Development of European Ecolabel Criteria for Imaging Equipment

BACKGROUND REPORT

INCLUDING DRAFT CRITERIA PROPOSAL

Working Document

for the development of

EU Ecolabel criteria for imaging equipment

Jiannis Kougoulis, Renata Kaps, Dritan Osmani, Oliver Wolf

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Development of European Ecolabel and Green Public Procurement Criteria for Imaging Equipment

Background report including draft criteria proposal

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Abbreviations

AHWG – ad-hoc Working Group

BAT – Best Available Techniques

BREF – Reference Document on Best Available Techniques

CEN TC – European Committee for Standardization Technical Committee

CO_2 – Carbon dioxide

EPA – United States Environmental Protection Agency

EU – European Union

GPP – Green Public Procurement

ISO – International Standardisation Organisation

MS – Member State

UBA – German Federal Environment Agency

dB – deciBell

DIDP – di-isodecyl phthalate

DINP – di-isononyl phthalate

DNOP – di-n-octyl phthalate

DS – Dye Sublimation

DT – Direct Thermal

ECMA –European Computer Manufacturers Association

EP –Electrophotography

IJ –Ink Jet

ipm –images per minute

IT	–Information technology
LCA	–Life cycle assessment
MFDs	–multifunctional devices
MFPs	–multifunction products
Sbw	– monochrome printing/copying speed
SI	–Solid Ink
TT	–Thermal Transfer
PJ	–Peta Joule
EEE	–Electric and electronic equipment
TVOC	–Total volatile organic compounds
ISO	–International standardisation organisation
R	–risk phrase
H	–Hazard statement
TBBPA	–Tetrabromobisphenol-A
BBP	–Butyl pththalate
SCCP	–short chain chlorinated paraffins
DIBP	–Diisobutyl phthalate
PBBs	– polybrominated biphenyls
PBDEs	–polybrominated diphenyl ethers–
SDS	–Safety Data Sheets
CMR	–carcinogenic, mutagenic or toxic for reproduction
REACH	–Registration, Evaluation, Authorisation and Restriction of Chemicals
PCs	–Personal computers

1 INTRODUCTION

The European Ecolabel[1] is an element of the European Commission's action plan on Sustainable Consumption and Production and Sustainable Industrial Policy[2] adopted on 16 July 2008. This is a voluntary scheme established to encourage manufacturers to produce goods and services that are environmentally friendlier. The EU Ecolabel flower logo should facilitate recognition by consumers and organizations (i.e. public and private purchasers) of the best performing products in this respect, and making environmentally conscious choices more easily. The EU Ecolabel covers a wide range of products and services, and its scope is constantly being broadened. The process of establishing the criteria proceeds at the European level following consultation with experts and all interested parties. A product or a service awarded with this label must meet high environmental and performance standards.

Green Public Procurement (GPP), defined in the Commission Communication "Public procurement for a better environment"[3] as "a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured." This is also a voluntary instrument, which public authorities can use to provide industry with incentives for developing and marketing more environmentally sound products[4].

The criteria for "imaging equipment" aim at promoting reduction of environmental damage or risks related to the use of energy (global warming, acidification, depletion of non-renewable energy sources) by reducing energy consumption, environmental damage related to the use

1 EU Ecolabel website http://ec.europa.eu/environment/ecolabel/about_ecolabel/what_is_ecolabel_en.htm.

2 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – on the Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan, COM (2008) 397, available online: http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0397:FIN:en:PDF

3 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Public procurement for a better environment, COM (2008) 400, available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0400:FIN:EN:PDF

4 GPP website http://ec.europa.eu/environment/gpp/what_en.htm

of natural resources and hazardous substances, by reducing the use of such substances in imaging equipment devices.

The criteria aim, in particular, at promoting products that have a reduced environmental impact along their life cycle, which performance is resource efficient and energy efficient, and which contain a limited amount of hazardous substances. Since the main environmental impacts along the life cycle are related to the use of paper, energy consumption and the use of hazardous substances the products with improved performance on these aspects shall be promoted and therefore it is appropriate to establish EU Ecolabel criteria for this product group.

The criteria furthermore aim at promoting products with low noise levels and that contribute to lower indoor air emissions. Their selection is based on IPTS preliminary work conducted in the project "Development of EU Ecolabel criteria for imaging equipment"[5], stakeholders' feedback to the IPTS first working document for criteria development [6] and input received at the 1st and 2nd AHWG Meeting, as well as written comments received afterwards.

Criteria are proposed for the following areas:

1. Paper Management
2. Energy efficiency
3. Indoor air emissions
4. Noise
5. Substances and mixtures in imaging equipment
6. Reuse, recycling and end-of-life management
7. Ink and toner consumables
8. Corporate criteria

5 For details please see the project's website: http://susproc.jrc.ec.europa.eu/ecotapware/.

6 1st technical background report available at the project's website: http://susproc.jrc.ec.europa.eu/ecotapware/stakeholders.html.

2 PRODUCT DEFINITION AND SCOPE

The definition and scope of the product group of imaging equipment has been addressed in more detail in the respective background document of IPTS "Product definition and scope" report. This issue was the subject of discussion and agreement in the 1st Ad-hoc Working Group (AHWG) meeting.

The product group of imaging equipment is defined by adopting the definition used in the Energy Star label, which matches the one used in the current EU Green Public Procurement criteria as well as the respective one used in the frame of the Ecodesign Directive (EU Ecodesign Preparatory Study for imaging equipment and respective Industry Voluntary agreement). This definition is also used worldwide by numerous Ecolabel schemes. The definition as proposed by IPTS was agreed in the 1st AHWG.

With regard to the scope of the study in general, imaging equipment involves the products marketed as office printers, copiers, multifunctional devices (MFDs), scanners, digital duplicators and fax and mailing machines. From this wider scope based on the outcomes of the market analysis (Technical background Report[7]), the current market situation, technological trends and the discussion among stakeholders in the 1st AHWG, it was agreed to address in the scope of the Ecolabel criteria the products which are: commonly used in the office (household and professional devices), have high market volumes and without significant negative market or trends. The products which fulfil these requirements and were agreed on for the scope of the Ecolabel criteria are: printers, copiers and MFDs.

An important point in determining further the product scope is to set the limit between a) the office imaging equipment devices which are used typically in work or private environments and b) the imaging equipment devices which are designed to address special commercial or professional needs. In the latter category the devices are very large in volume and their market sales are considered lower than in case of a). Based on manufacturers' input this delimitation was made using technical specifications i.e. maximum speed (ipm). A delimitation of the scope based on the marking technology used was not considered relevant.

7 "Technical Background Report- Development of EU Ecolabel and GPP Criteria for Imaging Equipment", Institute for Prospective Technological Studies/ Joint Research Centre, March 2011

The definition of the imaging equipment devices and the scope of the Ecolabel criteria is as follows:

The product group “Imaging equipment” shall comprise products which are used in the office (private or professional) and their function is:

i) to produce a printed image (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 or/and

ii) to produce a digital image from a hard copy through a scanning/copying process.

The Ecolabel criteria apply to products which are marketed as printers, copiers and multifunctional devices (MFD). Other type of imaging equipment devices i.e. fax machines, digital duplicators, mailing machines, scanners are excluded from the scope. The following marking technologies can be used: Electrophotography (EP), Ink Jet (IJ), Solid Ink (SI), Direct Thermal (DT), Dye Sublimation (DS), Impact, High Performance IJ, Stencil and Thermal Transfer (TT).

Large products which are not typically used in household and office equipment with 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
- Designed for A2 media and larger
- Products marketed as plotters

Speed to be rounded to the nearest integer as prescribed in the ENERGY STAR agreement.

are also excluded from the scope of this decision.

A "printer" is a commercially available imaging product that serves as a hard copy output device, and is capable of receiving information from single-user or networked computers, or other input devices (e.g. digital cameras). The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products

that are marketed as printers, including printers that can be upgraded into MFDs while in use.

A "copier" is a commercially available imaging product which sole function is the production of hard copy duplicates from graphic hard copy originals. The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as copiers or upgradeable digital copiers.

A "multifunction device (MFD)" is a commercially available imaging product which is a physically integrated device or a combination of functionally integrated components that performs two or more of the core functions of copying, printing, scanning, or faxing. The copy functionality, as addressed in this definition, is considered to be distinct from single sheet convenience copying offered by fax machines. The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as MFDs or multifunction products (MFPs).

"Packaging" means all products made of any materials of any nature used for the containment, protection, handling, delivery and presentation of goods, from raw materials to processed goods, from the producer to the user or the consumer.

“Recycling” means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and reprocessing into materials that are to be used as fuels or for backfilling operations.

‘Re-use’ means any operation by which products or components that are not waste are used again for the same purpose for which they were conceived

"Re-used content" of a product means the content of a product which has undergone a re-use operation

"Cartridge anti re-utilisation devices/practises, ARUD" are both devices fitted on the cartridge as well software/hardware that is necessary for the cartridge functioning that result to hamper the direct cartridge reuse. Examples of ARUD are (clever) chips that restrict the cartridge reuse to single models, embedded software restricting the cartridge reuse, welding, glue, blind screws or conjoined part

"Spare parts" are those parts of the product which typically have the potential to fail during the normal use of the product.

"Consumables" means articles that are marketed also separately from the main Imaging devise and that the user needs to purchase along the product use phase and its operation. Typical consumables are ink and/or toner cartridges. The supply of electricity is not covered by the scope of consumable here.

‘Networked equipment’ means equipment that has the ability to connect to a network and has one or more network ports;

'network port' means a wired or wireless physical interface of the network connection located at the equipment through which the equipment is able to be remotely activated.

‘networked equipment with high network availability’ (HiNA equipment) means equipment with one or more of the following functionalities, but no other, as themain function(s): router, network switch, wireless network access point (not being aterminal), hub, modem, VoIP telephone, video phone;

"large format printing equipment’ means printing equipment designed for printing on A2 media and larger, including those designed to accommodate continuous-form media above or equal to 406 mm wide"

3 ECOLABEL CRITERIA

The following criteria are proposed for the EU Ecolabel for imaging equipment. The criteria are classified in the following areas:

PAPER MANAGEMENT

Criterion 1. Availability of N-up printing

Criterion 2. Duplex printing requirement

Criterion 3. Use of recycled paper

ENERGY EFFICIENCY

Criterion 4. Energy efficiency

INDOOR AIR EMISSIONS

Criterion 5. Restriction on indoor emissions

NOISE EMISSIONS

Criterion 6. Noise emissions

SUBSTANCES AND MIXTURES IN IMAGING EQUIPMENT

Criterion 7. Excluded or limited substances and mixtures

(a) Hazardous substances and mixtures

(b) Substances listed in accordance with article 59(1) of Regulation (EC) No 1907/2006

Criterion 8. Mercury in light sources

REUSE, RECYCLING AND END-OF-LIFE MANAGEMENT

Criterion 9. Design for disassembly

Criterion 10. Recycled and reused content

INK AND TONER CONSUMABLES

Criterion 11. Design for recycling and/or reuse of toner and/or ink cartridges

Criterion 12. Toner and/or ink cartridge take-back requirement

Criterion 13. Substances in ink and toners

OTHER CRITERIA

Criterion 14. Requirements on packaging

Criterion 15. Warranty, guarantee of repairs and supply of spare parts

Criterion 16. User Information

Criterion 17. Information appearing on the EU Ecolabel

The above list covers key environmental areas as indentified by IPTS and agreed to by the stakeholders in the 1st AHWG meeting (points 1 to 7). Complementary corporate criteria were added to these areas (i.e. user information, information appearing next to the Ecolabel flower logo) and social criteria. The social criteria are aligned with discussions held within EU Ecolabelling Horizontal Task Force for addressing social criteria in EU Ecolabel.

3.1 Paper management

Formulation and verification of paper management criteria

The following three criteria fall under the category of paper management. Their proposed formulation and verification are given below.

3.1.1 Criterion 1 - Availability of N-up printing

The following formulation is proposed:

3.1.1 Criterion 1 - Availability of N-up printing

Imaging equipment devices shall offer as a standard feature the capability to print and/or copy 2 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).

