

IRISH GPP CRITERIA:

ICT PRODUCTS AND SERVICES



IRISH GPP CRITERIA: ICT PRODUCTS AND SERVICES



This document sets out the core and comprehensive GPP criteria for the purchase of Information and Communications Technology (ICT) products and services by Irish public bodies. The criteria cover the procurement of the below products, and facilities or services which specify the use of these products (including cloud services, data entry, web design, mobile communications contracts etc.):

STATIONARY ICT DEVICES

- **Computers:**
 - Desktop computers
 - All-in-one computers (or integrated desktop computers)
 - Desktop thin clients
 - Workstations
- **Computer displays**
- **ICT Equipment included in the Triple E Register:**
 - Rack Mounted Servers
 - Enterprise Storage Equipment
 - Precision Cooling Equipment
 - Centralised Direct Current Power Distribution
 - Power Management
 - Uninterruptible Power Supply
 - Blade Servers
 - Enterprise Communication Equipment
 - ICT Optimisation Solutions

MOBILE ICT DEVICES

- **Portable computers**
 - Notebooks
 - Two-in-one notebooks
 - Mobile thin clients
 - Tablets
- **Smartphones**

DATA CENTRES AND SERVICES PROVIDED USING DATA CENTRES

- Design and build of data centres
- Purchase of storage capacity in existing data centres including enterprise, colocation and managed service provider centres
- IT virtualisation services
- Purchase of hosting services or cloud services delivered via data centres such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS and Software as a Service (SaaS)

The criteria have been developed based on the *2021 EU GPP Criteria for Computers, Monitors, Tablets and Smartphones*, the *2020 EU GPP Criteria for Data Centres, Server Rooms and Cloud Services*, relevant Irish and European legislation, the *SEAI Triple E Register* criteria, the *EU Life-cycle Costing Tool for Computers and Monitors*, and a consultation with Irish public bodies, NGOs and industry associations. Further context for the development of the criteria, and advice on

how they can be applied and verified within tender procedures, is given in the accompanying EPA guidance document. For an overview of the sector, GPP approach and examples of real tenders, please see *Module 7.1 of the GPP Training Toolkit*.

The following tables summarise the core and comprehensive GPP criteria for ICT Products and Services.

WHAT DO THE CRITERIA COVER?

1 SUPPLY OF ICT PRODUCTS WITH REDUCED ENVIRONMENTAL IMPACT

TOPIC	CORE GPP CRITERIA	COMPREHENSIVE GPP CRITERIA
A. MINIMUM ENERGY PERFORMANCE (TS AND AC)	TS1. Minimum energy performance for computers	TS1. Minimum energy performance for computers
	TS2. Minimum energy performance for monitors	TS2. Minimum energy performance for monitors
		TS3. Thin Client devices in a server-based environment
	AC1. Improved energy performance for computers	AC1. Improved energy performance for computers
	AC2. Improved energy performance for monitors	AC2. Improved energy performance for monitors
B. HAZARDOUS SUBSTANCES (TS AND AC)		TS4. Substance Controls
	TS5. Restriction of chlorinate and brominate substances in plastic parts	TS5. Restriction of chlorinate and brominate substances in plastic parts
		AC3. Restriction of Substances of Very High Concern
		AC4. Avoidance of regrettable substitution
C. PRODUCT LIFESPAN EXTENSION (TS AND CPC)	TS6 (a) Provision of an extended service level agreement	TS6 (a) Provision of an extended service level agreement
	TS6 (b) Manufacturer's warranty	TS6 (b) Manufacturer's warranty
	TS7. Continued availability of spare parts	TS7. Continued availability of spare parts

TOPIC	CORE GPP CRITERIA	COMPREHENSIVE GPP CRITERIA
C. PRODUCT LIFESPAN EXTENSION (TS AND CPC)	TS8. Design for reparability	TS8. Design for reparability
		TS9. Secure data deletion
	CPC1. Service Level Agreement Reporting	CPC1. Service Level Agreement Reporting
D. RECHARGEABLE BATTERY LIFE AND PERFORMANCE (TS AND AC)	TS10. Rechargeable battery endurance	TS10. Rechargeable battery endurance
		TS11. Minimum requirements for electrical performance
	TS12. Information on battery state of health	TS12. Information on battery state of health
	TS13. Battery protection software	TS13. Battery protection software
		TS14. Intelligent charging
	AC5. Further rechargeable battery endurance	
E. ELECTRONIC DISPLAYS (TS, AC AND CPC)	TS15. Ecodesign and applicable standards	TS15. Ecodesign and applicable standards
	TS16. Energy label	TS16. Energy label
	TS17. Product longevity and warranty	TS17. Product longevity and warranty
	TS18. Installation instructions and user information	TS18. Installation instructions and user information
	TS19. End-of-life service	TS19. End-of-life service
	AC6. Life-cycle costs	AC6. Life-cycle costs
	AC7. Extended warranty	AC7. Extended warranty
	CPC2. Environmental performance	CPC2. Environmental performance
	CPC3. Reporting on the end-destination of equipment	CPC3. Reporting on the end-destination of equipment
F. MOBILE EQUIPMENT DURABILITY TESTING (TS AND AC)	TS20. Drop testing	TS20. Drop testing
		TS21. Temperature Stress
		TS22. Ingress protection level
	AC8. Additional mobile equipment durability testing	AC8. Additional mobile equipment durability testing
	AC9. Additional Ingress Protection Level – Semi Rugged and Rugged Devices	AC9. Additional Ingress Protection Level – Semi Rugged and Rugged Devices

TOPIC	CORE GPP CRITERIA	COMPREHENSIVE GPP CRITERIA
G. INTEROPERABILITY AND REUSABILITY OF COMPONENTS (TS)	TS23. Standardised port	TS23. Standardised port
		TS24. Standardised External Power Supply
		TS25. External Power Supply: Detachable Cables
		TS26. Backward compatibility: Adaptors
		TS27. ICT Equipment without Accessories
H. DESIGN FOR RECYCLING (TS)		TS28. Marking of plastic casings, enclosures and bezels
		AC10. Recyclability of plastic casings, enclosures and bezels - separable inserts and fasteners
		AC11. Recyclability of plastic casings, enclosures and bezels – paints and coatings
I. PACKAGING, DELIVERY AND END-OF-LIFE MANAGEMENT (TS, AC AND CPC)	TS29. Packaging	TS29. Packaging
	TS30. Secure computer collection, sanitisation, re-use and recycling	TS30. Secure computer collection, sanitisation, re-use and recycling
	AC12. Environmental impact of deliveries	AC12. Environmental impact of deliveries
	CPC4. Reporting on the end-destination of ICT Equipment	CPC4. Reporting on the end-destination of ICT Equipment
J. SUPPLY OF REFURBISHED OR REMANUFACTURED EQUIPMENT (SC, TS, AC AND CPC)	TS31. Quality assurance	TS31. Quality assurance
	TS32. Refurbished/remanufactured product warranty	TS32. Refurbished/remanufactured product warranty
	TS33 (a) Rechargeable battery endurance – new battery	TS33 (a) Rechargeable battery endurance – new battery
	TS33 (b) Rechargeable battery endurance - second hand battery	TS33 (b) Rechargeable battery endurance - second hand battery
		TS34. Minimum requirements for electrical performance
		TS35. Provision of an extended service agreement
		AC13. Further rechargeable battery endurance
		AC14 (a) Standardised External Power Supply
		AC14 (b) External Power Supply: Detachable Cables
		CPC5. Service commitments

TOPIC	CORE GPP CRITERIA	COMPREHENSIVE GPP CRITERIA
K. TRIPLE E REGISTER CRITERIA (TS)	TS35. Compliance with Triple E Register Criteria	TS35. Compliance with Triple E Register Criteria

NOTE: The SEAI Triple E Register includes criteria for Rack Mounted and Blade Servers, Enterprise Storage and Communication Equipment and Precision Cooling. The criteria for data centres in Section 2 also cover some of these products. It is recommended to use

the Triple E Register Criteria as core requirements in the case of server rooms or small-scale installations, and the data centre criteria for larger outsourced storage or service requirements.

2 DATA CENTRES AND SERVICES PROVIDED USING DATA CENTRES

TOPIC	CORE GPP CRITERIA	COMPREHENSIVE GPP CRITERIA
A. SELECTION CRITERIA (SC)	SC1. Server utilisation	
		SC2. Control of hazardous substances – restricted substance in servers, data storage and network equipment
	SC3. Cooling energy management	
B. TECHNICAL SPECIFICATIONS (TS)	TS1. Server active state efficiency	TS1. Server active state efficiency
	TS2. ICT Operating range – temperature and humidity	TS2. ICT Operating range – temperature and humidity
		TS3. Design for repair and upgrading of servers and data storage
	TS4. End-of-life management of servers, data storage and network equipment	TS4. End-of-life management of servers, data storage and network equipment
	TS5. Environmental monitoring	TS5. Environmental monitoring
	TS6. Cooling system best practices	TS6. Cooling system best practices
	TS7. Waste heat reuse readiness	TS7. Waste heat reuse
	TS8. Renewable energy factor (REF)	TS8. Renewable energy factor (REF)
		TS9. Global warming potential of refrigerants
C. AWARD CRITERIA (AC)	AC1. Server idle state power	AC1. Server idle state power
		AC2. Server deployed power demand
	AC3. Server utilisation	AC3. Server utilisation
	AC4. End-of-life management of servers	AC4. End-of-life management of servers

TOPIC	CORE GPP CRITERIA	COMPREHENSIVE GPP CRITERIA
C. AWARD CRITERIA (AC)	AC5. Power usage effectiveness (PUE) – Designed PUE	AC5. Power usage effectiveness (PUE) – Designed PUE
	AC6. PUE improvement against baseline	AC6. PUE improvement against baseline
		AC7. Cooling system energy management
		AC8. Waste heat reuse (for new data centres)
		AC9. Waste heat reuse (for managed services)
	AC10. Renewable energy factor (REF)	AC10. Renewable energy factor (REF)
	AC11. Global warming potential of refrigerants	
D. CONTRACT PERFORMANCE CLAUSES (CPC)		CPC1. Monitoring of IT energy consumption
	CPC2. Monitoring of IT equipment utilisation	CPC2. Monitoring of IT equipment utilisation
	CPC3. Reporting on the end-destination of servers, data storage and network equipment	CPC3. Reporting on the end-destination of servers, data storage and network equipment
		CPC4. Demonstration of PUE at handover
	CPC5. Monitoring of PUE input values	CPC5. Monitoring of PUE input values
		CPC6. Implementation of best practice designs
		CPC7. Monitoring of cooling system's energy consumption
		CPC8. Monitoring of heat supply and connection
	CPC9. Renewable energy factor (REF)	CPC9. Renewable energy factor (REF)
		CPC10. Global warming potential of refrigerants

3 PROVISION OF ICT SERVICES WITH REDUCED ENVIRONMENTAL IMPACT

TOPIC	CORE GPP CRITERIA	COMPREHENSIVE GPP CRITERIA
A. CAPACITY OF SERVICE PROVIDERS (SC)	SC1. Environmental Management Capacity of Service Providers	SC1. Environmental Management Capacity of Service Providers
B. PROCUREMENT OF ICT PRODUCTS (TS, AC AND CPC)	<i>Service Providers are required to apply the relevant GPP technical specifications, award criteria and contract performance clauses in the procurement of ICT products</i>	

IRISH GPP CRITERIA - HOW TO READ THE TEMPLATE

Scope	Defines the products and services to which the criteria apply.
Exclusions	Identifies any related products or services which are not covered by the criteria.
References	The primary sources consulted to develop the Irish GPP criteria.
Eco-labels	Type I eco-labels and other labels which address relevant environmental characteristics of the products or services and may be used either to define GPP criteria, verify compliance or both. Labels with equivalent criteria must also be accepted.
Legislation and Standards	Relevant EU and Irish legislation which applies within the sector and International, European or Irish standards which may be referenced in technical specifications (accompanied by the words 'or equivalent').
Notes	Practical tips and advice on applying the criteria, and explanations of the environmental impacts being addressed.
Core Criteria	Criteria which can be applied by any Irish public body and which are expected to have minimal effect on costs or verification effort.
Comprehensive criteria	Criteria which go beyond the core requirements to target enhanced environmental performance and may imply some additional costs or verification effort.
Selection criteria	Criteria which operators must meet in order to be eligible for tender submission (in a two-stage procedure) or award (in an open procedure).
Specification	Minimum requirements which all tenders must meet. Where multiple specifications are included in the criteria, these may be used together (recommended) or separately.
Specification - Variant	An optional alternative to the specification, which allows alternative solutions to be considered.
Award criteria	Criteria which target environmental performance beyond the minimum requirements of the specification. These may be qualitative or quantitative in nature and must be weighted for evaluation. It is up to the contracting authority to determine an appropriate weighting based on its priorities and the totality of criteria which it is applying in a specific tender.
Contract management	Clauses which can be inserted into contracts in order to manage environmental aspects and promote progressive improvements in delivery.

NOTE: A merged cell for core and comprehensive criteria indicates that the same criterion is applicable to both.

SCOPE, REFERENCES, LEGISLATION AND CERTIFICATIONS/LABELS

IN SCOPE	<p>These criteria relate to the purchase or lease of ICT equipment in the below categories, and to the provision of facilities or services (e.g. outsourced ICT services including cloud services (IaaS, PaaS, SaaS), data entry, web design, mobile communications contracts) which specify the use of any of these equipment items:¹</p> <p>STATIONARY ICT DEVICES</p> <ul style="list-style-type: none"> • Computers: <ul style="list-style-type: none"> • Desktop computers • All-in-one computers (or integrated desktop computers) • Desktop Thin clients • Workstations • Computer displays • ICT Equipment included in the Triple E Register: <ul style="list-style-type: none"> • Rack Mounted Servers • Enterprise Storage Equipment • Precise Cooling • Centralised Direct Current Power Distribution • Power Management • Uninterruptible Power Supply • Blade Servers • Enterprise Communication Equipment • ICT Optimisation Solutions <p>MOBILE ICT DEVICES</p> <ul style="list-style-type: none"> • Portable computers <ul style="list-style-type: none"> • Notebooks • Two-in-one notebooks • Mobile thin clients • Tablets • Smartphones
NOT IN SCOPE	<ul style="list-style-type: none"> • Supply of other types of ICT equipment not included in the above categories • Procurement of services for which, while the above equipment may be used as part of delivery of the services, it is not included in the technical specifications (e.g. legal services, consultancy or other professional services).

¹ Definitions for each of the product types are provided below.

IRISH GPP CRITERIA: ROAD TRANSPORT VEHICLES AND SERVICES

LEGISLATION AND STANDARDS	<ul style="list-style-type: none"> • <i>S.I. 151/2011 European Union (Energy Efficient Public Procurement) Regulations 2011</i> • <i>Directive 2012/27/EU on energy efficiency, as amended by Directive 2018/2002</i> • <i>Regulation (EU) 617/2013 of 26 June 2013 laying down ecodesign requirements for computers and computer servers)</i> • <i>Regulation (EU) 2019/424 of 15 March 2019 laying down ecodesign requirements for servers and data storage products</i> • <i>Regulation (EU) 2019/2021 of 1 October 2019 laying down ecodesign requirements for electronic displays</i> • <i>Regulation (EU) 2021/341 (Ecodesign Omnibus Regulation) amending various Ecodesign regulations</i> • <i>Regulation 2019/2013 on Energy Labelling of Electronic Displays as amended by Energy Label Omnibus Regulation (2021/340)</i> • <i>Regulation (EU) 2019/1782 of 1 October 2019 laying down ecodesign requirements for external power supplies</i> • <i>Directive 2011/65/EU on the restriction of certain hazardous substances in electrical and electronic equipment (RoHS)</i> • <i>Consolidated Regulation No. 1907/2006 on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)</i> • <i>Directive 2012/19/EU on waste electrical and electronic equipment (WEEE Directive)</i> • <i>Directive 2008/98/EC on waste and repealing certain directives</i>
ECO-LABELS	<ul style="list-style-type: none"> • <i>EPEAT/IEEE 1680</i> • <i>TCO Certified</i> • <i>TÜV Green Product Mark</i> • <i>Blue Angel</i> • <i>GreenScreen Certified</i> • <i>Energy Star</i> (no longer applicable to products unless they are marketed in the US or Canada. See further information on the expiry of the EU-US Agreement on EnergyStar here)
REFERENCE DOCUMENTS	<ol style="list-style-type: none"> 1. European Commission Joint Research Centre (2019) <i>Revision of the EU Green Public Procurement (GPP) Criteria for Computers and Monitors: Technical Report v 1.0: Draft criteria proposals</i> 2. European Commission Joint Research Centre (2018) <i>Technical Report on Development of EU GPP Criteria for Data Centres and Server Rooms</i> (Version 3.0) 3. Sustainable Energy Authority of Ireland, <i>Categories and Criteria for Inclusion on the Triple E Register</i> 4. European Commission (2019) GPP Training Toolkit: <i>Module 7.1 Computers and Monitors</i>

SCOPE, REFERENCES, LEGISLATION AND CERTIFICATIONS/LABELS

REFERENCE DOCUMENTS	<ol style="list-style-type: none"> 5. European Commission (2020) Life-cycle Costing for Computers and Monitors: <i>User Guide</i> and <i>Excel Tool</i> 6. EU <i>Code of Conduct for Energy Efficiency in Data Centres</i> (2020) 7. ICLEI and Electronics Watch (2020) <i>How to procure fair ICT hardware: Criteria for socially responsible procurement</i> 8. iFixit – <i>Manuals for repair of ICT devices and rating of different devices based on repairability</i>
NOTES	<p>Production, use and disposal of ICT equipment have a major effect upon the environment. In addition to the use of raw materials, many of which are non-renewable, the energy associated with the operation of IT equipment has climate change and cost implications. At the end of their life, ICT products require careful treatment in order to maximise the recovery and reuse of their components or safe disposal of those which cannot be recycled.</p> <p>In addition to applying the below core or comprehensive criteria when purchasing ICT equipment or services, public sector purchasers should consider how to manage demand for ICT in a way which is environmentally responsible. Usage requirements and the ability to turn equipment off or to power-saving mode should be considered in advance of issuing tender documents, and users consulted to ensure that the equipment purchased meets needs and will not have to be replaced or supplemented before the end of its useful life. Further information on needs assessment is available here.</p>

HOW CAN THE CRITERIA BE APPLIED AND VERIFIED?

