



JRC SCIENCE FOR POLICY REPORT

Revision of the EU Green Public Procurement (GPP) Criteria for imaging equipment.

*Final Technical Report:
Final criteria*

Kaps Renata, Vidal-Abarca-Garrido Candela, Gama-Caldas Miguel (JRC Dir. B – Growth and Innovation)
Maya-Drysdale Larisa, Viegand Jan (Viegand Maagøe),
Wood Jonathan (Tenvic)

August 2020



This report has been developed in the context of the Administrative Arrangement "Scientific support to Green Public Procurement (GPP 2015)" between DG Environment and DG Joint Research Centre. The project responsible for DG Environment was: Enrico Degiorgis

This publication is a Science for Policy report by the Joint Research Centre, the European Commission's in-house science service. It aims to provide evidence-based scientific support to the European policy-making process. The scientific output expressed does not imply a policy position of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this publication. This draft has not been adopted or endorsed by the European Commission. Any views expressed are the preliminary views of the Commission services and may not in any circumstances be regarded as stating an official position of the Commission. The information transmitted is intended only for the Member State or entity to which it is addressed for discussions and may contain confidential and/or privileged material.

EU Science Hub

<https://ec.europa.eu/jrc>

JRC121607

EUR 30481 EN

PDF

ISBN 978-92-76-26941-0

ISSN 1831-9424

doi:10.2760/02995

Luxembourg: Publications Office of the European Union, 2020

© European Union, 2020



The reuse policy of the European Commission is implemented by the Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39). Except otherwise noted, the reuse of this document is authorised under the Creative Commons Attribution 4.0 International (CC BY 4.0) licence (<https://creativecommons.org/licenses/by/4.0/>). This means that reuse is allowed provided appropriate credit is given and any changes are indicated. For any use or reproduction of photos or other material that is not owned by the EU, permission must be sought directly from the copyright holders.

All content © European Union 2020, except: Cover page (source: Fotolia.com) and captions where the source is specified.

How to cite this report: Kaps Renata, Vidal-Abarca-Garrido Candela, Gama-Caldas Miguel, Maya-Drysdale Larisa, Vie gand Jan and Wood Jonathan, *Revision of the EU Green Public Procurement (GPP) Criteria for imaging equipment. Final Technical Report: Final criteria*, EUR 30481 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-26941-0, doi:10.2760/02995, JRC121607.

Table of Contents

1	INTRODUCTION	5
1.1	THE CRITERIA REVISION PROCESS AND EVIDENCE BASE	6
1.2	STRUCTURE OF THIS TECHNICAL REPORT	7
1.3	PRODUCT GROUP SCOPE AND DEFINITIONS	8
1.3.1	Revised proposal for scope and definitions for imaging equipment product group	8
1.4	PUBLIC PROCUREMENT ROUTES	14
1.5	MARKET VOLUMES	16
1.5.1	Imaging equipment products	16
1.5.2	Imaging equipment consumables	20
1.5.3	Print services	22
1.6	THE LIFE CYCLE COSTS OF IMAGING EQUIPMENT	22
1.7	THE KEY ENVIRONMENTAL IMPACTS AND IMPROVEMENT POTENTIALS ACCORDING TO TECHNICAL ANALYSIS	26
1.7.1	Imaging equipment products	26
1.7.2	Imaging equipment consumables	26
1.7.3	Imaging equipment services (Print services)	27
1.7.4	Identified improvement options	28
2	DRAFT CRITERIA AREAS AND PROPOSALS	30
2.1	CRITERIA STRUCTURE	30
2.2	CRITERIA AREA 1 – IMAGING EQUIPMENT PRODUCTS	33
2.2.1	Preliminary assessment of existing fleet and procurement needs	33
2.2.2	Energy efficiency	34
2.2.3	Duplex imaging capability	39
2.2.4	N-up printing	42
2.2.5	Capability to use recycled paper	44
2.2.6	Capability to use remanufactured cartridges	46
2.2.7	Reduced number of materials	49
2.2.8	Postconsumer recycled plastic	51
2.2.9	Reparability and recyclability	54
2.2.10	Substance emissions	66
2.2.11	Noise Emissions	71
2.2.12	Hazardous substances requirements	74
2.2.13	Firmware Update Control	81
2.2.14	Warranty and service agreements	83
2.2.15	End-of-life management services	86
2.2.16	Supply of paper and imaging equipment consumables	90
2.3	CRITERIA AREA 2 – IMAGING EQUIPMENT CONSUMABLES	92
2.3.1	Cartridges/containers page-yield	92
2.3.2	Consumable mass resource efficiency	94
2.3.3	Consumable hazardous substances content	102
2.3.4	Reuse and remanufacturability	106
2.3.5	Consumable quality	110
2.3.6	End-of-life management	114
2.4	CRITERIA AREA 3 – PRINT SERVICES	121

2.4.1	Commitment to reuse and repair imaging equipment products.....	121
2.4.2	Supply of imaging equipment.....	122
2.4.3	Supply of paper and imaging equipment consumables.....	123
2.4.4	Provision of managed print services.....	125
2.4.5	Provision of consumable use information.....	126
2.4.6	Provision of environmental information during service contract.....	127
2.5	HORIZONTAL CRITERIA.....	129
2.5.1	Tenderer Environmental Management activities.....	129
2.5.2	Guaranteed provision of consumables and spare parts during contract.....	129
2.5.3	User instructions for green performance management.....	130
ANNEX 1: TABLE OF COMMENTS		132

List of Figures

Figure 1: Total Life Cycle Costs for different printouts per month.....	23
Figure 2: Total Life Cycle Costs for product lifetime assuming 2500 printouts/month.....	24
Figure 3: Total Life Cycle Costs for product lifetime assuming 8000 printouts/month.....	24
Figure 4: Total Life Cycle Costs for product lifetime assuming 25000 printouts/month.....	25
Figure 5: Comparison of energy use between standard sized mono laser printers in the ENERGY STAR database during 2014 and 2018.....	36
Figure 6: Comparison of energy use between standard sized mono laser MFDs in the ENERGY STAR database during 2014 and 2018.....	37
Figure 7: Mass resource efficiency of mono toner cartridges and containers with associated drum units.....	97
Figure 8: Mass resource efficiency of colour toner cartridges and containers with associated drum units.....	98
Figure 9: Mass resource efficiency of colour ink cartridges and containers (all).....	98
Figure 10: Mass resource efficiency of black ink cartridges and containers (below 10,000 page-yield).....	99
Figure 11: Mass resource efficiency of colour ink cartridges and containers (below 10,000 page-yield).....	99
Figure 12 Wheelie bin marking.....	119

List of Tables

Table 1: EU public institution supply, service and work contracts covering CPV 30232100 in 2016 by public institution type.....	15
Table 2: EU public institution supply, service and work contracts covering CPV 30232100 in 2016 by procurement procedure.....	16
Table 3: Data sources for sales of products in scope.....	18
Table 4: Estimated annual sales of imaging equipment in million units, including average annual growth rate.....	19
Table 5: Estimated non-domestic B2B market share (as percentage of annual sales).....	20
Table 6: Estimated non-domestic B2B market annual sales (in million units).....	20
Table 7: Consumable non-domestic B2B sales (ink/toner cartridges and containers) (in million units), including average annual growth rate.....	21
Table 8: Printers and MFDs categories based on size (defined by printing speed).....	23
Table 9: Identified improvement options based on environmental analysis.....	28
Table 21: Overview of Green Public Procurement criteria.....	30
Table 10: Environmental Initiative Inclusion of Duplex Imaging Criteria.....	40
Table 11: ENERGY STAR v2.0 Duplexing requirements.....	40
Table 12: ENERGY STAR v3.0 Duplexing requirements for all TEC MFD and printers.....	41
Table 13: N-Up Printing criteria in other initiatives.....	43
Table 14: Related criteria in other initiatives.....	44
Table 15: Reduced numbers of materials criteria in other initiatives.....	50
Table 16: Postconsumer recycled plastic criterion in other initiatives.....	52
Table 17: Compliance rates to EPEAT postconsumer recycled plastic criteria.....	53
Table 18: Spare parts criterion in other initiatives.....	59
Table 19: Blue Angel requirements on 3.1.1.1 Design for disassembly requirements (Table 1 in BA).....	61
Table 20: Blue Angel requirements on 3.1.1.2 Requirements concerning material selection for recyclability (Table 2 in Blue Angel).....	63
Table 21: EPEAT Hazardous material content criteria.....	77
Table 22.: Blue Angel (RAL-UZ-205) ⁶ hazardous material content criteria.....	78
Table 23: Product lifetime criterion in other initiatives.....	84
Table 24: Imaging equipment warranty periods.....	86
Table 25: EU Voluntary Agreement version 5.2 Consumable Yield Criterion.....	93
Table 26: Nordic Swan version 6.3 consumable efficiency requirements.....	96
Table 27: TS 17 consumable mass resource efficiency calculation.....	100
Table 28: TS 17 consumable mass resource efficiency threshold calculation.....	100
Table 29: Example consumable mass resource efficiency calculations.....	101
Table 27: Blue Angel exclusion of intentionally added substances in colourants.....	104
Table 28: Additional Blue Angel exclusion of intentionally added substances in colourants.....	105
Table 29.: Consumable reuse ability criterion in other initiatives.....	108
Table 30: Consumable quality criterion in other initiatives.....	111
Table 31: Consumable Take Back criterion in other initiatives.....	116

1 INTRODUCTION

This document is intended to provide the background information for the revision of the Green Public Procurement (GPP) criteria for Imaging Equipment¹. The study has been carried out by the Joint Research Centre's Directorate B (JRC Dir. B – Growth and Innovation) with technical support from a consulting consortium. The work is being developed for the European Commission's Directorate General for the Environment.

EU GPP criteria aim at facilitating public authorities the purchase of products, services and works with reduced environmental impacts. The use of the criteria is voluntary. The criteria are formulated in such a way that they can be, if deemed appropriate by the individual authority, integrated into its tender documents.

There are four main types of GPP Criteria:

- **Selection criteria (SC)** assess the suitability of an economic operator to carry out a contract and may relate to:
 - (a) suitability to pursue the professional activity;
 - (b) economic and financial standing;
 - (c) technical and professional ability.
- **Technical specifications (TS)**, the required characteristics of a product or a service including requirements relevant to the product at any stage of the life cycle of the supply or service and conformity assessment procedures;
- **Award criteria (AC)**, qualitative criteria with a weighted scoring which are chosen to determine the most economically advantageous tender. The criteria are linked to the subject-matter of the public contract in question and may comprise, for instance:
 - environmental performance characteristics, including technical merit, functional and other innovative characteristics;
 - organisation, qualification and experience of staff assigned to performing the contract, where the quality of the staff assigned can have a significant impact on the level of performance of the contract; or
 - after-sales service and technical assistance, delivery conditions such as delivery date, delivery process and delivery period or period of completion.

Award criteria must be considered to be linked to the subject-matter of the public contract where they relate to the works, supplies or services to be provided under that contract in any respect and at any stage of their life cycle, including factors involved in:

- (a) the specific process of production, provision or trading of those works, supplies or services; or
- (b) a specific process for another stage of their life cycle,

even where such factors do not form part of their material substance.

- **Contract performance clauses (CPC)**, special conditions laid down that relate to the performance of a contract and how it must be carried out and monitored, provided that they are linked to the subject-matter of the contract.

For each set of criteria there is a choice between two ambition levels:

- **Core criteria** are designed to allow for easy application of GPP, focussing on the key area(s) of environmental performance of a product and aimed at keeping administrative costs for companies to a minimum.

¹ <http://ec.europa.eu/environment/gpp/pdf/criteria/imaging/EN.pdf>

-
- **Comprehensive criteria** take into account more aspects or higher levels of environmental performance, for use by authorities that want to go further in supporting environmental and innovation goals.

1.1 The criteria revision process and evidence base

The main purpose of this technical report is to evaluate the current criteria and discuss if they are still appropriate or should be revised, restructured or removed. It also identifies, based on the background technical analysis presented in the preliminary report², new criteria areas for consideration in order to better address key environmental impacts of the product group.

This document is complemented and supported by the abovementioned preliminary report addressing:

- Review of existing scope and product categorisation based on recent legislation, standards and voluntary agreements (Task 1)
- Review of technical state of play, procurement practices, market analysis and life cycle costs (Task 2),
- Review of key environmental aspects including identified life cycle hotspots, of Best Available Technologies (BAT) on the market and identification of improvement options to reduce life cycle environmental impacts (Task 3),

The conclusions of each of the tasks are presented in detail in the preliminary report². In this introductory chapter, extraction of the main aspects and conclusions from these tasks is presented.

An initial survey was sent out to a wide range of stakeholders at the beginning of the revision process concerning scope, definitions and the currently valid criteria. The target groups were government, industry, NGOs, academy and public procurers. The input provided has been incorporated in the preliminary report, and together with the proposed criteria presented in this technical report, form the basis for consultation with the stakeholders. After the consultation process is finalised, this report will be revised and a final set of criteria will be established.

A first version of this technical report (TR1.0) with the first criteria proposal was published in September 2018 and constituted the basis for the Ad-Hoc Working Group (AHWG) meeting, which took place in October 2018. This document has been reviewed based on the discussions carried out at the AHWG meeting and on stakeholders' comments provided in written form after the meeting to produce the second version of the technical report (TR2.0).

The main changes introduced in the second criteria proposal are briefly pointed out below:

- Definitions for consumables have been revised in order to reflect different types, i.e. new-builds, remanufactured or refilled cartridges and containers and complementary definitions have been modified accordingly. Minor changes have been introduced in other definitions referring to the scope.
- With regard to criteria:
 - Several award requirements have been removed, mainly due to the difficulty in the verification ("extended page-yield", "postconsumer recycled plastic minimum content" and "reduced number of materials")
 - The rest of the requirements have been revised according to the comments received and further desk research.

The second version (TR2.0) was distributed to stakeholders in June 2019 for final written consultation. Based on the comments received (see Annex 1 for detailed comments on the second draft version and answers to the comments), this third version (**final version**) of the technical report (TR3.0) with the corresponding final criteria has been prepared.

² Available at: <http://susproc.irc.ec.europa.eu/imaging-equipment/stakeholders.html>

Main changes introduced in the finalfinal criteria proposal are briefly summarised below:

- The scope of consumables was modified to cover only cartridges and containers, as the final criteria refer to those two types of consumables.
- In the criteria on “Imaging equipment minimum energy efficiency” and “Duplex imaging capability” direct reference to the latest version of Energy star has been introduced. In addition, an explanatory note has been included to reflect that new and previous version of ENERGY STAR should be allowed in the first year after the publication of the new ENERGY STAR.
- In the TS on “Spare parts availability” a requirement on maximum delivery time for spare parts has been included. This is a practice included in recent Ecodesign for similar products in order to incentivise reparability. With regards TS “Design for disassembly and repair” it has been specified that only reusable fasteners are permitted for the casing and chassis and a definition of reusable fasteners has been included.
- In relation to “firmware update” the text has been modified to alternatively allow that tenderers provide a solution in case a software update prevents the use of reused/remanufactured.
- In the core criterion TS on “warranties” it has been added that the warranty cannot be automatically invalidated through usage of remanufactured consumables unless it is proven that any malfunction or damage was directly caused by the use of the remanufactured consumable.
- For “Hazardous substances” criterion on consumables additional harmonisation of the wording of this criterion with the relevant criterion in the Blue Angel RAL-UZ-205 has been made.
- The scope of the criterion on “Consumable quality” has been extended to cover all cartridges and containers and not only remanufactured types to ensure a high quality of all consumables no matter if it is a new built or remanufactured.
- In the TS on “user instructions for green performance management” a possibility to offer a physical or on-line training on green performance management have been added.
- The previously proposed SC on “Tenderer Environmental Management activities” and the AC on “cost competitiveness of spare parts” have been finally removed with the aim of harmonisation of criteria for similar products and simplification of this already long criteria set.
- Minor wording modifications in rest of the requirements have been introduced according to the comments received.

For more detailed information on the changes introduced and rationale behind, see the background to each specific criterion.

1.2 Structure of this technical report

Based on the findings from the preliminary report, this report is divided into following sections:

- Product group scope and definitions
- Public procurement roots
- Market volumes
- Life cycle costs
- The key environmental impacts and the identification of improvement potential which led to the focus areas and draft proposed criteria
- The criteria proposal

The focus is given to the areas where the procurers can apply the criteria and engage the tenderers to reduce their life cycle environmental impacts, concentrating in particular on those presenting mayor improvement opportunities and which can be verified by the procurers.

For each focus area, one or more criteria are proposed, supported by a background for the proposed criteria and its assessment and verification. The rationale covers to certain extent following aspects:

- Existing criteria and/or metrics
- Life cycle environmental hotspots and potential improvements
- Life cycle costs implications and trade-offs with potential environmental improvements
- Market implications and functionality
- Applicability to public procurement

1.3 Product group scope and definitions

For the assessment of the existing scope and definitions analysis of the product categorisation in statistical sources and well as in relevant legislation and standards was performed. In addition, a detailed study of the scope, product categorisations and definitions used in various environmental initiatives like the Energy Star³, EU Voluntary Agreement⁴, the EPEAT⁵ scheme and national labels, i.e. Blue Angel⁶, Nordic Swan⁷ and Korea Ecolabel, was made.

Main background information which aids the revision of the current scope and definitions of the EU GPP for imaging equipment product group is presented in the previously-mentioned preliminary report². In this section main findings which support the revised proposal are briefly explained along with the stakeholders' feedback.

This feedback has been gathered through a preliminary online survey and regarded mainly the practicability of the current product group definition and scope. Out of the 16 responses provided, half of the stakeholders consider that the scope of GPP should be changed, 4 of them think it should remain as it is and 4 have no opinion.

The most important findings are summarised below:

- Most stakeholders think the cartridges and consumables should be included within the scope of this product group, whilst others were of the opposite opinion (one thinks they should have their separate GPP criteria).
- Most respondents indicated that the speed restriction is unnecessary, and a couple ask for alignment with other available environmental schemes.
- Several stakeholders consider that products designed for A2 media and larger as well as products marketed as plotters should be included.

Concerning the inclusion of cartridges and consumables, the stakeholders are mainly supporting their inclusion as these products are responsible for a large part of the product's environmental impacts and therefore giving to clients the opportunity to choose more environmentally friendly consumables is supported.

1.3.1 Revised proposal for scope and definitions for imaging equipment product group

³ Energy Star Version 3.0 can be downloaded from:

https://www.energystar.gov/products/spec/imaging_equipment_specification_version_3_0_pd

⁴ For more information on EU Voluntary Agreement see: <http://www.eurovaprint.eu/pages/voluntary-agreement/>

⁵ For more information on EPEAT scheme see: <https://www.epa.gov/greenerproducts/electronic-product-environmental-assessment-tool-epeat>

⁶ Blue Angel has currently two sets of environmental criteria for imaging equipment: RAL-171 criteria can be downloaded from: <https://www.ecomark.jp/pdf/171-1207-e.pdf> and RAL-205 criteria can be downloaded from: <https://produktinfo.blauer-engel.de/uploads/criteriafile/en/DE-UZ%20205-201701-en%20Criteria.pdf>

⁷ Nordic Ecolabelling Version 6.5 can be downloaded from: <http://www.svanen.se/en/Criteria/Nordic-Ecolabel-criteria/Criteria/?productGroupID=9>

The current EU GPP criteria focus on imaging equipment products. However, as the products become more efficient, the importance of consumables is more evident (responsible for 20-30% contribution to Global Warming Potential and Primary Energy Demand in the LCA studies reviewed⁸). Furthermore, other widely used environmental schemes such as the Blue Angel⁶, EPEAT⁵ and the Nordic Swan⁷ already consider consumables in their criteria concurring on their importance, which is also pointed out by the stakeholders answering the survey. It was therefore proposed to extend the scope of the EU GPP criteria to include consumables and harmonise with the above-mentioned schemes.

In addition, it was proposed to extend the scope to include also printing services, as the analysis of public tenders shown in the preliminary report suggests that a trend to increase the use of printing service agreements, where the price is linked to the quantity of printed pages is expected. These can include a leasing agreement for printing and scanning or selling the products including a service agreement covering maintenance and even optimised document output through a managed printing service (MPS). It is expected that these services develop further into established services offered to non-domestic users, and this needs to be taken into account in the revision of the current EU GPP criteria.

1.3.1.1 Imaging equipment products

For the purpose of the revised EU GPP criteria, in the first proposal, the definition of imaging equipment products was proposed to remain the same as in the existing criteria.

Also the scope of imaging equipment products remains almost the same as in the existing criteria in force, except that large format printing equipment is now included in scope as long as they fit the definitions in scope.

In the existing EU GPP, 'Large format printing equipment' was excluded from the scope. 'Large format printing equipment' is defined as: large products which are not typically used in offices if they meet one of the following technical specifications:

- standard black and white format products with maximum speed over 66 A4 images per minute;
- standard colour format products with maximum speed over 51 A4 images per minute
- products designed for A2 media and larger; or
- products marketed as plotters.

In the revised scope these products are covered by the definition of 'Printer', in order to simplify the product categorisation and reflecting the categorisation of ENERGY STAR.

In addition, scanners were proposed to be in the scope for harmonizing with other important voluntary schemes (ENERGY STAR and Nordic Swan) and due to their market significance, which is at the same level as that of copiers.

During the Ad-hoc Working Group Meeting (AHWG) consultation, one stakeholder pointed out that large format printers should not be in scope as they are not designed for office. The stakeholder mentioned that these products were mainly used for architectural, engineering and construction applications, which are also relevant for some public organisations. Nevertheless, ENERGY STAR v3.0⁹ includes them in scope and therefore energy efficiency requirements are settled for them.

Against this background, no relevant changes were included after the AHWG meeting.

The exclusion of facsimiles machines, which was not mentioned in the first proposal by mistake, was corrected in the TR2.0.

No changes have been included in final report with regards the scope as a result of the last written consultation.

⁸ For more details see Preliminary Report section 4.1, available at: http://susproc.jrc.ec.europa.eu/imaging-equipment/docs/PR_GPP_EUIE_1st_AHWG_September_2018.pdf

⁹

<https://www.energystar.gov/sites/default/files/FINAL%20Version%203.0%20ENERGY%20STAR%20Imaging%20Equipment%20Program%20Requirements.pdf>

Imaging Equipment scope

Products that are marketed for office or domestic use, or both, and whose function is one or both of the following:

- a) to produce a printed image in the form of paper document or photo through a marking process either from a digital image, provided by a network/card interface or from a hardcopy through a scanning/copying process;
- b) to produce a digital image from a hard copy through a scanning/copying process.

Excluded from the scope are:

- a) Digital Duplicators,
- b) Mailing machines,
- c) Facsimile (fax) machines.

Imaging equipment	Definition
Printer	A product whose primary function is to generate paper output from electronic input. A printer is capable of receiving information from single-user or networked computers, or other input devices (e.g., digital cameras). This definition is intended to cover products that are marketed as printers, and printers that can be field-upgraded to meet the definition of an MFD.
Copier	A product whose sole function is to produce paper duplicates from paper originals. This definition is intended to cover products that are marketed as copiers, and upgradeable digital copiers (UDCs).
Multifunctional device (MFD)	A product that performs two or more of the core functions of a Printer, Scanner, Copier, or Fax Machine. An MFD may have a physically integrated form factor, or it may consist of a combination of functionally integrated components. MFD copy functionality is considered to be distinct from single-sheet convenience copying functionality sometimes offered by fax machines. This definition includes products marketed as MFDs, and “multi-function products” (MFPs).
Scanner	A product whose primary function is to convert paper originals into electronic images that can be stored, edited, converted, or transmitted, primarily in a personal computing environment. This definition is intended to cover products that are marketed as scanners.
Professional Imaging Product	<p>A printer or MFD marketed as intended for producing deliverables for sale, with the following features:</p> <ul style="list-style-type: none"> a) Supports paper with basis weight greater than or equal to 141 g/m²; b) A3-capable; c) If product is monochrome, monochrome product speed equal to or greater than 86 ipm; d) If product is colour, colour product speed equal to or greater than 50 ipm; e) Print resolution of 600 x 600 dots per inch or greater for each colour f) Weight of the base model greater than 180 kg; and <p>Five of the following additional features for colour products or four for monochrome products, included standard with the Imaging Equipment product or as an accessory:</p> <ul style="list-style-type: none"> g) Paper capacity equal to or greater than 8,000 sheets; h) Digital front-end (DFE); i) Hole punch; j) Perfect binding or ring binding (or similar, such as tape or wire binding, but not staple saddle stitching); k) Dynamic random access memory (DRAM) equal to or greater than 1,024 MB. l) Final-party color certification (e.g., IDEAlliance Digital Press Certification, FOGRA Validation Printing System Certification, or Japan Color Digital Printing Certification, if product is color capable); and m) Coated paper compatibility.

1.3.1.2 Imaging equipment consumable

For the first proposal, the scope and definitions for consumables were developed based on the analysis of the definitions found in other schemes like the EPEAT, Blue Angel, Nordic Ecolabelling, Eco Mark and the Korea eco-label (see preliminary report, chapter 2.3) with the aim of harmonisation with those schemes.

During the AHWG meeting, a stakeholder suggested to include paper and other components integrated in printing modules that aid on the printing by the cartridges. Regarding paper, this is already covered by another set of EU GPP criteria¹⁰. Regarding other components, these are already included in the definition of cartridges. A stakeholder also asked to include new cartridges/containers manufactured by a final party (not Original Equipment Manufacturers (OEM)), but illegally branded under an OEM brand name, in the scope by a specific definition.

Against this background, the definition was revised. The most common types of cartridges and containers consumables were included in the complementary definitions section.

In this **final version** of the criteria the scope of consumables was modified to cover only cartridges and containers, as the final criteria refer to those two types of consumables. Further very minor clarifications to the definitions have been added as a result of comments received during the written consultation, e.g. mentioning of the word “clones”, as synonym for “counterfeits” (as specified in TR2.0) have not been considered correct and has been removed from the definitions section, while the definitions of drums, fuser and transfer units were moved to the section on complementary definitions.

Imaging Equipment consumables scope

A replaceable product that is essential to the functioning of the imaging equipment product. It can be replaced or replenished by either the end user or service provider during the normal usage and life span of the imaging equipment product.
Imaging equipment consumables covered under the scope of this EU GPP include containers and cartridges.

¹⁰ The EU GPP criteria for paper are available for download from: http://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

Imaging equipment consumable	Definition
Container	<p>An end-user replaceable product that holds toner or ink and that fits onto or into or is emptied into an imaging equipment product. Containers do not contain integrated components or moving parts integral to the imaging product's function.</p> <p>Containers can be:</p> <ul style="list-style-type: none"> • New built (Original Equipment Manufacturers (OEM) and non-OEM manufactured, including counterfeits) • Remanufactured (by OEM and non-OEM) • Refilled (by OEM and non-OEM) <p>Containers may also be called bottles or tanks.</p>
Cartridge (Ink/toner)	<p>An end-user replaceable product, which fits into or onto an imaging equipment product, with printing-related functionality that includes integrated components or moving parts integral to the imaging equipment's function beyond holding the ink or toner material.</p> <p>Cartridges can be:</p> <ul style="list-style-type: none"> • New built (OEM and non-OEM manufactured, including counterfeits) • Remanufactured (by OEM and non-OEM) • Refilled (by OEM and non-OEM) <p>Cartridges may also be called modules.</p>
Complementary definitions	
Drum units	An end-user replaceable product, which fits into an imaging equipment product and which includes a photosensitive drum.
Fusers units	An end-user replaceable product, which fits into an imaging equipment product and which consists of a pair of heated rollers that fuse toner onto output media.
Transfer unit	An end-user replaceable product, which fits into an imaging equipment product, and which supports the transfer of toner onto output media ahead of a fusing process.
New built	A new cartridge/container
Remanufactured	A cartridge/container that, after having been used at least once and collected at its end-of-life, is restored to its original as new condition and performance, or better, by for example replacing wear parts and filled in with new toner or ink (incl. solid ink). The resulted product is sold like-new with warranty to match.
Refilled	A cartridge/container that has been used and filled with new toner or ink (incl. solid ink)
Counterfeits	Counterfeits are new cartridges/containers manufactured by a third party (not an OEM), but illegally branded under an OEM brand name. ¹¹

¹¹According to IDC, these represented 1% of Western Europe's consumable shipments in 2016
Source: Revision of Voluntary Agreement on Imaging Equipment. Task 2 report. March 2019.

1.3.1.3 Print services

The proposed scope and definitions for print services is based on general practices. Many schemes and business models exist for the provision of these services (see chapter 1.4 for more details), so the proposed definition is generic in order to cover all these possibilities.

Print services

Service agreements where the price is linked to the quantity of printed pages. These agreements can include the supply of IE products and /or consumables, maintenance, end of life activities and optimisation of organisation's document output.

1.4 Public procurement routes

Directive 2014/24/EU¹² defines three kinds of contracts:

- 1) '**public supply contracts**' means public contracts having as their object the purchase, lease, rental or hire-purchase, with or without an option to buy, of products. A public supply contract may include, as an incidental matter, siting and installation operations;
- 2) '**public service contracts**' means public contracts having as their object the provision of services other than those referred to in point on '**public supply contracts**';
- 3) '**public works contracts**' means public contracts having as their object one of the following:
 - (a) the execution, or both the design and execution, of works related to one of the activities within the meaning of Annex II;
 - (b) the execution, or both the design and execution, of a work;
 - (c) the realisation, by whatever means, of a work corresponding to the requirements specified by the contracting authority exercising a decisive influence on the type or design of the work;

In addition, contracts can also be classified according to its duration and form:

- one-off (e.g. buy one printer; provide a service to clean the windows for a specific date)
- long-term (e.g. supply of a certain number of cartridges every month for one year; offices cleaning service provision every day for one year)
- call-downs from framework contracts that specify the conditions of sale of something during a given time duration but not the amount (e.g. supply as many printers as requested by fix price and specific conditions during one year).

The large variance in imaging equipment products, consumables and services in the scope of this revision project means that procurement practices will also vary significantly.

Lack of data causes that it is not possible to indicate exact purchasing patterns used by businesses. Many large businesses, including large public organisations, may purchase imaging equipment products or printing services directly from imaging equipment manufacturers. There are also many imaging equipment resellers who are also focussed on the larger business market.

However, government purchasing patterns can be identified due to the requirement for public disclosure of information. The European Commission Tenders Electronic Daily (TED) website includes records of how government bodies throughout the EU purchase imaging equipment¹³.

¹² Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC.

¹³ <http://ted.europa.eu/TED/misc/aboutTed.do>

TED is the supplement to the Official Journal of the EU where all public procurement contracts over set financial thresholds for central government authorities and sub-central contracting authorities are mandatorily published. The thresholds differ according to the type of contracts but it should at least be of value above 135 000 EUR. It is important to note that government purchasing of imaging equipment under the set thresholds may not be recorded in the TED database as there is no requirement to publish the contract through TED. This means that contracts from smaller government bodies are more likely to be missed from this analysis.

Questioning the TED database shows that in 2016 public institutions in the EU published 384 contract award notices for **supply contracts**, **service contracts** and exceptional cases of **work contracts** which included products meeting the CPV code 30232100 (Printers and plotters)¹⁴ (see Table 1).

About 85% of the procurement of contracts of imaging equipment in the EU are supply contracts, indicating that most of the public institutions that procured imaging equipment in 2016 over a 135 000 EUR threshold purchased products. This highlights the importance of maintaining EU GPP criteria for imaging equipment products. Although it is predicted that more public institutions will purchase services in the future, this is in fact not yet known with accuracy and criteria for products are therefore needed.

Table 1 also shows that a significantly larger amount of these contracts are procured by diverse government depending organisations with specific purposes (i.e. bodies governed by public law), regional and local authorities and ministries and other national/federal authorities which are not agencies. These public institutions contract imaging equipment products in their large majority.

Table 1: EU public institution supply, service and work contracts covering CPV 30232100 in 2016 by public institution type

Type	Supply contracts	Service contracts	Work contracts	Total by public institution type
Ministry or any other national or federal authority	79	9		88
National or federal Agency/ Office	7	2		9
Regional or local authority	92	19	2	113
Regional or local Agency/ Office	3	1		4
Utilities	16	5		21
Body governed by public law	129	20		149
Total by type of contract	326	56	2	384

Table 2 shows that most procurement contracts in the EU happened as open procedure¹⁵ in 2016. This keeps a more fair competition and may reflect the wide availability of imaging equipment products, consumables and services providers in the EU.

¹⁴ According to the Common Procurement Vocabulary (CPV). SIMAP (système d'information pour les marchés publics), Codes and nomenclatures – CPV, available from <https://simap.ted.europa.eu/cpv>

¹⁵ In an open procedure any business may submit a tender. The minimum time limit for submission of tenders is 35 days from the publication date of the contract notice. If a prior information notice was published, this time limit can be reduced to 15 days.

Table 2: EU public institution supply, service and work contracts covering CPV 30232100 in 2016 by procurement procedure

Type	Supply contracts	Service contracts	Work contracts	Total by procurement procedure
Contract award without prior publication	2			2
Competitive dialogue	1	1		2
Competitive procedure with negotiation		3		3
Negotiated procedure without a call for competition	3	5		8
Open procedure	303	45	2	350
Restricted procedure	3			3
Negotiated procedure	14	2		16
Total by type of contract	326	56	2	384

Many purchasing decisions concerning imaging equipment are made at departmental or individual, rather than at the organisational level. This can result in a surplus of imaging equipment products, especially lower specification desktop-based devices (e.g. small inkjet printers, scanners and/or multifunctional devices), which also leaves larger centralised imaging equipment underutilised. This situation can result in increased costs for procuring authorities due to the need for increased support and inefficient use of resources. A lack of visibility and understanding over the Total Cost of Ownership (TCO) of printing drove the imaging equipment market to recognise the need for better management of imaging equipment and to provide imaging equipment management services.

1.5 Market volumes

1.5.1 Imaging equipment products

This section provides a brief summary of the market analysis included in the preliminary report (chapter 3)².

The imaging equipment market is characterised by a relatively small number of manufacturers. A total of 14 manufacturers account for over 95% of all imaging equipment sold in the European Union (EU).¹⁶ These manufacturers are:

- Brother International Europe
- Canon
- Epson
- HP
- Konica Minolta Business Solutions Europe
- KYOCERA Document Solutions Europe B.V.
- Lexmark International
- OKI (UK) Ltd.
- Panasonic Europe Ltd.
- Ricoh Europe PLC
- Samsung Electronics Europe
- Sharp Electronics Europe Ltd (SEE)
- Toshiba TEC Germany Imaging Systems
- Xerox

¹⁶ For more information see: <http://www.eurovaprint.eu/pages/our-members/>

Approximately 70% of the total annual EU sales are estimated to be non-domestic products, which covers both public procurement and private business to business purchases. Because of the lack of procurement-specific data, the volumes and future trends are established based on assumptions made on the share of products sold for B2B purposes. The annual sales for all imaging equipment products (i.e. B2B and B2C) have been estimated based on several data sources (see Table 3), which have been, in a great extent, reviewed and complemented after the AHWG meeting considering input from stakeholders (see detailed input in Annex 1). This review used also the latest input provided to the revision of the Voluntary Agreement for Imaging Equipment¹⁷ on market trends, lifetime and sales. The following data sources have been used:

¹⁷ Revision of Voluntary Agreement on Imaging Equipment. Task 2 report. March 2019. Available at: <https://www.review-imagingequipment.eu/documents>

Table 3: Data sources for sales of products in scope

Product type	Product sub-type	Data sources	
		Historical sales	Current and future sales
Printers	Inkjet printers	Imaging equipment Impact assessment 2013 ¹⁸ and Survey of the Market Penetration of energy Efficient Office Equipment under the EU ENERGY STAR Programme ²⁰	2016-2021: Revision of the Voluntary Agreement for Imaging Equipment, Task 2 ¹⁷ ; 2021-2040: Linear regression
	Laser printers		
Multifunctional devices (MFDs)	Inkjet MFDs	Imaging equipment Impact assessment 2013 ¹⁸ and Survey of the Market Penetration of energy Efficient Office Equipment under the EU ENERGY STAR Programme ²⁰	
	Laser MFDs	Linear regression between 1995-2015, assuming zero sales in 1995 ¹⁹ and Survey of the Market Penetration of energy Efficient Office Equipment under the EU ENERGY STAR Programme ²⁰	
Copiers		Impact assessment 2013 ¹⁸ and Survey of the Market Penetration of energy Efficient Office Equipment under the EU ENERGY STAR Programme ²⁰	
Scanners		Online research ^{21,22} and linear regression between 2009-2020	2016-2020: Linear regression; 2020-2040: Stable sales no growth

The estimated annual sales of imaging equipment in scope of the GPP are presented in Table 4. Only the period of 2015 to 2040 is shown as previous sales are not considered relevant. Historic sales have been estimated purely to compare trends and being able to apply linear regressions in the case of data gaps.

The assumed decrease in sales can be a consequence of the trend in businesses and offices aiming to become “paper free”, where more work is handled digitally e.g. signing of contracts digitally and reports which are handed in online. This also impacted the domestic sector too, where the sales are also falling in the recent years. In many countries, the public sector and semi-public like the energy and water utilities are also going more digital e.g. by using secure e-mail etc. for sending letters and documents to citizens and organisations. However, many people still prefer to print their assignments and reports for different purposes, so a lot of

¹⁸ <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex:52013SC0014>

¹⁹ Brother introduced the world's first multi-function machine - <https://www.brother.co.uk/about-brother/history>

²⁰ ENER/C3/2014-561 Support for Energy Star Impact Assessment and Market Penetration Survey. Interim Report 3: Q3-Q4 2015: Survey of the Market Penetration of Energy Efficient Office Equipment under the EU ENERGY STAR Programme (not publicly available).

²¹ <http://www.infotrends.com/public/Content/INFOSTATS/Articles/2007/07.31.2007.html>

²² <http://newbusinesstechnology.co.uk/2011/05/document-scanner-market-analysis/>

printing is still occurring tough with declining tendency. It can be assumed that the sales of paper follow trend set by the sales of imaging equipment.

In general, accurate predictions and estimations of the future sales of products are difficult to make as many factors might have an impact. However, the sales are assumed to decrease for all types of imaging equipment with varying rates. The highest decrease is expected to be connected with single functionality copiers which are considered to almost disappear from the market in 2020. Scanners sales are expected to grow mainly due to increased demand in small and medium offices where public organisations prefer to buy scanners rather than big MFDs. This is estimated based on the analysis on the number of scanners and copiers in the EU ENERGY STAR database. Inkjet printers have had the largest decrease in sales since 2005. In general, the sales of printers have decreased more than the sales of MFDs, and today, based on sales data, MFDs are clearly the preferred type of imaging equipment. The total annual sales amount to ca. 24.8 million units back in 2015 and 23.5 million units in 2020.

Table 4: Estimated annual sales of imaging equipment in million units, including average annual growth rate

Product type	Product sub-type	2015	2020	2025	2030	2035	2040	2015-2040 average annual growth rate
Printers	Inkjet	0.96	0.91	0.86	0.82	0.78	0.74	-1.0%
	Laser	3.8	3.6	3.5	3.3	3.1	3.0	-1.0%
Multi-functional devices (MFDs)	Inkjet	14.8	14.1	13.4	12.8	12.1	11.5	-1.0%
	Laser	4.2	4.0	3.8	3.6	3.4	3.2	-1.0%
Copiers		0.57	0	0	0	0	0	0%
Scanners		0.46	0.88	0.88	0.88	0.88	0.88	2.63% ²³
TOTAL IN SCOPE		24.8	23.5	22.4	21.3	20.3	19.4	-0.98%

In order to establish the market volumes of imaging equipment products that are relevant to the GPP criteria, the share of annual sales for the non-domestic market was estimated. Sales of imaging equipment products in the UK show increased B2B share for printers, MFDs, scanners and copiers (data not publicly available). Assuming a similar trend in the rest of the EU, it is expected that there will be an overall increase in the proportion of sales to non-domestic users, as domestic consumer needs for imaging equipment reduces. Printing devices, apart from MFD laser, are estimated to have an increase in non-domestic sales. Shares of copiers and scanners B2B market share are expected to remain stable due to the ongoing and future need of this equipment to digitalize older documents. Furthermore, in many public institutions the need to document in hard copy is still a common practice.

The EU GPP background report of previous revision (2014)²⁴ gave the ratio of images produced at work and at home as approximately 20 to 3. This ratio is used as the basis for estimating the non-domestic (i.e. B2B) and domestic (i.e. B2C) market shares for scanners and copiers. The market shares of printers and MFDs are based on the partial sales data from one Member State combined with the total EU-28 market size, and refined based on expert assumptions projected up to 2030²⁵. The established share of imaging equipment products sold to the non-domestic market is shown in Table 5.

²³ Although no growth from 2020 onwards, this is the estimated total growth averaged over the 25 year period

²⁴ Green Public Procurement for Imaging Equipment Technical Background Report, 2014

²⁵ Sales data were used to establish a market division between B2C and B2B. It was assumed the B2B will grow considerably for inkjet MFDs since the laser MFD market is already saturated.

Table 5: Estimated non-domestic B2B market share (as percentage of annual sales)

Product type	Product sub-type	2015	2020	2025	2030	2035	2040
Printers	Inkjet	38%	42%	46%	50%	54%	58%
	Laser	86%	87%	87%	88%	89%	89%
Multi-functional devices (MFDs)	Inkjet	53%	57%	61%	65%	69%	73%
	Laser	98%	98%	98%	98%	69%	73%
Copiers		97%	not relevant	not relevant	not relevant	not relevant	not relevant
Scanners		97%	87%	87%	87%	82%	79%

Based on these shares, the estimated annual sales for the non-domestic market, both historical and forecasted, are shown in Table 6.

Table 6: Estimated non-domestic B2B market annual sales (in million units)

Product type	Product sub-type	2015	2020	2025	2030	2035	2040
Printers	Inkjet	0.36	0.38	0.40	0.41	0.42	0.43
	Laser	3.3	3.2	3.0	2.9	2.8	2.7
Multi-functional devices (MFDs)	Inkjet	7.9	8.0	8.2	8.3	8.4	8.4
	Laser	2.2	2.3	2.3	2.3	2.4	2.4
Copiers		0.55	0.0	0.0	0.0	0.0	0.0
Scanners		0.45	0.77	0.77	0.77	0.72	0.70
TOTAL		14.7	14.6	14.7	14.7	14.6	14.6

The data show that, in the future, printers will be sold much less in B2B applications than multifunctional devices (MFDs), in particular inkjet printers. Annual sales data on inkjet printers will continue being modest while annual sales of inkjet MFDs are expected to grow in B2B applications and will remain having more than half of the B2B market in the EU. In 2015 inkjet printers had already been significantly reduced due to the rapid shift from inkjet printers to inkjet MFDs. The B2B market share of scanners will slightly decrease, mainly due to the overall low sales of these products combined with an increase of interest by B2C users. All in all, the MFDs will be dominant in the non-domestic market. Overall, it is expected that the non-domestic market for imaging equipment products will remain stable.

During the AHWG meeting, some stakeholders mentioned the sales predictions for imaging equipment were not realistic, where they showed market growth in the future. Both the imaging equipment and the consumables sales, from historic to present to future trends, have been revised and updated in above-presented tables based on different data sources. The revised sales show actually net sales reductions; although these are small as some product and consumable types will continue to grow.

1.5.2 Imaging equipment consumables

During the AHWG consultation, stakeholders expressed concerns on the lack of consumables market volumes, as these figures are important to understand the magnitude of the problem. After the meeting, this section has been revised. Data on consumable sales has been established for ink/toner consumables, which are expected to cover most of the printing consumables in the EU market. Sales estimations have been based on desktop research and a

range of sources used during the revision of the Voluntary Agreement for Imaging Equipment¹⁷. The main data sources and assumptions are detailed below:

- The current annual sales of ink and toner consumables are 2008 – 2016 data for Western Europe from InfoTrends²⁶, which has been scaled up to the whole EU-28 via a factor derived from GDP.
- The historical data was linearly estimated based on the available data for 2008 – 2016.
- From 2017 onwards to 2021, based on International Data Corporation (IDC)'s info²⁷.
- From 2021 onwards, no data is available, sales are assumed to have a steady 1% decrease.
- The data from InfoTrends only consider ink and toner consumables and does not further sub-divide into “cartridges” or “containers”, the following assumptions are made:
 - For ink it is assumed that 20 % of the ink is sold as cartridges and the remaining 80 % are sold as containers, according to inputs from stakeholders²⁸.
 - For toner it is assumed that 80 % of the toner is sold as cartridges and the remaining 20 % are sold as containers, according to consultant's expert opinion.

Based on these data sources, estimations and assumptions, the sales of consumables are shown in Table 7 (only B2B sales). The market share for B2B consumables sales applied was the same used to estimate the B2B sales of imaging equipment (see Table 5). Both printers' and MFDs' B2B market shares were averaged for each printing technology type (i.e. average of ink printers and MFDs and average of laser printers and MFDs).

Table 7: Consumable non-domestic B2B sales (ink/toner cartridges and containers) (in million units), including average annual growth rate

Consumable type	2015	2020	2025	2030	2035	2040	2015-2040 average annual growth rate
Ink cartridges	37	35	35	35	36	36	-1.5%
Ink containers	147	138	139	142	144	146	
TOTAL INK CONSUMABLES	184	173	173	177	180	182	
Toner cartridges	82	73	70	69	67	66	
Toner containers	20	18	17	17	17	16	
TOTAL TONER CONSUMABLES	102	92	87	86	84	82	
TOTAL CONSUMABLES	286	265	261	263	264	265	

Table 7 shows that the majority (i.e. 80 %) of the inkjet consumables are containers, while the majority (i.e. i.e. 80%) of the laser consumables are cartridges. This shows that the containers market in the EU is much more mature for inkjet equipment than for laser equipment. This may be due to the higher complexity of laser consumables needed for laser equipment. This trend is expected to continue unless there are more incentives to manufacture simpler consumables

²⁶ U.S., Western European and World Wide Market and Trends for Laser and Inkjet Supplies, John Shane, sales data from 2008 - 2016

²⁷ IDC, EMEA Consumables Tracker, March 2017. Western Europe Consumables shipments, 2014-2021 by technology.

²⁸ EFIM (European Federation of ink and ink cartridges manufacturers) input based on estimations, stakeholder consultation July-August 2018

for laser equipment. For inkjet, this is already achieved, although cartridges will continue to exist.

From 2017 onwards to 2021, toner and inkjet cartridges sales are falling by 2.7% - 4% annually, due to multipack and high yield inkjet cartridges, as well as high yield toner cartridges with the intention to reduce servicing costs in contracts. Overall, it is expected that the sales of ink and toner consumables will decrease at an average of 1.5% annually, due to decreasing stock levels of imaging equipment.

1.5.3 Print services

Publicly available data on the amount of print services used in public procurement is not known. However, the analysis of public tenders done in the preliminary report suggests that most public contracts are for purchasing products and not for leasing and services. The overview of the procurement practices performed in the preliminary report, shows that mostly supply contracts (i.e. supply of imaging equipment products) are awarded by public authorities at EU level over a threshold of 135 000 EUR. This, however, does not tell whether the absolute number of imaging equipment products is higher for supply rather than service (i.e. printing services) contracts.

On the other hand, a trend is expected for an increased use of purchase service agreements where the price is linked to the quantity of printed pages. It is expected that these services develop further into established services offered to non-domestic users.

1.6 The life cycle costs of imaging equipment

The Life Cycle Costs (LCC) of imaging equipment products in the scope have been established in order to get an overview of the most important costs to consumers, which in this case are the public procurers. The LCCs are also used as the starting point to identify whether certain criteria would incur on significant costs to the procurers.

LCCs account for the products' total cost of ownership. The life cycle stages considered relevant during the development of the current GPP criteria for imaging equipment products are found applicable for the revision of the criteria. These are:

- Purchase cost
- Running costs for operation (i.e. costs for electricity, paper, and toner/ink cartridges)
- Running costs for repair and maintenance
- End of life costs

Installation costs are considered negligible.

Printers and MFDs come in different sizes with very different purchase and operating costs in the market. Three sizes based on printing speed were observed during the data collection, which can be seen in Table 8. Furthermore, prices and costs also vary widely depending on whether the printing is colour or monochrome. Therefore, costs data is split throughout this chapter not only on size but on type of printing.

Scanners don't show these differences, beside the difference in the cost of purchase, and they are therefore grouped in one product category without further categorization.

All aspects of the LCC analysis except electricity consumption were established based on data collected from online retail prices, including costs of consumables, purchasing costs, and maintenance.

Table 8: Printers and MFDs categories based on size (defined by printing speed)

Size	Printing speed (Pages per minute – ppm)
Small	1-20
Medium	21-40
Large	>40

The total Life Cycle Costs are shown in Figure 1 below, which considers all the information, assumptions and data presented in the Preliminary Report (see task 2, chapter 10). The error bars primarily originate from the large variation in the costs of paper.

Generally, the paper is the dominant cost for medium/large laser MFDs and printers, while for small laser MFDs and printers the toner is also significant. These total LCCs represent a wide variation of pages printed per lifetime based on the calculated average prints per month presented in section 10.2.2.1 of the Preliminary Report (i.e. 2500, 8000, and 25000 for small, medium and large products). This has a direct influence on the calculated total LCCs, as large products show higher paper costs.

Figure 1 can hence be used to estimate the total LCC for the products lifetime, but not used comparatively between devices if a set number of printed pages per month is assumed.

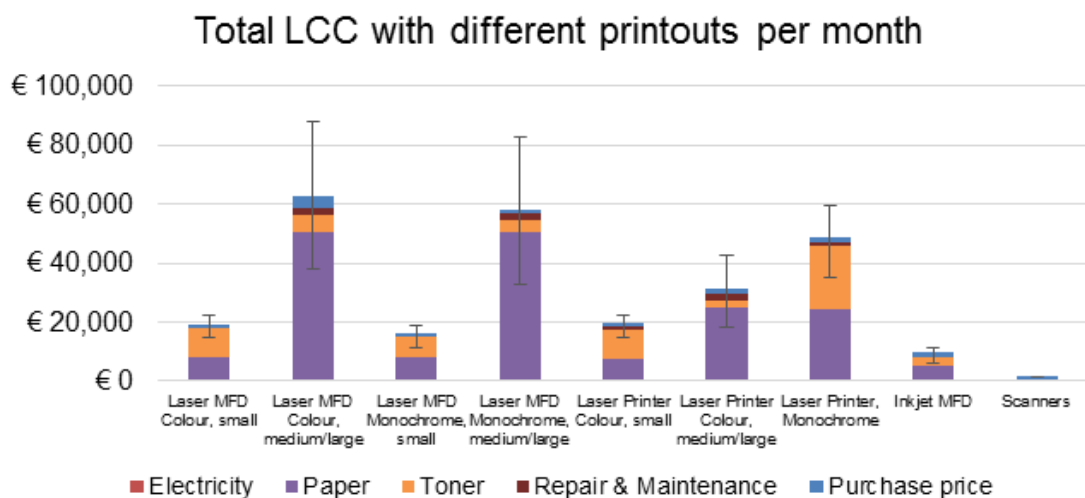


Figure 1: Total Life Cycle Costs for different printouts per month

Figure 2, Figure 3 and Figure 4 assume a fixed number of pages printed each month, and compare the total LCC of the different devices for their whole lifetime. This can hence be used to compare total LCC when buying new devices, if the required number of pages printed each month is known. Note that the Inkjet MFD devices have a lower number of total pages printed, due to its lifetime being shorter than the laser printers.

