2 Server deployed power demand</p> <p><i>This criterion is recommended if the contracting authority wishes to invite bids based on the power consumption of the anticipated IT workload and then to monitor this during operation. To be used in conjunction with CPC1</i></p> <p>Points will be awarded based on the deployed power estimate calculated for all the server types and their configurations to be deployed in the data centre.</p> <p>The performance of the different server configurations may be interpolated from high and low-end test data for the configurations. The calculation may be based on the workloads specified by the contracting authority.</p> <p>Maximum points will be awarded to the offer with the lowest deployed power. All other offers will be awarded points in proportion to the best offer.</p> <p>Verification</p> <p>The tenderer must detail the calculation of the deployment power based either on [to be specified]:</p> <ul style="list-style-type: none"> • the EN 303470 deployed power method with standardised workloads, or • a testing protocol to be specified by the contracting authority. <p>Where the performance of configurations has been interpolated from test data, information on the methodology used must be provided.</p>
<p>Subject matter: Purchase of IT consolidation or virtualisation services</p> <p><i>To be included when the data centre is operated by a third party. To be used in conjunction with CPC 4.2 (same for core and comprehensive criteria)</i></p> <p>AC3 Server utilisation</p> <p>Points will be awarded based on the anticipated annual average server utilisation level based on the contracting authorities data handling and processing requirements. Points will be awarded in line with the following ranges:</p> <p>>70%: [specified] points</p> <p>40-70%: $0.8 \times$ [specified] points</p> <p>25-40%: $0.5 \times$ [specified] points</p> <p>Verification</p> <p>The tenderer must provide the modelling, calculations or estimations of the anticipated utilisation based on the tools described in SC1.</p>	

Subject matter: Purchase of end-of-life services for servers
AC4 End-of-life management of servers
<i>(same for core and comprehensive criteria)</i>
<i>To be used in conjunction with criterion TS4</i>
Points will be awarded to providers of reuse and recycling services who ensure that printed circuit boards and external cables that are not suitable for reuse are separated and recycled.
Verification:
The tenderer must provide certification that the components identified have been recycled.
Subject matter: Construction/retrofitting of a new/existing data centre
AC5 Power usage effectiveness (PUE) – Designed PUE
<i>(same for core and comprehensive criteria)</i>
<i>Applicable in case of construction/retrofitting of a new/existing data centre when the IT power use can already be determined.</i>
Points will be awarded for the best performing Designed PUE (dPUE) offer (full number of specified points) at a given IT load (e.g. 50% of design) and specific environmental conditions. The PUE value must be determined according to ISO/IEC 30134:2016 Part 2, EN 50600-4-2:2016 or equivalent.
Verification:
The tenderer must provide design calculations which show how the PUE has been calculated according to ISO/IEC 30134:2016 Part 2, EN 50600-4-2:2016 or equivalent.
Subject matter: Purchase of operation and maintenance services for enterprise data centre / server rooms
AC6 Power usage effectiveness (PUE) – PUE Improvement potential
<i>(same for core and comprehensive criteria)</i>
<i>Applicable in case of operation and maintenance of an existing data centre where the historical PUE is known. It may also be applicable to server rooms if they have a dedicated cooling infrastructure.</i>
Points will be awarded based on the tenderer's estimated potential for improvement relative to the historical baseline for the PUE [to be provided by the contracting authority]. Bid estimates must be made based on the historical IT load and environmental conditions, as specified by the contracting authority. The PUE value must be determined according to ISO/IEC 30134:2016 Part 2, EN 50600-4-2:2016 or equivalent.
Verification:
Tenderers must provide calculations which show how the PUE has been estimated according to ISO/IEC 30134:2016 Part 2, EN 50600-4-2:2016 or equivalent.

<p>Subject matter: Construction/retrofitting of a new/existing data centre</p>	<p>AC7 Cooling system energy consumption</p> <p>Points will be awarded based on the estimated cooling energy consumption required to operate the data centre design under reference climatic conditions for the location. Points will be awarded for the best performing design offer (full number of specified points).</p>
	<p>Verification:</p> <p>The tenderer must provide documentation, modelling and calculations for the design estimation process.</p>
	<p>AC8 Waste heat reuse (for new data centres)</p> <p><i>The criterion should be adapted to the local availability of district heating systems and networks. It is recommended that a comprehensive award criterion be set if a public authority identifies local opportunities.</i></p> <p>Points will be awarded to tenderers that commit to supplying more than a x% [percentage to be specified by the contracting authority] of the data centre's waste heat expressed as the energy reuse factor (ERF) to local end-users. An additional point will be given for every 10% of extra waste heat the data centre supplies.</p> <p>The ERF must be calculated for each facility according to EN 50600-4-6:2020 or an equivalent standard.</p> <p>Verification:</p> <p>The tenderer must provide calculations according to ETSI ES 205 200-2-1 or an equivalent standard and the design engineering drawings for the heat reuse systems and connection. Evidence of contractual arrangements or letters of intent must be obtained from potential heat customers.</p>