Assessment and verification

The applicant shall provide to the awarding competent body a declaration of compliance with these requirements including explanation as to how users can access N-up printing facilities.

3.1.2 Criterion 2 - Duplex printing requirement

The following formulation is proposed:

3.1.2 Criterion 2 - Duplex printing requirement

Imaging equipment devices with a maximum operating speed for monochrome printing/copying of 19 ipm (images per minute) or more for A4 size paper shall be equipped with an automatic double-side print/copy unit (a duplex-unit).

The duplex printing and/or copying function shall be set as default in the original software provided by the manufacturer. For the devises receiving a printing order from a computer, a message should be formulated by the manufacturer and displayed on the computer screen of the user (e.g. in the print dialogue) when the default setting is changed into one-side printing. The content of this message should highlight the fact that: This mode of printing will contribute to higher environmental impacts than double-side printing.

Assessment and verification

The applicant shall provide to the awarding competent body a declaration of compliance with these requirements including declaration of the speed for monochrome printing and an explanation as to which message and where and when such message for devices receiving a printing order from computer, is displayed to users.

3.1.3 Criterion 3 - Use of recycled paper

The following formulation is proposed:

3.1.3 Criterion 3 - Use of recycled paper

Imaging equipment devices must be capable of processing recycled paper made of 100% post-consumer paper that meets the requirements of EN 12281:2002. The applicant shall be free to recommend certain types of recycled paper.

Assessment and verification

The applicant shall provide to the awarding competent body a declaration of compliance with these requirements.

Rationale of paper management criteria (3.1.1 Criterion 1 to 3.1.3 Criterion 3)

The most significant aspect affecting the overall life cycle environmental performance of the product group of imaging equipment is the consumption of paper.

The environmental assessment, conducted in the framework of the study, shows (as explained in detail in the 1st Working Document[8]) that paper consumption, followed by energy consumption in the use phase, has the most dominant role in the life cycle of imaging equipment influencing the overall environmental product performance. The high importance of paper consumption is related to the large energy demand in the paper production phase.

Indicatively, in a base-case assessment for monochrome MFD-copier used in a working environment, as analysed in the Preparatory Study for LOT 4[9], the consumption of paper was assumed to be 87 880 pages for each of the six years of the product's lifetime. The total energy consumption of the stock of copiers, printers and MFDs, as modelled in this study, shows that for the reference year 2005 the consumption of paper was responsible for 80 % (or 586 PJ) of the total EU energy consumption related to the life cycle of imaging equipment. This very high contribution of the paper use to the overall energy consumption affects notably other environmental impact categories, as significant environmental impacts are related to

8 Jiannis Kougoulis, Oliver Wolf "Working Document Input to 1st AHWG on 21st March 2011", Institute for Prospective Technological Studies/ Joint Research Centre, March 2011

9 DG TREN Preparatory Studies for Eco-Design Requirements of EuPs. LOT 4. 'Imaging Equipment'. Final Report. http://www.ecoimaging.org/doc/Lot4_T1_Final_Report_2007-11-12.pdf

the energy production phase. This indicates the strong need for efficient use of paper for a reduction in its total consumption.

Following the discussion and conclusions from the stakeholders' consultation conducted in the framework of the criteria development process, the rationales for the proposed criteria on paper management are presented.

Rationale of 3.1.1 Criterion 1 - Availability of N-up printing

This criterion is set to ensure that the user has the possibility to print more than one digital page on the same side of one paper sheet. This function is user friendly and is considered to reduce unnecessary paper consumption. This requirement is included in the industry voluntary agreement with regard to the EU Ecodesign Directive 2005/32/EC for energy using products.

Rationale of 3.1.2 Criterion 2 - Duplex printing requirement

This requirement is found in all Ecolabel schemes investigated, including the MS Ecolabels. The requirements on duplex printing are also included in the Energy Star label. The duplex printing function is considered to be very effective for the reduction of paper consumption, especially when it is set as a default mode.

Setting the threshold:

- The threshold, of 19 ipm is based on:
- analysis of the products found in the market. In this analysis the Energy Star database was used, The percentage of the products found in the market and not registered in the Energy Star database is considered very low, currently estimated to be close to 100 % for MFDs, printers and scanners and for copiers a bit lower,[10].
- consultation with stakeholders.

An analysis of the EU Energy Star database follows:

[10] Source: EU Energy Star Technical Experts Board.

In Energy Star the product group is divided in two groups. The Typical Electricity Consumption (TEC) products and the Operational Mode (OM) products. TEC products are Standard-size copiers, Multifunction Devices (MFDs), and printers that use Electrophotography (EP), Solid Ink (SI), and High Performance Ink Jet (IJ) marking technologies, OM products cover the rest of mainly non high-performance inkjet products.

In the below table for OM products, is shown that, per 1 Feb. 2012, 20% of mono chrome and 41% of colour EU-registered products with respective speed >= 24 ipm (for monochrome), and speed >= 24 (for colour) are already compliant with the duplexing requirements under our Criteria 2 on duplex printing requirement

Table 1: Duplex capability OM products Energy star (available on EU market)

Automatic Duplex Output Capable?	Monochrome		Colour	
	≤ 24 ipm n=284	> 24 ipm n=202	≤ 19 ipm n=122	> 19 ipm n=238
Yes	14%	20%	36%	41%
No	86%	80%	64%	59%
Option	0%	0%	0%	0%

In the Energy Star version 2.0,[11], the automatic duplexing feature must be standard for all TEC products, colour and monochrome, with a monochrome speed of 19 ipm or higher.The table below shows that, per 1 Feb. 2012, 84% of mono chrome and 83% of colour EU-registered products with speed >= 19 ipm are already compliant with the duplexing requirements under our Criteria 2 on duplex printing requirement

[11] In this section we refer to Energy 2.0, Draft 3 requirements of January 2013.. Energy 2.0 is expected to be published in July 2012 and entering into force March 2013.

Table 2: Duplexing rates TEC products compliant with Energy star version 2.0 (draft 1 requirement)

Automatic Duplex Output Capable?	Monochrome		Colour	
	≤ 19 ipm n=401	>19ipm n=2298	≤ 19 ipm n=140	>19ipm n=1431
Yes	42%	84%	20%	83%
No	52%	12%	76%	16%
Option	5%	4%	4%	1%

The above Tables provide sufficient support for our benchmark of 19 ipm for duplex printing requirement, as Ecolabel aims 10 – 20 % best performing product in the market.

Rationale of 3.1.3 Criterion 3 - Use of recycled paper

This requirement is currently used in the MS Ecolabel schemes and was agreed in the 1st AHWG Meeting. It is considered important that Ecolabel products contribute to promotion of recycling and facilitate use of recycled products.

3.2 Energy efficiency

Formulation and verification of criteria on energy efficiency

3.2.1 Criterion 4 - Energy efficiency

The following formulation is proposed:

3.2.1 Criterion 4 - Energy efficiency

a) The energy consumption of the product shall fulfil the energy efficiency requirements of Energy Star v.2.0 criteria for imaging equipment.

b) Power consumption in a condition providing 'networked standby':

The power consumption of equipment with HiNA functionality, in a condition providing networked standby into which the equipment is switched by the power management function, or a similar function, shall not exceed 3,00 W.

The power consumption of other networked equipment in a condition providing networked standby into which the equipment is switched by the power management function, or a similar function, shall not exceed 1,50 W.

The power consumption limits as stipulated above shall not apply to large format printing equipment.

Networked equipment that has one or more standby mode(s) shall comply with the requirements for these standby mode(s) when all network ports are disconnected or, for wireless network ports, the network ports are deactivated.

The power consumption limits as stipulated above shall not apply to printing equipment with a power supply of a rated power larger than 750 W.

Assessment and verification:

Part a) The applicant shall provide to the competent bodies a declaration of compliance with the energy efficiency requirements as set in Energy Star v2.0 and a test report with the results of the energy efficiency test according to the methods specified in Energy Star. Energy Star v.2.0 labelled products are deemed to comply with the requirements of this criterion and the applicant shall submit a copy of the energy label award.

Part b) The applicant shall provide to the competent bodies a declaration that it meets the criteria including a test report (according to the relevant ISO standard when available) stating the consumption in the network standby mode.

Rationale of 3.2.1 Criterion 4 - Energy efficiency

After paper consumption, the next most important aspect regarding the life cycle environmental performance of imaging equipment is energy consumption in the use phase. This outcome is confirmed from several LCA studies, as presented in the Working document for the 1st AHWG. It is estimated that energy consumption in the use phase can account for approximately 2/3 of the total energy consumption of imaging equipment during product lifetime (energy consumption related to paper use is not considered). Thus, a better environmental performance can be achieved by energy efficient products. The consumption of less energy is also beneficial with respect to other investigated environmental aspects due to the lower pollutant emissions in the energy production phase.

The electricity consumption in the use phase is an aspect which is dependent on the product design (different from the previous case, i.e. paper consumption, which is strongly user dependent) and together with the energy label criteria is also a key aspect for the EU Ecolabel criteria. Energy efficiency is also one of the main environmental goals set by the manufacturers. The development of the electronic sector is vast especially and the trend of producing more energy efficient products is very high.

With regard to energy efficiency, as discussed in the 1st AHWG meeting, requirements in the new version of the Energy Star v2.0 for imaging equipment are proposed. Energy Star is considered the most successful energy label with a high number of applications and it is also the EU Energy label for the product group of imaging equipment. Revision of the Energy Star label is planned to take place every 2 years due to its vast developments in the IT and EEE sector.

As energy efficiency plays an important role in the overall environmental performance of the product, additional consultation was undertaken with the stakeholders and a sub-AHWG on energy was formed. In the discussions which took place within this group the following issues were addressed:

a) New developments and changes of Energy Star 1.1 criteria for imaging equipment;

b) A proposal made by IPTS to use as indication for the EU Ecolabel energy efficiency requirements calculation based on the industry voluntary agreement and Energy Star 1.1;

c) Harmonisation possibilities with the energy label of Energy Star;

d) The option of having a dynamic link with the Energy Star label and proposed compliance with Energy Star 2.0 and if available with the latest version of Energy Star for imaging equipment.

With regard to point a) the sub-group proposed (as agreed in the 1st AHWG meeting) to align the energy efficiency requirements with Energy Star 2.0 criteria developments and found that the changes introduced in the revision contribute to improving the measurement of the energy efficiency of the imaging devices. Based on the current stand point a first draft version of the Energy Star 2.0 is planned to be released by the end of October. Stakeholders will be asked for comments and a final version of the Energy Star requirements will be released at the beginning of March 2013. The criteria will enter into force 9 months later – by beginning of Decemebr 2013. Thus, the revision process of Energy Star 2.0 criteria goes in parallel to the development of the EU Ecolabel criteria for the imaging equipment. The latest documents regarding the Energy Star revision are given in Annex 6.2.

With regard to point b) a proposal related to energy efficiency calculation for EU Ecolabel (based on the "industry voluntary agreement"[12] and the Energy Star 1.1.) is given in Annex 6.2. The sub-group agreed with this approach and proposed to forward this feedback to the Energy Star criteria developers. This was undertaken by the IPTS.

It is considered that current criterion proposal facilitates the harmonisation with the EU Energy labelling scheme in this case with Energy Star label. Possibilities of common recognition and agreement with the US Energy Star should be further explored.

The option of having a dynamic link with the Energy Star label by formulating the criterion with inclusion of compliance not only to the Energy Star 2.0 requirements but to the latest Energy Star version for imaging equipment is supported by several stakeholders. It is considered that in that way compliance with the best performing products (in case the next Energy Star revision takes place earlier than the EU Ecolabel criteria revision) is ensured.

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12 Industry Voluntary Agreement to improve the environmental performance of Imaging equipment placed on the European Market, Version 3.5, 15 February 2011 (this contributes to the objectives of Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products, in line with Recitals 18-20 and Annex VIII on self regulation)

However, as Energy Star criteria have already and are further planned to be expanded to areas which are not exclusively related to the energy efficiency in the use phase, e.g. duplex requirements, or life cycle impacts (for details see Annex 6.2), the EU Ecolabel criterion proposal asks for the compliance with only the energy efficiency requirements in the use phase of the latest Energy Star criteria version.

