MEMORANDUM

TO: Joint Committee on Environmental Leadership Standard for Servers

FROM: Matthew Realff, Chairperson

DATE: April 17, 2015

SUBJECT: Proposed New Standard - NSF 426 *Environmental Leadership Standard for Servers*

Enclosed for your review is the draft of NSF 426 *Environmental Leadership Standard for Servers, issue 1, revision 1*. Please review the ballot for this standard and submit your vote by the ballot due date of **May 19, 2015** via the online workspace (http://standards.nsf.org).

Each Joint Committee member will vote *affirmative*, *abstain*, or *negative with comment*. Each negative vote **must** be justified in the comment section. Please include exactly why you oppose and what changes must be made in order for you to support the proposed draft.

Comments submitted during the balloting period, as well as the public comment period, will be responded to in writing. New substantive issues will be brought forward to the Joint Committee during a revision ballot (if applicable).

A copy of the NSF International Standard Development and Maintenance Policies are available here for further information on the process.

Webinar:
There will be a webinar open to all interested stakeholders on **May 5th, 2015** at 11am EDT, to review the draft standard and answer questions. The meeting registration is available here.

Please note that NSF and IEEE discussions continue on a joint environmental leadership standard for servers. NSF remains fully committed to a positive outcome from these deliberations. In the interim, both Standards Development Organizations continue to work on their respective processes per their mutual agreement when the negotiations began.

Purpose
The purpose of this ballot is to create a new standard for servers that addresses product environmental performance criteria and corporate performance metrics that exemplify environmental leadership in the market.

Background
The standard provides a framework and consistent set of performance objectives for manufacturers and the supply chain in the design and manufacture of servers and server components. For purchasers, this standard provides a consensus-based definition of key environmental attributes and performance metrics, alleviating individual purchasers from the arduous and complex task of defining environmental performance for servers. This standard can be used within an established system for the identification of environmentally preferable products by purchasers and to provide market recognition for conforming products and brand manufacturers.

This standard was developed based on the principle that only environmental leadership products, those in the top third of the market, are expected to qualify to the standard at the Bronze level at the date of publication of the standard. Only a very few, if any, products are expected to meet the highest performance level (Gold) at the date of publication of the standard.

This standard will be continually maintained and periodically reviewed to ensure that the definition of environmental leadership, as reflected in the performance criteria, progresses with the evolution of technology and services and environmental improvements in the product sector.

Public Health Impact
The new standard intends to have a positive impact on public health.

If you have any questions about the technical content of the ballot, you may contact me in care of:

Matthew Realff
Chairperson, Joint Committee on Environmental Leadership Standard for Servers
c/o Joint Committee Interim Secretariat,
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Environmental Leadership Standards For Servers

1 General

1.1 Purpose

The purpose of this standard for servers is to establish product environmental performance criteria and corporate performance metrics that exemplify environmental leadership in the market.

The standard provides a framework and consistent set of performance objectives for manufacturers and the supply chain in the design and manufacture of servers and server components. For purchasers, this standard provides a consensus-based definition of key environmental attributes and performance metrics, alleviating individual purchasers from the arduous and complex task of defining environmental performance for servers. This standard can be used within an established system for the identification of environmentally preferable products by purchasers and to provide market recognition for conforming products and brand manufacturers.

This standard was developed based on the principle that only environmental leadership products, those in the top third of the market, are expected to qualify to the standard at the Bronze level at the date of publication of the standard. Only a very few, if any, products are expected to meet the highest performance level (Gold) at the date of publication of the standard.

This standard will be continually maintained and periodically reviewed to ensure that the definition of environmental leadership, as reflected in the performance criteria, progresses with the evolution of technology and services and environmental improvements in the product sector.

1.2 Scope

This is an environmental leadership standard for computer servers. The definition of computer servers used in this standard is given in the ENERGY STAR Program Requirements for Computer Servers Version 2.0: blade, multi-node, rack-mounted, or pedestal form factor computer servers with no more than four processor sockets in the computer server (or per blade or node in the case of blade or multi-node servers).

This standard establishes measurable criteria for multiple levels of environmental leadership achievement and performance throughout the lifecycle of the product. This standard addresses multiple attributes and environmental performance categories including energy efficiency, management of substances, preferable materials use, product packaging, design for repair, reuse, and recycling, product longevity, responsible end-of-service/end-of-life management, life cycle assessments, and corporate responsibility.

2 References

2.1 Normative References

80 Plus[1]

American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments, 3rd Edition[2]

ANSI Z10, Occupational Health and Safety Management System[3]

ASTM D256, Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics[4]

ASTM D7611/D7611M, Standard Practice for Coding Plastic Manufactured Articles for Resin Identification[5]

CENELEC - EN 50625 Collection, logistics & treatment requirements for WEEE[6]

Conflict Free Sourcing Initiative (CFSI)[7]

Conflict Free Tin Initiative[8]

Creative Commons[9] (CC-BY)

Ecospold v.2[10]

Electronic Industry Citizenship Coalition (EICC) Code of Conduct[11]

ENERGY STAR Program Requirements for Computer Server Version 2.0[12]

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[1] http://www.plugloadsolutions.com/80PlusPowerSupplies.aspx
[2] https://www.ashrae.org/resources--publications/bookstore/datacom-series#thermalguidelines
[3] http://www.asse.org/ansiaihaasse-z10-2012-occupational-health-safety-management-systems/ansi/aiha/asse-z10-2012-occupational-health-and-safety-management-systems/
[4] ASTM publications are available from the American Society for Testing and Materials http://www.astm.org/
[5] ASTM publications are available from the American Society for Testing and Materials http://www.astm.org/
[6] http://www.cenelec.eu/
[7] http://www.conflictfreesourcing.org/conflict-free-smelter-refiner-lists/
[8] http://solutions-network.org/site-cfti/
[9] www.creativecommons.org
[10] Ecospold V.2 Data Format http://www.ecoinvent.org/data-providers/how-to-submit-data/ecospold2/
[11] http://www.eiccoalition.org/
[12] ENERGY STAR publications are available from the ENERGY STAR Website at http://www.energystar.gov

e-Stewards *Standard for Responsible Recycling and Reuse of Electronic Equipment*[13]

European Commission Joint Research Centre, International reference Life Cycle Data System (ILCD) Handbook[14]

European Union, Eco-Management and Audit Scheme (EMAS)[15]

European Union, European Commission Directive 94/62/EC of the European Parliament and of the Council on Packaging and Packaging Waste[16]

European Union, European Commission Directive 2012/19/EU of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE) [17]

European Union, European Commission Directive 2006/66/EC of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC

European Union, European Council former Directive 2002/95/EC as amended by 2005/618/EC and 2011/65/EU of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

European Union Regulation (EC) No. 1907/2006, Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)[18]

Global Reporting Initiative[19]

IEC 62474, Material declaration for products of and for the electrotechnical industry[20]

IEC TR 62635 Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment[21]

IEEE 1680.2-2012 Standard for the Environmental Assessment of Imaging Equipment[22]

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[13] http://e-stewards.org

[14] http://eplca.jrc.ec.europa.eu/?page_id=86. See Recommendations for Life Cycle Impact Assessment in the European context (EUR 24571 EN-2011) at: http://eplca.jrc.ec.europa.eu/uploads/ILCD-Recommendation-of-methods-for-LCIA-def.pdf

[15] http://ec.europa.eu/environment/emas/index_en.htm

[16] European Union Directives are available at http://europa.eu

[17] European Union Directives are available at http://europa.eu

[18] REACH regulations and information are available from the European Union at http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm

[19] https://www.globalreporting.org/

[20] IEC publications are available from the International Electrotechnical Commission http://www.iec.ch/

[21] Ibid

[22] IEEE publications are available from The Institute of Electrical and Electronics Engineers http://standards.ieee.org/.

IEEE 1874 – IEEE Standard for Documentation Schema for Repair and Assembly of Electronic Devices/oManual[23]

International Accreditation Forum (IAF)[24]

Interstate Chemicals Clearinghouse (IC2) Alternatives Assessment Guide, Hybrid or Sequential Frameworks[25]

IPCC Guidelines for National Greenhouse Gas Inventories, 2006[26]

ISO 179, Plastics—Determination of Charpy impact properties[27]

ISO 180, Plastics—Determination of Izod impact strength

ISO 1043, Plastics—Symbols and Abbreviated Terms

ISO 9001, Quality Management Systems

ISO 11469, Plastics—Generic identification and marking of plastics products

ISO 14001, Environmental management systems—Requirements with guidance for use

ISO 14021, Environmental Labels & Declarations—Self-declared environmental claims (Type II environmental labelling)

ISO 14025, Environmental labels and declarations—Type III environmental declarations—Principles and procedures

ISO 14040, Environmental management—Life cycle assessment—Principles and framework

ISO 14044, Environmental management—Life cycle assessment—Requirements and guidelines

ISO 18602, Packaging and the environment: Optimization of the packaging system

IUPAC, Compendium of Chemical Terminology, 2nd ed. (the "Gold Book")[28]

Model Toxics in Packaging Legislation [compilation was developed by CONEG and is administered by the Toxics in Packaging Clearinghouse (TPCH)][29]

National Academies of Science, Design and Evaluation of Safer Chemical Substitutions – A Framework to Inform Government and Industry Decisions[30]

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[23] IEEE publications are available from The Institute of Electrical and Electronics Engineers http://standards.ieee.org/

[24] http://www.iaf.nu/

[25] www.newmoa.org/prevention/ic2/IC2_AA_Guide-Version_1.pdf

[26] Available online at http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html

[27] ISO publications are available from the ISO Central Secretariat http://www.iso.org/

[28] http://goldbook.iupac.org/C01039.html

[29] Available at http://www.toxicsinpackaging.org/

OECD, Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas, 12 n.2 (2011)[31]

OHSAS 18001, Occupational Health and Safety Management[32]

Responsible Recycling ("R2") Standard for Electronics Recyclers[33]

Social Accountability (SA) 8000[34]

Solutions for Hope[35]

Substitution Support Portal (SUBSPORT)[36]

United Nations Protocol on Pollutant Release and Transfer Registry[37]

University of Leiden Institute of Environmental Sciences (CML), Handbook on LCA[38]

U.S. Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Section 1502[39]

U.S. EPA GHG Reporting Rule, Subpart I[40]

U.S. EPA, Life Cycle Assessment: Principles and Practice, Office of Research and Development. National Risk Management Research Laboratory, Editor 2006, U.S. EPA: Cincinnati, OH.[41]

U.S. EPA Protocol for Measuring Destruction or Removal Efficiency (DRE) of Fluorinated Greenhouse Gas Abatement Equipment in Electronics Manufacturing (EPA DRE Protocol)[42]

U.S. EPA Tool for the Reduction and Assessment of Chemical and other Environmental Impacts (TRACI) 2.1[43]

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[30] http://www.nap.edu/catalog.php?record_id=18872
[31] Available at http://www.oecd.org/investment/mne/
[32] For OHSAS 18001, see http://www.ohsas-18001-occupational-health-and-safety.com/ohsas-18001-kit.htm and http://www.bsigroup.com/en-GB/ohsas-18001-occupational-health-and-safety/
[33] http://www.sustainableelectronics.org/r2-documents/
[34] http://www.sa-intl.org/index.cfm?fuseaction=Page.ViewPage&pageId=937
[35] http://solutions-network.org/site-solutionsforhope/
[36] http://www.subsport.eu/about-the-portal
[37] Available at http://www.unece.org/env/pp/prtr/Protocol%20texts/PRTR_Protocol_e.pdf
[38] http://cml.leiden.edu
[39] https://www.sec.gov/spotlight/dodd-frank/speccorpdisclosure.shtml
[40] http://www.epa.gov/ghgreporting/reporters/subpart/i.html
[41] http://www.epa.gov/research/NRMRL/std/lca/pdfs/chapter1_frontmatter_lca101.pdf
[42] http://www.epa.gov/semiconductor-pfc/documents/dre_protocol.pdf
[43] US EPA, Tool for the Reduction and Assessment of Chemical and other Environmental Impacts, http://www.epa.gov/nrmrl/std/traci/traci.html

U.S. EPA Toxics Release Inventory[44]

U.S. Securities Exchange Act of 1934, Rule 13p-1

WEEELABEX Treatment Standard[45]

2.2 Informational References

California Safer Products regulations–CA Code of Regulations Title 22, Division 4.5, Chapter 55 Article 5, Sections 69505.5-69505.7[46]

DIN EN 15343: 2008-02, Plastics - Recycled Plastics - Plastics recycling traceability and assessment of conformity and recycled content[47]

EN 50581, Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances[48]

Global Protocol on Packaging Sustainability 2.0[49]

UL 746D, Standard for Polymeric Materials - Use in Electrical Equipment Evaluations[50]

3 Definitions

3.1 Abatement system: A specific tool, or system, often a combustion system that destroys specific F-GHGs. The system may include process improvements, alternative chemicals and capture and beneficial reuse for F-GHG reduction.