Subject matter:

- **Procurement of colocation services**
- **Procurement of hosting services**
- **Procurement of cloud services**
- **Enterprise data centre/ server room operation and maintenance**

	<p>AC9 Waste heat reuse (for managed services)</p> <p><i>It is recommended that this comprehensive award criterion be used if a service is being procured.</i></p> <p>Points will be award based on the declared energy reuse factor (ERF) for the facilities that will be used to execute the contract. Points will be awarded in proportion to the tenderer that offers the highest energy reuse factor.</p> <p>The ERF must be calculated for each facility according to EN 50600-4-6:2020 or an equivalent standard.</p> <p>Verification:</p> <p>The tenderer must provide calculations according to EN 50600-4-6:2020 or an equivalent standard.</p> <p>A third party verification of the ERF can be accepted as evidence.</p> <p>Third party verified energy management systems (based on the ISO 50001) or environmental management systems (based on EMAS or ISO 14001) reporting the calculated ERF can also be accepted as evidence.</p>
<p>AC10 Renewable energy factor (REF)</p> <p><i>To be included when the data centre is operated by a third party. The points are only to be awarded to tenderers meeting the minimum requirements for IT and M&E system performance. For cloud services, the REF may be requested as a mean value for the sites providing the service.</i></p> <p>Points are to be awarded in proportion to the tenderer that offers the highest REF for their electricity use.</p> <p>The REF for energy supplied and consumed in the data centre must be calculated according to EN 50600-4-3⁸.</p> <p>The electricity contributing to the REF must come from renewable sources as defined by Directive 2009/28/EC⁹.</p>	<p>AC10 Renewable energy factor (REF)</p> <p><i>To be included when the data centre is operated by a third party. The points are only to be awarded to tenderers meeting the minimum requirements for IT and M&E system performance. For cloud services, the load matched REF may be requested as a mean value for the sites providing the service.</i></p> <p>Points are to be awarded in proportion to the tenderer that offers the highest load matched REF for their electricity use.</p> <p>The REF for energy supplied and consumed in the data centre must be calculated according to EN 50600-4-3. The load profile for the generating capacity must then be related to the projected load profile of the data centre.</p>

⁸ EUROPEAN STANDARD EN 50600-4-3 - Information technology - Data centre facilities and infrastructures - Part 4-3: Renewable energy factor

<p>Verification:</p> <p>The REF and the electricity supply and usage data on which the calculations are based must be declared.</p> <p>A third party verification of the REF can be accepted as evidence.</p> <p>Third party verified energy management systems (ISO 50001) or environmental management system (EMAS or ISO 14001) reporting the calculated REF can also be accepted as evidence.</p>	<p>The electricity contributing to the REF must come from renewable sources as defined by Directive 2009/28/EC.</p> <p>Verification:</p> <p>The REF and the electricity supply and usage data and load profiles on which the calculations are based must be declared.</p> <p>A third party verification of the REF can be accepted as evidence.</p> <p>Third party verified energy management systems (based on the ISO 50001) or environmental management system (based on EMAS or ISO 14001) reporting the calculated REF can also be accepted as evidence.</p>
<p>Explanatory note: Guarantee of origin</p> <p>All EU countries are legally obliged, under Directives 2009/28/EC and 2004/8/EC, to set up guarantee of origin schemes for electricity from renewable energy sources. These provide a good legal basis for verification. Please note that the current state of mandatory application of guarantee of origin schemes may vary between Member States.</p> <p>An alternative would be for the supplier to provide independent proof of the fact that a corresponding quantity of electricity has been generated from sources defined as renewable (e.g. a tradable certificate from an independent issuing body, which has been approved by the government). Another alternative would be if the electricity supplied carried a Type-1 ecolabel with a definition at least as strict as that in Directive 2009/28/EC.</p>	
<p>AC11 Global warming potential of mixture of refrigerants</p> <p><i>To be included when the data centre is operated by a third party</i></p> <p><i>See also TS10.</i></p> <p>Points will be awarded to the tenderer according to the global warming potential (GWP) weighted average for the mixture of refrigerants that will be used in the data centre cooling system. This must be calculated in accordance with Annex IV of Regulation (EU) No 517/2014, see explanatory note). The points will be awarded according to the next resulting GWP weighted average intervals. A maximum of x points [to be specified] may be awarded:</p> <ul style="list-style-type: none"> • x points to resulting GWP weighted averages in the range of 0 to 10 • 0.6x points to resulting GWP weighted averages in the range of 11 to 150 • 0.2x points to resulting GWP weighted averages in the range of 151 to 750. 	