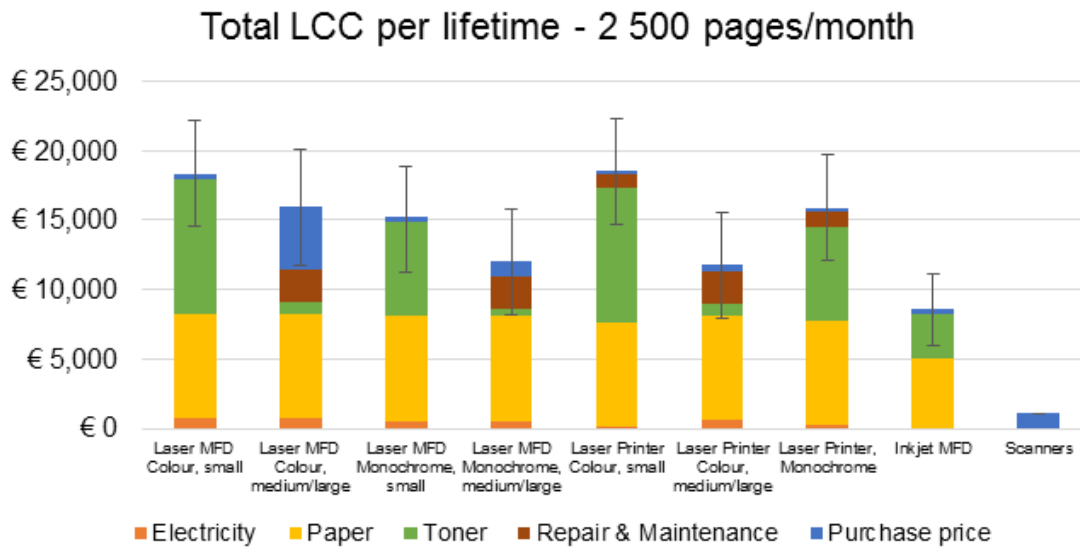


Figure 2: Total Life Cycle Costs for product lifetime assuming 2500 printouts/month

The figures show that if the printing requirements of an office are at or close to 2500 pages per month, the type of MFD and printer chosen is not as important for the total LCC as it is for more printouts. When below 2500 pages, the smaller printers tend to be cheaper, as the dominant factor becomes the purchasing price, instead of consumables. Moreover, in these smaller printout ranges, other costs such as purchase price and repair/maintenance costs become important.

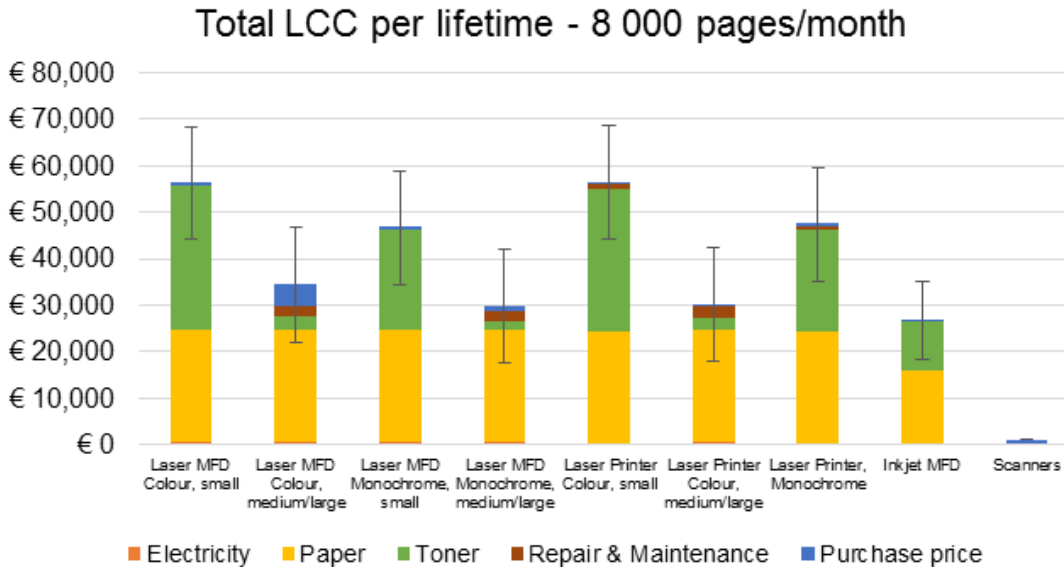


Figure 3: Total Life Cycle Costs for product lifetime assuming 8000 printouts/month

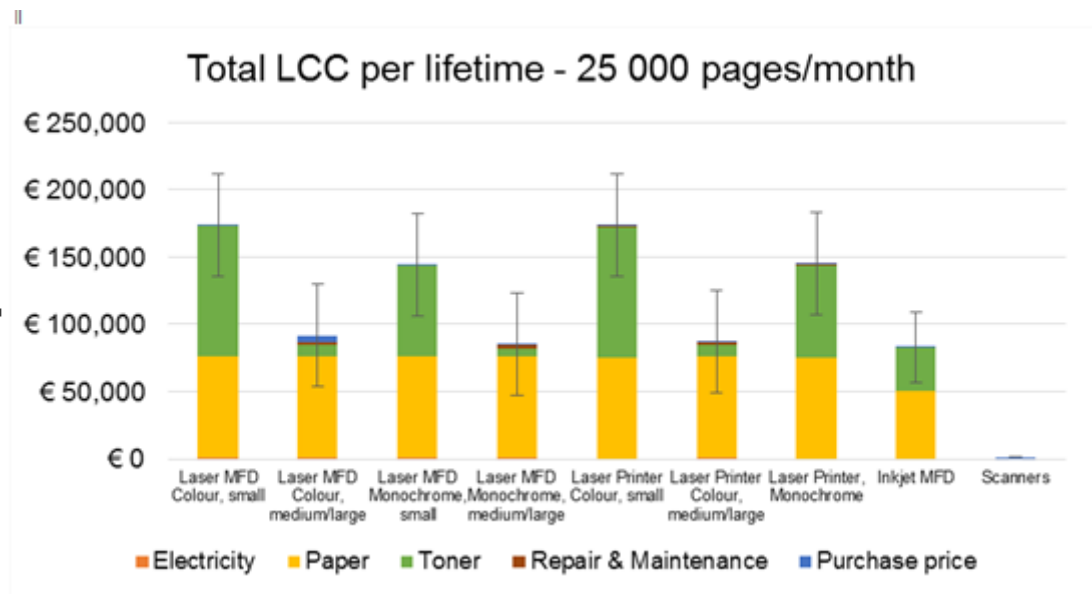


Figure 4: Total Life Cycle Costs for product lifetime assuming 25000 printouts/month

When above 2500 pages, large devices tend to be dominantly cheaper. This is solely because of the differentiation between costs of toner/ink cartridges for small and for large devices.

1.7 The key environmental impacts and improvement potentials according to technical analysis

Review of key environmental aspects including identified life cycle hotspots, of Best Available Technologies (BAT) on the market and identification of improvement options to reduce life cycle environmental impacts. The conclusions are presented in detail in the preliminary report².

1.7.1 Imaging equipment products

The review of LCA studies has identified the following hotspots for imaging equipment products:

- Use of electricity for printers and MFDs, particularly for those with less efficient printing technologies.
- Use of electricity for scanners, which can be reduced if consumer utilises low power modes for longer periods.
- Use of consumables, particularly paper and cartridges (for printers and MFDs).
- Manufacturing of printers, MFDs and scanners, particularly for the more efficient printing technologies (i.e. laser technologies).

Key Performance Indicators (KPIs) used by other environmental schemes and initiatives are:

- Energy use
- Availability of low power modes and power management functions
- Use of cartridges
- Manufacturing impacts
- Recyclability
- Recycled content
- Product weight
- Product lifetime extension
- Content of hazardous substances

Furthermore, the BAT review indicates that the best products on the market concerning energy and material efficiency aspects are:

- Energy efficient both for active state and low power modes
- Designed for recycling
- Accepting of remanufactured cartridges
- Limiting the content of hazardous substances

1.7.2 Imaging equipment consumables

The review of LCA studies²⁹ has identified the following hotspots for imaging equipment consumables:

- Manufacturing of cartridges, in particular of the housing and print head, which can be greatly reduced if cartridges can be refilled; the more refills the less contribution from manufacturing of new cartridges.

²⁹ The review of LCA studies is available at: https://susproc.jrc.ec.europa.eu/imaging-equipment/docs/PR_GPP_EUIE_1st_AHWG_September_2018.pdf

-
- The amount of paper the cartridge uses to deliver printouts with a desired quality; the higher the quality the more the reductions of environmental impacts by using less paper. However, this can be a subjective parameter to measure as different users can have different expectations of how their printouts should look like and the required quality will depend on the purpose of the printout (just a draft, final document etc.).
 - The consumer transport for refilled cartridges; the more refills the higher the contribution of transport for the total environmental impacts. However, this is subject to great variability depending on the allocated fuel used per trip per refilling.

KPIs used by other environmental schemes and initiatives are:

- Paper use
- Manufacturing impacts
- Possibility to refill cartridges
- Indoor emissions

Furthermore, the BAT review indicates that the products on the market incentivizing the reduction of energy and materials for their consumables are:

- Promoting more common cartridges designs which promote the use of remanufactured cartridges
- Accepting refilled cartridges
- Reducing use of paper
- Limiting the indoor emissions from the use phase
- Limiting the content of hazardous substances

During and after the AHWG meeting, a couple of stakeholders pointed at the imbalance of the assessment concerning the reviewed LCAs. They questioned mainly the validity of reviewed LCAs where findings were different to LCA studies performed by one specific OEM, assessing specific imaging equipment models and consumables and showing use of OEM consumables was better. One stakeholder did not agree on including 10 years' old LCAs in the assessment, while another pointed out that old LCAs shouldn't be discarded just because they are old, their comprehensiveness, data quality and independency is also important.

The study team emphasized during the meeting that the LCA review was done based on criteria presented in ISO 14040 series of standards on Life Cycle Assessment. 9 studies were assessed (5 of them were OEM studies). A scoring matrix was used to evaluate the completeness and relevance of the different studies.

According to this technical analysis included in the preliminary report, conclusions were drawn, indicating that, regardless whether the consumables are OEM or non-OEM, the use of remanufactured and refilled cartridges and/or containers reduces the life cycle environmental impacts of imaging equipment significantly and the use of single use consumables, in particular cartridges, is one of the main hotspots. Therefore, no changes were made to the main conclusions of this assessment.

1.7.3 Imaging equipment services (Print services)

At organization level, contracting of leasing agreements may promote use of products with higher durability, extend the real usage time and reduce the amount of waste by encouraging take-back systems and managed printing services. This is due to the fact that the imaging equipment fleet may be better managed when outsourced, in particular in large public institutions where time used on tracking product utilization and maintenance by internal staff may be more limited.

Take-back systems reduce the amount of waste and promote reuse and recycling of imaging equipment products and of cartridges. Managed printing services can encourage the use of remanufactured cartridges by encouraging manufacturers to offer brand agnostic services, can reduce the amount of paper used by optimizing document output, can integrate other office service areas to optimize the use of energy and can improve employers education in terms of the products and consumables environmental impacts.

1.7.4 Identified improvement options

Considering information collected for imaging equipment, related services and its consumables identified improvement options (not placed in the order of importance) are shown in Table 9.

Table 9: Identified improvement options based on environmental analysis

Imaging equipment category	Improvement options
Imaging equipment products	<ol style="list-style-type: none"> 1. Limiting the use of energy, both in active state and in low power modes 2. Promote the use of recycled materials in imaging equipment products 3. Promote modular designs which facilitate repair and recycling 4. Restrict the indoor use emissions, in particular of hazardous substances such as VOCs 5. Ensure accepting of remanufactured cartridges 6. Limiting the content of hazardous substances 7. Measuring and reporting the impacts of manufacturing of imaging equipment products 8. Limiting the use of paper and promote the use of recycled paper and printing features in the printer such as automatic duplexing, N-up printing, certified use of recycled and low weighted paper, pull printing, and printing awareness tools 9. Encouraging the use of refilled cartridges, and of remanufactured cartridges rather than limiting to the use of OEM cartridges 10. Promoting more common cartridges designs which promote the use of remanufactured cartridges 11. Accepting refilled cartridges 12. Promote reusability and recyclability trough take back system 13. Provision of information for green performance
Imaging equipment consumables	<ol style="list-style-type: none"> 1. Promote efficient consumables (materials and printing efficiency) 2. Limiting the indoor emissions from the use phase 3. Limiting the content of hazardous substances 4. Promote reusability and recyclability trough design and take back system 5. Provision of information for green performance
Imaging equipment services (Print services)	<ol style="list-style-type: none"> 1. Promote imaging equipment fleet optimization 2. Promoting resource efficiency 3. Provision of information for green performance

2 DRAFT CRITERIA AREAS AND PROPOSALS

2.1 Criteria structure

This is a final proposal of the revised EU GPP criteria. The criteria have been divided into three main sections, depending on the subject matter, and one additional horizontal section which applies to all three criteria areas. Two levels of ambitions are proposed for the majority of criteria, first one more basic, so called "core level" and the second one, with higher environmental ambition level, called the "comprehensive level".

Table 10 presents the GPP criteria proposal ordered by the type of criteria, i.e. technical specifications, award criteria, contract performance clauses and selection criteria. Later in this document, the criteria are ordered by thematic areas.

Table 10: Overview of Green Public Procurement criteria

	No	Criterion	Core	Comprehensive
PRELIMINARY CONTRACT CLAUSE				
SUBJECT MATTER: PRELIMINARY ASSESSMENT (conducted by a different provider than the potential provider for procurement of imaging equipment)				
CONTRACT PERFORMANCE CLAUSES	CPC1	Preliminary assessment of existing fleet and procurement needs	X	X
CRITERIA AREA 1 – IMAGING EQUIPMENT				
SUBJECT MATTER: PURCHASE, LEASING OF IMAGING EQUIPMENT				
SELECTION CRITERIA	SC1	Restricted substance control		X
TECHNICAL SPECIFICATIONS	TS1	Imaging equipment minimum energy efficiency	X	X
	TS2	Duplex imaging capability	X	X
	TS3	N-up printing	X	X
	TS4	Capability to use recycled paper	X	X
	TS5	Capability to use remanufactured cartridges	X	X
	TS6	Reduced number of materials		X
	TS7	Information on postconsumer recycled plastic used		X
	TS8(a)	Spare parts availability	X	X
	TS8(b)	Design for disassembly and repair	X	X
	TS8(c)	Design for recycling	X	X
	TS9	Substance emissions	X	X
	TS10	Noise emissions	X	X
	TS11	Substances of very high concern	X	X
	TS12	Hazardous substances content		X
	TS13	Firmware update control		X
TS14	Warranty and services agreements	X	X	
TS15(a)	Supply of copy and graphic paper meeting the EU GPP criteria	X	X	

	No	Criterion	Core	Comprehensive
	TS15(b)	Supply of cartridges meeting the EU GPP criteria	X	X
AWARD CRITERIA	AC1	Improvement in the imaging equipment's energy efficiency beyond TS1	X	X
	AC2(a)	Longer warranties	X	X
	AC2(b)	The longest warranty	X	X
	AC3	Take-back system for imaging equipment	X	
		End-of-life management of imaging equipment		X
AC4	Supply of reused/remanufactured ink and/or toner cartridges	X	X	
CONTRACT PERFORMANCE CLAUSES	CPC2	Reporting on reuse/recycling activities of imaging equipment	X	X
	CPC3	Reporting on supplied consumables	X	X
CRITERIA AREA 2 – CONSUMABLES				
SUBJECT MATTER: PURCHASE OF CONSUMABLES (CARTRIDGES AND/OR CONTAINERS)				
TECHNICAL SPECIFICATIONS	TS16	Cartridges/containers page-yield declaration	X	X
	TS17	Consumables mass resource efficiency		X
	TS18	Consumable hazardous substances		X
	TS19	Design for reusing/remanufacturing	X	X
	TS20	Consumable quality	X	X
	TS21	Take-back system for cartridges and containers and WEEE registration	X	X
AWARD CRITERIA	AC5	Electrophotographic consumables resource efficiency	X	X
	AC6	Facilitating reusability/remanufacturability	X	X
	AC7	End-of-life management of cartridges		X
CONTRACT PERFORMANCE CLAUSES	CPC4	Reporting on reuse/recycle activities of consumables	X	X
CRITERIA AREA 3 – PRINT SERVICES				
SUBJECT MATTER: PURCHASE OF OUTPUT - NUMBER OF PRINTOUTS				
TECHNICAL SPECIFICATIONS	TS22(a)	Commitment to reuse of imaging equipment	X	X
	TS22(b)	Commitment to repair of imaging equipment	X	X
	TS23	Supply of imaging equipment meeting the EU GPP criteria	X	X

	No	Criterion	Core	Comprehensive
	TS24(a)	Supply of paper meeting the EU GPP criteria	X	X
	TS24(b)	Supply of cartridges meeting the EU GPP criteria	X	X
AWARD CRITERIA	AC8	Supply of reused/remanufactured cartridges and containers	X	X
	AC9	Provision of managed print services		X
CONTRACT PERFORMANCE CLAUSES	CPC5	Reporting on supplied consumables	X	X
	CPC6	Provision of consumable use information		X
	CPC7	Provision of environmental information during service contract		X
HORIZONTAL CRITERIA (applicable to all criteria areas)				
TECHNICAL SPECIFICATIONS	TS25(a)	Guaranteed provision of consumables during contract	X	X
	TS25(b)	Guaranteed provision of spare parts during contract	X	X
	TS26	User instructions for green performance management	X	X

2.2 Criteria area 1 – Imaging equipment products

Criteria described in this section can be used when purchasing and/or leasing imaging equipment products that are within scope of the EU GPP. They could also be used for provision of these products under a print service contract (See section **Supply of imaging equipment** under print service criteria section).

2.2.1 Preliminary assessment of existing fleet and procurement needs

Existing EU GPP criteria in force does not include a criterion regarding assessment of existing fleet and procurement needs for imaging equipment.

The following criterion, presented already in the AHWG meeting, is proposed:

Final criteria proposal	
Core criteria	Comprehensive criteria
CONTRACT PERFORMANCE CLAUSE	
CPC1 Preliminary assessment of existing fleet and procurement needs <i>(This contract should be considered as a preliminary procedure, conducted by a different provider than the potential provider for procurement of imaging equipment. This preliminary assessment should apply only when the procuring authority identifies the need to optimise the use of the existing fleet prior to procurement of new imaging equipment and when the procurer decides not to use in-house staff to carry out this assessment.)</i> The service provider must conduct an evaluation of any current fleet of imaging equipment that the procuring authority has on their site(s) and provide to the procuring authority the results of that evaluation. The evaluation must identify the following: <ul style="list-style-type: none">• Number of imaging equipment models on each site• Name, model number and type of each imaging equipment model• Approximate age of each imaging equipment model. Based on the main print needs communicated by the procurer (or assessed through the analysis of data registered by the existing machines) and the above evaluation results, the service provider must classify each imaging equipment model into distinct categories which identify their future status. Example categories include: <ul style="list-style-type: none">○ Retain: Product to be kept for continued use on procuring authority's estate○ Return: Product to be returned to incumbent or past supplier (if applicable)○ Reuse: Product to be sold for reuse outside of procuring authority's estate○ Refurbish: Product to be treated to increase or restore its performance and/or functionality or to meet applicable technical standards or regulatory requirements, with the result of making a fully functional product to be used for a purpose that is at least the one that was originally intended○ Recycle: Product to be sent for end-of-life processing. Based on the elements above, the service provider must produce a short report advising the procurer on the number and characteristics of the additional new products to be procured.	

2.2.1.1 Background for the proposed criteria

The ability to better manage imaging equipment within a public body could encourage significant reductions in environmental impacts across many environmental hotspots. For example, a full assessment of an imaging equipment fleet could result in identification of areas where fewer products could be used.

There are no known criteria in any major environmental initiatives which cover assessments of products already included in an imaging equipment fleet. No standard metrics are required to assess compliance with this criterion. However, it is suggested that assessments of current fleets of imaging equipment would help procuring authorities to better manage imaging resources on their sites and if they plan to purchase additional equipment.

It is suggested that the assessment is conducted by a different provider to the one who will supply new equipment. It is recognised that procuring authorities would need to work with potential suppliers to identify how products would be classified (i.e. into the Retain, Return, Reuse or Recycle categories).

2.2.1.2 Further background after AHWG meeting

Several stakeholder comments were submitted on this criterion.

One stakeholder stated that the procuring authority should preferably have an asset management system in place, the evaluation asked for usually has a cost if not part of a Managed Print Services offering. The study team noted that the criterion does not state that the assessment of the fleet needs to be free of charge and so no changes are made.

An additional stakeholder stated that the requirement should only be for large product fleets. The study team noted that the criterion is relevant for all type of purchases regardless of the size. An additional stakeholder comment noted that the term "Refurbishment" was not listed under the "Rs". The wording of material efficiency terminology was subsequently reviewed and a category of "refurbish" was added.

Another stakeholder comment claimed that there was a need to take account of use intensity as well as age; however as it is expected that an incoming service provider would not have normally access to historical usage statistics (unless provided by the customer), no change was made to the criterion.

In the final written consultation additional proposal was submitted. It suggested that award points could be given for offer of provision of "refurbishes" equipment. This suggestion has not been incorporated in this criteria revision due to limited market availability of "refurbished" equipment. It should though be kept in mind for the future revisions, when respective market availability is expected to be higher.

2.2.2 Energy efficiency

Existing EU GPP criteria in force include an energy criterion consisting of requirements that products meet the Energy Star v.2.0 specification for imaging equipment. For the AHWG meeting a first criteria proposal linked to ENERGY STAR was presented. The criteria have been revised as follows after the meeting:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
<p><i>TS1 Imaging equipment minimum energy efficiency</i> <i>(same for core and comprehensive)</i> <i>(Applicable to imaging equipment covered by energy efficiency requirements in Energy Star)</i> Imaging equipment must meet all energy efficiency and power management requirements laid down in the most recently published ENERGY STAR specification [version to be specified in the call for tender, taking into account the explanatory note]. The ENERGY STAR version implemented at the time of publication is 3.0 and updates can be followed at the following link: https://www.energystar.gov/products/office_equipment/imaging_equipment</p>	

Verification:

The tenderer must provide test reports carried out according to the test methods laid down in the version(s) of the ENERGY STAR specified in the call for tender. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.

Explanatory note: TS1 Imaging equipment minimum energy efficiency

To ensure availability of products for the tendering procedure, during the first year since the publication of a new version of the ENERGY STAR, the new and the previous version of the ENERGY STAR should be allowed in TS1.

AWARD CRITERIA**AC1 Improvement in the imaging equipment's energy efficiency beyond TS1**

(same for core and comprehensive)

(Applicable to imaging equipment covered by energy efficiency requirements in Energy Star)

Points will be awarded if imaging equipment is more energy efficient than the TEC_MAX value laid down in the ENERGY STAR TEC approach. Points must be calculated in comparison with the maximum typical electricity consumption (TEC_MAX) allowed under the ENERGY STAR version(s) specified in TS1.

A maximum of x points [to be specified] may be awarded. Points must be awarded in proportion to the improvement in energy efficiency in comparison to the TEC_MAX value:

- over 80% lower: x points
- 60-79% lower: 0.8x points
- 40-59% lower: 0.6x points
- 20-39% lower: 0.4x points
- 10-19% lower: 0.2x points

Verification:

The tenderer must provide reports of tests carried out according to the test methods laid down in the ENERGY STAR version(s) specified in TS1. The tenderer must detail the measured TEC value and the TEC_MAX value, for each applicable product and detail a calculation of the improvement in energy efficiency. These must be provided upon award of the contract or prior to that upon request.

2.2.2.1 Background for the proposed criteria

Energy consumption during the use phase for all imaging equipment products in scope is still one of the three major hotspots, as recognized during the development of the current criteria. This does not only apply to active state consumption but also consumption at other low power modes. In the case of scanners, consumption in low power modes is the main hotspot.

Concerning printers and MFDs, studies assessing differences between different technologies showed that energy consumption during use is more critical for solid ink devices than for laser devices increasing about 20-30% of the environmental impacts from the use phase. Therefore, it is important to retain energy efficiency as part of the criteria.

Energy efficiency is being a widely known indicator on the market which is easy to verify.

The ENERGY STAR specification for imaging equipment (v2.0) was implemented in the US and EU in 2014. The US EPA has finalized by end of 2018 the process of revising the ENERGY STAR specification for imaging equipment. The new version 3.0 will take effect on October 11, 2019.³⁰ The criteria for ENERGY STAR v3.0 can be found [here](#).

Besides the ENERGY STAR, Blue Angel is among the voluntary schemes most widely known in public procurement in the EU, with over 1,400 models of imaging equipment across 17 manufacturers registered with the scheme³¹. The criteria for the Blue Angel (RAL-UZ 205) can be downloaded [here](#).

³⁰ US EPA, 2017, *Imaging Equipment Specification Version 3.0*, available from

https://www.energystar.gov/products/spec/imaging_equipment_specification_version_3_0_pd

³¹ Blue Angel, Energy saving and Low-Pollutant Printers, Copiers and Multifunction Devices, available from <https://www.blauer-engel.de/en/products/office/drucker-kopierer-und-multi-funktionsgeraete-2012>

Both criteria offer similar energy efficiency requirements, having energy use and power management as their main focus areas, however, the Blue Angel test method is based on ENERGY STAR V.2.0.

The current EU GPP criteria on imaging equipment include requirements based on the ENERGY STAR v2.0 specification and is therefore outdated. At the time ENERGY STAR specifications are developed they are designed to be met by only the top 25% most efficient products on the market.

The US EPA estimates that 100% of the MFD's and printers on the US market met the ENERGY STAR v2.0 specification by mid-2016³². Figure 4 and Figure 5 illustrate the improvement in energy efficiency of standard sized laser printers and laser MFDs found in the EU ENERGY STAR database during January 2014 and April 2018. The graphs show that products registered with the EU ENERGY STAR initiative in 2014 used considerably more energy than similar products registered in 2018.

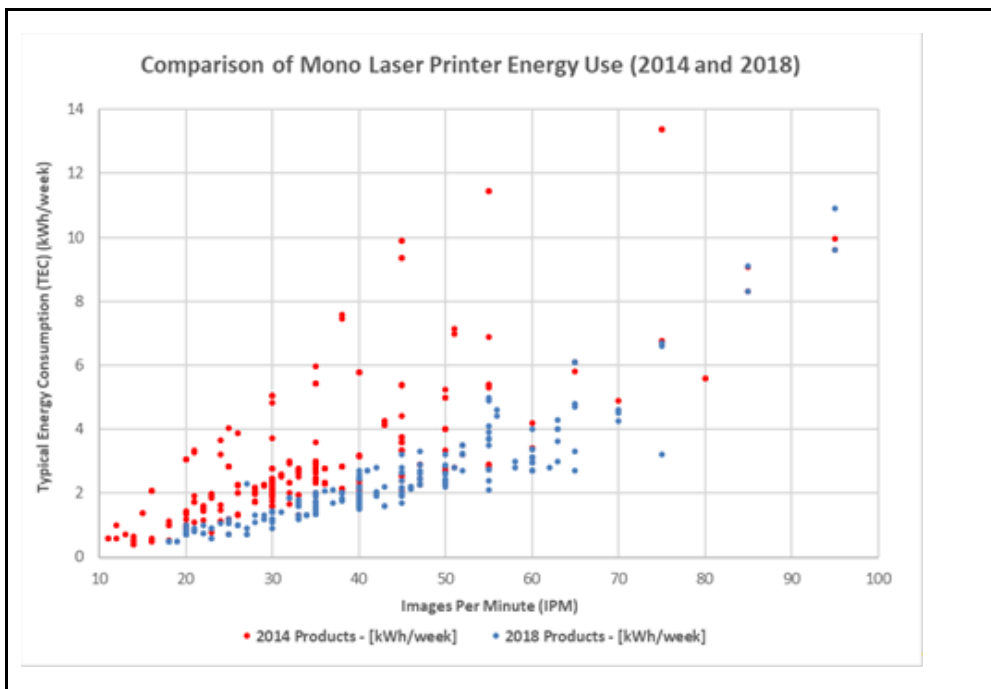


Figure 5: Comparison of energy use between standard sized mono laser printers in the ENERGY STAR database during 2014 and 2018

³² US EPA, Annual Shipment Data, ENERGY STAR® Unit Shipment and Market Penetration Report Calendar Year 2016 Summary, available from https://www.energystar.gov/ia/partners/downloads/unit_shipment_data/2016_USD_Summary_Report.pdf?bb80-83d4

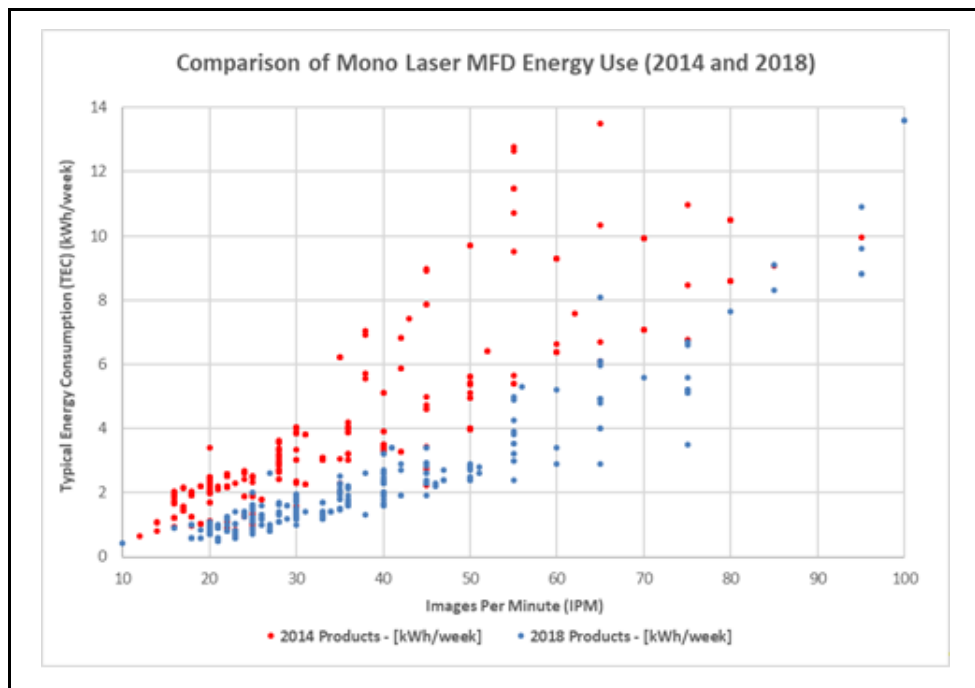


Figure 6: Comparison of energy use between standard sized mono laser MFDs in the ENERGY STAR database during 2014 and 2018

Against this background, due to their wide use and knowing they are already applied in public procurement, it was decided for the first criteria proposal to establish a technical specification and an award criterion in the revised EU GPP criteria, including a dynamic link to the energy efficiency and power management requirements of these voluntary schemes (ENERGY STAR for the technical specification and both schemes in the award criterion), which can be tied to the most recent updates. By making the criteria linked to the latest version of ENERGY STAR, it would be assured that the energy consumption levels are kept updated in relation to technological development and securing the potential energy savings according to this development.

The proposed award criterion aimed to promote purchase of products which go beyond the ENERGY STAR and Blue Angel. Points would be calculated in comparison with the maximum typical energy consumption allowed in each scheme. As an alternative to awarding points for greater energy efficiency, procurers could opt for an LCC approach whereby more than just the purchase price is included in the costs when assessing the tenders. The rules for the use of LCC are set out in article 68 of Directive 2014/24/EU³³ on public procurement. Procurers have to indicate the data to be provided by the tenderers and the method which the contracting authority will use to determine the life-cycle costs on the basis of this data. It is necessary that the monetary value of the cost elements can be determined and verified.

With regard to the life cycle costs of the proposed criterion it is understood that given the large-scale uptake of ENERGY STAR there are unlikely to be any significant costs for either manufacturers or procuring authorities.

Procuring authorities are likely to save some costs through running more efficient imaging equipment. The running costs differences between products that meet ENERGY STAR requirements and those that do not are likely to be smaller than in the past. Reduced savings are expected as most imaging equipment models on the market already exhibit a good degree of energy efficiency (as witnessed by the high market coverage against the ENERGY STAR v2.0 specification).

³³ Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC

2.2.2.2 Background for the proposed verification

The verification text specified that tenderer must provide the test reports carried out according to the test methods laid down in the latest version of the ENERGY STAR (and Blue Angel in award criterion). When new ENERGY STAR specifications are developed, they reflect the performance of the top 25% most efficient products in the ENERGY STAR dataset (i.e. the database of products that is used to inform the ENERGY STAR specification development process). The delay (N.B. varies between 3 months and 18 months) between development of new ENERGY STAR specifications and their implementation provides manufacturers with the opportunity to ensure that new products will meet the new ENERGY STAR specifications. Manufacturers are often quick to ensure new products meet ENERGY STAR specifications as compliance to ENERGY STAR specifications are mandatory requirements in US and was supported in the EU central government public procurement contracts in the past.^{34,35}

The EU ENERGY STAR program followed an Agreement between the EU and the Government of the US to coordinate energy labelling of office equipment. It was managed by the European Commission and the Environmental Protection Agency (EPA). The EU-US agreement expired on 20 February 2018³⁶. Still, ENERGY STAR is widely used by manufacturers. This widespread uptake ensures that there are sufficient products that meet new ENERGY STAR specifications available on the market. In the light of the existing situation, it should be however understood that very good performing IE products (from the energy efficiency point of view), which are produced only for the EU market and not for the US market, might not carry ENERGY STAR label anymore.

Verifying whether products meet the energy efficiency and power management requirements of ENERGY STAR or Blue Angel is unlikely to cause complications due to extensive use of the ENERGY STAR test procedure by imaging equipment manufacturers. The test procedure used behind the ENERGY STAR specification 2.0 is used within the latest Blue Angel specification as well as referred to in the ECMA-370 declaration³⁷.

2.2.2.3 Further background after AHWG meeting

During the AHWG, there was wide agreement amongst stakeholders to use ENERGY STAR specifications as the basis of the GPP criteria.

In addition, the **comments** pointed out that the award criterion should also allow business inkjet imaging equipment to receive award points. The stakeholders suggested that the Blue Angel TEC measurement methodology could be used to support assessment of business inkjet energy use within the award criterion. The study team agreed that this approach was feasible and that business inkjet imaging equipment should not be excluded from the award stage analysis.

For the **final criteria proposal**, wording has been amended to refer to the requirements laid down in the latest version of the ENERGY STAR, instead of the industry voluntary agreement to which reference was made in the second criteria proposal. In addition, an explanatory note has been included to reflect that new and previous version of ENERGY STAR should be allowed in the first year after the publication of the new ENERGY STAR. At the time of writing the final criteria proposal the Voluntary Agreement is still under revision.

Furthermore, based on stakeholder input, the award criteria have been slightly changed by removing the possibility to use the TEC_{MZul} value(s) laid down in the Blue Angel RAL-UZ 205 specification, thus only referring to the TEC_MAX value laid down in the Appendix 1 of the Voluntary Agreement. The reason is that the test methods are different, and that the VA and the BA may be different in the future depending on time of the revision.

³⁴ US EPA, 2017, *What Energy Efficient Products Are Federal Agencies Required to Purchase?*, available from https://www.energystar.gov/index.cfm?c=fed_agencies.fed_ag_efficient

³⁵ European Commission, *EU ENERGY STAR: For public procurers*, available from <https://www.eu-energystar.org/publicprocurement.htm>

³⁶ See DG ENERGY website for more information: <https://ec.europa.eu/energy/en/energy-star>

³⁷ For details on ECMA-370 declaration see: <https://www.ECMA-international.org/publications/standards/ECMA-370.htm>.

2.2.3 Duplex imaging capability

For the second revision of this criterion the following is proposed:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
<p>TS2 Duplex imaging capability <i>(same for core and comprehensive)</i> <i>(Applicable to imaging equipment covered by duplex imaging requirements in Energy Star.)</i> Imaging equipment must meet automatic duplexing requirements laid down in the most recently published ENERGY STAR specification [version to be specified in the call for tender] and duplex printing must be set as default. The ENERGY STAR version implemented at the time of publication is 3.0 and updates can be followed at the following link: https://www.energystar.gov/products/office_equipment/imaging_equipment</p> <p>Verification: Equipment registered in the ENERGY STAR database or holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply. A statement from the manufacturer demonstrating that these requirements have been met is also accepted.</p> <p>Explanatory note: TS2 Duplex imaging capability <i>To ensure availability of products for the tendering procedure, during the first year since the publication of a new version of the ENERGY STAR, the new and the previous version of the ENERGY STAR should be allowed in TS2.</i></p>	

2.2.3.1 Background for the proposed criteria

Use of paper is the most important hotspot throughout the life cycle of printers and MFDs. It has been since the development of the existing criteria, even after later developments with paper savings functionalities. Furthermore, this continues to be a hotspot considering printing on hard copy is not done up to the extent it was done 8-10 years ago when the background studies for the development of the existing criteria were done (see Preliminary Report, section 4.1).

The availability of duplex printing as an automatic function and as default setting in the software provided by the manufacturer has an impact on the user concerning use of paper as it directs them to use less. In reality this criterion would continue to secure the potential environmental savings already estimated for existing criteria and the evidence indicates this is still an important criterion which should not be removed.

Duplex functionality set as default is already part of the current EU GPP criteria. Duplex imaging capability is required though only for imaging equipment with monochrome printing/copying speeds which exceeded 25 images per minute (A4 size paper).

Majority of known environmental initiatives include requirements on duplex printing, as shown in following table.

Table 11: Environmental Initiative Inclusion of Duplex Imaging Criteria

Environmental Impact Areas		Initiative						
Impact Area	Sub-Impact Area	ENERGY STAR v2.0	EU GPP Criteria	Ecodesign VA	Blue Angel ⁶	Nordic Swan	EPEAT/IEEE 1680.1	Korea Ecolabel
Paper Use	Automatic duplex	Yes	Yes	Yes	Yes	Yes	Yes	Yes

For the first criteria proposal it was suggested that the revised technical specification (core level) should reflect the duplex requirements found in ENERGY STAR.

The ENERGY STAR version 2.0 states that imaging speed must be the highest speed as claimed by the manufacturer, expressed in images per minute (ipm) and rounded to the nearest integer, as follows:

- 1) In general, for Standard-size products, a single A4 or 8.5" × 11" sheet printed/copied/scanned on one side in one minute is equal to 1 (ipm).
 - a) When operating in duplex mode a single A4 or 8.5" × 11" sheet printed/copied/scanned on both sides in one minute is equal to 2 (ipm).
- 2) For all products, the product speed must be based on:
 - a) The highest manufacturer-claimed monochrome print speed, unless the product cannot print, in which case,
 - b) The highest manufacturer-claimed monochrome copy speed, unless the product cannot print or copy, in which case,
 - c) The manufacturer-claimed scan speed.
 - d) When a manufacturer intends to qualify a product in a certain market by making use of test results that qualified the product in another market using other sizes of paper (e.g., A4 versus 8.5" × 11"), and if its maximum claimed speeds differ when producing images on different sizes of paper, the highest speed must be used.

The requirements in the ENERGY STAR v2.0 can be seen in following table.

Table 12: ENERGY STAR v2.0 Duplexing requirements

Product type:	Monochrome Product Speed (s) as Calculated in the Test Method (ipm)	Automatic Duplexing Requirement	Automatic Duplexing Optional Requirements
Colour TEC Copiers, MFDs, and Printers	$s \leq 19$	None	Additional software-supported option for duplex printing and copying.
	$19 < s < 35$	Integral to the base product or optional accessory	Duplex printing must be set as default
	$s \geq 35$	Integral to the base product	
Monochrome TEC Copiers, MFDs, and Printers	$s \leq 24$	None	
	$24 < s < 37$	Integral to the base product or optional accessory	
	$s \geq 37$	Integral to the base product	

The Blue Angel requirement matches that in ENERGY STAR v2.0 but also includes requirements on duplex imaging needed to be set as a default option.

The first proposal for the revised core criterion was slightly more stringent than the existing EU GPP criterion for some products but more lenient for others. That is, the current EU GPP criterion requires that all products with an imaging speed of at least 25 ipm must have automatic duplexing functionality. The revised proposed criterion requires that products with imaging speeds between 19 and 24 must offer automatic duplexing as an optional accessory. The core criterion does not impose extra burden to manufacturers and would continue securing the environmental and costs savings already identified for the existing criteria.

The first proposal for comprehensive level included a more ambitious requirement that all imaging equipment which uses thermal marking technologies needs to provide automatic duplexing functionality.

Market availability of compliant products is high given the large number of products registered with the ENERGY STAR. Market availability of products which are compliant with the comprehensive criterion is also high given that it is similar as in the Blue Angel and there is a high number of products registered under this scheme. In addition, the Voluntary Agreement (VA)⁴ on imaging equipment includes similar requirements on duplex imaging.

With this regard, life cycle costs implications addition of a duplexing unit will result in some extra product costs. These costs are likely to be offset by a reduction in paper usage, especially where installed in a high use imaging equipment model. The requirement for software supported duplex imaging is unlikely to add significant cost to either manufacturers or purchasing authorities.

The presence of duplex printing functionality in products will not result in any significant trade-offs with other impact areas. There is some potential for duplex printing to increase electricity consumption in products due to a more complicated paper path. Any extra electricity usage will be offset by the embodied energy savings resulting from reduced paper use.

2.2.3.2 Background for the proposed verification

Verification of whether a product supports duplexing functionality, and whether this functionality is set to default, can be achieved through reviewing suitable product technical documentation. Manufacturers include these declarations as part of their engagement with initiatives such as ENERGY STAR and via declarations such as the ECMA-370. For the first proposal, it was proposed to request documentation, registration to ENERGY STAR or a statement from the manufacturer demonstrating that these requirements have been met is also accepted.

2.2.3.3 Further background after AHWG meeting

At the end of November 2018 revised ENERGY STAR version 3.0 criteria were published. The new requirements can be found in following table.

Table 13: ENERGY STAR v3.0 Duplexing requirements for all TEC MFD and printers

Product type:	Product speed (ipm)
Color	s > 19
Monochrome	s > 24

For the **final criteria proposal**, wording has been amended to refer to the requirements laid down in the latest version of the ENERGY STAR. In addition, an explanatory note has been included to reflect that new and previous version of ENERGY STAR should be allowed in the first year after the publication of the new ENERGY STAR.

2.2.4 N-up printing

For the second revision of this criterion the following is proposed:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
TS3 N-up printing <i>(same for core and comprehensive)</i> Imaging equipment must offer as a standard feature the capability to print two or more pages of a document on one sheet of paper when the product is managed by original software provided by the manufacturer (printer driver). Verification: The tenderer must provide documentation stating that the requirement is met. Products holding a relevant Type 1 Eco-label fulfilling the listed requirements will be deemed to comply.	

2.2.4.1 Background for the proposed criteria

N-up printing (i.e. the ability to print multiple pages on a single sheet of paper) is already part of the existing EU GPP as criterion titled 'Multiple images on single sheet of paper' that requires all imaging equipment to offer capability to print and/or copy 2 or more pages of a document on one sheet of paper as a standard feature and thereby reducing the paper usage.

This ability is related to the use of paper, which is the most important hotspot in the life cycle of printers. The availability of N-up printing as a standard feature can save considerable amounts of paper, although its use is generally reserved for draft copies of files or notes due to the reduction in size of each page on the sheet of paper and it does not have the same impact as the availability of duplex printing.

It is assumed that only a share of printouts would be for draft files or notes such as power point presentations, maps or internal notes, which would vary between one third and half of the printouts as a general assumption. Therefore, this criterion would continue to secure the potential environmental savings already estimated for existing criteria and it should not be removed.

Apart from the EU GPP criteria, this criterion is also found in the Voluntary Agreement of Imaging Equipment version 5.2³⁸ and in the Blue Angel. The VA of imaging equipment includes a requirement that all products placed on the market after the 1st January 2012 should offer N-up functionality. This functionality is a widely applied metric in the EU not imposing extra burdens to the manufacturers. The respective requirements included in the EU Voluntary Agreement and in Blue Angel can be seen in Table 14 below.

³⁸ Industry voluntary agreement to improve the environmental performance of imaging equipment placed on European market, VA v.5.2, April 2015, <https://ec.europa.eu/energy/sites/ener/files/documents/VA%20Imaging%20Self-Regulatory%20Initiative-V-4-0.pdf>

Table 14: N-Up Printing criteria in other initiatives

Environmental initiative	Criterion Text
EU Voluntary Agreement version 5.2	5.1 Availability of N-up printing <i>All product models first placed on the EU market after 1 January 2012 must offer as a standard feature the capability to print several pages of a document on one sheet of paper, when the product is managed by original software provided by the manufacturer (printer driver). A model is considered Part II qualified when it meets all the requirements as detailed in section 5.</i>
Blue Angel ⁶	1.4.3 Availability of N-up printing <i>Devices must offer as a standard feature the capability to print several pages of a document on one sheet of paper. The required information on the availability of N-up printing and software settings must be contained in the information and data sheet.</i>

N-Up printing is a software-based application and so is supported in many common formats such as PDF.³⁹

Against this background, it was proposed for the AHWG meeting to keep the existing EU GPP criterion ‘Multiple images on single sheet of paper’ renamed as “N-up printing”. Even though it is understood that majority of products is already compliant, it was considered reasonable to keep this criterion just as a safety net, due to the fact that if a product does not have this functionality typically it cannot be retrofitted. It requires an update of the printer software to include this feature. An alternative option is to install an add-on 3rd party software, however, this option may add complexity for the users.

Given the wide scale use of N-Up printing it was not necessary to derive a separate more ambitious comprehensive criterion. No changes were suggested to be introduced in the criterion text and its verification.

2.2.4.2 Further background after AHWG meeting

One stakeholder commented that N-Up imaging was a standard feature and so the criterion should be deleted. It is recognized that whilst N-Up printing is a standard option on most imaging equipment, it is not clear whether all imaging equipment offered this functionality. As N-Up printing can provide paper savings it has been decided to retain the criterion to ensure availability of this functionality. No changes have been introduced in this criterion for the second proposal.

For the **final criteria proposal** a stakeholder proposed that the addition “when the product is managed by original software provided by the manufacturer” should be removed because drivers are integrated in operating systems and it may happen that printers do not need the original software from manufacturers. This is correct, however, the criterion has been kept unchanged, because it is not possible to include a requirement for a product when a 3rd party software or printer driver not delivered together with the product is used with the product.

2.2.5 Capability to use recycled paper

Existing EU GPP criteria in force do not directly cover the capability to use recycled paper within imaging equipment.

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
<p>TS4 Capability to use recycled paper <i>(same for core and comprehensive)</i> Imaging equipment must be capable of processing recycled paper that meets the quality requirements of EN 12281⁴⁰. Scanners are excluded from the scope of this criterion.</p> <p>Verification: The tenderer must provide a declaration confirming or documentation proving that recycled paper meeting the requirements in EN 12281 can be used in the product. Products holding a relevant Type 1 Eco-label fulfilling the listed requirements will be deemed to comply.</p>	

2.2.5.1 Background for the proposed criteria

Recycled paper can have substantially lower environmental impacts than virgin paper^{41,42}, so the confirmed ability of the equipment to use recycled paper can bring significant reduction of impacts (for instance energy consumption reduced by 27%; wastewater reduced by 33%, air particulate emission reduced by 28% and solid waste reduced by 54%)⁴³. The availability of using recycled paper in imaging equipment products is found already in many devices on the market. Recycled paper, providing that it meets certain quality standards (e.g. in EN 12281), can deliver quality printouts. Capability to use recycled paper is a requirement already found in the Blue Angel, the EU Voluntary Agreement version 5.2 and EPEAT (See Table 15). It was thus suggested for the **first criteria proposal** to include a requirement on capability to use recycled paper.

Table 15: Related criteria in other initiatives

Environmental initiative	Criterion Text
Voluntary agreement version 5.2	<p>6.4 Information on Paper recyclability <i>For new product models first placed on the EU market after 1 April 2015 Signatories must make available and provide to users information regarding recycled paper via website or other means.</i> <i>Example statements are listed below:</i></p> <ul style="list-style-type: none"> • <i>Recycled paper promotes the circular economy with more recycling saving more natural resources.</i> • <i>The use of waste paper to produce recycled paper significantly reduces the amount of energy and water consumed compared to virgin fiber paper. In addition, the forest resources are conserved - an</i>

⁴⁰ EN 12281: Printing and business paper for dry toner imaging processes

⁴¹ <https://www.nap.edu/read/5734/chapter/9#61>

⁴² <http://www.planetexperts.com/recycled-beats-virgin-paper-environmental-impact-new-study-shows/>

⁴³ Pratima Bajpai, 15 - Environmental Aspects of Recycling, in: Recycling and Deinking of Recovered Paper, 2014, Pages 271-282; available online at: <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/recycled-paper>

	<p><i>important contribution to biodiversity! Existing environmental savings can be enhanced in a simple and efficient manner.</i></p> <ul style="list-style-type: none"> • <i>Modern recycled paper meets the highest quality requirements for different printing processes - appropriate standards guarantee this. The imaging equipment supplied by the VA signatories is suitable for using with recycled paper meeting the EN 12281:2002 standard.</i> • <i>Regarding archiving - recycled paper meets all requirements for long-term storage.</i> • <i>The use of recycled paper is a visible and credible sign of ecological, resource efficient behavior.</i>
Blue Angel ⁶	<p>3.1.4.1 Usability of recycled paper</p> <p><i>The devices must be capable of using recycled paper made of 100% post-consumer recycled paper that meets the requirements of EN 12281. The distributor is free to recommend certain types of recycled paper.</i></p> <p><i>The information and data sheet must include the following note: "This equipment is suitable for using recycled paper". A reference to EN 12281 can be included.</i></p>
EPEAT	<p>4.9.1.1 Required—Allow use of general office paper with renewable content, recycled content, and that is chlorine free</p> <p><i>Product criterion: The product allows the use of general office paper with renewable content, and paper with pre/postconsumer recycled content, and paper that is chlorine free. Documentation that the product allows the use of these types of paper is readily available or has been provided to the purchaser. For example, documentation types may include the following:</i></p> <ul style="list-style-type: none"> <i>a) An owner's manual, set-up instructions, label or other information provided with the product, or</i> <i>b) Warranty and/or service contract provided with the product, or</i> <i>c) Information on the manufacturer's Website, such as included in product specification or as a policy statement, etc.</i> <p><i>The manufacturer may require that paper must meet standard paper quality requirements such as EN12281:2002.</i></p>

There are unlikely to be any life cycle costs implications because of products needing to accept good quality recycled paper. There may be some costs involved for manufacturers needing to test products to ensure that recycled paper can be used without impacting performance. With the aim of harmonization across different environmental schemes, it is recommended to add a new technical specification to the existing EU GPP criteria to secure more environmental savings. No differentiation between core and comprehensive criteria are suggested.