3.2 Additives and fillers: Ingredients added to polymers to improve processing, properties and end-use performance.

3.3 Blade server[51]: A computer server that is designed for use in a blade chassis. A blade server is a high-density device that functions as an independent computer server and includes at least one processor and system memory, but is dependent upon shared blade chassis resources (e.g., power supplies, cooling) for operation. A processor or memory module that is intended to scale up a standalone server is not considered a blade server.

[44] Available at http://www.epa.gov/TRI/
[45] http://media.wix.com/ugd/968606_0dbec6e7617cd83ae8307684f59d4244.pdf
[46] https://www.dtsc.ca.gov/LawsRegsPolicies/Title22/
[47] http://www.en-standard.eu/store/
[48] http://www.en-standard.eu/store/
[49] http://www.theconsumergoodsforum.com/download-global-protocol-on-packaging-sustainability-gpps
[50] http://ulstandards.ul.com/
[51] ENERGY STAR Program Requirements for Computer Server Version 2.0

3.4 Commonly available tools: A tool which is widely used and readily available for purchase by any individual or business without restrictions.

3.5 Computer server[52]: Computer servers provide services and manage networked resources for client devices (e.g., desktop computers, notebook computers, thin clients, wireless devices, PDAs, IP telephones, other computer servers, or other network devices). A computer server is sold through enterprise channels for use in data centers and office/corporate environments. A computer server is primarily accessed via network connections, versus directly-connected user input devices such as a keyboard or mouse. For purposes of this standard, a computer server must meet all of the following criteria:

- Is marketed and sold as a computer server;
- Is designed for and listed as supporting one or more computer server operating systems (OS) and, or hypervisors;
- Is targeted to run user-installed applications typically, but not exclusively, enterprise in nature;
- Provides support for error-correcting code (ECC) and, or buffered memory (including both buffered dual in-line memory modules (DIMMs) and buffered on board (BOB) configurations);
- Is packaged and sold with one or more AC-DC or DC-DC power supplies; and
- Is designed such that all processors have access to shared system memory and are visible to a single OS or hypervisor.

3.6 Conflict free: A product that does not contain conflict minerals, necessary to the functionality or production of that product, that directly or indirectly finance or benefit armed groups in the Democratic Republic of the Congo (DRC) or an adjoining country. Conflict minerals that a manufacturer or its supplier(s) obtains from recycled or scrap sources, are considered conflict free.

> Note – The term "armed group" [53] means an armed group that is identified as perpetrators of serious human rights abuses in the annual Country Reports on Human Rights Practices under sections 116(d) and 502B(b) of the Foreign Assistance Act of 1961 (22 U.S.C. 2151n(d) and 2304(b)) relating to the Democratic Republic of the Congo or an adjoining country.

3.7 Conflict minerals[54]:

- Columbite-tantalite (coltan), cassiterite, gold, wolframite, or their derivatives, which are limited to tantalum, tin, and tungsten; and
- Any other mineral or its derivatives determined by the U.S. Secretary of State to be financing conflict in the Democratic Republic of the Congo or an adjoining country.

[52] Ibid

[53] U.S. Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Section 1502

[54] As defined in the U.S. Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Section 1502, and the Securities and Exchange Commission Rule

3.8 Cosmetic blank/dummy: Cover or mockup provided as a placeholder for option(s) and is redundant when provided in excess or redundantly along with the corresponding option(s). Examples may include, but are not limited to: cosmetic covers, blanks, hard drive dummies, power supply dummy, power supply blank, optical drive blank, etc.

3.9 Declaration: When this term refers to specific information, the specified information shall be provided to a publicly available registry of declared products by the manufacturer at the time of product registration and certification; note that "declare" is also used to indicate conformance to the standard and individual criteria. If the manufacturer has the product third-party certified, the information referred to shall be publicly disclosed on the manufacturer's website in the form of a certification report, or equivalent, issued by the certifying organization. If a manufacturer self declares, the information referred to shall be publicly disclosed on the manufacturer's website.

3.10 De-installed: Unplugged equipment that is destined for, or intended to be destined for, removal from a customer site.

3.11 Disclosure: Information made available to the audience specified in criterion (e.g. purchasers, public, etc.).

3.12 Direct reuse: The using again, by a person other than its previous owner, of equipment and components that are not waste for the same purpose for which they were conceived without the necessity of repair, refurbishment or hardware upgrading.

3.13 Disposal: Any operation which does not lead to materials recovery, recycling, reclamation, or reuse of equipment or components, with or without energy reclamation. This includes operations which deposit into, or on, land or water, or via incineration.

3.14 Documentation: Information to be provided at time of verification or certification.

3.15 End-of-life: Life-cycle stage of electronic equipment and components when they are no longer intended for use and are destined, or intended to be destined for, dismantling, material recovery, recycling or disposal.

3.16 End-of-service: Life cycle stage of electronic equipment and components when they are no longer wanted by the customer whether in working order, or not, or suitable of being prepared for reuse.

3.17 Energy recovery: An operation where the material is used principally as a fuel or to generate energy.

3.18 ENERGY STAR certified: A product has been found to be in conformance with the ENERGY STAR Computer Servers eligibility criteria by an ENERGY STAR approved third-party certification body, and the product is listed on the ENERGY STAR Qualified Product List located at <www.energystar.gov>.

3.19 Environmental management system[55]: Part of an organization's management system used to develop and implement its environmental policy and manage its environmental aspects.

NOTE 1 – A management system is a set of interrelated elements used to establish a policy and objectives and to achieve those objectives.

[55] ISO 14001 Second Edition: 2004-11-15

NOTE 2 – A management system includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources.

3.20 External enclosure: The outside casing that houses the components of a system.

3.21 Feedstock: Raw material used in a manufacturing process.

3.22 Fiber-based: Cellulose material derived from trees and other plants.

3.23 Final disposition: The last facility or operation managing equipment and or components and materials derived from them at which they either:

- Cease to be a waste by being processed into materials that will be used directly in manufacturing new products or processes;
- Are prepared for reuse (including direct reuse); and, or
- Have arrived for disposal and are finally disposed.

3.24 Firmware: System, hardware, component, or peripheral programming provided with the product to provide basic instructions for hardware to function inclusive of all applicable programming and hardware updates.

3.25 First customer: Customer who acquires (purchases, leases, receives by donation, etc.) and then uses the new product.

3.26 Greenhouse gas (GHG) inventory: Identification and quantification of emissions and removals of greenhouse gases from manufacturing processes.

3.27 GRI boundary: The area of operations and impact upon which the Global Reporting Initiative (GRI) disclosure is based. The boundary may be "within the organization" or it may include some part of the organization's supply chain.

3.28 Idle state[56]: The operational state in which the OS and other software have completed loading, the computer server is capable of completing workload transactions, but no active workload transactions are requested or pending by the system (i.e., the computer server is operational, but not performing any useful work). For systems where ACPI standards are applicable, idle state correlates only to ACPI System Level S0.

3.29 Impact assessment categories[57]: Classifications of human health and environmental effects caused by a product throughout its life cycle.

3.30 Inventory data[58]: The identification and quantification of energy, resource usage, and environmental emissions for a particular product, process, or activity.

[56] ENERGY STAR Program Requirements for Computer Server Version 2.0

[57] U.S. EPA, Life Cycle Assessment: Principles and Practice, Office of Research and Development. National Risk Management Research Laboratory, Editor 2006, U.S. EPA: Cincinnati, OH.

[58] Ibid

3.31 Life cycle assessment (LCA)[59]: Compilation and evaluation of the inputs, outputs, and the potential environmental impacts of a product system throughout its life cycle.

3.32 Manufacturer: The legal entity that is the owner or the licensee of the brand or trademark under which the product in the scope of this standard is placed on the market, and:

- Manufactures a product; and, or
- Has a product designed or manufactured; and, or
- Acquires a product for sale under their brand or trademark.

3.33 Multi-node server[60]: A computer server that is designed with two or more independent server nodes that share a single enclosure and one or more power supplies. In a multi-node server, power is distributed to all nodes through shared power supplies. Server nodes in a multi-node server are not designed to be hot-swappable.

3.34 Packaging: See packaging system.

3.35 Packaging component[61]: Any individual assembled part of a package such as, but not limited to, (a) any interior or exterior blocking, bracing, cushioning, weatherproofing, exterior strapping, coatings, closures, inks, and labels; (b) tin-plated steel that meets American Society for Testing and Materials (ASTM) A-623; (c) electro-galvanized coated steel and hot-dipped coated galvanized steel that meets ASTM A-525 and A-879.

3.36 Packaging optimization[62]: Process for the achievement of minimum adequate weight or volume (source reduction) for meeting the necessary requirements of primary or secondary or transport packaging, when performance and user/consumer acceptability remain unchanged or adequate, thereby reducing the impact on the environment.

3.37 Packaging system[63]: Complete set of packaging for a packaged good, encompassing one or more of the following that are applicable (depending on the packaged goods): primary packaging, secondary packaging, tertiary (i.e., distribution or transport) packaging.

> NOTE – For the purposes of this Standard, unless otherwise noted in a criterion, product packaging refers to the primary (sales or unit packaging) and secondary (holding two or more primary packages) packing of the product declared to the standard.

3.38 Pedestal server[64]: A self-contained computer server that is designed with PSUs, cooling, I/O devices, and other resources necessary for stand-alone operation. The frame of a pedestal server is similar to that of a tower client computer.

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[59] ISO 14044: 1997(E)
[60] ENERGY STAR Program Requirements for Computer Server Version 2.0
[61] Model Toxics in Packaging Legislation (www.toxicsinpackaging.org)
[62] ISO 18602:2013(E)
[63] ISO 18602: 2013(E)
[64] ENERGY STAR Program Requirements for Computer Server Version 2.0

3.39 Plastic: Material that contains, as an essential ingredient, one or more organic polymeric substances of large molecular weight, is solid in its finished state, and, at some stage in its manufacture or processing into finished articles, can be shaped by flow.

3.40 Polymer: Substance consisting of molecules characterized by the repetition (neglecting ends, branch junctions, other minor irregularities) of one or more types of monomeric units.

3.42 Postconsumer recycled material[65]: Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

NOTE – This definition applies to materials such as plastic, fiber, metal, etc.

3.43 Pre-consumer material[66]: Material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

3.44 Prepared for reuse: Equipment and components that have been checked, tested, cleaned, repaired, and determined to be safe and fully functional, to be placed back on the market in their original use or in their upgraded state, without further processing.

3.45 Printed circuit board: A thin board made of fiberglass, composite epoxy, or other laminate material with conductive pathways etched or "printed" onto the board, connecting different components on the board, such as transistors, resistors, and integrated circuits.

3.47 Principal storage device: Primary hardware, or hard drive, in the product that stores the operating system, applications and data.

3.48 Principal semiconductor device: Primary component of a computer server that runs the operating system and applications.

3.49 Printed circuit board assembly: Printed circuit board with mounted chips and components.

3.50 Product: A computer server:

- Within the scope of the ENERGY STAR Program Requirements for Computer Servers Version 2.0; and
- A marketing model with one or more specific configurations identified, inclusive of the product's full range of configurations and as tested for compliance with ENERGY STAR.

NOTE – ENERGY STAR Program Requirements for Computer Servers Version 2.0 defines a computer server as all hardware and materials contained within the chassis, including the power supply unit.

3.51 Product specification: Product marketing details of key parametric information, such as, but not limited to, number of CPUs, amount of memory, number of internal disk drives, I/O bandwidth, and enclosure dimensions.

[65] ISO 14021, Environmental Labels & Declarations
[66] Ibid

3.52 Rack-mounted server[67]: A computer server that is designed for deployment in a standard 19-inch data center rack as defined by EIA-310, IEC 60297, or DIN 41494. For the purposes of this standard, a blade server is considered under a separate category and excluded from the rack-mounted category.

3.53 Recovery: Operations that are part of a process to recapture elements, compounds, or materials and transform them into commodities which need no further processing, cleaning, separation, or recycling and are not destined for disposal.

3.54 Recyclable: Materials or components that can be removed or recovered from the whole product and put back into productive use as a material or component, not including energy recovery, using standard technologies, or as otherwise demonstrated.

3.55 Recycled content[68]: Proportion, by mass, of recycled material in a product or packaging. Only pre-consumer and post-consumer materials shall be considered as recycled content.

3.56 Recycling: Operations by which products, components, materials, or waste are processed and converted into raw materials for use in the production of new products or in processes, not including energy recovery or disposal.

3.57 Refurbishment: Functional or aesthetic maintenance or repair of a product to restore to original or upgraded state.

3.58 Reuse: Using again, equipment or components for the originally intended purpose or in an upgraded state, possibly after refurbishment, repair or hardware upgrading.

3.59 Reuse facility: Location where end-of-service or end-of-life equipment or components are prepared for reuse.

3.60 Reuse operator: The entity responsible for preparing equipment or components for reuse.

3.61 Semiconductor manufacturing tools: Processing and cleaning steps using perfluorocompounds (PFCs) for chemical vapor deposition and to etch patterns onto silicon wafers.

3.62 Sensitivity analysis[69]: A systematic evaluation process for describing the effect of variation of inputs to a system on the output.