3.3 Indoor emissions

Formulation and verification of criteria on indoor emissions

3.3.1 Criterion 5 - Restriction on indoor emissions

The following formulation is proposed:

3.3.1 Criterion 5 - Restriction on indoor emissions

In the use phase the product shall not emit the below listed pollutants in amounts higher than the maximum emission rates given below:

Emission rate in mg/h,			
		Monochrome printing	Colour Printing
Ready mode	TVOC**	1 (Desktop products) 2 (Floor-mounted equipment (Volume >250 l)	1 (Desktop products) 2 (Floor-mounted equipment, Volume > 250 l)
Printing mode (Sum of Ready + Printing mode)	TVOC**	10	18
	Benzene	< 0,05	< 0,05
	Styrene	1,0	1,8
	Not identified single VOC substances**	0.9	0.9
	Ozone *	1,5	3,0
	Dust*	4,0	4,0

Rationale of 3.3.1 Criterion 5 - Restriction on indoor emissions

3.3.1 Criterion 5 - is mainly based on the respective criterion of Blue Angel, which was presented as an option in the 1st AHWG meeting. In the area of indoor emissions currently Nordic Swan as well as all other worldwide Ecolabel schemes in which are found criteria on this area uptake the developments of Blue Angel. This criterion was agreed in the 1st AHWG.

The use of the ECMA-328 standard measurement of the pollutants is proposed as this is the latest international standard. The proposed threshold values are the same as the one used in

the current Blue Angel criteria thus its application is tested and was proved beneficial. Therefore it is also proposed for the EU Ecolabel.

3.4 Noise emissions

Formulation and verification of criteria on noise emissions area

The requirements regarding noise emissions of imaging equipment was a joint work between German Environmental Agency and IPTS. The modelling of noise emissions was based on data derived from Blue Angel labelled products.

3.4.1 Criterion 6 - Noise emissions

The following formulation is proposed:

3.4.1 Criterion 6 - Noise emissions

The noise emission is rated by the declared A-weighted sound power level depending on printing speed per minute given in dB with one decimal place accuracy (or in B with two decimal places accuracy).

The declared A-weighted sound power level $\boldsymbol{L_{WAd}}$ of the product shall not exceed the following limits while operating:

a. For monochrome printing– the A-weighted sound power level limit value $\boldsymbol{L_{WAd,lim,bw}}$ shall be determined depending on the operating speed $\mathbf{S_{bw}}$ given with one decimal place accuracy according to the following formula:

$$\boldsymbol{L_{WAd,lim,bw} = 37 + 20*\log(S_{bw} + 8)\ dB}$$

$\boldsymbol{L_{WAd,lim,bw}}$ = A-weighted sound power level limit for monochrome printouts given in dB

b. For colour printing – the A-weighted sound power level limit value $\boldsymbol{L_{WAd,lim,co}}$ shall be determined depending on the operating speed S_{co} given with one decimal place accuracy according to the following formula:

$$\boldsymbol{L_{WAd,lim,co} = 38 + 20*\log(S_{co} + 8)\ dB}$$

$\boldsymbol{L_{WAd,lim,co}}$ = A-weighted sound power level limit in dB for colour printouts

c. In addition, for both monochrome and colour printing – the A-weighted sound power level limit value $\boldsymbol{L_{WAd,lim,co}}$ and $\boldsymbol{L_{WAd,lim,co}}$ shall not exceed an upper limit of 75.0 dB:

$L_{WAd,lim,bw}$ < 75.0 dB

$L_{WAd,lim,co}$ < 75.0 dB

For serial electrophotographic colour devices with $\mathbf{S_{co} \leq 0,5\ S_{bw}}$ the sound power level shall be determined and indicated. For assessment purposes compliance with $\boldsymbol{L_{WAd,lim,bw}}$ for monochrome printouts with printing speed $\mathbf{S_{bw}}$ shall be considered exclusively.

Assessment and verification

The applicant shall demonstrate compliance with the criteria requirements and submit a test report containing the results of the A-weighted sound power according to the methods specified in ISO 7779 3rd edition (2010) (corresponds to ECMA-74:2010[13]). The testing laboratory performing the test must be accredited according to EN ISO/IEC 17025 as well as according to ISO 7779 for acoustic measurements. The applicant shall attach a copy of the valid accreditation certificates of the test laboratory.

Rationale of 3.4.1 Criterion 6 - Noise emissions

The noise emission criterion is in line with the recent developments undertaken in Blue Angel scheme, which is one of the leading worldwide in the area of noise criteria for Ecolabels. Nordic Swan as well as other third country Ecolabel schemes usually overtake the noise criteria and benchmarks proposed by the Blue Angel. In the 1st AHWG meeting the group agreed to base the criteria related to noise exposure on the criteria set in the Blue Angel scheme. In comparison to the current available version of Blue Angel (Ed. May 2009), which is valid until the end of 2011, the following amendments are proposed for the EU Ecolabel:

- New formula for determining the noise limits based on logarithmic models;
- Testing method based only on ECMA-74;
- Update and alignment with ISO 7779 (3rd edition 2010);
- Change of paper sheet weight from 60 to 80 g/m² in testing.

13 as described in the noise measurement method section of the criteria background report

The main change is the proposal of modelling using the logarithmic models. This was the outcome of investigations on noise emission values of MS Ecolabelled products. The main conclusions on the investigations on the modelling curve are presented below.

The A-weighted sound power level LWAd of imaging equipment in relation to the operating speed Sbw for monochrome printing is shown on The data was obtained from the database of Ecolabelled products of Blue Angel.

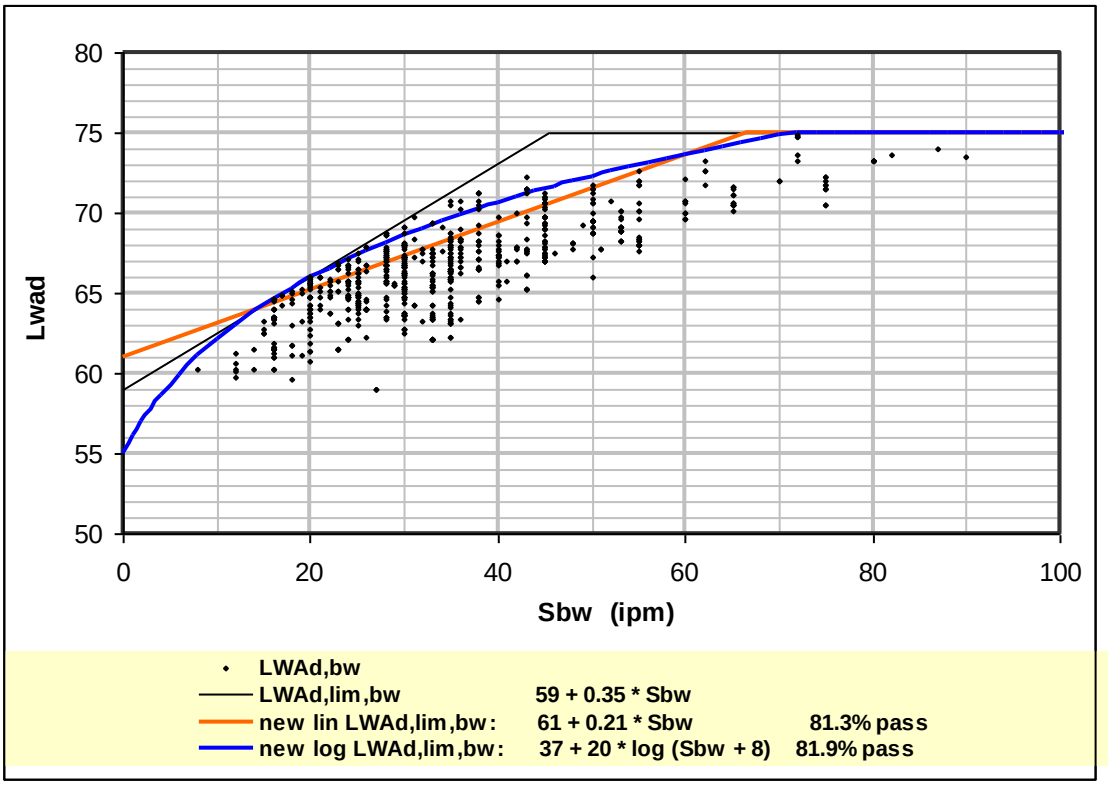


Figure 1 **A-weighted sound power level LWAd of imaging equipment in relation to the operating speed Sbw for monochrome printing. Data basis Ecolabelled products of Blue Angel**

In Figure 1 three possible modelling curves are given:

the current linear limit curve (black line) with $L_{WAd,lim,bw}$ = 59 + 0.35 * S_{bw} dB

a logarithmic limit curve (blue line) with $L_{WAd,lim,bw}$ = 37 + 20*log(S_{bw}+ 8) dB

another linear model (orange line) with $L_{WAd,lim,bw}$ = 61 + 0.21 * S_{bw} dB

The first curve is the current limit curve ($L_{WAd,lim,bw}$ = 59 + 0.35 * S_{bw} dB). This linear limit curve goes back to 2003 when it was first introduced for Blue Angel products. Since then

development and improvements have been made and currently an update of the threshold in order to promote the best products is considered of relevance.

However, the current data availability is limited to data sets from the currently Ecolabelled products. Thus, this data is considered to reflect the best performing products and not an average sample of all the products found in the market. This complicates the determination of a new limit curve.

In order to overcome this obstacle, the percentage of products which will pass if a new limit curve is applied is calculated. This percentage is indicated in Figure 1 and in case of the logarithmic curve b) it is 81.9%, while in case of the linear curve c) it is 81.3 %. In general for the current needs of the EU Ecolabel and based on the available data it is considered important to model the limit curve in a way that will better reflect the modeling sample but also allow a high number of the Ecolabelled products to reach these limits.

Based on the above graph (Figure 1) it can be identified that the logarithmic curve (i.e. the curve b) better reflects the modeling relation between the A-weighted sound power level L_{WAd} of the product and its performance speed S_{bw} in ipm. Moreover, there are a few more products which pass this limit than in the case of c) – the linear modelling curve option, as the pass rate is 81.9 versus 81.3 % respectively.

The majority of products which are beyond the limits of the logarithmic curve have speeds in the range of 28 -38 ipm. In this range of speed there are relatively many products and, based on the available data, not only the frontrunners but also an average Ecolabelled product performs much better, has lower $\boldsymbol{L_{WAd}}$ (i.e. for S_{bw} =35 ipm the average is 65.09dB whereas the limit is 69.67dB). Conclusively, it is proposed to use the logarithmic modelling curve b) expressed with the formula: $L_{WAd,lim,bw} = 37 + 20*\log(S_{bw}+ 8)$ dB as it more accurately reflects the modeling relation between A-weighted sound power level of the product and operational speed.

Similar investigations were undertaken for the case of colour printing. In the A-weighted sound power level L_{WAd} of imaging equipment in relation to the operating speed S_{bw} for colour printing is given. The data basis is the one of Blue Angel.