Information about how each of the criteria can be verified is included. **The verification methods form an essential part of the criteria and must be included in tender documents to ensure that suppliers are aware of how compliance with the criteria will be assessed.** The forms of verification referred to in the criteria include:

- Provision of **test results** based on specified standards (or equivalent) – e.g. IEC 62623:2012 or equivalent for Typical Energy Consumption (E_{TEC})
- Provision of a relevant **Type 1 Ecolabel** which addresses the specific criteria, e.g. EPEAT, TCO Certified, TÜV Green Product Mark
- A valid **Energy Label** issued under the EU Energy Labelling Framework Regulation (2017/1369) (for monitors)
- **Documented internal procedures** for substance controls, supply chain management and end-of-life treatment
- For end-of-life treatment: a **permit** issued by the national competent authority in accordance with Article 23 of Directive 2008/98/EC
- **A third-party certificate of compliance** with the technical requirements of EN 50625-1 or an equivalent compliance scheme
- **Shipping information** for equipment intended for re-use, in accordance with Annex VI of WEEE Directive 2012/19/EU
- For WEEE exported to be treated outside the EU, a **third-party certificate of compliance** with the minimum WEEE requirements, or with the technical requirements of EN 50625-1 or an equivalent compliance scheme

Some simple market research in advance of tendering should be sufficient to confirm that suppliers, products and services are available which meet the criteria and verification requirements.

Further information on techniques for market engagement linked to GPP, including legal and practical considerations, is available in *Module 6 of the GPP Training Toolkit*.

KEY ENVIRONMENTAL IMPACTS – ICT PRODUCTS AND SERVICES

KEY ENVIRONMENTAL IMPACTS

ICT Products

- Climate change effects linked to energy consumption of ICT products.
- Impact on air, water, soil, biodiversity and human health of hazardous substances found in ICT products.
- Climate change effects and natural resource depletion linked to the manufacturing, delivery and disposal of new products.
- Specific environmental impact of battery production and end-of-life, including use of hazardous materials.
- Climate change effects and natural resource depletion linked to frequent replacement of mobile equipment.
- Climate change effects and natural resource depletion linked to early/ unnecessary replacement of ICT products.
- Use of fossil fuels and accumulation of plastic waste.
- End-of-life impacts including release of hazardous substances

Data Centres

- Electricity consumption of ICT in data centres (primarily servers).
- Electricity consumption of mechanical and electrical (M&E) systems controlling the internal environmental conditions of data centres.
- Direct and indirect greenhouse gas (GHG) emissions linked to data centre operations, including electricity consumption, refrigerants, manufacturing of ICT systems and unexploited potential for waste heat reuse.
- The use of high global warming potential (GWP) gases in cooling systems.



GPP APPROACH

ICT Products

- Specify ICT products which are highly energy efficient.
- Specify ICT products which are free of hazardous substances or which contains these in minimal amounts considered to be safe.
- Adopt measures to extend product lifespan including service level agreements, manufacturer's warranty, availability of spare parts and reparability of products; purchase refurbished products where possible.
- Adopt measures to improve battery endurance and electrical performance and to inform users about battery usage.
- Require testing for durability and other factors affecting product lifespan.
- Apply criteria to ensure interoperability and reusability of components.
- Encourage the use of recycled plastic in ICT equipment.
- Adopt measures to ensure that equipment can be effectively recycled or reused; require reporting on end-of-life destination.

Data Centres

- Design and construction to achieve high energy-efficiency performance, including for the M&E system.
- Require the highest possible share of renewable energy for the provision of data centre services.
- Ensure waste heat reuse, e.g. in building or district heating networks.
- Avoid use of refrigerants with high GWP, unless the use of close-to-zero GWP refrigerants is impossible due to exceptional circumstances or would reduce the energy-efficiency of the system.

Please note that the order of environmental impacts above does not necessarily correspond to their importance.

DEFINITION OF PRODUCTS INCLUDED IN THE GPP CRITERIA

- **ALL-IN-ONE COMPUTERS (OR INTEGRATED DESKTOP COMPUTERS)** means a computer in which the computer and the display function as a single unit, which receives its AC power through a single cable. Integrated desktop computers come in one of two possible forms:
 1. a product where the display and the computer are physically combined into a single unit; or
 2. a product where the display is separated from the computer but it is connected to the main chassis by a direct current (DC) power cord. An integrated desktop computer is intended to be located in a permanent location and is not designed for portability. Integrated desktop computers are not primarily designed for the display and reception of audiovisual signals.
- **DATA CENTRE** 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. This includes the following categories:
 - **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 provider (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 cohosting of multiple customers, which may take the form of a cloud application environment.
- **DESKTOP COMPUTER** means a computer where the main unit is intended to be located in a permanent location and is not designed for portability and which is designed for use with an external display and external peripherals such as a keyboard and mouse.
- **DESKTOP THIN CLIENT** means a computer that relies on a connection to remote computing resources (e.g. servers) to obtain primary functionality and has no rotational storage media integral to the product. The main unit of a desktop thin client must be intended for use in a permanent location (e.g. on a desk) and not for portability. Desktop thin clients can output information to either an external or, where included with the product, an internal display.
- **ELECTRONIC DISPLAY** means a display screen and associated electronics that, as its primary function, displays visual information from wired or wireless sources.
- **INFRASTRUCTURE AS A SERVICE (IAAS)** means a service provider offers clients pay-as-you-go access to storage, networking, servers and other computing resources in the cloud.
- **MOBILE THIN CLIENT** means a type of notebook computer that relies on a connection to remote computing resources (e.g. computer server, remote workstation) to obtain primary functionality and has no rotational storage media integral to the product.
- **NOTEBOOK COMPUTER** means a computer designed specifically for portability and to be operated for extended periods of time either with or without a direct connection to an AC power source. Notebook computers utilise an integrated display, with a viewable diagonal screen size of at least 22,86 cm (9 inches), and capable of operation on an integrated battery or other portable power source.

- **PLATFORM AS A SERVICE (PAAS)** means a service provider offers access to a cloud-based environment in which users can build and deliver applications. The provider supplies underlying infrastructure.
- **SMARTPHONE** means an electronic device used for long-range communication over a cellular network of specialized base stations known as cell sites. It must also have functionality similar to a wireless, portable computer that is primarily for battery mode usage and has a touch screen interface. Connection to mains via an external power supply is considered to be mainly for battery charging purposes and an onscreen virtual keyboard or a digital pen is in place of a physical keyboard. Screen size is generally between 3 and 6 inches.
- **SOFTWARE AS A SERVICE (SAAS)** means a service provider delivers software and applications through the internet. Users subscribe to the software and access it via the web or vendor Application Programming Interfaces (APIs).
- **TABLET COMPUTER** means a wireless, portable computer that is primarily for battery mode usage and has a touch screen interface. This means that connection to mains via an adapter is considered to be mainly for battery charging purposes and the onscreen virtual keyboard or a digital pen is in place of a physical keyboard. Devices with a visible display area of less than 100 cm² are not considered to be Tablet Computers under this specification.
- **TWO-IN-ONE NOTEBOOK** means computer which resembles a traditional notebook computer but has a detachable display which can act as an independent Slate/Tablet when disconnected.
- **VIRTUALISATION** means creation of a virtual version of physical ICT equipment or resource to offer a more efficient use of ICT hardware. This may include **consolidation** of distributed ICT and small server rooms in a more efficient data centre.
- **WORKSTATION** means a high-performance, single-user computer primarily used for graphics, Computer Aided Design, software development, financial and scientific applications among other compute intensive tasks.

DEFINITION OF PRODUCTS INCLUDED IN THE SEAI TRIPLE E REGISTER

- BLADE SERVER** means an optimised server computer of modular design for use in a shared blade chassis which can house multiple blade servers resulting in reduced space and energy usage. It will typically contain processors, memory, integrated network controllers, an optional fibre channel host bus adaptor (HBA) and other input/output (IO) ports. Blade servers can also optionally contain internal storage disks and cooling systems.
- CENTRALISED DIRECT CURRENT (DC) POWER DISTRIBUTION** means equipment that converts utility power from alternating current (AC) to direct current, with the purpose of eliminating the requirement for individual IT components to have their own AC/DC conversion transformers. Efficient Centralised DC Power Distribution equipment is seen as the initial required component of an overall advanced ICT electrical management system.
- ENTERPRISE COMMUNICATION EQUIPMENT** means equipment which enables a network of connected computers to communicate with each other. This equipment is made up of network devices which facilitate the intercommunication and resource sharing between the computers.
- ENTERPRISE STORAGE EQUIPMENT** means a storage device specifically designed to achieve very high levels of energy efficiency. A storage device is defined as an array of disks which consist of fast access iSCSI/ Fibrechannel disks and/or larger and slower SATA disks.
- ICT OPTIMISATION SOLUTIONS** means systems and/or software that improve the power efficiency of enterprise ICT hardware systems and/ or of ICT-related infrastructure resources.
- PRECISION COOLING EQUIPMENT** means equipment that is designed to efficiently and effectively remove heat from enterprise IT equipment. This includes the most efficient cooling units and ancillary items designed to provide direct cooling and aid heat removal from IT rooms and cabinets.
- POWER MANAGEMENT** means a system that provides monitoring, analysis, reporting and management tools to allow end users to manage and rationalise the power usage of IT equipment and resources with the aim of achieving optimal energy efficiency.
- RACK MOUNTED SERVER** means a server computer which is designed to provide services and manage networked resources for client devices in a highly energy efficient manner. It is designed to function as a standalone server and is configured for installation in a central framework called a rack. Rack Mounted Servers typically contain amongst others such components as processors, integrated network controllers, memory, input/output (IO) ports, storage disks and power supplies.
- UNINTERRUPTIBLE POWER SUPPLY (UPS)** means energy efficient equipment which provides uninterrupted, regulated power from a separate source when utility power fails or falls outside predetermined parameters. UPS is considered an important component of an overall advanced ICT Electrical Management system.

1. GPP CRITERIA FOR ICT PRODUCTS

SUBJECT MATTER

Supply of ICT products with reduced environmental impact

A MINIMUM ENERGY PERFORMANCE

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS1. Minimum energy performance for computers

The calculated Typical Energy Consumption (E_{TEC}) for each item of equipment delivered as part of the contract must be less than or equal to the Maximum E_{TEC} requirement set out in *Annex 1*.

Verification: Tenderers must report the Typical Energy Consumption (E_{TEC}) value, based on testing and calculations according to the IEC Standard 62623:2012. Products holding a relevant Type I Eco-label or other label fulfilling this specified requirement will be deemed to comply. In particular, holding one the following labels is considered as proof of compliance:

- Energy Star Version 7.0 or 7.1
- TCO Certified Version 8 (only if the certificate shows compliance with Energy Star 7.0 version or above)
- EPEAT 2018 for Computers [based on IEEE 1680.1 – 2018 Standard for Environmental and Social Responsibility Assessment of Computers and Displays]
- Blue Angel DE UZ-78 Version 2
- TÜV Green Product Mark 2PFG-E 2354:07.2018 for Portable Computers

As an alternative, test results obtained by test bodies accredited to ISO17025 or equivalent according to IEC 62623:2012 or equivalent, and which show compliance with the above E_{TEC} values, will be accepted.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<p>TS2. Minimum energy performance for monitors (electronic displays) <i>Note that this technical specification also applies under Section E. Where electronic displays are being purchased separately, the additional criteria in Section E should be applied.</i></p> <p>Electronic displays must be labelled in accordance with <i>Regulation (EU) 2019/2013</i> (as amended) and have a rating of A, B, C or D.</p> <p>Verification: A copy of the energy label for the proposed product(s) and Product Information Sheet showing compliance with the above requirements must be submitted with the tender.</p>	<p>TS2. Minimum energy performance for monitors (electronic displays) <i>Note that this technical specification also applies under Section E. Where electronic displays are being purchased separately, the additional criteria in Section E should be applied.</i></p> <p>Electronic displays must be labelled in accordance with <i>Regulation (EU) 2019/2013</i> (as amended) and have a rating of A, B or C.</p> <p>Verification: A copy of the energy label for the proposed product(s) and Product Information Sheet showing compliance with the above requirements must be submitted with the tender.</p>
<p>NOTE: From 1st March 2021, the scale for energy labels for electronic displays changed so that the highest possible class is A. It is expected to take some time for products in the new A class to become available. Procurers may wish to review the list of products with high energy ratings on the <i>TopTen website</i> or <i>EPREL</i> database to ensure that the class specified is suitable based on their requirements and product availability.</p>	
	<p>TS3. Thin Client devices in a server-based environment <i>This Technical Specification is appropriate for use where a Thin Client working environment applies.²</i></p> <p>The Typical Energy Consumption (E_{TEC}) for each item of equipment must be lower than the E_{TEC_MAX} for Thin Clients calculated in accordance with <i>Annex 1</i>.</p> <p>Verification: Tenderers must report the Typical Energy Consumption (E_{TEC}) value in kWh, based on testing and calculations according to the IEC Standard 62623:2012 or equivalent, and demonstrate compliance with the E_{TEC_MAX} threshold calculated as above. Products holding a relevant Type I Eco-label fulfilling this specified requirement will be deemed to comply.</p>

² Thin Client is defined as a computer that relies on a connection to remote computing resources (e.g. computer server, remote workstation) to obtain primary functionality and has no rotational storage media integral to the product.

CORE CRITERIA

COMPREHENSIVE CRITERIA

AWARD CRITERIA

AC1. Improved energy performance for computers

It is recommended to use this criterion in conjunction with TS1 for desktop computers if the products specified are for graphics intensive uses. Alternatively, a life-cycle cost award criterion could be applied following the model set out in

Marks will be awarded if the product is more energy efficient than the E_{TEC_MAX} value required under TS1. A maximum of [X] marks may be awarded. Marks will be awarded in proportion to the improvement in energy efficiency as follows:

- $\geq 60\%$ lower: X marks
- 40-59% lower: 0.75X marks
- 25-39% lower: 0.5X marks
- 15-24% lower: 0.25X marks

Verification: Tenderers must report the Typical Energy Consumption (E_{TEC}) value, based on testing and calculations according to the IEC Standard 62623:2012 or equivalent.

AC2. Improved energy performance for monitors

Marks will be awarded if the product is in an energy class higher than D. A maximum of [X] marks may be awarded. Marks will be awarded in proportion to the improvement in energy efficiency as follows:

Energy Efficiency class	Energy Efficiency Index (EEI)	Marks
A	$EEI < 0.30$	X
B	$0.30 \leq EEI < 0.40$	0.66X
C	$0.40 \leq EEI < 0.50$	0.33X

Verification: For each product type/model included in the tender, the tenderer must provide the valid Energy Label issued according to the EU's Energy Labelling framework Regulation (2017/1369).

AC2. Improved energy performance for monitors

Marks will be awarded if the product is in an energy class higher than C. A maximum of [X] marks may be awarded. Marks will be awarded in proportion to the improvement in energy efficiency as follows:

Energy Efficiency class	Energy Efficiency Index (EEI)	Marks
A	$EEI < 0.30$	X
B	$0.30 \leq EEI < 0.40$	0.5X

Verification: For each product type/model included in the tender, the tenderer must provide the valid Energy Label issued according to the EU's Energy Labelling framework Regulation (2017/1369).