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3.63 Substance[70]: Matter of constant composition best characterized by the entities (molecules, formula units, atoms) it is composed of. Physical properties such as density, refractive index, electric conductivity, melting point etc. characterize the chemical substance.

3.64 Supplier: Entity that provides goods or services.

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[67] ENERGY STAR Program Requirements for Computer Server Version 2.0

[68] ISO 14021, Environmental Labels & Declarations

[69] U.S. EPA, Life Cycle Assessment: Principles and Practice, Office of Research and Development. National Risk Management Research Laboratory, Editor 2006, U.S. EPA: Cincinnati, OH.

[70] IUPAC, Compendium of Chemical Terminology, 2nd ed. (the "Gold Book") http://goldbook.iupac.org/C01039.html

3.65 Tier 1 suppliers: Companies that provide the manufacturer with materials, components, subassemblies, manufacturing services, or product assembly services, and with which the manufacturer has a contractual relationship.

3.66 Treatment: Material recovery or disposal operations, including preparation prior to recovery or disposal.

3.67 Treatment facility: Location where end-of-life equipment, components, or materials undergo treatment.

3.68 Treatment operator: The entity responsible for the treatment of equipment or components.

4 Conformance, evaluation and assessment

This standard is divided into nine environmental categories consisting of prerequisite criteria and optional criteria:

- Energy efficiency
- Management of substances
- Preferable materials use
- Product packaging
- Design for repair, reuse and recycling
- Product longevity
- Responsible end-of-service/end-of-life management
- Life cycle assessment
- Corporate responsibility

4.1 Criteria

A summary of all criteria in this standard, including prerequisites and optional points, is provided in Annex A.

4.1.1 Prerequisites

Each category has prerequisites that must be met in order to conform to this standard.

Table 4.1

Prerequisites	
5 Energy efficiency	
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	13.1.3 Manufacturer conformance with occupational health and safety performance

4.1.2 Optional points

Once the prerequisites are met, products may achieve higher levels of conformance by meeting a specified percentage of optional criteria.

4.1.3 Product and corporate criteria

This standard includes two types of criteria.

- Product criteria: Applies to the product declared to conform to the standard.

- Corporate criteria: Applies to the company that declares products to conform to this Standard. These criteria are noted in the standard.

4.1.4 Country or region specific criteria

With regard to being region or country specific, there are only the three following options for criteria:

- If the criterion does not specify, then requirements must be met globally (i.e., wherever the product is sold); or

- If the criterion specifies, “This requirement is applicable only in countries or regions for which the product is declared to conform to this standard”, then the requirement must be met for conformance in those countries or regions; or

- The criterion may specify, “This criterion may be declared differently by country or region.” in which case the criterion may be declared differently by country or region.

  NOTE – Region means countries and territories whose independence is not recognized by all countries (e.g., Taiwan)

4.1.5 Units of measure

Unless specified otherwise, units of measure within this standard shall be reported in metric units.

4.1.6 Dated and undated references

A reference to another standard or regulation is either dated or undated.

- Dated standards or regulations remain the reference in this NSF standard even if the referenced standard or regulation is subsequently amended or replaced.

- Undated standards or regulations will automatically update within this NSF standard when the referenced standard or regulation is updated (including any amendments or corrigenda). In order to remain in conformance with this NSF standard, the product and, or manufacturer shall conform to the referenced aspects of the updated standard or regulation when it goes into effect, as applicable.

- For EU Directives, which contain the adoption date in their title, shall not be treated as “dated standards or regulations” (as defined above). Unless explicitly indicated otherwise, when an EU Directive is referenced in this NSF standard, a new or updated EU Directive shall apply as the referenced Directive upon its enforcement date.

4.1.7 Declare, disclose, and document

Within this Standard, these three terms are used as follows.

- **Declaration/declare** – When these terms refer to specific information, the specified information shall be provided to a publicly available registry of declared products by the manufacturer at the time of product registration and certification; note that "declare" is also used to indicate conformance to the standard and individual criteria. If the manufacturer has the product third-party certified, the information referred to shall be publicly disclosed on the manufacturer's website in the form of a certification report, or equivalent, issued by the certifying organization. If a manufacturer self declares, the information referred to shall be publicly disclosed on the manufacturer's website.

- **Disclosure/disclose** – Information made available to the audience specified in criterion (e.g., purchasers, public, etc.).

- **Documentation/document** – Information to be provided at time of verification or certification.

4.2 Levels of conformance

There are three levels of conformance.

- Bronze – meets all prerequisites
- Silver – meets all prerequisites plus at least 50% of the optional criteria points
- Gold – meets all prerequisites plus at least 75% of the optional criteria points

The optional points can come from any of the environmental categories. Prerequisites can be assigned to levels of conformance.

If the option of declaring "Not Applicable (NA)" is provided in an optional criterion, for product registrations that declare NA, the calculation of the total number of available optional points shall not include that criterion.

5 Energy efficiency

5.1 Prerequisites

5.1.1 ENERGY STAR

The product shall conform with the current version, and maintain conformance with any subsequent versions of the ENERGY STAR Computer Servers program, as per the requirements in Table 5.1 below.

Table 5.1

Region or Country	Requirement
U.S. and Canada	• Product shall be ENERGY STAR certified
ENERGY STAR international partner countries or regions	• Product shall conform with the international partner country's or region's current ENERGY STAR Computer Servers Qualification Criteria; or • Product shall be on the country's or region's ENERGY STAR qualified product listing
Countries or regions that are not ENERGY STAR international partners	• Product shall conform with the current version of the U.S. and Canada ENERGY STAR Computer Servers Eligibility Criteria

Manufacturer shall declare to which of the above the product conforms. This criterion may be declared differently by country or region.

5.1.2 Allowable temperature and humidity specifications

Product specification shall support Class A1 allowable environmental operating range published in the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments, 3rd Edition, in Table 2.3, on a continuous basis.

5.1.3 Reduction of ENERGY STAR idle state power allowances (prerequisite for Bronze, Silver and Gold)

The product shall meet the idle state power allowances specified in Table 5.2 below as prerequisites. The idle state power shall be measured as required in the ENERGY STAR Program Requirements for Computer Servers Version 2.0.

These requirements are applicable to only one- and two-socket products. If the product is not a one- or two-socket system, "Not Applicable" may be declared.

Table 5.2

Category (as used in ENERGY STAR[71])	Maximum Possible Number of Installed Processors (#P)[72]	Managed Server[73]	**Prerequisite for Bronze** Base Idle State Power Allowance, P_{base} (watts) (as required by ENERGY STAR[74])	**Prerequisite for Silver** Base Idle State Power Allowance (watts)	**Prerequisite for Gold** Base Idle State Power Allowance (watts)
A	1	No	47	30	18.8
B	1	Yes	57	37	22.8
C	2	No	92	60	36.8
D	2	Yes	142	92	57
Resilient	2	Yes	205	133	82

With additional memory, the base idle state power allowance is reduced from 0.75 watts per GB to 2 watts per DIMM for DIMMs of 16 GB or less, and 0.20 watts per GB for DIMMs over 16 GB. All other allowances are kept the same as ENERGY STAR Program Requirements for Computer Servers Version 2.0.

Manufacturer shall declare the category and performance tier (Bronze, Silver or Gold) for the product.

5.2 Power supply efficiency (optional)

5.2.1 80 plus program

The product shall include power supplies rated through the 80 Plus program and listed on the 80 Plus program and listed on the 80 Plus website http://www.plugloadsolutions.com/80PlusPowerSupplies.aspx or shall meet the requirements in Table 5.3 below. Manufacturer may claim the points associated with only one 80 Plus level.

Table 5.3

Power Supply Unit	80 Plus Level	Points
Single Output	Platinum	1
	Titanium	2
Multi Output	Gold	1
	Platinum	2
	Titanium	3

Manufacturer shall declare whether the product contains single output or multi-output power supply units (PSUs).

Point value: 1, 2 or 3.

[71] ENERGY STAR® Program Requirements Product Specification for Computer Servers Eligibility Criteria Version 2.0
[72] Ibid
[73] Ibid
[74] Ibid

5.3 Systems energy efficiency (optional)

5.3.1 Energy efficient supply chains

Integrated circuits or printed circuit boards (PCB) shall be manufactured by at least one supplier at a facility that is certified as Superior Energy Performance™ (SEP) Silver level or higher at the time of manufacture. Demonstration of conformance shall include documentation that the component(s) originated at a facility with SEP certificates provided through ANSI-ANAB-accredited SEP verification bodies.

Point value: 2.

> NOTE – Facilities that manufacture PCB assemblies may be used to meet this criterion only if they also manufacture the bare PCB.

5.3.2 Reduce energy lost from power conversion

The product shall operate at high voltage AC power as shown in Table 5.4 to reduce energy loss from power conversion during distribution and provide an overall higher system efficiency. The product shall be tested using the methodology specified in the ENERGY STAR Program Requirements for Computer Servers.

Table 5.4

High Voltage AC Power	Points
400/230v or 480/277v	1
600v or higher	2

Point value: 1 or 2.

5.3.3 Advanced allowable temperature and humidity specifications

Product specifications shall support the requirements below in Table 5.5 for allowable environmental operating ranges published in the ASHRAE Thermal Guidelines for Data Processing Environments, 3rd Edition, Table 2.3, on a continuous basis.

Table 5.5

ASHRAE allowable environmental operating ranges	Points
Class A2;	1
Or Class A3;	3
Or Class A4	6

Point value: 1, 3 or 6.

5.3.4 Logged server activity metrics

Product shall have the capability to log the metrics in Table 5.6 below. Manufacturer may claim one point for each set of logged metrics listed in the table.

Table 5.6

Logged Metrics	Points
• Total system power draw (watts); and • CPU percent utilization (% of maximum CPU utilization); and • Server inlet temperature (degrees Celsius)	1
• Physical memory utilization (% total); and • Network utilization (% total bandwidth); and • Disk I/O usage (% total bandwidth)	1

This capability shall be enabled in the as-shipped default configuration and shall perform the measurements, processing, logging and file management automatically. Data shall be accessible by the user with appropriate authority.

Data acquisition and format shall be consistent with Annex B.

Point value: maximum 2.

6 Management of substances

6.1 Prerequisites

6.1.1 Conformance with European Union RoHS Directive

The product shall meet the substance restriction requirements of the European Union RoHS Directive. All exemptions to the substance restrictions as defined by the Directive are applicable.

Demonstration of conformity to this requirement shall include documentation as required by the EU RoHS Directive including the technical documentation[75] and declaration of conformity.

6.1.2 Conformance with European Union Battery Directive

Batteries in the product shall meet the substance restriction requirements of the European Battery Directive.

If the product does not contain batteries, “Not Applicable” may be declared.

6.1.3 Inventory of declarable substances

Manufacturer shall inventory the presence of IEC 62474 declarable substance groups and declarable substances in the product at or above the reporting threshold amounts stated in the IEC 62474 standard, using the version of IEC 62474 which is current at the time the product is declared to conform to this

[75] Technical documentation can be generated per standard EN 50581 or equivalent; the EU Commission has identified EN 50581 as a harmonized standard for EU RoHS technical documentation.

standard. The inventory shall include all declarable substance groups and declarable substances designated criteria 1, 2 and 3 of IEC 62474.

The manufacturer shall have an effective supply chain management process to manage, maintain, and update all data received on declarable substances as listed in IEC 62474. The manufacturer shall provide documentation of 1) the process to collect and manage the data; and 2) a process to keep the data current.

6.1.4 Reduction of Bromine and Chlorine content of plastic parts > 25 grams

If the product contains any plastic parts exceeding 25 grams which contain greater than 1000 ppm chlorine or greater than 1000 ppm bromine[76] as determined by test method EN 14582, the manufacturer shall conduct an alternatives assessment on the substance(s) responsible for the observed bromine and, or chlorine levels in accordance with criterion 6.3.4. Parts which exceed 25% postconsumer recycled content may contain a maximum of 3000 ppm chlorine and a maximum of 3000 ppm bromine before an alternatives assessment is required.

Manufacturer shall provide documentation that any plastic parts exceeding 25 grams in the product contain less than 1000 ppm chlorine and less than 1000 ppm bromine, or if they contain greater than 25% postconsumer recycled content, that they contain less than 3000 ppm chlorine and less than 3000 ppm bromine, or shall provide the required documentation stated in criterion 6.3.4.

If the product does not contain plastic parts > 25 g, “Not Applicable” may be declared.

6.2 Further reduction of substances of concern (optional)

6.2.1 Reduction of substances on the European Union REACH Regulation Candidate List of Substances of Very High Concern

The product shall not contain substances on the Candidate List of Substances of Very High Concern[77] (SVHC) above 0.1% by weight per ”article”, as per Article 33 paragraph 1 of the REACH regulation and interpreted according to the European Chemicals Agency “Guidance on requirements for substances in articles.” All SVHCs with a *Date of inclusion* one year or more before the product is declared to conform to this criterion are subject to this requirement.