2.2.5.2 Background for the proposed verification

The VA on imaging equipment and the Blue Angel specification include specific requirements that recycled paper meeting the EN 12281 standard can be used in products. Given the extensive coverage of the VA across imaging equipment on the EU market, no issues with market availability are foreseen.

Verification against this criterion can take the form of a manufacturer's declaration or technical dossier from the manufacturer proving that that recycled paper conforming to the EN 12281 standard can be used in their product.

2.2.5.3 Further background after AHWG meeting

There were no comments to this specific criterion during the AHWG meeting nor during the written consultation. No changes have been made to this specific criterion.

For the **final criteria proposal** based on a stakeholder comment, a note has been added that scanners are excluded from the scope of this criterion.

2.2.6 Capability to use remanufactured cartridges

Existing EU GPP criteria in force includes a requirement regarding the capability to use remanufactured cartridges in imaging equipment. For the AHWG meeting discussions it was proposed to keep it in the revised criteria too. The criterion has been revised after the meeting as shown below:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
TSS Capability to use remanufactured cartridges and containers <i>(same for core and comprehensive)</i> The products must not be designed to prevent remanufactured toner and/or ink cartridges and containers. Constructive, software-based or other measures that prevent use of remanufactured cartridge and containers should not be present or applied. Verification: The tenderer must provide a declaration confirming or documentation proving that remanufactured cartridges and containers can be used in the product. Products holding a relevant Type 1 Eco-label fulfilling the listed requirements will be deemed to comply.	

2.2.6.1 Background for the proposed criteria

This criterion addresses the area linked to use of remanufactured cartridges/containers. Reuse of cartridges is resource efficient but can be also associated with economic benefits as the price of reused items is generally lower than the price of new ones. This can be of special importance as in the analysis of cost consideration for this product group the life cycle costs for the procurers are strongly influenced by the cost of inks/toners.

The main aim of this criterion is to promote reuse and recycling of consumables materials (thus reducing in this way the amount of new resources which have to be used if the waste materials are not recovered) and to give the incentive to manufacturers to design their products in the way that enables longer life of these consumables.

The reference point for this criterion is the existing requirement set in the EU GPP criteria for Imaging Equipment⁴⁴. Main outcomes of the consultation with manufacturers and ink or toners remanufacturers (questionnaire feedback) in the previous revision, further input received during the AHWG meeting and more up-to-date sources of information from the ongoing revision of the Voluntary Agreement on Imaging Equipment indicate that:

- with regard to cartridge waste volumes and reuse rates of cartridges ⁴⁵:
 - approximately 404 million ink cartridges and containers and 148 million toner cartridges and containers were sold in 2016 in the EU-28;

⁴⁴ Green Public Procurement for Imaging Equipment - Technical Background Report, JRC Scientific and Policy Reports, 2014, available online at: <http://ftp.jrc.es/EURdoc/JRC88789.pdf>, accessed August 2018.

⁴⁵ Source: Revision of Voluntary Agreement on Imaging Equipment. Draft version. Task 2 report. March 2019. Available at: <https://www.review-imagingequipment.eu/documents>

-
- there is a low collection rate amongst OEM in the EU under their material recycling programmes, which is about 10–15% approximately including primary sorting;
 - about 30%-50% of all printer cartridges are being recycled or reused in the UK, Germany, Austria and Switzerland (best practice) while less than 10% are recycled or reused in Eastern Europe;
 - a few OEM producers are involved in reused/remanufacturing activities where up to 3% of their cartridges in the EU are reused whereas 75% of their cartridges are recycled into new materials;
 - it is estimated that in total volume per year the 60 -70 % of the cartridges end up in landfills and/or incinerators after single use.
- with regard to the cartridge reuse circles stakeholders suggest that:
- It is estimated that ink and toner cartridges can be reused at least once but on average 2-3 times, and printing quality remains sufficiently good at this level of reuse;
 - Toner cartridges can be remanufactured more easily than ink cartridges and there are examples of even up to 25 reuse cycles;
 - Some parts break down easier and have to be changed in the remanufacturing process;
 - The number of reuse circles depends on the model and the condition of the collection of the cartridge.
- with regard to parameters affecting the cartridge reuse cycles stakeholders suggest that:
- This is a very complex area and there are several parameters affecting the reuse of the cartridge, which vary based on the type and model of the cartridge. In cases of remanufacturing of OEM cartridges via cartridge return programs there are obviously no problems. However, for cartridge remanufacturing by third parties, the identified technical parameters (which can limit/influence this process) are as follows:
 - presence of clever/killer/smart chips;
 - design features that hamper remanufacturing i.e. welding, glue, blind screws or conjoined parts to fit cartridge-parts together;
 - weaker print heads;
 - limited printer functionality, when non-OEM cartridges are used.

The potential for achieving environmental savings and resource conservation via reusing cartridges is high as the majority of them are disposed after the first use. Reuse has either better or equal environmental benefits as recycling, thus it shall be prioritised as an option. This is in line with the waste management hierarchy.

Technical analysis from the previous revision has been updated in the preliminary report and concluded that use of remanufactured cartridges should be promoted. Still it is important to mention that there are studies which provide evidence around the environmental benefits of using OEM vs remanufactured cartridges. The answer to which is the most environmentally preferable option is dependent on a set of variables such as:

- Final disposal route and end-of-life practices for cartridges/containers and their associated materials
- Reliability rates of the virgin and remanufactured cartridges
- The number of times a single cartridge/container can be remanufactured
- The number of cartridge/container parts that need to be changed during remanufacture

- The quality of cartridges and related printouts
- Other remanufacturing process impacts

What is clear from the studies is that cartridge/container remanufacturing can, under certain circumstances, result in lower overall environmental impacts.^{46,47,48}

A Commission funded project into the consumable market has estimated that increasing consumable remanufacturing rates to 75% (from a current estimate of 25%) would result in an annual CO₂ impact reduction of around 4 kt per year in the EU.⁴⁹

There are a significant number of market implications surrounding the remanufacturing of consumables. The previously mentioned study investigated in detail the consumable reuse/remanufacturing market in Europe. Original Equipment Manufacturer (OEM) suppliers dominate the consumables market with an estimated 18% of inkjet and 25% of laser consumables being collected for remanufacturing. Most remanufacturing organisations are EU based SME's which typically sell remanufactured consumables for significantly less than the originals.

Against this background, the existing EU GPP requirement was proposed to be kept for the first criterion proposal before the AHWG meeting. Freedom given to the designer on how to achieve this goal is considered of importance as no eco-innovation shall be hampered.

2.2.6.2 Background for the proposed verification

Verification against this criterion can take the form of a manufacturer's declaration or technical dossier from the manufacturer proving that that remanufactured cartridges can be used in their product.

2.2.6.3 Further background after AHWG meeting

There were several stakeholder comments on “capability to use remanufactured cartridges and containers” criterion. One stakeholder commented that the criterion should limit the use of chips in consumables. The study team pointed out that cartridge chip issues are dealt with in award criterion “advanced design for reuse/remanufacturing”, and to limit the use of chips would restrict supplies availability.

Other stakeholder commented that the text of the criterion should be harmonized with the text in BA RAL-UZ-205 3.1.1.3 table 3, no.4. This text asks: “*Is the use of refurbished toner modules and refurbished ink modules and containers according to DIN 33870-1 and 33870-2 not prevented by constructive, software-based or other measures?*”

In accordance with the suggestion, the wording of the criterion has been slightly modified with direct reference to exclusion of constructive, software-based or other measures.

For the **final criteria proposal** based on a stakeholder comment, the criterion has been slightly modified by substituting “...accept remanufactured toner and/or ink cartridges and containers” with “not be designed to prevent”, which is a more precise description of what the manufacturers are responsible for.

⁴⁶ Four Elements Consulting, 2011, *Life Cycle Environmental Impact Study HP LaserJet Toner Cartridges vs. Remanufactured Cartridges in North America SUMMARY REPORT*, available from <http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/LJ-LCA-NA.pdf>

⁴⁷ First Environment, 2004, *LaserJet Cartridge Environmental Comparison: A Life Cycle Study of the HP 96A Print Cartridge vs. its Remanufactured Counterpart in North America*, available from <http://www.etira.org/images/content/HPFirstEnvironmentreport%20Sept%202004.pdf>

⁴⁸ Berglind et al, 2002, *Life Cycle Assessment of Toner Cartridge HP C4127X Environmental impact from a toner cartridge according to different recycling alternatives*, available from <http://www.etira.org/wp-content/uploads/2013/07/LCA-Kalmar-Univ.pdf>

⁴⁹ European Commission, 2017, *Study on the implementation of product design requirements set out in Article 4 of the WEEE Directive The case of re-usability of printer cartridges. Final report*

2.2.7 Reduced number of materials

Existing EU GPP criteria in force do not address the number of materials used in imaging equipment. The following requirement is proposed for the revised criteria version:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
	<p>TS6 Reduced number of materials</p> <p>The number of materials used for plastic components of a similar function is limited to one material. Applies to:</p> <ul style="list-style-type: none"> – Casing parts, chassis – Mechanical parts ($\geq 25\text{g}$). <p>Verification:</p> <p>The tenderer must provide a product schematic illustrating the applicable plastic parts and the type of polymer used. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>

2.2.7.1 Background for the proposed criteria

Plastic parts constitute an important share of the volume and weight of imaging equipment products. Increasing the share of these parts sent for recycling would bring environmental benefits, especially for devices with large plastic parts. When more polymer blends are used, it becomes more difficult to recycle them as the melting and granulation processes cannot deliver the purity that the pellet needs so it can be reused again for injection moulding and other types of plastic processing. Generally, the more 'pure' the plastics are, the easier is to recycle them (e.g. HDPE, PET, PC), excluding those with certain additives such as pro-oxidants and photo-oxidation catalysts and galvanizers which hinder the recycling process^{50,51}. However, it is important to notice that the embodied environmental impacts of plastics are generally much lower (except for some high-end plastics) than those of metals, in particular aluminium, steel and copper. Though, the levels of recovery and recyclability of the latter are already very high. Existing EU GPP criteria in force do not address the number of materials used in imaging equipment. However, requirements on reduced number of materials are found in several schemes. The Blue Angel, under the section 3.1.1.2 Requirements concerning a material selection for recyclability, the requirement number 1 promotes products with limited number of materials used for plastic components for similar function. The EPEAT initiative includes a requirement on the use of single recyclable plastic type per plastic parts heavier than 100 g. The EU Voluntary Agreement version 5.2 includes criteria limiting the polymers used in plastic casing parts with a mass greater than 100 grams. Detailed formulation of the requirements can be found in Table 16.

⁵⁰ http://plasticsrecycling.org/images/pdf/design-guide/Full_APR_Design_Guide.pdf

⁵¹ An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling. Hahladakisa et al. (2018). Journal of Hazardous Materials. Available at: <https://www.sciencedirect.com/science/article/pii/S030438941730763X>

Table 16: Reduced numbers of materials criteria in other initiatives

Environmental initiative	Criterion Text
Blue Angel ⁶	<p>3.1.1.2 Requirements concerning a material selection for recyclability*</p> <p>(1) Is the variety of materials used for plastic components of similar function limited to one material?</p> <p>Applies to: Casing parts, chassis and mechanical parts (≥ 25g)</p> <p>The smaller the variety of materials, the more efficient the separation and recycling processes are. This requirement does not apply to parts that are demonstrably reused according to para. 3.1.1.4.</p>
EPEAT	<p>4.3.2.1 Required—Use of single recyclable plastic type per plastic part</p> <p>Each plastic part >100 g must consist of only one recyclable plastic type. Printed circuit boards, labels, cables, connectors, electronic components, optical components, ESD components, EMI components, and hoses/tubes for transporting fluid within the unit are excluded from this requirement.</p>
EU Voluntary Agreement version 5.2	<p>5.3 Polymer composition</p> <p><i>For all new TEC product models first placed on the EU market after 1 January 2015:</i></p> <p>In order to limit the variety of materials used, plastic casing parts with a mass greater than 100 grams have to consist of one single polymer or a polymer blend.</p> <p>All plastic casing parts may only consist of up to four separable polymers or polymer blends.</p> <p>Large-sized casing parts must be designed in a way that the contained plastics can be used for the production of high-quality durable products by applying available recycling techniques.</p> <p>The use of coatings for special parts is to be reduced to a minimum, unless it can be demonstrated that it does not alter recyclability. Galvanic coatings on plastic parts are not permissible.</p>
*Note	<p><i>Other requirements under 3.1.1.2 Requirements concerning a material selection for recyclability are covered in other criteria sections (see complete Blue Angel Table 2 in section 2.2.9.1 (Table 21 in this report))</i></p>

There are two additional criteria within the same section of the VA. The first deals with the reuse of recovered plastics in the production of new products. This criterion was not adopted due to difficulties in verifying whether plastics have indeed been reused in alternative products. The second one deals with reduction in coatings that impact recyclability. This requirement is dealt with in criterion 1.6 - Design for disassembly/recyclability. There are also a number of other requirements in the Blue Angel section 3.1.1.2 on material selection for recyclability. They are presented and referred to in the next chapters, namely 2.2.8 (requirement number 10) and 2.2.9 (requirements 2 to 8).

Against this background, it was proposed to include a comprehensive new technical specification in the revised EU GPP based on the VA.

2.2.7.2 Background for the proposed verification

Signatories to the VA account for 96% of all imaging equipment sold in the European Union, and over 90% of signatories' products are compliant with the VA requirements. As such, no market availability issues were expected as a result of using the proposed "reduced number of materials" criterion in public procurement contracts. Verification against this criterion was

proposed to take the form of a product schematic illustrating the applicable plastic parts and the type of polymer used. Compliance with an environmental initiative which also covers the same reduced number of materials requirements.

2.2.7.3 Further background after AHWG meeting

Several stakeholders requested that the requirements and wording of the EU GPP mirrored those in the Blue Angel. After the discussions at the AHWG meeting it was decided for the second proposal to align the criterion with the Blue Angel UZ 205 section 3.1.1.2, table 2, requirement number 1. Alignment with Blue Angel will facilitate verification and will not reduce the level of ambition, while making the criterion more precise. Compliance is required for casing parts, chassis and for mechanical parts ($\geq 25g$). No changes have been introduced in the verification part.

The **final proposal** remains unchanged. No changes have been introduced as a result of the final written consultation.

2.2.8 Postconsumer recycled plastic

Existing EU GPP criteria in force do not include requirements on postconsumer recycled plastic content. For the AHWG meeting criteria on information on postconsumer recycled plastic used was proposed. These criteria have been further revised after the AHWG meeting:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
	<p>TS7 Information on postconsumer recycled plastic used</p> <p>The percentage of postconsumer recycled plastic content, calculated as a percentage of total plastic (by weight), must be declared. The percentages must be provided in increments of $x < 1\%$, $1\% \leq x < 5\%$, $5\% \leq x < 10\%$, $10\% \leq x < 15\%$, $15\% \leq x < 20\%$ and beyond (in 5% intervals).</p> <p>The following parts may be excluded from the calculation: printed circuit boards, cables, connectors, electronic components, optical components, electrostatic discharge (ESD) components, electromagnetic interference (EMI) components, and bio-based plastic material.</p> <p>Verification:</p> <p>The tenderer must provide documentation which specifies the percentage of postconsumer plastic used within the imaging equipment model(s) calculated in accordance with EN 45557. Documentation may consist of a manufacturer declaration, proof of compliance with an appropriate environmental scheme which includes the same product design features or other alternative means of</p>

	<p>proof detailing postconsumer recycled plastic content.</p> <p>Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>
--	--

2.2.8.1 Background for the proposed criteria

Manufacturing is the fourth most important environmental hotspot in the life cycle of imaging equipment products. For more energy efficient product where the energy consumption is no longer the most important hotspot, manufacturing has become even more important. This trend will continue in the future, as more devices become more efficient.

One of the sources of impacts is the materials used in imaging equipment products. Because of the complexity of designs, in particular of MFDs and in some printers, the number, type and quantity of materials contained in imaging equipment products vary considerably due to the broad scope of this product group. However, most material volume consists of common plastics (e.g. PS (HI-PS), ABS, PC) and metals (steel, copper, aluminium). In spite of their high embodied impact, steel and aluminium are nowadays highly recyclable^{52,53} but plastics are not. Therefore, it was considered important to address this source of impacts by proposing a criterion to incentivize the use of recycled plastics.

The use of post-consumer recycled plastic in products can result in trade-offs with hazardous material content. This trade-off can occur where manufacturers face difficulties sourcing post-consumer plastics which do not meet hazardous material content requirements. The likelihood of this trade-off occurring reduces as the restrictions on hazardous material content increase in ambition and lifetime.

The declaration of recycled plastics content in imaging equipment products is a criterion/requirement found in Blue Angel, EPEAT, the EU Voluntary Agreement version 5.2 and the Nordic Swan. Due to the great market penetration of Blue Angel and EPEAT in public procurement, this metric is considered widely applied and possible to add to the existing EU GPP criteria. The relevant criteria are listed in the tables below.

Table 17: Postconsumer recycled plastic criterion in other initiatives

Environmental initiative	Criterion Text
Voluntary agreement version 5.2	<p>5.5 Recycled plastic content</p> <p>For all new product models first placed on the EU market after 1 January 2015 signatories must make information available to customers on the minimum percentage of postconsumer recycled plastic content*, calculated as a percentage of total plastic (by weight) in each product.</p> <p>* In increments of 0-5%, 5-10%, 10-15%, etc.</p> <p>The following may be excluded from the calculation of the percentage: printed circuit boards, labels, cables, connectors, electronic components, optical components, electrostatic discharge (ESD) components, electromagnetic interference (EMI) components, and biobased plastic material. Products that do not contain plastics can declare “Not applicable” for this criterion.</p>
Blue Angel ⁶	<p>3.1.1.2 Requirements concerning a material selection for recyclability</p> <p>(10) Is the share of post-consumer recycled plastics stated in the information and data sheet, calculated as percentage of total plastic</p>

⁵² http://www.world-aluminium.org/media/filer_public/2013/01/15/f10000181.pdf

⁵³ <http://www.eurofer.org/Sustainable%20Steel/Steel%20Recycling.fhtml>

Environmental initiative	Criterion Text
	(by weight) and indicated in intervals of 0-1%, 1-5%, 5-10%, 10-15%, 15-20%, and so on (in 5% intervals)? Explanation: The following parts may be excluded from the calculation of the recycle share: printed circuit boards, cables, connectors, electronic components, optical components, electrostatic discharge (ESD) components, electromagnetic interference (EMI) components, and biobased plastic material.
EPEAT	4.2.1.1 Required—Declaration of postconsumer recycled plastic content Product criterion: Manufacturer declares minimum percentage of postconsumer recycled plastic content, calculated as a percentage of total plastic (by weight) in each product. The following may be excluded from the calculation of percentage: printed circuit boards, labels, cables, connectors, electronic components, optical components, electrostatic discharge (ESD) components, electromagnetic interference (EMI) components, and bio based plastic material.

The percentage of post-consumer recycled plastic in products is declared under all above-mentioned initiatives. Whilst EPEAT requires that exact percentages of post-consumer recycled plastic are provided, the Blue Angel and VA initiatives require that declarations are provided in incremental values.

The results of questioning the EPEAT database around these criteria can be seen in Table 18.

Table 18: Compliance rates to EPEAT postconsumer recycled plastic criteria

EPEAT Criterion	Products compliant (No.)	Products compliant (%)	Max Value	Min Value
4.2.1.1 - Declaration of postconsumer recycled plastic content	1832	100.0%	N/A	N/A
4.2.1.1 - Declaration of postconsumer recycled plastic content (%)	1832	100.0%	53.6%	0.0%
4.2.1.2 - Minimum content of postconsumer recycled plastic *	1798	98.1%	N/A	N/A
4.2.1.3 - Minimum 5% to 10% content of postconsumer recycled plastic	220	12.0%	N/A	N/A
4.2.1.4 - Minimum 25% content of postconsumer recycled plastic	26	1.4%	N/A	N/A
* Any product containing plastic parts whose combined weight exceeds 100 g must contain at least 5g of postconsumer recycled plastic.				

The results from the EPEAT database show that 98.1% of products registered with EPEAT contain at least 5g postconsumer plastic in parts over 100 g. Fewer products meet the EPEAT criterion 4.2.1.3 criterion which requires that products containing less than 5 kg of plastic

contain, on average, a minimum of 10% postconsumer recycled plastic and products with more than 5 kg of plastic must contain a minimum of 5% postconsumer recycled plastic. The EPEAT results also show that manufacturers are readily communicating information about the postconsumer recycled content in imaging equipment. In addition, an assessment of the EPEAT database⁵⁴, suggests that less than 20% of products on the market contain more than 5% of postconsumer recycled plastic.

Whilst it is clear that manufacturers are able to source some postconsumer recycled plastic for use in imaging equipment it is unclear if this results in additional costs. However, given that 98.1% of imaging equipment models registered with the EPEAT scheme contain at least some postconsumer recycled plastic it is assumed that any increases in costs are not significant.

The VA on imaging equipment includes a criterion requiring manufacturers to report on the amount of postconsumer recycled plastic in new products. The inclusion of this requirement in the VA suggests that communication of postconsumer recycled plastic information in imaging equipment is commonplace within the EU market.

Against this background **it was first proposed** to include a new comprehensive technical specification criterion aligned to Blue Angel and a comprehensive award criterion for higher post-consumer recycled content in the revised EU GPP.

2.2.8.2 Background for the proposed verification

It was suggested that the verification against this criterion can take the form of a manufacturer declaration which specifies the percentage of postconsumer plastic used within the imaging equipment model(s). Blue Angel and EPEAT awards can be used to assist with verification.

2.2.8.3 Further background after AHWG meeting

Several stakeholders pointed out that both Blue Angel and EPEAT criteria include exemptions for some components when determining total postconsumer recycled plastic content. They asked to include such exemptions also in the EU GPP. For the **second proposal**, the text was amended to include the list of exempted components to ensure that the criterion was not excessively stringent. In addition, the intervals were slightly modified to be completely harmonised with Blue Angel. With regard to the initially proposed award criterion in the light of lack of credible verification scheme, it was decided to remove this criterion from the revised proposal.

Final proposal remains unchanged with the exception of a minor addition in the verification section of the reference to the standard EN 45557 (General method for assessing the proportion of recycled content in energy-related products) for the calculation of the recycled content.

2.2.9 Reparability and recyclability

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
TS8 (a) Spare parts availability Spare parts listed below must be made available by manufacturers for at least 3 years from the date of purchase.	TS8 (a) Spare parts availability Spare parts listed below must be made available by manufacturers for a minimum of 5 years from the date of purchase.

⁵⁴ EPEAT, Product Search, available from <https://www.epeat.net/?category=imaging>

<ul style="list-style-type: none"> • Print heads (where not considered a consumable) • Laser unit (where not considered a consumable) • Fuser units (where not considered a consumable) • Drum units (where not considered a consumable) <p>The manufacturer, importer or authorised representatives must ensure the delivery of the spare parts mentioned above within 15 working days after having received the request.</p> <p>Verification: The tenderer must provide documentation which confirms that spare parts will be available for the durations listed in the criteria. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>	<ul style="list-style-type: none"> • Storage devices • Scanning units • Print heads (where not considered a consumable) • Laser unit (where not considered a consumable) • Fuser units (where not considered a consumable) • Drum units (where not considered a consumable) • Transfer belts/kits (where not considered a consumable) • Maintenance kits (where not considered a consumable) • Paper feed components • Density sensors • Power and control circuit boards • Cartridge/container attachment components • External power supplies • Hinges. <p>The manufacturer, importer or authorised representatives must ensure the delivery of the spare parts mentioned above within 15 working days after having received the request.</p> <p>Verification: The tenderer must provide documentation which confirms that spare parts will be available for the durations listed in the criteria. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>
<p>Explanatory note: TS8 (a) Spare parts availability <i>Spare parts are all components or assemblies that can potentially fail and/or that are expected to need replacement within the service life of the product. Other parts which have a lifetime usually exceeding the typical life span of the product are not spare parts.</i></p>	
<p>TS8 (b) Design for disassembly and repair <i>(same for core and comprehensive)</i> Imaging equipment must be designed to facilitate disassembly and repair. The following requirements must be met:</p> <ul style="list-style-type: none"> • Casing parts, chassis, electric/electronic assemblies and cartridges/containers are separable or connected by separation aids^[1]. • Electric/electronic assemblies and components such as batteries and condensers which have a risk of containing constituents bearing hazardous substances, as well as fluorescent lamps containing mercury are easy to find and to remove. 	

- Disassembly of casing, chassis and electric/electronic assemblies can be undertaken with tools class A, B and C of the EN 45554:2020 standard^[2].
- Screw connections for fastening casing parts, chassis and electric/electronic assemblies can be tightened with no more than three tools.
- Only reusable fasteners are permitted for the casing and chassis^[3].
- Disassembly of the entire unit can be performed by a single person (i.e. not more than one snap-on connection has to be loosened at the same time).
- Casing parts are free of electronic assemblies.
- The manufacturer has carried out a trial disassembly, with reference to the above design features, and recorded it with a focus on weak spots.
- Instructions on how to replace the parts must be provided with the service manual. The manual must include an exploded diagram of the device illustrating the parts that can be accessed and replaced, and the tools required. The service manual must be available online for anyone to read, free of charge.

Verification:

The tenderer must provide a declaration of compliance with the above requirements together with the repair manual (physical document or a link where the document is available), which must include an exploded diagram of the product illustrating the parts that can be accessed and replaced, the tools required and how the repair process should be conducted.

Repair information must be provided according to EN 45559 (methods for providing information relating to material efficiency aspects of energy-related products). Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.

Explanatory notes : TS8 (b) Design for disassembly and repair

[1]: The term ‘separation aids’ refers to predetermined breaking points, for example.

[2]: Tools class A, B and C, as defined in ‘Table A.2 — Process classification by necessary tools’. This means that all tools except proprietary tools are allowed. Proprietary tools are tools that are not available for purchase by the general public or for which any applicable patents are not available to license under fair, reasonable, and non-discriminatory terms.

[3]: An original fastening system that can be completely reused, or any elements of the fastening system that cannot be reused are supplied with the new part for a repair, reuse or upgrade process.

TS8 (c) Design for recycling

Imaging equipment must be designed to facilitate recycling through the following design features:

- Plastic components weighing more than 25 g with a flat surface of at least 200 mm² must be provided with a permanent marking of the material in accordance with ISO 11469 (considering ISO 1043) or equivalent standard,
- Galvanic coatings on plastic parts are not used in casing parts and cartridges/containers.

Verification:

The tenderer must provide documentation proving that each of the design-for-recycling requirements has been met. Equipment

TS8 (c) Design for recycling

Imaging equipment must be designed to facilitate recycling through the following design features:

- Plastic components weighing more than 25 g with a flat surface of at least 200 mm² must be provided with a permanent marking of the material in accordance with ISO 11469 (considering ISO 1043) or equivalent standard,
- Galvanic coatings are not used in casing parts and cartridges/containers
- The presence of paints and coatings (other than galvanic) in casing parts must not significantly impact upon the resilience of plastic recycle produced from these parts upon recycling and

<p>holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>	<p>when tested according ISO 180 or equivalent.</p> <p>Verification: The tenderer must provide documentation which proves that each of the design-for-recycling requirements has been met. The report of a valid mechanical/physical test carried out according to ISO 180 or equivalent should be provided for the requirement regarding paints. Alternatively, third-party test reports obtained from plastics recyclers, resin manufacturers or independent pilot tests will be accepted. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p> <p>Explanatory notes : TS8 (b) Design for disassembly and repair <i>For the purposes of this criterion, a significant impact is defined as a >25% reduction in the notched Izod impact of a recycled resin, as measured using ISO 180.</i></p>
--	--

2.2.9.1 Background for the proposed criteria

Spare parts are all components or assemblies that can potentially fail and/or that are expected to need replacement within the service life of the product. In addition, design to access to spare parts influences indirectly product durability as it incentivizes the repair rather than disposal. Short product lifetime does not seem to be recurrent in office imaging equipment product nowadays, where modular designs are available for many of the larger MFDs making repair more accessible. This is not the case for smaller devices, which are still in use by many small offices with small groups of staff.

In addition, design targeted at easy disassembly/dismantling is one of the crucial legislative features^{55,56} for enhancing recycling of products at their end of life. However, materials must also be easily identified so that they can be sorted more easily according to the type to be recovered. If imaging equipment products are sorted out properly, more of their parts containing highly valued materials can be recovered and sent for recycling. This also avoids the mixing with other products and materials which hinders recycling.

Therefore spare parts availability, design for easy access (spare parts accessibility in the product) and design to facilitate recycling are critical aspects for maintaining the product lifetime and ensure recycling of products at their end of life.

Spare parts availability

Even though the manufacturing of spare parts implies also environmental burdens from the use of new resources and manufacturing and transport processes, their provision will avoid a premature disposal of the products which will imply a whole new purchase, creating a much larger environmental impact. Generally, the provision of spare parts contributes to reducing the impacts from manufacturing of new products, which is one of the hotspots in the lifecycle of imaging equipment.

⁵⁵ <http://www.europarl.europa.eu/legislative-train/theme-new-boost-for-jobs-growth-and-investment/file-ecodesign-for-circular-economy>

⁵⁶ http://ec.europa.eu/environment/circular-economy/implementation_report.pdf

The availability of spare parts as a requirement is found in Blue Angel, EPEAT, the EU Voluntary Agreement version 5.2 and Nordic Swan. The main criteria used to inform the development of the EU GPP criterion can be seen in the tables below.

Table 19: Spare parts criterion in other initiatives

Environmental initiative	Criterion Text
Blue Angel ⁶	<p>3.1.5.3 Repair options</p> <p>The distributor commits to ensure that the spare parts and exchange parts needed for repair of the devices and the according infrastructure are available for at least 5 years after ceasing production and that the user is informed about this availability of spare parts. Other parts the life span of which usually exceeds the typical life span of the product do not have to be held available as spare parts.</p> <p>The distributor commits to provide easily accessible repair options for the device to the users. Such repair options may consist in a delivery to the service centre of the manufacturer by means of licensed dealers or logistical solutions (package services) offered to the customer, or that dealers and repair centres independent from the manufacturer have access to spare parts and repair information.</p> <p><i>Spare parts are components or assemblies that can potentially fail within the service life of the products. This includes e.g. hinges of casing parts, paper trays etc. as well as cable connections and electronic components which might be damaged by overheating.</i></p>
EPEAT	<p>4.4.3.1 Required—Spare parts</p> <p>Manufacturer must declare if spare parts are available, and if available, the length of time that spare parts are available after the end of production. The following information must be provided to purchasers:</p> <p>a) If spare parts are available, and if available the length of time that they are planned to be available after the end of production.</p> <p>b) If spare parts are available, how to obtain spare parts (or, at the manufacturer’s option, compatible spare parts from a different supplier).</p> <p><i>Spare parts: A component of a product that is kept in reserve for possible use to replace a similar or identical component in the product.</i></p>
EU Voluntary Agreement version 5.2	<p>6.2 Availability of spare parts</p> <p>For new product models first placed on the EU market after 1 January 2015, Signatories must make available spare parts for the minimum time periods after the end of product manufacturing:</p> <ul style="list-style-type: none"> • For Electrophotography, Solid Ink and High Performance Inkjet models - 5 years • For Inkjet models - 3 years <p>Making spare parts available must only involve offering spare parts for sale through their usual spare part distribution channels and must not require Signatories to trade directly with Customers or users.</p> <p><i>In this section, “spare parts” means those parts which it is reasonably anticipated by the manufacturer of a model as being likely to fail during the typical use of the product. In contrast, those parts whose life cycle usually exceeds the usual life of the product do not have to be made available as spare parts.</i></p>

EPEAT requires that manufacturers declare the length of time that spare parts are available after the end of production. While the Blue Angel initiative includes a requirement that spare

parts should be available for at least 5 years after the end of production. Blue Angel and VA define spare parts as parts that typically have the potential to fail during the normal use of the product. Blue Angel also provides a small list of examples including hinges of casing parts, paper trays, cable connections and electronic components which might be damaged by over-heating.

Spare parts availability for a period of two years is covered by the EU legal warranty. A 2-year period is much shorter than the products estimated lifetime of 6 years for laser printers and MFDs and 4 years for inkjet printers and MFDs and scanners.

Spare parts availability is a common requirement in many of the established environmental initiatives dealing with imaging equipment and thus spare parts are likely to be widely available for these product types.

The current EU GPP criteria include a requirement that spare parts are available for all imaging equipment for a period of 5 years. For the **first criterion proposal**, it was suggested to keep this requirement. Given the relatively short average lifespan of inkjet products the 5-year period was deemed a little too restrictive for a core criterion, therefore 3 years was proposed instead (for inkjet models), in line with Voluntary Agreement version 5.2. The comprehensive criterion maintained the 5-year spare parts availability period for all types of imaging equipment in scope of the EU GPP specification. A number of components that have been deemed as applicable spare parts were listed to add clarity. In addition, an award criterion was added to reward the supplier(s) which offer the most cost-competitive spare parts service.

Despite the large compliance rates, stocking of spare parts does result in additional costs for manufacturers, especially in terms of storage. However, given the fact that the spare parts are already widely available it is not expected that the proposed EU GPP criteria would cause any additional life cycle cost implications.

Further background with regard to spare parts after AHWG meeting

During the AHWG meeting and consultation thereafter, stakeholders questioned the formulated list of spare parts that deem compliance with these criteria. This list was based on an analysis of what other schemes list as spare parts examples, and considers also those that typically have a shorter lifetime than the equipment's service life and that cause equipment's failure. However, defining a specific list of parts is considered necessary in order to ensure that the parts which are prone to failure are available. In the second revised criterion, it was proposed to reduce the list of spare parts for the core proposal. In addition the definition of spare part was included in line with the work of the JRC group developing the Repair Scoring System⁵⁷.

For the **final proposal**, in the Technical Specification a text has been included to request a maximum delivery time for spare parts. This has been requested by a stakeholder and it is a practice included in Ecodesign for similar products in order to incentivise reparability. Otherwise it has been clarified that spare parts should be available by manufacturers for at least 3 years from the date of purchase. Finally, the previously proposed award criterion on cost competitiveness of spare parts was removed in line with decisions made in the GPP criteria for other electronic product group (i.e. computers and monitors).

Design for disassembly and repair

Access to spare parts is important as some of those tend to fail and need replacement to prevent disposal of the device because of failure. Spare parts that are important to replace are storage devices and storage units which cause product fail if not repaired.

The inclusion of design features to facilitate reparability could potentially have some impact on the durability of products. That is, if parts are easily replaced there may be less incentive on the manufacturers to ensure that parts are durable. The extent of this potential impact would be curtailed through longer warranty periods which place the financial burden for

⁵⁷ JRC study about the analysis and development of a scoring system for repair and upgrade of products, available at <https://ec.europa.eu/jrc/en/publication/analysis-and-development-scoring-system-repair-and-upgrade-products>

reparability on the manufacturer not the user. In addition, design targeted at easy disassembly/dismantling is crucial for enhancing reparability of products and recycling of materials from them at their end of life. By making the access of these parts available by using universally available tools, materials can be better recovered. Since the housing of imaging equipment products is typically made of plastics, it is important they are easily removed to recover important parts. Marking of plastic parts is also important to enhance the recycling of plastics so plastics are not mixed before treatment. Finally, availability of high quality repair manual is crucial for the support of successful repair operation.

Blue Angel, EPEAT, the EU Voluntary Agreement version 5.2, Nordic Swan and the Korean Ecolabel include criteria on design for disassembly. However, only Blue Angel and EPEAT include extensive requirements in this area.

The Blue Angel specification includes a broad range of requirements in sections “3.1.1.1 Design for disassembly requirements”.

Table 20: Blue Angel requirements on 3.1.1.1 Design for disassembly requirements (Table 1 in BA) ⁶

No.	Requirement	Applies to Assembly	Must/Should Requirement
1	Are assemblies made of mutually incompatible materials separable or connected by separation aids?	Casing parts, chassis, electric/electronic assemblies, modules for colourants	Must
2	Are electric/electronic assemblies easy to find and to remove?	Entire unit, including lamps	Must
3	Are detachable connections easy to find?	Casing parts, chassis, modules for colourants	Should
4	Can disassembly be done exclusively with general-purpose tools?	Casing, chassis, electric/electronic assemblies	Must
5	Have the points of application and the work space required for disassembly tools been considered?	Casing parts, chassis, electric/electronic assemblies	Must
6	Are all connecting elements that have to be dismantled for recycling axially accessible?	Casing parts, chassis, electric/electronic assemblies	Should
7	Can screw connections for fastening assemblies be tightened with no more than three tools?	Casing parts, chassis, electric/electronic assemblies	Must
8	Are detachable connections of plastic components at least half click/snap-on connections?	Casing parts	Should
9	Can the disassembly be performed by one person?	Entire unit	Must

No.	Requirement	Applies to Assembly	Must/Should Requirement
10	Can the supporting surface be maintained during the entire disassembly process?	Unit to be handled	Should
11	Are casing parts free of electronic assemblies?	Casing parts	Must
12	Has the manufacturer carried out a trial disassembly (e.g. in accordance with no.1-11) and recorded it with focus on weak spots?	Entire unit	Must

Most of the Blue Angel criteria in this area are marked as “must” criteria meaning that products have to comply with in order to be awarded the Blue Angel label

Against this background, for the first proposal, it was suggested to add a new technical specification on design for disassembly focused on accessibility and easy separation of spare parts/components in order to facilitate reparability and recyclability at the end of life. The criterion was inspired by the EU GPP for computers⁵⁸ and Blue Angel⁶/EPEAT⁵ criteria. However, some of the Blue Angel “must” criteria were not reflected to allow the use of other initiatives. Given that large numbers of products in the marketplace include design features which facilitate disassembly it is estimated that there would not be any additional costs associated with meeting the design for reparability criteria. That is, manufacturers have already taken steps to include reparability features into products and therefore already absorbed the costs for these changes to the product design. It is not expected that the design features would continue to add extra costs to the product as they only dictate fastening types. As such, the EU GPP criteria will have little, if any, impact on product price in respect of reparability design features.

Further background with design for disassembly and repair after AHWG meeting

During the AHWG meeting and following comments, a number of stakeholders recommended that criterion TS8(b) design for disassembly and repair should be harmonized with Blue Angel RAL-UZ205 3.1.1.1 table 1 No. 1,2,4,5,7,9,11 and 12. Stakeholders also requested that reference to an exploded diagram should be removed from the criterion.

For the second criteria proposal, it was proposed to amend the criterion in order to further harmonize with the suggested Blue Angel RAL-UZ205 design for disassembly and repair requirements, still keeping certain level of flexibility, as only “must” Blue Angel criteria have been included..

For the **final criteria proposal** based on a stakeholder comment, it has been added in TS8 (b) *Design for disassembly and repair* that only reusable fasteners are permitted for the casing and chassis. A definition of reusable fasteners has been included. In addition, minor non-content wise changes have been included to harmonise this sub-criterion with other recently developed GPP criteria for electronic products (i.e. computers and monitors).

Design for recycling

Materials must also be easily identified so that they can be sorted more easily according to the type to be recovered. If imaging equipment products are sorted out properly, more of their parts containing highly valued materials can be recovered and sent for recycling. This also avoids the mixing with other products and materials which hinders recycling.

⁵⁸ EU GPP criteria for Computers and Monitors can be downloaded from: http://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

The Blue Angel specification includes a broad range of requirements in section “3.1.1.2 Requirements concerning material selection for recyclability”. For instance, requirement number 3 restricts the use of coating which are incompatible with recycling in addition to a ban on the use of galvanic coatings (see Table 21). Compliance with the Blue Angel specification would result in the proposed GPP criterion being met.

EPEAT also includes a broad range of criteria in this area under the section “4.3 Design for end of life”⁵⁹. EPEAT also includes restrictions on coatings that negatively impact recyclability of materials.

Table 21: Blue Angel requirements on 3.1.1.2 Requirements concerning material selection for recyclability (Table 2 in Blue Angel)

No.	Requirement	Applies to Assembly	Must/Should Requirement
1	Is the variety of materials used for plastic components of similar function limited to one material?	Casing parts, chassis Mechanical parts (≥ 25g)	Must
2	Are components that are made of the same plastic dyed uniformly or compatibly?	Casing parts, modules for colourants	Should
3	Has the coating of plastic components been limited to a minimum? Have no galvanic coatings been used?	Casing parts, modules for colourants	Must
4	Are recyclable materials and material composites used?	Casing parts, chassis, modules for colourants	Must
5	Is the partial use of post-consumer recycled plastics permitted?	Casing parts, chassis, modules for colourants	Must
6	Does the share of post-consumer recycled plastics amount to at least 5% of the complete plastic material?	Casing parts, casings of modules for colourants	Should
7	Are assemblies and materials easy to dismantle according to Appendix 4 of the Electrical and Electronic Equipment Act (ElektroG)?	Entire unit	Must
8	Have materials been selected in accordance with no.1-5 and has this been documented in writing?	Casing parts, chassis, modules for colourants	Must
9	Are plastic parts >25 g with a flat surface of at least 200 mm ² marked in accordance with EN/ISO 11469 considering ISO 1043?	Entire unit (exempted are plastic parts contained in reused complex assemblies)	Must

⁵⁹ <https://www.epeat.net/resources/criteria-2/#tabs-1=imagingequipment>

No.	Requirement	Applies to Assembly	Must/Should Requirement
10	Is the share of post-consumer recycled plastics stated in the information and data sheet, calculated as percentage of total plastic (by weight) and indicated in intervals of 0-1%, 1-5%, 5-10%, 10-15%, 15-20%, and so on (in 5% intervals)?	All assemblies	Must
Note	Requirements number 1 and 10 are covered under previous criteria sections		

For the first proposal, it was suggested to include a new technical specification in the revised EU GPP. These requirements were used as the main point of reference to develop the proposed GPP criteria. They were reformulated from questions to requirements, selecting only the most relevant requirements which are common across Blue Angel and EPEAT. Common criteria with a focus on limiting the presence of paints and coating were chosen to ensure that the EU GPP criteria could be more readily verified.

Due to high market penetration of these schemes in procurement, it was assumed this criterion will not create extra burdens on the market and would create harmonization amongst EU GPP and the rest of the schemes. The proposed criterion was supposed to provide a valuable addition for increasing the recycling of imaging equipment products. A separate comprehensive criterion was not proposed due to uncertainties over market penetration levels against more ambitious requirements.

Further background with design for recycling after AHWG meeting

Several stakeholders also recommended that criterion TS8(c) Design for recycling should be harmonized with Blue Angel RAL UZ205 3.1.1.2 table 2 No.9 as the current EU GPP criterion wording included additional requirements beyond Blue Angel making verification more difficult. Several changes have been introduced in the second proposal:

- Requirement on marking has been fully aligned with Blue Angel,
- The scope has been specified for galvanic coatings in line with Blue Angel,
- Requirement on paints and coatings not impeding recycling has been added in the comprehensive technical specification.

Final proposal remains unchanged. No changes have been introduced as a result of the final written consultation

2.2.9.2 Background for the proposed verification

For criterion 8(a) suppliers can prove compliance against this criterion through documentation which confirms spare part availability for the period required for each model of imaging equipment included in a tender.

Verification text for criteria 8(b) and 8(c) asks for provision of documentation, e.g. showing that products are compliant with an environmental initiative which covers the same design for disassembly/recycling attributes. For both 8(b) and 8(c) this would mean that proving compliance with Blue Angel RAL UZ205 would be a suitable means of verification. Manufacturers could also provide other third-party evidence showing that they meet the

applicable requirements under TS8(c) through marking of plastics according the applicable standard ISO 11469⁶⁰.

Given the large number of imaging equipment models that are registered with Blue Angel and EPEAT there are no market availability issues foreseen as a result of including reparability and recyclability criteria within the EU GPP specification.

For the award criterion on spare parts the manufacturer must provide a price list and indications about how long these prices will remain valid.

⁶⁰ ISO 11469 Plastics – Generic identification and marking of plastics products

2.2.10 Substance emissions

The existing EU GPP specification does not include any requirements on substance emissions from imaging equipment.

For the AHWG meeting, a criterion with this regard was proposed. The criterion has been revised after the meeting:

Final criteria proposal

Core criteria

Comprehensive criteria

TECHNICAL SPECIFICATIONS

TS9 Substance emissions

Imaging equipment (tested with the OEM cartridge) must meet the following substance emission rate requirements when measured according to the test procedure detailed in Blue Angel specification RAL-UZ 205:

Permissible test values for emission rates as determined according to appendix S-M[1] for electrophotographic devices

(All values in mg/h)		Monochrome printing	Colour printing
Pre-operating phase	TVOC[2]	1 (Desktop devices) 2 (Floor-mounted devices, device volume > 250 l)	1 (Desktop devices) 2 (Floor-mounted devices, device volume >250 l)
		10.0	18.0
Print phase (= pre-operating + print phase)	TVOC[2]	10.0	18.0
	Benzene	< 0.05	< 0.05
	Styrene	1.0	1.8
	Ozone	1.5	3.0
	Dust	4.0	4.0

Large format printers (LFP), professional imaging products and scanners are excluded from the scope

Verification:

Imaging equipment (tested with the OEM cartridge) must meet the following substance emission rate requirements when measured according to the test procedure detailed in the Blue Angel specification RAL-UZ 205:

Permissible test values for emission rates as determined according to appendix S-M[1] for electrophotographic devices

(All values in mg/h, except for particle emissions)		Monochrome printing	Colour printing
Pre-operating phase	TVOC[2]	1 (Desktop devices) 2 (Floor-mounted devices, device volume > 250 l)	1 (Desktop devices) 2 (Floor-mounted devices, device volume >250 l)
		10.0	18.0
Print phase (= Pre-operating + print phase)	Benzene	< 0.05	< 0.05
	Styrene	1.0	1.8
	Unidentified single substances		
	VOC	0.9	0.9
	Ozone	1.5	3.0
	Dust	4.0	4.0

The tenderer must provide test results indicating emission rates during print phase for each of the named substances along with the details concerning the test procedure used to measure the emission rates. Test reports for devices of identical construction are accepted. The definition of 'identical construction' is the same as listed in Blue Angel RAL-UZ 205 appendix B-M to the basic award criteria. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.

Print phase	PER10 PW [Particles/1 0 min]	3.5 * 10 ¹¹	3.5 * 10 ¹¹
-------------	------------------------------------	------------------------	---------------------------

Permissible test values for emission rates determined according to appendix S-M[1] for inkjet devices

(All values in mg/h)		Monochrome printing	Colour printing
Pre-operating phase	TVOC[2]	1 (Desktop devices) 2 (Floor-mounted devices, device volume > 250 l)	1 (Desktop devices) 2 (Floor-mounted devices, device volume >250 l)
Print phase (= Pre-operating + print phase)	TVOC[2]	10	18
	Benzene	< 0.05	< 0.05
	Styrene	1	1.8
	Unidentified single substances VOC	0.9	0.9

Large format printers (LFP), professional imaging products and scanners are excluded from the scope.

Verification:

The tenderer must provide test results indicating emission rates during the print phase for each of the substances named along with the details concerning the test procedure used to measure the emission rates. Test reports for products of identical construction

	are accepted. The definition of 'Identical construction' is the same as listed in Blue Angel RAL-UZ 205 appendix B-M to the basic award criteria. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.
--	--

Explanatory notes : TS9 Substance emissions

[1]Appendix S-M of Blue Angel specification RAL-UZ 205 (January 2017 edition (Printers and Multifunction Devices))

[2] The list of volatile organic compounds which must be considered when measuring emissions from imaging equipment with a printing function must be determined as listed in Blue Angel specification RAL-UZ 205 (January 2017 edition) - (Appendix S-M - para. 4.5 VOCs).

2.2.10.1 Background for the proposed criteria

VOC, dust and other emissions from imaging equipment are hazardous to humans when emitted indoors over certain thresholds.

Some older studies in the early 2000^{61,62,63} reported levels of VOCs indicating laser printers had higher emission levels than inkjet printers, specially operating units rather than idle units. Overall for all imaging equipment products, the emission rates from photocopiers were much higher than for printers and multi-functional devices. But one of the studies refers to other studies and their high variability, ranging over three orders of magnitude for some chemicals, e.g., toluene and styrene. Despite this, there are some consistencies between the studies that show that chamber concentrations of styrene, xylenes and ozone are increased in printing process of the laser printer, and pentanol is detected from the ink-jet printer. The emission rates of laser printers were the highest and found to be about 6 times that of ink-jet printers. Chemical emissions, both as reporting and limits requirements are found in Blue Angel, EPEAT, Nordic Swan and the Korean Ecolabel. Blue Angel eco-labelled printers, copiers and MFDs all make particularly low contributions to indoor air pollution at the workplace or in private households. For better indoor quality, strict requirements on air emissions are set for low content of harmful substances. In addition, strict requirements are made for fine and ultrafine particle release during laser printer operation. Currently, 979 products are registered as complying with Blue Angel⁶.

A standard already exists for measuring and reporting five chemical substances as emissions from the use of imaging equipment products, namely:

- Dust (particulate matter) (electrophotographic imaging equipment only),
- Styrene,
- Benzene,
- TVOC,
- Ozone (electrophotographic imaging equipment only).

Moreover, the Blue Angel specification includes a test procedure. Nevertheless, measuring these emissions is not a common practice. Although more than one thousand products are registered in Blue Angel, complying with certain limits may be a costly exercise for manufacturers. Reporting may also imply extra costs, however this may be already a common practice by manufacturers, but only covering OEM products (i.e. not non-OEM cartridges set-up in imaging equipment printers and MFDs).

The EPEAT levels are slightly less stringent than those found in the latest version of Blue Angel, whereas the Nordic Ecolabelling criteria refer to the Blue Angel specification (RAL UZ 205) for compliance. The same applies to the Korean Ecolabel, except that the emission requirements for VOCs are also applicable to standby mode.

Against this background, for the first revised GPP criteria version, it was proposed to include a technical specification aligned to Blue Angel. Blue Angel requirements are the most comprehensive and are used also in other schemes.