B HAZARDOUS SUBSTANCES

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
	<p>TS4. Substance Controls <i>Applicable to all product categories except for refurbished/ remanufactured devices.</i></p> <p>The tenderer must demonstrate use of a framework for Restricted Substance Controls (RSC) along the supply chain for the products to be supplied.</p> <p>Product evaluations according to the RSC should, as a minimum, cover the following areas:</p> <ul style="list-style-type: none"> • product planning/design • supplier conformity • analytical testing <p>The RSC must at least outline the substances restricted under RoHS and, where relevant, under REACH (Annex XVII) and substances on the REACH Candidate List³ (see the explanatory note below). Implementation should follow the guidelines in IEC 62476 or equivalent and use the IEC 62474 material declaration database⁴ as the basis for identifying, tracking and declaring specific information about the composition of the products to be supplied. Alternatively, IPC1752 can be used to collect declarations from the supply chain.</p> <p>Supplier declarations of conformity with the RSCs must be collected and kept up to date for relevant materials, parts and sub-assemblies of the products to be supplied. These may be supported, where appropriate, by supplier audits and analytical testing.</p> <p>The RSC procedures must ensure that product and supplier compliance is re-evaluated when:</p> <ul style="list-style-type: none"> • restricted substance requirements change • supplied materials, parts and sub-assemblies change or • manufacturing and assembly operations change <p>Verification: The tenderer must provide documentation describing the system and its procedures and giving proof of its implementation.</p>

³ The REACH candidate list is available on the ECHA website [here](#).

⁴ International Electrotechnical Commission (IEC), IEC 62474: Material declaration for products of and for the electrotechnical industry, <http://std.iec.ch/iec62474>

CORE CRITERIA
COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS
EXPLANATORY NOTE: LIST OF SUBSTANCES REGULATED UNDER RoHS AND REACH

The list of restricted substances under RoHS is defined in the Annex II of the Commission Delegated Directive COMMISSION (EU) 2015/863 of 31 March 2015 amending Annex II to Directive 2011/65/EU.

Annex XVII of the Regulation (EC) 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH Regulation) contains a list of substances that shall not be manufactured, placed on the market or used unless they comply with the restriction conditions. The *list of restricted substances* is published and periodically updated on the ECHA website.

The *Candidate List of substances of very high concern* is published in accordance with Article 59(10) of the REACH Regulation and periodically updated on the ECHA website.

For substances identified as SVHCs included in the Candidate List, a particular duty to communicate the content of the substances in products applies under Article 33 of the REACH Regulation. This communication should happen throughout the supply chain without being requested. The same information must also be submitted to ECHA by all suppliers along the supply chain under Article 9(1)(i) of the Waste Framework Directive, and is available in the *Substances of Concern in Products (SCIP)* database.

TS5. Restriction of chlorinate and brominate substances in plastic parts

Applicable to all relevant product categories except refurbished/remanufactured devices.

Equipment must contain low halogenated substances in plastic parts that weigh more than 25 grams (5 grams for smartphones). Each plastic part of the device must contain less than 1000 ppm (0.1% weight by weight) of bromine and less than 1000 ppm (0.1% weight by weight) of chlorine.

Applicable exemptions are printed circuit boards, electronic components, cables and wiring insulation, fans.

Verification: The tenderer must provide either:

- Test data showing that the part contains less than 1000 ppm chlorine and less than 1000 ppm bromine (test methods used can be IEC 62321-3-1, IEC 62321-3-2 or equivalent); or
- Documentation based on IEC 62474 or equivalent (e.g. documents produced according to the Substance Control system, such as analytical testing and suppliers' conformity assessments).

Where exemptions are used, a declaration by the manufacturer must be provided.

Products holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
	<p>AC3. Restriction of Substances of Very High Concern</p> <p>[X] marks will be awarded for products for which contain no REACH Candidate List Substances of Very High Concern (SVHC) above 0.1% (weight by weight) in each of the following sub-assemblies:</p> <ul style="list-style-type: none"> • Populated motherboard (including CPU, RAM, graphics units); • Display unit (including backlighting); • Casings and bezels; • External keyboard, mouse and/or trackpad; • External AC and DC power cords (including adapters and power packs). <p>Compliance must be ensured with the latest version of the SVHC list available at the time of tendering.</p> <p>Verification: The tenderer must provide a declaration of compliance with the criterion. Documentation based on IEC 62474 or equivalent (e.g. documents produced according to a Substances Control system as analytical testing and supplier's conformity assessments) can be used. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply</p>
	<p>AC4. Avoidance of regrettable substitution</p> <p><i>This criterion is applicable to relevant products containing plasticisers and flame retardants, except for refurbished/remanufactured devices.</i></p> <p>[X] marks will be awarded if the substitution of plasticisers restricted under RoHS (restriction of hazardous substances) and halogenated flame retardants is based on methods and tools for comparative hazard assessment indicated by the European Chemicals Agency or the OECD Substitution and Alternatives Assessment Toolbox.</p> <p>This hazard assessment must apply (as a minimum) to the flame retardants and plasticisers used in plastic parts that weigh more than 25 grams.</p> <p>Verification: The alternative plasticisers and flame retardants must be indicated by name and CAS number. The tenderer must provide evidence that the selected alternative(s) have been assessed by methods or tools for comparative hazard assessment indicated by the <i>European Chemicals Agency</i> or the <i>OECD Substitution and Alternatives Assessment Toolbox</i>. Products holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>

C PRODUCT LIFESPAN EXTENSION

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS6 (a) Provision of an extended service level agreement

The tenderer must provide a minimum of two years' service coverage as detailed in the Service Level Agreement. *(See explanatory note below).*

Verification: The tenderer must provide a written declaration that the products supplied will be warrantied in conformity with the contract specifications and the related Service Level Agreement.

TS6 (a) Provision of an extended service level agreement

The tenderer must provide a minimum of [three to four years'] service coverage as detailed in the Service Level Agreement.

Verification: The tenderer must provide a written declaration that the products supplied will be warrantied in conformity with the contract specifications and the related Service Level Agreement.

EXPLANATORY NOTE:

A Service Level Agreement (SLA) describes how the service should be delivered to the customer. Examples of possible Service Level Requirements to be included are listed below:

- **Access to the Manufacturer's warranty:** register the manufacturer's warranty; manage any documentation or proof required to invoke Manufacturer Warranty; invoke the Manufacturer Warranty on behalf of the Client (during the Manufacturer Warranty's duration); follow up with the manufacturer in order to ensure that the terms of the Manufacturer Warranty are met;
- **Pick up and return:** pick-up the product(s) from a specified location at the Client's premises and return it/them to a specific location at the Client's premises.
- **Management of failures:** the provision of an efficient single point of contact for technical issues and problem escalations, a person responsible for following through the progress of the case, reporting, transparent access to a warranty database (whomever manages this warranty data) to verify warranty status, incident status for open incidents.
- **Access to diagnostic and repair tools:** access to all technical tools available to the tenderer to perform hardware diagnostics and corrections; access to any technical training required to become a certified repair technician; non-exclusivity to become a certified technical partner (perform warranty repairs).
- **Battery coverage:** the service explicitly covers battery defects for applicable products with rechargeable batteries as failure to charge or faulty battery connection. A progressive drop in battery capacity due to usage must not be considered to be a defect unless it is covered by the battery replacement policy of the bullet below.
- **Battery replacement policy:** the service covers replacing batteries not fulfilling the minimum performance conditions related to endurance in number of cycles (see TS on rechargeable batteries endurance)
- **Provision of failure statistics provision of a high level,** aggregate, anonymized and not traceable back statistics of incident types in nature and quantities, problems and diagnostics concerning the products in the scope of the contract
- **Incident management / Problem management / Preventive maintenance:** this service include all the operations necessary to maintain the ICT products in perfect working order, or to restore a defective product or one of its components to perfect working order, including incident management, problem management and preventive maintenance.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<ul style="list-style-type: none"> • Repair / Replacement activities: repair or replace any products which become damaged or defective in the course of normal use during the Extended Warranty period with products which have identical or better performance characteristics. Breakdowns related to firmware are also covered. If part of an item is replaced, the replacement part must be covered by the same Extended Warranty level and duration as the replaced part. The Extended Warranty applies to both hardware and software, unless explicitly agreed otherwise • Commitment to Repair / upgrade as first remedy in case of failures and, whenever compatible with costs and time, the service provider commits to implement a repair / upgrade of the equipment instead of an equipment substitution. 	
<p>TS6 (b) Manufacturer's warranty <i>Applicable to all categories of devices except refurbished/ remanufactured devices (refer to Section J)</i></p> <p>Products provided under the contract must be covered by a manufacturer's warranty of a minimum of two years' duration.</p> <p>Verification: The tenderer must provide written evidence of the manufacturer's warranty and confirm that this will apply under the contract.</p>	<p>TS6 (b) Manufacturer's warranty <i>Applicable to all categories of devices except refurbished/ remanufactured devices (refer to Section J)</i></p> <p>Products provided under the contract must be covered by a manufacturer's warranty of a minimum of three years' duration.</p> <p>Verification: The tenderer must provide written evidence of the manufacturer's warranty and confirm that this will apply under the contract.</p>
<p>TS7. Continued availability of spare parts <i>Applicable to all categories of devices except refurbished/ remanufactured devices. This criterion is not relevant if repair/replacement of components is covered separately by a Service Level Agreement.</i></p> <p>The tenderer must guarantee the availability of spare parts (critical components), including as a minimum those identified in criterion TS8(b), for at least <i>[5-15 years depending on expected service life of equipment]</i> from the date of purchase. All critical components identified must be:</p> <ul style="list-style-type: none"> • available to be purchased • or replaced by a service network for repair and maintenance <p>Verification: The tenderer must provide a declaration that critical components will be available and a price list. <i>[Note that costs for spare parts are included in the Life-cycle Costing tool for computers and monitors. For other products, these should also be included in LCC evaluation]</i></p>	

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<p>TS8. Design for reparability <i>Applicable to all categories of devices except refurbished/remanufactured devices.</i></p> <p>The tenderer must ensure that joining or sealing techniques for the products supplied do not prevent the repair and replacement of the parts (critical components) listed below:</p> <ul style="list-style-type: none"> • Notebooks: Battery, Display panel/Display assembly, Storage (SSD, HDD, RAM), External/internal PSU, Keyboard, System/motherboard • Desktops: CPU, GPU (PCIe), External/internal PSU, Storage (SSD, HDD, ODD, RAM), System/motherboard • All-in-one PCs: External/internal PSU, Storage (SSD, HDD, ODD, RAM), System/motherboard • Tablets: Battery, Display panel/Display assembly, External/internal PSU • Smartphones: Battery, Display panel/Display assembly, Charger • Computer displays: Connectivity cables, Power cables, External PSU <p>NOTE 1: <i>On-board soldered CPUs are excluded from the critical component list.</i></p> <p>NOTE 2: <i>A list of mandatory replaceable components for computer displays is set out in Annex II (D. Material efficiency requirements. Point 5. A) of Regulation (EU) 2019/2021.</i></p> <p>Instructions on how to replace the parts must be provided with a service/repair manual. The manual must include security measures to ensure safe repair, an exploded diagram of the device illustrating the parts that can be accessed and replaced (which could also be provided in the form of a tutorial video), and the tools required. The service/repair manual must be available online, free of charge.</p>	<p>TS8. Design for reparability <i>Applicable to all categories of devices except refurbished/remanufactured devices.</i></p> <p>The tenderer must ensure that the following parts (critical components) are easily accessible, repairable and replaceable by the use of commercially available tools (class A, B or C, as defined according to EN 45554:2020 – see the explanatory note below):</p> <ul style="list-style-type: none"> • Notebooks: Battery, Display panel/Display assembly, Storage (SSD, HDD, RAM), External/internal PSU, Keyboard, System/motherboard • Desktops: CPU, GPU (PCIe), External/internal PSU, Storage (SSD, HDD, ODD, RAM), System/motherboard • All-in-one PCs: External/internal PSU, Storage (SSD, HDD, ODD, RAM), System/motherboard • Tablets: Battery, Display panel/Display assembly, External/internal PSU • Smartphones: Battery, Display panel/Display assembly, Charger • Computer displays: Screen assembly and LED backlight, power and control circuit boards <p>NOTE 1: <i>On-board soldered CPUs are excluded from the critical component list.</i></p> <p>NOTE 2: <i>A list of mandatory replaceable components for computer displays is set out in Annex II (D. Material efficiency requirements. Point 5. A) of Regulation (EU) 2019/2021.</i></p> <p>Instructions on how to replace the parts must be provided with a service/repair manual. The manual must include security measures to ensure safe repair, an exploded diagram of the device illustrating the parts that can be accessed and replaced (which could also be provided in the form of a tutorial video), and the tools required. The service/repair manual must be available online, free of charge.</p>

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<p>TS8. Design for reparability (continued) Verification: The tenderer must provide:</p> <ul style="list-style-type: none"> • A statement that the applicable parts are replaceable by the end-user and/or a technician. • The service/repair manual with instructions on how to replace the parts through a direct link to the document on the manufacturer’s website. • Repair information according to EN 45559:2019 – Methods for providing information relating to material efficiency aspects of energy-related products.⁵ <p>Equipment holding a Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>	<p>TS8. Design for reparability (continued) Verification: The tenderer must provide:</p> <ul style="list-style-type: none"> • A statement that the applicable parts are replaceable by the end-user and/or a technician. • The service/repair manual with instructions on how to replace the parts through a direct link to the document on the manufacturer’s website. • Repair information must be provided according to EN 45559:2019 – Methods for providing information relating to material efficiency aspects of energy-related products.⁵ <p>Equipment holding a Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>
<p>EXPLANATORY NOTE:</p> <p>Classification of tools according to EN45554:2020</p> <p>According to EN 45554:2020, a part is replaceable by Class A tools if the disassembly is feasible with:</p> <ul style="list-style-type: none"> • The use of no tools; • A tool, or a set of tools, or a set of tools supplied with the product or with the spare part; • Basic tools as listed in Table A.3 of the standard: Screwdriver for slotted heads, cross recess or for hexalobular recess heads (ISO2380, ISO8764, ISO10664); Hexagon socket key (ISO2936); Combination wrench (ISO7738); Combination pliers (ISO5746); Half round nose pliers (ISO5745); Diagonal cutters (ISO5749); Multigrip pliers (multiple slip joint pliers) (ISO8976); Locking pliers; Combination pliers for wire stripping and terminal crimping; Prying lever; Tweezers; Hammer, steel head (ISO15601); Utility knife (cutter) with snap-off blades; Multimeter; Voltage tester; Soldering iron; Hot glue gun; Magnifying glass. <p>A part is replaceable by a Class B tool if the disassembly is feasible with the use of a tool, or with a product-specific tool that is listed as part of a method to assess whether a product can be repaired, upgraded and re-used (in the absence of a method defining product-specific tools, this category is void). A part is replaceable by a Class C tool if the disassembly is not feasible by the use of basic or product-specific tools as defined above, but can be carried out without the use of any proprietary tools.</p>	

⁵ According to EN 45559:2019, for end-users, the information to be provided shall be simple, clear and intuitive, easily accessed, visible and readable, and shall be provided in the official languages where the product is sold. Where possible, symbols may replace or support the use of long or complex texts. The communication method should be assessed (if possible) prior to applying it to end-users, and the findings of any existing studies in this area taken into account.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
	<p>TS9. Secure data deletion <i>Applicable to all categories of devices except monitors and refurbished/remanufactured devices.</i></p> <p>Functionality for secure data deletion must be made available for the deletion of user data contained in all data storage devices of the product (see the explanatory note below). Instructions on how to use this functionality, the techniques used and the secure data deletion standard(s) it supports must be provided in the user manual and/or by a web link to the manufacturer’s webpage.</p> <p>Verification: The tenderer must provide specifications for the data erasure functionality provided with the product. A relevant reference for compliance can be the <i>NIST 800-88 Revision 1</i> guidelines, for the level of ‘Clear’, or equivalent.</p> <p>Equipment holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.⁶</p>
<p>EXPLANATORY NOTE:</p> <p>Secure data deletion may be implemented by means of technical solutions such as, but not limited to:</p> <ul style="list-style-type: none"> • Functionality implemented in firmware, typically in the Basic Input/Output System (BIOS) • Functionality implemented in the software included in a self-contained bootable environment provided in a bootable compact disc • Digital versatile disc or universal serial bus memory storage device included with the product, or in software installable in the supported operating systems provided with the product 	

⁶ For example, the TCO certified label fulfils this requirement.