Manufacturer shall document that a supply chain management system, which may include supplier management and grading procedures, material declaration and disclosure, as well as analytical testing, is used to ensure that the product does not contain these substances.

Point value: 1.

[76] Based on chlorine and bromine thresholds specified in IEC 62474 Material declaration for products of and for the electrotechnical industry

[77] Candidate List of Substances of Very High Concern: http://echa.europa.eu/web/guest/candidate-list-table.

6.3 Supply chain management and inventory of substances (optional)

6.3.1 Disclosure of declarable substances

Manufacturer shall make publicly available on their website the inventory generated for conformance with Criterion 6.1.3. The inventory shall contain the CAS number for each declarable substance (not including declarable substance groups). The link to the inventory shall be placed on the product specification or documentation web page. The manufacturer shall declare the URL of the public disclosure.

The product specification or documentation means the product marketing details of key parametric information, such as, but not limited to, number of CPUs, amount of memory, number of internal disk drives, I/O bandwidth, and enclosure dimensions.

Point value: 1.

6.3.2 Requesting full substance inventory

The manufacturer shall have a record of having requested from suppliers (or otherwise have access to) a complete list of the substances (full substance/material declaration), including their individual mass and CAS numbers, in each item that may be assembled into the product.

The manufacturer shall also have a process and a database, either in-house or through a third-party service provider, to manage and maintain all data received. The manufacturer shall provide documentation of the process to:

1) Collect and manage the data;

2) Keep the database current for the active bill of materials (BOM), including a policy for:

    a) Notification of material changes or supplier changes; and

    b) Suppliers to resubmit data every 3 years

3) Demonstrate the database system's ability to manage detailed substance-level disclosure information; and

4) Demonstrate the database's ability to record and sum the collected information to enable metric calculation of the supplier information that has been received, as is relevant to 6.3.3, including the percentage mass of the covered product, or the percentage of unique parts for the covered product.

The intent of this criterion is to demonstrate that the manufacturer has made a good faith effort to obtain full substance inventory from their suppliers.

NOTE – For items that are multi-sourced (i.e., have multiple approved manufacturer part numbers) the reference to "each item that may be assembled into the product" includes all approved manufacturer part numbers.

NOTE – "Each item that may ne assembled into the product" includes materials that may be added during assembly such as lubricants and adhesives.

NOTE – "Request" means either the manufacturer, or agent, or supplier of the manufacturer has requested this information in writing from the supplier and has a documented response from the supplier

representative, or has a contractual agreement between the manufacturer and the supplier that requires the supplier to provide this information.

Point value: 2

6.3.3 Acquiring substance inventory

The manufacturer shall demonstrate that it has in the database, per 6.3.2, a complete list of the substances in the products/components supplied to the manufacturer, down to the part level, from its suppliers, as specified in the table below. This requirement allows for up to 5% by mass, per part, of the substances to not be reported if they are confidential business information.

Conformity to this criterion shall be demonstrated based on the approved manufacturer parts (unique parts) for which the manufacturer has a complete list of the substances, as compared to all approved manufacturer parts on the product bill of materials. A combination of the following metrics shall be used (both metrics need to be met to receive the points):

- Percentage of mass of the parts for which the manufacturer has a complete list of the substances; and

- Percentage of unique parts for which the manufacturer has a complete list of the substances.

Manufacturer may claim the points associated with only one level in Table 6.1

Table 6.1

Data Acquired on Substance Inventory % mass and % of approved unique parts on bill of materials	Points
Minimum of 70% of total mass and minimum of 50% of unique parts	1
Minimum of 85% of total mass and minimum of 65% of unique parts	2
Minimum of 95% of total mass and minimum of 80% of unique parts	3
Minimum of 99% of total mass and minimum 95% of unique parts	4

The manufacturer shall have a system for validating reports or other substance ingredient declarations from its suppliers.

Point value: 1, 2, 3 or 4.

6.3.4 Alternatives assessment

Manufacturer shall document that it or a supplier or a third party has performed an alternatives assessment on at least one substance of concern included in the product or manufacturing process. The substance shall be listed in the "Declarable Substances List" (Table A) of IEC 62474, Material Declaration for Products of and for the Electro-technical Industry or listed as a carcinogen, mutagen, reproductive toxicant, persistent, bioaccumulative, and toxic (PBT) substance, or endocrine disruptor in the lists in Annex C of this standard. Manufacturer shall consider exposure and risk throughout the life cycle as part of the substance selection process.

This assessment shall be performed consistent with one of the following frameworks[78]:

- Interstate Chemicals Clearinghouse *Alternative Assessment Guide,* Hybrid or Sequential Frameworks[79]

- Report of the National Academies of Science project "Design and Evaluation of Safer Chemical Substitutions – A Framework to Inform Government and Industry Decisions"[80]

An alternatives assessment performed on a substance application from a prior-shipped product is considered sufficient if the application is demonstrated to be relevant to the product to which this standard is being applied.

Manufacturer documentation of the alternatives assessment shall include:

- Framework used;

- Date of completion of the assessment; the assessment shall have been completed no more than one year prior to the date the product is declared to conform to this criterion;

- Substances evaluated;

- Which of the following outcomes resulted from their alternative assessment:

  - A safer alternative was identified and used as the substitute for the original substance; or

  - The original substance was determined to be safer than, or as safe as, the evaluated potential alternative, or

  - A safer alternative was identified but is not commercially or technically viable for that application per the requirements of the framework used; or

  - The need for the function provided by the substance was eliminated.

An alternative assessment performed under 6.1.4 shall not be eligible for this optional criterion.

Point value: 2.

6.3.5 Making alternatives assessment publicly available

The manufacturer shall publicly disclose the documentation required for conformance with criterion 6.3.4 and provide a list of criteria and weighting used in the alternative assembly by either:

[78] Other alternatives assessment frameworks are under development and may be included in later versions of this standard when published. For example, a guidance document is being developed for the California Safer Products regulations–CA Code of Regulations Title 22, Division 4.5, Chapter 55 Article 5, Sections 69505.5-69505.7

[79] www.newmoa.org/prevention/ic2/IC2_AA_Guide-Version_1.pdf

[80] http://www.nap.edu/catalog.php?record_id=18872

- Posting on a publicly accessible database such as the Substitution Support Portal (SUBSPORT)[81] or the IC2 Database[82], or

- Making the documentation accessible on the manufacturer's website.

In the case of an assessment done as part of a partnership or industry consortium, the other participating parties shall be named.

The manufacturer shall declare the URL of the public disclosure.

Point value: 1.

6.4 Greenhouse gas emissions (optional)

6.4.1 Reduce fluorinated greenhouse gas/N_2O emissions resulting from semiconductor manufacturing

The manufacturer shall declare that at least one supplier of central processing units (CPUs) and, or dynamic random-access memory (DRAM) used in the product has installed abatement systems designed, operated, and maintained specifically to destroy or remove fluorinated greenhouse gases (F-GHGs) and nitrous oxide (N_2O) used in the manufacture of CPUs and, or DRAM. These systems shall be installed on all CPU and, or DRAM manufacturing tools to the maximum extent physically and technically feasible.[83] The intent of this criterion is to facilitate destruction or removal of F-GHG and N_2O emissions that result from CPU and, or DRAM manufacturing.

This declaration shall be supported with a letter provided by the CPU and, or DRAM supplier. Examples of F-GHGs include, but are not limited to, CF_4, C_2F_6, C_3F_8, c-C_4F_8, C_4F_8O, CHF_3, CH_2F_2, NF_3, and SF_6. To the extent that installing abatement systems is not feasible or where equally or more effective means of reducing emissions exist, manufacturers shall demonstrate implementation of such methods (e.g., use of alternatives) to reduce emissions to the extent possible.

The supplier letter shall assure the following:

- That abatement systems have been installed on all manufacturing tools that use F-GHG and N_2O (i.e., etching and cleaning tools) to the extent physically and technically feasible or the supplier has eliminated the use of F-GHG /N_2O in manufacturing. If abatement systems cannot be installed on all manufacturing tools, the letter shall:

  - Demonstrate why it is not possible to install abatement systems on all manufacturing tools.

  - Describe how the supplier reduced its F-GHG/N_2O emissions. For example, if the supplier's emissions reductions also resulted from the use of alternative gases, process optimization, and, or recovery and, or recycling, the use and impact of those strategies should be explained.

[81] http://www.subsport.eu/about-the-portal

[82] http://www.newmoa.org/prevention/ic2/projects/resource/hazassesstool.cfm

[83] It may not be feasible to install control technologies on all manufacturing tools due to space limitations in the fab or sub fab, or other physical and technical restrictions.

– That the supplier has worked with the abatement system provider to develop and adhere to company-specific operation and maintenance procedures and schedules.

– That the supplier has tested the abatement systems according to the EPA's Protocol for Measuring Destruction or Removal Efficiency (DRE) of Fluorinated Greenhouse Gas Abatement Equipment in Electronics Manufacturing (EPA DRE Protocol[84]) or other abatement system test procedures outlined in subpart I to ensure the systems are performing as intended.

– That the supplier has developed a GHG inventory of F-GHG and N_2O emissions associated with its CPU and, or DRAM manufacturing process (including fluorinated heat transfer fluids) expressed in tons of CO_2e using the 2006 IPCC Tier 2a, 2b or Tier 3 methodology, or subpart I of EPA's GHG Reporting Rule.

– That the supplier publicly reports its GHG inventory of F-GHG and N_2O emissions.

Point value: 1.

7 Preferable materials use

7.1 Prerequisites

7.1.1 External enclosure

External enclosure shall consist of one or more of the following materials each of which comprise separable parts:

– Steel or aluminum alloys; or

– Plastic containing a minimum of 20% postconsumer recycled (PCR) plastic; or

– A material demonstrated to have lower environmental impact than those listed above based on an LCA conducted in accordance with criterion 11.2.1.

Manufacturer shall declare the materials used in the external enclosure. If plastic, manufacturer shall demonstrate conformance by providing a supplier letter stating the following: minimum percentage of PCR plastic in the materials supplied to the manufacturer or to the manufacturer's part supplier. If steel or aluminum alloys are used, then no recycled content documentation is required.

7.1.2 Disclosure of postconsumer recycled content

Manufacturer shall declare the minimum percentage by weight of PCR content in the product. The following equation shall be used to calculate the percentage:

$$\frac{\text{PCR material by weight}}{\text{total material (of the type in the numerator) by weight, less exclusions}} \times 100 = \%\ \text{PCR content}$$

[84] http://www.epa.gov/semiconductor-pfc/documents/dre_protocol.pdf

In the calculation:

- Parts < 25 g and printed circuit board assemblies may be excluded.
- Only material derived from PCR feedstock shall be included in the numerator.
- Additives and fillers that are not derived from PCR feedstock shall not be included in the numerator.
- Additives and fillers used in material shall be included in the denominator.

The entire weight of the product, less exclusions, shall be included in the denominator. Manufacturer may choose not to calculate the PCR content of individual components, parts or the entire product. If the manufacturer chooses not to calculate the PCR content, "unknown" shall be declared. If "0" or "unknown" is declared for the entire product, manufacturer cannot claim optional points in Section 7.2 of this standard.

7.2 Recycled content (optional)

7.2.1 Postconsumer recycled content

The use of PCR material in the product, shall be awarded points according to Table 7.1 below. Manufacturer may claim one point for each achievement listed in the table.

Table 7.1

Postconsumer Recycled Content	Points
≥ 10% PCR plastic	1
≥ 25 % PCR plastic	1
≥ 25 % PCR metal	1
≥10 % derived WEEE plastic	1
Demonstrated conformity with a material traceability standard[85]	1

The equation in 7.1.2 shall be used to calculate the percentage.

For all points claimed, documentation shall include:

- A list of plastic and, or metal parts ≥ 25 g, weight of each part and percentage PCR content (see Annex D for an example template).
- A letter from the supplier of the material stating the origin(s) of PCR material and the minimum percentage of PCR content supplied to the manufacturer or manufacturer's fabricated parts supplier. Information on origin of materials (e.g., material type/form, product type, sourcing) shall be sufficient to demonstrate that materials are traceable to postconsumer sources.

[85] Including DIN EN 15343:2008-02 or UL 746D that demonstrate a system for material-identity and quality control of PCR content.

The weight of all parts and components for a material, less exclusions, shall be in the product weight. Manufacturer may choose not to calculate the PCR content of individual components and parts.

Point value: maximum 5.

7.2.2 Postconsumer recycled content of rare earth elements

Product shall contain a hard drive with actuator/voice coil or spindle magnets which contain 5% or more PCR content neodymium or dysprosium by weight of neodymium or dysprosium in the magnet. The neodymium or dysprosium shall be provided through the recycling of magnets from used devices. Manufacturer shall provide documentation from the disk drive supplier confirming that the product contains a hard drive with 5% or more PCR content neodymium or dysprosium.

Point value: 2.