In the **first proposal**, for core criterion it is asked to measure TVOC in pre-operating phase and the following emissions in the print phase:

- TVOC,
- Benzene,
- Styrene,
- Ozone,
- Dust

⁶¹ Destailats, Hugo, Randy L Maddalena, Brett C Singer, Alfred T Hodgson, and Thomas E Mckone. 2008. "Indoor Pollutants Emitted by Office Equipment: A Review of Reported Data and Information Needs." *Atmospheric Environment* 42: 1371–88. doi:10.1016/j.atmosenv.2007.10.080.

⁶² Naoki Kagia, Shuji Fujiib, Youhei Horibab, Norikazu Namikic, Yoshio Ohtanic, Hitoshi Emic, Hajime Tamurad, and Yong Shik Kime. 2007. "Indoor Air Quality for Chemical and Ultrafine Particle Contaminants from Printers." *Building and Environment* 42: 1949/1954.

⁶³ S.C. Lee, Sanches Lam *, Ho Kin Fai. 2001. "Characterization of VOCs, Ozone, and PM10 Emissions from Office Equipment in an Environmental Chamber." *Department of Civil and Structural Engineering* 36: 837/842.

for electrographic products.

With regard to the GPP comprehensive criterion requirements are set for electrographic and inkjet devices. In the case of electrographic equipment, in the comprehensive criteria beside the same emissions restricted in the core criterion, also maximum allowed value for particles PER10 PW was established. In the case of inkjet devices, the following emissions are restricted:

- TVOC,
- Benzene,
- Styrene,
- Unidentified Single Substances VOC.

The large number of products compliant with the Blue Angel specifications suggests that neither manufacturers nor procuring authorities would see additional costs associated with these criteria.

2.2.10.2 Background for the proposed verification

ECMA 370 declarations are widely used by the imaging equipment manufacturers in the EU as a means of providing information about the environmental performances of their products. With regard to Blue Angel, at the time of writing of the report, 979 products registered against the RAL-UZ-205 specification and 1379 products registered against the RAL-UZ-171 specification. Products meeting the RAL-UZ-171 specification would be able to comply with both the core and comprehensive criteria. As such, no market availability issues are foreseen. Manufacturers will be able to verify compliance with the criteria through submission of documentation showing that products have been tested using appropriate test procedures, or equivalent, and meet the substance emission requirements.

Products holding ISO type I schemes certification which addresses the relevant requirement would be deemed to comply.

2.2.10.3 Further background after AHWG meeting

During consultation stakeholders commented that Blue Angel allows for a single product to be tested and all identical products to use this single test for compliance purposes. The Blue Angel specification includes a detailed definition for “identical product”. This ensures that any product using the emission tests results of another product would itself be compliant if tested.

For the **second criteria proposal**, it was proposed allowing identical products to use test results from a single tested product in order to reduce costs without decreasing levels of ambition. A statement has been included in the criterion verification section allowing identical products to the tested product to meet the requirement. In addition, it has also been included a reference to the Blue Angel ecolabel definition for “identical products”.

For the **final criteria proposal** based on stakeholder comments, a note has been added that large format printers (LFP) and professional imaging products and scanners are excluded from the scope because they are not in scope of the test procedure detailed in the Blue Angel specification RAL-UZ 205 used for these criteria. In addition, a comment has been received stating that OEMs test their IE systems with OEM cartridges and, if a non-OEM cartridge is used, the substance emissions level might not be met. The reason is that the emissions from a printer in operation is dependent on the print system set-up including the cartridge. It will not be possible for the manufacturer of the IE to test with all non-OEM cartridges on the market. Therefore the text has been modified to reflect that the emissions limits should be met by the equipment tested with the OEM cartridge.

2.2.11 Noise Emissions

The existing EU GPP specification does not include any requirements on noise emissions from imaging equipment; however a proposal was made for the AHWG meeting and discussed with stakeholders. After these discussions the proposal was modified as follows:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
<p>TS10 Noise emissions (same for core and comprehensive)</p> <p>The A-weighted sound power level <i>LWA</i> must be determined according to ISO 7779. Devices capable of colour printing must be tested in both monochrome mode (<i>LWA,M</i>) and colour mode (<i>LWA,F</i>).</p> <ul style="list-style-type: none"> • Noise measurements must be conducted without optional peripheral devices. • A4 size paper of grammage 60 g/m² to 80 g/m² must be used for test operations. • The four-page Adobe Reader file from the Office Test Suite according to B.1 of ISO/IEC 24734 must serve as test pattern. • Only one-sided printing must be measured. • The noise measurement must only be conducted during repetitive printing operation cycles. The measurement time interval must include at least three complete outputs of the four-page test pattern (12 pages). The interval must begin after the printing preparation. <p>At least three devices of one model have to be tested. The declared A-weighted sound power level <i>LWAd</i> must be determined following the procedures of ISO 9296:1988. It must be declared in decibels (dB) with one decimal place. If the noise emission measurement can be performed with one device, only the following formula may be used as a substitute to determine the declared A-weighted sound power level <i>LWAd</i>.</p> $LWAd = LWA1 + 3,0 \text{ dB}$ <p>(<i>LWA1</i> = A-weighted sound power level of a single device, in dB with one decimal place)</p> <p>The declared A-weighted sound power level(s) of (both) monochrome mode <i>LWAd,mo</i> (and full colour mode <i>LWA,co</i>, if applicable) must not exceed the limit. The limit <i>LWA,lim</i> must be determined depending on the page throughput of (both) monochrome mode <i>sM</i> and colour mode <i>sF</i>, if applicable, given to one decimal place and according to the following formula:</p> $LWA,lim = 47 + 15 * \lg (SM/F + 10) \text{ dB}$ <p>The values of the declared A-weighted sound power level <i>LWAd</i> in dB with one decimal place and page throughput <i>SM/F</i> in ipm must be indicated in the information and data sheet under 'environment and health-related statements'. For devices capable of colour printing, the declared A-weighted sound power levels <i>LWAd,M</i> and <i>LWAd,F</i> and corresponding page throughput <i>SM</i> and <i>SF</i>, both of monochrome mode and colour mode, must be indicated.</p> <p>Verification:</p> <p>The tenderer must provide documentation, such as a test report, which identifies noise emission rates during print phase when measured according to requirements in ECMA-74 combined with ECMA-109. The testing laboratory must be accredited according to both ISO/IEC 17025 and ISO 7779 for acoustical noise measurements or equivalent. The documentation should also identify if the A-weighted sound-power level in the criterion has been met.</p> <p>Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>	

2.2.11.1 Background for the proposed criteria

Noise pollution is not reflected in Life Cycle Assessments of imaging equipment products. However, it has an impact on end-user, in particular when confined to a closed area such as public offices.

Noise pollution is considered relevant for this product group as larger products such as MFDs may create irritating noise to end-users while in operation. Some of the short and long term effects⁶⁴ that can be avoided are:

- It creates annoyance to the receptors due to sound level fluctuations.
- Physiological features like breathing amplitude, blood pressure, heart-beat rate, pulse rate, blood cholesterol are affected.
- Noise has negative impacts on cognitive performance. For attention and memory, a 5 dB(A) reduction in average noise level results in approximately a 2-3 % improvement in performance.
- It causes pain, ringing in the ears, feeling of tiredness, thereby effecting the functioning of human system.
- It affects sleepiness by inducing people to become restless and lose concentration during their activities.

Some standards, such as the ECMA-370 (The Eco Declaration), support measurement of noise emission level. Nordic Ecolabel⁷ and Blue Angel⁶ require certified products to comply with certain limit values.

In order to keep protecting end-users from noise pollution, in the first proposal it was suggested to include criteria on noise emissions as part of the updated GPP criteria. The core criterion only required that noise emission rates meet the older Blue Angel (RAL-UZ-171⁶) limits. The comprehensive criterion was aligned with the new version of Blue Angel RAL-UZ-205 specification.

The large number of products compliant to the Blue Angel specifications (1379 for RAL-UZ-171 and 979 for RAL-UZ-205) suggests that neither manufacturers nor procuring authorities are expected to face significant additional costs associated with these criteria.

2.2.11.2 Background for the proposed verification

Manufacturers will be able to verify compliance with the criteria through submission of documentation showing that products have been tested to the appropriate test procedures, or equivalent, and meet the allowed noise emission levels. This documentation could take the form of a manufacturer declaration or proven compliance to the ECMA-74 combined with ECMA-109 (ISO 9296⁶⁵) specification.

2.2.11.3 Further background after AHWG meeting

During consultation several stakeholders commented that some requirements in the initially proposed core criterion were more stringent than those in the comprehensive criterion. The stakeholders also noted that this situation had occurred because some of the older Blue Angel requirements used in the core criterion were more stringent than requirements in the newer Blue Angel criteria used in the comprehensive criterion. The stakeholders recommended harmonizing the EU GPP (core and comprehensive) criteria with the newest Blue Angel criterion. It has been decided to accept the comments and for the second proposal the original core criterion based on the older Blue Angel specification has been removed.

For the **final criteria proposal** based on a stakeholder comment, the reference standards have been updated, otherwise the formulation as of the 2nd proposal was kept.

⁶⁴ Green Public Procurement for Imaging Equipment. Technical Background report. 2014.

⁶⁵ ISO 9296:2017 Acoustics - Declared noise emission values of information technology and telecommunications equipment

2.2.12 Hazardous substances requirements

The existing EU GPP specification does not include any requirements on hazardous material content.

For the AHWG meeting criteria on hazardous substances were proposed. In the proposal the core sub-criterion on Substances of Very High Concern has been revised after the meeting as follows:

Final criteria proposal	
Core criteria	Comprehensive criteria
SELECTION CRITERIA	
	<p>SC1 Restricted substance controls</p> <p>The tenderer must demonstrate implementation of a framework for the operation of restricted substance controls (RSCs) along the supply chain for the products to be supplied. Product evaluations according to the RSCs should, as a minimum, cover the following areas:</p> <ul style="list-style-type: none"> - Product planning/design; - Supplier conformity; - Analytical testing. <p>As a minimum, the RSCs must apply to REACH candidate list substances and RoHS restricted substances. The IEC 62474 material declaration database* must be used as the basis for identifying, tracking and declaring specific information about the composition of the products to be supplied. The RSCs must be used to ensure that the tenderer is aware of the presence or non-presence of substances that are listed in the IEC 62474 database.</p> <p>Supplier declarations of conformity with the RSCs must be collected and kept up to date for relevant materials, parts and sub-assemblies of the products to be supplied. These may be supported, where appropriate, by supplier audits and analytical testing. The RSC procedures must ensure that product and supplier compliance is re-evaluated when:</p> <ul style="list-style-type: none"> - restricted substance requirements change; - supplied materials, parts and sub-assemblies change; - manufacturing and assembly operations change. <p>Implementation of the RSCs must be with reference to the guidance in IEC 62476 or equivalent and the IEC 62474 material declaration database.</p> <p>*International Electrotechnical Commission (IEC), IEC 62474: Material declaration for products of and for the electrotechnical industry, http://std.iec.ch/iec62474</p> <p>Verification:</p>

	<p>The tenderer must provide documentation which describes the system, its procedures and proof of its implementation. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
<p>TS11 Substances of very high concern <i>(same for core and comprehensive)</i> No REACH candidate list substances are to be intentionally added as constituents to the plastics in casings and casing parts. The requirements also apply to recycled material. Compliance to be ensured for the latest version of the list of substances of very high concern, available one year prior to the product's date of manufacture. Verification: The tenderer must provide a declaration of compliance with the criterion. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>	
	<p>TS12 Hazardous substances content</p> <ul style="list-style-type: none"> • Halogenated polymers and halogenated organic compounds for their use as flame retardants are not permitted. Exempted from this requirement are: <ul style="list-style-type: none"> - Fluorinated organic additives (as, for example, anti-dripping agents) used to improve the physical properties of plastics, provided that they do not exceed 0.5% w/w. - Fluorinated polymers as, for example, PTFE. - Plastic parts with a mass equal to or less than 25 grams. However, these must not contain PBBs (polybrominated biphenyls), PBDEs (polybrominated diphenyl ethers) or chlorinated paraffins. (This exemption does not apply to control panel keys.) - Special plastic parts located close to heating and fuser elements. These parts must, however, not contain PBBs, PBDEs or chlorinated paraffins. • No substances are to be intentionally added as constituents to the plastics which meet at least one of the conditions set out in following table: <p>Conditions for the exclusion of substances from materials in casings and casing parts.</p>

Hazard class	Hazard category	CLP-Regulation (EC) No. 1272/2008
Carcinogenicity	Carc. 1A, 1B	H350 May cause cancer
Carcinogenicity	Carc. 1A, 1B	H350i May cause cancer if inhaled
Germ cell mutagenicity	Muta. 1A, 1B	H340 May cause genetic damage
Reproductive toxicity	Repr. 1A, 1B	H360 May damage fertility or the unborn child

The requirements also apply to recycled material.

- The support material of printed circuit boards must not contain PBBs (polybrominated biphenyls), PBDEs (polybrominated diphenyl ethers) or chlorinated paraffins.

Verification:
The tenderer must provide documentation which proves that the requirement has been met. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.

2.2.12.1 Background for the proposed criteria

Most electronics products, including imaging equipment, contain at least some hazardous ingredients. Of particular concern are for instance heavy metals (e.g. mercury, cadmium, lead) and certain flame retardants in plastics. A number of other substances found on the Candidate List of Substances of Very High Concern (SVHC) and REACH Annex XIV (List of Substances Subject to Authorization) are also likely to be present in some imaging equipment products. Hazardous material content data for imaging equipment is addressed in a number of environmental initiatives (Blue Angel, Nordic Swan, ECMA 370, EPEAT). Most of these hazardous ingredients are unlikely to be emitted to the environment during a product's useful life as they are found in internal components. Nevertheless, in some cases hazardous substances may be emitted to the environment during end-of-life processing, depending on the amount and type of initial hazardous content and the specific end-of-life

processing which takes place⁶⁶. In order to minimize this risk is considered relevant to address hazardous substances in the revised GPP criteria, especially for the procurers who would like to establish more ambitious requirements (i.e. through GPP comprehensive criteria). The most important criteria from other initiatives used to inform the EU GPP criteria can be seen in the tables below.

Table 22: EPEAT Hazardous material content criteria

Criterion Number and Title	Criterion Text
4.1.3.1 Required— Reporting on amount of mercury content in light sources	<p><i>Manufacturer must report the number of mercury containing light sources in the product and the mercury content per light source. Data may be reported in accordance with the ranges of the following list:</i></p> <ul style="list-style-type: none"> <i>– 0 mg (less than lower limit of detection)</i> <i>– > 0 mg to ≤ 5 mg</i> <i>– > 5 mg to ≤ 10 mg</i> <i>– > 10 mg to ≤ 50 mg</i> <i>– > 50 mg to ≤ 100 mg</i> <i>– > 100 mg to ≤ 1 g</i> <i>– Greater than 1 g</i> <p><i>For products that do not contain light sources, the manufacturer may declare “Not applicable” on the MSE Registry.</i></p>
4.1.3.2 Optional— Use of non-mercury containing light sources	<p><i>No intentionally added mercury in light sources. Light source employs a technology that is documented not to require the presence of mercury.</i></p>
4.1.4.1 Optional— Reduction of substances on the EU REACH Candidate List of SVHCs	<p><i>A product must not contain substances included in the Candidate List of Substances of Very High Concern (SVHC) and REACH Annex XIV (List of Substances Subject to Authorization) above the 0.1% weight by weight threshold as described by the current European Chemicals Agency “Guidance on Articles” document or the REACH regulation. The manufacturer must demonstrate absence (less than 0.1% weight by weight in the product) of substances on the Candidate List of SVHC that have a Date of Inclusion on the candidate list of one year or more prior to the date he product in question is first registered. External attachments and associated accessories that ship with the product being registered must also not contain SVHCs above 0.1% weight by weight of the individual attachment or accessory.</i></p>
4.1.6.1 Required— Reducing BFR/CFR/PVC content of external plastic casings	<p><i>External plastic casings greater than 25 g must contain no more than 0.1% weight (1000 ppm) bromine and 0.1% weight (1000 ppm) chlorine attributable to brominated flame retardants (BFRs), chlorinated flame retardants (CFRs), and polyvinyl chloride (PVC) with the following exceptions:</i></p> <ul style="list-style-type: none"> <i>– Parts containing 25% or more postconsumer recycled content are permitted up to 0.3% weight (3000 ppm) bromine and 0.3% weight (3000 ppm) chlorine.</i> <i>– Uses of brominated or chlorinated substances that are not classified as BFRs, CFRs, or PVC are allowed, but their use must be documented if the bromine or chlorine content exceeds the applicable threshold.</i> <i>– External plastic casings for external power supplies.</i>

⁶⁶ The EU has taken a number of initiatives to address the hazardous waste issues. e.g. the RoHS Directive 2002/95/EC, the Stockholm convention, the Waste Shipment Regulation and the original and revised WEEE Directives

<p>4.1.6.2 Optional— Eliminating or reducing BFR/CFR content of printed circuit board laminates</p>	<p>All printed circuit board laminates included in the product excluding components soldered or affixed to the printed circuit board laminates must contain no more than 0.1% weight (1000 ppm) bromine and 0.1% weight (1000 ppm) chlorine attributable to BFRs and CFRs, with the following exception:</p> <ul style="list-style-type: none"> – Uses of brominated or chlorinated substances that are not classified as BFRs or CFRs are allowed, but their use must be documented if the bromine or chlorine content exceeds the applicable threshold.
<p>4.1.6.3 Optional— Eliminating or reducing BFR/CFR/PVC content of product</p>	<p>All plastic materials within the product must contain no more than 0.1% weight (1000 ppm) bromine and 0.1% weight (1000 ppm) chlorine attributable to BFRs, CFRs, and PVC with the following exceptions:</p> <ul style="list-style-type: none"> – Parts containing 25% or more postconsumer recycled content are permitted up to 0.3% weight (3000 ppm) bromine and 0.3% weight (3000 ppm) chlorine. – Uses of brominated or chlorinated substances that are not classified as BFRs, CFRs, or PVC are allowed but their use must be documented if the bromine or chlorine content exceeds the applicable threshold.

Table 23: Blue Angel (RAL-UZ-205)⁶ hazardous material content criteria

<p>Criterion Number and Title</p>	<p>Criterion Text</p>												
<p>3.2.1 Hazardous substances in casings and casing parts</p>	<p>Halogenated polymers and halogenated organic compounds for their use as flame retardants are not permitted. Exempted from this requirement are:</p> <ul style="list-style-type: none"> • Fluorinated organic additives (as, for example, anti-dripping agents) used to improve the physical properties of plastics, provided that they do not exceed 0.5% w/w. • Fluorinated polymers as, for example, PTFE. • Plastic parts with a mass equal to or less than 25 grams. However, these must not contain PBBs (polybrominated biphenyls), PBDEs (polybrominated diphenyl ethers) or chlorinated paraffins. (This exemption does not apply to control panel keys.) • Special plastic parts located close to heating and fuser elements. These parts must, however, not contain PBBs, PBDEs or chlorinated paraffins. • Large-sized plastic parts which are reused as can be proven and which are marked according to 3.1.1.2, Table 2, no. 9. They must not, however, contain PBBs, PBDEs or chlorinated paraffins. <p>Flame retardants used in plastic parts with a mass greater than 25 grams are to be confidentially reported to the RAL and identified by their CAS number. In addition, no substances are to be intentionally added as constituents to the plastics which meet at least one of the conditions set out in Table 5: Table 5: Conditions for the exclusion of substances from materials in casings and casing parts</p> <table border="1" data-bbox="470 1780 1257 2004"> <thead> <tr> <th>Hazard class</th> <th>Hazard category</th> <th>CLP-regulation (EC) No. 1272/2008</th> </tr> </thead> <tbody> <tr> <td>Carcinogenicity</td> <td>Carc. 1A, 1B</td> <td>H350 May cause cancer</td> </tr> <tr> <td>Carcinogenicity</td> <td>Carc. 1A, 1B</td> <td>H350i May cause cancer if inhaled</td> </tr> <tr> <td>Germ cell mutagenicity</td> <td>Muta. 1A, 1B</td> <td>H340 May cause genetic damage</td> </tr> </tbody> </table>	Hazard class	Hazard category	CLP-regulation (EC) No. 1272/2008	Carcinogenicity	Carc. 1A, 1B	H350 May cause cancer	Carcinogenicity	Carc. 1A, 1B	H350i May cause cancer if inhaled	Germ cell mutagenicity	Muta. 1A, 1B	H340 May cause genetic damage
Hazard class	Hazard category	CLP-regulation (EC) No. 1272/2008											
Carcinogenicity	Carc. 1A, 1B	H350 May cause cancer											
Carcinogenicity	Carc. 1A, 1B	H350i May cause cancer if inhaled											
Germ cell mutagenicity	Muta. 1A, 1B	H340 May cause genetic damage											

Criterion Number and Title	Criterion Text		
	Reproductive toxicity	Repr. 1A, 1B	H360 May damage fertility or the unborn child
	Substances of the so-called candidate list according to REACH Article 59. The version of the candidate list at the point of application applies. The requirements also apply to recycled material.		
3.2.2 Hazardous Substances in Printed Circuit Boards	The support material of printed circuit boards must not contain PBBs (polybrominated biphenyls), PBDEs (polybrominated diphenyl ethers) or chlorinated paraffins.		

EPEAT contains a criterion which requires that products contain less than 0.1% by weight of substances on the REACH Candidate List. As of May 2017, 49% of the 1832 imaging equipment models registered with EPEAT were shown to meet this requirement. The EPEAT scheme also includes a criterion on the identification of intentionally added chemicals residing in products. Under the EPEAT criterion manufacturers must declare if they have identified the presence, within their products, of the Joint Industry Guide 101 (JIG-101)⁶⁷ or IEC 62474⁶⁸ declarable substance lists in concentrations above the thresholds noted in the latest published revisions of those initiatives. It should be noted that the IEC 62474 list has formally replaced the JIG-101.

The Blue Angel RAL-UZ-205 specification also includes criteria which address substances on the REACH candidate list but also includes additional hazardous substances limitations. Substances restricted within the Blue Angel label include:

- Halogenated polymers and halogenated organic compounds for their use as flame retardants are not permitted (exemptions apply).
- Substances of the so-called candidate list according to REACH Article 59. The version of the candidate list at the point of application applies.
- Support material of printed circuit boards must not contain PBBs (polybrominated biphenyls), PBDEs (polybrominated diphenyl ethers) or chlorinated paraffins

Given the relevance of addressing hazardous substances in imaging equipment, and the fact that the issue is covered by other environmental initiatives, it was suggested **for the first proposal** to include in the revised GPP a hazardous substances content technical specification criteria to limit possible impacts from their release, particularly at the products' end-of-life. It is recognized that hazardous material criteria including "white lists" of acceptable substances would be preferable to criteria which restrict some substances. However, there is currently no widely acceptable list of substances that could be referenced in a "white list" approach. Future versions of the GPP criteria should investigate this approach further to understand if such lists of acceptable substances are widely available.

The current EU GPP criteria on computers and monitors include a selection criterion (SC1) which requires that suppliers have implemented a framework for the operation of Restricted Substance Controls (RSCs) along their supply chains. It was proposed that the revised EU GPP specification of imaging equipment also includes this as a selection criterion for comprehensive level at this first proposal. More information on how extended is the use of Restricted Substance Controls (RSCs) for IE industry would be needed in order to set a proposal at core level. Imaging equipment manufacturers are increasingly aware that they need to understand and control hazardous material content of products. This is witnessed by the registration of large numbers of products within schemes that include restrictions on hazardous material content.

⁶⁷ http://www.ipc.org/4.0_Knowledge/4.1_Standards/Free/JIG-101-Ed-4.0.pdf

⁶⁸ IEC 62474 - Material Declaration for Products of and for the Electrotechnical Industry

Manufacturers would need to develop a supply chain management system to effectively control hazardous material content of products. As such, it is assumed that most manufacturers that claim restrictions of hazardous materials in their products would be able to meet the proposed selection criterion.

In addition, it was suggested to include a technical specification (core and comprehensive) (TS11 “Substances of Very High Concern”) which excluded substances of very high concern present at a concentration of greater than 0.1% (by weight) in the whole product and in a number of defined sub-assemblies. Furthermore, a second technical specification (only comprehensive) (TS12 “Hazardous substances content”) reflected the more ambitious requirements laid out in the new Blue Angel (hazardous material content criteria).

There are unlikely to be any additional costs associated with compliance to the core criterion. Some additional costs may be associated with use of the comprehensive criterion given the potential lower number of complaint products on the market. Any additional costs associated with use of the comprehensive criterion will likely reduce over time as manufacturers ensure that their products are compliant with the new Blue Angel specification.

2.2.12.2 Background for the proposed verification

Manufacturers will be able to verify compliance with the criteria through submission of documentation showing that products have been tested to the appropriate test procedures, or equivalent, and meet the hazardous material content requirements (where relevant). This documentation could take the form of a manufacturer declaration or proven compliance to the Blue Angel RAL-UZ-205 specification (where relevant) or other type of ISO type I label fulfilling the respective requirements.

As of March 2018, 38% of the products registered in the EPEAT imaging equipment database met the EPEAT criterion on identification of hazardous substances within the IEC 62474 declarable substance list.

2.2.12.3 Further background after AHWG meeting

During consultation, several stakeholders commented on SC1 stating that the criterion was too ambitious, and should either be deleted or changed to an award criterion.

In addition, one stakeholder suggested referencing the ISO 1043 standards rather than IEC 62474.

However, no changes were introduced in the SC1 as a result of the consultation for the **second proposal**. The SC1 was kept as comprehensive technical specification criterion, which is designed to highlight best practices. With regard to the standards, the study team reviewed the indicated documents and identified some benefits of the IEC approach over referencing the ISO standard. The IEC 62474 - Material Declaration for Products of and for the Electrotechnical Industry and the associated database are regularly updated. In addition, the IEC standard appears to cover a wider range of substances than the ISO standard. As such, it does not seem appropriate to change the reference to the ISO standard.

Stakeholders also provided comments on TS11 “Substances of Very High Concern”, which focussed on requests to harmonize with Blue Angel as the current core criterion was seen as too ambitious. Against this, it has been decided to move the first proposed criterion to comprehensive and develop a new core criterion aligned with Blue Angel restrictions on REACH candidate list which only applies to casing and casing parts. This alteration ensured that procurers could choose a more ambitious criterion if desired but also allowed more products to meet the core criterion. One stakeholder pointed out that the candidate list is updated every 6 months. Therefore, the text in the second version of the criteria was clarified to reflect that compliance is requested at the moment of tendering. In addition, there is a dynamic link in the criteria to the SVHC candidate list, so there is no problem when the list is updated.

In the **final criteria proposal** a change has been introduced in TS11 Substances of Very High Concern based on stakeholder comments that the compliance should be ensured for the

latest version of the SVHC list available at one year prior to the manufacture date of the product in order to allow time for making design changes for compliance with the criteria. Requiring no intentionally added REACH Candidate List substances as of the tendering date is very difficult, since it is not possible to foresee substances added in the future between the manufacturing data and at the moment of tendering. In addition, the ambition level have been harmonised for core and comprehensive considering that the text on comprehensive was far more ambitious than existing Type I labels.

With regard to TS12 “Hazardous substances content”, two stakeholders stated that it was too ambitious. However, as the requirement is based on Blue Angel requirements, and there are large numbers of products registered with Blue Angel, potential impacts on product availability would likely be minimal.

2.2.13 Firmware Update Control

The existing GPP specification on imaging equipment does not tackle control of firmware updates. For the AHWG meeting a comprehensive criterion was proposed. The requirement has been revised after the meeting as follows:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
	<p>TS13 Firmware update control</p> <p>Any firmware update must not prevent the use of reused/remanufactured consumables. The imaging equipment must include functionality allowing firmware updates to be rolled back to previously installed versions. This functionality may be provided through a network connected computer or within the imaging equipment itself. Instructions detailing how firmware updates can be rolled back must be provided in the technical documentation. If the previous version of the firmware is made openly available on the internet, from the time it is first released, and users are provided clear instructions on where this can be located, then the objectives of the criterion are met. Alternatively, the tenderer must commit that if a software update prevents the use of reused/remanufactured consumables, a solution will be provided that permits the continuous use of reused/remanufactured consumables.</p> <p>Verification:</p> <p>The tenderer must provide documentation which identifies that the requirement has been met. Documentation may consist of a manufacturer’s declaration or other alternative means of documentation that provide the necessary information.</p>

2.2.13.1 Background for the proposed criteria

The possibility to control firmware would give the end-users control over any updates that interfered with the operation of their imaging equipment. This is an important consideration given that some manufacturer firmware updates sent to imaging equipment in use have resulted in the ability to no longer use remanufactured consumables.⁶⁹ Therefore, for the **first proposal**, it was suggested to include a criterion on firmware control to ensure that public authorities can maintain the option to use remanufactured consumables. The criterion was listed as comprehensive due to uncertainties surrounding market availability of this option. None of the main schemes used as background for the EU GPP criteria includes this kind of criterion; nevertheless it seems relevant in order to stimulate use of remanufactured consumables.

Any additional costs from facilitating user control of software updates would likely be minimal for manufacturers and have no negative costs implication for procuring authorities. Procuring authorities could see savings because of continued available use of remanufactured cartridges. It is currently unclear how many imaging equipment manufacturers support the rolling back of firmware updates. At least one imaging equipment manufacturer has provided users with the ability for some inkjet devices to remove the dynamic security feature that have limited the ability to use cartridges with non-OEM security chip.⁷⁰ This indicates that the possibility to remove software or specific features exist.

2.2.13.2 Background for the proposed verification

Tenderers must provide documentation (manufacturer declaration or other alternative means of documentation) which identifies that the users are afforded the ability to roll back firmware updates.

2.2.13.1 Further background after AHWG meeting

Stakeholders provided a range of comments with regard to this criterion. In particular, stakeholders expressed some concerns about security impacts and potential non-compliance with the General Data Protection Regulation (GDPR) ((EU) 2016/679). They asked for it to be deleted.

However no relevant changes with this regard was introduced in the criterion for the **second proposal**. The market availability of option on firmware control has not been well established and so it was included as a comprehensive rather than core criterion. The requirements of the General Data Protection Regulation ((EU) 2016/679); called later GDPR, became enforceable in May 2018. It is assumed that any software placed on imaging equipment is already compliant with the requirements of the mentioned regulation. The criterion does not require that users block firmware updates, but rather they have the ability to roll back firmware updates that may have caused for instance interoperability issues with remanufactured consumables. Manufacturers would retain the ability to notify product users of any potential conflicts with the GDPR Regulation arising as a result of downloading a previous version of firmware. That is, manufacturers will be able to ensure that their customers take on the responsibility for any GDPR Regulation compliance if they choose to revert to an older version of firmware. This would provide manufacturers with an exemption from any GDPR Regulation compliance issues.

Stakeholders also requested that if old versions of the firmware are available on the internet then this should be seen as a compliant action as not all imaging equipment has a rollback function. With this regard, additional text has been added. It was also clarified that the firmware

⁶⁹ Bit-tech, 2017, *HP re-releases third-party ink cartridge lock-out firmware*, available from <https://www.bit-tech.net/news/tech/peripherals/hp-re-releases-third-party-ink-cartridge-lock-out-firmware/1/>

⁷⁰ HP, 2017, *HP Inkjet Printers - Dynamic Security Feature Affecting Cartridges Using Non-HP Security Chip*, available from <https://support.hp.com/us-en/product/hp-officejet-pro-8610-e-all-in-one-printer-series/5367603/model/5367606/document/c05308850/>

needs to be made available from the time it is first released. This is to limit the chance that there is a delay in publishing the previous version of the firmware.

For the **final criteria proposal** based on a stakeholder comment, it has been added that any firmware update must not prevent the use reused/remanufactured consumables. The reason is that it is the main aim of the criterion. In addition, in the light of received comments the text has been modified to alternatively allow that tenderers provide a solution in case a software update prevents the use of reused/remanufactured.

2.2.14 Warranty and service agreements

The existing EU GPP criteria include a product longevity and warranty criterion. This requests repair and replacement warranty for a period of five years including availability of spare parts. For the first proposal criteria on warranty and service agreements were proposed. The criteria have been revised after the AHWG meeting as follows:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
<p><i>(This criterion is not relevant for contracts including maintenance)</i></p> <p>TS14 Warranty</p> <p>The tenderer must provide a minimum two-year warranty, free of additional costs, effective from delivery of the product. This warranty must cover repair or replacement. The warranty must ensure that the products are in conformity with the contract specifications at no additional cost. The warranty must not be invalidated as a result of reused/remanufactured consumables being used in imaging equipment unless it is proven that any malfunction or damage was directly caused by the use of a reused/remanufactured consumable.</p> <p>Verification:</p> <p>A copy of the warranty and service agreement must be provided by the tenderer. They must provide a declaration that they cover the conformity of the goods with the contract specifications.</p>	<p><i>(This criterion is not relevant for contracts including maintenance)</i></p> <p>TS14 Warranty and service agreements</p> <p>The tenderer must provide a minimum three-year warranty, free of additional costs, effective from delivery of the product. This warranty must cover repair or replacement and include a service agreement with options for pick-up and return or on-site repairs. The warranty must guarantee that the products are in conformity with the contract specifications at no additional cost. The warranty must not be invalidated as a result of reused/remanufactured consumables being used in imaging equipment unless it is proven that any malfunction or damage was directly caused by the use of a reused/remanufactured consumable.</p> <p>Verification:</p> <p>A copy of the warranty and service agreement must be provided by the tenderer. They must provide a declaration that they cover the conformity of the goods with the contract specifications.</p>
AWARD CRITERIA	
Core criteria	Comprehensive criteria
<p><i>(same for core and comprehensive)</i></p> <p>Option 1: AC2(a) Longer warranties</p> <p>Points will be awarded to each additional year of warranty offered that is more than the minimum technical specification. A maximum of x points [to be specified] may be awarded.</p> <ul style="list-style-type: none"> - +4 years or more: x points - +3 years: 0.75x points - +2 years: 0.5x points - +1 year: 0.25x points 	

<p>Verification: A copy of the warranty must be provided by the tenderer.</p>
<p>Option 2: AC2(b) The longest warranty Points will be awarded to the tenderer that provides the longest warranty of all the bidders. A maximum of x points [to be specified] may be awarded.</p> <p>Verification: A copy of the warranty must be provided by the tenderer.</p>

2.2.14.1 Background for the proposed criteria

Repair and maintenance are key aspects for assuring a product's longevity according to its predicted lifetime. If the product lifetime is reduced due to failure, more environmental impacts will arise from manufacturing of new products as a cause of replacement.

Warranty coverage needs to be in place for accessing free repair and maintenance of imaging equipment products. However, the existing legal guarantee scheme in the EU requires products to be covered for a period of 2 years⁷¹ including repair for consumer products.

According to authors' knowledge, there is no EU wide legislation which requires a minimum guarantee period for non-consumer products. Some Member States have specific legislation covering commercial warranties.⁷²

Still, even in consumer product guarantees, some particular aspects such as the use of non-OEM cartridges may prevent being able to benefit from the warranty terms, and it is thus important to ensure that the 2-years legal period includes using such cartridges. This will also incentivize the use of refilled and remanufactured cartridges, which according to evidence in the preliminary report² reduce the environmental impacts significantly as being one of the life cycle hotspots of imaging equipment products.

Placing requirements on extended product warranties is unlikely to result in any negative trade-offs with other impact areas. Conversely, the existence of warranties on products may encourage manufacturers to improve durability to reduce costs associated with product returns. Blue Angel, EPEAT and Nordic Swan include a criterion addressing early lifetime and warranties. The most important of these, from the perspective of informing the development of the EU GPP criteria can be found in the table below.

Table 24: Product lifetime criterion in other initiatives

environmental initiative	Criterion Text
EPEAT	4.4.1.1 Required—Early failure process: <i>Manufacturer must make available to the customer procedures as to how the manufacturer or its designee must troubleshoot, repair, or replace a product that fails prior to 3 years after date of sale for institutional products and 1 year after date of sale for consumer products. These procedures must be easily accessible to customers on the manufacturer's website or in the documentation that accompanies the product at the point of sale.</i>
Blue Angel ⁶	3.1.5.1 Information regarding supposed service life: <i>The distributor informs in the information and data sheet about the typical service life span or use intensity (e.g. in printed pages), which the device is designed for in its default configuration assuming typical user behaviour. The manufacturer must define the assumed typical use conditions in the information and data sheet.</i>

⁷¹ https://europa.eu/youreurope/citizens/consumers/shopping/guarantees-returns/index_en.htm

⁷² For instance the United Kingdom "The Sale of Goods Act"

EPEAT includes a requirement which states that manufacturers should provide information to customers regarding procedures for troubleshooting, repair, or replacement of product that fails prior to 3 years after date of sale for institutional products and 1 year after date of sale for consumer products. Blue Angel states that manufacturers must provide information about the typical service life span or use intensity (e.g. in printed pages), which the device is designed for in its default configuration assuming typical user behaviour. As such neither of the major initiatives require a defined warranty period.

Although it may be problematic to require a certain warranty period, especially for smaller devices for office use, though, there are some standard practices in terms of service provision and warranty, but these may be limited to certain types and/or sizes or to specific services. Only one of the imaging equipment manufacturers (Kyocera) provides a two-year warranty as standard (i.e. no fees involved), with most of the remaining manufacturers offering extended warranties (i.e. additional purchase required) meeting the two-year requirement. The need to purchase an extended warranty will increase upfront purchase costs for public bodies but the extended coverage could save costs in the long term due to product failures being covered. Considering the importance of warranty coverage for the provision of repair services, for the AHWG meeting discussions it was proposed to keep the existing EU GPP criterion in force with following modifications:

- The core criterion reduces the warranty period to two years to reflect current market practices.
- A new comprehensive criterion extends the required warranty period to three years and ensures that warranties cannot be automatically invalidated through usage of remanufactured consumables.
- In addition, award criterion was proposed, which rewards suppliers with longer standard warranty period.

2.2.14.2 Background for the proposed verification

Suppliers can prove compliance against this criterion through documentation which details the warranty period, and any associated conditions, for each model of imaging equipment included in their offer.

Most of the large imaging equipment manufacturers operating in the EU market provide warranties on their products. The extent of these warranties can vary in terms of both scope and duration. Below table illustrates the standard and enhanced warranty periods as advertised by the largest imaging equipment manufacturers on the EU market.

Table 25: Imaging equipment warranty periods

Imaging equipment manufacturer	Standard warranty duration (years)	Enhanced warranty duration (max) (years)
Brother	1	3
Canon	unclear	1
EPSON	1	3
HP	unclear	3
Konica Minolta	1	5
KYOCERA	2	5
Lexmark	1	5
OKI	1	3
RICOH	1	Unclear
SHARP	unclear	Unclear
TOSHIBA	unclear	Unclear
Xerox	1	Lifetime of product (where consumables purchased from Xerox)

2.2.14.3 Further background after AHWG meeting

A few comments were received with regard to this criterion after the AHWG meeting. The wording of the criteria has been revised and clarified accordingly. Core criterion refers only to warranties while the comprehensive one covers further service agreements.

After the written consultation in the **final criteria proposal**, it has been added to the core criteria that warranties cannot be automatically invalidated through usage of remanufactured consumables unless it is proven that any malfunction or damage was directly caused by the use of the remanufactured consumable. This is common rule used for other products like cars and it is the reason why it is included also for the core criteria.

2.2.15 End-of-life management services

The existing EU GPP specification on imaging equipment does not place requirements on service providers to guarantee the provision of a take back system for used imaging equipment.

Final criteria proposal	
Core criteria	Comprehensive criteria
AWARD CRITERIA	
<p>AC3 Take-back system for imaging equipment <i>(This criterion should be used in conjunction with contract performance clause CPC2)</i></p> <p>Points must be awarded to a tenderer who offers a take-back system for used imaging equipment, at no cost to the procuring authority, with the aim of channelling such equipment for reuse of the equipment or its parts, or for material recycling, with preference given to reuse.</p> <p>The tenderer may fulfil these obligations themselves or via a suitable third-party organisation.</p> <p>Verification:</p>	<p>AC3 End-of-life management of imaging equipment <i>This criterion should be used in conjunction with contract performance clause CPC2)</i></p> <p>Points must be awarded to a tenderer who provides a re-use and recycling service for the whole product and/or ensures the selective treatment of components in accordance with Annex VII of the WEEE Directive for equipment that has reached the end of its service life at no cost to the procuring authority.</p> <p>The service must comprise the following activities: - collection;</p>

<p>The tenderer must provide documentation which states that a free take-back system will be provided. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>	<ul style="list-style-type: none"> - confidential handling and secure data erasure (unless carried out in-house); - functional testing, servicing, repair and upgrading to prepare products for re-use[1]; - the remarketing of products for re-use; - dismantling for component re-use, recycling and/or disposal. <p>In providing the service, they must report on the proportion of equipment prepared or remarketed for re-use and the proportion of equipment prepared for recycling.</p> <p>Preparation for re-use, recycling and disposal operations must be carried out in full compliance with the requirements in Article 8 and Annexes VII [2] and VIII of (recast) WEEE Directive 2012/19/EU and with reference to the list of components for selective treatment [see accompanying explanatory note].</p> <p>The tenderer may fulfil these obligations themselves or via a suitable third-party organisation.</p> <p>If the service is provided outside EU, where the WEEE Directive is not applicable, the treatment of waste components shall take place in conditions that are equivalent to the requirements of this Directive [3].</p> <p>Verification:</p> <p>The tenderer must provide details of the arrangements for collection, data security, preparation for re-use, remarketing for re-use and recycling/disposal. This must include, during the contract, valid proof of compliance for the WEEE handling facilities to be used.</p> <p>Equipment holding a relevant Type I Eco-label that fulfils the specified requirements will be deemed to comply.</p> <p>The following compliance schemes are considered, at the time of writing, to meet these requirements: WEEELABEX:2011 requirement on 'Treatment of WEEE'; 'Responsible Recycling' (R2:2013) standard for electronics recyclers; eStewards standard 2.0 for Responsible Recycling and Reuse of Electronic Equipment; Australian/New Zealand standard AS/NZS 5377:2013 on 'Collection, storage, transport and treatment of end-of-life electrical and electronic equipment'</p>
	<p>Explanatory note: AC3 End-of-life management of imaging equipment</p> <p><i>[1] Some Member States have developed standards and/or schemes that public authorities may wish to refer to in order to</i></p>

	<p><i>provide greater detail on how equipment will be made suitable for reuse and resale.</i></p> <p><i>[2]Components requiring selective treatment in accordance with Annex VII of the WEEE Directive:</i></p> <ul style="list-style-type: none"> • <i>Mercury containing components</i> • <i>Batteries</i> • <i>Printed circuit boards greater than 10 cm²</i> • <i>Plastic containing brominated flame retardants</i> • <i>Chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons (HFC), hydrocarbons (HC)</i> • <i>External electric cables</i> • <i>Polychlorinated biphenyls (PCB) containing capacitors</i> • <i>Components containing refractory ceramic fibres</i> • <i>Electrolyte capacitors containing substances of concern</i> • <i>Equipment containing gases that are ozone depleting or have a global warming potential (GWP) above 15</i> • <i>Ozone-depleting gases must be treated in accordance with Regulation (EC) No 1005/2009.</i> <p><i>[3] At the time of writing this Staff Working Document the Commission is planning to adopt a delegated act to lay down the criteria for the assessment of equivalent conditions.</i></p>
--	--

CONTRACT PERFORMANCE CLAUSES	
Core criteria	Comprehensive criteria
<p>CPC2 Reporting on reuse/recycling activities of imaging equipment <i>(same for core and comprehensive)</i> <i>This criterion should be used in conjunction with award criterion 3.</i> The contractor must provide records regarding the end of life of used imaging equipment. In particular the recording must detail:</p> <ul style="list-style-type: none"> - number of equipment taken back from the procuring authority, - number of equipment/parts, as appropriate, channelled for reuse, - number of equipment/parts, as appropriate, channelled for material recycling. 	

2.2.15.1 Background for the proposed criteria

As electronic products, imaging equipment falls within the scope of the Waste Electrical and Electronic Equipment (WEEE) 2012/19/EU Directive.⁷³ The WEEE Directive regulates the

⁷³ European Commission, Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE), available from <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012L0019>

separate collection, treatment and recycling of end-of-life electrical and electronic equipment, which includes imaging equipment within category 3 “IT and telecommunications equipment”⁷⁴. It sets collection, recycling and recovery targets for all types of electrical goods, which EU member states are obligated to achieve. It requires that 85% of imaging equipment is recovered and 80% is prepared for re-use and recycling. For small equipment with no external dimension more than 50 cm the targets 75% for recovery and 55% for recycling⁷⁵.

The provision of a take-back scheme could contribute to improvement of environmental impacts associated with manufacture of new equipment due to better channelling of used products for reuse of parts or entire equipment after repair or refurbishment, if necessary, or for remanufacturing.

As this is not certain that such take-back practices are well developed in the procurement, for the first proposal it was suggested to set this criterion as a comprehensive award one in order to promote such practices but not to be too demanding. In addition, a contract performance clause to monitor the criterion was suggested.

2.2.15.2 Background for the proposed verification

As a proof of verification, the tenderer should provide documentation which confirms that such a free for procurers take back system will be provided by the tenderer or a third party sub-contracted by them. Documentation may consist of a manufacturer declaration, proof of compliance to an appropriate environmental scheme which includes the same requirement or other alternative means of proof that provide the necessary information.

2.2.15.3 Further background after AHWG meeting

Stakeholders’ comments on “take-back system for imaging equipment” centred on the fact that imaging equipment is already covered by the WEEE directive and so claimed that the criterion is superfluous. Other stakeholders suggested that the criterion should be separated into high-end and low-end equipment. These suggestions have been rejected as the criterion is an award criterion and so does not need to be met by all suppliers. In addition, the criterion aims to promote suppliers that extend their product end of life responsibilities.

One stakeholder raised a concern about the term “free” used in the criterion as it was not defined. Some clarifications have been added in the text.

Another stakeholder raised concerns about the provision of take back systems not being enough to optimise end of life practices. Considering this comment, it was decided to keep the criterion on take-back system provision on the core level and to propose a more ambitious comprehensive criterion, which goes beyond the provision of a take-back system and covers additionally provision of re-use and recycling services. This proposal is aligned with the criterion included in the EU GPP criteria for Computers and Monitors⁵⁸.

Minor changes have been introduced in the **final criteria proposal** in order to recognise that end of life activities can be performed by operators from third countries. In the case where the WEEE Directive is not applicable, the treatment of waste components shall take place in conditions that are equivalent to the requirements of this Directive. At the time of writing this criteria the Commission is planning to adopt a delegated act to lay down the criteria for the

⁷⁴ According to the old categorisation in the WEEE Directive. From August 2018 new categories are set out in Annex III. According to this classification, imaging equipment can be classified either under category 4 “Large equipment” or under category 5 “Small equipment” depending on the size of the imaging equipment (larger or smaller than 50 cm)

⁷⁵ Summary document of the Waste electrical and electronic equipment rates and targets, available for download at: <https://ec.europa.eu/eurostat/documents/342366/351758/Target-Rates-WEEE/b92a549c-7230-47ba-8525-b4eec7c78979>.

assessment of equivalent conditions. In order to facilitate the assessment and verification for the award criterion (AC3), a number of compliance schemes has been included in the final text.

2.2.16 Supply of paper and imaging equipment consumables

The goal of these criteria is to promote the use of environmental preferable paper and imaging equipment consumables, when those are supplied together with imaging equipment. Criteria for supply of paper and consumables are already established in the EU Green Public Procurement criteria for Copying and graphic paper^{Error! Bookmark not defined.} and in the current GPP criteria proposal for Imaging Equipment consumables (Criteria area 2). Therefore, the below criteria under criteria area 1 (imaging equipment products) make reference to the GPP for paper and to the current GPP criteria area 2.

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATION	
<p><i>(when copy and graphic paper supply is included in the imaging equipment supply contract)</i></p> <p>TS15 (a) Supply of copy and graphic paper meeting the EU GPP criteria</p> <p>Copy and graphic paper offered by the tenderer as part of the provision of imaging equipment must comply with the core technical specifications of the EU green public procurement criteria for copying and graphic paper⁷⁶.</p> <p>Verification:</p> <p>The tenderer must provide supporting documentation that the products to be supplied meet the criteria specified above.</p>	<p><i>(when copy and graphic paper supply is included in the imaging equipment supply contract)</i></p> <p>TS15 (a) Supply of copy and graphic paper meeting the EU GPP criteria</p> <p>Copy and graphic paper offered by the tenderer as part of the provision of imaging equipment must comply with the comprehensive technical specifications of the EU green public procurement criteria for copying and graphic paper⁷⁶.</p> <p>Verification:</p> <p>The tenderer must provide supporting documentation that the products to be supplied meet the criteria specified above.</p>
<p><i>(when imaging equipment consumables supply is included in the imaging equipment supply contract)</i></p> <p>TS15 (b) Supply of consumables meeting the EU GPP criteria</p> <p>Consumables offered by the tenderer as part of the provision of imaging equipment must comply with the core technical specifications included in EU GPP criteria area 2 imaging equipment consumables.</p> <p>Verification:</p> <p>The tenderer must provide supporting documentation that the products to be supplied meet the criteria specified above.</p>	<p><i>(when imaging equipment consumables supply is included in the imaging equipment supply contract)</i></p> <p>TS15 (b) Supply of consumables meeting the EU GPP criteria</p> <p>Consumables offered by the tenderer as part of the provision of imaging equipment must comply with the core technical specifications included in EU GPP criteria area 2 imaging equipment consumables.</p> <p>Verification:</p> <p>The tenderer must provide supporting documentation that the products to be supplied meet the criteria specified above.</p>
AWARD CRITERIA	
Core criteria	Comprehensive criteria

⁷⁶ Available at: http://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

AC4 Supply of remanufactured cartridges/containers

(same for core and comprehensive)

(when the supply of cartridges and containers is included in the imaging equipment supply contract)

Points must be awarded in proportion to the commitment to provide the highest percentage (share) of remanufactured cartridges/containers which comply with the core technical specifications included in EU GPP criteria area 2 imaging equipment consumables.

Verification:

The tenderer must provide supporting documentation that the products to be supplied meet the criteria specified above.

CONTRACT PERFORMANCE CLAUSES**Core criteria**

(when cartridges or copy and graphic paper supply is included in the imaging equipment supply contract)

CPC3 Reporting on supplied consumables

The contractor must provide records on the provision of consumables specified in TS Supply of consumables, as appropriate, for:

- copy and graphic paper meeting the EU GPP criteria (TS15 (a)),
- consumables meeting the EU GPP criteria (TS15 (b)),
- remanufactured cartridges and containers (AC5).

Comprehensive criteria

(when cartridges or copy and graphic paper supply is included in the imaging equipment supply contract)

CPC3 Reporting on supplied consumables

The contractor must provide records on the provision of consumables specified in TS Supply of consumables, as appropriate, for:

- copy and graphic paper meeting the EU GPP criteria (TS15 (a)),
- consumables meeting the EU GPP criteria (TS15(b)),
- remanufactured cartridges and containers (AC5),
- number of pages printed by remanufactured cartridges/containers that comply with EU GPP criteria area 2.