CORE CRITERIA
COMPREHENSIVE CRITERIA
CONTRACT PERFORMANCE CLAUSE
CPC1. Service Level Agreement Reporting *To be used in conjunction with the TS on Service Level Agreement*

The tenderer must provide periodic [monthly / annual] reports on its compliance with all the metrics, Key Performance Indicators and other indicators defined in the Service Level Agreement.

EXPLANATORY NOTE:

Examples of KPIs:

- **Aggregate KPI 1** – Incident solved: number of incidents resolved within the incident resolution time during a month / total number of incidents opened during the given month or opened during a previous month and still pending. Monthly target: $\geq 90\%$.
- **Aggregate KPI 2** – Commitment to repair as first remedy: number of incidents resolved by product repair or upgrade / number of incidents resolved by product replacement. Annual target: $\geq 90\%$

D RECHARGEABLE BATTERY LIFE AND PERFORMANCE

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<p>TS10. Rechargeable battery endurance <i>Applicable to portable devices (portable computers, tablets and smartphones). For refurbished/remanufactured devices, see Section J.</i></p> <p>The tested State of Health of the battery after 300 cycles⁷ must be ≥80%.</p> <p>Tests must be carried out according to the standard IEC EN 61960-3:2017 or equivalent. See the explanatory note below for the definitions.</p> <p>Verification: Tenderers must provide test results obtained by accredited ISO17025 test bodies according to the IEC EN 61960-3:2017 standard or equivalent.</p> <p>Products holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>	<p>TS10. Rechargeable battery endurance <i>Applicable to portable devices (portable computers, tablets and smartphones). For refurbished/remanufactured devices, see Section J.</i></p> <p>The tested State of Health of the battery must be:</p> <ul style="list-style-type: none"> • ≥90% after 300 cycles, or • ≥80% after 500 cycles. <p>Tests must be carried out according to the standard IEC EN 61960-3:2017 or equivalent. See the explanatory note below for the definitions.</p> <p>Verification: Tenderers must provide test results obtained by accredited ISO17025 test bodies according to the IEC EN 61960-3:2017 standard or equivalent.</p> <p>Products holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>
<p>EXPLANATORY NOTE: DEFINITION OF STATE OF HEALTH (SOH) State of Health: Current full charge capacity (in mAh) expressed as a percentage of the design capacity (rated capacity).</p>	
	<p>TS11. Minimum requirements for electrical performance <i>Applicable to portable devices (portable computers, tablets and smartphones). For refurbished/remanufactured devices, see Section J.</i></p> <p>The battery must be compliant with the electrical test acceptance criteria according to standard IEC EN 61960-3:2017 or equivalent (see <i>Annex 2</i>).</p> <p>Verification: Tenderers must provide test results obtained by test bodies accredited under ISO17025 or equivalent.</p>

⁷ The testing threshold of 300 cycles does not represent the expected endurance, but is a proxy for much longer endurance (e.g. >500 cycles).

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<p>TS12. Information on battery state of health <i>Applicable to portable devices (portable computers, tablets and smartphones). For refurbished/remanufactured devices, see Section J.</i></p> <p>The tenderer must provide the equipment with pre-installed software to determine and monitor the status of the battery/accumulator and allow for the reading of the battery or accumulator's 'state of health' and 'state of charge', as well as the number of 'full charge cycles' already performed from the battery/accumulator and to display these data for the user. See the explanatory note below for the definitions.</p> <p>The software must also provide tips for users to maximise battery lifespan.</p> <p>Verification: The tenderer must provide the specifications and version of the software.</p> <p>Equipment holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>	
<p>EXPLANATORY NOTE: DEFINITION OF CHARGE CYCLE, STATE OF CHARGE (SoC) AND STATE OF HEALTH (SoH)</p> <ul style="list-style-type: none"> • Charge Cycle: One charge cycle is completed when the battery is fully charged from 0% up to 100% and then discharged back down to 0%. This could be performed by partially charging-discharging the battery multiple times on different SoC levels as long as the total amount of charge-discharge percentage is approximately equal to the nominal capacity. • State of Charge: The remaining battery capacity expressed as a percentage of full charge capacity (SBS-IF, 1998). • State of Health: Current full charge capacity (in mAh) expressed as a percentage of the design capacity (rated capacity). 	
<p>TS13. Battery protection software <i>Applicable to portable computers.</i></p> <p>Equipment must be provided with pre-installed software to enable a limit on the battery State of Charge (SoC) when the computer is used systematically in grid operation (e.g. to a value $\leq 80\%$ SoC).</p> <p>Verification: The tenderer must provide a written declaration that the products supplied have pre-installed software with the requested features. The specifications and version of the software must also be provided.</p> <p>Equipment holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>	

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
	<p>TS14. Intelligent Charging <i>Applicable to tablets and smartphones.</i></p> <p>Equipment must be provided with a pre-installed battery management system that includes intelligent charging software able to identify the user's regular charging habits/pattern, stop the charging process before it reaches 100% (e.g. at 80%), and fully charge the device only when needed by the user.</p> <p>Verification: The tenderer must provide a written declaration that the products supplied have pre-installed software with the requested features. The specifications and version of the software must also be provided.</p> <p>Equipment holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>
AWARD CRITERIA	
	<p>AC5. Further rechargeable battery endurance <i>Applicable to portable devices (portable computers, tablets and smartphones). For refurbished/remanufactured devices, see Section J.</i></p> <p>Up to [X] marks will be awarded if the battery endurance is greater than 500 cycles (with ≥80% capacity retention of the initial rated capacity). The product offering the highest number of additional cycles will receive maximum marks, with all other bids being marked proportionally.</p> <p>Verification: Tests must be carried out according to the standard IEC EN 61960-3:2017 or equivalent. Tenderers must provide test results obtained by test bodies accredited under ISO17025 or equivalent.</p>

E ELECTRONIC DISPLAYS

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS15. Ecodesign and applicable standards

Electronic displays must comply with the ecodesign requirements set out in *Regulation (EU) 2019/2021*⁸ (as amended). This includes compliance with *Directive 2011/65/EU on the restriction of certain hazardous substances in electrical and electronic equipment* (RoHS) and *Directive 2012/19/EU on waste electrical and electronic equipment* (WEEE Directive).

Verification: Tenderers must provide the product Declaration of Conformity confirming that the above requirements are met.

TS16. Energy Label

Electronic displays must be labelled in accordance with *Regulation (EU) 2019/2013* (as amended) and have a rating of A, B, C or D.

Verification: A copy of the energy label for the proposed product(s) and Product Information Sheet showing compliance with the above requirements must be submitted with the tender.

TS16. Energy Label

Electronic displays must be labelled in accordance with *Regulation (EU) 2019/2013* (as amended) and have a rating of A, B or C.

Verification: A copy of the energy label for the proposed product(s) and Product Information Sheet showing compliance with the above requirements must be submitted with the tender.

NOTE:

From 1st March 2021, the scale for energy labels for electronic displays changed so that the highest possible class is A. It is expected to take some time for products in the new A class to become available. Procurers may wish to review the list of products with high energy ratings on the *Topten website* or *EPREL* database to ensure that the class specified is suitable based on their requirements and product availability.

⁸ Regulation 2019/2021 repeals and replaces Regulation 642/2009 with effect from 1 March 2021. It sets requirements regarding design for repair and reuse, including minimum periods during which spare parts must be available from the manufacturer. It has been amended by Regulation 2021/341 (Ecodesign Omnibus Regulation),

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<p>TS17. Product longevity and warranty</p> <p><i>This criterion may be suitable in contracts where an extended SLA is not being purchased, so TS 6 (a) is not applied. Note that the availability of spare parts is regulated under the Ecodesign Regulation 2019/2021.</i></p> <p>Repair or replacement of the electronic display and each of its components must be covered by the warranty terms for a minimum of two years from the date of commissioning. The tenderer must confirm that genuine or equivalent spare parts will be available for at least ten years from the date of purchase. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative equipment where required.</p> <p>Verification: Tenderers must provide a copy of the warranty terms which includes the above requirements.</p>	<p>TS17. Product longevity and warranty</p> <p><i>This criterion may be suitable in contracts where an extended SLA is not being purchased, so TS 6 (a) is not applied. Note that the availability of spare parts is regulated under the Ecodesign Regulation 2019/2021.</i></p> <p>Repair or replacement of the electronic display and each of its components must be covered by the warranty terms for a minimum of three years from the date of commissioning. The tenderer must confirm that genuine or equivalent spare parts will be available for at least ten years from the date of purchase. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative equipment where required.</p> <p>Verification: Tenderers must provide a copy of the warranty terms which includes the above requirements.</p>
<p>TS18. Installation instructions and user information</p> <p>The equipment must be supplied with installation instructions and user information in printed (on the packaging and/or on documentation accompanying the product) and electronic format, which include the following:</p> <ol style="list-style-type: none"> a. Full installation instructions, including: <ol style="list-style-type: none"> i. instructions specifying that the equipment shall be installed by fully trained fitters; ii. any specific precautions that shall be taken when the equipment is assembled or installed; iii. instructions specifying how the control settings of the equipment shall be adjusted properly after installation; iv. information on who the fitter can approach for guidance on installation; b. Operating instructions for service personnel; c. User information, including: <ol style="list-style-type: none"> i. references to competent installers and service personnel; ii. recommendations on the proper use and maintenance of the equipment; iii. advice on how users can minimise the environmental impact of the equipment, in particular information on use to minimise energy consumption; iv. if applicable, information on how diagnostic results should be interpreted and how they can be improved; v. information about which spare parts can be replaced; d. Recommendations on appropriate disposal at the product's end-of-life. <p>Verification: A copy of the installation instructions and user information which will be supplied with the equipment must be provided in electronic format as part of the tender.</p>	

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS19. **End-of-life service**

Tenderers must provide a service for the re-use and recycling of the whole product or of components requiring selective treatment in accordance with Annex VII of the WEEE Directive for equipment that has reached the end of its service life. The service must comprise the following activities:

- Collection (take back system);
- Functional testing, servicing, repair and upgrading to prepare products or components for re-use;
- Dismantling for component re-use, recycling and/or disposal.

In providing the service, the contractor must report on the proportion of equipment prepared or remarketed 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 [see note].

Verification: The tenderer must provide details of the arrangements for collection, preparation for re-use, and recycling/disposal. This must include valid proof of compliance for the WEEE handling facilities to be used.

AWARD CRITERIA

AC6. **Life-cycle costs**

This criterion is suitable for use for electronic displays or other items of ICT equipment. It allows the contracting authority to capture the true cost of ownership based on purchase price, energy consumption, time to replacement and end-of-life costs. The European Commission LCC tools also allow a cost to be assigned to carbon emissions linked to the products. Alternatively, an award criterion such as AC2 could be applied.

The cost of each valid and responsive tender will be evaluated on the basis of total life-cycle costs (LCC). Tenderers are required to complete the spreadsheet included in the tender documents with the requested data regarding their products. This information will be used to calculate LCC and the tender with the lowest life-cycle cost will be awarded [X] marks, with other tenders being scored according to the following formula:

$$\text{Score Tender A} = [X] * \frac{\text{Lowest LCC}}{\text{LCC}_{\text{TENDER A}}}$$

Verification: The completed spreadsheet must be submitted with the tender and where indicated, supporting documentation verifying the data must be provided. The data entered in the spreadsheet will become binding under the contract with the successful tenderer.

CORE CRITERIA
COMPREHENSIVE CRITERIA
AWARD CRITERIA
NOTE:

*Contracting authorities may choose to evaluate LCC using an existing template such as the **European Commission LCC Tools**, or based on their own bespoke template. In either case, certain information such as the evaluation period, energy costs and cost of maintenance/replacement (if not included in the tender) will need to be completed by the contracting authority. See **Section 4** for further information.*

AC7. Additional warranty

Up to [X] marks will be awarded to tenders offering a product warranty in excess of the minimum period required under TS17. Full marks will be awarded to the tender offering the longest warranty period, with other offers being scored proportionately.

Verification: Tenderers must provide a copy of the warranty terms offered for the product. Where the extended warranty has an additional cost this must be clearly indicated within the pricing schedule.

CONTRACT PERFORMANCE CLAUSES
CPC2. Environmental performance

This clause should be adapted to the specific nature of the contract and the scope of any maintenance/repair/warranty commitments. It is important that it includes a specific requirement to test environmental performance at regular intervals and assigns responsibility for this activity.

The contractor is responsible for ensuring that the levels of environmental performance, including energy efficiency, indicated in its tender are met both at the point of installation/commissioning and during the *[entire operating lifetime of the appliance]/ [warranty period]*. Where this is dependent upon specific usage instructions and maintenance activities these must have been clearly highlighted in the tender. Regular inspections and testing of the equipment to ensure compliance will be carried out *[specify the schedule for these and whether the contractor is responsible for the cost]*.

Where the inspections or tests indicate that the designated levels of environmental performance are not being achieved, the contractor is responsible for *[repairing and/or replacing the equipment and any components]/[the costs of such work carried out by the contracting authority's nominated agent]*. The maximum time period for remedying any default in environmental performance shall be *[14 working days]* from the date on which the fault is identified. Where required by the contracting authority, the contractor must provide suitable alternative equipment during the repair period.

CORE CRITERIA

COMPREHENSIVE CRITERIA

CONTRACT PERFORMANCE CLAUSES

CPC3. Reporting on the end-destination of equipment

To be applied in conjunction with TS19.

The contractor must provide a report on the status of the equipment 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 will be accepted:

- A permit issued by the national competent authority in accordance with Article 23 of Directive 2008/98/EC, or
- A third-party certificate 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:

- Shipping information for equipment intended for re-use, in accordance with Annex VI of WEEE Directive 2012/19/EU.

For WEEE exported to be treated outside the EU, a third-party certificate of compliance with the minimum WEEE requirements, or with the technical requirements of EN 50625-1 or an equivalent compliance scheme⁹ must be provided.

⁹ 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'

F MOBILE EQUIPMENT DURABILITY TESTING

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS20. Drop testing

Applicable to portable devices (portable computers, tablets and smartphones).

The equipment must be tested according to the following standards (or equivalent):

- IEC 60068 Part 2-31: Ec (Freefall, procedure 1), or
- MIL-STD-810H - Method 516.8 – Shock (Procedure IV) with a drop height of 45 cm.

The functional performance requirements in **Annex 3** of this document must be met by the equipment after exposure to the drop test.

Alternatively, the device must be provided with cover and protection cases tested for, or designed according to, a robustness standard such as US MIL-STD-810 or equivalent test procedures.

Verification: The tenderer must provide test reports showing that the model has been tested and met the functional performance requirements for durability. Testing must be carried out by a test facility accredited to ISO 17025 or equivalent.

Existing tests for the product, carried out to the same or a stricter specification, will be accepted without the need to retest.

Equipment holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.

NOTE: Tests carried out according to the corresponding method in the previous version of the Military Standard 'MIL-STD-810G' can be accepted until the end of 2021 (see **Annex 3** for details).

TS21. Temperature Stress

Applicable to portable devices (portable computers, tablets and smartphones).

The equipment must be tested according to the following standards:

- IEC 60068 Part 2-1: A Cold Part 2-2: B Dry Heat, or
- MIL-STD-810H Method 501.7 - High temperature - Basic Hot (A2) and Method 502.7 - Low temperature - Basic Cold (C1),

with the modified storage/operational temperatures described in **Annex 3**.