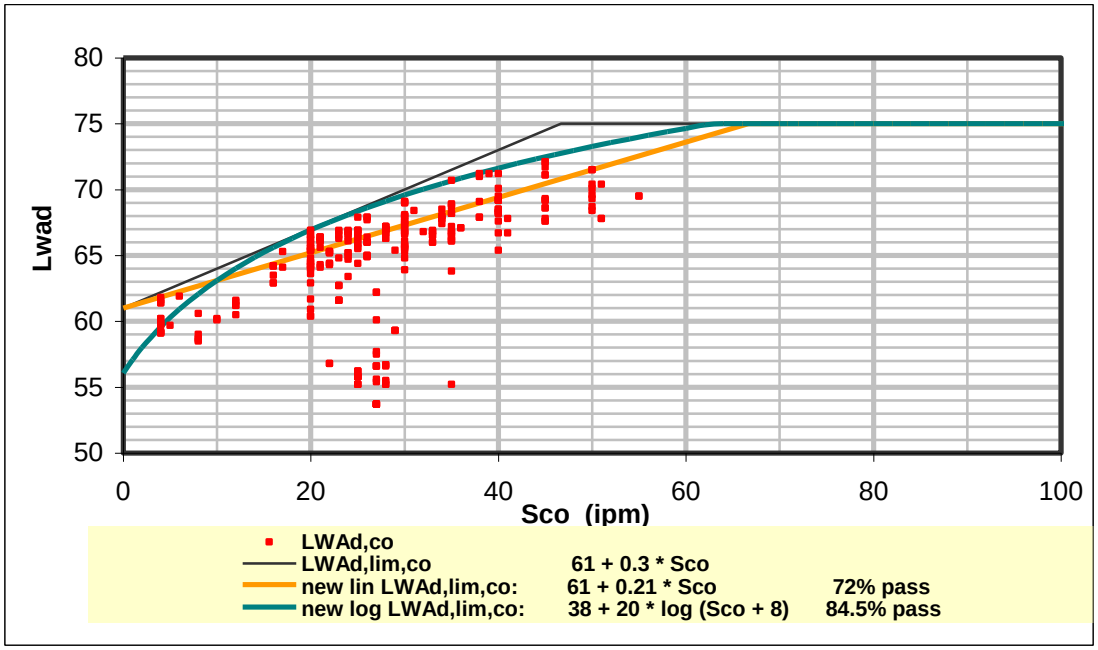


Figure 2 A-weighted sound power level L_{WAd} of imaging equipment in relation to the operating speed S_{bw} for monochrome printing. Data basis Ecolabelled products of Blue Angel

Similar to the case of monochrome printing three possible modelling curves are given in

Figure 2:

the current linear limit curve (black line) with $L_{WAd,lim,co}$ = 61 + 0.30 * S_{co}dB

a logarithmic limit curve (green line) with $L_{WAd,lim,co}$ = 38 + 20*log(S_{co}+ 8) dB

another linear model (orange line) with $L_{WAd,lim,co}$ = 61 + 0.21 * S_{co} dB

Again, also for colour printing we can identify that the logarithmic modelling curve b) expressed with the formula: $L_{WAd,lim,bw}$ = 38 + 20*log(S_{bw}+ 8) dB better reflects the modelling relation between A-weighted sound power level of the product and operational speed S_{co}.

The proposed logarithmic modeling formula for setting the thresholds for the colour printing can also be derived from the respective one of monochrome printing:

$$L_{WAd,lim,co} = L_{WAd,lim,bw} + 1 \text{ dB}$$

The addition of 1 dB for the colour printing seems reasonable as colour printing reaches, on average, higher weighted sound power levels than the monochrome one. For colour printing it shall be highlighted that the majority of products which cannot match the thresholds based

on the proposed logarithmic limit curve are with the speed of 10 ipm or lower. Imaging equipment of that low speed is typically not used in an office working environment.

Moreover, the maximum limit of 75.0 dB for both monochrome and colour printing was overtaken from the current Member State ecolabeling criteria.

More detailed information with regard the noise emissions criterion and other discussion points on the area of noise emissions are presented in Annex 6.4.

3.5 Substances and mixtures in imaging equipment

Formulation and verification of criteria on the area substances and mixtures in imaging equipment

The following criteria fall under the category of substances and mixtures in imaging equipment. Their proposed formulation and verification are given below. These criteria were jointly developed and elaborated with the external[14] technical experts Stefan Posner and Roland Weber.

3.5.1 Criterion 7 - Hazardous substances and mixtures

The following formulation is proposed:

Criterion 7. Excluded or limited substances and mixtures

(a) Hazardous substances and mixtures

According to the Article 6(6) of Regulation (EC) No 66/2010 on the EU Ecolabel, the product or any article[15] of it shall not contain substances meeting criteria for classification with the hazard statements or risk phrases specified below in accordance with Regulation (EC) No 1272/2008 or Directive 67/548/EC nor shall it contain substances referred to in Article 57 of Regulation (EC) No 1907/2006. The risk phrases below generally refer to substances. However, if information on substances cannot be obtained, the classification rules for mixtures apply.

List of hazard statements:

Hazard Statement[1]	**Risk Phrase[2]**
H300 Fatal if swallowed	R28
H301 Toxic if swallowed	R25

14 Stefan Posner, Swerea IVF AB, Besöksadress: Argongatan 30, 431 53 Mölndal, Sweden

Roland Weber, POPs Environmental Consulting, D-73035 Göppingen, Germany

[15] In Regulation (EC) No 1907/2006 (REACH) Article: means an object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition;

H304 May be fatal if swallowed and enters airways	R65
H310 Fatal in contact with skin	R27
H311 Toxic in contact with skin	R24
H330 Fatal if inhaled	R23/26
H331 Toxic if inhaled	R23
H340 May cause genetic defects	R46
H341 Suspected of causing genetic defects	R68
H350 May cause cancer	R45
H350i May cause cancer by inhalation	R49
H351 Suspected of causing cancer	R40
H360F May damage fertility	R60
H360D May damage the unborn child	R61
H360FD May damage fertility. May damage the unborn child	R60/61/60-61
H360Fd May damage fertility. Suspected of damaging the unborn child	R60/63
H360Df May damage the unborn child. Suspected of damaging fertility	R61/62
H361f Suspected of damaging fertility	R62
H361d Suspected of damaging the unborn child	R63
H361fd Suspected of damaging fertility. Suspected of damaging the unborn child.	R62-63
H362 May cause harm to breast fed children	R64
H370 Causes damage to organs	R39/23/24/25/26/27/28
H371 May cause damage to organs	R68/20/21/22
H372 Causes damage to organs through prolonged or repeated exposure	R48/25/24/23
H373 May cause damage to organs through prolonged or repeated exposure	R48/20/21/22
H400 Very toxic to aquatic life	R50
H410 Very toxic to aquatic life with long-lasting effects	R50-53

H411 Toxic to aquatic life with long-lasting effects	R51-53
H412 Harmful to aquatic life with long-lasting effects	R52-53
H413 May cause long-lasting harmful effects to aquatic life	R53
EUH059 Hazardous to the ozone layer	R59
EUH029 Contact with water liberates toxic gas	R29
EUH031 Contact with acids liberates toxic gas	R31
EUH032 Contact with acids liberates very toxic gas	R32
EUH070 Toxic by eye contact	R39-41

[1] *Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006*

[2] *Directive 67/548/EEC with adjustment to REACH according to Directive 2006/121/EC and Directive 1999/45/EC as amended*

Substances or mixtures which change their properties through processing (e.g., become no longer bioavailable, or undergo chemical modification in a way that removes the previously identified hazard) are exempted) from the above requirement.

Concentration limits for substances or mixtures which may be or have been assigned the hazard statements or risk phrase listed above, meeting the criteria for classification in the hazard classes or categories, and for substances meeting the criteria of Article 57 (a), (b) or (c) of Regulation (EC) No 1907/2006, shall not exceed the generic or specific concentration limits determined in accordance with the Article 10 of Regulation (EC) No 1272/2008. Where specific concentration limits are determined they shall prevail over the generic ones.

Concentration limits for substances meeting criteria of Article 57 (d), (e) or (f) of Regulation (EC) No 1907/2006 shall not exceed 0,1% weight by weight.

The final product must not be labelled according to the hazard statements above.

The following substances/components are specifically derogated from this requirement:

Articles with weight below 25g	All hazard statements and risk phrases
Homogeneous parts of complex articles with weight below 25 g	All hazard statements and risk phrases

Inks and toners and cartridges	All hazard statements and risk phrases
Ni in stainless steel of all types other than of high-sulphur grades (S > 0.1%)	
2-(2H-benzotriazol-2-yl)-4-(1,1,3,3,-tetramethylbutyl) phenol CAS 3147-75-9	
Triphenylphosphine CAS 603-35-0	
(1-methylethylidene)di-4,1- phenylene Bisphenol-A bis(diphenyl phosphate) and Bisphenol A diphosphate) (BDP) CAS 5945-33-5 and CAS 181028-79-5 when it is used as pure and not with technical quality of equal or less than 90 % BDP	

Assessment and verification: For each article or any homogenous part of the applicant shall provide a declaration of compliance with this criterion, together with related documentation, such as declarations of compliance signed by their suppliers, on the non-classification of the substances or materials with any of the hazard classes associated to the hazard statements referred to in the above list in accordance with Regulation (EC) 1272/2008, as far as this can be determined, as a minimum, from the information meeting the requirements listed in Annex VII of Regulation (EC) 1907/2006. This declaration shall be supported by summarized information on the relevant characteristics associated to the hazard statements referred to in the above list, to the level of detail specified in section 10, 11 and 12 of Annex II of Regulation (EC) 1907/2006 (Requirements for the Compilation of Safety Data Sheets).

Information on intrinsic properties of substances may be generated by means other than tests, for instance through the use of alternative methods such as in vitro methods, by quantitative structure activity models or by the use of grouping or read-across in accordance with Annex XI of Regulation (EC) 1907/2006. The sharing of relevant data is strongly encouraged.

The information provided shall relate to the forms or physical states of the substance or mixtures as used in the final product.

For substances listed in Annexes IV and V of REACH, exempted from registration obligations under Article 2(7)(a) and (b) of Regulation 1907/2006 REACH, a declaration to this effect will suffice to comply with the requirements set out above.

(b) Substances listed in accordance with article 59(1) of Regulation (EC) No 1907/2006

No derogation from the exclusion in Article 6(6) of the Regulation (EC) No 66/2010 shall be given concerning substances identified as substances of very high concern and included in the list foreseen in Article 59 of Regulation (EC) No 1907/2006, present in mixtures, in an article or in any homogeneous part of a complex article in concentrations > 0.1%. Specific concentration limits determined in accordance with Article 10 of Regulation (EC) No1272/2008 shall apply in cases where the concentration is lower than 0.1%.

Assessment and verification: The list of substances identified as substances of very high concern and included in the candidate list in accordance with Article 59 of Regulation (EC) No 1907/2006 can be found here:

http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp

Reference to the list shall be made on the date of application. The applicant shall provide a declaration of compliance with this criterion, together with related documentation, such as declarations of compliance signed by the material suppliers and copies of relevant Safety Data Sheets for substances or mixtures in accordance with Annex II to Regulation (EC) No 1907/2006 for substances or mixtures. Concentration limits shall be specified in the Safety Data Sheets in accordance with Article 31 of Regulation (EC) No 1907/2006 for substances and mixtures.

3.5.1.1 Threshold values for articles and related assessment and verification procedure

According to Article 3.3 of REACH an 'article' is defined as "an object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition".

According to Directive 2011/65/EC (RoHS)([16]) a 'homogeneous material' is a "material of uniform composition or a material consisting of a combination of materials that cannot be disjointed or separated into different materials by mechanical actions such as unscrewing, cutting, crushing, grinding and abrasive processes."

Concentration limits for substances meeting criteria of Article 57 (d), (e) or (f) of Regulation (EC) No 1907/2006 shall not exceed 0.1 % weight by weight (w/w). In this proposal two main issues for discussion with stakeholders have been identified:

- The threshold of 10 g given for articles and/or homogeneous parts of complex article;
- Self-declaration by the applicant to prove the compliance with these criteria.

In general it is suggested that the criteria fulfil the following:

a. be feasible for both the applicant and the competent bodies with regard to compliance verification procedure and have manageable administrative effort, and
b. have a high ambition level and allow to identify the environmental frontrunners by promoting the manufacturers who do not use substances of health risks and environmental concern.

In the past, for Ecolabel criteria applied to several similar product groups, a threshold of 25 g was used. The choice of this value is related to the fact that articles weighing 25 g or more can be traced back easily as they must be documented in Safety Data Sheets. This makes the inventory of substances in these articles quite straightforward.

Stakeholders suggest in the case of imaging equipment plastic parts weighting over 25 g cover app. 85 % of the total plastic parts of the product. Further, there is no significant difference among small, medium and high performance products.