2.3 Criteria area 2 – Imaging Equipment consumables

Criteria under this section can be used when purchasing imaging equipment consumables (see scope in chapter 1.3.1.2).

2.3.1 Cartridges/containers page-yield

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
TS16 Cartridges/containers page-yield declaration <i>(same for core and comprehensive)</i> The expected page-yield must be declared for all cartridges/containers that will be supplied for use in the relevant imaging equipment. Verification: The tenderer must provide documentation which identifies page-yields and associated test procedures used to derive the values. Measurement of page-yield for inkjet and toner consumables should be carried out in accordance with the latest version of the following standards: <ul style="list-style-type: none">– ISO/IEC 24711,– ISO/IEC 19752,– ISO/IEC 19798,– DIN 33870-1,– DIN 33870-2. or through other reliable, accurate and reproducible methods, which take into account the generally recognised state of the art. Documentation may consist of a manufacturer declaration or other alternative means of documentation that provide the necessary information. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.	
Explanatory note: TS16 Cartridges/containers page-yield <i>Page-yield: Measured number of images that may be produced by the cartridge/container.</i>	

2.3.1.1 Background for the proposed criteria

Impacts related to the use of cartridges are among them imaging equipment three life cycle environmental hotspots identified in the preliminary analysis⁷⁷. Depending on the printing technology, the relative contribution of life cycle environmental impacts from the use of cartridges becomes the second most important after the use of paper. When paper use is excluded from the system boundaries, the embodied impacts from the cartridges (i.e. from manufacturing) can become at least as important as the energy consumption during use, in terms of Global Warming Potential, Primary Energy Demand, Ozone Depletion, Acidification Potential, Eutrophication Potential, Resource Depletion Potential, amongst others.

By requiring tenderers to report page-yield (i.e. the measured number of images that may be produced by the cartridge/container), it is expected that a level playing field is created, which can incentivise longer yields maintaining same printing quality (including refilled and remanufactured cartridges). The latter is of special importance, as the evidence shows printing quality is very important for use of paper (see preliminary report²). By doing this, impacts from new cartridge manufacturing will be avoided.

Page-yield information is important for procuring authorities as it can help identify costs per printed page. Cartridges/containers with higher page-yields tend to have lower costs per printed page. As such, providing procurers with indications of how many pages may be printed with each cartridge/container will assist in printed page cost calculations.

⁷⁷ For more details see Preliminary report at the project website: <http://susproc.jrc.ec.europa.eu/imaging-equipment/>.

Reporting measured cartridge yield is only found in the EU Voluntary Agreement version 5.2 (see Table 26).

Table 26: EU Voluntary Agreement version 5.2 Consumable Yield Criterion

Criterion Number and Title	Criterion Text
6.6.2	Signatories must make information on inkjet and toner cartridge yield available to Customers based on the measurement standards specified, for example, in ISO/IEC 24711:2006 (for ink), ISO/IEC 19752:2004 (for monochrome toner), ISO/IEC 19798:2006 (for colour toner), and through other company methods.

In spite of being an important parameter affecting the life cycle environmental impacts of imaging equipment products as identified in the preliminary report (task 3)², this is not a common metric to report for compliance with environmental schemes. However, this is a common metric to benchmark cartridges and due to its influence on their overall environmental impacts (i.e. the lower yield, the more cartridges to buy), this issue is considered important. However, it is essential that the test methods applied to measure the yield are declared and that evidence is provided on how the yield was derived. Measurement standards already exist^{78,79}.

- ISO/IEC 24711 Method for the determination of ink cartridge yield for colour inkjet printers and multi-function devices that contain printer components;
- ISO/IEC 19798 Method for the determination of toner cartridge yield for colour printers and multi-function devices that contain printer components.

For the **first proposal** it was suggested to introduce a core and a comprehensive technical specification requiring provision of cartridge/container yield data. In addition an award criterion titled extended page-yield was proposed. The text of the award criterion included a formula which was developed as part of this revision project to promote improved material efficiency in consumables (i.e.; higher page-yield for procurers with high printout needs) comparing cartridges provided by different tenderers.

2.3.1.2 Background for the proposed verification

The “page-yield” of a cartridge, identifies the number of printed pages that are likely to be produced before a consumable reaches its end of life. The verification of the proposed page-yield criterion is relatively straightforward given the existence of the ISO and DIN standards. It is normally measured according to:

- ISO/IEC 24711 - Method for the determination of ink cartridge yield for colour inkjet printers and multi-function devices that contain printer components
- ISO/IEC 19752 - Information technology -- Office equipment -- Method for the determination of toner cartridge yield for monochromatic electrophotographic printers and multi-function devices that contain printer components
- ISO/IEC 19798 - Information technology -- Office equipment -- Method for the determination of toner cartridge yield for colour printers and multi-function devices that contain printer components

The ISO standards provide a common printed output so that comparisons of page-yields across different cartridges and containers can be made. The ISO series of standards identify page-

⁷⁸ ISO/IEC 24711:2007 Method for the determination of ink cartridge yield for colour inkjet printers and multi-function devices that contain printer components, available at: <https://www.iso.org/standard/50016.html>

⁷⁹ ISO/IEC 19798:2007 Method for the determination of toner cartridge yield for colour printers and multi-function devices that contain printer components; available at: <https://www.iso.org/standard/50015.html>

yields under specific test conditions and actual page-yields witnessed by users may differ. The difference between measured page-yields, according to one of the ISO standards, and actual page-yield differ depending on a variety of factors including:

- Page coverage – the percentage of paper that is covered by ink or toner
- Colour use – greater use of one colour over another can result in decreased yields
- Cartridge failure – the premature end of life of a cartridge/container
- Humidity – the humidity of the air in the immediate vicinity of the imaging equipment
- Print frequency – infrequent use of ink cartridges often results in the use of some ink to keep print nozzles clear

The following list of DIN series of standards which cover remanufactured cartridges/containers also cover page-yields, reflecting the requirements in the ISO series of standards:

- DIN 33870-1 - Office machines - Requirements and tests for the preparation of refilled toner modules for electrophotographical printers, copiers and facsimile machines - Part 1: Monochrome⁸⁰
- DIN 33870-2 - Office machines - Requirements and tests for the preparation of refilled toner modules for electrophotographical printer, copiers and facsimile machines- Part 2: 4-Colour-printers⁸¹

Suppliers offering alternative means of verification would need to demonstrate how the alternative method produced comparable results to the more established page-yield test standards.

As the EU Voluntary Agreement version 5.2 on imaging equipment includes information reporting requirements on cartridge yield^{82,83}, most large OEMs therefore already communicate page-yield data for their cartridges and containers and so an EU GPP criterion on this issue will not add any extra costs to these large OEMs. Smaller cartridge/container remanufacturers may encounter some additional costs as a result of the proposed EU GPP criterion on cartridge/container page-yield. The expected impact of these costs is likely to be small. ETIRA members⁸⁴ test their cartridges using either the ISO or DIN standards.⁸⁵

2.3.1.1 Further background after AHWG meeting

Stakeholder comments with regard to technical specifications centred on the fact that the ISO standards should be better referenced. The respective references were included in the text for the **second version** of the criteria. In addition, it was decided to remove the initially proposed award criterion on extended page-yield mainly due to difficulty in verification as the criterion required comparing cartridges provided by different tenderers. In addition, resource efficiency is considered to be already comprehensively addressed by other criteria.

The final proposal remains unchanged. No changes have been introduced as a result of the final written consultation.

2.3.2 Consumable mass resource efficiency

A criterion on consumable mass resource efficiency does not exist in the currently valid EU GPP criteria. Based on the preliminary analysis it was however considered justified to set requirements in this area. The proposed formulation is as follows:

⁸⁰ <https://www.din.de/en/getting-involved/standards-committees/nia/standards/wdc-beuth:din21:181049829>

⁸¹ <https://www.din.de/en/getting-involved/standards-committees/nia/standards/wdc-beuth:din21:193881977>

⁸² EUROVAPRINT, Members, available at <http://www.eurovaprint.eu/pages/members/>

⁸³ Page 14, Industry Voluntary Agreement to improve the environmental performance of imaging equipment placed on the European market, VA v.5.2 April 2015, available from http://www.eurovaprint.eu/fileadmin/eurovaprint_files/pdfs/VA_version_5.2_April.pdf

⁸⁴ ETIRA – the European Toner and Inkjet Remanufacturers Association, <http://www.etira.org/>

⁸⁵ <http://www.etira.org/cartridge-remanufacturing/quality-first/>

Final criteria proposal							
Core criteria	Comprehensive criteria						
TECHNICAL SPECIFICATIONS							
	<p>TS17 Consumable mass resource efficiency</p> <p>The consumable mass resource efficiency [measured number of images that may be produced by a consumable per gram of the consumable material], calculated according to equation (1) must not be lower than the threshold indicated in the table below:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="background-color: #D3D3D3;">Consumable type</th> <th>Minimum consumable mass resource efficiency</th> </tr> </thead> <tbody> <tr> <td>Toner cartridge or container & drum</td> <td>$(2 \times [10 \times \tanh(0.1 + 0.0003 \times (C_{\text{Mass}} - 10)) - 0.5] + 1)$</td> </tr> <tr> <td>Ink cartridge or container</td> <td>$(2 \times [15 \times \tanh(0.2 + 0.0004 \times (C_{\text{Mass}} - 8)) - 1] + 2)$</td> </tr> </tbody> </table> <p>Tanh = hyperbolic tangent</p> $\text{Consumable mass resource efficiency} = \frac{\text{Page Yield}}{C_{\text{MASS}}} \quad (1)$ <p>Where:</p> <ul style="list-style-type: none"> • Page-yield is the measured number of images that may be produced by the consumable. • Consumable mass (C_{Mass}) is the mass (g) of each cartridge or container (plus drum unit, if applicable), as measured in their to-be-installed condition (i.e. full of ink or toner). <p>Verification:</p> <p>The tenderer must provide the result of the consumable mass resource efficiency calculation together with documentation which identifies all page-yields, associated test procedures used to derive the values, and the mass of all cartridges, containers and drum units designed for use in each imaging equipment model. Documentation may consist of a manufacturer's declaration or other alternative means of documentation that provide the necessary information.</p>	Consumable type	Minimum consumable mass resource efficiency	Toner cartridge or container & drum	$(2 \times [10 \times \tanh(0.1 + 0.0003 \times (C_{\text{Mass}} - 10)) - 0.5] + 1)$	Ink cartridge or container	$(2 \times [15 \times \tanh(0.2 + 0.0004 \times (C_{\text{Mass}} - 8)) - 1] + 2)$
Consumable type	Minimum consumable mass resource efficiency						
Toner cartridge or container & drum	$(2 \times [10 \times \tanh(0.1 + 0.0003 \times (C_{\text{Mass}} - 10)) - 0.5] + 1)$						
Ink cartridge or container	$(2 \times [15 \times \tanh(0.2 + 0.0004 \times (C_{\text{Mass}} - 8)) - 1] + 2)$						
AWARD CRITERIA							
	<p>AC5 Electrophotographic consumables mass resource efficiency</p> <p><i>(same for core and comprehensive)</i></p> <p>Points must be awarded for electrophotographic consumables (cartridges, containers and drum units) that minimise material use per page-yielded. A maximum of x points [to be specified] may be awarded to the tenderer which offers the highest overall consumable resource efficiency value across all electrophotographic consumables for each model of imaging equipment. The resource efficiency should be calculated in accordance with the equation given in TS17. The results for each consumable should be summed to arrive at a total value. When different consumables are purchased, the value should be an average value across all products to be supplied.</p> <p>Verification:</p> <p>The tenderer must provide the result of the calculation of the consumable mass resource efficiency together with documentation which identifies the following for all cartridges/containers and any separate drum units used in relevant electrophotographic imaging equipment:</p>						

- page-yields
- mass of full cartridges/containers
- mass of separate drum units.

Documentation may consist of a manufacturer’s declaration or other alternative means of proof that provides the necessary information.

2.3.2.1 Background for the proposed criteria

The amount of material used in consumables results in lifecycle impacts from extraction to disposal. The extent of these lifecycle impacts will depend on the exact material composition of the consumable (i.e. what materials are included) and the total volume of materials used.

Consumable mass resource efficiency

There is significant variation in the amount of material used within consumables that provide the same or similar functionality. Plastics account for most of the materials used in most consumables and so any reduction in weight will reduce the amount of plastics used.

The Nordic Swan Version 6.3 includes a requirement that consumables (including packaging) must meet defined material efficiency requirements. The Nordic Swan criterion states that all consumables that the end user can change by themselves shall be listed with gross weight (kg) including packaging and number of pages according to ISO/IEC 19752 and ISO/IEC19798. The mass of the consumable plus packaging is then divided by the page-yield (according to the ISO standards) and must meet the ratio requirements. The requirements can be seen in Table 27.

Table 27: Nordic Swan version 6.3 consumable efficiency requirements ⁸⁶

Images Per Minute (IPM)	Monochrome application (Kg/1000 pages according to ISO/IEC 19752)	Colour application (Kg/1000 pages according to ISO/IEC19798)
IPM > 19	≤ 0,65	≤ 2
IPM ≤ 19	≤ 1	≤ 3

There are no known criteria within any other established environmental schemes which address consumable mass resource efficiencies.

Due to a lack of data, it was not possible to assess the level of ambition associated with the Nordic Swan criterion. As such, further investigations were made as part of this EU GPP project into consumable material efficiency based on a dataset with 571 products resulting in the criteria formulas proposed.

Whilst many manufacturers publish the packaged weight of cartridges/containers there is little data available for cartridges/containers as separate products. Manufacturers could collate cartridge/container weight data from either production or end of life processes. As such, market availability of cartridge/container weight data could become readily available if disclosure was promoted via the EU GPP criteria.

For the **first revision** it was suggested to include a criterion on consumable mass resource efficiency. To facilitate the development of the requirement, consumable weight data was secured from an EU based remanufacturer.⁸⁷ Yield data was compared to full weight data (i.e. full levels of ink or toner) for each consumable in the dataset. To aid the analysis the consumables were grouped into five main types:

- Toner container

⁸⁶ Nordic Ecolabelling of Imaging equipment Version 6.3 □ 20 June 2013 – 31 December 2019

⁸⁷ Embatex Iberia S.L, personal communications.

- Toner drum units
- Toner cartridges
- Ink containers
- Ink cartridges

Each of the five main types of consumables was further subdivided into mono/black and colour. Two formulae were developed which ensured that approximately half of the consumables (of each type) met the efficiency requirements.

The figures below show the results of the analysis as well as the proposed criterion limit line. Consumables above the red line would be compliant with the criterion limit, with those below the line not meeting the requirement.

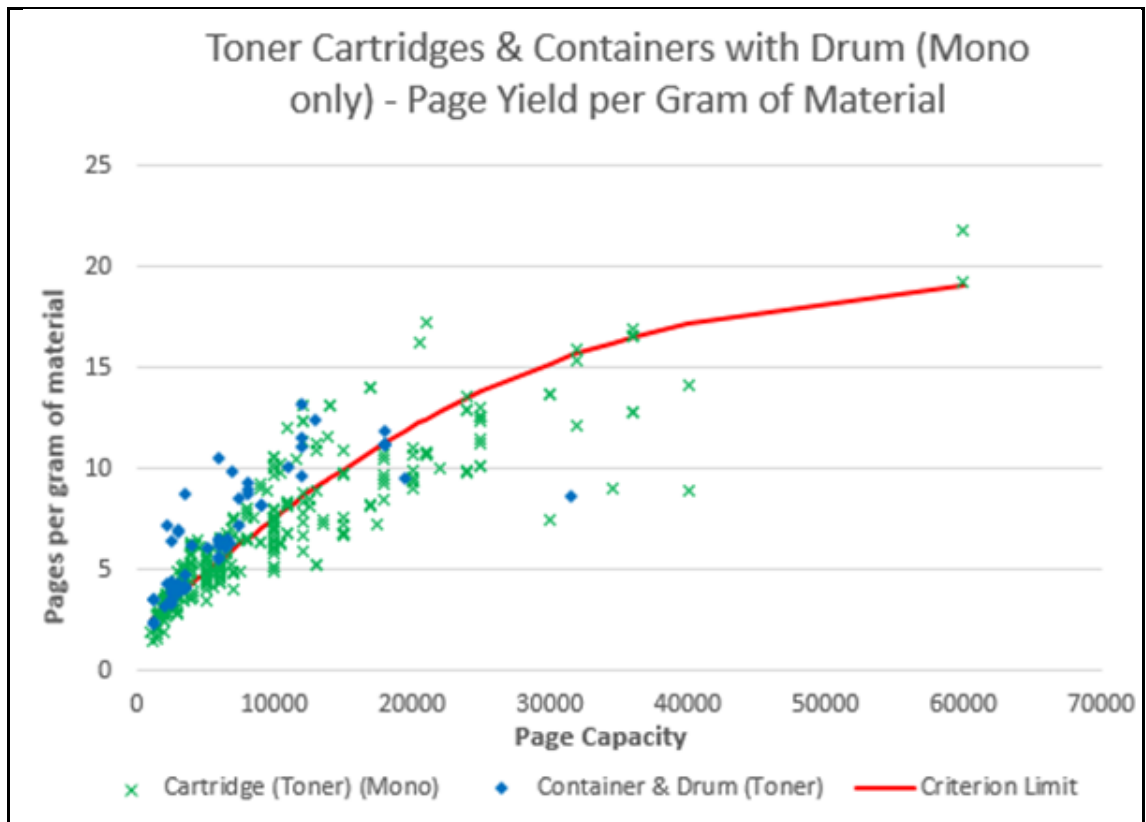


Figure 7: Mass resource efficiency of mono toner cartridges and containers with associated drum units

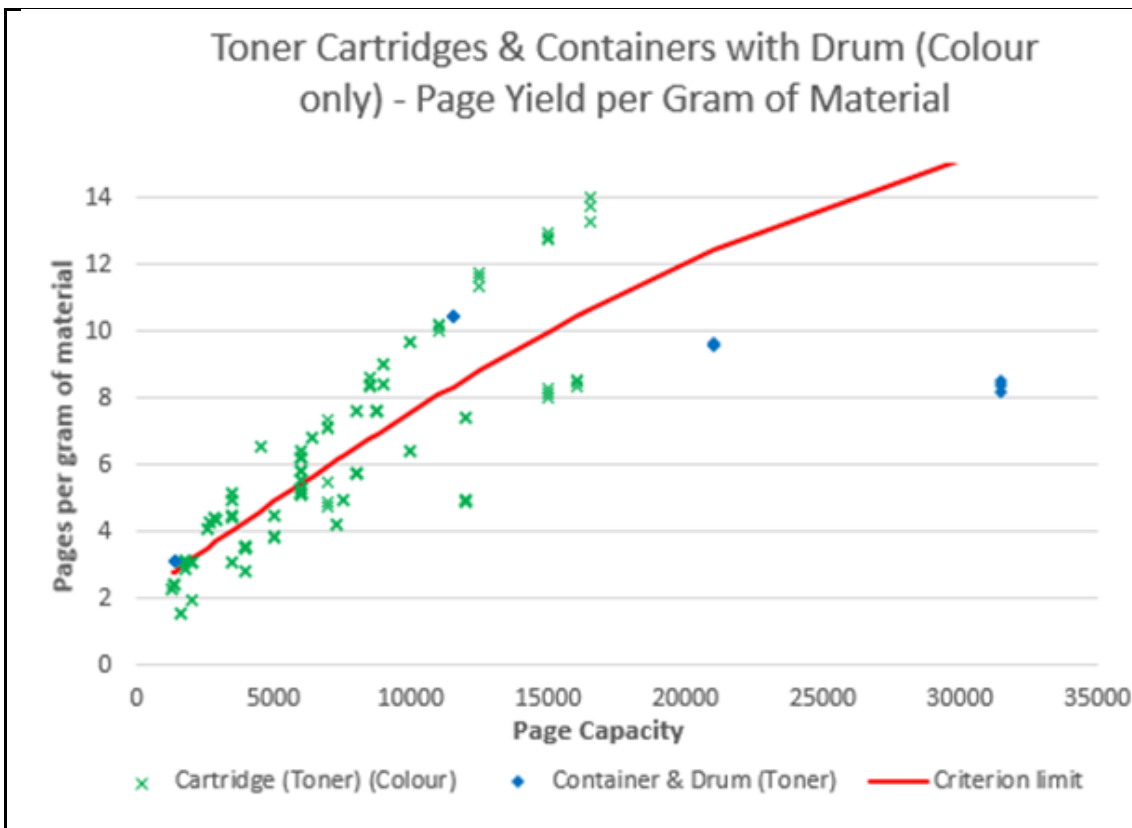


Figure 8: Mass resource efficiency of colour toner cartridges and containers with associated drum units

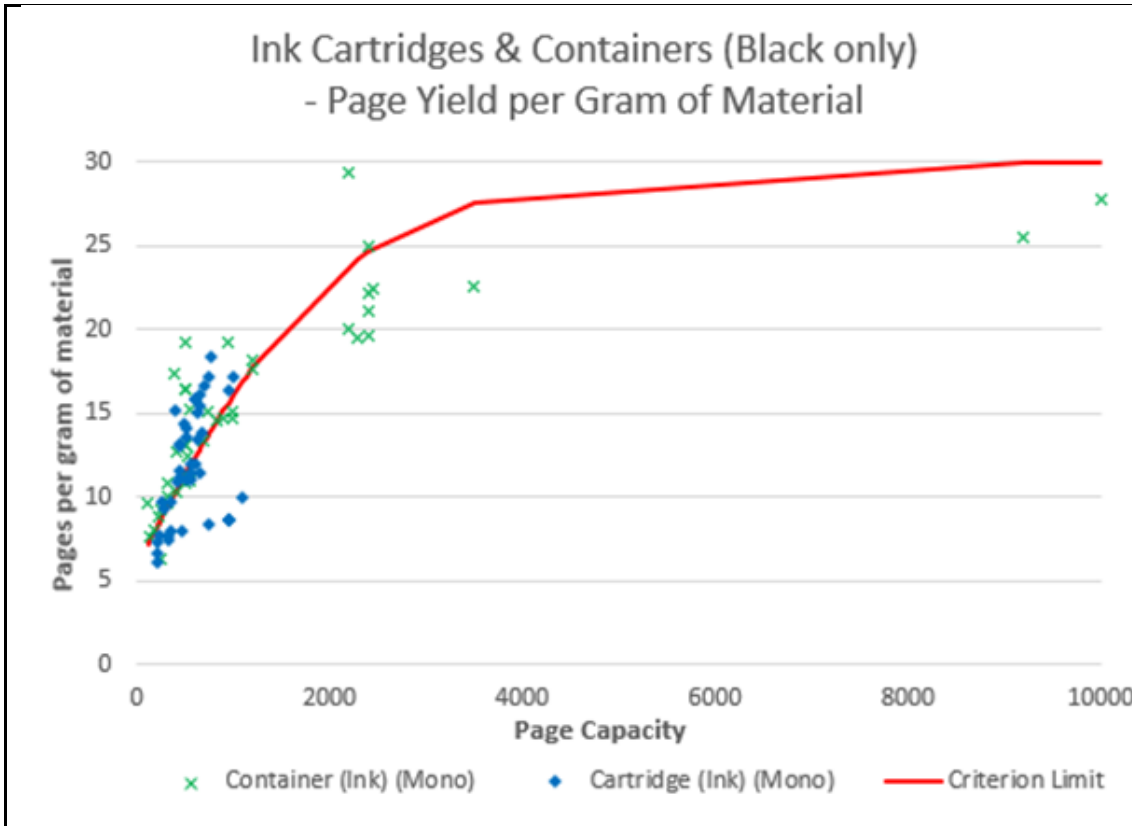


Figure 9: Mass resource efficiency of colour ink cartridges and containers (all)

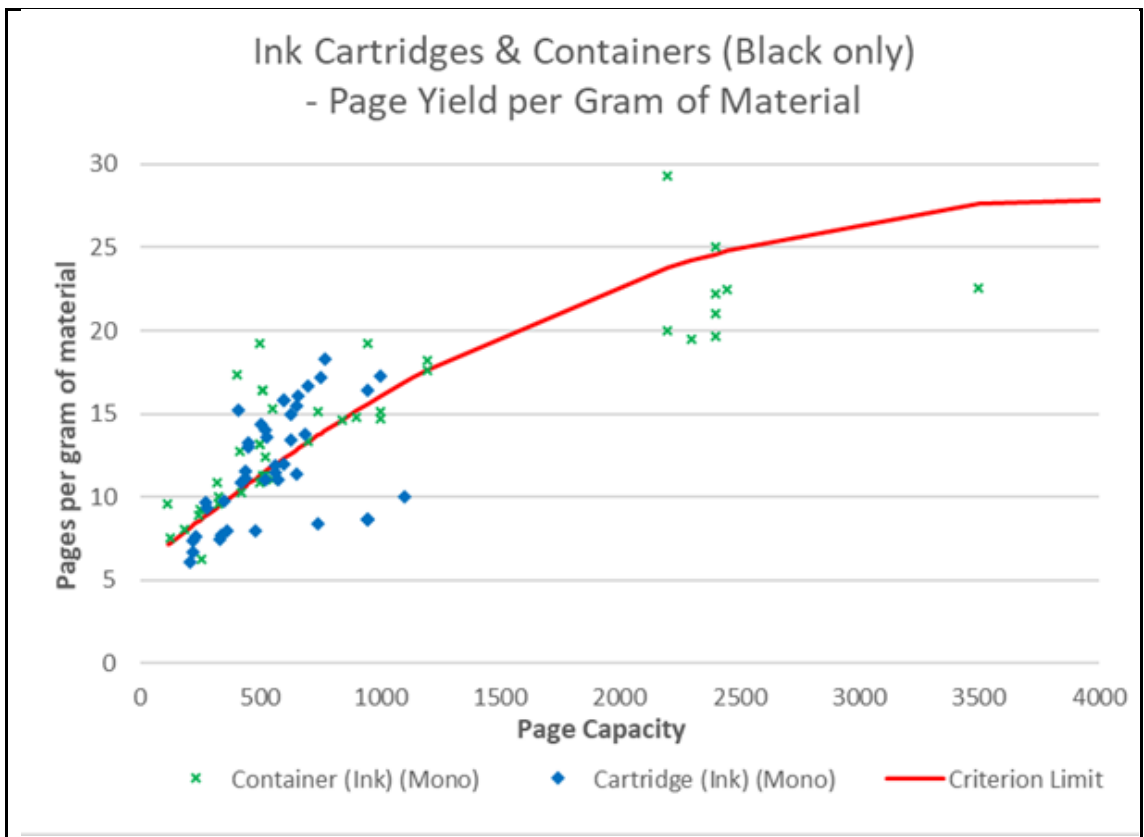


Figure 10: Mass resource efficiency of black ink cartridges and containers (below 10,000 page-yield)

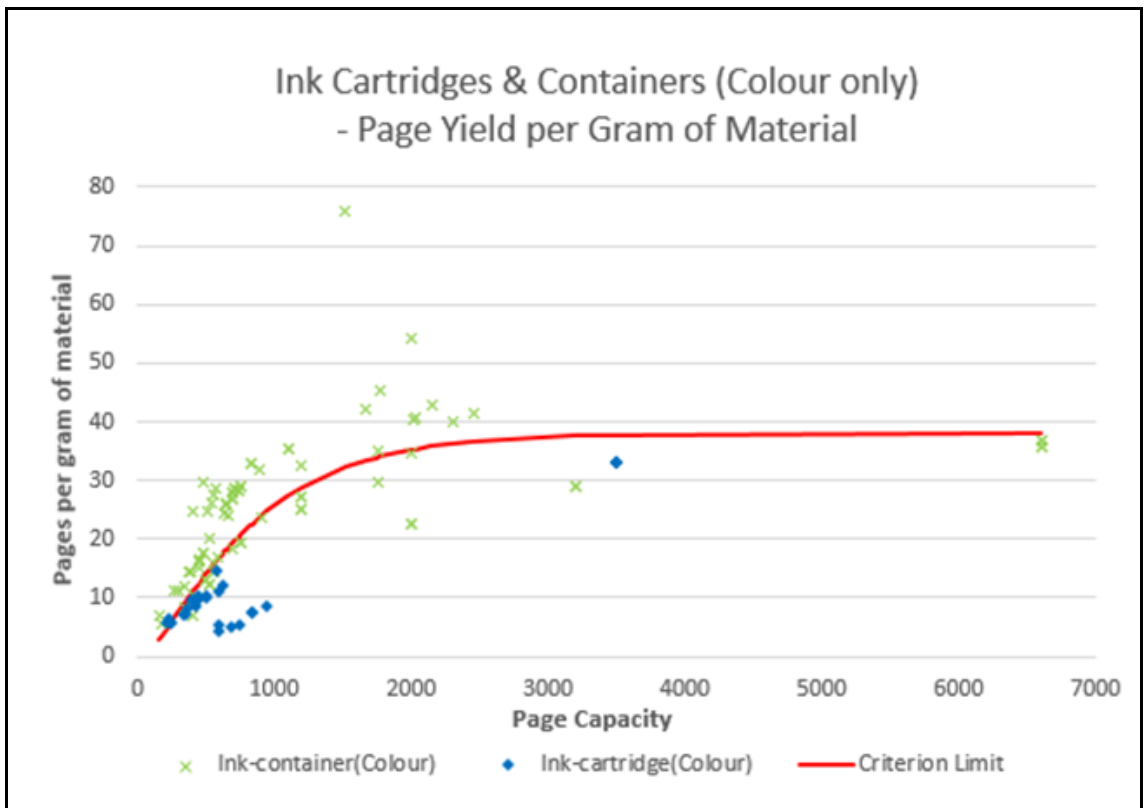


Figure 11: Mass resource efficiency of colour ink cartridges and containers (below 10,000 page-yield)

Given the ability to measure both consumable mass and yield it was therefore possible to propose a consumable mass resource efficiency criterion. A technical specification and award criterion only at comprehensive level were proposed, reflecting some of the complexities that procurers may face when using this innovative approach to consumable resource efficiency. Approximately 50% of the toner cartridges and containers in the dataset (571 products) met the proposed comprehensive technical specification. Analysis of the inkjet consumables revealed that 54% of the mono and 71% of the colour consumables in the dataset (194 products in total) met the proposed comprehensive technical specification. The consumables in the dataset were assumed to be representative of products on the market. As such, it is assumed that 50% or above of consumables available on the market would be compliant with proposed criterion now. The proposed award criterion was suggested to only cover electrographic (i.e. toner) consumables, due to the relatively small material savings available from purchasing the most efficient inkjet consumables. This criterion aimed to provide extra points to the tenderer that offers the highest overall consumable mass resource efficiency across all consumables for all applicable imaging equipment included within a bid. The consumable mass resource efficiency should be calculated for each consumable in accordance with the equation given in the technical specification with the results for each consumable summed together. When different consumables are purchased, the value should be an average value across all products to be supplied.

An example of how this criterion should be calculated, using the equations in Table 28 and Table 29, for four example laser printers consumable types is provided in Table 30.

Table 28: TS 17 consumable mass resource efficiency calculation

Consumable mass resource efficiency	$= \frac{Page\ Yield}{C_{MASS}}$
-------------------------------------	----------------------------------

Table 29: TS 17 consumable mass resource efficiency threshold calculation

Toner cartridge or container & drum	$(2 \times [10 \times \tanh(0,1+0,0003 \times (C_{Mass}-10))-0.5]+1)$
-------------------------------------	---

Table 30: Example consumable mass resource efficiency calculations

		Laser Printer 1	Laser Printer 2	Laser Printer 3	Laser Printer 4
Consumable Data	Consumable Type(s)	Toner Cartridge	Toner Cartridge	Toner Container & Separate Drum Unit	Toner Container & Separate Drum Unit
	Cartridge Yield (Pages)	2500	5000		
	Cartridge Mass (g)	780	780		
	Container Yield (Pages)			4500	6000
	Container Mass (g)			800	800
	Drum Unit (Pages)			20000	20000
	Drum Unit Mass (g)			583	583
Calculation: Consumable mass resource efficiency (Pages/g) (Equation in Table 28)	Cartridge	3.2	6.4		
	Container			5.6	7.5
	Drum			34.3	34.3
Threshold: Consumable mass resource efficiency Threshold (Pages/g) (Equation in Table 29)	Cartridge	6.4	6.4		
	Container			6.5	6.5
	Drum			20.0	20.0
Consumable(s) Compliant (i.e. result from formula in Table 28 \geq in Table 29)	Cartridge	No	Yes		
	Container			No	Yes
	Drum			Yes	Yes
	Container & Drum			No	Yes

The examples in Table 30 illustrate that the consumables for Laser Printer 1 and Laser Printer 3 would not meet the TS17 “consumable mass resource efficiency” requirements but that the consumables for Laser Printer 2 and Laser Printer 4 would meet the requirements. The requirements are met when a sufficiently high number of pages can be printed per gram on material (e.g. plastics and metals) used in the construction of the consumables. For Laser Printer 3 and Laser Printer 4 it is shown that both the toner container and the separate drum unit need to meet the requirements in order for the consumable system to be compliant. This formula takes into account the correlation between page-yield and consumable mass but also considers the wide variety of page-yields for different types of imaging equipment. For example, the consumable mass yield efficiency for lower speed imaging equipment will not be as high as for high speed imaging equipment due to average lower page-yields.

The costs involved in manufacturers collecting cartridge/container weight data from either production or end-of-life operations is likely to be minimal.

Procuring authorities are unlikely to see significant costs implications from the provision of cartridge/container weight data. Some benefit could be achieved through a reduction in costs associated with disposal of waste materials. These waste disposal savings would be achieved where procuring authorities favour lower weight consumables and where they are responsible for the financial costs of consumable disposal.

Reduced number of materials

In addition to mass, the overall lifecycle impacts resulting from consumable composition are highly dependent on the **type of materials used** as well as their final end-of-life processing. Potential improvements in environmental impacts can be brought about by improving the product design with regard to consumable material composition.

The detailed composition of consumables (i.e. the number of materials used) is not covered in any other major environmental initiative.

For the **first criteria proposal** it was decided to include an award criterion to reward consumables that include the lowest number of material types. Reducing the number of material types within consumables is likely to result in higher recoverable material content during end of life processing.

2.3.2.2 Further background after AHWG meeting

A stakeholder commented that the award criterion on reduced number of materials should be deleted as they saw it as a potentially misleading metric without including mass of the components and ability to separate for recycling. In the light of this comment and due to difficulty in verifying the compliance by the procuring authority, it was decided to delete this requirement.

No changes have been introduced in the **final criteria proposal** drafted after the written consultation.

2.3.3 Consumable hazardous substances content

The following criteria regarding hazardous substance content is proposed:

Final criteria proposal																				
Core criteria	Comprehensive criteria																			
TECHNICAL SPECIFICATIONS																				
	<p>TS18 Consumable hazardous substances content</p> <p>Colourants such as toners, inks, solid inks and the like must not contain substances as intentionally added constituents which meet the conditions set out in the table below.</p> <table border="1"> <thead> <tr> <th>Hazard class</th> <th>Hazard category</th> <th>CLP-regulation (EC) No. 1272/2008</th> </tr> </thead> <tbody> <tr> <td>Carcinogenicity</td> <td>Carc. 1A, 1B</td> <td>H350 May cause cancer</td> </tr> <tr> <td>Carcinogenicity</td> <td>Carc. 1A, 1B</td> <td>H350i May cause cancer if inhaled</td> </tr> <tr> <td>Carcinogenicity</td> <td>Carc. 2</td> <td>H351 Suspected of causing cancer</td> </tr> <tr> <td>Germ mutagenicity cell</td> <td>Muta. 1A, 1B</td> <td>H340 May cause genetic damage</td> </tr> <tr> <td>Germ mutagenicity cell</td> <td>Muta. 2</td> <td>H341 Suspected of causing genetic defects</td> </tr> </tbody> </table>		Hazard class	Hazard category	CLP-regulation (EC) No. 1272/2008	Carcinogenicity	Carc. 1A, 1B	H350 May cause cancer	Carcinogenicity	Carc. 1A, 1B	H350i May cause cancer if inhaled	Carcinogenicity	Carc. 2	H351 Suspected of causing cancer	Germ mutagenicity cell	Muta. 1A, 1B	H340 May cause genetic damage	Germ mutagenicity cell	Muta. 2	H341 Suspected of causing genetic defects
Hazard class	Hazard category	CLP-regulation (EC) No. 1272/2008																		
Carcinogenicity	Carc. 1A, 1B	H350 May cause cancer																		
Carcinogenicity	Carc. 1A, 1B	H350i May cause cancer if inhaled																		
Carcinogenicity	Carc. 2	H351 Suspected of causing cancer																		
Germ mutagenicity cell	Muta. 1A, 1B	H340 May cause genetic damage																		
Germ mutagenicity cell	Muta. 2	H341 Suspected of causing genetic defects																		

Final criteria proposal			
Core criteria	Comprehensive criteria		
	Reproductive toxicity	Repr. 1A, 1B	H360 May damage fertility or the unborn child
	Reproductive toxicity	Repr. 2	H361 Suspected of damaging fertility or the unborn child
	<p>In addition, colourants must not contain substances as intentionally added constituents which require labelling of the mixture with the H phrases according to Annex 1 of Regulation (EC) No. 1272/2008 or which meet the criteria of the related classification.</p>		
	Specific target organ toxicity (Single exposure)	STOT SE 1	H370 Causes damage to organs
	Specific target organ toxicity (Single exposure)	STOT SE 2	H371 May cause damage to organs
	Specific target organ toxicity (Repeated exposure)	STOT RE 1	H372 Causes damage to organs through prolonged or repeated exposure
	Specific target organ toxicity (Repeated exposure)	STOT RE 2	H373 May cause damage to organs through prolonged or repeated exposure
	<p>Consumables must also meet the following hazardous material requirements:</p> <ul style="list-style-type: none"> • Not contain any additional REACH candidate list substances at a concentration greater than 0.1% (by weight) • Toners and inks must not contain any intentionally added mercury, cadmium, lead, nickel or chromium-VI-compounds. Complex nickel compounds of high molecular weight used as colourants are exempted. • Toner and inks must not contain azo dyes (dyes or pigments) that can release carcinogenic aromatic amines listed in Regulation (EC) 1907/2006 (REACH Regulation), Annex XVII, Appendix 8. • No biocides must be added to toners or inks unless an active substance dossier, as defined under the Biocidal Product Regulation (BPR, Regulation (EU) 528/2012) for preservatives for products during storage (product type 6), has been submitted. Substances must not be used where they have been rejected from inclusion in the list of approved substances for product type 6. • Photoconductor drums must not contain intentionally added selenium, lead, mercury or cadmium (or any of their compounds). 		
	<p>Verification: The tenderer must provide documentation, such as safety data sheets (SDSs), which proves that the requirement has been met for the product(s) offered. Documentation should clearly prove that each aspect of the criterion has been met. Proof of compliance may consist of test reports from third parties or the manufacturer's own tests illustrating the lack of any of the excluded substances listed in the criterion. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>		

2.3.3.1 Background for the proposed criteria

Hazardous substances present in consumables are usually not assessed in Life Cycle Assessments. Still during operation of the imaging equipment products hazardous substances can be emitted, in the form of dust, volatile organic chemicals (VOCs), ozone, benzene, particulate matter and semi-volatile organic compounds (SVOCs).

Information about the hazardous material content of consumables is available in several widely used sources of information and environmental initiatives including:

- Material Safety Data Sheets
- Blue Angel RAL-UZ 205⁶
- Nordic Swan
- ECMA 370

The level of detail provided about hazardous material content of consumables varies across the main initiatives. The material safety data sheets and the ECMA 370 provide the least amount of information about consumable hazardous material content. The ECMA-370 declaration includes criteria relating to:

- cadmium content of photo conductors and inks/toners
- labelling of consumables and provision of Safety Data Sheet (SDS) where consumables are classified as hazardous or where they contain a substance(s) for which there are Community workplace exposure limits
- The Nordic Swan and the Blue Angel initiatives require significantly more information about hazardous material content. The Blue Angel RAL-UZ 205 specification includes a broad range of substance restrictions including those listed in Table 31 and Table 32.

Table 31: Blue Angel exclusion of intentionally added substances in colourants

Hazard class	Hazard category	CLP-regulation (EC) No. 1272/2008
Carcinogenicity	Carc. 1A, 1B	H350 May cause cancer
Carcinogenicity	Carc. 1A, 1B	H350i May cause cancer if inhaled
Carcinogenicity	Carc. 2	H351 Suspected of causing cancer
Germ cell mutagenicity	Muta. 1A, 1B	H340 May cause genetic damage
Germ cell mutagenicity	Muta. 2	H341 Suspected of causing genetic defects
Reproductive toxicity	Repr. 1A, 1B	H360 May damage fertility or the unborn child
Reproductive toxicity	Repr. 2	H361 Suspected of damaging fertility or the unborn child
Substances of the so-called candidate list according to REACH Article 59. The version of the candidate list at the point of application applies.		

Table 32: Additional Blue Angel exclusion of intentionally added substances in colourants

Hazard class	Hazard category	CLP-regulation (EC) No. 1272/2008
Specific target organ toxicity Single exposure	STOT SE 1	H370 Causes damage to organs
Specific target organ toxicity Single exposure	STOT SE 2	H371 May cause damage to organs
Specific target organ toxicity Repeated exposure	STOT RE 1	H372 Causes damage to organs through prolonged or repeated exposure
Specific target organ toxicity Repeated exposure	STOT RE 2	H373 May cause damage to organs through prolonged or repeated exposure

In addition, the Blue Angel RAL-UZ 205 specification requires that no substances which contain mercury, cadmium, lead, nickel or chromium-VI-compounds are to be added to toners and inks. An exemption is included for high molecular weight complex nickel compounds used as colourants. There is also an exemption for production-related heavy metal (e.g. cobalt and nickel oxides and organotin compounds) contamination. Further restrictions are included for azo dyes (dyes or pigments) in toners and inks that can release carcinogenic aromatic amines as listed in Regulation (EC) 1907/2006 (REACH Regulation), Annex XVII, Appendix 8. Biocides which are not covered by an active substance dossier for preservatives for products during storage (product type 6) according to the Biocidal Product Regulation (BPR, Regulation (EU) 528/2012) are also not permitted under the Blue Angel rules. Furthermore, the Blue Angel RAL-UZ 205 specification also prohibits the inclusion of selenium, lead, mercury or cadmium (or any of their compounds) in photoconductor drums.

For the **first proposal**, it was decided to include a comprehensive technical specification on hazardous material content in consumables based on the Blue Angel criteria. The criterion was proposed to apply to all consumables covered in the scope (containers, cartridges, drum units, fusers units and transfer kits). No core level for this technical specification was proposed to reflect the fact that addressing the issue of consumable hazardous material content is ambitious.

There are likely to be some costs to manufacturers associated with identifying the hazardous material content of their consumables. Many of these costs can already be assigned to legal requirements for the more basic hazardous material identifications. Some of the additional costs for more in-depth hazardous material content analysis has already been assigned to compliance with the Blue Angel and Nordic Swan eco-label criteria.

Disposal costs for hazardous material content can be higher than for non-hazardous material content. Costs for procuring authorities could therefore be reduced where they can avoid purchasing consumables that become classified as hazardous at their end-of-life.

2.3.3.2 Background for the proposed verification

Manufacturers will be able to verify compliance to the criteria through submission of documentation showing that relevant consumables have been tested to the appropriate test procedures, or equivalent, and meet the hazardous material content requirements (where relevant). This documentation could take the form of a manufacturer technical dossier or proven compliance to the Blue Angel RAL-UZ-205 specification.

2.3.3.1 Further background after AHWG meeting

One stakeholder commented that this criterion did not include all the exemptions found under Blue Angel. It has been identified that indeed one exemption on production-related

contamination by heavy metals was omitted. This exemption was added to the criterion in the revised **second proposal**.

Several stakeholders suggested that a requirement should be added for suppliers to provide Safety Data Sheets (SDSs), the verification section of the criterion has been amended to include the provision of SDSs.

For the **final proposal**, after written consultation additional harmonisation of the wording of this criterion with the relevant criterion in the Blue Angel RAL-UZ-205 has been made.

2.3.4 Reuse and remanufacturability

The existing GPP specification on imaging equipment includes a requirement on consumable design for reuse/remanufacturing. The current criterion states that devices and practices that would prevent reuse/remanufacturing of toner and/or ink cartridge (i.e. anti-reutilisation devices/ practices) should not be present or applied in the imaging equipment.

Based on this, criteria were proposed for the AHWG meeting and revised as follows considering the received comments:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
<p>TS19 Design for reuse/remanufacturing</p> <p>Cartridges or containers must not be designed to limit the ability to reuse/remanufacture. Examples of features which are deemed to limit the ability to remanufacture, or promote non-reuse, include, but are not limited to:</p> <ul style="list-style-type: none"> • Statements on the cartridge or container, or packaging, which declare, or imply, that the product is not designed to be remanufactured. <p>Verification:</p> <p>The tenderer must provide documentation which explicitly states that cartridges or containers are not designed to limit the ability to reuse/remanufacture.</p> <p>Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>	<p>TS19 Design for reuse/remanufacturing</p> <p>Cartridges or containers must not be designed to limit the ability to reuse/remanufacture. Examples of features which are deemed to limit the ability to remanufacture, or promote non-reuse, include, but are not limited to:</p> <ul style="list-style-type: none"> • Cartridges or containers covered by patents or licence agreements which include statements that seek to limit remanufacturing • Statements on the cartridge or container, or packaging, which declare, or imply, that the product is not designed to be remanufactured. <p>Verification:</p> <p>The tenderer must provide documentation which explicitly states that cartridges or containers are not designed to limit the ability to reuse/remanufacture and identify how compliance to the two examples is achieved. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>
AWARD CRITERIA	
<p>AC6 Facilitating reusability/remanufacturability</p> <p>A maximum of x points [to be specified] may be awarded to the tenderer who offers consumables meeting the following requirement:</p> <ul style="list-style-type: none"> • Consumables can be manually dismantled, where necessary with the use of universally available tools (e.g. openly available screw heads, pliers or tweezers), 	<p>AC6 Facilitating reusability/remanufacturability</p> <p>A maximum of x points [to be specified] may be awarded to the tenderer who meets at least one of the following technical features or practices:</p> <ul style="list-style-type: none"> • Consumables are designed to facilitate reuse/remanufacture through technical features, which encourage remanufacturing, namely:

<p>in order to replace worn parts and be refilled with toner material or ink.</p> <p>Verification: The tenderer must provide documentation which explains how the requirement has been met.</p>	<ul style="list-style-type: none"> ✓ avoidance of a chip in the consumable, which controls imaging functionality <p>or</p> <ul style="list-style-type: none"> ✓ any installed chip that includes functionality allowing a full reset to be initiated via either the imaging equipment controls or a network connected computer without the need for additional products <ul style="list-style-type: none"> • OEM offers non-OEM organisations to purchase the rights, at a reasonable cost, to reprogram a consumable chip so that full imaging equipment functionality is supported • From the time a consumable is first placed on the EU market, replacement chips, which support full imaging equipment functionality, are available on the open market. <p>Verification: The tenderer must provide documentation that explains which technical features of the practices listed above have been applied.</p>
--	--

2.3.4.1 Background for the proposed criteria

Relevant rationale regarding the use of remanufactured cartridges can be consulted additionally in chapter 2.2.6

In relation to the design aspects of the cartridges there are several different challenges limiting the ability to remanufacture imaging equipment consumables. These can be broken down into technical and non-technical barriers. The technical barriers include design features such as welded materials to limit separation and the inclusion on non-reprogrammable chips which facilitate communications between the consumable and the imaging equipment. Non-technical barriers include legal restrictions on remanufacturing such as patented remanufacturing processes and patents placed on parts needed to facilitate use after remanufacturing. Additional barriers stem from either real or perceived quality issues with remanufactured consumables and the lack of supporting criteria in public procurement contracts.

Including a criterion which limits negative influences on the ability to reuse/remanufacture consumables could result in more EU based remanufacturing.

Design for reuse is a criterion used in Blue Angel, EPEAT, the EU Voluntary Agreement version 5.2, Nordic Swan and the Korean Ecolabel. In spite it is applied widely by environmental initiatives, the use of refilled and remanufactured cartridges is assumed not to constitute a significant part of the market. It has been estimated that, in the EU, remanufactured consumables account for 17% to 21% of the toner consumable market and 15% of the inkjet consumable market.⁸⁸

The most widely used criteria which address remanufacturing limits in consumables can be found in the EU Voluntary Agreement version 5.2, EPEAT and Blue Angel. These criteria are shown in the tables below.

⁸⁸ *European Toner and Inkjet Remanufacturers Association, Key facts about the cartridge remanufacturing market, available from <https://www.etira.org/cartridge-remanufacturing/key-facts/>*

Table 33: Consumable reuse ability criterion in other initiatives

Environmental initiative	Criterion Text
EU Voluntary Agreement version 5.2 ⁴	5.4.1 Any cartridge produced by or recommended by the OEM for use in the product must not be designed to prevent its reuse and recycling. The requirements of paragraph 5.4 must not be interpreted in such a way that would prevent or limit innovation, development or improvements in design or functionality of the products, cartridges, etc.
EPEAT	4.9.4.1 Required—Documentation that the cartridge or container is not designed to prevent its reuse and recycling Manufacturer must provide documentation that is readily available and provided to the purchaser stating that any cartridge or container produced by or recommended by the manufacturer for use in the product is not designed to prevent its reuse and recycling. Examples of documentation that will satisfy the requirements of this criterion and should be readily available and provided to the purchaser include, but are not limited to, an owner’s manual; set-up instructions; or information on the manufacturer’s Website, whereby a purchaser received a URL or hard/electronic copy of a product specification or a policy statement that is available on the manufacturer’s Website.
Blue Angel	3.1.1.3 Reusability of components and assemblies (5) Can modules for colourants be refurbished? Reuse must not be precluded by constructive measures

At least two major EU based environmental initiatives, Blue Angel and Nordic Swan, have also developed remanufactured cartridge/container specifications.^{89,90} Both specifications include criteria which seek to reduce the potential negative environmental impacts associated with remanufactured cartridges/containers. The requirements focus on hazardous material content, emissions and the actual remanufacturing process as opposed to including detailed requirements concerning cartridge design to prevent reuse. The Blue Angel on the imaging equipment (RAL-171 and RAL-205 specifications) do include some requirements in this area. The specifications concentrate on encouraging cartridge design which facilitates recycling rather than reuse. However, the Blue Angel RAL-205 specification does require that consumables can be remanufactured and that reuse must not be precluded by constructive measures. No further details about what is meant by “constructive measures” is included. The EPEAT and EU Voluntary Agreement version 5.2 criteria also do not adequately identify what features of consumables could be deemed to inhibit remanufacturing.