The functional performance requirements set out in **Annex 3** of this document must be met by the equipment after exposure to the temperature stress tests.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
	<p>NOTE: Tests carried out according to the corresponding method in the previous version of the Military Standard 'MIL-STD-810G' can be accepted until the end of 2021 (see <i>Annex 3</i> for details).</p>
	<p>TS22. Ingress protection level – rugged and semi-rugged equipment <i>Applicable to portable devices (portable computers, tablets and smartphones). To be included where the expected use is for outdoor working activities or other harsh usage environments and conditions.</i></p> <p>The equipment delivered as part of the contract must have passed durability tests carried out according to:</p> <ul style="list-style-type: none"> • IEC/EN 60529:2013, Degrees of Protection Provided by Enclosures (IP Code), or • MIL-STD-810H 510.7 – Procedure I - Sand and Dust – Blowing Dust and MIL-STD-810H 506.6 – Procedure I Rain. <p>The functional performance requirements set out in <i>Annex 3</i> must be met by the equipment after exposure to the temperature stress tests.</p> <p>The degree of protection provided by enclosures must be classified as level IP54 or higher.</p> <p>Verification: The tenderer must provide test reports showing that the model has been tested and has met the functional performance requirements for ingress protection level. Testing must be carried out by a test facility accredited to ISO 17025 or equivalent. Existing tests for the product, carried out to the same or a stricter specification, will be accepted without the need to retest. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p> <p>NOTE: Tests carried out according to the corresponding method in the previous version of the Military Standard 'MIL-STD-810G' can be accepted until the end of 2021 (see <i>Annex 3</i> for details).</p>

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

EXPLANATORY NOTE: DEGREE OF PROTECTION UNDER IEC/EN 60529:2013 :

The degree of protection against solid foreign objects is indicated by the first characteristic numeral:

- **IP5x** - Ingress of dust is not totally prevented, but dust must not penetrate in a quantity to interfere with satisfactory operation of the apparatus or to impair safety
- **IP6x** - No ingress of dust; complete protection against contact
- The degree of protection against water is indicated by the second characteristic numeral:
- **IPx4** - Water splashed against the enclosure from any direction must have no harmful effects.
- **IPx5** - Water projected in jets against the enclosure from any direction must have no harmful effects
- **IPx6** - Water projected in powerful jets against the enclosure from any direction with no harmful effects
- **IPx7** - Ingress of water in quantities causing harmful effects must not be possible when the enclosure is temporarily immersed in water under standardised conditions of pressure and time
- **IPx8** - Ingress of water in quantities causing harmful effects must not be possible when the enclosure is continuously immersed in water under conditions which must be agreed between the manufacturer and user, but which are more severe than for numeral 7.

CORE CRITERIA

COMPREHENSIVE CRITERIA

AWARD CRITERIA

AC8. Additional mobile equipment durability testing

Applicable to portable devices (portable computers, tablets and smartphones). The contracting authority should choose the additional tests which are relevant for the intended usage of the device.

Marks will be awarded for offers including products that have passed durability tests carried out according to IEC 60068, US MIL810G or equivalent. Marks may be awarded as follows:

- Resistance to shock ([X] marks)
- Resistance to vibration ([X] marks)
- Screen resilience ([X] marks)

Functional performance requirements and test specifications are provided in Annex 3.

Verification: Tenderers must provide test reports showing that the model has been tested and has met the functional performance requirements for durability. Testing must be carried out by a test facility accredited according to ISO 17025 or equivalent. Existing tests for the product, carried out to the same or a stricter specification, will be accepted without the need to retest. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.

AC9. Additional Ingress Protection – Semi Rugged and Rugged Devices

May be included if the expected use is for outdoor working activities or other harsh usage environments and conditions.

Marks will be awarded for products which meet the following IP Protection Levels according to the IEC/EN 60529:2013. A maximum of [X] marks may be awarded as follows:

- IP65 – 0.25X marks
- IP66 – 0.5X marks
- IP67 – 0.75X marks
- IP68 – X marks

Verification: Tenderers must provide test reports showing that the model has been tested and has met the functional performance requirements for ingress protection level. Testing must be carried out by a test facility accredited according to ISO 17025 or equivalent. Existing tests for the product, carried out to the same or a stricter specification, will be accepted without the need to retest. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.

G INTEROPERABILITY AND REUSABILITY OF COMPONENTS

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<p>TS23. Standardised port <i>Applicable to all devices except computer displays and refurbished/remanufactured devices.</i> The equipment delivered as part of the contract must carry at least one standardised USB Type-C or equivalent receptacle (port) for data exchange that is backward compatible with USB 2.0 according to the standard IEC 62680-1-3:2018 or equivalent. If the product does not have a built-in USB Type-C receptacle, then an adapter must be available to be ordered at no additional cost. Verification: The tenderer must provide a product manual for each model provided, which must include an exploded diagram of the device illustrating the types of connectors used. Equipment holding a Type I Eco-label fulfilling the specified requirement will be deemed to comply.¹⁰</p>	
<p>EXPLANATORY NOTE: STANDARDISED USB TYPE-C The USB Type-C receptacle is defined according to the standard IEC 62680-1-3:2018 - Universal serial bus interfaces for data and power - Part 1-3: Common components - USB Type-C Cable and Connector Specification.</p>	
	<p>TS24. Temperature Stress <i>Applicable to portable computing devices with power supplies up to 100 W. For refurbished/remanufactured devices, see criterion AC13.</i> <i>This is not applicable to products with Qi (wireless) charging capability (e.g. for strong resistance to immersion in water or to dust, such as industrial computers).</i> Equipment must carry a USB Type C standardised receptacle or equivalent for USB power delivery (PD) according to the standard EN/IEC 63002:2017 or equivalent. If the product does not have a built-in USB PD receptacle, then an adapter must be made available at no additional cost. Verification: The tenderer must provide a product manual for each model provided, which must include an exploded diagram of the device illustrating the types of EPS used.</p>
<p>EXPLANATORY NOTE: STANDARDISED EXTERNAL POWER SUPPLY Interoperability guidelines for external power supplies are defined according to the standard IEC 63002:2016 - Identification and communication interoperability method for external power supplies used with portable computing devices.</p>	

¹⁰ For example, the TCO Certified 8 label ensures the use of at list one USB Type-C connector.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
	<p>TS25. External Power Supply: Detachable Cables</p> <p>The External Power Supply (EPS) configuration must consist of an EPS with a detachable input cable (or integrated in the EPS housing) and a detachable output cable to the ICT device.</p> <p>Verification: Tenderers must provide a product manual for each model provided, which must include an exploded diagram of the device illustrating the types of EPS used.</p>
	<p>TS25. External Power Supply: Detachable Cables</p> <p>The following adaptors [to be selected from the list below] must be available to be separately procured:</p> <ul style="list-style-type: none"> • USB-C to USB Type-A receptacle • USB-C to VGA • USB-C to HDMI • USB-C to RJ45 (Ethernet Port) <p>Verification: The tenderer must provide product specifications and a price list for the adaptors required.¹¹</p>
	<p>TS27. ICT Equipment without Accessories</p> <p><i>Applicable in the context of a Framework Agreement</i></p> <p>The equipment model must be available in a version without the following accessories [to be specified]:</p> <ul style="list-style-type: none"> • External Power Supply. (EPS) • Cables • Headphones <p>These accessories must be available to be procured separately.</p> <p>Verification: The tenderer must provide a price for each model with and without these accessories, and a separate price for each of the accessories.¹²</p>

¹¹ The cost of the relevant adaptors should be included in the Life-cycle Costing evaluation spreadsheet (See Section 4)

¹² The cost of the relevant accessories should be included in the Life-cycle Costing evaluation spreadsheet (See Section 3)

H DESIGN FOR RECYCLING

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
	<p>TS28. Marking of plastic casings, enclosures and bezels</p> <p>External plastic casings, enclosures and bezels with a weight greater than 25 grams must be marked in accordance with ISO 11469 and ISO 1043-1 or equivalent. Plastic parts are exempted from marking in the circumstances described by the explanatory note below.</p> <p>Verification: Tenderers must identify the plastic parts by their weight, their polymer composition, and their ISO 11469 and ISO 1043-1 markings. The dimension and position of the marking must be visually illustrated. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.¹³</p>
<p>EXPLANATORY NOTE:</p> <p>Plastic components are exempt from marking requirements in the following circumstances:</p> <ul style="list-style-type: none"> i. the marking is not possible because of the shape or size; ii. the marking would impact on the performance or functionality of the plastic component; and iii. marking is technically not possible because of the molding method. <p>For the following plastic components no marking is required:</p> <ul style="list-style-type: none"> i. packaging, tape, labels and stretch wraps; ii. wiring, cables and connectors, rubber parts and any component without sufficient surface area for the marking to be of a legible size; iii. PCB assemblies, PMMA boards, optical components, electrostatic discharge components, electromagnetic interference components, speakers; iv. transparent parts where the marking would obstruct the function of the part in question. 	

¹³ Relevant Ecolabels include EPEAT/IEEE, TCO Certified, TÜV Green Product Mark and Blue Angel.

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
	<p>AC10. Recyclability of plastic casings, enclosures and bezels - separable inserts and fasteners <i>Applicable to stationary computers and computer displays.</i></p> <p>[X] marks will be awarded if all discrete plastic parts >25 grams do not contain a metal insert or fastener that is moulded-in, inserted by heat or ultrasonically, or glued-in, unless the metal component is either separable by breaking it off from the plastic part or is separable by using commonly available tools. Fan impellers are excluded from this requirement.</p> <p>Verification:</p> <p>The tenderer must provide either:</p> <ol style="list-style-type: none"> 1. documentation showing that the product does not contain a metal insert or fastener that is moulded-in, inserted by heat or ultrasonically, or glued-in; or 2. where metal inserts or fasteners are moulded, inserted by heat or ultrasonically, or glued into plastic parts, documentation showing how it is separable by way of breaking it off from the plastic part or by using commonly available tools. <p>Equipment holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>
	<p>AC11. Recyclability of plastic casings, enclosures and bezels – paints and coatings <i>Applicable to stationary computers and computer displays.</i></p> <p>Additional points will be awarded if the presence of paints and coatings in the plastic components of the devices does not have a significant impact on the resilience of plastic recyclate produced from these components upon recycling and when tested according to ISO 180 or equivalent (see the explanatory note below).</p> <p>Discrete plastic parts >25 grams must not have an adhesive, coating, paint or finish that is incompatible with recycling.</p>

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
	<p>AC11. Recyclability of plastic casings, enclosures and bezels – paints and coatings (continued)</p> <p>The following are excluded from this requirement:</p> <ul style="list-style-type: none"> • printed circuit board assemblies and fan impellers; • wires and cables, connectors, electronic components, optical components, acoustic components, ESD components and EMI components; • metal inserts/fasteners required for safety, legal or technical requirements. <p>Verification: The compatibility of a surface coating(s) (adhesives, coatings, paints, or finishes) with recycling must be demonstrated through either:</p> <ol style="list-style-type: none"> 1. test results showing that the surface coating(s) do not lead to more than a 25% reduction in the notched Izod or Charpy impact at room temperature, as measured using ASTM D256, ASTM E23, ISO 180, or ISO 179-1; one test result can be representative for multiple parts in the event that the same material is used in the parts and that the worst-case application is tested; <p style="text-align: center;">or</p> <ol style="list-style-type: none"> 2. a statement from a minimum of three plastics recyclers individually, or at least one plastics recycler processing plastics from electronics and working under an independent entity (e.g. not contracted/associated with the manufacturer or contracted with a trade organisation), confirming these surface coatings do not negatively impact the recyclability of the plastic; or 3. test results from an independent laboratory. <p>Equipment holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>
<p>EXPLANATORY NOTE: IMPACT ON THE RESILIENCE OF PLASTIC RECYCLATE</p> <p>For the purposes of this criterion, a significant impact is defined as a >25% reduction in the notched Izod impact of a recycled resin as measured using ISO 180:2019 Plastics - Determination of Izod impact strength.</p>	

PACKAGING, DELIVERY AND END-OF-LIFE MANAGEMENT

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS29. **Packaging**

Equipment must be packaged and delivered in a manner which minimises the environmental impact of these activities, specifically:

- Packaging must not exceed the volume required to ensure safe transport of equipment;
- Packaging must be recyclable and/or reusable unless special considerations prevent this;
- All producers must comply with the obligations set out in the European Union (Packaging) Regulations 2014 (*S.I. 282 of 2014*), including where applicable the specific obligations on major producers regarding facilities and collection arrangements for recycling packaging;

Verification: Tenderers must declare the type and volume of packaging that will be used to fulfil orders, its ability to be recycled or reused, and the specific measures in place to meet obligations under the European Union (Packaging) Regulations 2014. Where packaging is not recyclable/reusable, the justification for using this type of packaging must be detailed.

TS30. **Secure computer collection, sanitisation, re-use and recycling**

Tenderers must provide a service for the re-use and recycling of the whole product or of components requiring selective treatment in accordance with Annex VII of the WEEE Directive for equipment that has reached the end of its service life. The service must comprise the following activities:

- Collection (take back system);
- Confidential handling and secure data erasure¹⁴;
- Functional testing, servicing, repair and upgrading to prepare products for re-use;
- Remarketing of products for re-use;
- Dismantling for component re-use, recycling and/or disposal.

In providing the service, the contractor must report on the proportion of equipment prepared or remarketed 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 [see note].

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 for the WEEE handling facilities to be used.

¹⁴ Not relevant if this activity is carried out by the contracting authority.

CORE CRITERIA	COMPREHENSIVE CRITERIA
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TECHNICAL SPECIFICATIONS	
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EXPLANATORY NOTE:

The following components require selective treatment in accordance with Annex VII of the WEEE Directive:

- Components containing mercury
- Batteries
- Printed circuit boards greater than 10 cm²
- Plastic containing brominated flame retardants
- Chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons (HFC), hydrocarbons (HC)
- External electric cables
- Capacitors containing polychlorinated biphenyls (PCB)
- 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, which must be treated in accordance with Regulation (EC) No 1005/2009.

AWARD CRITERIA	
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AC11. Environmental impact of deliveries

Tenderers must describe the steps which they will take to limit the environmental impact of deliveries under the contract, which may include:

- Additional measures to reduce the environmental impact of packaging beyond the requirements set out in TS29, for example the use of packaging made from recycled/renewable/lower impact materials and measures to reduce and reuse packaging which will be applied to this contract;
- Measures to reduce the environmental impact of deliveries through consolidation, route planning and logistics which will be applied to this contract;
- Use of low or zero-emission vehicles for transportation and deliveries under this contract.

Verification: Tenderers must describe the specific measures which will be taken to reduce the environmental impact of deliveries under the contract while still meeting all specified requirements. These measures, if accepted by the contracting authority, will form part of the contractual terms.

CORE CRITERIA
COMPREHENSIVE CRITERIA
CONTRACT PERFORMANCE CLAUSE
CPC4. Reporting on the end-destination of ICT Equipment

The contractor must provide a report on the status of the equipment 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 will be accepted:

- A permit issued by the national competent authority in accordance with Article 23 of Directive 2008/98/EC, or
- A third-party certificate 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:

- Shipping information for equipment intended for re-use, in accordance with Annex VI of WEEE Directive 2012/19/EU.

For WEEE exported to be treated outside the EU, a third-party certificate of compliance with the minimum WEEE requirements, or with the technical requirements of EN 50625-1 or an equivalent compliance scheme¹⁵ must be provided.

¹⁵ 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'

J SUPPLY OF REFURBISHED/REMANUFACTURED ICT EQUIPMENT

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

Depending on the procurement route chosen, this requirement may also be formulated as a selection criterion. The capacity of providers to supply refurbished/remanufactured ICT equipment should be evaluated at the pre-procurement stage through market engagement activities (see EPA Guide). One approach is to include a lot dedicated to the supply of refurbished/remanufactured equipment as part of a larger contract or framework.