However, the health and environmental risks are still considered significant in articles which weigh below 25 g if they contain substances characterized as carcinogenic, mutagenic or dangerous for reproduction (CMR). Therefore, efforts were made to address this issue and in similar electronic products, i.e. in the EU Ecolabel for personal computer and laptops, the respective value was reduced to 10 g.

(16) Directive 2011/65/EU of the European Parliament and f the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, available online at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:174:0088:0110:EN:PDF.

Considering that in imaging equipment the number of articles weighing in the range of 10 g to 25 g is lower than in the case of computers or laptops, it seems feasible to apply this limit in this product group. Additionally, using the same threshold ensures coherence among Ecolabel criteria of electronic products.

It is suggested that the same limit of 10 g shall be applied to homogeneous parts of bigger and complex articles. As defined in REACH, the 'article' is determined based on functionality regardless of its weight, volume or number of different homogeneous parts. However, in a complex article it is possible to indentify homogeneous parts of variable weight (i.e. more than 10 or 25 g). Therefore in order to ensure consistency it is suggested to apply the same threshold limits to these items.

Based on manufacturers' feedback, concerns have been raised regarding the applicability of this criterion. One of the points of concern is the currently limited data availability. The proposed criterion is a generic criterion addressing in principle all substances, including additives, in all materials used in the final product. This is rather a new approach in the Ecolabel, which in the past had criteria related to substance restrictions for certain plastic parts or for certain substance groups or single compounds, e.g. flame retardants. This development, although considered an improvement towards fostering green manufacturing and eco-innovation, seems to entail difficulties for the applicants and their suppliers related to data collection. Thus, increased administrative burdens can be expected.

Another issue is the proposal of self-declaration of compliance by manufacturers. The self-declaration could reduce additional administrative burdens. However, stakeholders raise concerns about its effectiveness. The reason for this is related to the fact that the self-declaration currently refers only to what can be confirmed based on the current knowledge. Consequently, verification is lacking that the necessary underlying standard OECD tests for each R/H phrase have indeed been performed to ensure that the individual R/H phrases have not been assigned to the substance. The Safety Data Sheets for substances in articles contain only information about performed tests but do not reveal the data gaps. Therefore, there is a risk that substances with major data gaps could be approved and considered ’greener,’ but in fact could have higher health and environmental impacts than their better investigated substitutes.

Furthermore, if the OECD tests are conducted, this would lead to an increase in costs as well as a greater amount of animal testing needed. The latter shall be avoided based on Article 6(3) point (g) of the Ecolabel Regulation 66/2010 in which it is stated that "as far as possible the principle of reducing animal testing" shall be applied.

Summarising, it seems that proposing 3.5.1 Criterion 7 is a step forward towards sustainability; nevertheless the aforementioned complications regarding lack of information, lack of testing and issues of practicability regarding the raised administrative burdens need to be taken into consideration. Such kind of burdens may hamper the uptake of the EU Ecolabel by manufacturers. In this respect stakeholders are asked to provide their feedback and comments on how to overcome these difficulties.

3.5.1.2 Exemption of inks and toners

Inks, toners and cartridges are regarded as typical consumables of imaging equipment. These are separate products. Typically ink and toners cartridges are purchased by the user (with the exception of the first cartridge supplied together with the product when it is sold). Thus, in general, the effectiveness of criteria on consumables is considered limited.

Criteria related to the use of substances in these items are proposed separately. The criteria 13-15 cover the main environmental aspects related to inks and toners.

The application of 3.5.1 Criterion 7 to ink and toners is considered to be related with a high administrative burden as the number of substances used in these items is considered to be very high and knowledge on them is not available and low effectiveness as these items are sold separately and their purchase is mainly decided by the user. The composition of inks is not always available and rights related to patents could also hamper the substance inventory. However, in the case of developing EU Ecolabel criteria for the product group of inks and toners such a type of criterion could be considered.

3.5.1.3 Substances changing their properties during processing

In the EU Ecolabel criteria for PC as well in the one of notebooks in the respective Ecolabel criterion regarding the use of Hazardous substances and mixtures is stated that: " …The use of substances or mixtures which change their properties upon processing (e.g. become no longer bioavailable, undergo chemical modification) so that the identified hazard no longer applies is exempted from the above requirement".

During the stakeholders consultation process concerns were expressed regarding the use of the term "bioavailable". In order to avoid possible confusion on this thematic in the current 3.5.1 Criterion 7 there is no reference given to bioavailability. Nonetheless, as requested by stakeholders, information about this aspect is provided below.

The following definition of bioavailability, as used in the Regulation (EC) No 1272/2008 on classification, labelling and packaging (CLP), could be used:

"Bioavailability is the rate and extent to which a substance can be taken up by an organism and is available for metabolism or interaction with biologically significant receptors. Bioavailability (biological availability) involves both release from a medium (if present) and absorption by an organism (IPCS 2004)([17])."

However, it should be highlighted that bioavailability is not explicitly evaluated in hazard classification. It is important to keep in mind that the observation of systemic toxicity implicitly demonstrates a degree of bioavailability. When no toxicity is demonstrated in a test, this may be a result of either lack of intrinsic toxicity of the substance or lack of bioavailability in the test system employed.

Hence, the non-bioavailability of a substance is difficult to verify and evaluate. In line with REACH guidelines 21, when a supplier proposes derogation from hazard classification on the basis of bioavailability, adequate and robust data should be provided to support the conclusion of lack of bioavailability. This is difficult as it is possible that a substance is bioavailable by one route but not another (e.g. absorbed following inhalation but not absorbed through the skin). In such cases the lack of bioavailability may derogate the substance classification for the relevant route.

When considering the non-bioavailability of a mixture, the evaluation shall be based on data for all relevant ingredients of the mixture. Potential interaction of the ingredients that could influence the bioavailability of the mixture as such or one of its components shall be considered.

A non-bioavailable substance may however, react with the media and be transformed to soluble available forms. The rate and extent at which this process takes place can vary extensively between different substances and can constitute an important factor in determining the appropriate hazard category. More information is given in Annex 6.6.

Information on relative bioavailability (e.g. relative amounts of absorption) within a related group/category of chemicals can be of some use in classification. It is possible that consideration of bioavailability data in a semi-quantitative manner would lead to the

17 European chemical Agency, "Guidance on the Application of the CLP Criteria", available online at: http://guidance.echa.europa.eu/docs/guidance_document/clp_en.pdf, page 71.

classification for the same hazard class but in a different category, on the ground that the extent of bioavailability would be reflected in the relative potency.

Nevertheless, as indicated in Article 12 (b) of CLP, there may be cases where a specific evaluation of bioavailability is warranted. In general terms, for a substance or mixture to have an effect on a biological or environmental system, there must be some degree of bioavailability.

Therefore, a substance or mixture does not need to be classified when it can be shown by conclusive experimental data from internationally acceptable test methods, e.g. from Regulation (EC) No 440/2008 (REACH), that the substance or mixture is not biologically available (UN Global Harmonised System OECD "task force 1.3.2.4.5.1").

3.5.3 Derogation requests

3.5.3.1 Derogation requests - Overview and description of the decision approach

Methodological approach

In general, substances and mixtures which fall in the H- and R- phrase classification, as presented in 3.5.1 Criterion 7 are investigated. In line with Articles 6(6) and 6(7) of the Ecolabel Regulation 66/2010, the stakeholders can submit for a substance a request for derogation from this criterion. According to Article 6(7) of Regulation No 66/2010 on the EU Ecolabel, no derogation from the exclusion in Article 6(6) shall be given concerning substances identified as substances of very high concern (SVHC) and included in the list foreseen in Article 59 of REACH, present in mixtures, in an article or in any homogenous part of a complex article in concentrations higher than 0.1 % (w/w). Specific concentration limits determined in accordance with Article 10 of CLP Regulation No1272/2008 shall apply in the case that it is lower than 0.1% (w/w).

The methodological approach regarding the investigation of the request of derogations is as follows.

For each substance the following information and data is gathered:

- General physical and chemical properties, functionality of the substance and of the materials in which it is used, and its overall mass or concentration found in the product.
- Health and direct environmental impacts

In this phase scientific information reveals the importance of how the hazardous effects of the substance occur and what are the potential health impacts., Potential direct environmental impacts due to the substance are also investigated in this phase.

- Life cycle considerations and indirect environmental impacts related to the use of this substance are further investigated.

  This information indicates/reveals whether the use of the substance raises high environmental concerns along the life cycle of the product, e.g. in stages like production, raw material extraction, recycling, thermal recovery or disposal on a landfill.

- Potential substitutes

  In this phase the potential substitutes of the substance are investigated. It is important to identify whether safer – from the health and environmental viewpoint – substances are available. In this phase it can be also considered whether alternative materials can be used, thus preventing the use of the investigated hazardous substance.

Based on the overall information gathered for the given substance and on the decisiveness of each input, it is determined whether derogation shall be granted or not.

In this phase we shall highlight that the aforementioned approach in which these four elements of information are collected has to be adapted to the particular characteristics and case-specific conditions. Depending on what type of substance is investigated, one piece of information may be more significant than another. For example, the life cycle considerations and the indirect environmental impacts are more relevant in the case of chemical additives which are related to the formation of dioxins than the case of Ni in stainless steel for which less significant indirect environmental impacts could be identified in the production or recycling phases.

Another important aspect in this respect is the availability of information. When the investigation covers many features of one specific substance the availability of information cannot be taken for granted. Data gaps can be expected. The lack of data is especially important regarding the question of substitution.

The potential alternatives shall be evaluated in order to be indicated as substitutes and better options than the substance requested for derogation. However, this implies that a similar investigation of the potential substitutes (like for the substance of interest) shall be carried out, i.e. including information on health and direct impacts, indirect environmental impacts in a life cycle perspective and functionality of the substances. Furthermore, a detailed investigation on the substitutes should also contain economic and technical considerations in order to explore if recommendation of the substitute is feasible under current conditions.

Nevertheless, an indication on the potential of the substitution, especially when this is accessible and known, is important and therefore it was included to the appropriate extent in this investigation.

In this process of development of EU Ecolabel criteria for imaging equipment the industry asked for the following substances to be derogated from 3.5.1 Criterion 7:

1. (1-methylethylidene)di-4.1-phenylenetetraphenyl diphosphate (also named Bisphenol-A bis(diphenyl phosphate) and Bisphenol A diphosphate) (BDP))
2. (2H-benzotriazol-2-yl)-4-(1,1,3,3,-tetramethylbutyl)phenol
3. Triphenylphosphine
4. Nickel in Stainless Steel

In addition to the above listed substances, a derogation request for antimony trioxide was submitted to the DG ENV in a later stage. This request does not specifically refer to the development of EU Ecolabel criteria for imaging equipment but is addressed in general for all product groups for which EU Ecolabel criteria are developed. As this request came in the last phase of the development of the EU Ecolabel criteria for imaging equipment, the investigation of this derogation request is not presented in this analysis.

The following sections present the information collected in the frame of the study, together with external expertise received for the above listed substances requested to be derogated from the hazardous substances criterion. More details of this analysis are available in the previous released report: "Discussion on hazardous substances criterion. Investigation of request for derogation" available via the project website[18].

3.5.3.2 Derogation requests – Conclusions regarding derogation request[18]

Conclusions regarding derogation request of Bisphenol-A bis(diphenyl phosphate) and Bisphenol A diphosphate) (BDP)

The assessment of Bisphenol-A bis(diphenyl phosphate) and Bisphenol A diphosphate) (BDP) are hampered by data gaps and contradictory data. Due to the low load in product, any potential emissions to the environment of this substance can be neglected.

18 This work was conducted jointly with the following experts: Stefan Posner and Roland Weber http://susproc.jrc.ec.europa.eu/imaging-equipment/stakeholders.html

Conclusively, it is suggested that Bisphenol-A bis(diphenyl phosphate) and Bisphenol A diphosphate) (BDP) to be derogated from the 3.5.1 Criterion 7 as requested by the industry.

Conclusions regarding derogation request of 2-(2H-benzotriazol-2-yl)-4-(1,1,3,3,-tetramethylbutyl)phenol

2-(2H-benzotriazol-2-yl)-4-(1,1,3,3,-tetramethylbutyl)phenol is mainly used as UV stabilizer in polycarbonate, and polycarbonate blends with ABS, and/or SAN and/or PET that is used in external housing parts, internal mechanical parts and internal optical parts with maximum load to 0.4 % (w/w).