Against this background, for the first proposal it was decided to include a technical specification that provides a basic level requirement to limit anti-reuse technologies. Two main features which appear to most limit remanufacturing are non-reprogrammable chips and patents or licence agreements which cover remanufacturing processes. Developing a criterion that limit the use of non-reprogrammable chips would significantly impact product availability. Including a core criterion that limits the use of patents or licence agreements which constrain remanufacturing is ambitious but achievable.

In addition, two award criteria were proposed. The award criterion “advanced design for reuse/remanufacturing” seeks to provide additional rewards for manufacturers that employ enhanced design for reuse/remanufacture features in their consumables. The award criterion

⁸⁹ Blue Angel, Remanufactured Toner Modules (DE-UZ 177), available from <https://www.blauer-engel.de/en/products/paper-printing/tonermodule/aufbereitete-tonermodule>

⁹⁰ Nordic Swan, 2012, *Nordic Ecolabelling of Remanufactured OEM Toner Cartridges: Version 5.3- 15 June 2012 – 31 December 2019*, available from <http://www.nordic-ecolabel.org/product-groups/group/?productGroupCode=008>

on “facilitating reusability/remanufacturability” is designed to reward manufacturers that actively facilitate the remanufacturing of consumables.

The purchasing of remanufactured cartridges/containers can result in significant costs savings for procuring authorities. As an example, the French Ministry of Education saw cost reductions of 30 % over two and half years as a result of purchasing remanufactured cartridges.⁹¹ The costs savings from purchasing remanufactured cartridges can be significantly reduced, or eliminated, where the quality of remanufactured cartridges is poor. The use of poor quality remanufactured cartridges/containers can lead to increased costs associated with paper use, engineer visits and additional cartridges/containers. Requiring that remanufactured cartridges/containers meet established quality standards can help to reduce these potential impacts.

2.3.4.2 Background for the proposed verification

Verification of the core criterion could be problematic as many technical features which are included in cartridges, and, to a lesser extent, in containers, may inadvertently limit remanufacturing but may also be required for function of the consumable. For example, many cartridges contain chips which communicate with the imaging equipment that they are installed within via direct contact or radio frequency. Cartridge chips tend to provide the following functions:

- Stores cartridge specific information including
- Model
- Page-yield
- Region
- Provides a means of authentication between the imaging equipment and cartridge
- Stores data on toner use as determined by the imaging equipment

Whilst these functions are important to assist the imaging equipment monitor toner or ink levels they also result in the need for chips to be either replaced or reprogrammed at cartridge end-of-life. The need for reprogramming or replacement occurs because the data written to the chip, by the imaging equipment, is permanent. As such, when the imaging equipment determines that the cartridge is empty this information is permanently written to the chip. Some chips are capable of being reprogrammed but most are not, therefore necessitating their replacement. If replacement chips are not available in the market place, then the ability to remanufacture is limited.

In the current core criterion proposal it is required from the tenderer to provide documentation, which explicitly states that cartridges or containers are not purposefully designed to limit the ability to remanufacture. In addition, in order to demonstrate compliance with the award criteria annotated product schematic detailing which design features have been included to facilitate remanufacturing, must be provided as well as a declaration stating that all the specific requirements have been met.

2.3.4.1 Further background after AHWG meeting

One stakeholder commented that technical specification on “design for reuse/remanufacturing” would limit industries intellectual property rights and potentially limit innovation; this was however not supported with further evidence and internal EC check did not result in identifying of potential issues.

⁹¹ UNEP, 2012, *The Impacts of Sustainable Public Procurement: Eight Illustrative Case Studies*, available from <http://www.unep.fr/scp/procurement/docsres/projeinfo/studyonimpactsofspp.pdf>

It was further proposed to split the original criterion into core and comprehensive, with the comprehensive criterion including the more stringent requirements on consumable design and the core one – more basic.

Two stakeholders expressed concern over the award criterion on “advanced design for reuse/remanufacturing”. The first stakeholder claimed that the criterion unfairly favored remanufactured consumables and was unworkable for procurers. However, the aim of the criterion is to promote remanufacturing, which can be done by any party, OEMs or remanufacturers. Another stakeholder expressed concern that some of the language in the criterion was not sufficiently robust. In the light of these comments, the language in the criterion and rationale has been further clarified.

For the **final criteria proposal** based on a stakeholder comment, the word "purposefully" has been removed from the criteria, because it is not sufficiently clear what is meant with it and it is difficult to verify. Furthermore, an error in the form of a double negation has been corrected. Two award criteria (AC7 Advanced design for reuse/remanufacturing and AC8 Facilitating reusability/remanufacturability) have now been merged under a single award criterion AC 6 and restructured. The technical features stated originally as examples are now stated as the only technical features to be used for the award criteria to make it simpler to the procurers to verify the criteria. At least one of the listed features has to be present in order to be given the award points. Finally, the verification of the award criteria have been amended.

2.3.5 Consumable quality

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATIONS	
<p>TS20 Consumable quality <i>(same for core and comprehensive)</i> Any cartridges or containers must meet all requirements behind at least one widely recognised cartridge/container quality standard. Verification: The tenderer must provide documentation which proves that cartridges or containers meet the requirements of at least one recognised quality standard, such as the DIN 33870-1 series, DIN 33870-2 series, DIN 33871-1 series or the equivalent for remanufactured cartridges and containers and the DIN 33871-2 series or the equivalent for new cartridges and containers. Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p>	

2.3.5.1 Background for the proposed criteria

Poor quality consumables can result in excessive waste generation as users dispose of them before their end of life. As such, the life-cycle hotspots of poor-quality consumables are the same as those found for all consumables but magnified due to their shorter lifespan. Improving the quality of consumables therefore results in life cycle impacts that are shared over a greater period of time.

The quality of consumables is an important issue which is addressed in a number of different environmental initiatives like the Nordic Ecolabel⁹² and Blue Angel⁹³. The relevant Nordic Swan and Blue Angel criteria are shown in the tables below.

⁹² Available at: <http://www.nordic-ecolabel.org/product-groups/group/?productGroupCode=008>

⁹³ Available at: <https://www.blauer-engel.de/en/products/office/toner-modules/toner-modules>

Coverage of quality issues for consumables in other initiatives is largely limited to remanufactured consumables rather than new-built consumables.

Table 34: Consumable quality criterion in other initiatives

Environmental initiative	Criterion Text
Nordic Swan ⁹⁰	<p>R13 Production quality <i>The annual average level of complaints relating to Nordic Swan Ecolabelled products must not exceed 1%. Only complaints relating to Nordic Ecolabelling criteria must be included in this calculation.</i> <i>The level of complaints must be calculated monthly for each type of Nordic Swan Ecolabelled toner cartridge. These complaint figures must be used actively to assure and raise the quality. If the level of complaints exceeds 1% for a month, a report must be submitted detailing the reasons and remedial actions. If the level of complaints exceeds 2%, contact Nordic Ecolabelling.</i> <i>Specification of complaints must include types of product-related complaint, how claims are dealt with, the follow-up of production and contact with Nordic Ecolabelling.</i></p> <p>R15 Print quality <i>All toner cartridges must be tested to and comply with one of the following standards/test methods:</i></p> <ul style="list-style-type: none"> • <i>DIN Technical Report No. 155:2007-09</i> • <i>ASTM F:2036 for monochrome printouts</i> • <i>DIN 33870-1 for monochrome printouts</i> • <i>DIN 33870-2 for colour printouts</i> <p><i>For applications and the extension of a licence, each Nordic Swan Ecolabelled toner cartridge type must be tested.</i> <i>During the licence period, print quality must be tested annually for 50% of the Nordic Swan Ecolabelled toner cartridge types.</i> <i>If the toner powder and/or the drum are changed during the licence period, the relevant cartridge type must be tested. Independent auditors (from a third-party company such as TÜV, STMC, Dekra, Intertek etc) must confirm that testing has been carried out in line with the requirement. The third-party company must confirm in writing that the auditor is familiar with the applied test method for print quality for remanufactured OEM toner cartridges, and provide a CV to support the expertise of the auditor in assessing how the applicant is applying the test methods used. Alternatively, the applicant may be certified under the STMC certification system. In both cases, documentation must show that the applicant has a valid declaration or STMC certificate. Specify the test standard and describe the test process in production.</i></p>
Blue Angel ⁸⁹	<p>3.1.2 Remanufacturing <i>The toner modules must be remanufactured in accordance with remanufacturing instructions detailing the remanufacturing process. The functionality of the toner modules must be ensured by tests and documented in accordance with DIN 33870-1 or DIN 33870-2. Remanufacturing must include and document the following process steps:</i></p> <ul style="list-style-type: none"> • <i>Incoming goods inspection and marking of quality-relevant components, such as purchased parts and raw materials.</i> • <i>Inspection of empty and used toner modules. The applicant must ensure the use of empty modules which had been marketed by original equipment manufacturers (OEM) or remanufactured in accordance with DIN 33870-1 and -2.</i> <p><i>Remanufacturing may include the following process steps:</i></p>

	<ul style="list-style-type: none"> • <i>Disassembly of the toner module to the extent required for compliance with quality requirements;</i> • <i>Cleaning of the components intended for reuse;</i> • <i>Filling of the toner containers with the specified amount and type of toner as shown in the parts list;</i> • <i>Assembly of the specified components according to the parts list;</i> • <i>Testing of the functionality of each toner module on a printer;</i> • <i>Optical test of the finished toner module;</i> • <i>Marking of the toner modules with a serial or lot number to ensure the traceability of the remanufacturing process.</i> <p><i>The remanufactured toner modules must contain a minimum of 75% (weight per-cent) recycled material, not counting the amount of toner filled in. Excluded are parts with a direct impact on the print quality (e.g. photoconductor drum).</i></p>
--	--

The Nordic Swan requires that the annual average level of complaints relating to Nordic Swan Ecolabelled production must not exceed 1%. In relation to consumables, the Nordic Swan asks that the level of complaints must be calculated monthly for each type of Nordic Swan Ecolabelled toner cartridge and associated production line. Furthermore, the label requires that if the level of complaints exceeds 1% for a month, a report must be submitted detailing the reasons and remedial actions. The report needs to include the types of product-related complaints, how claims are dealt with, the follow-up of production and contact with Nordic Ecolabelling.

Blue Angel requires that the functionality of the toner modules must be ensured by tests and documented in accordance with DIN 33870-1 or DIN 33870-2.

Some metrics exist to support measurements on consumable quality. The following DIN standards refer to remanufactured cartridges:

- DIN 33870-1 Office machines - Requirements and tests for the preparation of refilled toner modules for electrophotographical printers, copiers and facsimile machines - Part 1: Monochrome
- DIN 33870-2 Office machines - Requirements and tests for the refilled toner modules for electrophotographic printers, copiers and facsimile machines - Part 2: 4 colour printers
- DIN 33871-1 Office machines, inkjet print heads and inkjet tanks for inkjet printers - Part 1: Preparation of refilled inkjet print heads and inkjet tanks for inkjet printer
- DIN 33871-2 Office machines, inkjet print heads and inkjet tanks for inkjet printers - Part 2: Requirements on compatible ink cartridges (4-colour system) and their characteristic features

They address the performance to ensure consistent print quality and the good functioning. They specify the properties and functions after remanufacturing as well as the tests to be carried out to prove consistent printing quality and malfunction-free operation across the entire period of use of the toner cartridges, inkjet print heads and ink tanks.

There are also an ISO/IEC standards that address image quality outputs from printers and copiers:

- ISO/IEC 24700: Quality and performance of office equipment that contains reused components
- ISO/IEC 24790 Information technology -- Office equipment -- Measurement of image quality attributes for hardcopy output -- Monochrome text and graphic images

ISO/IEC 24700 specifies product characteristics for use in an original equipment manufacturer's or authorized third party's declaration of conformity to demonstrate that a marketed product that contains reused components performs equivalent to new, meeting equivalent to new component specifications and performance criteria, and continues to meet all the safety and

environmental criteria required by responsibly built products. It is relevant to marketed products whose manufacturing and recovery processes result in the reuse of components.⁹⁴

ISO/IEC 24790 specifies device-independent image quality attributes, measurement methods and analytical procedures to describe the quality of output images from hardcopy devices. The standard is relevant for applicable to human-readable monochrome documents produced from printers and copiers.⁹⁵ It is unclear how often this standard is used to support quality attributes from office-based imaging equipment.

Against this background, for the first proposal it was decided to include a criterion (the same core and comprehensive) to request that remanufactured consumables (cartridges and containers) meet the requirements behind at least one quality standard. By allowing compliance to any recognized standard there is greater scope for suppliers to prove compliance. This would provide procuring authorities with further confidence that any remanufactured consumables purchased would not cause excessive costs through early failures. The use of quality standards amongst consumable remanufacturing organisations appears well established.

The costs associated with complying the DIN quality standards (DIN 33870 and DIN 33871) can be high but are often market access requirements due to customer concerns over cartridge/container quality. It costs approximately €3000 to test a cartridge against one of the DIN standards. As market access requirements the costs associated with compliance to these standards would unlikely to be increased by a EU GPP criterion.

Procuring authorities could save a significant amount of costs by procuring higher quality cartridges. Cartridge failures can result in extra costs through issues such as increased paper use, engineer visits, extra replacement cartridges.

Ensuring that remanufactured cartridges/containers comply with high quality standards provide assurance that early failure rates will be reduced and print quality will meet customer requirements.

With regards to new builds, large OEMs tend to rely on the fact that cartridges/containers are produced in facilities that meet ISO 9001 quality standards.^{96,97, 98} However, the ISO 9001 standard does not apply to a finished product, it focuses on processes to help organisations achieve consistent results and to continually improve those processes.

The Nordic Swan specification for remanufactured OEM Toner Cartridges includes a requirement that reference to the above DIN 33870 standards. There are 9221 remanufactured toner cartridges registered against this Nordic Swan specification in Sweden alone.⁹⁹

2.3.5.1 Further background after AHWG meeting

There was a large number of stakeholder comments on the consumable quality criterion. Some stakeholders commented that if the criterion does not address all types of consumables (i.e. new builds and remanufactured) then it should be deleted. However the criterion aims to provide assurances that any remanufactured cartridges/containers are of a suitably high quality. New builds do not need to meet this criterion. The criterion wording has been altered to ensure that scope is limited to remanufactured consumables.

Another stakeholder commented that there is a need to develop a global consumable quality standard, so that new build and remanufactured consumables can be accurately

⁹⁴ ISO/IEC 24700:2005 Quality and performance of office equipment that contains reused component, available from <https://www.iso.org/standard/34909.html>

⁹⁵ ISO/IEC 24790:2017 Information technology -- Office equipment -- Measurement of image quality attributes for hardcopy output -- Monochrome text and graphic images, available from <https://www.iso.org/standard/69796.html?browse=tc>

⁹⁶ Xerox, 2017, *Xerox-approved Quality and Reliability*, available from <https://www.xerox.com/printer-supplies/compatible-cartridges/toner-quality/enus.html>

⁹⁷ Canon, *ISO 9001 Quality Management System*, available from https://www.canon-europe.com/images/ISO9001_Nagahama_Canon_Inc_20140501_tcm13-28261.pdf

⁹⁸ Lexmark, 2010, *Genuine Lexmark Supplies, Service and Parts*, available from <http://media.lexmark.com/www/mdbnk/md/LXPRINT-2011060915341025.PDF>

⁹⁹ <http://www.svanen.se/en/Find-products/Product-search/?categoryID=53>

compared. The study team agree with this statement; however such a process it is beyond the scope of the project of the EU GPP criteria revision.

A further stakeholder suggested that the criterion should also address colour quality of consumables, nevertheless a recognised standard does not exist to assess this feature. GPP can only rely on the existing standards for measuring quality. Developing a new method goes beyond the scope of this revision.

For the **final criteria proposal** based on a stakeholder comment, the scope of the criteria has been extended to cover all cartridges and containers and not only remanufactured types. The reason is that it seems reasonable to ensure that all cartridges and containers meet the requirements of at least one recognised quality standard, to ensure a high quality of all consumables no matter if it is a new built or remanufactured. Furthermore, the list of quality standards has been updated.

2.3.6 End-of-life management

The existing GPP specification on imaging equipment does not place requirements on service providers to guarantee the provision of a take back system for consumables. For the AHWG meeting criteria were proposed for discussion. The criteria have been revised after the meeting:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATION	
<p>TS21 Take-back system for cartridges and containers and WEEE registration <i>(same for core and comprehensive)</i> <i>This criterion should be used in conjunction with contract performance clause CPC4.</i> A take-back system for used cartridges and containers must be provided at no cost to the procuring authority, with the aim of channelling them or their parts for reuse or for material recycling. The tenderer must provide containers to the procuring authority, which are suitable for the accumulation of used cartridges and containers. The tenderer may fulfil these obligations themselves or via a suitable third-party organisation. In addition, the proof of WEEE registration of the producer of cartridges falling under the WEEE Directive must be provided.</p> <p>Verification: The tenderer must provide a declaration which states that a free-of-charge take-back system will be provided for cartridges and containers. Cartridges and containers holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply. In addition, for cartridges falling under the WEEE Directive, the tenderer must provide proof that the producer is registered (i.e. WEEE registration number, or a WEEE registration certificate or any document proving that the producer is registered at that moment).</p>	
<p>Explanatory note: TS21 Take-back system for cartridges and containers and WEEE registration <i>Printer cartridges which contain electrical/electronic parts and are dependent on electric currents or electromagnetic fields in order to function properly meet the definition of EEE and therefore fall within the scope of the WEEE Directive.</i></p>	
AWARD CRITERIA	
	<p>AC7 End-of-life management of cartridges <i>(This criterion should be used in conjunction with contract performance clause CPC4)</i></p>

	<p>Points must be awarded to a tenderer who provides a re-use/remanufacturing and recycling service for used cartridges requiring selective treatment in accordance with Annex VII of the WEEE Directive for products that have reached the end of their service life at no cost to the procuring authority.</p> <p>The service must comprise the following activities:</p> <ul style="list-style-type: none"> - collection, - dismantling for component re-use/remanufacturing, recycling and/or disposal, - remarketing of products for re-use. <p>The tenderer must provide containers to the procuring authority which are suitable for the accumulation of used cartridges.</p> <p>Preparation for re-use, recycling and disposal operations must be carried out in full compliance with the requirements in Article 8 and Annexes VII and VIII of (recast) WEEE Directive 2012/19/EU.</p> <p>The supplier may fulfil these obligations themselves or via a suitable third-party organisation.</p> <p>If the service is provided outside EU, where the WEEE Directive is not applicable, the treatment of waste components shall take place in conditions that are equivalent to the requirements of this Directive [1].</p> <p>Verification:</p> <p>The tenderer must provide details of the arrangements for collection, data security, preparation for re-use, remarketing for re-use and recycling/disposal. This must include, during the contract, valid proof of compliance for the WEEE handling facilities to be used.</p> <p>Cartridges holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply.</p> <p><i>The following compliance schemes are considered, at the time of writing, to meet these requirements: WEEELABEX:2011 requirement on 'Treatment of WEEE'; 'Responsible Recycling' (R2:2013) standard for electronics recyclers; eStewards standard 2.0 for Responsible Recycling and Reuse of Electronic Equipment; Australian/New Zealand standard AS/NZS 5377:2013 on 'Collection, storage, transport and treatment of end-of-life electrical and electronic equipment'</i></p>
	<p>Explanatory note: C7 End-of-life management of cartridges</p>

[1] At the time of writing this Staff Working Document the Commission is planning to adopt a delegated act to lay down the criteria for the assessment of equivalent conditions.

CONTRACT PERFORMANCE CLAUSE

CPC4 Reporting on reuse/recycle activities of consumables

(same for core and comprehensive)

For bulk shipments (i.e. not for single consumable returns), the contractor must provide records on the free take-back system for used consumables whose purpose is to channel such equipment or its parts for reuse or for material recycling, with preference for reuse.

In particular the recording must detail:

- the number of consumables taken back from the procuring authority,
- the number and type of parts, as appropriate, channelled for reuse/remanufacturing,
- the number and type of parts, as appropriate, channelled for material recycling.

2.3.6.1 Background for the proposed criteria

The provision of a take-back scheme could contribute to improvement of environmental impacts associated with consumables manufacture due to better channelling of used consumables for remanufacturing and lower need to produce completely new products.

Most OEMs provide a take-back system for end-of-life consumables. The scope of the available take-back programmes can vary in terms of geographical and product coverage.

Majority of larger remanufacturers also offer take back programmes either directly or via agreements with other organisations.

In addition, given that end-of-life cartridges/containers often have residual value, due to their potential remanufacturability and subsequent resale; other organisations operating in the marketplace also offer cartridge/container take back systems.

It has been estimated that 370 million inkjet cartridges are placed on the European market each year with a total value of around €9.4 billion.¹⁰⁰ The 370 million units comprise of 13% reused cartridges, 2% from non-OEM ‘clones and 85% OEM sources.⁵⁴ It has been further estimated that a total of 65 million inkjet cartridges are collected at end-of-life with 75% of these being remanufactured.⁵⁴

The European toner cartridge market is estimated to be worth €10.2 billion annually, comprising of 135 million cartridges.⁵⁴ Approximately 20% of these cartridges are remanufactured, 4% non-OEM clones and 76% OEM. It is estimated that around 20% of toner cartridges are collected at end-of-life with 82% of these being remanufactured.⁵⁴

The Blue Angel RAL-205, EPEAT and EU Voluntary Agreement version 5.2 all include requirements on consumable take back. The relevant criteria can be seen in the tables below.

Table 35: Consumable Take Back criterion in other initiatives

Environmental initiatives	Criterion Text
<i>Blue Angel⁸⁹</i>	3.1.2 Take-back of modules and containers for colourants <i>The distributor commits to take back modules and containers for colourants which he supplied or recommended for use in the product documents in</i>

¹⁰⁰ European Commission, 2017, Study on the implementation of product design requirements set out in Article 4 of the WEEE Directive. The case of re-usability of printer cartridges. Final report

	<p>order to preferably channel such modules and containers to reuse or material recycling.</p> <p>This also applies to excess toner reservoirs. A third party (dealers or service agencies or companies engaged in the module reuse/recycling business) may be commissioned to perform this task. The formers are to be provided with instructions for proper handling of excess toners. Non-recyclable product parts must be properly disposed of.</p> <p>Modules and containers are to be taken back free of charge by the return facility named by the distributor to which products can be returned personally or by shipment (return facilities abroad are only permissible if the products can be sent there free of charge). The product documents and the information and data sheet must include detailed information on the return options.</p>
EPEAT	<p>4.9.3.1 Required—Provision of take-back and end-of-life management for cartridges and containers</p> <p>Manufacturer provides a take-back service for toner and ink cartridges and containers for end-of-life management for at least registered and formerly registered products. In the case of containers, the manufacturer can advocate local recycling of toner and ink containers but offers take-back for such items if a local recycling option is not identified by the end user.</p> <p>Landfill disposal and incineration are not used as part of the manufacturer take-back program for registered and formerly registered products. Waste-to-energy conversion may be used as an acceptable, but not preferable, disposition process when necessary for some materials. Secondary or residual materials resulting from waste-to-energy processes are exempt from this requirement.</p> <p>Additionally, on an annual basis, manufacturer must provide on its Website the end-of-life management methods for all cartridges and containers that are collected through its take-back program. Manufacturers must report the following:</p> <ul style="list-style-type: none"> a) Total tonnage of cartridges and containers collected annually (in metric tons) b) Total tonnage of materials sent to each of the following end-of-life management methods as a proportion of total collected weight of cartridges and containers <ul style="list-style-type: none"> – Reuse of components – Materials recycling – Waste-to-energy – Material in storage, pending processing – Incineration (incineration cannot be used for registered or formerly registered products) – Landfill (landfill cannot be used for registered or formerly registered products) <p>Manufacturers must declare the Website location of the preceding required information. Reporting must be done at the global level and/or at the region or country level and must be for all cartridges and containers collected through its take-back program for that geographic region.</p> <p>The take-back requirement is applicable only in those regions or countries for which the manufacturer has products declared on the MSE Registry. Cartridges or containers not manufactured under the registered trademark of the manufacturer provider of the imaging equipment are exempt from this requirement.</p> <p>Manufacturers that do not have any products on the Registry that use toner cartridges or containers can declare “Not applicable” for this criterion on the Registry.</p> <p>4.9.3.2 Optional—Manufacturer recycles or reuses toner material collected through its cartridge and container take-back program Annual Corporate Declaration Criterion: In accordance with the priorities of the waste hierarchy, manufacturer ensures that toner material collected through its cartridge and container take-back program for at least registered and formerly registered products is reused or recycled and that none is disposed</p>

	<p><i>of through a landfill or incineration option. Disposal through waste to energy of up to 25% of the total weight of toner material collected through this program is allowed. More than 25% may be sent to waste to energy where applicable local, national, or regional regulations dictate that toner material, regardless of composition, must be sent to waste to energy. The manufacturer must provide on its Website information confirming conformance with this requirement.</i></p> <p><i>The requirement is applicable only in those regions or countries for which the manufacturer has products declared on the MSE Registry. Cartridges or containers not manufactured under the registered trademark of the manufacturer provider of the imaging equipment are exempt from this requirement.</i></p> <p><i>4.9.3.3 Optional—Manufacturer recycles or reuses plastics collected through its cartridge and container take-back program Annual Corporate Declaration Criterion: In accordance with the priorities of the waste hierarchy, manufacturer ensures that plastic collected through its cartridge and container take-back program for at least registered and formerly registered products is reused or recycled and that none is disposed of through a landfill or incineration option. Disposal through waste to energy of up to 25% of the total weight of plastic collected through this program is allowed. More than 25% may be sent to waste to energy where applicable local, national, or regional regulations dictate that plastic, regardless of composition, must be sent to waste to energy. The manufacturer must provide on its Website information confirming conformance with this requirement.</i></p> <p><i>The requirement is applicable only in those regions or countries for which the manufacturer has products declared on the MSE Registry. Cartridges or containers not manufactured under the registered trademark of the manufacturer provider of the imaging equipment are exempt from this requirement.</i></p>
<p><i>EU Voluntary Agreement version 5.2</i></p>	<p>6.3 Cartridge disposal and treatment <i>For new product models first placed on the EU market after 1 January 2012, Signatories must provide end-users with information on suitable end-of-life management options for used cartridges. This information may be communicated via a company website.</i></p>

The Blue Angel specification states that distributors must provide a free take back system (either themselves or via a third party) for consumables (modules, containers and toner reservoirs) supplied for, or recommended for, use in the imaging equipment. The EPEAT specification requires that manufacturers (or dedicated third parties) must provide a take-back service for toner and ink cartridges and containers for all EPEAT registered imaging equipment (past and present). EPEAT also requires that landfill disposal and incineration are not used as part of the manufacturer take-back program. The Voluntary Agreement version 5.2 requires that manufacturers must provide information on potential end of life options for cartridges but does not require that a take back system is provided.

Against this background, for the first proposal it was decided to include a technical specification aligned with Blue Angel. The core and comprehensive criterion are similar but the comprehensive includes an expanded scope of products types that require inclusion under any take back program. The EPEAT requirement that landfill and incineration are not used in any consumable take back system was deemed potentially too ambitious for the EU market due to potential use of incineration in some EU consumable take back systems.

In addition, it was proposed to include a contract performance clause to ensure that used consumables can be collected effectively at their end of life.

OEMs tend to operate free take back systems, for a variety of business reasons, especially for larger users of cartridges and containers. Procuring authorities are unlikely to encounter any costs associated with end-of-life cartridges and containers. Procuring authorities may encounter additional costs associated with the disposal of other consumable items, such as fuser kits, transfer kits etc., that are not covered under some OEM take back systems.

2.3.6.2 Background for the proposed verification

It was proposed to include tenderer declaration or proof of compliance with relevant scheme as mean of verification. Reliance on supplier declarations was suggested as there are no formal standards covering provision of consumables take back initiatives. Continual verification may be required where additional information about take-back activities is required (e.g. as in CPC4 Reporting on reuse/recycle activities of consumables).

2.3.6.1 Further background after AHWG meeting

Some stakeholder suggested that the criterion should support the WEEE directive by requiring suppliers to confirm inclusion of wheelie bin marking (see Figure 12) on consumables and provision of WEEE registration numbers. Inclusion of WEEE registration number was asked for. Therefore a modification was introduced in the technical specification to cover WEEE registration for cartridges falling under the WEEE Directive. It is asked that the tenderer must provide a proof that the producer is registered through submission of WEEE registration number, or a WEEE registration certificate or any document proving that the producer is registered at the moment of tendering process.

Figure 12 Wheelie bin marking



A stakeholder commented that the reporting provisions in CPC4 Reporting on reuse/recycle activities of consumables, were too stringent as it would not be possible to track returns of single consumables (e.g. where they are returned through a postal service). As a result, the text has been modified so that the requirement is limited to bulk collections.

In addition it was decided to keep the same technical specification for take-back system applicable only to cartridges and containers and to propose a more ambitious comprehensive award criterion, which goes beyond the provision of a take-back system and covers additionally provision of re-use and recycling services. This proposal is aligned with the criterion included in the EU GPP criteria for Computers and Monitors⁵⁸.

The final proposal remains nearly unchanged. No changes have been introduced as a result of the final written consultation in the Technical Specification, with the exception of an explanatory note explaining which cartridges fall under the scope of the WEEE directive. In the award criterion on *End-of-life management of cartridges* beside collection and dismantling activities, also remarketing of products for re-use have been included.

Minor changes have been introduced in the **final criteria** proposal in order to recognise that end of life activities can be performed by operators from third countries. In the case where the WEEE Directive is not applicable, the treatment of waste components shall take place in conditions that are equivalent to the requirements of this Directive. At the time of writing this criteria the Commission is planning to adopt a delegated act to lay down the criteria for the assessment of equivalent conditions. In order to facilitate the assessment and verification for the award criterion (AC3), a number of compliance schemes has been included in the final text.

2.4 Criteria area 3 – Print services

The scope of the revised EU GPP is proposed to be extended to criteria which can be used in the procurement of print services where the price is linked to the quantity of printed pages. These agreements can include the supply of IE products and /or paper and consumables, maintenance, end of life activities and optimisation of organisation’s document output through Managed Print Service (MPS).

2.4.1 Commitment to reuse and repair imaging equipment products

For the AHWG meeting criteria regarding reuse and repair of imaging equipment products were proposed for discussion. The criteria have been revised after the consultation as follows:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATION	
TS22(a) Commitment to reuse of imaging equipment	
<p>Tenderers agree that fully functional imaging equipment owned by the purchasing authority and present at the procurer’s premises must be retained for continued use rather than be replaced with new products (subject to the procuring authority’s approval). This requirement does not apply if fewer overall imaging equipment products are installed. This requirement does not apply where a supplier provides evidence showing that replacing an existing product with a more efficient product(s) would reduce overall environmental impacts. This requirement does not apply where a supplier provides adequate reasoning identifying why the use of older equipment cannot be supported.</p> <p>Verification: Tenderer must provide a declaration of compliance with this requirement.</p>	
TS22(b) Commitment to repair of imaging equipment	
<p><i>(same for core and comprehensive)</i> Suppliers agree that imaging equipment that ceases to function during the contract will be brought back into full service using spare parts (subject to the procuring authority’s approval). This requirement does not extend to:</p> <ul style="list-style-type: none"> • imaging equipment that is no longer able to provide the necessary levels of functionality stipulated by the procuring authority, • imaging equipment that cannot be feasibly brought back into full service through the substitution of non-functioning spare parts either due to lack of available spare parts or due to excessive costs, • the situation where the procuring authority wishes to reduce the total number of imaging equipment models in service. <p>Verification: The tenderer must provide a declaration of compliance with this requirement.</p>	

2.4.1.1 Background for the proposed criteria

The reuse of imaging equipment means that the overall lifecycle impacts of a product are being shared over a longer period of time (longer lifetime), thereby reducing impacts per unit of service. Energy use may become a larger factor where inefficient imaging equipment is used for longer periods of time. This issue will become less important as the efficiency gap between old and new products reduces over time (i.e. as efficiency improvements reduce over time). There are no detailed criteria in major environmental initiatives which encourage purchasing or retention of used equipment. Some public bodies have begun to include these stipulations in

contracts.¹⁰¹ It was decided for the first proposal that the EU GPP specification includes a criterion which commits new suppliers to retain fully functional imaging equipment already on the procuring authority's estate rather than install new products. The criterion also required that suppliers utilise the available spare parts for imaging equipment and repair products where feasible. This requirement therefore aimed to extend the lifetime of existing equipment on procurers' estates and to reduce the number of new products needed to provide procurers services.

Imaging equipment service providers may face additional costs, and a fall in revenue, from reusing existing imaging equipment within a customer premises. However, financial impacts associated with the reuse of existing equipment are highly variable depending on different service operator practices and their own cost models.

Encouraging the reuse of existing imaging equipment may provide financial savings for procuring authorities as has been achieved with reuse of computers¹⁰² but this will depend on which costs are assigned to them in a managed print service. For example, if procuring authorities only pay per printed page, with no costs associated for the installation of imaging equipment on their sites, then financial savings may be minimal for the procuring authority. There is an increasing awareness in the imaging equipment service provider industry that the complete replacement of existing imaging equipment within an organisation is not always necessary at the start of a new contract. Instead, some service providers integrate existing imaging equipment in customers' premises into their new service provision. That is, imaging equipment that is already in use within customer's premises may be reused where the products are still fully operational.

2.4.1.1 Background for the proposed verification

A supplier declaration that they will commit to reuse or repair of equipment is likely to be sufficient for verification purposes but continued evaluation of the supplier during the course of the contract will also be necessary.

2.4.1.1 Further background after AHWG meeting

Some stakeholders provided comments suggesting that the scope of the TS22(a) criterion on "Commitment to reuse of imaging equipment" was too broad and needed to be further clarified for it to be effective in reducing environmental impacts. As a result, additional wording has been added to the criterion to allow exemptions where it is proven that retaining existing equipment would not reduce overall environmental impacts.

The **final proposal** remains unchanged. No changes have been introduced as a result of the final written consultation.

2.4.2 Supply of imaging equipment

The goal of this criterion is to promote the use of environmental preferable equipment, when those are supplied within a print service.

The following criterion was proposed for the AHWG meeting. No changes have been introduced after the consultation:

¹⁰¹ Crown Commercial Service, 2016, "Multifunctional Devices, Managed Print and Content Services and Records and Information Management", available from <https://ccs-agreements.cabinetoffice.gov.uk/contracts/rm3781>

¹⁰² http://ec.europa.eu/environment/gpp/pdf/news_alert/Issue57_Case_Study115_Durham.pdf

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATION	
<p>TS23 Supply of imaging equipment meeting the EU GPP criteria <i>(when the supply of imaging equipment is included in the print service contract)</i> Imaging equipment offered by the tenderer as part of the provision of printing services must comply with the core technical specifications included in the EU GPP criteria area 1 imaging equipment. Verification: The tenderer must provide supporting documentation that the products to be supplied meet the criteria specified above..</p>	<p>TS23 Supply of imaging equipment meeting the EU GPP criteria <i>(when the supply of imaging equipment is included in the print service contract)</i> Imaging equipment offered by the tenderer as part of the provision of printing services must comply with the comprehensive technical specifications included in the EU GPP criteria area 1 imaging equipment. Verification: The tenderer must provide supporting documentation that the products to be supplied meet the criteria specified above</p>

2.4.3 Supply of paper and imaging equipment consumables

The goal of these criteria is to promote the use of environmental preferable paper and imaging equipment consumables, when those are supplied together with imaging equipment. Criteria for supply of paper and consumables are already established in the EU Green Public Procurement criteria for Copying and graphic paper and in the current GPP criteria proposal for Imaging Equipment consumables (Criteria area 2).

The following criterion is proposed:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATION	
<p>TS24(a) Supply of copy and graphic paper meeting the EU GPP criteria <i>(when the supply of copy and graphic paper is included in the print service)</i> Copy and graphic paper offered by the tenderer as part of the provision of the printing service must comply with the core technical specifications of the EU green public procurement criteria for copying and graphic paper¹⁰³. Verification: The tenderer must provide supporting documentation that the products to be supplied meet the criteria specified above.</p>	<p>TS24(a) Supply of copy and graphic paper meeting the EU GPP criteria <i>(when the supply of copy and graphic paper is included in the print service)</i> Copy and graphic paper offered by the tenderer as part of the provision of the printing service must comply with the comprehensive technical specifications of the EU green public procurement criteria for copying and graphic paper¹⁰³. Verification: The tenderer must provide supporting documentation that the products to be supplied meet the criteria specified above.</p>

¹⁰³ Available at: http://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

Final criteria proposal	
Core criteria	Comprehensive criteria
<p>TS24(b) Supply of consumables meeting the EU GPP criteria <i>(when the supply of imaging equipment consumables is included in the printing service)</i> Consumables offered by the tenderer as part of the provision of the printing service must comply with the core technical specifications included in EU GPP criteria area 2 imaging equipment consumables. Verification: The tenderer must provide supporting documentation that the products to be supplied meet the criteria specified above.</p>	<p>TS24(b) Supply of consumables meeting the EU GPP criteria <i>(when the supply of imaging equipment consumables is included in the printing service)</i> Consumables offered by the tenderer as part of the provision of the printing service must comply with the comprehensive technical specifications included in EU GPP criteria area 2 imaging equipment consumables. Verification: The tenderer must provide supporting documentation that the products to be supplied meet the criteria specified above.</p>
AWARD CRITERIA	
Core criteria	Comprehensive criteria
<p>AC8 Supply of reused/remanufactured cartridges and containers <i>(same for core and comprehensive)</i> <i>(when the supply of cartridges and containers is included in the print service)</i> Points must be awarded for the commitment to provide the highest percentage (share) of reused/remanufactured cartridges/containers, which comply with the core technical specifications included in EU GPP criteria area 2 imaging equipment consumables. Verification: The tenderer must provide supporting documentation that the products to be supplied meet the criteria specified above.</p>	
CONTRACT PERFORMANCE CLAUSES	
Core criteria	Comprehensive criteria
<p>CPC5 Reporting on supplied consumables <i>(same for core and comprehensive)</i> <i>(when the supply of imaging equipment consumables or copy and graphic paper is included in the printing service)</i> The contractor must provide records on the provision of consumables specified in TS supply of consumables, as appropriate, for:</p> <ul style="list-style-type: none"> - copy and graphic paper meeting the EU GPP criteria (TS24 (a)), - consumables meeting the EU GPP criteria (TS24 (b)), - reused/remanufactured cartridges/containers (AC5). 	

2.4.3.1 Background for the proposed criteria and verification

It is requested that the tenderer must provide supporting documentation that the products to be supplied meet the requirements specified in relevant sub-criteria.

2.4.3.2 Further background after AHWG meeting

During the AHWG meeting and following written consultation, stakeholders proposed to use printed pages by remanufactured cartridges and/or containers as an additional award criterion. Moreover, stakeholders did not see the need to have two identical criteria. The proposals from stakeholders were considered relevant, as this would introduce the paper yield element into the criteria, assuring reused/remanufactured cartridges/containers provide higher yields. Therefore, this was introduced as part of the comprehensive criterion.

After the written consultation, for the **final proposal**, it has been decided to remove the requirement on printed pages by remanufactured cartridges (i.e. former comprehensive AC10 Supply of reused/remanufactured cartridges and containers) and to align the ambition level to the core criterion.

2.4.4 Provision of managed print services

Managed printing services can reduce the amount of paper used by optimizing document output, can integrate other office service areas to optimize the use of energy and can improve employers' education in terms of the products and consumables environmental impacts. Against this background it is proposed to include a comprehensive award criterion which promotes tenderers who offer such services.

Final criteria proposal	
Core criteria	Comprehensive criteria
AWARD CRITERION	
	<p>AC9 Provision of managed print services Points will be awarded to the tenderers who offer the provision of managed print services (MPS). MPS should cover the following areas: -<i>Assessment</i>: which involves a review of the existing print environment of an organisation and aims to provide recommendations for better device management, -<i>Optimisation</i>: which entails consolidating and rationalising devices and business processes to develop a comprehensive MPS strategy, -<i>Management</i>: which covers systematic reviews, the monitoring of service level agreements and remote management. It aims to improve ongoing processes and workflows.</p> <p>Verification: The tenderer must provide documentation which details the MPS conditions.</p> <p>Explanatory note: AC9 Provision of managed print services <i>Managed print services (MPS) is defined as 'the active management and optimisation of document output devices and related business processes'.</i></p>

2.4.4.1 Background for the proposed criteria

Managed print services, although not very commonly used by SMEs, are gaining more importance in the current practices (see Preliminary report for further details²). During and following the AHWG meeting stakeholders provided information on number of environmental benefits linked to implementation of such systems. Among them there are:

- Eliminating shipping toner in excess: e.g. a printer shared by multiple users, when the printer says “toner is low”, multiple users may be calling to request the same cartridge.
- Eliminating stock of cartridges at the customer. This is a common practice inherited from the time in which copiers were standalone devices (not connected to internet). The service providers ship a certain number of cartridges to the customer. The different users pick-up their cartridge as a per needed basis, but with no control of what is being installed, when and in which printer. There 2 costs here: there are cartridges in excess sitting at the customer, and there is a no control over this stock. Local stock is eliminated when the delivery is done automatically based on actual needs and when the cartridge is fully tracked to certify it is installed in the printer.
- Eliminating losing cartridges: 8% of cartridges never reach the printer¹⁰⁴. These cartridges may get lost in the organization (and sometimes found 3 years afterwards), or they be deviated outside the organization when cartridge is shipped automatically.

The **final proposal** is kept unchanged. No changes have been introduced as a result of written consultation.

2.4.5 Provision of consumable use information

For the first criteria version contract performance clause on provision of consumable information was proposed for discussion. The criterion has been revised after the consultation as follows:

Final criteria proposal	
Core criteria	Comprehensive criteria
CONTRACT PERFORMANCE CLAUSE	
	<p>CPC6 Provision of consumable use information</p> <p>The provision of print services must include the dissemination of detailed consumable usage statistics to the procuring authority, on a regular basis, or when requested to do so by the procuring authority, during the life of the service contract. Consumable usage information must include, as appropriate, the information listed below:</p> <ul style="list-style-type: none"> • Paper usage for each imaging equipment model within the fleet, indicating: <ul style="list-style-type: none"> – the number of sheets/rolls of paper and size (i.e. A4, A3, etc.), – the paper type (i.e. recycled, virgin, grammage, etc.) • Number of cartridges or containers used for each imaging equipment model within the fleet • Yield per cartridge/container/drum unit per imaging equipment model in the fleet • Amount of other consumables used for each imaging equipment model within the fleet

¹⁰⁴ Personal communication with Nubaprint, October 2018.

	<ul style="list-style-type: none"> • Number of new and remanufactured consumables used • Number of mono and colour (per colour type) consumables used • Number of premature failures or dead-on-arrival consumables (per type). <p>Verification: The tenderer must provide documentation which contains the information listed.</p>
--	---

2.4.5.1 Background for the proposed criteria

There are no direct life cycle environmental hotspots associated with the provision of consumable use information. The information itself may help to reduce the environmental impacts of imaging equipment consumables through improved management practices. Some public bodies require that the use of consumables within their organizations is monitored by suppliers.¹⁰⁵ No measurement metrics are needed to report on this criterion given that values are absolute figures. The inclusion of the requirement on the provision of consumable use information will assist procuring authorities to better manage environmental impacts. For example, procuring authorities would be provided sufficient information to be able to identify where high levels of impacts were occurring on their estates. There are no detailed criteria in major environmental initiatives covering this area for printing services. The provision of consumable use information is unlikely to place additional costs on imaging equipment service providers as much of the required data is already collected. The ability to understand consumable usage patterns over an estate provides significant costs savings opportunities for procuring authorities. Imaging equipment service providers often provide detailed consumable usage information to customers as it is frequently needed for billing purposes.

2.4.5.2 Further background after AHWG meeting

One stakeholder raised a number of points on CPC6 Provision of consumable use information. The stakeholder suggested remote access may not be possible and physical access may be unfeasible so data provision may be difficult. The stakeholder also commented that service calls should not be included in the listed information but that premature failures of consumables (per type) should be included. Against this background, a reference to premature failures or dead on arrival consumables (per type), number of new/remanufactured consumables used and number of mono/colour consumables has been included. Reference to number of service calls per consumable type was not included as results could be misleading. For example, it is more likely that remanufactured consumables would be used in older equipment that may already be susceptible to more service calls. Following stakeholder concerns, the criterion was also moved from core status to comprehensive status only.

The **final proposal** is kept unchanged. No changes have been introduced as a result of written consultation.

2.4.6 Provision of environmental information during service contract

¹⁰⁵ European Commission, 2015, GPP in Practice Issue 54, Resource efficient print and copy management solutions Consip (Italy), available from http://ec.europa.eu/environment/gpp/pdf/news_alert/Issue54_Case_Study110_italy_print_management.pdf

The following criterion is proposed with regard to the provision of environmental information during service contract:

Final criteria proposal	
Core criteria	Comprehensive criteria
CONTRACT PERFORMANCE CLAUSE	
	<p>CPC7 Provision of environmental information during service contract</p> <p>The service provision must include, on request by the contracting authority, the supply of the following information during the life of the contract:</p> <p>Details concerning the management of the imaging equipment and associated components at end of life. This must include:</p> <ul style="list-style-type: none"> • Initial destination of products at end of life • Confirmation that the end-of-life service providers are certified on an ongoing basis to a recycling standard by independent certification bodies • Number of products sent for: <ul style="list-style-type: none"> • Reuse • Remanufacture then reuse • Recycling • Other end-of-life options (to be specified (e.g. energy recovery, landfilling)). <p>Verification:</p> <p>The tenderer must provide documentation which confirms that the required environmental information will be supplied, on request by the contracting authority, throughout the duration of the contract.</p>

2.4.6.1 Background for the proposed criteria

The provision of environmental information about impacts associated with a contract can help procuring authorities mitigate these impacts. For example, procuring authorities may seek to set targets for reduction of impacts from certain activities (e.g. energy use) but need to first identify current state of play (i.e. set a benchmark). Without understanding the current situation it is difficult for public bodies to develop savings targets.

It is unclear how many imaging equipment service providers operating within the EU market currently provide detailed environmental information during the provision of their services.

Some public bodies require, however, that suppliers monitor and report on environmental impacts throughout the duration of an imaging equipment service provision. Suppliers would need to identify their own metrics for measuring and reporting the required information. It is proposed that a new EU GPP contract performance clause on the provision of environmental information during imaging equipment service contracts is developed. This criterion will help procuring authorities to better manage the environmental impacts from their imaging equipment services. There are no detailed criteria in major environmental initiatives covering this area for printing services. The collection and distribution of the environmental information listed in the proposed criterion is unlikely to result in any significant costs to a service provider.

2.4.6.2 Background for the proposed verification

A supplier declaration confirming that they will provide the required environmental information during the life of the service contract is likely to be sufficient for verification purposes. Continual assessment of the service provider against this criterion would be required within the contract performance clauses.

2.4.6.1 Further background after AHWG meeting

One stakeholder requested that the terms, “Recycling” and “other end of life options” should be clarified. The study team note that the criterion addresses whole products rather than material flows. As such, the end-of-life options are not as detailed as for material flow assessments. Other clarifications have been added to the text.

The **final proposal** is kept unchanged. No changes have been introduced as a result of written consultation.

2.5 Horizontal Criteria

Criteria under this section can be used to all criteria areas (supply/lease of imaging equipment products, supply of consumables and procurement of printing services).

2.5.1 Tenderer Environmental Management activities

Initially, a Selection Criterion it was proposed in order to ensure that the tenderers commit to reduce the environmental impacts associated to their activities. Having an environmental management system (EMS) implemented is one of systematic ways to help organisations in minimizing the environmental impacts associated with their activities.

This criterion has been finally removed with the aim of harmonisation of criteria for similar products and simplification of this already long criteria set.

2.5.2 Guaranteed provision of consumables and spare parts during contract

The following criterion is proposed regarding the guaranteed provision of consumables and spare parts during contract:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATION	
TS25(a) Guaranteed provision of consumables during contract <i>(same for core and comprehensive)</i> <i>(applicable for tenders where procurement of consumables is included)</i> The tenderer must ensure the provision of consumables for any imaging equipment that is retained for use for the duration of the contract. Verification: The tenderer must provide a declaration of compliance with this criterion.	

Final criteria proposal	
Core criteria	Comprehensive criteria
<p>TS25(b) Guaranteed provision of spare parts during contract <i>(same for core and comprehensive)</i> <i>(applicable for tenders where procurement of repair service is included)</i> The service must include the provision of spare parts for any existing installed imaging equipment that is retained for use for the duration of the contract.</p> <p>Verification: The tenderer must provide documentation which confirms that spare parts for any existing installed imaging equipment that is retained for use will be provided for the duration of the contract.</p>	

2.5.2.1 Background for the proposed criteria

The guaranteed provision of consumables and spare parts for existing equipment in stock for the duration of a contract is not addressed in the major environmental initiatives. However, the ability to secure them for the life of a contract would facilitate continued use of existing imaging equipment, resulting in lower environmental impacts.

Other initiatives such as Blue Angel and EPEAT include requirements that distributors and manufacturers must provide spare parts. These requirements do not cover service providers, however, so whilst spare parts may be available service providers may not be willing or able to meet the requirements behind Blue Angel or EPEAT.

Guaranteeing the provision of consumables and spare parts for imaging equipment during the life of a contract may result in some additional costs for service providers, while procuring authorities are likely to see savings from the ability to continue to use existing imaging equipment through the life of a contract.

It is proposed that new EU GPP requirements guaranteeing the availability of consumables and spare parts for older equipment would help to extend the life of products and reduce overall impacts from an imaging equipment fleet.

2.5.2.2 Background for the proposed verification

A tenderer declaration that they will guarantee the provision of consumables during a contract will be required for verification purposes.

2.5.2.3 Further background after AHWG meeting

One stakeholder commented that the requirements in the criteria should be dealt with in a service level agreement following up certain indicators during the execution phase of the contract. The same stakeholder asked if it important that the spare parts are present at the procurers' premises. Furthermore, the stakeholder suggested that the criterion could request guarantees that products were fixed within a certain period of time. However, in the criterion there is no requirement for suppliers to store spare parts at procuring authority premises. The request refers to the tenderer capacity to provide spare parts, when needed. It was not possible to identify common response times for product breakdown and so no requirements on this issue were included. No changes have been introduced in this requirement as a result of the consultation.

The **final proposal** is kept unchanged. No changes have been introduced as a result of written consultation.