⁹ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources. As of 30 June 2021 the definition of renewable sources set out in Directive 2018/2001/EU, repealing Directive 2009/28/EC, will apply.

Verification:

Tenderers must report the calculation of the global warming potential weighted average, including for the inventory of the refrigerants used at the sites or to provide the service, and show consistency with the method described in Annex IV of Regulation (EU) No 517/2014.

The tenderer must provide evidence of the use of the refrigerants reported in the calculation.

Third party verified energy management system (ISO 50001) or environmental management system (EMAS or ISO 14001) reporting the use of refrigerants can be accepted as evidence.

Explanatory note: Method of calculating the total GWP of a mixture of refrigerants according to Annex IV of Regulation (EU) No 517/2014

The GWP of a mixture is calculated as a weighted average, derived from the sum of the weight fractions of the individual substances multiplied by their GWP, unless otherwise specified, including substances that are not fluorinated greenhouse gases. The formula is shown below:

$$\sum (\text{Substance } X \% \times \text{GWP}) + (\text{Substance } Y \% \times \text{GWP}) + (\text{Substance } N \% \times \text{GWP})$$

Where % is the contribution by weight with a weight tolerance of $\pm 1\%$. The GWP of refrigerants is listed in Annex I of Regulation (EU) No 517/2014.

Documentation on the quantity and type of fluorinated gas is already required by Article 6 of Regulation (EU) No 517/2014.

3.4 Contract performance clauses

Core criteria	Comprehensive criteria
Subject matter: <ul style="list-style-type: none"> Purchase of services for the operation and maintenance of enterprise data centres or server rooms 	<p>CPC1 Monitoring of IT energy consumption <i>To be included when the data centre is operated by a third party. To be used in conjunction with AC2.</i> The contractor must provide monthly and annual data for the IT equipment that is located in the data centre. Monitoring of energy consumption must be in line with the requirements and recommendation of standard EN 50600-2-2</p>
CPC2 Monitoring of IT equipment utilisation <i>(same for core and comprehensive criteria)</i> <i>To be included when the data centre is operated by a third party. To be used in conjunction with AC3</i> The contractor must provide periodical reporting of optimisation analysis and the achievement of utilisation targets agreed with the client during the specific IT project. The service provider must measure and report monthly the utilisation rate of the servers in the data centre based on ISO 30134-5.	
Subject matter: <ul style="list-style-type: none"> Purchase of end-of-life services for servers, data storage and network equipment 	<p>CPC3 Reporting on the end-destination of servers, data storage and network equipment <i>(same for core and comprehensive criteria)</i> <i>To be used in conjunction with TS4</i> The contractor must provide a report on the status of the equipment in the inventory once all items have been processed for re-use, recycling or disposal. The report must identify the proportion of items re-used or recycled, and whether they remained in the EU or were exported. For equipment and components recycled in the EU, the following means of proof for the handling facilities must be accepted: <ul style="list-style-type: none"> a permit issued by the national competent authority in accordance with Article 23 of the Directive 2008/98/EC, or a third party certification of compliance with the technical requirements of EN 50625-1 or an equivalent compliance scheme. Where equipment and components are exported for re-use or recycling, contractors must provide the following shipment and treatment information: <ul style="list-style-type: none"> shipping information for equipment intended for re-use, in accordance with Annex VI of WEEE Directive 2012/19/EU. </p>

For WEEE exported to be treated outside the EU, a third party certification of compliance with the minimum WEEE requirements laid down in the criterion, or with the technical requirements of EN 50625-1 or an equivalent compliance scheme¹⁰.

Subject matter:

- Construction of a new data centre
- Expansion of existing building with new data centre and server rooms infrastructure
- Services to consolidate existing server rooms and/or data centres into new or existing data centres

CPC4 Demonstration of power usage effectiveness (PUE) at handover

To be used in conjunction with AC5. The demonstration and reporting may be carried out on a modular basis where relevant to the data centre's design and phasing.