7.3 Material efficiency/dematerialization (optional)

7.3.1 Reduction of surplus parts by default

The manufacturer shall document and implement a customization program to reduce surplus parts. The program shall identify the minimal product configuration, as determined by the manufacturer and outlined below:

- Keyboards/mice – zero by default; 1 keyboard and, or 1 mouse as options. Indicate connector required (e.g., PS/2, USB, specific).
- Power cables (where appropriate) – zero by default; 1 for each power supply as option.
- Mounting hardware – zero by default; specific mounting hardware as an option.
- Documentation and advertising – zero by default; 1 per server type in order as option.
- Installation media – zero by default; 1 per server type in order as option.
- Cosmetic blanks/dummies – option of not receiving parts that are not required.
- Fans – include option of ordering minimum as determined by manufacturer.

The manufacturer shall declare whether there is additional cost to the purchaser for the above customization options.

Point value: 1.

8 Product packaging

8.1 Prerequisites

8.1.1 Elimination of substances of concern in product packaging

Product packaging shall not contain lead, mercury, cadmium or hexavalent chromium above a total of 100 ppm for the four metals combined in any packaging component, in accordance with the European Union Packaging Directive and the Model Toxics in Packaging Legislation.

8.1.2 Enhancing recyclability of packaging materials

Product packaging shall meet the following requirements:

- All non-reusable packaging components ≥25 g shall be separable by material type, including by plastic material type specified in the bullet below, without the use of tools, with the exception of labels affixed to plastics bags or wraps, staples, and nails in pallets.

- All plastics ≥ 25 g shall be clearly marked with material type in accordance with ISO 11469/1043, ASTM D7611/D7611M, or DIN[86], with the exception of plastic films.

8.1.3 Recycled content fiber in packaging

Fiber-based packaging materials shall contain a minimum percentage recycled content fiber (by fiber weight) as specified in Table 8.1. Manufacturers shall also state a preference in purchasing specifications, which are applicable to the product, for a minimum 25 percent postconsumer recycled content fiber (by fiber weight). Fiber-based packaging materials derived from alternative sources to traditional paper mill products (such as bamboo or mushrooms) are exempt from this recycled fiber requirement and shall not be included in the calculation of recycled content.

Table 8.1

Packaging Category	Percentage Recycled Content Fiber (by fiber weight)
Corrugated containers	50
All other fiber-based packaging	80

8.1.4 Elimination of individual packaging for hardware and components

All hardware and components required for normal operation of the server (and shipped with the product) shall be shipped inside the server. Exceptions are components and accessories normally used external to the server such as power cords, keyboard, or mounting rails. No hardware shall be shipped in individual or separate packaging, either within the primary or secondary packaging container or within the server product.

[86] DIN 6120-1 - Marking of packaging and packaging materials for recycling purposes - Plastics packaging and packaging materials - Part 1: Graphical symbols (http://www.en-standard.eu)

8.1.5 Elimination of chlorine in processing packaging materials

Manufacturer shall document with a supplier letter that any fiber-based materials used in packaging was not bleached with chlorine compounds. This requirement applies to the bleaching of fiber-based materials (including recycled fiber) and their fabrication into packaging for server products declared to conform to this standard, and not to prior uses of the fiber.

8.2 Recycled content packaging (optional)

8.2.1 Higher recycled content fiber in packaging

Fiber-based packaging materials shall contain a minimum percentage recycled content fiber (by fiber weight) as specified in Table 8.2.

Table 8.2

Packaging Category	Percentage Recycled Content Fiber (by fiber weight)
Corrugated containers	80
All other fiber-based packaging	100

If the product packaging does not contain fiber-based packaging “Not Applicable” may be declared.

This criterion may be declared differently in different countries or regions.

Point value: 1.

8.3 Packaging reduction (optional)

8.3.1 Optimization of packaging system to reduce excess packaging

Manufacturers shall routinely evaluate packaging systems with the goal of reducing the amount of packaging materials used while providing appropriate levels of protection for the products shipped. Optional points (not to exceed 4 points) are awarded for a) packaging system evaluation (1 point); b) documentation of a reduction in the amount (by weight) of packaging materials (up to 2 points); and c) optimization of the packaging system (2 points).

The Global Protocol on Packaging Sustainability 2.0 may provide useful guidance in the implementation of this criterion.

8.3.1a Packaging system evaluation

Performance testing shall be conducted on the product packaging to determine the required level of protection and avoid excess packaging. As per ISO 18602, Packaging and the environment: Optimization of the packaging system, manufacturer shall determine and substantiate the single performance criterion that dictates the weight of each packaging constituent for delivery of the product to the customer. Consideration should be given to product redesign in cases where product fragility requires extra protection. Conformance to this criterion requires documentation of performance testing on the packaging

applicable to this product conducted within at most two years prior to declaration of conformance to this criterion. (1 point)

8.3.1b Demonstration of packaging reduction

Manufacturer shall document at least a 10% reduction in the amount of packaging materials used in the delivery of the product. Table 8.3 provides examples of packaging reduction strategies eligible for optional points, the metric that shall be used to demonstrate and document the reduction, and additional documentation requirements for specific reduction strategies. These strategies may be implemented to reduce packaging between the manufacturer and its suppliers, between the manufacturer and end-use customers, or both.

Documentation of packaging material reductions shall include at a minimum:

- A description of the change that resulted in a reduction in the amount of packaging materials, including the implementation date;

- A listing of all packaging materials and their weight used in the immediate previous and current packaging system for which a material reduction is claimed;

- Calculation demonstrating packaging reduction using metric in Table 8.3;

- The amount of packaging reduced annually, including the total for the packaging system and by material. If the strategy was implemented within the previous 18 months (to either the declaration of conformance to this criterion or product verification), an estimate of the reduction is acceptable.

- If the amount of packaging material is reduced due to the use of an alternative material, the manufacturer must demonstrate a net reduction in environmental impact (e.g., reduction in toxicity or life cycle energy use).

Manufacturer shall earn one optional point for implementation and documentation of each packaging reduction strategy, up to 2 points. Conformance to this criterion requires documentation of packaging reduction as specified above, which is applicable to this product and implemented for the declared product within at most two years prior to declaration of conformance to this criterion.

Table 8.3

Reduction strategy	Metric	Additional Documentation	Points
Amount of packaging materials used to deliver product to end use customer	Packaging to product ratio (by weight): the ratio of the weight of all packaging materials used to the weight of the product delivered. The calculation shall include all packaging constituents in the packaging system (i.e., primary, secondary, and tertiary packaging.)	None	1
Reuse of packaging - Between suppliers and manufacturer - For delivery to end-use customer - From supplier to manufacturer to end-use customer (i.e., the manufacturer utilizes the packaging that the chassis was shipped in)	Packaging reuse rate: the number of times the packaging is used	- Statement of percentage of packages reused vs. single use and average number of times packaging is reused	1
Multi-packs for delivery of two or more products to end-use customer	Packaging to product ratio (by weight): the ratio of the weight of all packaging materials used to the weight of the product delivered. The calculation shall include all packaging constituents in the packaging system (i.e., primary, secondary, and tertiary packaging.)	- Schematic drawing of the multi-pack options - Demonstration that customers are offered this option at the point of purchase - Statement of percentage of products shipped in multi-packs	1

8.3.1c Packaging optimization

Manufacturer shall provide proof of achievement of minimum packaging weight for all packaging constituents in the packaging system (primary, secondary, and tertiary) for product shipped to the customer. If claiming packaging optimization (8.3.1.3), manufacturer shall:

- Also conform with 8.3.1a;
- Not claim a reduction in the amount of packaging materials in 8.3.1b.

A manufacturer may claim 8.3.1c and packaging reuse or use of multipacks (1 point).

Point value: maximum 4 for 8.3.1a, 8.3.1b and 8.3.1c.

9 Design for repair, reuse and recycling

9.1 Prerequisites

9.1.1 Design for repair, reuse and recycling

The product shall be designed with the following features to facilitate repair, preparation for reuse, recycling, and safe handling.

- External enclosures shall be removable by hand or with commonly available tools, without destruction of the enclosure.

- Components with special handling needs listed in the European WEEE Directive 2012/19/EU Annex VII shall be identified, accessible, and removable by hand or with commonly available tools.

- At a minimum, if present in the product, data drives or cards, processor, memory DIMMs, power supply, fans and I/O cards, shall be accessible and replaceable by hand or with commonly available tools.

- Wires and cables that connect to external sources of power or data shall be removable from the products by hand or with commonly available tools without either the wire or cable, or the product being rendered unusable, unless required for technical or safety reasons.

In order for a component to be considered "accessible" for the purposes of this criterion it shall, following removal of the external enclosure, be visible without removal of other components and shall be removable without having to remove more than two other components. The removal referred to in this paragraph shall be non-destructive.

In order for a component to be considered "identified" for the purposes of this criterion either the component shall be called out in the product disassembly report called for in prerequisite 9.1.4 or marked with a visual display as called for in 9.3.1.

9.1.3 Product recyclability calculation and minimum 90% recyclability rate

Manufacturer shall perform a calculation for the recyclability of the product using the IEC TR62635 methodology, and shall make the assumptions, methodology and calculation results publicly available and readily accessible on their website. A link to that information shall be declared.

The product shall have a minimum recyclability rate of 90% by weight based on technology and processes available at the time the product is declared to conform to this standard.

Determination of the recyclability rate shall start with the receipt of the untreated waste equipment (if beyond reuse) and end when the end-of-waste status for fractions is achieved. Printed circuit board substrate material, included in printed circuit boards that will be sent to a smelter for metals recycling, shall be considered recyclable for the purpose of the calculation.

The methodology shall identify the recycling technologies and practices that are sufficient for achieving the claimed recyclability rate. These technologies and practices must be common in existing recycling systems, though they need not be available everywhere or throughout the world. Also, the methodology shall identify the information about the product from the manufacturer which would be needed by a treatment operator in order to achieve the claimed rates.

9.1.4 Information and reporting in preparation for reuse and recycling (prerequisite for Silver and Gold)

The manufacturer shall publish a manual for third-party reuse and recycling organizations, in at least English, with the information listed below, including the same information as provided by the manufacturer for use by its technicians for the same purposes as follows:

- Manual shall be available on a publicly accessible website without restriction of access. The manufacturer shall declare the URL of the public disclosure.

- The manual shall be available in any region or country in which the criterion is declared and the manufacturer shall have a written procedure that makes the manual publicly available for a minimum of 7 years following the end of production of the product.

The manual shall contain the following information about preparation for reuse and recycling:

- The different components and materials; and

- The location of materials with special handling needs as identified in European WEEE Directive 2012/19/EU Annex VII ; and

- Technical reference of each individual sub-assembly providing 1) a pin diagram, and 2) the make and model of each connector capable of being field terminated, as provided to manufacturer repair/authorized service centers; and

- The components that cannot be replaced by non-manufacturer supplied components; and

- A list, updated at least annually, of any components provided by the manufacturer that are compatible or equivalent with original components; and

- A disassembly or end-of-life characterization report that demonstrates conformity to all the prerequisites in Section 9.1 and includes, at a minimum, step-by-step disassembly instructions with required tools, product specifications and troubleshooting information.

The function specified in the manufacturer's user manual, repair manual or technical manual should be used to determine original intended function, and to assist with the preparation for reuse or treatment operations.

The manual shall meet the following formatting requirements:

- Available in user-friendly formatting on the web and as downloadable PDFs for offline viewing; and

- Available in machine-friendly file format: either XML or oManual/IEEE 1874 – IEEE Standard for Documentation Schema for Repair and Assembly of Electronic Devices; and

- Provided under an open-source license that allows redistribution and modification, such as Creative Commons (www.creativecommons.org) (CC-BY).

9.1.5 Functionality testing software tools

The manufacturer shall make publicly available and readily accessible, and provide access to the necessary hardware functionality testing software tools and applicable updates to ensure the product meets operating specifications and can be returned to service as provided by the manufacturer's repair/authorized service centers. Manufacturer shall also make available and provide access to any system or peripheral firmware (BIOS, etc.) and drivers for the server hardware.

The manufacturer shall have a written procedure that makes all of these items available for a minimum of 7 years following the end of production of the product and identifies if there is a cost. The manufacturer shall declare if there will be any cost associated with the provision of the functionality testing software tool.

The manufacturer shall declare the URL of the public disclosure.

9.1.6 Informing reuse operators and treatment operators of information available for their assistance (corporate)

Manufacturers shall inform reuse operators and treatment operators with which they, or an organization working on their behalf, have a business relationship for providing end-of-service/end-of-life management of the products declared to this standard regarding the availability of the information provided under any of the following criteria to which they declare conformance: 9.1.4, 9.3.1, and 9.5.1.

The method of informing reuse operators and treatment operators shall be in writing and a record of its distribution shall be documented.

9.2 Design for plastics recycling (optional)

Plastic parts >100 g, with the exception of printed circuit boards, wire and cables, shall not have:

- Molded, glued or otherwise attached metal inserts or metal fasteners, unless the metal component can be completely snapped off manually or entirely removed with commonly available tools;

- Adhesives, coatings, paints, or finishes that have a significant impact on the physical or mechanical properties of the plastic when it is recycled. This shall be demonstrated by either:

    - Test results showing no more than a 25% reduction in either the notched Izod impact at room temperature between a test sample made from the original plastic without adhesives, coatings, paints, or finishes and test sample made from the plastic with adhesives, coatings, paints, or finishes, as measured using ASTM D256 or ISO 180, or the Charpy impact for the same test samples as measured using ISO 179; or

    - Peer reviewed published literature concluding no significant impact.