2.5.3 User instructions for green performance management

The following criterion is proposed regarding the user instructions for green performance management:

Final criteria proposal	
Core criteria	Comprehensive criteria
TECHNICAL SPECIFICATION	
<p>TS26 User instructions for green performance management <i>(same for core and comprehensive)</i></p> <p>Physical or on-line training on how to maximise the environmental performance of the particular imaging equipment provided by the manufacturer and the best practices for the use of related consumables must be offered. Alternatively, a guide on green performance management can be provided with instructions included as a specific part of the user manual and/or in a digital form accessible via the manufacturer's website.</p> <p>Any of the chosen options should cover at least the following elements: paper management functions, energy efficiency functions, more efficient use and better end-of-life management for consumables.</p> <p>Verification:</p> <p>Products holding a relevant Type 1 Eco-label fulfilling the listed requirements will be deemed to comply. Other appropriate means of proof that the above clause will be met will also be accepted, such as a declaration provided by the manufacturer when the equipment is supplied</p>	

2.5.3.1 Background for the proposed criteria

Criteria related to information for the user are very important as they raise the user environmental awareness and subsequent behaviour. It happens very often that the product has functions which could reduce significantly the overall environmental impacts of the device during its use; the user however is not always aware of the "green" features of the device and therefore may not apply them. The existing GPP criteria in force requires that a guide must be provided with instructions on how to maximise the environmental performance of the particular imaging equipment (covering paper management functions, energy efficiency functions and of any consumables such as ink and/or toner cartridges). It can be provided in written form as a specific part of the user manual and/or in digital form accessible via the manufacturer's website

It is suggested for this revision to keep current formulation and extend the criteria to cover also consumables.

2.5.3.2 Background for the proposed verification

A declaration from the manufacturer, provided at the moment of equipment's supply, that the above clause will be met should be accepted as a mean of proof. Products holding a relevant Type 1 Eco-label fulfilling the listed requirements will be also deemed to comply.

2.5.3.1 Further background after AHWG meeting

Minor wording clarifications have been introduced as a result of the consultation.

As a result of the final written consultation a possibility to offer a physical or on-line training on green performance management have been added.

ANNEX 1: TABLE OF COMMENTS

Comments on 2 nd draft criteria received in written form (Criteria numbers in the Table of comments correspond to the 2 nd proposal in the TR2.0)	JRC Dir. B response
General	
<p><i>Stakeholder suggests that the JRC organises a webcast for all key stakeholders to discuss version 2.0. Many criteria still need further clarification or/and scientific evidence. Many criteria need further improvement in order to be put in practice by public authorities and OEMs.</i></p>	<p>Comment rejected: An extended stakeholder process has been carried out involving a face-to-face stakeholder meeting, a written public consultations and e-mail communication. All comments received have been scrutinized and taken into account when preparing the drafts.</p>
<p><i>Stakeholder suggest that the JRC organises a Webinar/conference call for all stakeholders to discuss version 2.0. There are still many questions and open points that need to be clarified.</i></p>	
<p><i>These GPP should be mandatory on public bodies. A voluntary approach does not give progress in environmental deliverables, as public bodies can choose to ignore voluntary GPP criteria and simply only use price as single criterion. An example of such an approach is a Spring 2019 public tender issued by the EU Commission for buying print consumables, see here: https://ted.europa.eu/udl?uri=TED:NOTICE:257792-2019:TEXT:EN:HTML&src=0</i></p> <p><i>The legal base of this tender is EU Directive 2014/24/EU, which is the EU's horizontal public tenders directive. This horizontal directive was approved in 2014. One of its key objectives was to promote the inclusion of social and environmental criteria in public tenders, and not only price. This was a major change from the horizontal Directive it replaced. However, the award criteria in this 2019 EU tender is only price, see Section II.2.5.</i></p> <p><i>This example shows that we still are far away from where we need to be!</i></p>	<p>Comment rejected: The GPP scheme is a voluntary instrument and the Member States and public authorities can determine the extent to which they implement it. More details can be read here: https://ec.europa.eu/environment/gpp/what_en.htm. The comment goes beyond the scope of the revision process for specific GPP criteria.</p>
<p><i>There are currently too many criteria. JRC should simplify the document that is far too long and complex (154 pages)</i></p>	<p>Comment rejected: This is the technical report, which contains all the technical analyses and rationale behind the criteria. The final and adopted criteria document will only contain the criteria. E.g. the current GPP IE document is only 13 pages long. Furthermore, being a voluntary instrument, the institutions can select the criteria area and the specific criteria they want to include in the criteria.</p>
The criteria revision process and evidence base	
<p><i>The award requirement "postconsumer recycled plastic minimum content" has been removed under version 2.0 due to the difficulty in the verification. This is very disappointing since postconsumer recycled plastic content is a key criterion that is currently under positive development by many OEMs.</i></p> <p><i>See the below voluntary pledges to use or produce recycled plastics by Dell, HP or Lexmark: https://circulareconomy.europa.eu/platform/en/commitments/pledges</i></p> <p><i>The Circular Plastics Alliance commits to increase the uptake of recycled plastics up to at least 10 million tonnes in all plastics products.</i></p> <p><i>How do the future GPP guidelines address this problem?</i></p>	<p>Comment rejected: With regard to the initially proposed award criterion in the light of lack of credible verification scheme, it has been decided to remove this criterion from the revised proposal as described in this report. An information requirement is maintained.</p>

<p>The French authorities are currently working on a new CE law (PROJET DE LOI RELATIF A LA LUTTE CONTRE LE GASPILLAGE ET A L'ECONOMIE CIRCULAIRE) that would also include targets on postconsumer recycled plastic content.</p> <p>Why is JRC moving into an opposite direction. Should OEMs follow national CE laws or EU GPP guidelines? Please do reconsider your approach.</p> <p>At the current stage the easiest verification method would be to request the declarations from OEMs PCR supplier.</p>	
Product group scope and definitions	
<p>Stakeholder welcome that large format printers have been excluded from noise and substance emissions criteria.</p> <p>However: JRC's feedback on p 130 in TR 2.0 "Large format printing equipment is expected to be used in office environments very relevant to GPP." "further JRC writes: LFPs and scanners excluded from noise emission and substance emissions requirements." And in the next comment: "ENERGY STAR v3.0 will include them in scope and will therefore have to comply to energy efficiency requirements, as shown in ES v3.0 final version"</p> <p>To these points, we believe it's important to be as close as possible aligned with ecolabel criteria, where these types of printers are out of scope. See also earlier comment on that these are a special product category (included below for reference.</p> <p>We still consider it important to exclude them fully from the scope of these GPP. Rationale: The Large Format Printer and Professional Imaging Product are designed for specialized customers but not for ordinary office. Moreover, Blue Angel and Nordic Swan, which are well-known type 1 environment labels covering broad environmental aspects, do not cover both the Large Format Printer and Professional Imaging Product in their scope. Only ENERGY STAR program covers the Large Format Printer, which its applicable requirement is limited to energy efficiency. The ENERGY STAR program Ver. 3.0 newly covers the Professional Imaging Product. However, even under the Ver. 3.0, the previous ENERGY STAR specifications (Ver. 2.0) will apply to the Professional Imaging product. We think that it is not appropriate that the Large Format Printer and Professional Imaging Product are included in the scope of GPP at this time.</p> <p>Please see an overview of the applicability to LFPs and scanners of the draft criteria. (GPP scope_2.xlsx)</p>	<p>Comment rejected: We acknowledge the comment and the position, however, no substantial evidence has been provided to exclude large format printers from the scope. The alignment with Type I Ecolabels is desirable; nevertheless, it should be kept in mind that the objective of the Type I Ecolabels and the GPP criteria is not the same. The GPP should cover with its scope any products, which are of relevance for public procurement.</p>

Our earlier comment provided on scope for TR v.1.0: Scope considerations
The scope, definitions and criteria should be aligned with Blue Angel (BA) and the Voluntary Agreement to improve the environmental performance of Imaging Equipment (VA). Products having the BA label should comply with GPP Comprehensive Criteria. We kindly request to keep the GPP scope exclusions. If LFPs and scanners shall be added to the scope, these products should be excluded from noise emission and substance emission requirements, as there is no standardized measurement procedure.

Large format printers

Products designed for Wide Format Printing (A2 or larger) are typically not designed for office. They are not in the scope of Eco label criteria such as Nordic Swan, Blue Angel, and the EU Ecolabel. Large format printers are a special product category. Large format printers evolved from the standard format printer for professional use – mainly for industries with applications for 2D CAD line drawing – i.e. architectural, engineering, MCAD and construction industries. They utilize the same printing technology as professional inkjet printers. But due to the fact they have to handle very large drawing or photo files they require an embedded computing capability. They also have to transport and precisely position media of all kinds in extra-large sizes from A0 format to paper rolls. They are also capable to receive print jobs from all kinds of LAN or wireless connected terminals.

We would like to ask that Large Format Printer and Professional Imaging Product should not be in the scope of GPP.

Reasons:

The Large Format Printer and Professional Imaging Product are designed for specialized customers but not for ordinary office. Moreover, Blue Angel and Nordic Swan do not cover the Large Format Printer and Professional Imaging Product in their scope.

Only ENERGY STAR program covers the Large Format Printer, which its applicable requirement is limited to energy efficiency.

The ENERGY STAR program Ver. 3.0 newly covers the Professional Imaging Product. However, the previous ENERGY STAR specifications (i.e. Ver. 2.0) will apply to the Professional Imaging product.

We think that it is not appropriate that the Large Format Printer and Professional Imaging Product are included in the scope of GPP at this time.

Many criteria are not appropriate or not applicable for large format printers and professional imaging products. We think that especially the following criteria are not fit for large format printers and professional products:

2.2.2 Energy efficiency

2.2.3 Duplex imaging capability

2.2.5 Capability to use recycled paper

2.2.6 Capability to use remanufactured cartridges

2.2.10 Substance emissions

2.2.11 Noise Emissions

2.2.16 Supply of paper and imaging equipment consumables

2.4.3 Supply of paper and imaging equipment consumables

An OEM cartridge/container that, after having been used at least once and collected at its end-of-life, is restored to its original as new condition and performance, or better, by for example replacing wear parts and filled in with new toner or ink (incl. solid ink). The resulted product is sold like-new with warranty to match.
Ratio: only original OEM cartridges can be remanufactured legally. Newbuild will infringe OEM patents.

Comment clarified: The definition of a “remanufactured cartridges” has a direct link to the above definition of a “cartridge”, which indicated that those can be OEM or non-OEM. This reflects the situation on the market. The focus of the definition is on the effect of remanufacturing practice.

Please rectify the definition of “counterfeits”. Counterfeits are not known as “clones”. This is a wrong statement

Comment accepted: Statement corrected.

Enlarging the scope of service agreements considering:

1. A preventive assessment of real printing needs inside offices, which is key to ensure a correct dimensioning of printing services;
2. Workforce behavioural aspects (non-ICT barriers, e.g. “think before print” habit could save 28% of paper per worker, onscreen reading could reduce 45% paper), which are not adequately addressed.
3. Provision of training programmes.

Award points must be assigned to those providers guaranteeing training services, such as e-learning platforms or similar. Training should be centred on a) assessing printing needs inside the office/department, b) making use of consumables more efficient and c) addressing behavioural aspects.

Comment partially accepted: With regards to the first point mentioned there is one sub-criterion 2.2.1 Preliminary assessment of existing fleet and procurement needs, which covers the point raised in the comment. A possibility to offer a physical or on-line training on green performance management have been added in criterion on User instructions for green performance.

Public procurement routes

<p><i>Italian minimum procurement criteria approved in 2018 explicitly state that public procurers “should re engineer their printing flows and should shift from public supply contracts to public service contracts”.</i></p> <p><i>EU GPP should be at least as ambitious as Member States ones and, in this section, should explicitly encourage public procurers to implement print services contracts instead of supply contracts.</i></p>	<p>Comment acknowledged: This has been considered, see the text on print services, copied below. In addition, as mentioned in response to the previous comment, such indications could be included in GPP guidance accompanying the GPP criteria.</p> <p><i>In addition, it was proposed to extend the scope to include also printing services, as the analysis of public tenders shown in the preliminary report suggests that a trend to increase the use of printing service agreements, where the price is linked to the quantity of printed pages is expected. These can include a leasing agreement for printing and scanning or selling the products including a service agreement covering maintenance and even optimised document output through a managed printing service (MPS). It is expected that these services develop further into established services offered to non-domestic users, and this needs to be taken into account in the revision of the current EU GPP criteria.</i></p>
Market volumes	
<p><i>Please delete footnote 28 and related statement. EFIM (European Federation of ink and ink cartridges manufacturers) is not registered in the EU Transparency Register. The members of EFIM are unknown. Therefore, EFIM should be disqualified from being a recognised stakeholder.</i></p>	<p>Comment rejected: No data was available regarding the distribution between cartridges and containers during the study and the estimations from EFIM are considered of higher quality than own estimates. Note: “based on estimations” has been added in the footnote to ensure clarity.</p>
The life cycle costs of imaging equipment	
<p><i>The inclusion of scanners in all the figures for LCC is confusing as only the purchase price is considered. Scanners need repair/maintenance, electricity and EoL treatment. EPEAT handle scanners so I would suggest they are either removed from the figures or add extra contributions to LCC. Also scanners can vary enormously in purchase price.</i></p>	<p>Comment acknowledged: Indeed all products can vary very much in purchase price, thus the assumed average purchase price was used. For scanners other costs than purchase price have also been included such as e.g. electricity but the costs are too small to be visible in the charts.</p>
The key environmental impacts and improvement potentials according to technical analysis	
<p><i>A common question from procurers is the difference between inkjet and laser printers in terms of economic and environmental performance. Some of these differences are elaborated upon in several of the tasks of the review study of the voluntary agreement for imaging equipment. Although it probably isn't appropriate to develop a criteria which distinguishes between the two technologies – some non-technical overview and analysis of the main differences which is accessible for procurers would be useful within the report.</i></p>	<p>Comment rejected: This technical report serves as evidence base for the revised criteria proposal. As the criteria should be technology neutral no further change is proposed to this report. More general explanations regarding differences in impacts resulting from use of different technologies are available in the Preliminary Report (Revision of European Ecolabel and Green Public Procurement (GPP) criteria for Imaging Equipment).</p>
<p><i>Please clarify the source and the availability of the LCA study referenced, is it made for an all-in-one cartridge? Further, please clarify the source of data regarding empty toner bottles, is there an LCA made for those</i></p>	<p>Comment accepted: Footnote added with reference to the Preliminary Report (Revision of European Ecolabel and Green Public Procurement (GPP) criteria for Imaging Equipment) where the relevant LCAs are mentioned.</p>
<p><i>The statement “the more refills the less contribution from manufacturing” is a simplistic view and needs to include Life Cycle thinking. Only a minor amount of cartridge models can simply be refilled. Most of them needs remanufacturing.</i></p>	<p>Comment rejected: The text already considers that not all cartridges can be refilled. The text states that the impacts of manufacturing can be greatly reduced if cartridges can be refilled, and the more refills the less contribution from manufacturing i.e. the statement is related directly to the manufacturing phase. Furthermore, the hotspots are identified based on the LCA studies mentioned. Hence, the statement is still correct.</p>

<p>Include "provision of training programmes"</p>	<p>Comment acknowledged: Training programme and information to users etc. can in some cases be useful. To a certain extent, this is covered by the criterion on green instructions.</p>
<p>CPC1 Preliminary assessment of existing fleet and procurement needs</p>	
<p>Support the suggestion to involve a different provider to make the assessment, in order to avoid conflicts of interest.</p>	<p>Comment accepted, no change: Noted</p>
<p>While the criteria do well to promote the use of refurbished and refilled consumables, more could be done to promote the procurement of used and refurbished imaging equipment products. Ideally, in the future, the environmental footprint of the products would guide procurers. Until this is possible, a second hand or refurbished printer would nearly always have a lower environmental footprint than an equivalent product when brought new. Refurbished printers are available on the European market today – why are these not considered as relevant?</p> <p>In the criteria for "Preliminary assessment of existing fleet and procurement needs" reuse and refurbishment are only considered as options for managing the existing fleet. We suggest that the option to procure used and refurbished printers is also presented as a credible option for procurers when considering expanding the ir fleet.</p> <p>A separate "award criteria" could be included which gives a bonus for purchasing refurbished printers, and an additional bonus point could be considered when these are purchased through social enterprises (see for example the E-Reuse project in Barcelona)</p>	<p>Comment acknowledged: Even though the project team recognises the proposal as going in the right direction, currently the availability of refurbished products is quite low and even lower if and when products should still comply with the remaining criteria. Therefore, for this version, no further actions are taken, though this area should be investigated further in the next criteria revision.</p>
<p>TS1 Imaging equipment minimum energy efficiency</p>	
<p>This is unclear/ inconsistent – should be align with VA. The current RAL UZ 205 makes a reference to the Energy Star v2.0, so it's also inconsistent with this eco label standard.</p> <p>Verification should be modified by adding the underlined text as follows: The tenderer must provide test reports carried out according to the test methods laid down in the Appendix 1 of the Voluntary Agreement, or equivalent test methods in Blue Angel RAL-UZ 205 specification or a relevant Type 1 Eco-label. Equipment holding a relevant Type 1 Eco-label fulfilling the specified requirements will be deemed to comply.</p> <p>Rationale: Though "Verification" clearly accepts relevant Type 1 eco label, TS1 only refers to the Industry Voluntary Agreement. In order to avoid any confusion or misunderstanding, the description of TS1 should also refer to BA and others.</p> <p>Furthermore, as mentioned in the Introduction (quoted in the below), to avoid added administrative costs, test methods should be widely accepted as allowed in relevant Type 1 Eco-labels including Blue Angel.</p> <p>"1 INTRODUCTION"</p>	<p>Comment rejected: The Blue Angel is a Type I Eco-label. When test methods used in these Eco-labels are equivalent, respective certificate can be used as proof of verification. Currently, the Blue Angel test procedure is different to ENERGY STAR 3.0.</p>

For each set of criteria there is a choice between two ambition levels:
- Core criteria are designed to allow for easy application of GPP, focussing on the key area(s) of environmental performance of a product and aimed at keeping administrative costs for companies to a minimum."

"Verification" should be modified by adding the underlined text as follows:
The tenderer must provide test reports carried out according to the test methods laid down in the Appendix 1 of the Voluntary Agreement, or equivalent test methods in Blue Angel UZ 205 specification or a relevant Type I Eco-label. Equipment holding relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply. The base for calculating award point should be VA (=ENERGY STAR) only.

Reasons:
Though "Verification" clearly accepts relevant Type I Eco-label, TS1 only refers to the Industry Voluntary Agreement. In order to avoid any confusion or misunderstanding, the description of TS1 should also refer to Blue Angel and others.

Furthermore, as mentioned in the Introduction (quoted in the below), to avoid added administrative costs, test methods should be widely accepted as allowed in relevant Type I Eco-labels including Blue Angel (BA).

"1 INTRODUCTION

.....
For each set of criteria there is a choice between two ambition levels:
- Core criteria are designed to allow for easy application of GPP, focusing on the key area(s) of environmental performance of a product and aimed at keeping administrative costs for companies to a minimum."

Despite the EU-US agreement on Energy Star expired in February 2018, it may still be possible to apply this methodology for the EU market as well; in fact, direct communications with US EPA confirmed that it is "reasonable" to assume that, for imaging equipment, US and EU market are quite similar. For this reason, anywhere in the document direct references to Energy Star 3.0 should be included instead of referring to other documents (e.g. the VA) that, in turn, refer to Energy Star 3.0 methodology. In particular, in the core criteria direct reference to Energy Star must substitute the reference to Appendix 1 of the VA.

Moreover, where as we fully support the award criteria, a revision process should be designed to follow market development after the introduction of Energy Star 3.0. A mechanism referring to the one described by Reg (EU) 2017/1369, section 18 could be applied.

PPM speed limit: putting an up-limit to ppm speed is an effective method to limit energy waste. In fact, energy efficiency of products is very often undermined by products becoming bigger and bigger. It is a mechanism that has been widely observed for several product groups by, among others, EU-funded project Topten.

Comment accepted: In the requirements the link to the "latest version of ENERGY STAR" has been introduced.

<p>Reasonable ppm limits can be considered by taking into consideration Energy Star database, where at the moment more than 85% of products are <80 ppm. A new criterion limiting the possibility for procurers to select models with a ppm>80 would be reasonable.</p>	
<p>AC1 Improvement in the imaging equipment energy efficiency beyond TS1</p>	
<p>The base for calculating award point should be VA (=ENERGY STAR) only.</p> <p>Reason: Two criteria (VA and BA) may be different in the future depending on revision.</p>	<p>Comment accepted: Criterion has been modified accordingly.</p>
<p>TS2 Duplex imaging capability</p>	
<p>1. in the core criteria direct reference to Energy Star should substitute the reference to Appendix 1 of the VA</p> <p>2. Paper consumption has been identified as the dominant contributor by numerous of LCAs, one of which is the preliminary report drafted to review EU GPP criteria; so it looks reasonable to include a new and more ambitious criterion for printers expanding the scope of Energy Star 3.0 in terms of Automatic Duplexing Requirements (ALL duplex option should be set as default also for colour printers <1.9ppm and monochrome printers <24ppm).</p> <p>Printers duplex capability may depend on the presence of a duplex tray. To ease procurers' selection, the following additional criterion from Energy Star 3.0, (section 3.4.2.ii) should be added: if a product is not certain to be bundled with an automatic duplex tray, the partner must make clear in their product literature, on their website and in institutional sales literature that, to reach the stated duplex imaging capability, the product must be packaged with (or used with) a duplex tray.</p>	<p>Comment partially accepted: A reference to ENERGY STAR has been included. Automatic duplexing as default has been included.</p>
<p>Scanner should be out of the scope. Reason: The criterion is not applicable to scanners.</p>	<p>Comment rejected: Instead of listing the products which are not covered by this specific criterion a clarification has been added before the criteria text, as follows: Applicable to imaging equipment covered by duplex imaging requirements in Energy Star.</p>
<p>TS3 N-up printing</p>	
<p>Align the criterion to Blue Angel, removing "when the product is managed by original software provided by the manufacturer". Drivers are integrated in operating systems and it may happen that printers don't need the original software from manufacturers.</p>	<p>Comment rejected: It is not possible to include a requirement for a product when a 3rd party software or printer driver is used in relation to the product.</p>
<p>TS4 Capability to use recycled paper</p>	
<p>Scanner should be out of the scope. Reason: The criterion is not applicable to scanners.</p>	<p>Comment accepted: Scanners are specifically mentioned as removed from the scope.</p>
<p>TS5 Capability to use remanufactured cartridges and containers</p>	
<p>The wording of the criteria should be replaced by: "The use of refurbished toner cartridges and refurbished ink cartridges and containers must not be prevented by constructive, software-based or other measures." Reasons:</p>	<p>Comment accepted: We agree in the comment and has revised the requirement.</p>

If the intention of the current draft wording is harmonization with the relevant requirement in Blue Angel UZ 205 as mentioned at the last paragraph of Section 2.2.6.3 (Page 43), the description of the criteria should be identical to prevent different interpretation.

Our concern is as follows;

Current-proposed wording, "must accept", would mean that OEM manufacturers must assure all the unknown REM cartridges would work properly. However, no one can know all the existing and future REM cartridges, and their specifications such as chemical contents and safety, and emission, and so on. Current wording would be technically unfeasible, and all OEM manufacturer can only mention that they don't

design their products to prevent the use of non-OEM cartridges. For your information, Blue Angel RAL-UZ 205 and draft VA have similar criteria to our proposal.

The criteria as it's written is similar with the wording in the Blue Angel RAL UZ 205 for printers, but we would like to suggest the wording to be around 'prevention' rather than acceptance: products must not be designed to prevent remanufactured toner cartridges. The current BA doesn't require 'accept' remanufactured toner and/or ink cartridges and containers.

3.1.1.3 Reusability of components and assemblies

Table 3 Requirements concerning the reusability of components and assemblies

No.4

Is the use of refurbished toner modules and refurbished ink modules and containers according to DIN 33870-1 and 33870-2 not prevented by constructive, software-based or other measures?

Current proposed wording, "must accept", would mean that OEM manufacturers must assure all the unknown remanufactured cartridges and containers would work properly. However, no one can know all the existing and future remanufactured cartridges and containers. No one can know their specifications such as chemical contents and safety, and emission etc. Current wording would be technically unfeasible, and all the honest OEM manufacturers can only promise that they don't design their products to prevent the use of non-OEM cartridges. Therefore, we suggest amending this wording as follows.

T55 Capability to use remanufactured cartridges and containers

The products must ~~accept~~ not be designed to prevent remanufactured toner and/or ink cartridges and containers. Constructive, software-based or other measures that prevent use of remanufactured cartridge and containers should not be present or applied.

Verification:

The tenderer must provide a declaration confirming or documentation proving that remanufactured cartridges and containers can be used in the product. Products holding a relevant Type 1 Eco-label fulfilling the listed requirements will be deemed to comply

However, we do not support many of the data points made in 2.2.6.1. as we question their validity and too few references are made on where these data points have been collected.

<p>The JRC states that there is a low collection rate among OEMs. What is the collection rate of third-party remanufacturers? All remanufactured cartridges also come to an end of life and need to be collected. This needs to be clarified in this section.</p>	
<p>Background rationale text: Please add to the list of reuse blockades the wording:</p> <p>Limited printer functionality when non-OEM cartridges are used</p> <p>Intellectual property rights (patents) and aggressive legal actions against remanufacturers</p>	<p>Comment partially accepted: The text "Limited printer functionality when non-OEM cartridges are used" has been added to the rationale text. The other proposal has not been included because it is not a technical parameter and has not been assessed in the study.</p>
<p>TS7 Information on postconsumer recycled plastic used</p>	
<p>The GPP criteria should be at least as ambitious as the revised VA for these products – currently the draft VA states "For all products Signatories shall make information available to customers on the minimum percentage of postconsumer recycled plastic content, calculated as a percentage of total plastic (by weight) in each product."</p> <p>Presuming this provision is kept in the VA this criterion in the GPP criteria will become redundant as all imaging equipment will comply. Therefore, it is suggested that options for increasing the ambition should be explored. We feel that the comprehensive criteria should add an additional level of ambition for producers.</p> <p>In the technical study for the Revision of Voluntary Agreement on Imaging Equipment it is proposed to include a resource efficiency requirement to the VA: "Imaging equipment in scope must contain a minimum of 20% post-consumer recycled plastic content per weight of product unit."</p> <p>It is proposed that the current Comprehensive criteria is moved into the Core criteria, noting that "manufacturers are readily communicating information about the postconsumer recycled content in imaging equipment". The comprehensive criteria should be revised as follows:</p> <p>"TS7 Inclusion of postconsumer recycled plastic</p> <p>Imaging equipment meeting this criterion must contain a maximum of 20% post-consumer recycled plastic content per weight of product unit.</p> <p>Verification: The tenderer must provide documentation, which specifies the percentage of postconsumer plastic used within the imaging equipment model(s). Documentation may consist of a manufacturer declaration, proof of compliance to an appropriate environmental scheme which includes the same product design features or other alternative means of proof detailing postconsumer recycled plastic content Equipment holding a relevant Type I Eco-label fulfilling the specified requirements will be deemed to comply."</p> <p>If this cannot be set within the core and comprehensive criteria (e.g. because no such products exist on the market), we suggest it is included as an award criterion to indicate an area for innovation in the market in the future.</p>	<p>Comment rejected: The proposal on an award criterion has already been assessed and as stated, in the light of lack of credible verification scheme, it has been decided to remove this criterion from the revised proposal.</p>
<p>"5%" in the 2nd line from the bottom of Page 47 is wrong. It should be corrected to "5g".</p>	<p>Comment accepted: Text corrected</p>

TS8 (a) Spare parts availability	
<p><i>One of the major limitations of recent work done at the EU level on repairability is that the cost of spare parts is not integrated – i.e. within eco design requirements on spare part availability and in the development of the methodology for the repairability score system. This ignores the reality that the cost of repair is a key determinant of whether repair takes place or not – notably when the cost of repair is greater than the cost of buying a new appliance.</i></p> <p><i>GPP should be used as a tool to consider the cost of repair and spare parts more comprehensively – and creating an incentive for producers which make repair affordable for public authorities.</i></p> <p><i>Different approaches can be taken to control the cost of spare parts:</i></p> <p><i>a) setting the total cost of all spare parts relative to the cost of the whole product – one study suggests that the total cost of spare parts should not exceed 200% of the cost of the product</i></p> <p><i>b) setting a limit on the cost of the most expensive spare part – the proposal in the development of the French repair score system is that spare parts should not cost more than 30% of the price of the final product.</i></p> <p><i>In the case of imaging equipment, one option could be to include the cost of spare parts as a comprehensive criterion within section 2.2.9 Repairability and recyclability, alternatively the price of spare parts could be covered with as a separate criteria within section 2.3 CRITERIA AREA 2 – IMAGING EQUIPMENT CONSUMABLES. We urge the study team to consider options for how this could be done</i></p>	<p>Comment rejected: The cost of spare parts may be an economical barrier towards increased repair. However, the cost of spare parts is typically only a fraction of the combined cost when products are repaired. In northern countries the greatest barrier towards repair may very well be the labour cost of the repair. Hence the greatest obstacles can be difficult to control, if a free choice of repairer also shall be available.</p> <p>To ensure a long lifetime it may be better to ensure a proper warranty, so products are produced with durability in mind. See section 2.2.14.</p>
<p><i>We welcome a differentiation on 3- and 5-years availability for Core and Comprehensive level but must make the remark that some spare parts listed are not appropriate. In the VA revision there will be suggestion for a list of spare parts as a guidance and not an exhaustive list, and we suggest alignment with that (soon to be suggested by Euro VAp rint members).</i></p>	<p>Comment rejected: The GPP should go beyond the requirements of the VA. If the list of spare parts is aligned with the VA, the requirements is almost redundant to include in the GPP.</p>
<p><i>Would change “after the equipment supply” with “after the equipment ceasing production”, as in all other labelling initiatives.</i></p> <p><i>The phrase “after the equipment supply” in 3rd line should be amended to read as “after end of production” like other relevant Type I Eco-labels.</i></p> <p><i>Reason:</i></p> <p><i>We would like to ask that the wording should be harmonized with Blue Angel UZ 205</i></p>	<p>Comment rejected: This is a procurement requirement; therefore it should be related to the purchase of the product and the actual supply of the equipment.</p>
<p><i>“Disassembly of casing, chassis and electric/electronic assemblies can be undertaken with commercially available tools (i.e. all tools except of proprietary tools[2])”</i></p> <p><i>The definition of “commercially available” is open to interpretation and could be misunderstood as inappropriately including those that are only available to professionals. This term should be avoided, and the term “basic tools” should be used, and the definition aligned with prEN 45554 as follows.</i></p> <p><i>Basic tools: A tool or set of tools that is supplied with the product, or basic tools as listed Table A.3 of prEN 45554 (or transpose the table A.3 itself) removed part (in case of re-use) for a repair, re-use or upgrade process.</i></p> <p><i>Alternatively, the list from the JRC study on television repair could be used as it is openly available without the need for purchase of a standard.</i></p>	<p>Comment accepted: Reference to tools class A, B and C from the “Table A2 — Process classification by necessary tools” of the standard prEN 45554 has been introduced.</p>

<p><i>Task 2 of the technical study for the Revision of Voluntary Agreement on Imaging Equipment estimates that the life time of imaging equipment is between 5 and 6 years (including inkjets). Therefore, it does not make sense to offer spare parts for 3 years only in the core criteria. We do not understand the justification for a shorter period in relation to inkjet printers. We suggest the following formulation:</i></p> <p><i>Core criteria: Spare parts listed below must be made available by manufacturers for at least 5 years after the equipment supply and the information about this availability of spare parts shall be available to the procurer.</i></p> <p><i>Comprehensive criteria: Spare parts listed below must be made available by manufacturers for at least 6 years after the equipment supply and the information about this availability of spare parts shall be available to the procurer.</i></p> <p><i>We also challenge why a more restricted list of spare parts is included in the core criteria. The choice of the restricted list of spare parts does not seem to be adequately justified (e.g. in relation to a ranked list of parts most likely to fail). Therefore, the availability of some parts but not others could be counterproductive.</i></p> <p><i>Spare part availability is not challenging for manufacturers to achieve. Including a shorter availability time as above already allows some differentiation between the core and comprehensive criteria.</i></p>	<p>Comment rejected: The provision of spare parts shall ensure a minimum lifetime of products. Contrary, there is a risk that too many spare parts are produced and newer used, and a too ambitious criteria may increase the overall environmental impact. Given the relatively short average lifespan of inkjet products the 5-year period was deemed a little too restrictive for a core criterion, therefore 3 years was proposed instead (for inkjet models), in line with Voluntary Agreement. List was based on an analysis of what other schemes list as spare parts examples, and considers also those that typically have a shorter lifetime than the equipment's service life and that cause equipment's failure.</p>
<p><i>As well as the minimum period for which spare parts are available it is also suggested that the GPP criteria set a minimum delivery time for spare parts. Excessively long spare part delivery will reduce the likelihood of repair and potentially disrupt service provision in public institutions. In the most recent repairability provisions under ecodesign set for several products a "maximum delivery time of spare parts" is set at 15 working days after having received the order. It is suggested that a slightly more ambitious delivery time is included within this technical criteria – we suggest 10 working days. Producers who offer delivery time in a shorter time frame e.g. one week (5 working days), may be offered a bonus in an award criteria. This is considering that the "Product 10Y Repairable" label used by the SEB Group guarantees shipment of spare parts in 24-48 hours</i></p>	<p>Comment accepted: Text has been added accordingly.</p>
<p>TS8 (b) Design for disassembly and repair</p>	
<p><i>The 8th dot of TS 8(b) should be deleted:</i></p> <p><i>Repair manual with enough information to support repair operations (e.g. illustrating the parts that can be accessed and replaced, the tools required and how the repair process should be conducted, etc.) must be available to the procuring authority and to repairers.</i></p> <p><i> Likewise, the following statement in the Verification should also be deleted: The tenderer must provide a declaration of compliance with above requirements together with the repair manual (physical document or a link where the document is available), which must include an exploded diagram of the product illustrating the parts that can be accessed and replaced, the tools required and how the repair process should be conducted.</i></p> <p><i>Rationale:</i></p>	<p>Comment rejected: Provision of repair information is considered as an important factor to improve the lifetime of products. As for other products repair information have been available for years for repairs. Hence, it is considered possible for imaging equipment as well to provide this information.</p>

<p>Repair operations of the products covered by GPP are conducted by manufacturers of imaging equipment or professional repairers. It is not necessary since such people can access to a repair manual or information on repair.</p> <p>We have serious concerns about proposed requirements to disclose detailed repair information, because no one knows the quality of all repairers. OEM manufacturers would not be able to ensure quality of products repaired by such repairers. There are still serious legal uncertainties on quality assurances of products repaired by third party. Who would bear the responsibilities for any accidents caused by such products repaired by unauthorised repairers? For example, when the product doesn't bear any record of repair, liability of injuries caused by it may be put on original manufacturers based on trade mark on it. If such malfunction is caused by repairers authorized by a manufacturer, manufacturers may be able to cover it. However, if not, to identify the responsible person would be extremely difficult, because cause of malfunction must be strictly distinguished between original product and repair. It will take much time, and there is no benefit for consumers on this point. Would the Commission or JRC give any guarantee when accidents are happened with such repair? If not, this proposal is irresponsible.</p> <p>In addition, the proposal may hamper the industry's due competitiveness based on its diligence in technical development and reveal IPR-sensitive information. We believe that the GPP criteria should be equitable to reward the companies' diligence for technical development.</p>	
<p>"Screw connections for fastening casing parts, chassis and electric/electronic assemblies can be tightened with no more than three tools"</p> <p>The language on fasteners should be more precise. It is suggested that the definition of a renewable fastener is borrowed from prEN45554, and that only reusable fasteners are permitted for the casing and chassis.</p> <p>Reusable fastener: An original fastening system that can be completely re-used, or any elements of the fastening system that cannot be re-used are supplied with the new part for a repair, re-use</p>	<p>Comment accepted: Text updated.</p>
TS8 (c) Design for recycling	
<p>Should be completely harmonised with UZ-205.</p> <p>The 3rd dot of Comprehensive Criterion of 8(c) should be changed to be completely harmonized with UZ-205 3.1.1.2 Table.2 No.3:</p> <p>"The coating of plastic components in casing parts should be limited to a minimum"</p> <p>The presence of paints and coatings (other than galvanic) in casing parts must not significantly impact upon the resilience of plastic recycle produced from these parts upon recycling and when tested according ISO 180[1] or equivalent.</p> <p>The refer, 2nd paragraph and Note [1] of "Verification" for the Comprehensive Criterion should be deleted.</p> <p>A valid mechanical/physical test reports carried out according to ISO 180 or equivalent should be provided for requirement regarding paints. Alternatively, third party test reports obtained from plastics recyclers, resin manufacturers or independent pilot tests shall be accepted.</p>	<p>Comment rejected: The wording "should be limited to a minimum" is not precise enough and could be interpreted in various ways. In addition, the fragility of recycled plastic is an important factor concerning the quality and potential applications it can be used for. In addition, requirements on reduced number of materials as well as on design for disassembly are also included in the revised GPP set to additionally support recycling.</p>

Note [1] For the purposes of this criterion a significant impact is defined as a >25% reduction in the notched Izod impact of a recycled resin as measured using ISO 180.

Rationale:

Izod impact measurement would NOT be a direct method to measure recyclability. It measures only fragility of plastic against impact, and it is technically unreasonable to regard fragility as one and only criterion to assess recyclability.

Recyclability can be substantially estimated by the compatibility of plastic materials. For example, following method is better to judge recyclability than Izod impact.

IEC 62075 Ed 2.0: Audio/video, information and communication technology equipment -

Environmentally conscious design, shows following check-point on this matter:

- limit the number of polymers used in the product. Combinations of non-compatible materials which are not readily separated from each other shall be avoided, since this can compromise effective recycling. The compatibility guideline in Annex B should be used in selecting polymers when combinations of materials are intended to be used which could not easily be separated from each other.

For your information, "Polymers compatibility guide" can also be seen from the following source:

ECMA-341 Environmental Design Considerations for ICT & CE Products (ECMA 341 is the base of this IEC62075 and Annex B of IEC62075 is equal to Annex C of ECMA341.)

<https://www.ecma-international.org/publications/files/ECMA-ST/ECMA-341.pdf>

Annex C (informative) Polymers compatibility guide)

For your information, Blue Angel RAL-UZ 205 and draft VA do not have similar criteria requiring Izod.

The 3rd of 3 design features of Comprehensive Criterion of 8 (c) should be amended to be completely harmonized with UZ 205 3.1.1.2 Table 2

No.3:

"The coating of plastic components in casing parts should be limited to a minimum."

by deleting the following sentence:

~~—The presence of paints and coatings (other than galvanic) in casing parts must not significantly impact upon the resilience of plastic recycle produced from these parts upon recycling and when tested according ISO 180[1] or equivalent.~~

Therefore, 2nd paragraph and Note [1] of "Verification" for the Comprehensive Criterion should be deleted as shown below:

~~A valid mechanical/physical test reports carried out according to ISO 180 or equivalent should be provided for requirement regarding paints. Alternatively, third party test reports obtained from plastics recyclers, resin manufacturers or independent pilot tests shall be accepted.~~

<p><i>Note [1] For the purposes of this criterion a significant impact is defined as a >25% reduction in the notched Izod impact of a recycled resin as measured using ISO 180.</i></p> <p><u>Reasons:</u> <i>We think that the criteria should be completely harmonized with Blue Angel UZ 205. Blue Angel RAL-UZ 205 and draft VA do not have similar criteria requiring izod.</i></p> <p><u>Referential information:</u> <i>Izod impact measurement would NOT be a direct method to measure recyclability. It measures only fragility of plastic against impact, and it is technically unreasonable to regard fragility as one and only criterion to assess recyclability.</i></p> <p><i>Recyclability can be substantially estimated by the compatibility of plastic materials. For example, following method is better to judge recyclability than Izod impact. IEC 62075 Ed 2.0: Audio/video, information and communication technology equipment - Environmentally conscious design, shows following checkpoint on this matter: - limit the number of polymers used in the product. Combinations of non-compatible materials which are not readily separated from each other shall be avoided, since this can compromise effective recycling. The compatibility guideline in Annex B should be used in selecting polymers when combinations of materials are intended to be used which could not easily be separated from each other.</i></p> <p><i>For your information, "Polymers compatibility guide" can also be seen from the following source: ECMA-341 Environmental Design Considerations for ICT & CE Products (ECMA 341 is the base of this IEC62075 and Annex B of IEC62075 is equal to Annex C of ECMA341.) https://www.ecma-international.org/publications/files/ECMA-ST/ECMA-341.pdf Annex C (informative) Polymers compatibility guide)</i></p>	
AC2 Cost competitiveness of spare parts	
<p><i>One of the major limitations of recent work done at the EU level on repairability is that the cost of spare parts is not integrated – i.e. within e code design requirements on spare part availability and in the development of the methodology for the repairability score system. This ignores the reality that the cost of repair is a key determinant of whether repair takes place or not – notably when the cost of repair is greater than the cost of buying a new appliance.</i></p> <p><i>GPP should be used as a tool to consider the cost of repair and spare parts more comprehensively – and creating an incentive for producers which make repair affordable for public authorities.</i></p> <p><i>Different approaches can be taken to control the cost of spare parts: a) setting the total cost of all spare parts relative to the cost of the whole product – one study suggests that the total cost of spare parts should not exceed 200% of the cost of the product</i></p>	<p>Comment rejected: The cost of spare parts may be an economical barrier to wards increased repair. However, the cost of spare parts is typically only a fraction of the combined cost when products are repaired. Very often the greatest barrier to wards repair may very well be the labour cost of the repair. To ensure a long lifetime it seems important to ensure proper warranty, so products are manufactured with durability in mind. See section 2.2.14.</p>

b) setting a limit on the cost of the most expensive spare part – the proposal in the development of the French repair score system is that spare parts should not cost more than 30% of the price of the final product.

In the case of imaging equipment, one option could be to include the cost of spare parts as a comprehensive criterion within section 2.2.9 Reparability and recyclability, alternatively the price of spare parts could be covered with as a separate criteria within section 2.3 CRITERIA AREA 2 – IMAGING EQUIPMENT CONSUMABLES. We urge the study team to consider options for how this could be done.

TS9 Substance emissions

The emissions from a printer in operations is dependent on the print system set-up.

In the comments to the 1st consultation JRC respond:
Further, it was investigated whether it was possible to add requirements for remanufactured consumables in the comprehensive criterion. At this stage, it does not appear as if this is possible due to practical reasons (i.e. testing would have to be conducted on complete system)

If testing on the whole system seems impractical we request that a note is made both in the Core and Comprehensive criteria TS9 that:
"A Blue Angel certified printer is tested as a system including a specified consumable, and that OEMs test their printer systems with OEM cartridges, if a non-OEM cartridge is used the Blue Angel substance emissions level might not be met."

The Statement on page 61, section 2.2.10.1 it's stated:
"Moreover, the Blue Angel specification includes a test procedure. Nevertheless, measuring these emissions is not a common practice. Although more than one thousand products are registered in Blue Angel, complying with certain limits may be a costly exercise for manufacturers. Reporting may also imply extra costs; however, this may be already a common practice by manufacturers, but only covering OEM products (i.e. not non-OEM cartridges set-up in imaging equipment printers and MFDs)."
It must be emphasised that the test procedure RAL -UZ 205 emission tests can very well be performed by a supplier of non-OEM cartridges but it's never/seldom the case.

Comment partially accepted: The text has been modified to reflect that the emissions limits should be met by the equipment tested with the OEM cartridge.

The following product categories not covered by Blue Angel UZ 205 should be excluded from the scope of the GPP:
- Large format printers (LFP)
- Professional Imaging product and Scanner

Reasons:
The criteria of Blue Angel UZ 205 are developed for printer, copier, and MFD which are usually used in the ordinary office.
We think that the LFP, Professional Imaging product and scanner should not be included in the scope of the GPP as mentioned above (the Scope).
Since LFP and Professional IP are not designed for ordinary office, it is

Comment accepted: A note has been added that Large format printers (LFP) and professional imaging products and scanners are excluded from the scope

not appropriate to judge non-office equipment (LFP and Professional IP) with the same emission standard values as office equipment.

Also, scanners are not considered under the Blue Angel UZ 205, so that this criterion is not applicable to scanners.

TS10 Noise emissions

The specification (limit value) should be separated into Core and Comprehensive criteria.

1) We would like to suggest the following criteria respectively: "For Core criteria" Modes to be tested should be harmonized with the Blue Angel UZ 205.
Noise level should meet "additional 3dB allowance on the UZ 205 level (3.4)".
"For Comprehensive criteria"
No need to be changed on TS 10 of the 2nd Draft.

2) Reference standard should be replaced with our proposal.
Proposal:
The tenderer must provide documentation, such as a test report, which identifies noise emission rates during print phase when measured according to requirements in ECMA-74 (ISO 7779).

3) Scanner should be out of the scope. Reasons:
1) Although the level in the comprehensive criteria will be set as more challenging target to reflect and harmonized with relevant Type I eco-label such as the latest Blue Angel, the Core criteria should be set as the different ambition level (i.e. easier application) as compared with the Comprehensive criteria as mentioned Section 1 (INTRODUCTION) of the 2nd draft (in the last paragraph of p.1)

"1 INTRODUCTION
.....
For each set of criteria there is a choice between two ambition levels:

- Core criteria are designed to allow for easy application of GPP, focusing on the key area(s) of environmental performance of a product and aimed at keeping administrative costs for companies to a minimum."

2) As for Reference standard, ECMA-109 doesn't define measurement method (ECMA-74 does).

3) Scanners are not considered under the Blue Angel UZ 205, so that this criterion is not applicable to scanners.

Comment partially accepted: The change made from the 1st to this 2nd versions was based on stakeholder comments recommending harmonizing the EU GPP (core and comprehensive) criteria with the newest Blue Angel criterion because some of the older Blue Angel requirements used in the core criterion were more stringent than requirements in the newer Blue Angel. This has also been described in the report text. Scanners are in scope of the test method, therefore kept here. Reference standards have been updated, else no change made.

TS11 Substances of Very High Concern

3rd sentence of TS11 should be revised as follows:
Compliance to be ensured for the latest version of the SVHC list available at one year prior to the manufacture date of product.

In addition, a certain scheme to set or accept exempted applications from the criteria should be established if such exemptions are required or justified technically or for safety.

Comment accepted: We agree in the reasons and the comment. Text updated

Reasons:

Meeting current proposed criterion requiring no intentionally added REACH Candidate List substances as of the tendering date is basically NOT feasible since no one can foresee substances newly added in the future, which would be added frequently in the list (twice a year).

We can prospect which substances are likely to be added to "Candidate list", for example, from Registry of Intentions (Current SVHC intentions). However, it is so difficult for product manufacturers to ask the global suppliers, mostly SMEs to check and substitute all the possible substances at the stage where the final evaluations of such substances are not published. In some case, such requirements might be considered as lacking legal justification.

For example, most of substances are listed on Registry of Intentions around a half year before their listing on the Candidate list. However, not all the substances listed on Registry of Intentions become finally listed on the Candidate list. Even more, the final evaluation of substances on the list of Public Activities Coordination Tool (PACT) / Risk Management Option Analysis (RMOA) would be uncertain and difficult to predict.

Listing a substance on Candidate list means that the evaluation of the substance is established in EU. Accordingly, we believe the substances on Candidate list (not possible candidates) should be checked and substituted to keep the legal certainty at a certain level and to avoid needless works for suppliers.

However, even if the newly listed substances are not widely used, checking non-use (for example, investigating material suppliers or preparing declaration of conformity) would take a certain time. EEE is manufactured through the global and long supply-chain, and not all housing parts are available from 1st Tier suppliers and in a country where products are assembled. Therefore, we need at least one year as grace period, in order to investigate the newly added substances well.

3rd sentence of TS11 Core should be revised as follows:

Compliance to be ensured for the latest version of the SVHC list available at the moment of 1 year prior to the manufacture date of a product.

In addition, a certain scheme to set or accept exempted applications from the criteria should be established if such exemptions are required or justified technically or for safety.

Rationale:

Meeting current proposed criterion requiring no intentionally added REACH Candidate List substances as of the tendering date is basically NOT feasible since no one can foresee substances newly added in the future, which would be added frequently in the list (twice a year).

We can prospect which substances are likely to be added to "Candidate list", for example, from Registry of Intentions (Current SVHC intentions). However, it is so difficult for product manufacturers to ask the global suppliers, mostly SMEs to check and substitute all the possible substances at the stage where the final evaluations of such substances are not published. In some case, such requirements might be considered as lacking legal justification.

<p><i>For example, most of substances are listed on Registry of Intentions around a half year before their listing on the Candidate list. However, not all the substances listed on Registry of Intentions become finally listed on the Candidate list. Even more, the final evaluation of substances on the list of Public Activities Coordination Tool (PACT) / Risk Management Option Analysis (RMOA) would be uncertain and difficult to predict.</i></p> <p><i>Listing a substance on Candidate list means that the evaluation of the substance is established in EU. Accordingly, we believe the substances on Candidate list (not possible candidates) should be checked and substituted to keep the legal certainty at a certain level and to avoid needless works for suppliers.</i></p> <p><i>However, even if the newly listed substances are not widely used, checking non-use (for example, investigating material suppliers or preparing declaration of conformity) would take a certain time. EEE is manufactured through the global and long supply-chain, and not all housing parts are available from 1st Tier suppliers and in a country where products are assembled. Therefore, we need at least one year of grace period after listed on Candidate list, in order to investigate the newly added substances well.</i></p>	
<p><i>Current Comprehensive criteria should be deleted. Otherwise, it should be the same requirement which our proposal is reflected on TS11 Core Criteria as mentioned above.</i></p> <p><i>Reasons:</i> <i>Same as core. Criteria of comprehensive is far stricter than that of relevant Type I Eco-label requirements.</i></p>	<p>Comment accepted.</p>
<p><i>Extending the grace period for newly added SVHC helps a more thorough analysis and elimination of a substance in the supply chain.</i></p>	<p>Comment accepted: The comment is considered reasonable. Text updated accordingly.</p>
<p>TS12 Hazardous substances content</p>	
<ul style="list-style-type: none"> <i>• Halogenated polymers and halogenated organic compounds for their use as flame retardants are not permitted.</i> <p><i>This covers a range of different substances with widely different properties. No rationale has been provided for restricting them.</i></p> <p><i>We suggest the criteria set out in "SC1 Restricted Substance Controls" and "TS11 Substances of Very High Concern" are sufficient and cover all potentially hazardous substances. No individual substances/classes need to be singled out</i></p>	<p>Comment rejected: These substances pose both a risk for human health and a challenge regarding recycling of plastic. Hence these substances are pointed out due to special concerns. In addition, these types of flame retardants have previously been used widely in electronics.</p>
<p>TS13 Firmware update control</p>	
<p><i>It should be included that Firmware Updates must not stop remanufactured Non-OEM supplies from working.</i></p>	<p>Comment accepted: The following sentence has been included: "Any firmware updates must not prevent the use of reused/remanufactured consumables"</p>
<p><i>This requirement should be deleted.</i></p>	

*Reasons:
Firmware of imaging equipment is not created so that rollback can easily be performed like computer.*

Firmware is generally updated to, for example, fix technical bugs, improve print quality and/or improve the functionality of existing features. Once rolled back, not only may users lose such benefits, but possibility of exposing printer to network security vulnerabilities also may become high.