The data centre systems / integrated systems commissioning must include a test where the IT equipment load is simulated at part and full load, with power and cooling systems operating in automatic mode.

The total or clearly identified module of data centre power consumption and IT equipment power consumption must be recorded along with the ambient conditions. Actual performance can then be compared with targets from AC5.

Data to show instantaneous PUE based on measured values and part load according to ISO/IEC 30134:2016 Part 2, EN 50600-4-2:2016 or equivalent.

Subject matter:

Purchase of operation and maintenance services for enterprise data centres and server rooms

CPC5 Monitoring of power usage effectiveness (PUE) input values

(same for core and comprehensive criteria)

To be used in conjunction with AC5. and AC6

The operator of the data centre facility must provide an annual report containing the year's average and monthly disaggregated data for the total metered energy consumption of the data centre and the sub-metered electricity consumption for the mechanical & electric systems and the IT equipment.

¹⁰ The following compliance schemes are considered, at the time of writing, to meet these requirements: WEEELABEX:2011 requirement on 'Treatment of WEEE'; 'Responsible Recycling' (R2:2013) standard for electronics recyclers; e-Stewards standard 2.0 for Responsible Recycling and Reuse of Electronic Equipment; Australian/New Zealand standard AS/NZS 5377:2013 on 'Collection, storage, transport and treatment of end-of-life electrical and electronic equipment'

<p>Subject matter:</p> <ul style="list-style-type: none"> - Construction of a new data centre - Expansion of existing building with new data centre and server rooms infrastructure - Services to consolidate existing server rooms and/or data centres into new or existing data centres 	<p>CPC6 Implementation of best practice designs</p> <p><i>This criterion should be used in conjunction with technical specification TS6</i></p> <p>Based on the final design, the data centre must be [accepted for EU Code of Conduct participation/third party verified with reference to EN 50600 TR99-1] during execution of the contract.</p> <p>The tenderer must submit the final designs for participation in the EU Code of Conduct. Annual updated versions of the reporting form must also be copied to the contracting authority.</p> <p>The contracting authority reserves the right to request a third party audit of the data centre to verify implementation of the best practices.</p>
<p>Subject matter:</p> <p>Purchase of operation and maintenance services for enterprise data centres and server rooms</p>	<p>CPC7 Monitoring of cooling system's energy consumption</p> <p><i>To be included when the data centre is operated by a third party. To be used in conjunction with AC7</i></p> <p>The operator of the data centre facility must provide monthly and annual data for the energy consumption of the data centre's cooling system. The monitoring must be specified according to the guidelines in EN 50600-4-2:2016 or equivalent.</p>
	<p>CPC8 Monitoring of the heating supply and connection</p> <p><i>To be included when the data centre is operated by a third party in conjunction with technical specification TS8, and award criteria AC8 and AC9</i></p> <p>The operator of the data centre facility must provide average monthly data for the heat supplied to the local heat consumers.</p> <p>In addition, the energy reuse factor (ERF) must be calculated according to EN 50600-4-6:2020 or an equivalent standard and reported on.</p> <p>Upon request, the contracting authority must be given access to the equipment and network connection on-site at the data centre for auditing purposes.</p>

Subject matter:

- **Procurement of colocation services**
- **Procurement of hosting services**
- **Procurement of cloud services**

CPC9 Renewable energy factor (REF)

To be used in conjunction with AC10

The operator of the data centre facility or on/near-site generating capacity must provide monthly data for the renewable energy purchased or the renewable energy generated. Third party operators must also provide, for comparative purposes, the total metered energy consumption of the data centre.

Subject matter:

- **Procurement of colocation services**
- **Procurement of hosting services**
- **Procurement of cloud services**
- **Purchase of operation and maintenance services for enterprise data centres and/or server rooms**

CPC10 Global warming potential of mixtures of refrigerants

To be included if criteria AC11 is used.

The operator of the data centre project must monitor and verify the cooling system's greenhouse gas refrigerant emissions as estimated at bid stage.

The actual monitored emissions must be reported for each year of operation, based on metered energy consumption with the possibility for third party verification if requested.