If the product does not contain plastic parts weighing >100 g, “Not Applicable” may be declared.

Point value: 2.

9.3 Identification of components with special handling needs (optional)

9.3.1 Product marked to identify components and materials with special handling needs

The product shall visually display information on the presence and location of all components and materials with special handling needs as identified in the European WEEE Directive 2012/19/EU Annex VII. The information shall be provided on a label or other permanent marking located on the product itself or visible upon removal of the external enclosure in order to clearly identify the presence before any treatment. The label, or permanent marking, shall contain a Quick Response (QR) code, linked to the required information, and is not required to be co-located with other labels.

Products that contain no components with special handling needs as identified in the European WEEE Directive 2012/19/EU Annex VII may claim this point. A label or other permanent marking located on the product itself shall indicate the absence of components with special handling needs.

Point value: 2.

9.4 Recyclability rate calculation (optional)

9.4.1 Consultation for recyclability rate calculation

The manufacturer shall conduct a consultation, during the design phase for the product declared to conform to this standard, with a treatment operator that is certified to a standard per criterion 12.1.2.

The consultation shall result in a report that is publicly available on the manufacturer's website that (2 points):

- Provides a recyclability rate calculation of the product utilizing the procedures of criterion 9.1.3 and the guidelines provided in IEC TR 62635;

- Documents the recyclability rate of the product per Annex E of IEC TR 62635;

- Provides information from the treatment operator included in the example in section D.3 of Annex D of IEC TR 62635 regarding the process and the predicted recyclability rate of each material in the product. Printed circuit boards destined to be sent to a smelter shall be reported as a single recyclable material (the report need not document the recovery rate);

- Documents the time that the recycler estimates will be necessary to liberate and process each material from the product into a secondary commodity for which there is a market.

For an additional optional point (1 point):

- The report shall document potential improvements in product design and materials applicable to the product and next generation products that could increase their recyclability and potential for reuse. (1 point)

The manufacturer shall declare the URL of the public disclosure.

NOTE – The consultation may also include an eco-design consultant.

Point value: maximum 3.

9.5 Rare earth recovery and recycling (optional)

9.5.1 Information and reporting on disk drive magnet type and location

The manufacturer shall indicate the type of actuator/voice coil and spindle magnets in the product's hard disk drive on the external enclosure of the hard disk drive by means of a QR code. The QR code shall link directly to the magnet type and location information on a publicly available database or the manufacturer's website in at least English.

The QR code shall be printed in black on a white background if one or more of the magnets contain neodymium. The QR code shall include a non-machine readable chemical symbol (Nd) (see Annex E).

In the case that neither magnet contains neodymium, the QR code shall be printed in red on a white background (see Annex E).

The voice coil and the spindle magnet locations in the hard disk drive shall be identified by metric measurements from the edges of the disk drive.

Point value: 2

10 Product longevity

10.1 Prerequisites

10.1.1 Replacement components availability

Product replacement components and, or product service shall be made available through the manufacturer or an authorized third party for at least 5 years after the product is first placed on the market.

Replacement components shall include, at a minimum, power supplies, fans, hard drives, memory, processors and printed circuit boards. Information regarding the availability of product replacement components and, or product service shall be publicly available on the manufacturer's website. The manufacturer shall declare the URL of the public disclosure.

11 Life cycle assessment

11.1 Prerequisites

None.

11.2 Product life cycle assessment (optional)

11.2.1 Conduct life cycle assessment

The manufacturer shall conduct a life cycle assessment (LCA) of the product declared to this standard in accordance with ISO 14040/14044. The LCA shall include all stages (see Annex F) of the product life-cycle, from extraction of raw materials through end-of-life (i.e., cradle to grave), and shall address, at a minimum, the following impact assessment categories using either U.S. EPA TRACI 2.1[87], or CML 2001 (Nov 09)[88] , or ILCD 2011[89] impact assessment methodologies:

[87] US EPA, Tool for the Reduction and Assessment of Chemical and other Environmental Impacts (TRACI) (http://www.epa.gov/nrmrl/std/traci/traci.html)

[88] University of Leiden Institute of Environmental Sciences (CML), Handbook on LCA (http://cml.leiden.edu)

[89] European Commission Joint Research Centre, International reference Life Cycle Data System (ILCD) Handbook (http://eplca.jrc.ec.europa.eu/?page_id=86). See Recommendations for Life Cycle Impact

1) Global warming potential (GWP 100 years);

2) Acidification potential (AP);

3) Photochemical ozone creation potential (POCP, or "Smog");

4) Eutrophication potential (EP)

5) Ozone depletion potential (ODP)

6) Abiotic depletion potential (ADP) – or fossil fuels depletion when using TRACI.

To qualify under this criterion, the LCA must have been reviewed in accordance with ISO 14044 Section 6.1 by an independent third party external to the manufacturer, and must have been conducted no more than 3 years prior to product registration or certification. The LCA may be conducted on a group of products, but the declared product shall be listed on the LCA.

A new LCA will be required if:

- The previously submitted LCA is greater than 5 years old; or

- Changes have been made to the product manufacturing or design and a sensitivity analysis indicates that those changes have resulted in significant differences (a significant difference is when there have been changes or updates in the product that resulted in a change in environmental performance of the product entailing either an increase or decrease of 10% or more on any one of the impact assessment categories from the list in 11.2.1).

Point value: 1

11.2.2 Public disclosure of LCA results

The LCA produced in 11.2.1 shall be made available to the public on the manufacturer's website using one of the following documents:

- Third party report of the LCA as defined in section 5.2 of ISO 14044; or

- Environmental product declaration (EPD) Type III label in accordance with ISO 14025.

This criterion may be satisfied by the manufacturer providing a link on its website to another publicly accessible website. The manufacturer shall declare the URL of the public disclosure.

Point value: 1.

11.2.3 Public disclosure of LCA inventory data

The LCA inventory data for the entire product system utilized to produce the LCA in 11.2.1 shall be made publicly available. Data shall include both primary and secondary data used in the LCA, as modeled. To

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Assessment in the European context (EUR 24571 EN-2011) at:
http://eplca.jrc.ec.europa.eu/uploads/ILCD-Recommendation-of-methods-for-LCIA-def.pdf

qualify, all data disclosures under this criterion must align and be consistent with the LCA conducted in 11.2.1.

1) Publication of the life cycle inventory in a peer reviewed journal (e.g., Journal of Cleaner Production or The International Journal of Life Cycle Assessment); or

2) Acceptance of the life cycle inventory by a national or international database. In such cases data shall be provided in Ecospold v.2[90] or ILCD[91] formats.

One additional point shall be awarded for either of the following qualifying data disclosures. Only one additional point may be claimed for this criterion.

1) Reporting of primary data used to characterize the manufacturing life-cycle stage of the product system. Primary inventory data include data that derive from and are specific to elementary or product flows; or

2) Reporting inventory data representing scenarios for product disposal or reclamation at end-of-life. Scenarios must be fully documented in the LCA report, including all assumptions and sources of information upon which the data are based.

The manufacturer shall declare the URL of the public disclosure.

Point value: maximum 2.

12 Responsible end-of-service/end-of-life management

12.1 Prerequisite

12.1.1 Product take-back service (corporate)

Manufacturer shall ensure provision of, either directly or through a third party, a country-wide or region-wide take-back service to collect and process products declared and formerly declared to conform to this standard for reuse-and, or end-of-life management. Manufacturer shall offer the take-back service option either directly or through its distribution channels to the first customer; the customer may choose to utilize the take-back service option or not.

The service shall incorporate a management hierarchy to promote the extended and best possible use of the equipment and components, in a manner that is protective of human health and the environment, as follows:

1) Reuse of whole equipment;

2) Reuse of components;

3) Recycling for material recovery;

[90] Ecospold V.2 Data Format http://www.ecoinvent.org/data-providers/how-to-submit-data/ecospold2/
[91] International Life Cycle Data System http://eplca.jrc.ec.europa.eu/?page_id=134

4) Disposal of materials in energy recovery facilities and, or solid and hazardous landfill-facilities permitted in accordance with applicable legislation.

Notification of the take-back service, including how to utilize the service(s), shall be available in sales information and product documentation, including website-based sales information and user manuals in formats provided to customers (e.g., website, compact disc, hard copy) at the time of purchase/lease. The information shall be maintained and updated on the manufacturer's website. The manufacturer shall declare the URL of the public disclosure.

Manufacturer shall disclose both at the point of sale and the point of the take-back service if there will be any direct costs to the purchaser/lessee for the take-back service.

To demonstrate conformance with this criterion, the manufacturer shall obtain and maintain the following objective evidence:

- Of the manufacturers' conformity with this criterion throughout the distribution channel to the first customer;

- That the manufacturer offers the take-back service defined in this criterion for:

  - Customers in the country or region where the product is declared to conform to this Standard; and

  - All types of selling technique (e.g., distance-selling or through distribution network);

- That the manufacturer notifies the purchaser/lessee of the availability of take-back services, that includes how to utilize the take-back service;

- Of the manufacturers' compliance with national legislation/legal requirements and to confirm that compliant and environmentally sound management has been employed (to the criterion in 12.1.2) for the collection, transportation and processing (reuse, refurbishment or recycling, as applicable) and disposal of all products declared to conform to this Standard and returned under this criterion.

In jurisdictions where there are existing laws and, or regulations specifically to collect, reuse and, or recycle products declared and formerly declared to conform to this Standard, manufacturer's demonstration of compliance with these legal requirements will fulfill this requirement.

This criterion is applicable only in countries or regions for which the product is declared to conform to this Standard.

12.1.2 End-of-service/end-of-life management (corporate)

In jurisdictions where manufacturer can control the selection of the initial reuse or treatment operator, manufacturer shall ensure that all equipment and, or components (including lease returns, warranty returns, trade-ins) forming the whole or part of the product covered by criterion 12.1.1 are prepared for reuse and, or initially treated at a reuse or treatment facility, which is independently certified by an accredited certification body to one or more of the following recognized standards:

- Responsible Recycling ("R2") Standard for Electronics Recyclers;

- e-Stewards *Standard for Responsible Recycling and Reuse of Electronic Equipment;*

- WEEELABEX Treatment Standard; and, or

- CENELEC – EN 50625 Collection, logistics and treatment requirements for WEEE.

Certification bodies shall be accredited by an International Accreditation Forum member accreditation body (http://www.laf.nu/) to certify to the specific standard identified.

The NSF Joint Committee on the Environmental Leadership Standard for Servers may add standards to the above list of recognized standards, provided the standard meets requirements a) through i) in criterion 4.6.1.2 of the IEEE 1680.2-2012 Standard for the Environmental Assessment of Imaging Equipment.

These requirements apply to any products returned under 12.1.1 to any facility/operator whether owned by the manufacturer or an agent acting on behalf of the manufacturer.

To demonstrate conformance with this criterion, manufacturer shall provide valid certificates held by initial reuse or treatment facilities utilized at the time of product registration and certification, and maintain valid certificates on an on-going basis (whether facilities are owned by manufacturer or an agent of manufacturer.)

This requirement is applicable only in countries or regions for which the product is declared to conform to this Standard.

12.1.3 Trans-boundary movements (corporate)

If equipment and components collected pursuant to criteria 12.1.1 and 12.1.2 and materials derived from them are traded across national boundaries anywhere from the point of manufacturer take-back to the point of final disposition of the resulting devices and, or materials, manufacturer shall have an in-house management system which incorporates the elements necessary to achieve ongoing compliance with applicable trade laws[92] in all countries involved (export, transit, and import). Such a management system must be independently certified to a globally accepted management system standard, such as ISO 14001 or ISO 9001, by a certification body accredited by an IAF-member accreditation body to certify to the specified management system standard.

To demonstrate conformity to this criterion, manufacturer shall provide objective evidence of both:

- A current and valid certificate to a globally-accepted management system standard; and

- Inclusion of applicable trade laws in the manufacturer's management system relative to exporting, transiting, and importing countries; i.e., if a manufacturer or its service providers ship any of these materials across borders, the manufacturer's management system (including 'legal and other requirements', 'operational control', 'internal audit', 'corrective action plans', and 'management review') must explicitly address applicable laws in all countries involved in the trade.

[92] This typically pertains to materials determined to be hazardous or otherwise restricted by any of the countries involved in trans-boundary movement, based on domestic laws implementing international treaties such as the Basel Convention and the OECD Council Decisions, and may apply to materials being shipped between countries for the purposes of recycling, repair, disposal, and even direct reuse.