During the product's use phase it is not expected that 2-(2H-benzotriazol-2-yl)-4-(1,1,3,3,-tetramethylbutyl)phenol is emitted to the environment due to its very low volatility and low load in the imaging equipment.

Since 2-(2H-benzotriazol-2-yl)-4-(1,1,3,3,-tetramethylbutyl)phenol has very low water solubility and high bioaccumulation potential, the environmental impact of the substance is expected to be through particles. Due to the low load in housings and similar parts any potential emissions to the environment of this substance are negligible.

Based on the findings[18] it is suggested that 2-(2H-benzotriazol-2-yl)-4-(1,1,3,3,-tetramethylbutyl)phenol to be derogated from the 3.5.1 Criterion 7 as requested by the industry.

Additional information regarding the lack of alternative stabilizers to 2-(2H-benzotriazol-2-yl)-4-(1,1,3,3,-tetramethylbutyl)phenol could complement the current findings.

Conclusions regarding derogation request for triphenylphosphine

Triphenylphosphine is added in external housing parts (e.g. control panel cover, front, back and side housing panel) with a maximum load of 0,25% (w/w). Triphenylphosphine does not meet the requirements of 3.5.1 Criterion 7 since it is H413 classified.

During the product's use phase it is not expected that triphenylphosphine is emitted to the environment due to its very low volatility and low load in the imaging equipment devices. Since triphenylphosphine has very low water solubility and high bioaccumulation potential the environmental, the impact of the substance is expected to be through particles. Due to the low load in housings and similar parts, any potential emissions to the environment of this substance are negligible.

It is likely that triphenylphosphine could be emitted through plastic particles during recycling of external housing parts. If the housings are incinerated above 500°C then all triphenylphosphine is irreversibly eliminated.

Based on the findings[18] it is suggested that triphenylphosphine to be derogated from the 3.5.1 Criterion 7 as requested by the industry.

In accordance with the available knowledge the derogation seems substantiated as triphenylphosphine does not pose environmental and health risks if handled under controlled and normal foreseeable conditions.

Conclusions regarding derogation request for Nickel in stainless steel

In general, metallic stainless steel is likely to exert very low toxicity. Nickel in stainless steel has been regarded as safe for use in toys (Directive 2009/48/EC[19]).

Nonetheless, certain stainless steels with a sulphur addition (for example, AISI 303) may release nickel. The actual threshold for the induction of nickel allergy is unknown. In the case of sulphurated stainless steels like AISI 303, the risk of skin sensitization after prolonged skin contact is higher.

Nickel embedded in the stainless steel and, if handled along the life cycle under foreseeable conditions (i.e. BAT conditions), it will most likely be not released to the environment.

Further, the available information does not demonstrate that there is any substitute available for nickel in stainless steel which could ensure comparable properties in the end-product and be less hazardous and have fewer environmental concerns.

In conclusion, based on the findings[18] it is suggested that Nickel in stainless steel to be derogated as requested by the industry. Considerations are only raised when nickel is used in stainless steel of high-sulphur grades (S > 0.1%).

3.5.4 Criterion 8 - Mercury in light sources

The following formulation is proposed:

19 Directive 2009/48/EC on the safety of toys, p. 3 section (21)

3.5.4 Criterion 8 - Mercury in light sources

Mercury or its compounds shall not intentionally be added to light sources used in imaging equipment.

Assessment and verification: the applicant shall declare to the competent body that the light sources of the product do not contain more than 0.1 mg of mercury or its compounds per lamp. The applicant shall also provide a brief description of the lighting system used.

Rationale of 3.5.4 Criterion 8 - Mercury in light sources

Mercury and its compounds are highly toxic to humans, ecosystems and wildlife, including risk of serious, chronic, irreversible adverse neurotoxic and neurodevelopmental effects. Public awareness has increased about the health and environmental concerns related to mercury. Actions towards a reduction of the use of mercury in products have been undertaken for many years, most recently with the current pending proposal of ECHA regarding Mercury in measuring devices[20]. The release of mercury from imaging equipment is thought to take place mainly during the waste phase. Mercury is mainly contained in scanning unit lamps and the LCD control panel backlights.

Fluorescent lights are classified as hazardous under the European Hazardous Waste Directive because of their mercury content. Annex II of the WEEE Directive requires that the mercury be removed from these lights. Currently there are two methods for removing mercury from fluorescent lamps. One method is to cut the end off of the tube and remove the mercury and phosphor powder, and the second is to shred the complete light and then mechanically separate out the powder. More information on this is given in Annex 6.5.

In the study for DG ENTR regarding the RoHS and WEEE Directives[21] it is reported that although the amount of mercury in copiers and printers had been significantly reduced, there

20 European Environmnetal chemical Agency, Restrictions under considerations: http://echa.europa.eu/reach/restriction/restrictions_under_consideration_en.asp

21 Sarah Bogaert, Mike Van Acoleyen, Inge Van Tomme, Lieven De Smet, Dave Fleet, Rocio Salad, Final report: Study on RoHS and WEEE Directives N° 30-CE-0095296/00-09 project for European Commission DG

could be still be up to 84 g per copier (up to 0.1%). Criteria 14 is set in the context of a widely recognized need to further reduce mercury emissions at an EU level and apply the strategy to avoid pollution at source.

Today, LED lamps are becoming more common in these appliances (e.g. scanners and photocopiers) and replace mercury-containing fluorescent lamps. LEDs often provide additional benefits, such as longer lifetimes and energy efficiency. Additionally, according to stakeholders, the environmental benefits of using LEDs outweigh their impacts which are related to resource depletion potentials (i.e. use of gallium, energy intensive manufacturing process).

In the EU Ecolabel for laptops and computers, a criterion similar to 3.5.4 Criterion 8 regarding the use of Mercury in fluorescent lamps has been introduced. Other ecolabeling schemes like the US EPEAT in their current developments also propose criteria for Mercury in fluorescent lamps.

Stakeholders have been consulted regarding this criterion and there was consensus to introduce such a type of requirement. Using the current formulation the scope of the criterion covers apart of screen backlights also lighting sources used for scanning.

Enterprise and industry, March 2008
http://www.rsjtechnical.com/images/Documents/RoHSreview_simplification_Mar08.pdf

3.6 Reuse, recycling and end-of-life management

Formulation and verification of criteria on reuse, recycling and end-of-life management area

The following three criteria fall under the category of reuse, recycling and end-of-life management. Their proposed formulation and verification are given below.

3.6.1 Criterion 9 - Design for disassembly

The following formulation is proposed:

> 3.6.1 Criterion 9 - Design for disassembly
>
> The manufacturer shall demonstrate that the imaging device can be easily dismantled by professionally trained personnel using the tools usually available to them, for the purpose of repairs and replacements of worn-out parts, upgrading older or obsolete parts, and separating parts and materials, ultimately for recycling or reuse.
>
> ***Assessment and verification:*** the applicant shall shall submit an exploded diagram of the product. The diagram and accompaning material shall: label the main components; provide dismantling instructions and associated time for dismantling; identifying any hazardous substances in components. It can be in written or in digital format.

3.6.2 Criterion 10 - Recycled and reused content

The following formulation is proposed:

> 3.6.2 Criterion 10 - Recycled and reused content
>
> The product plastic parts shall have in total a recycled and/or reused content of not less than 5 % by mass.
>
> The total post-consumer recycled content and the reused content of the plastic parts shall be declared in the user information.
>
> The following components are excluded from the calculation of the percentage: printed circuit boards, labels, connectors, electronic components, optical components, electrostatic discharge (ESD) components, and electromagnetic interference (EMI) components.

Assessment and verification: the applicant shall provide the competent body with a declaration and any assocated documents, as necessary, stating the percentage of recycled content and/or reused content of the plastic parts of the product. The applicant shall provide a sample of the user information to the awarding competent body.

Rationale of 3.6.1 Criterion 9 - Design for disassembly and 3.6.2 Criterion 10 - Recycled and reused content

3.6.1 Criterion 9 - Design for disassembly, is mainly based on the respective criterion on Recyclable Design of Blue Angel, which was presented as an option at the 1st AHWG meeting. Many stakeholders agreed to this criterion and, as the experience showed in Blue Angel, its application is considered beneficial, hence it is also proposed for the EU Ecolabel. The criteria area of design for disassembly is found in every Ecolabel scheme (see also Technical Background Report for the 1st AHWG).

In EU Ecolabel criteria sets for similar products, i.e. EU Ecolabel for notebooks, this issue is also addressed. This criterion is linked to the environmental area of resource depletion which is addressed in Article 6.3 of EU Ecolabel Regulation 66/2010. The aim of this criterion area is to facilitate reuse[22] and recycling[23] of materials (thus reducing in this way the amount of new resources which have to be used if the end-of-life materials are not recovered) and to avoid design options which hamper the recovery.

However, this criterion is related to environmental savings via reduced resource consumption only when the device is eventually channelled for reuse and/or recycling. This was discussed at the 1st AHWG meeting. It was emphasized that the existing Ecolabeling schemes, despite set requirements related to this criterion, cannot in praxis ensure that the device will be sent

22 Reuse is defined here as: the use of part of the product for its original intended purpose, with or without prior repair or refurbishment

23 Recycling is defined here as: Processing parts of the products for retrieval of usable components or for recovery of material, including the processing of plastic materials for re-processing it in plastics manufacturing and the processing of metals for recovery of precious metals, or for resale as commodity scrap metal.

for reuse and recycling, as the latter is affected from several parameters (e.g. user behaviour, availability of collection systems, and other issues such as sending the products abroad to third countries, where the respective practices cannot be controlled) not possible to be controlled via an Ecolabel scheme.

In addition, in many product groups Ecolabel criteria which set requirements related to a mandatory use of recycled material are found (i.e. Nordic Swan, Blue Angel, EU Ecolabel, Epeat etc.). Resource consumption is an important area for the product group under study, and reuse and recycling play an important role in this regard. This area is in Article 6.3 of Ecolabel Regulation explicitly addressed[24].

In the manufacturer's sustainability reports is addressed the importance of resource efficiency and reuse and/or recycling activities are reported[25]. However, it shall be kept in mind that environmental impacts are also associated with recycling processes. The environmental break even point (which is defined as the recycling rate point of the material in which the environmental impacts of it are equal with the environmental impacts of a virgin material) varies among different material and generalization on this is not always straightforward. However, a positive balance is expected for low and very low recycling rates (under 30 %). Reporting the content of reused and recycled material in the products is of relevance for the product group of imaging equipment. Data shall be collected to allow for obtaining important information on the state-of-the-art, best performing products in the market. This could allow benchmarks to be set for the next revision in this area which is an area addressed explicitly in Article 6.3 of Ecolabel Regulation[26].

In the EU Ecolabel criteria for PCs as well in the ones for notebooks a minimum threshold value is set. Criterion-recycled content in these EU Ecolabel criteria decision documents is formulated as flows: "the external plastic case of the system unit, monitor and keyboard shall have a post consumer recycled content of not less than 10 % by mass".

24In art. 6.3 EU Ecolabel Regulation 66/2010 is stated that: In determining Ecolabel criteria, the potential to reduce environmental impacts due to durability and reusability of products shall be considered.

[25]25 See also "Working Document Input to 1st AHWG on 21st March 2011", Institute for Prospective Technological Studies/ Joint Research Centre, March 2011

26In art. 6.3 EU Ecolabel Regulation 66/2010 is stated that: In determining Ecolabel criteria, the potential to reduce environmental impacts due to durability and reusability of products shall be considered.

Regarding reuse in the product group of imaging equipment BAT-products have been identified. These BAT-products are specially designed for reuse and are marked business to business (B2B). The overall reuse rate for these products reaches 82%[27]. Nonetheless, these examples are currently limited either to pilot programs or to geographical regions outside EU-27 i.e. Japan and Hong Kong. Further, reuse is not a common practise among manufacturers despite the fact that reuse (according to the waste management hierarchy) is preferred over recycling.