4 LIFE CYCLE COSTING

Life cycle costing (LCC) is a method for assessing the total costs of a product or service under study. The life cycle costing model for a public authority is mainly related to the type of business model applied. In the case of server rooms and enterprise data centres, the public authority owner of the data centres /server rooms is responsible for the capital expenditure (CAPEX) costs, including the purchase and installation of the IT, mechanical and electrical equipment in the building, together with the building infrastructure. Also, the end-of-life costs related to decommissioning the facility are directly covered by the public authority.

The trend of purchasing data centre services (e.g. co-location or managed service provider (MSP) models) is instead changing the cost model for the public authorities towards less CAPEX and greater operational expenditure (OPEX) in the form of fees related to the services procured. Table 1 provides an indicative understanding of the life cycle cost structure of data centres and server rooms.

Table 1. Indicative life cycle costs for the owners and customers of data centres.

Cost category	Cost range for data centre user / customers (% breakdown of total life cycle cost)			
	Server rooms	Enterprise	Colocation	MSP
CAPEX facilities	1-5%	15-20%	1-5%	0%
CAPEX IT	30-60%	30-40%	40-50%	0%
OPEX facilities	10-30%	10-15%	5-15%	35-50%
OPEX IT	20-40%	25-35%	30-40%	50-70%
Decommissioning	5-10%	5-10%	1-5%	0%
Facilities end of Life	1-5%	1-5%	N/A	N/A

The EU GPP criteria for data centres, server rooms and cloud services will have a positive influence on some of the key costs that should be considered along the life cycle of a data centre. Although it is very difficult to estimate specific cost savings, applying these criteria has a high potential of reducing life cycle costs. A qualitative description of the expected impact of each set of criteria on the LCC is described below:

IT equipment-related expenditure

- **Criteria on the energy efficiency of servers** can result in reducing the facility's OPEX costs (due to the direct reduction in the electricity consumption of servers). This can also increase the computing capacity of the data centre and therefore avoid the need to expand the infrastructure and its associated costs (affecting both CAPEX and OPEX).
- **Criteria on the optimisation of servers:** Increasing utilisation reduces CAPEX costs because the same work is achieved with less IT equipment. In addition, the OPEX energy costs are reduced since it reduces mechanical and electrical needs for cooling.

- **Criteria on end-of-life management** can be used to encourage manufacturers and specialist WEEE handlers to bid for end-of-life equipment inventories. This may allow for recovery of some of the equipment's residual value.
- **Criteria on repairability and upgradability of IT equipment** can have the benefit of reducing the operational expenditure for maintenance of the equipment (OPEX IT). This expenditure can, over the life time of a data centre, equal the initial capital expenditure.
- **Criteria on the operating range of ICT:** Cooling costs are one of the major contributors to the total electricity bill of large data centres. Procuring IT equipment able to withstand wider environmental conditions (for operations that are not continuous) has a positive impact on the flexibility and cost of the data centre. This is relevant if it enables free cooling and/or economised cooling systems to be introduced, thus reducing the M&E installed capacity and the capital costs and operative costs of the facility. Although the IT CAPEX cost is expected to be higher, the energy costs savings will outweigh this initial increase in purchase price.

Mechanical and electrical systems-related expenditure

- **Criteria on power usage effectiveness (PUE):** several strategies can be pursued to reduce PUE, such as combining improvements in M&E equipment efficiency, operating conditions and thermal design. Reducing energy consumption reduces operating costs.
- **Criteria on the reuse of waste:** the potential costs and benefits are highly site specific, but value can be obtained if district heating is already available or is being planned. It is assumed that the waste heat is not reused where there is no demand. Case studies based on air cooled ICT equipment and heat pumps estimate payback periods of around 3 years where the district heating is in part financed by a third party. Liquid cooling allowing the heat to be captured at higher temperatures may increase the attractiveness due to reduced or eliminated investments (and operational) costs for heat pumps.
- **Criteria on operating conditions control, best practices for cooling systems:** Reducing cooling demand has a positive impact on the life cycle costs of a data centre under OPEX facilities. Some practices make it possible to reduce the M&E installed capacity needed, which can also enable a reduction of the capital costs.
- **Criteria on the use of refrigerants:** If traditional refrigerants with high GWP are avoided by installing free cooling or economised cooling solutions, operating costs can be reduced compared to traditional air-conditioning,

assuming that the required investment is paid back in less than 10 years¹¹. However, significant investment costs have to be considered, especially for small server rooms and structurally integrated medium-sized data centres. Moreover, the phasing out of F-gases in refrigerants is expected to lead to higher operating prices where traditional refrigerants are still used. This could push the market to use other more climate friendly alternatives that are potentially less costly.