12.2 End-of-life management (optional)

12.2.1 Publicly available record of the reuse/recycling achievement (corporate)

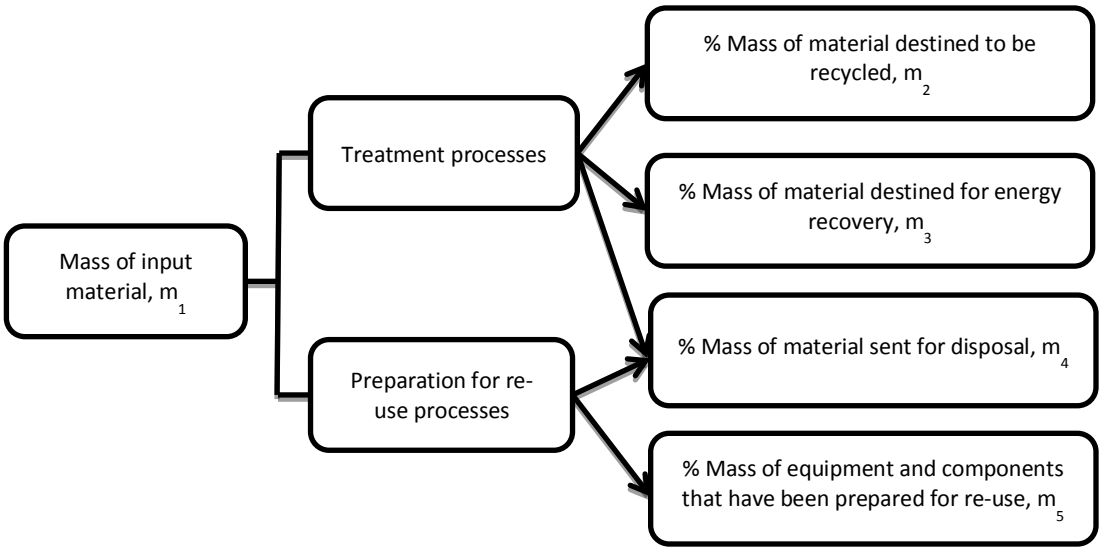
Manufacturer shall make publicly available on their website the annual reuse, recycling and recovery achievements (as separate percentages of their annual total mass returned) of the take-back service for each country into which the product is declared to conform to this Standard. This criterion applies only to equipment taken back under criterion 12.1.1. Equipment recovered and processed under national or regional collection schemes (mandated programs) may be included if the data is made available to the manufacturer.

With reference to Figure 12.1:

Determination and calculation of the reuse, recycling and recovery achievements at the reuse or treatment facility pursuant to 12.1.2, shall start with the receipt of the mass of all equipment or components through the take-back service [m_1] and end with:

- [m_5] mass of equipment or components prepared for reuse;
- [m_2] mass of material intended for recycling that has been sent to the next treatment facility or final destination facility (e.g., smelter, extrusion plant, etc.);
- [m_3] mass of material sent to a waste to energy facility; and
- [m_4] mass of material sent to a thermal or landfill facility for disposal.

Figure 12.1: Flow chart showing separate parts of the reuse and treatment process



The total reuse achievement shall be calculated as:

$$\text{Reuse achievement: \% rate} = \frac{m_5}{m_1}$$

The total recycling achievement shall be calculated as:

$$\text{Recycling achievement: \% rate} = \frac{m_2}{m_1}$$

The total recovery achievement shall be calculated as:

$$\text{Recovery achievement: \% rate} = \frac{m_2 + m_3}{m_1}$$

To demonstrate conformance with this criterion, the manufacturer shall obtain and maintain objective evidence in the form of statements of:

- Reuse from the initial certified reuse operator (percentage by weight to the mass of input equipment and, or components received for the preparation of reuse);
- Recycling from the initial certified treatment operator (percentage by weight to the mass of end-of-life equipment and, or components received); and
- Recovery from the initial certified treatment operator (percentage by weight to the mass of end-of-life equipment and, or components received).

Point value: 2.

12.2.2 Take-back service for de-installed equipment (corporate)

Manufacturer shall offer, either directly or through a third-party, a country-wide or region-wide take-back service to collect and process de-installed equipment and components, including non-registered products and products from other manufacturers, for reuse and, or end-of-life management when new, equivalent registered products are sold. Manufacturer shall offer the take-back service option either directly or through its distribution channels to the first customer; the customer may choose to utilize the take-back service option or not.

Notification of the take-back service for de-installed products, including how to utilize the service(s), shall be available in sales information and product documentation, including website-based sales information and user manuals in formats provided to customers (e.g., website, compact disc, hard copy) at the time of purchase/lease.

Manufacturer shall ensure that the equipment recovered under this criterion is managed in accordance with:

- The management hierarchy and conformance evidence requirements of criterion 12.1.1, and

- Criteria 12.1.2 and 12.1.3.

This criterion is applicable only in countries or regions for which the product is declared to conform to this standard.

Point value: 1.

13 Corporate responsibility

13.1 Prerequisite

13.1.1 Environmental management system (EMS) (corporate)

Manufacturer shall have formal, self-declared EMS for those parts of the company that have significant responsibility for the design and manufacturer of all products declared to conform to this standard. The EMS shall meet the requirements of ISO 14001. Certification to either ISO 14001 or EMAS (EU Eco-Management and Audit Scheme) meets this requirement.

13.1.2 Public disclosure of use of conflict materials in products (corporate)

Manufacturers shall:

- Determine whether any of their products that they manufactured or contracted to have manufactured contain conflict minerals that are necessary to the functionality or production of those products and prepare disclosures on use and sources of these minerals in conformance with Rule 13p-1 under the U.S. Securities Exchange Act of 1934, and

- Make such disclosures available on their public websites and shall declare the URL of the public disclosure.

13.1.3 Manufacturer conformance with occupational health and safety performance (corporate)

Conformance to ANSI Z10, Occupational Health and Safety Management Systems, or OHSAS 18001[93] shall be incorporated into the manufacturer's ISO 14001 management system.

13.2 Environmental management system (optional)

13.2.1 Environmental Management System (EMS) Certification (corporate)

EMS specified in 13.1.1 shall be certified to either ISO 14001 or EU EMAS by an accredited third-party certification body.

Point value: 1.

[93] For OHSAS 18001, see http://www.ohsas-18001-occupational-health-and-safety.com/ohsas-18001-kit.htm

13.2.2 Environmental and social responsibility on supply chain – nine suppliers (corporate)

Manufacturer shall publicly disclose corporate environmental and social responsibility performance using the key indicators of the Global Reporting Initiative (GRI) listed in Table 13.1.

The GRI boundary for reporting on this criterion shall be nine suppliers: the manufacturer's top three suppliers (by spend) of each of the following three types of components for the product category covered by this Standard:

- Principal storage device(s);
- Principal semiconductor device(s);
- Primary printed circuit board(s).

If there are less than three suppliers for a component type named above, every supplier for that component type shall be included in the public disclosure.

GRI reporting format and frequency:

- Disclosures shall be accessible on the manufacturer's public website. The manufacturer shall declare the URL of the public disclosure. For supplier data it is acceptable to provide a link to supplier GRI reporting on supplier's website.
- Data shall be reported consistent with the Specific Standard Disclosures in the Global Reporting Initiative (GRI) Guidelines that are in effect at the time the disclosures are made as described in Table 13.1. (Note: GRI updated its guidelines in 2013, calling the new guidelines "G4." Companies making GRI disclosures after December 31, 2015 must use the G4 indicators.)
- Publication of a full report or reports 'in accordance' with the GRI Guidelines is not required, but would meet this criterion if the report(s) cover the indicators and boundaries specified in this criterion.
- Performance against these indicators shall be reported and publicly disclosed annually; data included in the report must be from within the last two years.

Manufacturer may claim up to 2 points for this criterion. To claim 1 point, any 6 of the GRI indicators listed in Table 13.1 shall be publicly disclosed for all 9 suppliers. To claim 2 points, all 12 of the GRI indicators listed in Table 13.1 shall be publicly disclosed for all 9 suppliers.

Table 13.1

GRI Code (G4)	GRI Indicators
EN4	Energy consumption
EN5	Energy intensity
EN6	Reduction of energy consumption
EN15	Direct GHG emissions (Scope 1)
EN16	Energy indirect GHG emissions (Scope 2) Scope 2 = Purchased electricity.
EN1	Materials used by weight or volume

EN8	Total water withdrawal by source
EN10	Percentage of water recycled and reused
EN23	Total weight of waste by type and disposal method
HR4	Freedom of association and collective bargaining
HR6	Operations with risk for forced or compulsory labor
HR5	Operations with risk for incidents of child labor

Point value: maximum 2.

13.2.3 Environmental and social responsibility reporting on tier 1 suppliers (corporate)

Manufacturer shall publicly report on corporate environmental and social responsibility performance using the key indicators of the GRI listed in Table 13.2, and using the GRI reporting format and frequency specified in criterion 13.2.2.

The GRI boundary for reporting on this criterion shall be all Tier 1 suppliers who perform a manufacturing or assembly function for the manufacturer's server products.

Public disclosure shall include the details outlined for all GRI aspects in Table 13.2.

Table 13.2

GRI Code (G4)	GRI Indicators	Disclosure must include evaluation of supplier on these impacts:
LA14	Percentage of new suppliers screened with labor practice criteria	Labor practice criteria for screening and assessments must include compliance with laws on: - Minimum wages - Working hours - Compensation for overtime
LA15	Significant impacts for labor practices in supply chain and action	
SO9	Percentage of new suppliers screened using criteria for impacts on society	Disclosure must specify which societal impacts were used for screening and evaluation for these indicators.
SO10	Significant negative impacts on society in supply chain	
EN32	Percentage of new suppliers that were screened using environmental criteria	Disclosure must specify which environmental impacts were used for screening and evaluation for these indicators.
EN33	Significant actual and potential negative environmental impacts in the supply chain and actions taken	

Point value: 2.

13.3 Reporting toxics release data (optional)

Manufacturer shall publicly report annually toxics release data for the following three types of components for servers (principal storage device(s); principal semiconductor device(s); and primary printed circuit board(s)) from each of the top three suppliers (by spend) for each component. The reported data shall be according to the reporting requirements and for chemicals listed on the:

- U.S. EPA Toxics Release Inventory; or

- United Nations Protocol on Pollutant Release and Transfer Registry, or the applicable country's or region's equivalent.

The data collected from the suppliers can be for their entire company or the specific part of the company that manufactures an identified component in a product declared to conform to this Standard.

If there are less than three suppliers for a component type named above, every supplier for component type needs to provide data.

Manufacturer's website shall either provide the annual disclosure or a link to a public repository containing the disclosure. The manufacturer shall declare the URL of the public disclosure.

Manufacturer may claim one point each for inclusion of the reporting elements listed in Table 13.3.

Table 13.3

Reporting Elements	Points
– The specific locations of the releases, and – The identity and volume of each release	1
– The name of the company that is releasing the chemicals	1

Point value: maximum 2.

13.4 Conflict mineral sourcing (optional)

13.4.1 Conflict mineral sourced only from validated conflict free smelters (corporate)

Manufacturers shall determine the source of all conflict minerals used in all their products and conclude that they are from either:

- Recycled or scrap sources; or

- Smelters and, or refiners which have been determined to be Conflict Free by the Conflict Free Sourcing Initiative (CFSI), and appear on CFSI's list of validated smelters and refiners.

Independent private sector audit is required to verify manufacturer's control systems and justification for determination, conducted in accordance with Rule 13p under the U.S. Securities Exchange Act of 1934.

NOTE – For this criterion, "recycled or scrap sources" are defined as recycled metals are reclaimed end-user or post-consumer products, or scrap processed metals created during product manufacturing. Recycled metal includes excess, obsolete, defective, and scrap metal materials which contain refined or processed

metals that are appropriate to recycle in the production of tin, tantalum, tungsten and, or gold. Minerals partially processed, unprocessed or a bi-product from another ore are not recycled metals.[94]

NOTE – For CFSI list, see <http://www.conflictfreesourcing.org/conflict-free-smelter-refiner-lists/>.

Point value: 1.

13.4.2 Participation in in-region conflict-free sourcing program (corporate)

Manufacturer shall support and participate in one of the in-region conflict free controlled chain-of- custody sourcing programs, such as Solutions for Hope or Conflict Free Tin Initiative, which are committed to sourcing the minerals from conflict free sources in the region.

Point value: 2

13.5 Compliance with occupational health and safety and social responsibility performance standards (optional)

13.5.1 Supply chain certification to occupational health and safety performance standards

Manufacturer shall ensure that their three largest suppliers (based on total spend) for each of these three main components (principal storage device(s); principal semiconductor device(s); and primary printed circuit board(s)) produce these components in supplier facilities that are certified by accredited certification bodies to either ANSI Z10 or OHSAS 18001. Certification bodies shall be accredited by an International Accreditation Forum (IAF) member accreditation body (http://www.iaf.nu/) to certify to the specific standard identified.

If there are less than three suppliers for a component type named above, every supplier for that component type needs to provide data.

Point value: 2.