TS31. **Quality assurance**

The contractor must implement quality assurance/quality control procedures to ensure minimum quality of the equipment delivered as part of the contract (see the explanatory note below). Quality assurance and control procedures must cover, as a minimum, the following steps:

- Inspection
- Reprocessing (e.g. repair, replace or upgrade) if needed
- Cleaning
- Testing
- Storage
- Packaging and Transport

Verification: The tenderer must provide details of the quality assurance/quality control procedures established to ensure the quality of the equipment delivered as part of the contract. Third-party certified management systems for refurbishment/remanufacturing according to the following standards (or equivalent) can be accepted as proof of compliance:

- Quality and environmental management systems according to ISO 9001 and ISO 14001/EMAS, including quality assurance/quality control procedures for the steps mentioned above.
- BS 8887-220:2010 - Design for manufacture, assembly, disassembly and end-of-life processing (MADE). The process of remanufacture. Specification (applicable to remanufacture processes).
- BS8887-240:2011 - Design for manufacture, assembly, disassembly and end-of-life processing (MADE). Reconditioning (applicable to refurbished/reconditioned equipment).
- EN50614:2020 in case the equipment was previously discarded as WEEE, and prepared for re-use for the same purpose for which it was conceived.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<p>EXPLANATORY NOTE: QUALITY ASSURANCE LEVELS</p> <p>The contracting authority should establish minimum quality requirements as per the examples below:</p> <ul style="list-style-type: none"> • Aesthetic grade: no sign of aesthetic damage should be visible to more than 20 cm. • Original factory settings: the products must be restored to their original factory settings and must be fully unlocked for use. • Products must be upgradeable to the latest firmware supported by the OEM (where applicable and technically feasible). • An instruction manual must be provided. In the absence of physical instruction manuals, a link or reference to the manufacturer's instruction manual should be included, when possible. 	
<p>TS32. Refurbished/remanufactured product warranty</p> <p>The contractor must provide a warranty of at least one year, covering repair or replacement of the product and each of its components. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative equipment where required by the client.</p> <p>Verification: The tenderer must provide a copy of the warranty terms, indicating the maximum time periods for resolution of faults and the provision of temporary alternative equipment where required by the client.</p>	<p>TS32. Refurbished/remanufactured product warranty</p> <p>The contractor must provide a warranty of at least two years, covering repair or replacement of the product and each of its components. Where repair work is undertaken the maximum time period from notification of the fault through to its resolution must be stated together with the provision which will be made for temporary alternative equipment where required by the client.</p> <p>Verification: The tenderer must provide a copy of the warranty terms, indicating the maximum time periods for resolution of faults and the provision of temporary alternative equipment where required by the client.</p>
<p>TS33 (a) Rechargeable battery endurance - new battery</p> <p><i>Applicable to refurbished mobile equipment (laptops, tablets and smartphones) equipped with a new battery.</i></p> <p>The battery endurance must be > 300 battery cycles (with SoH ≥80%). Tests must be carried out according to standard IEC EN 61960-3:2017 or equivalent.</p> <p>Verification: Tenderers must provide test results obtained by accredited ISO17025 test bodies according to the IEC EN 61960-3:2017 standard or equivalent. Products holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>	<p>TS33 (a) Rechargeable battery endurance - new battery</p> <p><i>Applicable to refurbished mobile equipment (laptops, tablets and smartphones) equipped with a new battery.</i></p> <ul style="list-style-type: none"> • The battery endurance must be > 500 cycles (with SoH ≥80%), or • The battery endurance must be > 300 cycles (with SoH ≥90%). <p>Tests must be carried out according to IEC EN 61960-3:2017 or equivalent.</p> <p>Verification: Tenderers must provide test results obtained by accredited ISO17025 test bodies according to the IEC EN 61960-3:2017 standard or equivalent. Products holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<p>TS33 (b) Rechargeable battery endurance - second hand battery <i>Applicable to refurbished mobile equipment (laptops, tablets and smartphones) equipped with a second-hand battery.</i> The tenderer must indicate minimum levels of the second-hand battery's State of Health (SoH) in the tender (e.g. SoH > 80%). Verification: Tenderers must provide information on the battery SoH for the mobile equipment shipped as part of the contract.</p>	
	<p>TS34. Minimum requirements for electrical performance <i>Applicable to refurbished mobile equipment (laptops, tablets and smartphones) equipped with a new battery.</i> The battery must comply with the electrical test criteria set out in the standard IEC EN 61960-3:2017 or equivalent. Verification: Tenderers must provide test results from test bodies accredited under ISO17025 or equivalent. Products holding a relevant Type I Ecolabel fulfilling the specified requirements will be deemed to comply.</p>
	<p>TS35. Provision of an extended service agreement The contractor must provide a minimum of X years [to be defined] services as detailed in the Service Level Requirements document (see explanatory note below). Verification: The tenderer must provide a written declaration that it will comply with the terms of the service agreement.</p>
<p>EXPLANATORY NOTE: EXAMPLES OF SERVICE LEVEL REQUIREMENTS A Service Level Requirements document describes how the service should be delivered to the customer. Examples of possible service level requirements are listed below:</p> <ul style="list-style-type: none"> • Access to the refurbisher/remanufacturer's warranty: register the warranty; manage any documentation or proof required to invoke the warranty; invoke the warranty on behalf of the public administration (during the warranty); follow up with the refurbisher to ensure that the terms of the refurbisher's warranty are met. • Pick-up and return: pick up the product(s) from a specified location on the public administration's premises and return it/them to a specific location on the public administration's premises. Alternative options for convenient return of products can also be requested. 	

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

EXPLANATORY NOTE: EXAMPLES OF SERVICE LEVEL REQUIREMENTS (CONTINUED)

- **Management of failures:** provide an efficient single point of contact for technical issues and escalations of problems, a person responsible for following the progress of the case, reports on progress, transparent access to a warranty database (whoever manages this warranty data) to verify warranty status, and incident status for open incidents.
- **Access to diagnostic and repair tools:** access to all technical tools necessary to perform hardware diagnostics and corrections; access to any technical training required to become a certified repair technician; possibility, through non-exclusivity, to become a certified technical partner (perform warranty repairs).
- **Battery coverage:** the service explicitly covers battery defects for applicable products with rechargeable batteries, such as failure to charge or a faulty battery connection. A progressive drop in battery capacity due to usage must not be considered a defect unless it is covered by the battery replacement policy in the bullet below.
- **Battery replacement policy:** the service covers the replacement of batteries that do not fulfil the minimum performance conditions related to endurance in terms of number of cycles (see criteria TS25 and TS26 on rechargeable battery endurance).
- **Provision of failure statistics:** provision of high-level, aggregated, anonymous and non-traceable statistics on incident types (nature and quantity), problems and diagnostics concerning the products within the scope of the contract.
- **Incident management/problem management/preventive maintenance:** this service includes all the operations necessary to maintain the ICT products in perfect working order, or to restore a defective product or one of its components to perfect working order, including incident management, problem management and preventive maintenance. Preventive maintenance during the warranty period includes ensuring OS and security updates for the duration of the contract.
- **Upgrading:** a scan for upgrading possibilities can take place after a certain period (e.g. 3 years) and cover performance aspects like CPU/Memory/Disk.
- **Repair/replacement activities:** repair or replace any products which become damaged or defective in the course of normal use during the extended warranty period with products which have identical or better performance characteristics. Breakdowns related to firmware are also covered. If part of an item is replaced, the replacement part must be covered by the same level and duration of extended warranty as the part that has been replaced. The extended warranty applies to both hardware and software, unless explicitly agreed otherwise.
- **Commitment to repair/upgrade as first remedy:** in the event of failures and, whenever technically feasible, the service provider commits to provide the option of repairing/upgrading the equipment instead of substituting it.

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
	<p>AC13. Further rechargeable battery endurance <i>Applicable to portable devices (portable computers, tablets and smartphones).</i></p> <p>Up to [X] marks will be awarded if the battery endurance is greater than 500 cycles (with ≥80% capacity retention of the initial rated capacity). The product offering the highest number of additional cycles will receive maximum marks, with all other bids being marked proportionally.</p> <p>Verification: Tests must be carried out according to the standard IEC EN 61960-3:2017 or equivalent. Tenderers must provide test results obtained by test bodies accredited under ISO17025 or equivalent.</p>
	<p>AC14 (a) Standardised External Power Supply <i>Applicable to portable computing devices with power supplies up to 100 W.</i></p> <p><i>This is not applicable to products with Qi (wireless) charging capability (e.g. for strong resistance to immersion in water or to dust, such as industrial computers).</i></p> <p>Equipment must carry a USB Type C standardised receptacle or equivalent for USB power delivery (PD) according to the standard EN/IEC 63002:2017 or equivalent. If the product does not have a built-in USB PD receptacle, then an adapter must be made available at no additional cost.</p> <p>Verification: The tenderer must provide a product manual for each model provided, which must include an exploded diagram of the device illustrating the types of EPS used.</p>
<p>EXPLANATORY NOTE: STANDARDISED EXTERNAL POWER SUPPLY Interoperability guidelines for external power supplies are defined according to the standard IEC 63002:2016 - Identification and communication interoperability method for external power supplies used with portable computing devices.</p>	

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
	<p>AC14 (b) External Power Supply: Detachable Cables</p> <p>The External Power Supply (EPS) configuration must consist of an EPS with a detachable input cable (or integrated in the EPS housing) and a detachable output cable to the ICT device.</p> <p>Verification: Tenderers must provide a product manual for each model provided, which must include an exploded diagram of the device illustrating the types of EPS used.</p>
CONTRACT PERFORMANCE CONDITIONS	
	<p>CPC5. Service commitments</p> <p><i>To be used in conjunction with criterion TS35 on provision of an extended service agreement.</i></p> <p>The tenderer must provide periodic <i>[frequency to be agreed between the procurer and supplier]</i> reporting on their compliance with all the metrics, Key Performance Indicators and other indicators defined by the service level agreement. <i>[Remedies to be specified in case of breaches]</i></p>
<p>EXPLANATORY NOTE: EXAMPLES OF KEY PERFORMANCE INDICATORS</p> <p>Aggregate KPI 1 – Incident solved: number of incidents resolved within the incident resolution time during a month / total number of incidents opened during the given month or opened during a previous month and still pending. Monthly target: ≥90%.</p> <p>Aggregate KPI 2 – Commitment to repair as first remedy: number of incidents resolved within a product repair or upgrade / number of incidents resolved within a product replacement.</p>	

K TRIPLE E REGISTER CRITERIA

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS36. Compliance with Triple E Register Criteria

Products in each of the following categories must meet the criteria for inclusion in the Triple E Register published on the website of the Sustainable Energy Authority of Ireland.

- *Rack Mounted Servers*
- *Enterprise Storage Equipment*
- *Precise Cooling*
- *Centralised Direct Current Power Distribution*
- *Power Management*
- *Uninterruptible Power Supply*
- *Blade Servers*
- *Enterprise Communication Equipment*
- *ICT Optimisation Solutions*

Verification: Products included on the Triple E Register will be deemed to comply. For products not included on the register, evidence of compliance with the relevant criteria in the form of test results, Type 1 Ecolabels or other objective third-party forms of evidence will be accepted.

TS36. Compliance with Triple E Register Criteria

Products in each of the following categories must meet the criteria for inclusion in the Triple E Register published on the website of the Sustainable Energy Authority of Ireland.

- *Rack Mounted Servers*
- *Enterprise Storage Equipment*
- *Precise Cooling*
- *Centralised Direct Current Power Distribution*
- *Power Management*
- *Uninterruptible Power Supply*
- *Blade Servers*
- *Enterprise Communication Equipment*
- *ICT Optimisation Solutions*

Verification: Products included on the Triple E Register will be deemed to comply. For products not included on the register, evidence of compliance with the relevant criteria in the form of test results, Type 1 Ecolabels or other objective third-party forms of evidence will be accepted.

2. GPP CRITERIA FOR DATA CENTRES AND SERVICES PROVIDED USING DATA CENTRES

SUBJECT MATTER	
Procurement of data centres or services provided using data centres with reduced environmental impact.	
CORE CRITERIA	COMPREHENSIVE CRITERIA
SELECTION CRITERIA	
<p>SC1. Server utilisation</p> <p><i>To be included when the data centre is operated by a third party, e.g. for the purchase of enterprise data centre or server room operation and maintenance services or purchase of IT virtualisation or consolidation services.</i></p> <p>Tenderers must have relevant competencies and experience in optimising a server’s utilisation. This must include server virtualisation services, utilisation management tools and software,¹⁶ and the consolidation of IT assets in data centres.</p> <p>Verification: 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 delivered in the last three years which include the above elements. 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>	

¹⁶ 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.

CORE CRITERIA	COMPREHENSIVE CRITERIA
SELECTION CRITERIA	
	<p>SC2. Control of hazardous substances – restricted substance in servers, data storage and network equipment</p> <p><i>To be included when ICT equipment is procured as part of a data centre or data centre services.</i></p> <p>Tenderers 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 the composition of the products to be supplied. The RSCs must apply, as a minimum, to the:</p> <ul style="list-style-type: none"> • REACH candidate list of substances; and • Restricted substances and exemptions in the Restriction of Hazardous Substances (RoHS) Directive¹⁷ <p>Supporting material declarations must be kept up to date for relevant materials, parts and subassemblies of the products to be supplied.</p> <p>Verification: The tenderer must provide documentation, which describes the system, its procedures and proof of its implementation.</p>

¹⁷ Directive 2011/65/EU on the restriction of certain hazardous substances in electrical and electronic equipment

CORE CRITERIA

COMPREHENSIVE CRITERIA

SELECTION CRITERIA

SC3. Cooling energy management

To be included when the data centre is operated by a third party, e.g. for construction of new data centres; 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; or purchase of enterprise data centre or server room operation and maintenance services.

Tenderers 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:

- 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; and
- The operational experience in using monitoring systems and software to inform energy reduction strategies, with particular reference to the EU Code of Conduct¹⁸ / EN 50600 TR99-1 best practices on 'cooling management' and 'temperature and humidity settings'.

Verification: 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. Evidence in the form of information and references for specific data centres sites that have been serviced in the last three years. This evidence may relate to relevant contracts and/or key personnel who will be involved in providing the service.

¹⁸ <https://e3p-jrc.ec.europa.eu/communities/data-centres-code-conduct>

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

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.

Product type	Minimum Eff _{ACTIVE}
1 socket	
Rack	11.0
Tower	9.4
2 socket	
Rack	13.0
Tower	12.0
Blade or multi-node	14.0
4 socket	
Rack	16.0
Blade or multi-node	9.6

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.

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.

Product type	Minimum Eff _{ACTIVE}
1 socket	
Rack	13.0
Tower	11.0
2 socket	
Rack	18.0
Tower	12.0
Blade or multi-node	20.0
4 socket	
Rack	16.0
Blade or multi-node	9.6

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.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<p>TS2. ICT Operating range – temperature and humidity <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 Annex 4.</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.</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> ICT hardware must support operation within the facility supply water temperature ranges indicated in the tender with reference to classes W2 and W3 in Annex 5.</p> <p>Verification:</p> <p>The tenderer must provide manufacturer specifications and declarations for each piece of ICT equipment.</p> <p>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.</p> <p>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 <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 Annex 4.</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.</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> ICT hardware must support operation within the facility supply water temperature ranges indicated in the tender with reference to classes W4 and W5 in Annex 5.</p> <p>Verification:</p> <p>The tenderer must provide manufacturer specifications and declarations for each piece of ICT equipment.</p> <p>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.</p> <p>Information and test results provided for the purpose of CE marking may be used as verification.</p>

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<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>Awarding extra points for A3 capable servers needs to be considered in the context of whether designating 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 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

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
	<p>TS3. Design for repair and upgrading of servers and data storage (continued)</p> <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. Repair information must be provided according to the standard EN 45559:2019: <i>Methods for providing information relating to material efficiency aspects of energy-related products</i>. Test results obtained for the purpose of CE marking may be used as verification.</p>
<p>TS4. End-of-life management of servers, data storage and network equipment</p> <p><i>This criterion should be used in conjunction with contract performance clause CPC3.</i></p> <p>Tenderers must provide a service for:</p> <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 Directive¹⁹ for equipment that has reached the end of its service life; • the recycling of components in order to recover Critical Raw Materials. 	

¹⁹ Directive 2012/19/EU on waste electrical and electronic equipment

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS4. **End-of-life management of servers, data storage and network equipment** (continued)

The service must comprise the following activities (*specify all which are relevant*):

- collection
- confidential handling and secure data erasure
- functional testing, servicing, repair and upgrading to prepare products for re-use
- the remarketing of products for re-use
- dismantling for component re-use, recycling and/or disposal

In providing the service, the contractor must report on the proportion of equipment prepared or remarketed 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 [*see explanatory note*].

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 set out 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 components require selective treatment in accordance with Annex VII of the WEEE Directive:

- mercury containing components
- batteries
- 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, which must be treated in accordance with Regulation (EC) No 1005/2009.

CORE CRITERIA

COMPREHENSIVE CRITERIA

TECHNICAL SPECIFICATIONS

TS5. **Environmental monitoring**

To be used in case of new build or retrofit of data centres, or consolidation of existing server rooms and/or data centres into new or existing data centres.

Tenderers must demonstrate that the proposed facility has environmental control facilities and infrastructure 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)

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

Verification:

Tenderers 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.

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
	<p>TS6. Cooling system best practices</p> <p><i>To be used in the case of new build, retrofit or expansion and for the purchase of co-location, hosting or cloud services.</i></p> <p>Tenderers 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 Conduct²⁰ / 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 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 [EU 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 completed reporting form²¹ 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 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 / 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.</p>	

²⁰ <https://e3p.jrc.ec.europa.eu/communities/data-centres-code-conduct>

²¹ <https://e3p.jrc.ec.europa.eu/publications/ict-code-conduct-reporting-form-participants-and-endorsers-guidelines>

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
<p>TS7. Waste heat reuse readiness</p> <p><i>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.</i></p> <p>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.</p> <p>Verification:</p> <p>The tenderer must provide design engineering drawings showing that a facility water system with branches to each server row will be fitted or that the layout is so designed that it could be easily retrofitted.</p> <p>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.</p>	<p>TS7. Waste heat reuse</p> <p><i>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.</i></p> <p>The data centre must be connected to and supply 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 heat consumers.²²</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 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.</p> <p>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.</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>TS8. Renewable energy factor (REF)</p> <p><i>To be included when the data centre is operated by a third party. It is recommended 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. The electricity contributing to the REF must come from renewable sources as defined by Directive 2009/28/EC.</p>

²² This may include consumers on the same site or linked to the data centre via a district heating network

CORE CRITERIA	COMPREHENSIVE CRITERIA
TECHNICAL SPECIFICATIONS	
	<p>TS8. Renewable energy factor (REF) (continued)</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>TS9. Global warming potential of refrigerants</p> <p><i>To be included when the data centre is operated by a third party. 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 lower GWP 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>A 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 average in the range of 0 to 10 must be documented.</p>

CORE CRITERIA

COMPREHENSIVE CRITERIA

AWARD CRITERIA

AC1. **Server idle state power**

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. 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 specifications.