- **Criteria on the renewable energy factor:** The costs will vary depending on the market, the supplier and the individual situation of the data centre.

¹¹ Climate-friendly Air-Conditioning with Natural Refrigerants. Integrative concepts for non-residential buildings with data centres. Federal Ministry for the Environment, Building and Nuclear Safety (BMUB) and German Environment Agency. December, 2016. Available at: <https://www.umweltbundesamt.de/dokument/climate-friendly-air-conditioning-natural>

APPENDIX I: OPERATING CONDITION CLASSES FOR AIR COOLING

Table 2 below describes the operating condition classes according to Regulation (EU) 2019/424 laying down ecodesign requirements for servers and data storage products.

Table 2: Operating condition classes for servers and data storage products

	Dry bulb temp °C		Humidity range, non-condensing			
Operating condition class	Allowable range	Recommended range	Allowable range	Recommended range	Max dew point (°C)	Maximum rate of change (°C/hr)
A1	15- 32	18-27	-12°C dew point (DP) and 8% relative humidity (RH) to 17°C DP and 80% RH	-9°C DP to 15°C DP and 60% RH	17	5/20
A2	10-35	18-27	-12°C DP and 8% RH to 21°C DP and 80% RH	Same as A1	21	5/20
A3	5-40	18-27	-12°C DP and 8% RH to 24°C DP and 85% RH	Same as A1	24	5/20
A4	5-45	18-27	-12°C DP and 8% RH to 24°C DP and 90% RH	Same as A1	24	5/20

APPENDIX II: OPERATING CONDITION CLASSES FOR LIQUID COOLING

The table below describes the operating condition classes for the facility water supply temperature and the related cooling equipment required within the class specified in the ASHRAE Liquid Cooled Guidelines¹².

Table 3: Operating condition classes for liquid cooling

Class	Main heat rejection	Supplemental cooling equipment	Facility supply water temp (°C)
W2	Chiller/cooling tower	Water-side economiser (with dry-cooler or cooling tower)	2 – 27
W3	Cooling tower	Chiller	2 – 32
W4	Water-side economizer (w/dry cooler or cooling tower)	N/A	2 – 45
W5	Building or district heating system	Cooling tower	> 45

¹²ASHRAE (2011). Thermal Guidelines for Liquid Cooled Data Processing Environments

APPENDIX III: IDLE STATE POWER

According to Commission Regulation (EU) 2019/424 laying down ecodesign requirements for servers and data storage products, the idle state power (P_{idle}) of servers, with the exception of resilient servers, HPC servers and servers with integrated APA, is to be calculated using the following equation:

$$P_{idle} = P_{base} + \sum P_{add_i}$$

where P_{base} is the basic idle state power allowance in Table 4, and $\sum P_{add_i}$ is the sum of the idle state power allowances for applicable, additional components, as determined according to Table 5. For blade servers, P_{idle} is calculated as the total measured power divided by the number of installed blade servers in the tested blade chassis. For multi-node servers, the number of sockets is counted per node while P_{idle} is calculated as the total measured power divided by the number of installed nodes in the tested enclosure.

Table 4: Base idle state power allowances

Product type	Base idle state power allowance, P_{base} (W)
1-socket servers (neither blade nor multi-node servers)	25
2-socket servers (neither blade nor multi-node servers)	38
Blade or multi-node servers	40

Table 5: Additional idle power allowances for extra components

System characteristics	Applies to	Additional idle power allowance
CPU performance	All servers	1 socket: $10 \times \text{Perf}_{\text{CPU}}$ W 2 socket: $7 \times \text{Perf}_{\text{CPU}}$ W
Additional PSU	PSU installed explicitly for power redundancy	10 W per PSU
HDD or SSD	Per installed HDD or SSD	5.0 W per HDD or SSD
Additional memory	Installed memory greater than 4 GB	0.18 W per GB
Additional buffered DDR channel	Installed buffered DDR channels greater than 8 channels	4.0 W per buffered DDR channel
Additional I/O devices	Installed devices greater than two ports of ≥ 1 Gbit, onboard Ethernet	< 1 Gb/s: No allowance
		= 1 Gb/s: 2.0 W / Active port
		> 1 Gb/s and < 10 Gb/s: 4.0 W/ Active port
		≥ 10 Gb/s and <25Gb/s: 15.0 W/Active port
		≥ 25 Gb/s and <50Gb/s: 20.0 W/Active port
		≥ 50 Gb/s 26.0 W/Active port