13.5.2 Certification to social responsibility performance standard (corporate)

Manufacturer shall ensure that all facilities of its three largest suppliers (based on total spend) that manufacture each of three main components (principal storage device(s); principal semiconductor device(s); and primary printed circuit board(s)) for the product are:

1) Certified by accredited certification bodies to Social Accountability (SA) 8000[95]. Certification bodies shall be accredited by an authorized accreditation body to certify to the SA8000. The certification shall be no older than three years. (2 points)

   Optional points shall only be awarded for SA8000 certification if all facilities designated above are certified to SA8000. If there are fewer than three suppliers for a component type named above, every supplier for that component shall conform to this criterion.

[94] OECD, Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas, 12 n.2 (2011)

[95] SAI website: http://www.sa-intl.org/index.cfm?; SAI standard: http://www.sa-intl.org/index.cfm?fuseaction=Page.ViewPage&pageId=937

Or

2) Audited to the EICC Code of Conduct[96] using the Validated Audit Process (VAP). (1 point)

Optional point shall only be awarded for VAP audits if a certificate has been issued by the VAP Operations Management Team to verify that:

- Validated audit reports contain no major or priority non-conformation findings as defined by the EICC VAP and shall be no older than two years;

- Closure audit report confirming that all major or priority non-conformance corrective actions resulting from VAP audits were remedied within time frame specified by the VAP and the VAP audit shall be no older than two years.

Optional point shall be awarded for EICC VAP audits if all facilities designated above meet the VAP audit requirements or facilities meet a combination of VAP audits and SA8000 certification. If there are fewer than three suppliers for a component type named above, every supplier for that component shall conform to this criterion.

Point value: 1 or 2.

[96] http://www.eiccoalition.org/

Annex A

Table of Criteria and Optional Points

Criterion & Section		Optional Points
5 Energy efficiency		
5.1 Prerequisites		
	5.1.1 ENERGY STAR	
	5.1.2 Allowable temperature and humidity specifications	
	5.1.3 Reduction of ENERGY STAR idle state power allowances (prerequisite for Bronze, Silver and Gold)	
5.2 & 5.3 Optional Criteria		
	5.2.1 80 Plus program	3
	5.3.1 Energy efficient supply chains	2
	5.3.2 Reduce energy lost from power conversion	2
	5.3.3 Advanced allowable temperature and humidity specifications	6
	5.3.4 Logged server activity metrics	2
6 Management of substances		
6.1 Prerequisites		
	6.1.1 Conformance with European Union RoHS Directive	
	6.1.2 Conformance with European Union Battery Directive	
	6.1.3 Inventory of declarable substances	
	6.1.4 Reduction of bromine and chlorine content of plastic parts > 25 Grams	
6.2, 6.3 & 6.4 Optional Criteria		
	6.2.1 Reduction of substances on the European Union REACH Regulation Candidate List of Substances of Very High Concern	1
	6.3.1 Disclosure of declarable substances	1
	6.3.2 Requesting full substance inventory	2
	6.3.3 Acquiring substance inventory	4
	6.3.4 Alternatives assessment	2
	6.3.5 Making alternatives assessment publicly available	1
	6.4.1 Reduce fluorinated greenhouse gas/N2O emissions resulting from semiconductor manufacturing	1
7 Preferable materials use		
7.1 Prerequisites		
	7.1.1 External enclosure	
	7.1.2 Disclosure of postconsumer recycled content	
7.2 & 7.3 Optional Criteria		
	7.2.1 Postconsumer recycled plastic content	5
	7.2.2 Postconsumer recycled content of rare earth elements	2

	7.3.1. Reduction of surplus parts by default	1
8 Product packaging		
8.1 Prerequisites		
	8.1.1 Elimination of substances of concern in product packaging	
	8.1.2 Enhancing recyclability of packaging materials	
	8.1.3 Recycled content fiber in packaging	
	8.1.4 Elimination of individual packaging for hardware and components	
	8.1.5 Elimination of chlorine in processing packaging materials	
8.2 & 8.3 Optional Criteria		
	8.2.1 Higher total recycled fiber	1
	8.3.1 Optimization of packaging system to reduce excess packaging	4
9 Design for repair, reuse and recycling		
9.1 Prerequisites		
	9.1.1 Design for repair, reuse and recycling	
	9.1.2 Design for plastics recycling	
	9.1.3 Product recyclability calculation and minimum 90% recyclability rate	
	9.1.4 Information and reporting in preparation for reuse and recycling (prerequisite for Silver and Gold)	
	9.1.5 Functionality testing software tools	
	9.1.6 Informing reuse operators and treatment operators of information available for their assistance (Corporate)	
9.2, 9.3, 9.4 & 9.5 Optional Criteria		
	9.2.1 Reduction of materials incompatible with recycling	2
	9.3.1 Product marked to identify components and materials with special handling needs	2
	9.4.1 Consultation for recyclability rate calculation	3
	9.5.1 Information and reporting on disk drive magnet type and location	2
10 Product longevity		
10.1 Prerequisites		
	10.1.1 Replacement components availability	
11 Life cycle assessment		
11.1 Prerequisites		
	None	
11.2 Optional Criteria		
	11.2.1 Conduct life cycle assessment	1
	11.2.2 Public disclosure of LCA results	1
	11.2.3 Public disclosure of LCA inventory data	2
12 Responsible end-of-service/end-of-life management		
12.1 Prerequisites		
	12.1.1 Product take-back service (Corporate)	

	12.1.2 End-of-service/end-of-life management (Corporate)	
	12.1.3 Trans-boundary movements (Corporate)	
12.2 Optional Criteria		
	12.2.1 Publicly available record of the re-use / recycling achievement	2
	12.2.2 Take-back service for de-installed equipment	1
13 Corporate responsibility		
13.1 Prerequisites		
	13.1.1 Environmental management system (EMS) (Corporate)	
	13.1.2 Public disclosure of use of conflict minerals in products (Corporate)	
	13.1.3 Manufacturer conformance with occupational health and safety performance	
13.2, 13.3, 13.4 & 13.5 Optional Criteria		
	13.2.1 Environmental management system (EMS) certification	1
	13.2.2 Environmental and social responsibility reporting on supply chain - nine suppliers	2
	13.2.3 Environmental and social responsibility reporting on tier 1 suppliers	2
	13.3.1 Public reporting of toxics release data	2
	13.4.1 Conflict minerals sourced only from validated conflict free smelters	1
	13.4.2 Participation in in-region conflict-free sourcing program	2
	13.5.1 Supply chain certification to occupational health and safety performance standards	2
	13.5.2 Certification to social responsibility performance standard	2

Annex B

Criterion 5.3.4 Logged Server Activity Metrics: Data Acquisition and Format

B.1 Format

This Annex defines requirements for logging server activity in criterion 5.3.4. These requirements are intended to establish a lowest common denominator that could eventually become an industry standard, and hence expected of nearly all servers on the market.

- Each value listed shall be sampled at 2 Hz (i.e., twice per second)
- Each value listed shall be averaged over a one minute period and that average value shall be logged as one record per minute
- For each record, include date and time stamps as of the end of that one minute period in UTC format
- If product includes two CPUs, include percent utilization entries for each CPU
- If only one CPU, leave column for second CPU blank

B.2 Column headers and data format shall be:

- Date
- Time
- Demand (watts)
- CPU-1 Util (%)
- CPU-2 Util (%)
- Physical memory utilization (%)
- Network throughput (%)
- Disk IO (%)
- Server inlet temperature (deg. C)

B.3 File management shall:

- Store data in CSV format
- Store 45 days' worth of data (~ 65,000 records)
- Age off oldest record as each new record is written, and rename file as necessary

B.4 File name:

- File name shall be: "host-ID_activity_year_MO_DD.csv"
- Where the "host-ID" is the server host identifier, and most recent full day is included in the file name

ANNEX C

Lists of carcinogens, mutagens, reproductive toxicants, persistent, bioaccumulative, and toxic (PBT) Substances and Endocrine Disrupters

C.1 Carcinogens

Listed by the International Agency for Research on Cancer as:

- Group 1: carcinogenic to humans
- Group 2A: probably carcinogenic to humans

Listed by the National Toxicology Program as:

- Known human carcinogen
- Reasonably anticipated human carcinogen

Meet the criteria under the Globally Harmonized System of Classification and Labeling (GHS) for the carcinogenicity hazard class (codes H350, H351)

C.2 Mutagens

European Union CMR List

- Category 1: Substances known to be mutagenic to man
- Category 2: Substances which should be regarded as if they are mutagenic to man

EU Classification, Labeling, and Packaging (CLP)

- H340: May cause genetic defects
- H341: Suspected of causing genetic defects

Globally Harmonized System of Classification and Labeling (GHS)

- Category 1A: Chemicals known to induce heritable mutations in germ cells of humans

- Category 1B: Chemicals which should be regarded as if they induce heritable mutations in the germ cells of humans

- Category 2: Chemicals which cause concern for humans owing to the possibility that they may induce heritable mutations in the germ cells of humans

European Union. *Annex I – Classification and labeling requirements for hazardous substances and mixtures.* 2008 [cited 2011 September 13]; Available from: http://ec.europa.eu/enterprise/sectors/chemicals/documents/classification/index_en.htm

ECB, *Annex I of Directive 67-548-EEC. 2007*

GHS, *Germ Cell Mutagenicity. 2009,* United Nations

C.3 Reproductive toxicants

Listed under the State of California Safe Drinking Water and Toxic Enforcement Act (Prop 65) for reproductive or developmental toxicity

Meet the criteria under the Globally Harmonized System of Classification and Labeling (GHS) for the Reproductive Toxicity hazard class (codes H360 Categories 1A and 1B, H361, H362)

C.4 PBT substances

- Stockholm Convention Persistent Organic Pollutants
- U.S. – Canada Binational Toxics
- Toxics Release Inventory (TRI) PBT chemicals
- RCRA Waste Minimization Priority Chemicals

C.5 Endocrine disrupters

The Endocrine Disruptor Exchange (TEDX) list http://endocrine.org/endocrine-disruption/tedx-list-of-potential-endocrine-disruptors/overview)

ANNEX D
Example Template

D.1 Plastic parts list and % post-consumer recycled content

To be proposed during balloting.

ANNEX E
QR codes for criterion 9.5.1

E.1 Information and reporting on disk drive magnet type and location

The QR code shall be printed in black on a white background if one or more of the magnets contain neodymium. The magnet type shall be identified as neodymium iron boron. The QR code shall include a non-machine readable chemical symbol (Nd):

In the case that neither magnet contains Neodymium, the QR code shall be printed in red on a white background:

NOTE – The machine-readable codes presented in these examples are for demonstration purposes only. Actual QR codes should be configured as necessary to meet the requirements outlined in criterion 9.5.1 and include the non-machine readable symbols as indicated.

ANNEX F
Criterion 11.2.1 System Boundaries

F.1 Example Flow

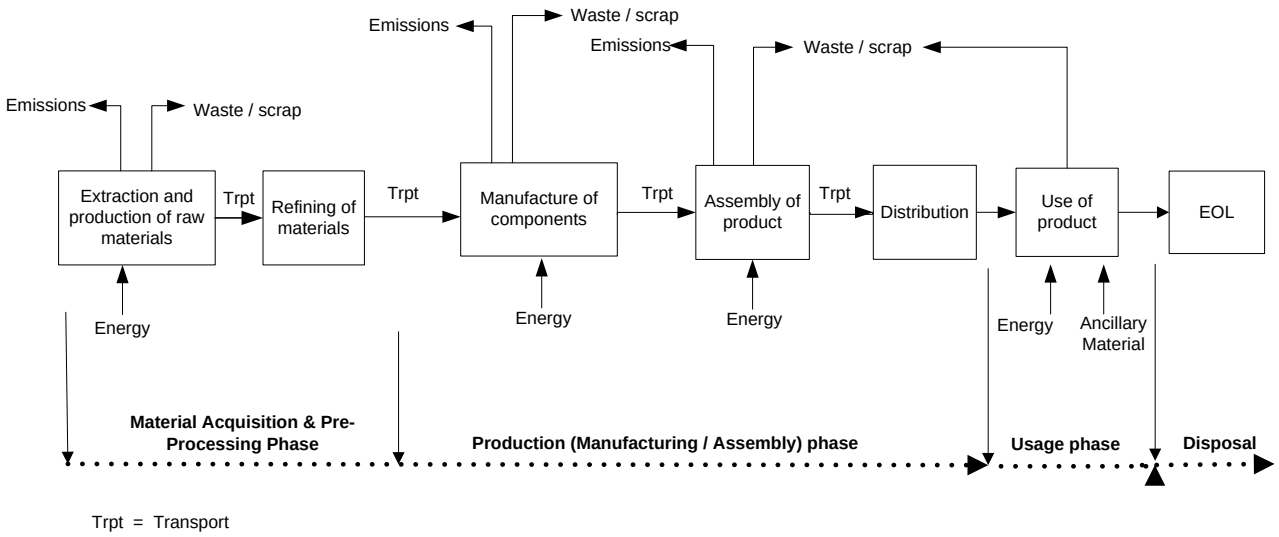


Figure 1: System Boundaries, example flow