A maximum of [X] marks will 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. This does not apply to resilient servers, HPC (high performance computing) servers and servers with integrated APAs (auxiliary performance accelerators).

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 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 Annex 6 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.

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
	<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>Up to [X] marks 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 marks will be awarded to the offer with the lowest deployed power. All other offers will be awarded marks in proportion to the best offer.</p> <p>Verification</p> <p>The tenderer must detail the calculation of the deployment power based either on <i>[to be specified]</i>:</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>AC3. Server utilisation</p> <p><i>To be included for the purchase of consolidation or virtualisation services when the data centre is operated by a third party. To be used in conjunction with CPC 2.</i></p> <p>Marks will be awarded based on the anticipated annual average server utilisation level based on the contracting authority's data handling and processing requirements. Marks will be awarded in line with the following ranges:</p> <ul style="list-style-type: none"> • >70%: [X] marks • 40-70%: 0.8 x [X] marks • 25-39%: 0.5 x [X] marks • 15-24%: 0.2 x [X] marks • Less than 15%: 0 marks 	

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
<p>AC3. Server utilisation (continued)</p> <p>Verification</p> <p>The tenderer must provide the modelling, calculations or estimations of the anticipated utilisation based on the tools which will be deployed. 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, for example.</p>	
<p>AC4. End-of-life management of servers</p> <p><i>To be used in conjunction with criterion TS4 and CPC3.</i></p> <p>A maximum of [X] marks will be awarded to tenderers who ensure that printed circuit boards and external cables that are not suitable for reuse are separated and recycled.</p> <p>Verification:</p> <p>The tenderer must provide certification that the components identified will be recycled.</p>	
<p>AC5. Power usage effectiveness (PUE) – Designed PUE</p> <p><i>Applicable in case of construction/retrofitting of a new/existing data centre when the IT power use can already be determined. To be used in conjunction with CPC4.</i></p> <p>A maximum of [X] marks will be awarded to the offer with the best performing Designed PUE (dPUE) based on the following parameters:</p> <ul style="list-style-type: none"> • IT load = [X]% of design • <i>[additional environmental conditions may be specified by the contracting authority]</i> <p>The PUE value must be determined according to ISO/IEC 30134:2016 Part 2, EN 50600-4-2: or equivalent.</p> <p>Verification:</p> <p>Tenderers 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. The dPUE will form part of the terms of the contract, with penalties for poor performance <i>[see CPC4]</i>.</p>	

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
<p>AC6. Power usage effectiveness (PUE) – PUE improvement against baseline <i>Applicable in contracts for 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. To be used in conjunction with CPC5.</i></p> <p>A maximum of [X] marks will be awarded based on the tenderer’s estimated improvement relative to the historical baseline for the PUE. Bid estimates must be made based on the following parametres:</p> <ul style="list-style-type: none"> • IT load = [X]% of design • <i>[additional environmental conditions may be specified by the contracting authority]</i> <p>The PUE value must be determined according to ISO/IEC 30134:2016 Part 2, EN 50600-4-2:2016 or equivalent.</p> <p>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. The estimated value will form part of the terms of the contract, with penalties for poor performance <i>[see CPC5]</i>.</p>	
<p>AC7. Cooling system energy consumption <i>Applicable in contracts for construction of new data centres or retrofit of existing centres. To be used in conjunction with CPC7.</i></p> <p>A maximum of [X] marks will be awarded based on the estimated cooling energy consumption required to operate the data centre design under reference climatic conditions for the location. The maximum number of marks will be awarded to the offer with the best performing design, with other bids scored proportionately.</p> <p>Verification: The tenderer must provide documentation, modelling and calculations for the design estimation process. The estimated value will form part of the terms of the contract, with penalties for poor performance <i>[see CPC7]</i>.</p>	

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
	<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>Marks 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 10% of the available marks 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: 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>
	<p>AC9. Waste heat reuse (for managed services)</p> <p><i>It is recommended that this comprehensive award criterion be used if any of the following services are being procured: colocation, hosting, cloud services, operation and maintenance of enterprise data centre/server room.</i></p> <p>A maximum of [X] marks will be awarded based on the declared energy reuse factor (ERF) for the facilities that will be used to execute the contract. The tenderer that offers the highest energy reuse factor will receive the maximum number of marks, with other bids being scored proportionately.</p> <p>The ERF must be calculated for each facility according to EN 50600-4-6:2020 or an equivalent standard.</p> <p>Verification: The tenderer must provide calculations according to EN 50600-4-6:2020 or an equivalent standard. 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.</p>

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
<p>AC10. Renewable energy factor (REF) <i>To be included when the data centre is operated by a third party. Marks 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>A maximum of [X] marks will be awarded to the tenderer that offers the highest REF for their electricity use, with other bids being scored proportionately.</p> <p>The REF for energy supplied and consumed in the data centre must be calculated according to EN 50600-4-38.²³ The electricity contributing to the REF must come from renewable sources as defined by Directive 2009/28/EC.²⁴</p> <p>Verification: The REF and the electricity supply and usage data on which the calculations are based must be declared. A third-party verification of the REF can be accepted as evidence. 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>AC10. Renewable energy factor (REF) <i>To be included when the data centre is operated by a third party. Marks 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>A maximum of [X] marks will be awarded to the tenderer that offers the highest load matched REF for their electricity use, with other bids being scored proportionately.</p> <p>The REF for energy supplied and consumed in the data centre must be calculated according to EN 50600-4-38.²⁵ The load profile for the generating capacity must then be related to the projected load profile of the data centre. The electricity contributing to the REF must come from renewable sources as defined by Directive 2009/28/EC.²⁶</p> <p>Verification: The REF and the electricity supply, usage data and load profiles on which the calculations are based must be declared. A third-party verification of the REF can be accepted as evidence. 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>EXPLANATORY NOTE: GUARANTEES 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. In Ireland, the issuing body for Guarantees of Origin is SEMO.</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>	

²³ EN 50600-4-3 - Information technology - Data centre facilities and infrastructures - Part 4-3: Renewable energy factor

²⁴ 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.

²⁵ EN 50600-4-3 - Information technology - Data centre facilities and infrastructures - Part 4-3: Renewable energy factor

²⁶ 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.

CORE CRITERIA	COMPREHENSIVE CRITERIA
AWARD CRITERIA	
<p>AC11. Global warming potential of refrigerants <i>To be included when the data centre is operated by a third party. See also TS9.</i></p> <p>Marks will be awarded to the tenderer according to the weighted average global warming potential (GWP) 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). A maximum of [X] marks will be awarded as follows:</p> <ul style="list-style-type: none"> • [X] marks to GWP weighted averages in the range of 0 to 10 • 0.6[X] marks to GWP weighted averages in the range of 11 to 150 • 0.2[X] marks to GWP weighted averages in the range of 151 to 750. • 0 marks to GWP weighted averages greater than 750. <p>Verification: Tenderers must provide the calculation of the global warming potential weighted average for the inventory of refrigerants at the site(s) used to provide the service, and show consistency with the method described in Annex IV of Regulation (EU) No 517/2014.</p> <p>The tenderer must provide evidence of the use of the refrigerants reported in the calculation. A 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>EXPLANATORY NOTE: METHOD OF CALCULATING THE TOTAL GWP OF A MIXTURE OF REFRIGERANTS ACCORDING TO ANNEX IV OF REGULATION (EU) NO 517/2014</p> <p>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:</p> <div style="text-align: center; border: 1px solid black; padding: 10px; margin: 10px 0;"> $\Sigma (\text{Substance } X\% \times \text{GWP}) + (\text{Substance } Y\% \times \text{GWP}) + (\text{Substance } N\% \times \text{GWP})$ </div> <p>Where % is the contribution by weight with a weight tolerance of ±1%. The GWP of refrigerants is listed in Annex I of Regulation (EU) No 517/2014.</p> <p>Documentation on the quantity and type of fluorinated gas is already required by Article 6 of Regulation (EU) No 517/2014.</p>	

CORE CRITERIA	COMPREHENSIVE CRITERIA
CONTRACT PERFORMANCE CLAUSES	
	<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></p> <p>The contractor must provide monthly and annual energy consumption 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>
<p>CPC2. Monitoring of IT equipment utilisation <i>To be included when the data centre is operated by a third party. To be used in conjunction with AC3. Contracting authorities should specify service point deductions or other penalties where the utilisation deviates from the levels estimated in the tender.</i></p> <p>The contractor must provide monthly reports of optimisation analysis and the achievement of utilisation targets agreed with the client.</p> <p>The utilisation rate of the servers in the data centre must be measured and reported based on ISO 30134-5 and must in line with the annual average server utilisation level indicated in the tender of <i>[specify value]</i>. Where the utilisation level deviates by more than [X]% from the target for the relevant period given in the contractor's tender, [Y] <i>[service points]</i> will be deducted. <i>[Contracting authority to specify process and timelines for remediation]</i></p>	
<p>CPC3. Reporting on the end-destination of servers, data storage and network equipment <i>To be used in conjunction with TS4 and AC4.</i></p> <p>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.</p> <p>For equipment and components recycled in the EU, the following means of proof for the handling facilities must be accepted:</p> <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 certificate of compliance with the technical requirements of EN 50625-1 or an equivalent compliance scheme. <p>Where equipment and components are exported for re-use or recycling, contractors must provide the following shipment and treatment information:</p> <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. 	

CORE CRITERIA	COMPREHENSIVE CRITERIA
CONTRACT PERFORMANCE CLAUSES	
	<p>CPC4. Demonstration of power usage effectiveness (PUE) at handover</p> <p><i>To be used in conjunction with AC5 for the construction of new data centres, expansion of existing building with new data centre and server rooms infrastructure, or consolidation of existing server rooms and/or data centres into new or existing data centres. The demonstration and reporting may be carried out on a modular basis where relevant to the data centre's design and phasing.</i></p> <p>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.</p> <p>The total (or clearly identified module) 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. <i>[Contracting authority to specify maximum acceptable deviation and process and timelines for remediation]</i></p> <p>Data to show instantaneous PUE must be based on measured values and part load according to ISO/IEC 30134:2016 Part 2, EN 50600-4-2:2016 or equivalent.</p>
<p>CPC5. Monitoring of power usage effectiveness (PUE) input values</p> <p><i>To be used in conjunction with AC5 and AC6. Additional detail regarding the breakdown of data may be included depending on the facility. Contracting authorities should specify service point deductions or other penalties where the PUE deviates from the levels estimated in the tender.</i></p> <p>The contractor 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. The contractor must also provide reports every <i>[state agreed reporting period]</i> showing the measured PUE value for the data centre at the IT load and under the environmental conditions specified in the tender documents. The PUE value must be determined according to ISO/IEC 30134:2016 Part 2, EN 50600-4-2:2016 or equivalent. Where the PUE value deviates by more than [X]% from the estimate for the relevant period given in the contractor's tender, [Y] <i>[service points]</i> will be deducted. <i>[Contracting authority to specify process and timelines for remediation]</i></p>	

CORE CRITERIA	COMPREHENSIVE CRITERIA
CONTRACT PERFORMANCE CLAUSES	
	<p>CPC6. Implementation of best practice designs</p> <p><i>To be used in conjunction with TS6 for the construction of new data centres, expansion of existing buildings with new data centre and server room infrastructure, or consolidation of existing server rooms and/or data centres into new or existing data centres.</i></p> <p>Based on the final design, the data centre must be <i>[accepted for EU Code of Conduct participation/third party verified with reference to EN 50600 TR99-1]</i> during execution of the contract. 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>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. Contracting authorities should specify service point deductions or other penalties where the cooling energy consumption deviates from the levels estimated in the tender.</i></p> <p>The contractor must provide monthly and annual data for the energy consumption of the data centre's cooling system. The monitoring must be carried out according to the guidelines in EN 50600-4-2:2016 or equivalent. Where the energy consumption deviates by more than [X]% from the estimate for the relevant period given in the contractor's tender, [Y] <i>[service points]</i> will be deducted. <i>[Contracting authority to specify process and timelines for remediation]</i></p>
	<p>CPC8. Monitoring of heat 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. Contracting authorities should specify service point deductions or other penalties where ERF deviates from the levels estimated in the tender.</i></p> <p>The contractor must provide average monthly data for the heat supplied to the local heat consumers.</p>

CORE CRITERIA	COMPREHENSIVE CRITERIA
CONTRACT PERFORMANCE CLAUSES	
	<p>CPC8. Monitoring of heat supply and connection (continued) 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. Where the ERF deviates by more than [X]% from the estimate for the relevant period given in the contractor's tender, [Y] [service points] will be deducted. [Contracting authority to specify process and timelines for remediation]</p>
<p>CPC9. Renewable energy factor (REF) <i>To be used in conjunction with AC10 for the purchase of colocation, hosting or cloud services. Contracting authorities should specify service point deductions or other penalties where REF deviates from the levels estimated in the tender.</i></p> <p>The operator of the data centre 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. Where the REF deviates by more than [X]% from the estimate for the relevant period given in the contractor's tender, [Y] [service points] will be deducted. [Contracting authority to specify process and timelines for remediation]</p>	
	<p>CPC10. Global warming potential of refrigerants <i>To be included if criteria AC11 is used for the purchase of colocation, hosting, cloud services or operation and maintenance of enterprise data centres and/or server rooms. Contracting authorities should specify service point deductions or other penalties where emissions deviate from the levels estimated in the tender.</i></p> <p>The contractor must monitor and verify the cooling system's greenhouse gas refrigerant emissions as estimated at bid stage.</p> <p>The actual monitored emissions must be reported for each year of operation based on metered energy consumption. The contracting authority may request third party verification of the reported emissions at any point during the contract, and the contractor must provide this within 30 days.</p> <p>Where the emissions deviate by more than [X]% from the estimate for the relevant period given in the contractor's tender, [Y] [service points] will be deducted. [Contracting authority to specify process and timelines for remediation]</p>

3. GPP CRITERIA FOR ICT SERVICES

SUBJECT MATTER	
The provision of ICT services with reduced environmental impact	
CORE CRITERIA	COMPREHENSIVE CRITERIA
SELECTION CRITERIA	
<p>SC1. Environmental Management Capacity of Service Providers</p> <p>Candidates must demonstrate their capacity, skills, resources and experience with regard to the specific environmental requirements of the contract, including <i>[select all that are relevant]</i>:</p> <ul style="list-style-type: none"> • Energy performance: Evaluation and sourcing of highly energy-efficient ICT products which meet the requirements of Energy Star Version 6.1, 7.0 or 7.1, TCO Certified Version 8, EPEAT 2018, IEEE 1680.1 – 2018, Blue Angel DE UZ-78 Version 2, TÜV Green Product Mark 2PFG-E 2354:07.2018 or other relevant Type 1 Ecolabels, and of monitors which meet or exceed an energy efficiency class of D. • Substances of Very High Concern: Implementation of Substance Controls addressing REACH Candidate List Substances of Very High Concern (SVHC) throughout the supply chain for ICT products; • Product lifespan: Implementation of measures to extend product lifespan including the use of service level agreements, ensuring the availability of spare parts, design for reparability, use of refurbished products and secure data deletion); • Battery life and performance: Evaluation and sourcing of mobile equipment with regard to rechargeable battery life and performance (e.g. that has been tested according to IEC EN 61960-3:2017 or equivalent), use of software providing information on battery health/ battery protection software, implementation of measures to prolong battery life; • Durability: Evaluation and sourcing of mobile equipment which has been tested for durability (e.g. drop testing, temperature stress, ingress protection); • Interoperability and reusability: Evaluation and sourcing of products with components that are interoperable and reusable (e.g. standardised connectors and external power supply; detachable cables for external power supply, backward compatible adaptors); • Recycled plastic content: Evaluation and sourcing of products containing post-consumer recycled plastic; • Design for recycling: Evaluation and sourcing of products which are designed for recycling and which conform to relevant standards such as ISO 180 54, ISO 11469, ISO 1043-1 and IEC 62902:2019; • End-of-life management: ensuring the re-use and recycling of the whole product or of components requiring selective treatment in accordance with Annex VII of the WEEE Directive for equipment that has reached the end of its service life. This should include collection of products (take back system); confidential handling and secure data erasure²⁷; functional testing, servicing, repair and upgrading to prepare products for re-use; the remarketing of products for re-use; dismantling for component re-use, recycling and/or disposal. 	

²⁷ Not relevant if this activity is carried out by the contracting authority.