It is suggested therefore to set a minimum requirement on the total reused and recycled content. This is considered to give an incentive to manufacturers to explore and integrate in their future developments better performance solutions regarding this issue. In order to allow the best performing products to benefit from their high reuse and recycling rates, it is suggested that the user shall be directly informed about this aspect.

27 http://www.ricoh.com/environment/product/resource/02_01.html

3.7 Ink and toner consumables

Formulation and verification of criteria for ink and toner consumables

The following three criteria fall under the category of ink and toner consumables.

3.7.1 Criterion 11 - Design for recycling and/or reuse of toner and/or ink cartridges

The following formulation is proposed:

3.7.1 Criterion 11 - Design for recycling and/or reuse of toner and/or ink cartridges

The products must accept remanufactured toner and/or ink cartridges.

The products must be designed by taking reuse of toner and/or ink cartridge into consideration.

The design of the cartridge recommended by the manufacturer (OEM) for use in the product should promote its durability. Devices and practices that would prevent its re-utilisation (i.e. anti re-utilisation devices/ practises) should not be present or applied. This requirement is not applicable for imaging equipment that is not using cartridges.

Assessment and verification: the applicant shall declare compliance with the criterion. The applicant shall provide to the competent body a copy of the user information. If requested by the competent body the applicant shall submit instructions on how the cartridge shall be remanufactured and/or refilled. The competent body may ask the applicant to provide a proof (i.e. one sample) that cartridges can be remanufactured or refilled following the provided instructions.

3.7.2 Criterion 12 - Toner and/or ink cartridge take-back requirement

The following formulation is proposed:

3.7.2 Criterion 12 - Toner and/or ink cartridge take-back requirement

The applicant shall offer a take-back system for the return of toner/ink modules and toner/ink containers supplied or recommended by the applicant for use in the product back to the applicant, in order to channel such modules and containers to reuse and/or material recycling with preference given to reuse. This also applies to residual toner containers.

Third parties (dealers and service agencies or companies engaged in the module reuse and/or recycling business) may be subcontracted to perform this task. They shall be provided with instructions for proper handling of residual toner. Non-recyclable product parts shall be properly disposed. Modules and containers shall be taken back free of charge by the return facility named by the applicant to which products may be returned personally or by shipment. The product documents shall include detailed information explainig the return system.

Assessment and verification: the applicant shall declare compliance with the requirements and document instructions for the recycling contractor for dealing with residual toner (e.g. by means of the EC Material Safety Data Sheet) and by means of the note: "Prevent toner dust from being released into the air." A declaration that the toner/ink modules and toner/ink containers are channelled for reuse and/or recycling signed by the subcontracted third parties (dealers and service agencies or companies engaged in the module reuse and/orrecycling business) shall also be provided to the awarding competent body.

3.7.3 Criterion 13 - Substances in ink and toners

The following formulation is proposed:

3.7.3 Criterion 13 - Substances in ink and toners

a) No substances may be added to toners and inks (including solid inks) supplied or recommended by applicant for use in the product which contain mercury, cadmium, lead, nickel or chromium-VI-compounds as constituents. High molecular weight complex nickel compounds as colorants are exempted. Production-related contamination by heavy metals, such as cobalt and nickel oxides shall be kept as low as technically possible and economically reasonable.

b) Azo colorants that might release carcinogenic aromatic amines appearing on the list of aromatic amines according to Regulation (EC) No 1907/2006 annex XVII, shall not be used in toners and inks supplied or recommended by the applicant for use in the product.

c) Only those substances which are listed as so-called existing substances in Annex II to Commission Regulation EC 2032/2003 amended by Regulation EC 1048/2005 may be added as active biocides to inks supplied or recommended by the applicant for use in the product.

Assessment and verification: the applicant shall declare compliance with these requirements. A declaration of compliance signed by the ink and toner supplier(s) and copies of relevant Safety Data Sheets about materials and substances shall also be provided to theawarding competent body.

Rationale of 3.7.1 Criterion 11 - 3.7.3 Criterion 13

3.7.1 Criterion 11 addresses the area of reuse and recycling of cartridges. In the framework requirements set by the EU Ecolabel Regulation 66/2010, one of the issues addressed is the potential to reduce environmental impacts due to durability and reusability of products to which this criterion is related. The aim of this criterion is to facilitate reuse and recycling of materials (thus reducing in this way the amount of new resources which have to be used if the end-of-life materials are not recovered) and to promote the products which are designed that way.

The importance of reuse and recycling of cartridges was presented in the Technical Background Report, discussed and agreed upon as an important area to draft Ecolabel criteria in the 1st AHWG meeting, and is an area for which criteria are found in Blue Angel and Nordic Swan. Reuse and material recycling strategies on ink and toner cartridges contribute to resource conservation and to waste reduction.

The start point of 3.7.1 Criterion 13 is the proposed industry voluntary agreement with regard to the Ecodesign Directive for ErP. Based on this in the European market the manufacturers signing this are committed that "for all products placed on the market after 1 January 2012, any cartridge produced by or recommended by the OEM for use in the product is not designed to prevent its reuse and recycling". In the proposed 3.7.1 Criterion 11 it is considered that the above given formulation could be also expressed in a positive way thus, the cartridges shall be designed for reuse and recycling. In general based on the waste management hierarchy pyramid the priority has reuse followed by recycling, energy recovery and disposal. Thus, reuse shall be given priority over recycling. This is also expressed in the current Ecolabel and Blue Angel criteria, and many stakeholders agreed with it in the 1st AHWG meeting.

In this area, manufacturing stakeholders presented data of a recent footprint-LCA study. In the particular LCA case study, the net footprints of both the new cartridge (which is assumed to have material recycling in its end-of-life phase) and the remanufactured cartridge (which is assumed to be exposed to the landfill) are about equal, with the remanufactured version having a slightly larger environmental impact overall. Thus, even under specific assumptions the benefit of reuse and recycling is proved to be high and in general it is concluded that: reuse of toner cartridges can deliver the best carbon avoidance benefits, but only if product performance and ultimate end-of-life disposal are optimized. More details on this are given in Annex 0**.**

It shall be emphasised at this point that this criterion is related to environmental savings via reduced resource consumption only when the device is eventually channelled for reuse. Therefore it is important that not only the design of the cartridge shall allow its reuse, but also the user be informed of the potential to reuse the cartridge.

For the LCA study investigations were carried out and both OEM cartridge producers and cartridge remanufacturer stakeholders were consulted via a respective questionnaire. The response to this was mainly from cartridge remanufacturer stakeholders as many imaging equipment manufacturers consider that a proper recycling of the cartridges could achieve sufficient environmental benefits (as mentioned before i.e. footprint LCA study and given in Annex 0). The main outcomes of this consultation (questionnaire feedback) are given below:

1. with regard to cartridge waste volumes and reuse rates of cartridges, stakeholders suggest that:

    a. 300-500 million ink cartridges and 10-20 million toner cartridges are annually sold in the EU-27;

    b. Approximately 20 % (at least) of these cartridges are reused.

    c. A few OEM producers are involved in remanufacture activities whereas many are involved in recycling activities;

    d. It is estimated that in total volume per year the 40 -70 % of the cartridges end up in landfills and/or incinerators.

2. with regard to the cartridge reuse circles stakeholders suggest that:

a. It is estimated that ink and toner cartridges can be reused at least once but on average two-three times, and printing quality remains sufficient at this level of reuse;

b. Toner cartridges can be remanufactured more easily than ink cartridges and there are extreme examples of up to 25 reuse circles;

c. Some parts have to be changed in the remanufacturing process;

d. The number of reuse circles depends on the model and the condition of the collection of the cartridge.

3. with regard to parameters affecting the cartridge reuse circles stakeholders suggest that:

    a. This is a very complex area and there 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 obviously there are no problems. However, for cartridge remanufacturing by third parties the identified technical parameters can be summarised in:

        i. clever/killer/smart chips;

        ii. design features that hamper remanufacturing i.e. welding, glue, blind screws or conjoined parts to fit cartridge-parts together;

        iii. Weaker print heads.

    b. Legal barriers because of patents

In conclusion, 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 coequal environmental benefits as recycling, thus it shall be prioritised as an option. This is in line with the waste management hierarchy and with priorities set in the MS Ecolabel criteria for imaging equipment and for remanufactured cartridges. 3.7.1 Criterion 11 also includes that the design of the cartridges shall also facilitate recycling.

The cartridge reuse circles depend on the type, model and the collection system, however, based on the stakeholders, a cartridge can be reused at least one time but the average is three times with a high improvement potential as there are examples of cartridges which were reused up to 25 times. As the number of reuse circles is not definite for each cartridge it

is suggested that no threshold values on the cartridge reuse circles shall be given in this phase but instead allow manufacturers to determine thresholds based on the case specific parameters.

The technical parameters which can affect the reuse are numerous and vary based on the type of cartridge and the model. However, practice shows that when a cartridge is designed for reuse these barriers are not present. Hence, in 3.7.1 Criterion 11 it is proposed to design the cartridges for reuse. Freedom given to the designer on how to achieve this goal is considered of importance as no eco-innovation shall be hampered. For verification a demonstration, if requested by the competent bodies, on how a cartridge can be reused is considered to be sufficient.

3.7.2 Criterion 12 - Toner and/or ink cartridge take-back requirement, is based on the respective criterion on of Blue Angel, which was discussed as an option in the 1st AHWG meeting. Many stakeholders agreed to this criterion and, as the experience showed in Blue Angel its application is considered beneficial, hence it is also proposed for the EU Ecolabel.

3.7.3 Criterion 13 - Substances in ink and toners is based on the respective criterion of Blue Angel. This criterion area was presented as an option in the 1st AHWG meeting and stakeholders agreed to it. Similar requirements are set also in Nordic Swan criteria. Ink and toners are a different product group from imaging equipment and are also marked separately. Ink and toners are consumables of imaging equipment and their manufacturers are also ink and toner producers. Therefore, to the extent it is possible, the main health and environmental impacts related to the use of substances in these items shall also be covered in the Ecolabel criteria for imaging equipment. This was agreed in the 1st AHWG meeting and based on current experience the main health and environmental impacts are covered by up taking the current Member State criteria. A more comprehensive option for substances found in the ink and toner consumables could be to apply the same requirements as set in 3.7.3 Criterion 13. However, as presented in section 0 this raises many practical difficulties and could be better covered in Ecolabel criteria of the product group of ink and toners.

3.8 Corporate Criteria

Formulation and verification of corporate criteria

The following four criteria fall under the category of corporate criteria. Their proposed formulation and verification are given below.

3.8.1 Criterion 14 - Requirements on packaging

The following formulation is proposed:

3.8.1 Criterion 14 - Requirements on packaging

Where cardboard boxes are used for the final packaging, they shall be made of at least 80 % recycled material.

Where plastic bags are used for the final packaging, they shall be made of at least 75 % of recycled material or they shall be biodegradable or compostable, in agreement with the definitions provided by the EN 13432 or equivalent.

Assessment and verification: the applicant shall declare compliance with these requirements and copies of material specifications from packaging material suppliers, shall also be provided to the awarding competent body.Only primary packaging, as defined in European Parliament and Council Directive 94/62/EC is subject to the criterion.

3.8.2 Criterion 15 – Warranty, guarantee of repairs and supply of spare parts

The following formulation is proposed:

3.8.2 Criterion 15 – Warranty, guarantee of repairs and supply of spare parts

The applicant shall ensure extend warranty covering repair or replacement for a minimum of minimum five years.

The applicant shall ensure that a supply of spare parts (direct or via other nominated agents) and necessary infrastructure for equipment repair is available for a period of at least 5 years after the end of production and that users are informed about the availability of spare parts.

This clause will not apply to the unavoidable and temporary situation that is beyond manufacturer's control such as natural disaster.

Assessment and verification: the applicant shall declare to the competent body compliance with this criterio and provide samples of the product information sheet and warranty terms to the awarding competent body.