No OEM is currently able to provide a rolling back of firmware updates. The JRC is mentioning in footnote 74 that one manufacturer has provided users with the ability to disable software updates. This is not true. Perhaps the JRC meant automatic updates. HP proposes only a new firmware update for some inkjet devices that removes the dynamic security feature. This should not be considered as a rolling back of firmware. Please clarify this issue under section 2.2.13.1.

*OEMs won't be able to provide rolling back firmware updates as this will create security vulnerabilities as well as prevent customers from receiving important operating system updates to keep their printers running efficiently. Lower printing efficiency will go against our principle of durability and extended life time.
Indeed, the JRC could request a rolling back of firmware updates in case of an automatic firmware update that has not been authorised by the user.*

Stakeholder requests to modify this section as this is not workable as it is written.

We still believe this criterion is overall negative for the users of the printer (see earlier comment below) and requests a deletion although JRC have suggested it as a comprehensive criterion.

The draft criteria states "...firmware needs to be available from the time it is first released." Imaging equipment industry use firmware for several reasons, as acknowledged by JRC. JRC point to that manufacturers would be free to point out that users should be aware of any potential GDPR, and we suspect, any other privacy and security related features enabled by the updated firmware.

A product can last 10 years and will go over multiple firmware updates during its life time. It is not practical to make all firmware updates available since its date of release.

As evidence for suggesting that this criterion is widely feasible for the IE Industry to adopt JRC points one occasion, in relation to one producer. This is too little background to analyse/foresee/estimate the impact on the process to enable roll-back of firmware for all printer types and producers. It's even too little evidence to state that since it has happened once it should be used as a comprehensive criteria, No evidence have been brought forward or attempt to estimate, on how much resources (effort, time) it took to make this happen in the single occasion referred to and what it would entail if the process should be widely used by industry.

Comment partially accepted: Assessments have shown that it is possible to roll-back firmware. Security updates should still be installed without being rolled back. The aim of this criterion is to enable user to roll-back the firmware update in the situation when the IE product rejects remanufactured cartridges after the update is installed. Such situation should be avoided. The text has been modified to alternatively allow that tenderers provide a solution in case a software update prevents the use of reused/remanufactured. The reference to HP dynamic security update has been corrected.

<p><i>It's worrying that JRC have only acknowledged, and don't request background data, to the comment (TR 2.0, p. 136 (or p.155 using the Adobe reader counter) that if it's impossible to roll back firmware then this would have a "exponentially increased risk when handling empty cartridges. The comment implies that if a firmware update has made it impossible to use a remanufactured cartridge in a printer supposedly the cartridge (?) is thrown away although not emptied. The comment also implies that this is the case today and "invalidating a remanufactured cartridge may represent an environmental offense as goes directly against the spirit of the WEEE ." However, in line with our comment to T55, Capability to use remanufactured cartridges, Blue Angel certified printer systems already require the capability to be kept. We support T55.</i></p> <p><i>Our earlier comments on 1st draft TR: Users are given a choice to accept/ or not firmware updates automatically during set-up of the device and can opt-out at a later date. Firmware is generally updated with regular intervals to, for example, fix technical bugs, improve print quality and/or improve the functionality of existing features. However, one of the main functions of firmware updates is to provide security patches and enhancements which by their nature are intended not to be open for rolling back. Rolling back Firmware can expose printer to a risk of network security vulnerabilities. (i.e. cyber-attack) Public sector has the obligation under GDPR to ensure that they take adequate technical and organizational measures to protect personal data. This includes IT security so decisions made to decline firmware updates could not only lead to increased risk of hacking but also put them in breach of GDPR.</i></p> <p><i>The Technical Report itself mentions at 2.2.13.1 that the market availability of this option has not been established and none of the main schemes used as background for this proposed criterion include this. The technical feasibility and reasonableness of this proposal has also not been assessed.</i></p>	
TS14 Warranty and service agreements	
<p><i>Again, inclusion of scanners seems to be odd. Kodak Alaris is a major manufacturer of scanners but are not included. Would it make more sense to account for features that are "not relevant" but still important for GPP as done with EPEAT?</i></p>	<p>Comment rejected: It cannot be seen why this criterion would not apply to scanners. There is no reason to exclude them. No change introduced.</p>
<p><i>Strongly support the award criterion for manufacturers / providers that ensure a longer warranty than the minimum. Strongly support that "the warranty must not be invalidated as a result of non-OEM cartridges or containers being used..."</i></p>	<p>Comment accepted, no change: Noted.</p>
<p><i>Please add to the list of reuse blockades the wording in red font below:</i></p> <p><i>Warranties must be honored also when remanufactured cartridges are used. Only if the remanufactured cartridge is the single cause of the printer defect may the warranty be refused. The repairer must conform this in writing.</i></p>	<p>Comment accepted: Text regarding remanufactured cartridges is added to the core criteria.</p>
<p><i>The proposed free warranty period of "2 years" should be amended as "1 year".</i></p>	

<p><i>Reasons:</i> The extension of the warranty period requires verification of the durability of the entire product and a review of the structural design, which places a heavy burden on the manufacturer.</p>	<p>Comment rejected: Extended life time is one of the most important factors to lower the environmental burden of imaging equipment. The best way to ensure a long life time is a minimum warranty, to prevent premature defects.</p>
<p><i>TS14 Comprehensive now mentions</i> "The warranty must not be invalidated as a result of non-OEM cartridges or containers being used in imaging equipment unless it is proven that any malfunction or damage was directly caused by the use of a non-OEM cartridge or container."</p> <p>We welcome that JRC acknowledge that IE manufacturer can't be held responsible for damages caused by a consumable not provided by the print manufacturer or some entity that has commissioned the right to produce consumables of same quality and specifications. We still believe the service concept is not used in the draft criteria in the way its used and understood in industry or in the marketplace. DE's earlier comments where "Service contract" includes fixed price contract, usage contract or combination of those. Under service contract, services listed are normally included.</p> <p>We question that the core requirement should be 2 years based on the overview in the table on page 73. Table 21. An OEM can make a marketing offer of 2 years warranty or more to their customers. This is up to each OEM. Standard warranty and enhanced warranty durations are a sales differentiation for OEMs</p>	<p>Within many product categories, many manufacturers already provide three years of warranty. Even used products can be sold with a warranty of two years.</p> <p>Furthermore, EU consumer guarantee already requires a minimum 2-year guarantee (legal guarantee) for consumers. Therefore, the burden should not be excessive compared to the environmental gains.</p> <p>The suggested warranty periods still leaves room for differentiation among OEMs</p>
<p>1) The proposed free warranty period of "3 years" should be amended as "1 year".</p> <p>2) Delete the 3rd sentence of the proposed criteria text.</p> <p>The warranty must not be invalidated as a result of non-OEM cartridges or containers being used in imaging equipment unless it is proven that any malfunction or damage was directly caused by the use of a non-OEM cartridge or container.</p> <p><i>Reasons:</i> 1) The extension of the warranty period requires verification of the durability of the entire product and a review of the structural design, which places a heavy burden on the manufacturer. 2) It is unacceptable to guarantee including non OEM components because it is beyond general rule of warranty</p>	<p>Comment rejected: Regarding warranty, see our previous answer. The use of cartridges should be decided by the user. In addition, reused consumables and products with a long life time have a lower environmental impact. Hence, it makes sense to ensure a long life time and the users an opportunity to choose a remanufactured cartridge. Shall the cause of malfunctioning be the cartridge, then the OEM manufacturer does not bear responsibility. However, if this is due to any problem with the IE, then the warranty should not be invalidated due to use of remanufactured consumables.</p>
<p>AC4 Take-back system for imaging equipment</p>	
<p>We welcome that JRC has clarified the mentioning of "Free" to "at no cost to the procuring authority" and that it's an award criterion.</p> <p>However, it signals that JRC, and DG Env considers, WEEE is not working in practice. JRC cannot expect from OEMs to pay twice for their end of life management. This is not acceptable.</p> <p>Our comments are the same as for the 1st draft ...Besides, one needs to differentiate between high end and low-end equipment. Assessment is required on this criterion. Today hardware is covered by WEEE, so if individual take back systems are</p>	<p>Comment rejected: This is an award criteria to differentiate tenders. The project team does not question the functioning of the WEEE Directive but notes that different initiatives are carried out to promote and enforce the Directive which e.g. is seen in recent Ecodesign regulations. These criteria encourage manufacturers to establish services that promote a circular economy. This could be by reuse/remanufacturing of equipment or closed-loop recycling.</p> <p>Overall such initiatives as refurbishment should be encouraged and this award criteria seems fit to stimulate this approach.</p> <p>As for the take-back system, the third-party organisation may be the established national WEEE system, therefore there will be no double payment.</p>

<p><i>recommended a wrong signal would be sent that WEEE doesn't work. There could be a distinction between large equipment and small equipment (large equipment should be taken back not small equipment).</i></p> <p><i>We consider both AC4 Core and comprehensive award criteria to be too difficult to verify at the time of purchase. It's mentioned it should be used in conjunction with the contract performance clause CPC2, and we suggest it's only used as this.</i></p> <p><i>Furthermore, we question the need to list all the components that needs special treatment according to WEEE in the criteria text as the criteria text will be too long for procurers to consider using. Just as a remark, these criteria cover with background etc. takes 10 pages out of the TR to explain, and we highly question it will be used.</i></p> <p><i>JRC ask one additional question to stakeholders in TR 2.0: Do you agree with the spare parts list included in the core technical specification or do you consider it should be expanded to cover additional spare parts? In the latter case, please provide a proposal. "</i></p> <p><i>A spare parts list can only be provided as guidance as each product family has a different list of spares depending its eco-design.</i></p>	<p>We acknowledge the last comment regarding list of spare parts, which applies to parts, which are appropriate for a certain product model/family.</p>
<p>End-of-life management services - Background for the proposed criteria</p>	
<p><i>Update needed in relation to categories of equipment set out in the WEEE Directive</i></p> <p><i>From 15.8.2018 the new categories set out in Annex III. According to this classification, imaging equipment can be classified either under category 4 "Large equipment" or under category 5 "Small equipment" depending on the size of the imaging equipment (larger or smaller than 50 cm)</i></p>	<p>Comment accepted: Footnote inserted.</p>
<p><i>Mistake related to the WEEE recovery targets set out in the WEEE Directive</i></p> <p><i>Please correct the mistake (reference Annex V to the WEEE Directive 2012/19/EU, part 3) as follows:</i></p> <p><i>"It requires that 8580% of imaging equipment is recovered and 80% is prepared for re-use and recycling. For small equipment with no external dimension more than 50 cm the targets 75% for recovery and 55% for recycling."</i></p>	<p>Comment accepted: Text corrected</p>
<p>TS15 (a) Supply of copy and graphic paper meeting the EU GPP criteria</p>	
<p><i>Clarification needed, is the TR2.0 complete in this section?</i></p> <p><i>The 2nd draft TR contains for a majority of the other criteria sections as follows</i></p> <ul style="list-style-type: none"> - x.x.x.1 Background for the proposed criteria - x.x.x.2 Background for the proposed verification, - and x.x.x.3 Further background after AHWG meeting. <p><i>These sections are missing in the TR 2.0 for 2.2.16.</i></p> <p><i>A mail was sent June 20th to one JRC contact and the generic JRC-B5- IMAGING-EQUIPMENT@ec.europa.eu mail address but no reply as of July 11th.</i></p>	<p>Comment partially accepted: No need for clarification as these criteria consist of other criteria to which references are made. However, a short clarification is inserted in the introductory part.</p>

<p>Scanner should be out of the scope. Reasons: The criterion is not applicable to scanners.</p>	<p>Comment rejected: If copy and graphic paper and consumables are included in a scanner supply contract, they would be in scope.</p>
<p>ACS Supply of remanufactured cartridges/containers</p>	
<p>We propose to revise the criteria as follows:</p> <p>Section 2.2.16 Core criteria <u>ACS Supply of remanufactured cartridges/containers or cartridges/containers made with recycled materials</u></p> <p>Points must be awarded in proportion to the commitment to provide the highest percentage (share) of remanufactured cartridges/containers <u>or cartridges/containers made with recycled materials</u> which comply with Core Technical Specifications included in EU GPP Criteria Area 2 Imaging equipment consumables.</p> <p>Comprehensive criteria <u>ACS Provision of remanufactured cartridges/containers or cartridges/containers made with recycled materials</u></p> <p>Points must be awarded in proportion to the amount of pages printed by remanufactured cartridges/containers <u>or cartridges/containers made with recycled materials</u> which comply with Core Technical Specifications included in EU GPP Criteria Area 2 Imaging equipment consumables.</p> <p><u>Reason:</u> From the viewpoint of material efficiency, cartridges and containers made using recycled materials have the same effect as reused/remanufactured. Therefore, we propose to add award criteria for cartridges and containers made using recycled materials as well.</p>	<p>Comment rejected: LCAs can be performed in various ways and with different boundary conditions. We have assessed a number of LCAs and the overall conclusion is that reuse is often the preferred option regarding environmental impact. This is also in line with many other LCAs for other product groups, which often support the waste hierarchy. As the waste hierarchy suggests it is better to reuse than to recycle.</p> <p>With certain boundary conditions, an LCA may suggest that recycling is better than reuse, but overall it is considered that in most cases that reuse is the option with the lowest environmental impact in particular in combination with the quality requirements suggested in Criteria area 2, which apply to remanufactured consumables.</p> <p>It should also be noted that the GPP criteria do not promote third party remanufacturing but rather aims to incentivise remanufacturing in general, independently whether done by OEM or non-OEM entities.</p> <p>With regards to the use of recycled content in the product, this criterion was removed due to difficulty in the verification process by the procurers.</p>
<p>We commented in the first consultation on AC6 that covered Supply of reused/remanufactured cartridges that we consider the scientific background for the overall aim to promote cartridges that are used for the 2nd (remanufactured, reused) time over all other aspects when purchasing IE. Just looking into the number of suggested criteria in TR 2.0 that concerns and promote 2nd use of cartridges this is clear, about 13-14 criteria are pointing to this.</p> <p>In the comment to the first consultation, AC6, JRC points to LCA's refer to as S8 and S9 in the draft PR. S8 is from 2014 so fairly recent but based on five (!) use cycles of a cartridges and S9 was a decade old in 2018.</p> <p>We commented that we don't consider this to be scientific evidence that third party remans should always be preferred before OEM new cartridge.</p> <p>We encourage JRC to point to data that shows that third party remanufacturing is most often done close to five times, as the intelligence held by OEMs states once or seldom twice,</p> <p>To use an LCA that was produced now eleven years ago in a fast-moving industry as the IT industry is not scientific.</p>	

<p>In JRC's comment on former criterion AC6 on page 138 (or p.144 using Adobes page counter) JRC states: We suggest to stick this comparison to the resources saved during manufacturing/re manufacturing and combine this with the consumable yield criterion to ensure avoiding the use of large amounts of paper by using an existing harmonized metric" We look for clarification from JRC if the quality of the printout is not to be taken into account at all. In reference it can be mentioned that the Swedish newly published IE GPP from Upphandlingsmyndigheten this potential stakeholder for the EU GPP for IE, have chosen to add quality criteria for remanufactured / refilled cartridges only (criterion 3.2) and not for OEM cartridges.</p> <p>Also, in a broader perspective we want to emphasise that when printing is delivered as a service the full life cycle impact of printing can be taken into account and handled by print service experts, with a high potential for overall reduced environmental impact.</p> <p>If the one-sided promotion of third-party remanufactured cartridges is made by JRC for the purpose of reducing the environmental impact of printing, we suggest to instead further develop the criteria are a 3 on Services. In many print services concept to day are high-yield cartridges part of the set-up and this means 'designing out waste' rather than 'reuse'.</p> <p>Each criterion on provision of reman cartridges should include an 'OR' statement. 'Provision of reman cartridges... OR an MPS contract, OR high/ultra-high yield cartridges, OR consumables (cartridges and containers) used recycled materials.' 'JRC simply are not providing credit for 'designing waste out' or 'reduce' as opposed to 'reuse'</p> <p>Further, we suggest adding the award criteria about consumable (cartridges and containers) used postconsumer recycled plastic. For resource efficiency, it is important using recycled materials as well as reusing/re manufacturing.</p>	
<p>We do not support the use of this criteria; background is given in above comment. Needs clarification, how will this be checked in the tender phase that a specific number of pages will be printed with a certain type of cartridges?</p>	<p>Comment partially accepted: The comprehensive criterion has been aligned with the core.</p>
<p>TS16 Cartridges/containers page-yield declaration</p>	
<p>General. Fostering dissemination amongst users of the benefits and quality of remanufactured cartridges</p> <p>I suggest requiring the inclusion of written documentation, inside and / or outside of the consumable packages, informing of:</p> <ul style="list-style-type: none"> •The ecological advantages of the circular economy and re manufacturing initiatives •The quality levels of this very remanufactured consumables versus OEM ones, backed by official information, if possible assessed by a 3rd party 	<p>Comment rejected: The quality of consumables shall be ensured by quality requirements. See section 2.3. Whether or not to inform about circular economy shall be decided by the individual manufacturer. Furthermore, many packages are small and it is difficult to find place for providing this information.</p>

<p><i>Include consideration for Chip behaviour when extending EOM Yields.</i></p> <p><i>Cartridges with extended yields can introduce abnormal chip behaviour when computing cartridge remaining pages</i></p> <p><i>This can confuse users, so they ask a new cartridge near to the end of the OEM yield. This erodes the green and economic gains associated with the extended Yield</i></p> <p><i>Best known chip approaches to tackle with this issue, introduce a plateau for the extra yield at some point, near the end of the OEM capacity</i></p> <p><i>I propose to award Extended yield, just in case the chip behaves as described in the previous paragraph</i></p>	<p>Comment rejected: We cannot recognise this issue. Typically, the non-OEM consumables have more or less same amount of ink/toner as the OEM ones. Furthermore, replacement or reset chips would typically also be adjusted to the ink/toner content.</p>
<p><i>It is not explained why the award criterion that should have promoted material efficiency of consumable has been removed. Being page-yield of cartridges comparable through ISO standards (see TS16), an award criterion encouraging longer duration of cartridges should be introduced.</i></p>	<p>Comment rejected: It was decided to remove the initially proposed award criterion on extended page-yield mainly due to difficulty in verification as the criterion required comparing cartridges provided by different tenderers. In addition, resource efficiency is considered to be already comprehensively addressed by other criteria.</p>
<p><i>The sentence "It was decided to remove the initially proposed award criterion on extended page-yield mainly due to difficulty in verification ..." is not consistent with the previous sentence in 2.3.1.2 "the ISO standards provide a common printed output so that comparisons of page-yields across different cartridges and containers can be made".</i></p>	
<p>TS17 Consumable mass resource efficiency</p>	
<p><i>Clarification for scope of consumables</i></p> <p><i>Some manufacturers supplies consist of assemblies of toner and drum. Some others sell those supplies as separated items, others include a drum whose expected life goes beyond the expected life of the equipment itself</i></p> <p><i>It would be interesting to define a criterion that covers all three scenarios, defining which parts shall be considered as consumables, and what life cycle to consider for the consumables of the 3rd group</i></p>	<p>Comment rejected: It is seen as too complex to cover all possible types of supplies. With the current proposal the majority of the supplies will be covered.</p>
<p><i>Effect of dissociating toner and drum towards usability</i></p> <p><i>In my company we did introduce Oki Colour printers, at the beginning of high-speed laser printing</i></p> <p><i>One of the drawbacks was the spill of toner powder when the users did substitute the toner cartridges</i></p> <p><i>I suggest including a complementary award criterion on usability that modulates the award on material efficiency to compensate for the decrease in usability when dissociating toner powder from drum cartridge</i></p>	<p>Comment rejected: It is believed that this issue is not very typical, also due to complaints from consumers, if there is too much toner waste.</p>
<p><i>The way this criterion is constructed, on yield to mass ratio of cartridges is simply a preference for an electrophotographic architecture where the drum is separate from the cartridge. We question if this is the intention.</i></p> <p><i>There two key issues for TS17:</i></p> <ol style="list-style-type: none"> <i>1) The exclusion of all the packaging and user removed material can favor a specific type of design and ignore the environmental impact of these other materials.</i> <i>2) Making it a "must" and establishing the threshold at ~50% of the population would eliminate half the suppliers which seems excessive.</i> <p><i>If JRC still wants to suggest these criteria, a better proposal is to include all materials shipped with the cartridge or container and to assign points based on the efficiency calculation and eliminate all the threshold curve fitting.</i></p>	<p>Comments rejected: The formula is aligned with the formula proposed in the VA study. This suggestion is considered to be the best method to assess the mass resource efficiency of consumables.</p> <p>The criterion does not favour electrographic in front of inkjet technologies as in a tenderer only specific type of consumables will be requested and the compared. In a tender, the different technologies will not compete.</p> <p>Regarding separation of drum from cartridge, it will typically reduce waste because the drum has longer life time.</p> <p>This suggestion value the reduce element of the waste hierarchy.</p> <p>The combined set of criteria ensures consumables of high quality, high yield and low use of materials.</p>

<p>JRC mentions in the comments p. 140 that "Encouraging less material use per printed page will reduce the need to process materials in the manufacture and recycling/reuse of consumables" We want to emphasize the need to look at not only the page-yield or amount of resources used to put ink or toner on the paper but that the production of paper is many times higher impact than production of the toner/ink that lands on it. Having a desirable to the user print-out quality to avoid a second print-out should be of much higher concern for JRC.</p> <p>We also want to reiterate that this will be a time consuming and difficult task for procurers to be able to follow-up and check that these criteria is met.</p>	<p>This specific criteria set does not deal with impacts of graphic paper, for which separate set of GPP criteria exists.</p>
<p>This criterion should be deleted.</p> <p>Reasons: Page-yield per 1 gram of consumables (e.g. toner cartridges) does NOT always show the resource efficiency. We believe that providing page-yield information based on ISO method in TS16 is enough. It is NOT suitable to calculate the consumable mass resource efficiency by using the equation shown in the 2.3.2 since some other conditions (e.g. functions in main product etc.) have to be considered to determine the page-yield in practice.</p>	
<p>Consumable mass resource efficiency - Reduced number of materials</p>	
<p>Best practice to award reduced number of materials</p> <p>There are many awarding criterions associated to technical aspects of the products, that could be assessed once by a central agency, and shared at least to all the public tenders in the EU</p> <p>I propose to create a Central Agency to carry al this work, so that they could directly award some points to be included in subsequent procurements</p>	<p>Comment acknowledged: This suggestion, even though would be very useful in supporting green public procurement in the EU, goes beyond the scope of this GPP criteria revision process.</p>
<p>Consumable mass resource efficiency - Further background after AHWG meeting</p>	
<p>Effect of introducing a criterion to award a reduced number of materials to award tender complexity The technical expertise required to assist in such evaluations, can be financially cumbersome for the whole contract, at least in countries like Spain, where appropriate profiles are very scarce in the Public Sector, and mainly devoted to managerial roles. I propose not to include this criterion unless there is some third party that does the calculation work for the contractors</p>	<p>Comment rejected: The criterion has already been removed prior to the written consultation.</p>
<p>TS18 Consumable hazardous substances content</p>	
<p>Not to consider manufacturer own tests illustrating the lack of any of the excluded substances Considering the Diesel emission scandal, I think that it is too dangerous to rely on manufacturers self-assessment, so I would only allow for third party assessment</p>	<p>Comment acknowledged: Third party assessment, even though would highly increase certainty of the compliance with the criterion, due to its complexity, would increase also significantly the overall costs. Therefore, it is not suggested here.</p>
<p>The criteria should be harmonized with Blue Angel UZ 205, section 3.2.3.</p> <p>We propose to amend text and table in the 1st paragraph of TS18 as follows:</p> <p>TS18 Consumable hazardous substances content</p>	<p>Comment accepted: The requested harmonisation in the wording of the criterion has been made.</p>

Colourants used in consumable products must not contain any intentionally added substances that meet the classifications in the table TS18(1).

Hazard class	Hazard category	CLP-regulation (EC) No. 1272/2008
Carcinogenicity	Carc. 1A, 1B	H350 May cause cancer
Carcinogenicity	Carc. 1A, 1B	H350i May cause cancer if inhaled
Carcinogenicity	Carc. 2	H351 Suspected of causing cancer
Germ cell mutagenicity	Muta. 1A, 1B	H340 May cause genetic damage
Germ cell mutagenicity	Muta. 2	H341 Suspected of causing genetic defects
Reproductive toxicity	Repr. 1A, 1B	H360 May damage fertility or the unborn child
Reproductive toxicity	Repr. 2	H361 Suspected of damaging fertility or the unborn child

Substances of the so-called candidate list according to REACH Article 59. The version of the candidate list at the point of application applies.¹⁴

In addition, colourants must not contain substances as intentionally added constituents which require labelling of the mixture according to Annex 1 of Regulation (EC) No. 1272/2008 with the H phrases or which meet the criteria of the according classification in Table TS18(2)

Table TS18(2)

Exemptions are approved for the case where a substance listed in the above tables is used as constituent because it is technically inevitable, an alternative is not available, and the document to show the rationale is prepared.

Reasons:

We think that it should be harmonized with UZ 205.

The table described in chapter 2.3.3 should be clearly divided in CMR criteria (Carc. 1A, 1B, 2, Muta. 1A, 1B, 2 and Repr.1A, 1B, 2) and STOT criteria (STOT SE 1, 2 and STOT RE 1, 2) because these criteria are clearly divided and distinguished in UZ 205 (please refer UZ 205 3.2.3.1).

In chapter 2.3.3.1 of the second draft GPP standard, JRC mentions that CMR criteria and STOT criteria are separated in Table 31 and Table 32 within the UZ 205 standard.

So, it should be strictly divided within the GPP standard as well.

The refore, delete STOT class/category from the prohibition substance list, and add the prohibition for mixtures classified as STOT in accordance with UZ 205 3.2.3.

In addition, add the exemption for the case where a substance listed is used as constituent because it is technically inevitable, an alternative is not available, and the document to show the rationale is prepared. In UZ 205, as seen in the measures for the change of the candidate list in Annex 1, the exemption in such cases is accepted subject to agreement with UBA.

Should be harmonized with RAL UZ 205.

The table described in chapter 2.3.3 should be clearly divided in CMR criteria (Carc. 1A, 1B, 2, Muta. 1A, 1B, 2 and Repr.1A, 1B, 2) and STOT criteria (STOT SE 1, 2 and STOT RE 1, 2) because these criteria are clearly divided and distinguished in RAL-UZ 205 (please refer RAL-UZ 205 3.2.3.1).

In chapter 2.3.3.1 of the second draft GPP standard, JRC mentions that CMR criteria and STOT criteria are separated in Table 31 and Table 32 within the

RAL-UZ 205 standard.

So, it should be strictly divided within the GPP standard as well.

<p><i>The refore, delete STOT class/category from the prohibition substance list, and add the prohibition for mixtures classified as STOT in accordance with RAL UZ 205 3.2.3.</i></p> <p><i>In addition, add the exemption for the case where a substance listed is used as constituent because it is technically inevitable, an alternative is not available, and the document to show the rationale is prepared. In RAL UZ 205, as seen in the measures for the change of the candidate list in Annex 1, the exemption in such cases is accepted subject to agreement with UBA.</i></p>	
<p>Consumable hazardous substances content - Background for the proposed verification</p>	
<p><i>Consider the value added of Nordic Swan in testing specific products and publishing the results in its web</i></p> <p><i>To my knowledge, Nordic Swan outperforms Blue Angel in transparency and dissemination of hazardous substances content tests, because it maintains a web site with all individual products awarded the Nordic Swan Label, and it makes quite easy for customer to assess compliance by suppliers</i></p>	<p>Comment acknowledged: Such a database would definitely simplify the verification process, nevertheless this is beyond the scope of the criteria revision process.</p> <p>Just a clarification: Also Blue Angel maintains a website with certified products. Please see https://www.blauer-engel.de/en/products/electric-devices/printers-and-multifunction-devices/printer for specific brands and models.</p>
<p>TS19 Design for reuse/remanufacturing</p>	
<p><i>Both core criteria and comprehensive criteria are strongly supported and should be reinforced by adding to examples of features that could limit the ability to remanufacture/reuse a clause about warranty, that must not be reduced or annulled should remanufactured/reused cartridges are used.</i></p>	<p>Comment acknowledged: The specific examples for features are included in the award criterion. The phrase regarding warranty not being annulled when remanufactured cartridges are used needs to be included in respective criteria on imaging equipment products but not in consumables.</p>
<p><i>Best Practices</i></p> <p><i>The ability to monitor usage with IT tools can be compromised in unfriendly IT environments, like printer Floating IPs, and highly secured environments where monitoring tools can pose a security threat</i></p> <p><i>I propose:</i></p> <p><i>a) To adapt monitoring tools to work with domain names instead of IP addresses,</i></p> <p><i>b) Promote monitoring tools able to run in the public side of hybrid clouds, so that securitization issues regarding these tools, somehow can be subcontracted to the cloud provider</i></p>	<p>Comment rejected: This comment is not about reuse and remanufacturing. The requirement may be relevant for the IT security at the consumer; however, it does not have an environmental impact and is therefore out of scope of GPP.</p>
<p><i>It's worrying to read the notation of the so called "chip issue" in JRCs comments to the first consultation. We believe this reflects a negative stance towards OEM manufacturers that is not reflecting the balance approach to different stakeholders' input that is the role of the JRC in line with the EU Public procurement basic principles.</i></p> <p><i>Since we don't believe the earlier comments have been replied or taken into enough consideration, we would like to submit them again:</i></p> <ul style="list-style-type: none"> <i>- How is this intended to be answered to by suppliers of non-originals, is it a generic "fulfilled"?</i> <i>- It's a technical specification that would limit industries intellectual property right.</i> <p><i>There is nothing in the patent laws applicable in Europe (either the EPC or national patent laws) that limits the rights of patent owners in the manner of this wording</i></p> <p><i>No reason for limitation of the rights of patent owners from legal point of view, and no need to further limit the rights of patent owners beyond National court decisions in EU member states</i></p> <ul style="list-style-type: none"> <i>- Industry is concerned about the restriction on the use of patents. This is putting IP rights and innovation in danger. The requirement shall be aligned with BA section 3.1.1.3. (Table 3 Nr 5)</i> 	<p>Comment rejected: The requirement is not for placing products on the market, it is related to an organisation's tender and it is not seen that this would limit the rights of patents or licenses.</p>

<p><i>Clever chips/embedded software are the largest barrier to cartridge reuse. They should be prohibited unless its codes are made available to 3rd parties under a reasonable license agreement. The GPP team says a limit to chips could impact product availability. But no evidence is given for this statement. We support the mentioning in AC7 and AC8 but ask that also wording on licensing be added: Devices and practices that prevent reuse/remanufacturing of toner and/or ink cartridge (i.e. anti-reutilisation devices/practices) should not be present or applied in the imaging equipment, unless a licensing agreement with 3rd parties on normal economic terms providing full access is available</i></p> <p><i>Re Core criterion TS19: no OEM will write this on their cartridge anymore. But that does not mean that the cartridge design will allow reuse. The Comprehensive criterion TS19 is too weak. A mere statement from the OEM that "cartridges are not purposely designed to limit the ability to remanufacture" will not deliver tangible benefits in the market. It is easy for an OEM to make such a statement but it will be almost impossible for a 3rd party to prove that a cartridge was designed with blocking its reuse in mind. Stakeholder calls for more strict wording as above in red font.</i></p> <p><i>Please check as we think that there is an unintended double negative (you may need to remove the words "are not") here: Cartridges or containers are not covered by patents or licence agreements which include statements that seek to limit remanufacturing</i></p>	<p>Comment partially accepted: Technical specification for consumables requires that features which unallow reuse of consumables are forbidden in the design of the products. In addition, in the section of criteria for imaging equipment, it is required that IE must not prevent use of remanufactured consumables. Award criteria go beyond and specify which features should not be present (e.g. avoidance of a chip or a functionality allowing its reset) or which options should be available in order to facilitate reuse and remanufacturing (e.g. ability for non-OEM organisations to purchase the rights, from an OEM to reset the chip). Double negative has been removed.</p>
<p><i>The criteria should be completely harmonized with Blue Angel UZ 205, section 3.1.1.3-Table 3-No.5 as follows: "Cartridges should be able to be refurbished."</i></p> <p><i>Reasons: Though it is general statement, it is widely accepted by worldwide Type I Eco-labels.</i></p>	<p>Comment rejected: The definition and understanding of refurbishment can vary. Some consider refurbishment as an action performed by the manufacturer. Hence, the current wording is kept.</p>
<p>AC7 Advanced design for reuse/remanufacturing</p>	
<p><i>Since we don't believe the earlier comments have been replied or taken into enough consideration, we would like to submit them again:</i></p> <ul style="list-style-type: none"> - <i>What is an annotated product schematic?</i> - <i>The issues associated with this proposal are far more complex than the drafting allows for and it is submitted that the criteria will be unworkable for public authorities in practice. For example:</i> - <i>How are authorities to rank the different sub-criteria? How do they decide which gets more points: the cartridge without a chip</i> 	<p>Comment partially accepted: "Annotated product schematic" has been substituted with "documentation". In addition, in the list of features "at least one" has been added in order to clarify that award points should be added if any of the features have been applied, eliminating the need of performing weighting the proposals by the procurers.</p>
<p>AC8 Facilitating reusability/remanufacturability</p>	
<p><i>Since we don't believe the earlier comments have been replied or taken into enough consideration, we would like to submit them again:</i></p> <ul style="list-style-type: none"> - <i>What is a reasonable cost, and reasonable to whom?</i> - <i>What is an annotated product schematic?</i> <p><i>We consider the verification to be tricky for most procurers that requests easy to use and easy to verify criteria.</i></p>	<p>Comment partially accepted: The statement "Reasonable cost" is used in Eco design. In addition, the Commission is currently working on the Life Cycle Costing tool for a number of products, among them for imaging equipment. Such a tool will facilitate evaluation of the costs for different elements of the purchasing process. "Annotated product scheme" has been replaced by "documentation which explains which of the features/actions to facilitate the reuse and/or remanufacture of consumables have been applied".</p>
<p>TS20 Consumable quality</p>	

<p><i>TS20 Consumable quality</i></p> <p><i>The following text should be added in section 2.3.5.1 Background for the proposed criteria</i></p> <p><i>Consumable compliance: cartridges must have a CE marking, and this means that they have to comply with all relevant directives including RoHS , REACH and WEEE.</i></p> <p><i>For new build cartridges coming to Europe it also might be necessary to comply with LVD and EMC directive.</i></p> <p><i>There is very little evidence about imported cartridges from outside of Europe (New build but also remanufactured) comply with the directives.</i></p>	<p>Comment acknowledged: This information is relevant to be addressed in the pre-requisites to the criteria. It will be included in the Staff Working Document.</p>
<p><i>Measurement of annual average level of complaints (Nordic Swan figures)</i></p> <p><i>In my company measured complains in considerably lower than real failures, because of lack of reporting failures</i></p> <p><i>Failures, as possible should be inferred indirectly by the monitoring tool from abnormal yields</i></p>	<p>Comment acknowledged: It is considered that procurers would definitely benefit from setting such a system and notifying the tenderer on the level of complaints and failures should be done. Nevertheless, we believe it is difficult to include such criteria in GPP.</p>
<p><i>Question to Stakeholders</i></p> <p><i>Concerning Consumable Quality of OEM Manufacturers, end users tend to assume that they are 100% reliable.</i></p> <p><i>My personal feeling is that OEM products are at least 10 times more reliable than remanufactured ones</i></p> <p><i>So, requiring OEM manufacturers to expose figures on reliability would provide a twofold effect:</i></p> <ul style="list-style-type: none"> <i>•Foster pressure on reliability requirements to Remanufacturers by the market, because of this gap in reliability</i> <i>•Break the end user perception that OEM consumables are 100% reliable</i> 	
<p><i>Annual target level of complaints (Nordic Swan figures)</i></p> <p><i>One of the main pitfalls in remanufactured to new adoption is failures</i></p> <p><i>In critical environments (like hospitals), failures are not tolerated by end users</i></p> <p><i>1% target is a good starting point, but GPP should encourage improvements to ward 3, 4, or more nines of quality (99,99% or greater default free rates)</i></p>	
<p><i>Colour image quality is key for user adoption</i></p> <p><i>As far as I know there are no standard procedures to measure this item</i></p> <p><i>We use a custom procedure that compares volumes of colour spaces, derived from the doctoral thesis of Dr Kiran Deshpande, that was already introduced in the previous draft comments</i></p> <p><i>I suggest promoting this procedure in the absence of a better one</i></p>	<p>Comment rejected: In the situation of lack of recognised standards for testing colour image quality it is difficult to request inclusion of a specific requirement on this aspect.</p>
<p><i>Non-OEM new build cartridges</i></p> <p><i>A previous comment asked for including wording to prohibit patent-infringing non-OEM cartridges. This comment was rejected by the JRC, which argued that legal issues related to patent infringement are beyond the GPP revision scope.</i></p> <p><i>We insist that "legal" also means that products comply with EU rules on Reach, RoHS CLP, WEEE etc. These GPP criteria should require new builds to demonstrate such compliance.</i></p>	<p>Comment accepted: Text updated and the pointed out statement removed. The criterion text was amended and now all cartridges are now included in the criteria. Testing according to DIN 33871-2 was added to the criteria text.</p>

<p>Also, according to EPR, suppliers must have a legal entity in the EU or, at a minimum, an authorized representative in the EU (cf. VAT legislation). The reality however is that thousands of non-EU suppliers send products to the EU every day without any compliance with these rules, creating an unlevel playing field with EU suppliers.</p>	
<p>Stakeholder rejects the statement that "Coverage of quality issues for consumables in other initiatives is largely limited to remanufactured consumables rather than new-built consumables. Some remanufactured consumables have suffered with quality issues in the past, due to imperfect remanufacturing processes."</p> <p>There is no empirical evidence at all for this statement, and the GP documents do not give this evidence. There is only the comment from biased OEM-paid but not independent "studies". The market reality is that non-OEM newbuilts from Asia suffer from major quality performance issues EU-wide. That is why, as mentioned at the Sevilla meeting, this Criterion must apply to all cartridges or to none. In its current proposed wording this criterion is not acceptable. It will be counterproductive. It cannot be that remanufactured OEM cartridges are obliged to meet strict quality standards, but OEM and newbuilt non-OEM cartridges can have any low quality they like, but still be considered to comply with these GPP criteria. This is unfair and against the objective of promoting cartridge reuse as a cartridge. It will reduce the number of remanufactured cartridges in the market, which is contrary to the objectives of these GPP criteria.</p> <p>It must be clarified in the criteria that there is no accepted general quality standard for new-builds, and they are the least preferred option in terms of environmental performance .</p> <p>As the GPP are only voluntary, such worst environmental and extremely low quality products should be banned! When this is not the case, it must be absolutely clear that newbuilts have to demonstrate (and never by way of self-declarations) that they comply with RoHS, REACH registration at ECHA, and WEEE, according to member state that might even require a threshold of preparation for reuse</p> <p>Please correct the following: DIN 33870-1 and 33870-2 and 33871-1 apply only to remanufactured cartridges. But 33871-2 applies only to new cartridges.</p>	
TS21 Take-back system for cartridges and containers and WEEE registration	
<p>Free of charge approach I agree 100% percent in this approach to foster availability of empty cartridges</p>	<p>Comment accepted: Noted</p>
<p>It should be clearly stated that re-use and remanufacturing must be preferred over raw material recycling. E.g. by a point system</p>	<p>Comment rejected: Reuse and remanufacturing are better choices than the recycling of materials from an environmental point of view in most cases and their preference is also reflected in the waste hierarchy, which was applied in all the criteria. This specific requirement refers only to facilitating a system from free of charge take-back system from the procurers.</p>
TS22(a) Commitment to reuse of imaging equipment	
<p>The GPP should not focus just in contracts where the provider is the owner of the image equipment, but also should provide guidance for the contracts where the customer is the owner of the image equipment.</p>	<p>Comment acknowledged: GPP criteria cover both situations, i.e. when the customer (i.e. procuring authority) becomes the owner and of only print service provision without the need of the procurer to</p>

<p>The later, there is an additional item to consider, that is in what circumstances an image equipment has to be replaced with a new one</p> <p>The replacement should be driven by optimal equipment usage, measured in financial terms. This implies a requirement of transparency in operational costs by the supplier, so that those calculations can be computed</p> <p>The above calculations should include explicit end of life and disposal costs, including a valuation of the disposal's ecological impact</p>	<p>own the equipment. Criterion CPC1 Preliminary assessment of existing fleet and procurement needs can be used when the procuring authority owns the IE and wants to e.g. "re new" its fleet. The proposed calculation of costs could be a part of Life Cycle Cost analysis accompanying the tendering process.</p>
<p>Encouraging reuse of existing image equipment</p> <p>The reuse should be driven by optimal equipment usage, measured in financial terms. The above calculations should include explicit end of life and disposal costs, including a valuation of the disposal's ecological impact</p>	
<p>The use of the words "evidence" and "adequate reasoning" appear too broad, above all if we think that we have two sides (service provider and public procurer) with very different knowledge of printing issues, which potentially could make the less informed side easily manipulated. Need to establish more robust metrics.</p>	<p>Comment acknowledged: This is correct that the terms are very "broad". Nevertheless, these metrics are the best suggestions and it is difficult to create more robust metrics with a low complexity, which would stimulate reuse of imaging equipment when still fully functional and with appropriate environmental performance.</p>
<p>Since we don't believe the earlier comments have been replied or taken into enough consideration, we would like to submit them again:</p> <ul style="list-style-type: none"> - If the criterion is kept, then add: "As long as the old equipment have the best environmental technology" - Add, after ...new products: ...under service contract if machine life can be supported. <p>In addition, if the one-sided promotion of reused equipment is made by JRC for the purpose of reducing the environmental impact of printing we suggest to instead further develop the criteria area 3 on Services. In many print services concept to day reusing or re deploying hardware in new functions (other users or operations than in the first use) is common practice. The focus is then circular use of print systems, 'reduce, designing out of waste' rather than 'reuse' only</p>	<p>Comment rejected: This is already covered by this statement in the text: "This requirement does not apply where a supplier provides evidence showing that replacing an existing product with a more efficient product(s) would reduce overall environmental impacts. This requirement does not apply where a supplier provides adequate reasoning identifying why the use of older equipment cannot be supported." This is considered adequate, as it then shall be proven that a replacement of equipment is a benefit for the environment. JRC does not promote only reused imaging equipment but rather intends to provide incentives to the tenderers to reuse in the future of equipment which is fully functional and with good environmental performance.</p>
<p>Commitment to reuse and repair imaging equipment products - Background for the proposed criteria</p>	
<p>Verification again appears too broad, only a "declared" commitment and no "formal" commitment.</p>	<p>Comment rejected: A signed declaration by the tenderer is considered a formal commitment to comply with criteria.</p>
<p>TS24(a) Supply of copy and graphic paper meeting the EU GPP criteria</p>	
<p>Points must be awarded for the commitment to provide the highest percentage of reuse / remanufactured cartridges</p> <p>Those points should be awarded just in case the Service provider commits to assume all repairs in despite of claims of warranty coverage loss by the equipment manufacturers</p>	<p>Comment rejected: Described warranty issues related to the imaging equipment are covered under Criteria Area Warranty and service agreements.</p>
<p>AC10 Supply of reused/remanufactured cartridges and containers</p>	
<p>In the comment to the first consultation, for AC12, JRC points to LCA's refer to as S8 and S9 in the draft PR. S8 is from 2014 so fairly recent but based on five (!) use cycles of a cartridges and S9 was a decade old in 2018.</p> <p>We commented that we don't consider this to be scientific evidence that remans should always be preferred before OEM new cartridges.</p>	<p>Comment rejected: LCAs can be performed in various ways and with different boundary conditions. We have assessed a number of LCAs and the overall conclusion is that reuse is often the preferred option regarding environmental impact. This is also in line with many other LCAs for other product groups, which often support the waste hierarchy. As the waste hierarchy suggest it is better to reuse than to recycle.</p>

<p><i>We encourage JRC to point to data that shows that remanufacturing is most often done close to five times, as the intelligence held by OEMs states once or seldom twice, To use an LCA that was produced now eleven years ago in a fast-moving industry as the IT industry is not scientific.</i></p> <p><i>Each criterion on provision of reman cartridges should include an 'OR' statement. 'Provision of reman cartridges... OR an MPS contract, OR high/ultra-high yield cartridges, OR consumables (cartridges and containers) used recycled materials.</i></p> <p><i>We suggest adding the award criteria about consumable (cartridges and containers) used postconsumer recycled plastic.</i></p> <p><i>For resource efficiency, it is important using recycled materials as well as reusing/remanufacturing.</i></p>	<p>With certain boundary conditions, an LCA may suggest that recycling is better than reuse, but overall it is considered that in most cases that reuse is the option with the lowest environmental impact in particular in combination with the quality requirements suggested in Criteria area 2, which apply to manufactured consumables.</p> <p>It should also be noted that the GPP criteria do not promote third party remanufacturing but rather aims to incentivise remanufacturing in general, independently whether done by OEM or non-OEM entities.</p> <p>With regards to the use of recycled content in the product, this criterion was removed due to difficulty in the verification process by the procurers.</p>
<p><i>We propose to revise the criteria as follows:</i></p> <p><i>Section 2.4.3</i> <i>Core criteria</i> <i>AC10 Supply of reused/remanufactured cartridges and containers or cartridges/containers made with recycled materials</i></p> <p><i>Points must be awarded for the commitment to provide the highest percentage (share) of reused/remanufactured cartridges/containers or cartridges/containers made with recycled materials, which comply with Core Technical Specifications included in EU GPP Criteria Area 2 Imaging equipment consumables.</i></p> <p><i>Comprehensive criteria</i> <i>AC10 Supply of reused/remanufactured cartridges and containers or cartridges/containers made with recycled materials</i></p> <p><i>Points must be awarded in proportion to the amount of pages printed by reused/remanufactured cartridges/containers or cartridges/containers made with recycled materials which comply with Comprehensive Technical Specifications included in EU GPP Criteria Area 2 Imaging equipment consumables.</i></p> <p><i>Reason:</i> <i>From the viewpoint of material efficiency, cartridges and containers made using recycled materials have the same effect as reused/remanufactured. Therefore, we propose to add award criteria for cartridges and containers made using recycled materials as well.</i></p>	<p>Comment rejected: Following the waste hierarchy, it is better to reuse than to recycle. Hence this award criteria promote the use of reused and remanufactured consumables over consumables containing recycled plastic.</p>
AC11 Provision of managed print services	
<p><i>Following what is mentioned in the document (MPS "can improve employers education in terms of products and consumables environmental impacts"), it makes sense to add a further area to cover in the comprehensive criteria: training/education of procurers and staff, which includes: 1. the assessing printing needs inside the office/department, 2. making use of consumables more efficient and 3. addressing behavioural aspects.</i></p>	<p>Comment rejected: With regards to the first point mentioned there is one sub-criterion 2.2.1 Preliminary assessment of existing fleet and procurement needs, which covers the point raised in the comment. A possibility to offer a physical or on-line training on green performance management have been added in criterion on User instructions for green performance</p>
CPC6 Provision of consumable use information	

<p><i>Concerning the use of statistics, privacy issues could be raised by staff, unions or other bodies (e.g. MPS could potentially allow to trace how many prints have been made by every single worker, which is good to give workers sense of responsibility but, on the other hand, it could lead to privacy concerns). An appropriate way to handle data could be included.</i></p>	<p>Comment rejected: Increased information can often lead to privacy concerns. However, none of the suggestions are considered to pose a risk regarding privacy as all information solely is related to the imaging equipment and not the individual user.</p>
<p><i>Measurement of energy consumption In case the imaging equipment does not provide means to measure energy consumption, this can be achieved with intelligent plugs or equivalent equipment This equipment would introduce an extra cost in the contract, so that the extra awarded points should cover at least the economic value of this extra cost</i></p>	<p>Comment acknowledged: The equipment should follow the maximum values specified in criteria area 1. There is however, no additional requirement present on energy management.</p>
<p>SC2 Tenderer environmental management activities</p>	
<p><i>In my opinion this requirement is relevant for all types of tenderers, because the final result is made by the addition of the contributions of each tenderer</i></p>	<p>Comment acknowledged: Nevertheless, it has been decided to remove this criterion with the aim of harmonisation of criteria for similar products and simplification of this already long criteria set. In addition, it is noted that this criterion did not receive much attention during the revision process and is not directly related to the subject matter.</p>
<p>TS25(a) Guaranteed provision of consumables during contract</p>	
<p><i>As a customer, this is not the point. What matters is that in case of lack of consumables / spare parts that force a substitution of the imaging equipment, the contractor assumes the extra costs, including the environmental ones, plus a premium for the inconveniences derived from this replacement</i></p>	<p>Comment rejected: This criterion is made exactly with the aim of preventing occurrence of a situation of lack of consumables or spare parts.</p>
<p>TS26 User instructions for green performance management</p>	
<p><i>Include an award criterion for those companies providing training services about green management of printing issues, better through third, independent parties.</i></p>	<p>Comment accepted: A possibility to offer a physical or on-line training on green performance management have been added.</p>
<p><i>As a customer, this is not feasible nor economically wise As much as possible, the green use of image equipment should be implemented s automated procedures and policies applied to imaging equipment This should have two requirements: It should be economically wise, balancing the costs of the burden posed to the end users because of those policies, and the costs of non-green behaviour associated to not applying those policies This should be accompanied of a communication campaign explaining the rationale of these policies to the end users This should be accompanied also of a measurement of the user satisfaction towards the customer's company behaviour, before and after the introduction of such policies</i></p>	<p>Comment rejected: We believe it is difficult to include these suggestions as requirements. The user instruction facilitates that the user itself or the organisation can change behaviour.</p>

GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest you at: <http://europa.eu/contact>

On the phone or by email

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

- **by freephone:** 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),
- **at** the following standard number: +32 22999696, or
- **by** electronic mail via: <http://europa.eu/contact>

FINDING INFORMATION ABOUT THE EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website at: <http://europa.eu>

EU publications

You can download or order free and priced EU publications from EU Bookshop at: <http://bookshop.europa.eu>. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see <http://europa.eu/contact>).

The European Commission's science and knowledge service

Joint Research Centre

JRC Mission

As the science and knowledge service of the European Commission, the Joint Research Centre's mission is to support EU policies with independent evidence throughout the whole policy cycle.



EU Science Hub

ec.europa.eu/jrc



@EU_ScienceHub



EU Science Hub - Joint Research Centre



EU Science, Research and Innovation



EU Science Hub



Publications Office
of the European Union

doi:10.2760/02995
ISBN 978-92-76-26941-0