CORE CRITERIA	COMPREHENSIVE CRITERIA
SELECTION CRITERIA	
<p>SC1. Environmental Management Capacity of Service Providers (continued)</p> <p>Verification: Candidates should demonstrate that they and/or their partners/subcontractors have the relevant capacity, skills, resources and experience by providing examples of previous contracts in which these services have been provided, written procedures, relevant certifications and qualifications. Environmental management measures which conform to ISO 14001, EMAS, or another relevant standard/certification may be submitted as evidence of compliance with these requirements.</p>	
TECHNICAL SPECIFICATIONS, AWARD CRITERIA AND CONTRACT PERFORMANCE CLAUSES	
<p><i>For ICT or related services which specify the use of one or more products which fall within the scope of the GPP criteria for ICT products, all of the relevant criteria for that product shall be included.</i></p>	

4. LIFE CYCLE COSTING

Life cycle costing (LCC) is a technique that can be used to estimate the total cost of ownership for ICT products and data centres, as well as environmental externalities such as CO₂ emissions.²⁸ It is a method for making effective, long-term investment decisions since some cost aspects may not be immediately apparent to the decision maker, e.g., a higher initial investment may be required to achieve lower life-cycle costs, based on lower energy costs and improved durability with associated longer lifespans and lower repair costs. When externalities are taken into consideration, LCC is particularly relevant to achieving an improved environmental performance.

4.1 ICT PRODUCTS

The GPP criteria for ICT products address a number of aspects of the design, operational lifetime and end-of-life management of ICT products and services that can serve to reduce the life cycle costs. However, it is recommended that Irish public bodies also apply life-cycle costing to evaluate and compare the true cost of different products/services. A spreadsheet-based *Tool* has been published by the European Commission for LCC of Computers and Monitors, together with a detailed *User Guide*. Note that this tool may be adapted to the specificities of your tender, e.g.

by including or omitting different parameters and by setting the evaluation period based on your organisation's usage patterns. Further advice on the use of the tool is available via the *EU GPP Helpdesk*.

4.2 DATA CENTRES

Life-cycle costs for data centres vary according 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 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.

²⁸ Further information on LCC, including the possibility to account for externalities, is included in the EPA guidance document accompanying these criteria.

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

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

Applying 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 to reduce 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 investment (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 years.²⁹ 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.

²⁹ 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>

ANNEX 1: MINIMUM ENERGY PERFORMANCE FOR COMPUTERS (BASED ON ENERGY STAR FOR COMPUTERS, SPECIFICATIONS 7.1)

Calculated Typical Energy Consumption (E_{TEC}) for Desktop, Integrated Desktop, and Notebook Computers per shall be less than or equal to the maximum TEC (E_{TEC_MAX}) as calculated below:
 (E_{TEC_MAX}) per Equation below:

$$E_{TEC_MAX} = (1 + ALLOWANCE_{PSU}) \times (TEC_{BASE} + TEC_{MEMORY} + TEC_{GRAPHICS} + TEC_{STORAGE} + TEC_{INT_DISPLAY} + TEC_{SWITCHABLE} + TEC_{EEE} + TEC_{MOBILEWORKSTATIONS})$$

Where:

- $ALLOWANCE_{PSU}$ is an allowance provided to power supplies that meet the optional more stringent efficiency levels specified in Table 1; power supplies that do not meet the requirements receive an allowance of 0;
- TEC_{BASE} is the base allowance specified in Table 2; and,
- $TEC_{GRAPHICS}$ is the discrete graphics allowance as specified in Table 2, with the exception of systems with integrated graphics, which do not receive an allowance, or Desktops and Integrated Desktops with switchable graphics enabled by default, which receive an allowance through $TEC_{SWITCHABLE}$; and
- TEC_{MEMORY} , $TEC_{STORAGE}$, $TEC_{INT_DISPLAY}$, $TEC_{SWITCHABLE}$, TEC_{EEE} and $TEC_{MOBILEWORKSTATIONS}$ are adder allowances as specified in Table 3.

Power Supply Type	Computer Type	Minimum Efficiency at Specified Proportion of Rated Output Current				Minimum Average Efficiency	Allowance _{psu}
		10%	20%	50%	100%		
IPS	Desktop	0.86	0.90	0.92	0.89	-	0.015
		0.90	0.92	0.94	0.90	-	0.03
	Integrated Desktop	0.86	0.90	0.92	0.89	-	0.015
		0.90	0.92	0.94	0.90	-	0.04

Table 1. Power Supply Efficiency Allowance

Category Name	Graphic Capability	Desktop or Integrated Desktop	
		Performance Score, P	Base Allowance
0	Any Graphics dGfx≤G7	P≤3	69.0
I1	Integrated or Switchable Graphics	3<P≤6	112.0
I2		6<P≤7	120.0
I3		P>7	135.0
D1	Discrete Graphics dGfx≤G7	3<P≤9	115.0
D2		P>9	135.0
Category Name	Notebooks		
	Performance Score, PV	Base Allowance	
0	P≤2	6.5	
I1	2<P≤5.2	22.0	
I2	5.2<P≤8	8.0	
I3	P>8	14.0	

Table 2. Base TEC (TEC_{BASE}) Allowances for Desktop or Integrated Desktops and Notebooks

Function			Desktop	Integrated Desktop	Notebook
TEC_{MEMORY} (kWH) vi			0.8		2.4 + (0.294 x GB)
TEC_{GRAPHICS} (kWH) vii	Graphics Category VIII	G1 (FB_BW ≤ 16)	36		29.3 x tanh (0.0038 x FB_BW - 0.137) + 13.4
		G2 (16 < FB_BW ≤ 32)	51		
		G3 (32 < FB_BW ≤ 64)	64		
		G4 (64 < FB_BW ≤ 96)	83		
		G5 (96 < FB_BW ≤ 128)	105		
		G6 (FB_BW > 128; Frame Buffer Data)	115		
		G7 (FB_BW > 128; Frame Buffer Data Width ≥ 192 bits)	130		
TEC_{SWITCHABLE} (kWH)			0.5 x G1		N/A
TEC_{EEE} (kWH) x			8.76 x 0.2 x (0.15 + 0.35)		8.76 x 0.2 x (0.10 + 0.30)
TEC_{STORAGE} (kWH) xi			26		2.6
TEC_{INT_DISPLAY} (kWH) xii			N/A	8.76 x 0.35 x (1+EP) x (4xr + 0.05 x A)	8.76 x 0.30 x (1+EP) x (2 x r + 0.02 x A)
TEC_{MOBILEWORKSTATION} (kWH) xii			N/A		4.0

Table 3. Functional Adder Allowances for Desktop, Integrated Desktop, Thin Client and Notebook Computers

EQUATION 1: CALCULATION OF ALLOWANCE FOR ENHANCED PERFORMANCE INTEGRATED DISPLAYS

$$EP = \begin{cases} 0, & \text{No Enhanced Power Displays} \\ 0.3 & \text{Enhanced Performance Display } d < 27 \\ 0.75 & \text{Enhanced Performance Display } d \geq 27 \end{cases}$$

Where:

- vi. **TECMEMORY Adder:** Applies per GB installed in the system.
- vii. **TECGRAPHICS Adder:** Applies to only the first dGfx installed in the system, but not Switchable Graphics.
- viii. **FB_BW:** Is the display frame buffer bandwidth in gigabytes per second (GB/s). This is a manufacturer declared parameter and should be calculated as follows: (Data Rate [Mhz] × Frame Buffer Data Width [bits]) / (8 × 1000).
- ix. **TECSWITCHABLE Incentive:** Applies to automated switching that is enabled by default in Desktops and Integrated Desktops.
- x. **TECEEE:** Applies per IEEE 802.3az-compliant (Energy Efficient Ethernet) Gigabit Ethernet port.
- xi. **TECSTORAGE Adder:** Applies once if system has more than one Additional Internal Storage element.
- xii. **TECINT_DISPLAY Adder:** EP is the Enhanced Performance Display allowance calculated per *Table 3*; r is the Screen resolution in megapixels; and A is viewable screen area in square inches.

CALCULATION OF E_{TEC_MAX} FOR THIN CLIENTS

$$E_{TEC_MAX} = TEC_{BASE} + TEC_{GRAPHICS} + TEC_{WOL} + TEC_{INT_DISPLAY} + TEC_{EEE}$$

Where:

- TEC_{BASE} is the Base Allowance specified in *Table 4*;
- TEC_{GRAPHICS} is the Discrete Graphics allowance specified in *Table 4*, if applicable;
- TEC_{WOL} is the Wake-on-LAN allowance specified in *Table 4*, if applicable;
- TEC_{INT_DISPLAY} is the Integrated Display allowance for Integrated Desktops specified in *Table 3*, if applicable; and

- TEC_{EEE} is the Energy Efficiency Ethernet incentive for Desktops specified in *Table 3*, if applicable, per IEEE 802.3az-compliant (Energy Efficient Ethernet) Gigabit Ethernet port.

Adder	Allowance (kWh)
TEC _{BASE}	31
TEC _{GRAPHICS}	36
TEC _{WOL}	2

Table 4. Adder allowances for Thin Clients

ANNEX 2: BATTERY TESTING ACCORDING TO EC EN 61960-3/2017

Parameter	Description	Acceptance Criteria Battery
Discharge performance at 20°C (Rated Capacity)	This test verifies the rated capacity of the battery.	100% of the rated capacity (C5 Ah) ³⁰
Discharge performance at -20°C (Rated Capacity)	This test determines the capacity of the battery at low temperatures.	30% of the rated capacity (C5 Ah)
High rate discharge performance at 20°C	This test determines the capacity of the battery when discharged at high rate. This test is not required if the battery is not designed to be used at this rate (1 ItA).	60% of the rated capacity (C5 Ah)
Charge (capacity) retention and recovery	This test determines, firstly, the capacity which a battery retains after storage for an extended period of time (28 days) and, secondly, the capacity that can be recovered by a subsequent recharge.	60% of the rated capacity (C5 Ah)
Charge (capacity) retention after long-term storage	This test determines the capacity of a battery after extended storage (90 days) at 50% state of charge, followed by a subsequent charge.	85% of the rated capacity (C5 Ah)
Endurance in cycles	This test determines the number of charge/discharge cycles which a battery can endure before its capacity has been significantly depleted.	60% of the rated capacity (C5 Ah) after 300 cycles
Electrostatic discharge	This test is to evaluate the ability of a battery to withstand electrostatic discharge.	Operational

³⁰ Amount of electricity declared by the manufacturer that a cell can deliver in a 5-hour period.

ANNEX 3: DURABILITY TESTS FOR MOBILE EQUIPMENT

Test	Test method	Minimum thresholds		Functional performance requirements
ACCIDENTAL DROP	IEC 60068 Part 2-31: Ec (Freefall, procedure 1) or MIL-STD-810G w/CHANGE 1 Drop test: Method 516.7 - Shock (procedure IV) or MIL-STD-810H Method 516.8 – Shock (Procedure IV)	CORE CRITERIA The notebook or tablet must be dropped from: a minimum of 45 cm (modified drop test height) of height onto a non-yielding surface. A minimum of one drop must be made on each bottom side and each bottom corner.	AWARD CRITERIA The notebook or tablet must be dropped from: a minimum of 76 cm (30 inches ³¹) of height onto a non-yielding surface. A minimum of one drop must be made on each bottom side and each bottom corner.	After exposure to any of the specified stress tests, the product should be able to: <ol style="list-style-type: none"> 1. Boot up and operate normally <ul style="list-style-type: none"> Booting up or resuming should not exceed 50% more time as a result of the test. No noticeable operational faults when using standard software applications. No major damage to the product that does not allow for standard usage.
TEMPERATURE STRESS	IEC 60068 Part 2-1: A Cold Part 2-2: B Dry Heat or MIL-STD-810G w/CHANGE 1 High temperature: Method 501.6 - Basic Hot (A2) Low temperature: Method 502.6 - Basic Cold (C1) or MIL-STD-810H Method 501.7 - High temperature - Basic Hot (A2) Method 502.7 - Low temperature - Basic Cold (C1)	The mobile equipment must be subjected to test cycles of a minimum of 48 hours exposure for storage temperature at: <ul style="list-style-type: none"> High temperature storage $\geq 60^\circ\text{C}$ Low temperature storage $\leq -30^\circ\text{C}$ The mobile equipment must be subjected to test cycles of a minimum of 4 hours for operational temperature at: <ul style="list-style-type: none"> Operational temperature $\geq 40^\circ\text{C}$ Operational temperature $\leq -20^\circ\text{C}$ 		<ol style="list-style-type: none"> 2. Not create hazards to the end- user <ul style="list-style-type: none"> No case or display cracking or other sharp points created from failures that could injure a user. No electrical component failures or access that could result in a user safety issue.

³¹ US Department of Defence standard MIL-STD-810G Method 516.6 Specification VI 'Transit drop test'.

Test	Test method	Minimum thresholds		Functional performance requirements
SCREEN RESILIENCE	<p>The test equipment and set-up used must be confirmed by the tenderer.</p> <p>Applicable test standards include:</p> <p>ISO 1518-1:2019 Paints and varnishes - Determination of scratch resistance - Part 1: Constant-loading method</p> <p>ISO 1518-2:2019 Paints and varnishes - Determination of scratch resistance - Part 2: Variable-loading method</p> <p>ASTM C1895 - 19 using a hardness test pencil equipped with a spiral spring and a carbide ball tip of 1 mm diameter (in accordance with ISO 1518)</p>		<p>With the product placed on a flat surface, two loading tests must be carried out:</p> <ul style="list-style-type: none"> • A minimum load of 50kg must be evenly applied to the screen lid (for notebooks) or screen (for tablets). • A minimum load of 25kg must be applied to a point at the centre of screen with a diameter of approximately 3cm. 	
RESISTANCE TO SHOCK	<p>IEC 60068</p> <p>Part 2-27: Test Ea and guidance: Shock</p> <p>Part 2-47: Test - Mounting of specimens for vibration, impact and similar dynamic tests</p>		<p>A minimum of a 40G peak half-sine wave pulse must be applied three times for a duration of a minimum of 6 ms to the top, bottom, right, left, front and rear side of the product.</p>	
RESISTANCE TO VIBRATION	<p>IEC 60068</p> <p>Part 2-6: Test Fc: Vibration (sinusoidal)</p> <p>Part 2-47: Test - Mounting of specimens for vibration, impact and similar dynamic tests</p>		<p>Minimum specification:</p> <p>Randomised sinusoidal vibrations in the frequency range 5Hz up to a minimum of 250Hz must be applied for a minimum of one sweep cycle to the end of each axis of the top, bottom, right, left, front and back of the product.</p>	

Test	Test method	Minimum thresholds		Functional performance requirements
<p>DUST INGRESS PROTECTION</p>	<p>IEC 60529, Degree of protection provided by enclosures</p> <p>or</p> <p>MIL-STD-810G Method 510.5, Procedure I Sand and dust - Blowing dust</p> <p>or</p> <p>MIL-STD-810H 510.7 – Procedure I - Sand and Dust – Blowing Dust</p>		<p>IP-6x - No ingress of dust; complete protection against contact.</p>	
<p>WATER INGRESS PROTECTION</p>	<p>IEC 60529, Degree of protection provided by enclosures</p> <p>or</p> <p>MIL-STD-810G, Method 506.5 Procedure I Rain and blowing rain</p> <p>or</p> <p>MIL-STD-810H 506.6 – Procedure I Rain</p>		<p>IP-x5 - Water is projected in jets against the enclosure from any direction with no harmful effects.</p>	

ANNEX 4: OPERATING CONDITION CLASSES FOR AIR COOLING (DATA CENTRES)

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

Table: Operating condition classes for servers and data storage products

Operating condition class	Dry bulb temp °C		Humidity range, non-condensing		Max dew point (°C)	Maximum rate of change (°C/hr)
	Allowable range	Recommended range	Allowable range	Recommended range		
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

ANNEX 5: OPERATING CONDITION CLASSES FOR LIQUID COOLING (DATA CENTRES)

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 Guidelines.³²

Table: 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 heating system	Cooling tower	> 45

³² ASHRAE (2011) Thermal Guidelines for Liquid Cooled Data Processing Environments

ANNEX 6: IDLE STATE POWER (DATA CENTRES)

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 1, and $\sum P_{add,i}$ is the sum of the idle state power allowances for applicable, additional components, as determined according to Table 2. 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 1: 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 2: Additional idle power allowances for extra components

System characteristics	Applies to	Additional idle power allowance
CPU performance	All servers	1 socket: $10 \times \text{Perf}_{CPU}$ W 2 socket: $7 \times \text{Perf}_{CPU}$ 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



E: info@epa.ie
W: www.epa.ie
LoCall: 1890 33 55 99