3.8.3 Criterion 16 - User Information

The following formulation is proposed:

3.8.3 Criterion 16 - User Information

The applicant shall inform the user as follows:

(a) Environmental relevance of paper consumption

A message should be formulated by the manufacturer in which it is explicitly highlighted the fact that:

"The main environmental impacts of this product along its life cycle are related to the consumption of paper. The less paper is used the lower the overall life cycle environmental impacts. It is recommended to apply double side printing and make use of the function of multiple page printing in one paper sheet."

(b) Noise

A message should be formulated by the manufacturer in which it is explicitly highlighted the fact that:

"This device has noise emissions LWAd > 63.0 dB(A) and is not suitable for use in rooms where people do primarily intellectual work. This device should be placed in a separate room because of its noise emission".

This information shall only be given when the measured A-weighted sound power level of the device exceeds the 63.0 dB(A) as measured for criterion.

(c) Ink and toner cartridges:

A message should be formulated by the manufacturer in which it is explicitly highlighted the fact that:

"The cartridges of this equipment are designed for reuse. It is recommended to reuse the cartridge as this is resource efficient."

The cartridge ink yield and the yield of number of printouts should be clearly written on the packaging of the recommended for use (OEM) cartridge. The aforementioned requirements related to cartridges are not applicable to cartridge free imaging devices.

(d) A guide shall be provided with instructions on how to maximise the environmental performance of the particular imaging equipment (covering paper management functions, energy efficiency functions, waste management of the product and of any consumables such as ink and/or toner cartridges) in written form as a specific part of the user manual and in digital form accessible via the manufacturers website.

Assessment and verification: a certificate signed by the manufacturer declaring compliance with these requirements and evidence of the required user information shall be provided by the applicant to the competent body. Printouts produced after cancelation shall be measured following the calculation method proposed in Annex 6.1 of the criteria technical background report. The applicant shall fill-in table 4 of annex 6.4 of criteria technical background report. A copy of the instruction manual shall be supplied to the authority. This manual shall be available for access on the manufacturer's website.

3.8.4 Criterion 17 - Information appearing on the Ecolabel

The following formulation is proposed:

3.8.4 Criterion 17 - Information appearing on the Ecolabel

Optional label with text box shall contain the following text:

- Designed for efficient paper management
- High energy efficiency
- Minimised use of hazardous substances

The guidelines for the use of the optional label with the text box can be found in the "Guidelines for the use of the EU Ecolabel logo" on the website:

http://ec.europa.eu/environment/ecolabel/promo/pdf/logo%20guidelines.pdf

Assessment and verification: the applicant shall provide a sample of the imaging equipment device showing the label, together with a declaration of compliance with this criterion.

4 ISSUES PROPOSED TO BE INCLUDED IN THE COMMISSION STATEMENT FOR THE REVISION PROCESS

In the Commission Statement accompanying the criteria document issues which are proposed to be taken into account in the next revision process are indicated. In the current criteria development process several aspects, which shall be considered for the revised criteria set for the product group of imaging equipment, were identified. They are briefly described below.

4.1 Reporting of ultrafine particles emissions

In the 1st AHWG meeting the issue of ultrafine particles emissions was discussed as a potential criterion area which could be covered by the EU Ecolabel criteria in the framework of the indoor emissions criterion. Health impacts due to fine and ultrafine particles (FP and UFP) are an area of intensive research. A direct link between FP and UFP originating from different sources (including i.e. imaging equipment) and health impacts has not been proved.

An important issue is that stakeholders show interest in this and propose to include measurements of UF and UFP in the Ecolabel criteria, as research can unveil wrong implications and/or suspicions. However, thresholds for FP and UFP cannot be proposed at this phase as on the one hand no link between FP/UFP from imaging equipments and health impacts has been proved and on the other hand there are no emission data available in order to identify the best performing products. Nonetheless, we propose to investigate this aspect in the next revision of the criteria in which more knowledge would be available.

4.2 Restriction on the number of printouts after cancelation

The performance of imaging equipment regarding the number of printouts after the printing cancellation varies among different models. The potential to reduce the overall paper consumption and the related environmental impacts along the life cycle of imaging equipment by ensuring low number of printouts produced after the user cancels/interrupts the printing process is considered high.

As the main environmental impacts of imaging equipment are related to the paper consumption, the number of printouts was chosen as a reference parameter.

Currently the data for setting a benchmark on this aspect is not available. Informing the user about the number of printouts for this first version of imaging equipment EU Ecolabel criteria shall allow the end-user to identify easily the product performing best in this respect and in this way to support promotion of manufacturers, who take this aspect into consideration in the product development process.

However, it is further recommended to consider in the next criteria revision process to include a criterion in which the maximum printouts number allowed will be determined.

5 ANNEXES

5.1 Energy Star v.2.0 development documents

The latest document "ENERGY STAR Imaging Equipment Version 2 0 Draft Test Method" regarding the Energy Star 2.0 developments.can be found:

http://energystar.gov/products/specs/node/148

5.2 Additional information on noise emissions criteria

Noise emissions are rated by the declared A-weighted sound power level. Following the ISO 80000-8 it is clearly given that: "*In practical applications and consistent with the definition of sound pressure [power, exposure] level, the sub multiple decibel, dB, is used instead of the bel, B.*" This gives reasons for using the noise emissions limits based on dB.

Measurement and calculation of sound power and printing speed:

The A-weighted sound power level L_{WA} shall be determined according to ISO 7779:2010 (corresponds to ECMA-74:2010). Noise measurements shall be conducted with products in standard product configuration without optional peripheral devices (e.g. sorters, stackers, staplers, binders or cutters) at operating temperature.

Devices of identical design which differ in their maximum (attainable) printing speeds shall be tested in all configurations in which they are to be offered, with reference to the EU Ecolabel.

- A-4 size paper with paper weights between 60 to 80 g/m² shall be used for printouts;
- The test document according to image C.5 b) of ECMA-74:2010 shall serve as test page for monochrome as well as for colour printing or copying;
- Devices capable of multiple colour printing shall additionally be tested in full colour mode in the same way as described for monochrome printing.

The following specific requirements differ from ISO 7779:2010 (ECMA-74:2010) and shall be taken into account in the testing process:

- Noise measurements shall be conducted during maximum noise operation of the base unit (usually at maximum print speed);
- The measured values are time-averaged over the measurement time interval;
- The L_{WA} of ink-jet devices shall be determined in standard printout mode (usually preset).

Printers:

- One-sided printing shall be measured unless two-sided printing is the default mode, in which case two-sided printing shall be measured;

- The measurement time interval starts at the beginning of printing (including preparation of printing, e.g. paper loading and positioning of the print heads) and ends after the output of the sixth page of the test document.

Copiers and MFD:

- One-sided printing shall be measured. L_{WA} shall be conducted during scanning via the flat-bed scanner or ADF (if standard product configuration) and printing of six copies of the test document;

- The measurement time interval starts at the beginning of the scanning process and ends after the output of the sixth page of the test document. Pauses of more than three seconds between the end of the scanning process and the beginning of the printing process shall not be included in the averaging.

The measurement of printing speeds $\mathbf{S_{bw}}$ und $\mathbf{S_{co}}$ in pages per minute shall be conducted under the same operating conditions as they are set for noise measurements. The number of printouts shall be counted from the beginning of the first printout for one minute duration. Only fully completed printouts shall be counted.

- $\mathbf{S_{bw}}$ = operating speed for monochrome printing in pages per minute;

- $\mathbf{S_{co}}$ = operating speed for colour printing in pages per minute.

Declared sound power level

At least three devices have to be tested in order for the sound power level to be considered as declared. The declared sound power level L_{WAd} shall be determined following the procedures of ISO 9296:1988 and shall be declared in decibels (dB) with one decimal place. If the noise emission measurement can be performed on one device only, the following formula may be used as a substitute to determine the declared A-weighted sound power level L_{WAd}.

$$L_{WAd} = L_{WAE} + 3.0 \text{ dB}$$

(L_{WAE} = sound power level determined by single measurement in dB)

For information on noise emission the L_{WAd} value measured and calculated accurate to 0.1 dB shall be indicated in the user documents (User Manual/Product Documents).

The following limits are proposed:

The devices shall generally not exceed an L_{WAd} 75.0 dB (noise limit for office equipment);

In addition, the declared A-weighted sound power level L_{WAd} shall not exceed the following limits of $L_{WAd,lim,bw}$ or $L_{WAd,lim,co}$ in the respective printout mode:

The limit value $L_{WAd,lim,bw}$ or monochrome printing shall be determined depending on the operating speed S_{bw} given to one decimal place according to the following formula:

$$L_{WAd,lim,bw} = 37+20*\log(S_{bw}+8)\ dB$$

$L_{WAd,lim,bw}$ = A-weighted sound power level limit in dB for monochrome printouts

Accordingly, the following applies to the limit $L_{WAd,lim,co}$ for colour printing on parallel systems:

$$L_{WAd,lim,co} = (38 + 20*\log(S_{co}+8)\ dB$$

$L_{WAd,lim,co}$ = -weighted sound power level limit in dB for colour printouts

For serial electrophotographic colour devices with $S_{co} \leq 0{,}5\ S_{bw}$, the sound power level shall be determined and indicated. For assessment purposes, compliance with $L_{WAd,lim,bw}$ for monochrome printouts with printing speed S_{bw} shall be considered exclusively.

The following user information is proposed for devices with L_{WAd} > 63.0 dB in monochrome mode:

“Office equipment with L_{WAd} > 63.0 dB is not suitable for the use in rooms where people do primarily intellectual work. Such equipment should be placed in separate rooms because of high noise emission.”

Blue Angel additional criterion on noise emissions

In Blue Angel label for imaging equipment is planned (the finalisation of the new Blue Angel criteria will take place in December 2010) to include an additional measurement and declaration of sound power and printing speed. A short presentation of the requirements of Blue Angel criterion follows.

Blue Angel Criterion on Reporting of sound power and printing speed:

"The determination of sound power and printing speed shall be conducted with the use of the test documents and the performance measurement procedure of ISO 24734:2009 (for printers) and ISO 24735:2009 (for copiers and MFD) as follows

Separate measurement protocol for inventory of sound power and printing speed values with usage of ISO 24734:2009 (for printers) and ISO 24735:2009 (for copiers and MFD)

		$ESAT_{30sec}$ [ipm]	$EFTP_{30sec}$ [ipm]	L_{WAd} [dB]
monochrome	simplex			
	duplex			
colour	simplex			
	duplex			

The determination of sound power and printing speed in Blue Angel shall be also conducted with the use of the test documents and one performance measurement procedure of ISO 24734:2009 (for printers) and ISO 24735:2009 (for copiers and MFD).

The procedure shall be similar to those described under noise emissions, only the following adjustments shall be followed:

- The 4-page Adobe Reader file from the Office Test Suite according to B.1 of ISO 24734:2009 shall serve as test page for monochrome as well as for colour printing or copying.

<u>Printers:</u>

- The determination of printing speeds ($ESAT_{30sec}$ und $EFTP_{30sec}$) shall be conducted according to the “1 Set + 30 Seconds Test” in paragraph 5.1.2 of ISO 24734:2009.
- During this printing process, the sound power level shall be conducted according to ISO 7779:2010. The measurement time interval for the time-averaging of L_{WA} shall be from t_1 till t_n according to paragraph 5.1.2 of ISO 24734:2009.

Copiers and MFD:

- The determination of copying speeds ($ESAT_{30sec}$ und $EFTP_{30sec}$) shall be conducted according to the “1 Set + 30 Seconds Test” in paragraph 6.1.2 of ISO 24735:2009.
- During this copying process, the sound power level shall be conducted according to ISO 7779:2010. The measurement time interval for the time-averaging of $\boldsymbol{L_{WA}}$ shall be from t_1 till t_n according to paragraph 6.1.2 of ISO 24735:2009.

The declared sound power level $\boldsymbol{L_{WAd}}$ shall be conducted according to the procedure described under Noise emissions.

There are no sound power level limits. The values of sound power level and printing speed shall be recorded in a separate measurement protocol.

The rationale of this Blue Angel criterion is: "harmonisation with international standards shall be achieved with the adjustment of the noise rating procedure as a part of the future developments of this basic criteria document. Therefore it is proposed that the applicant shall provide additional values which are determined according to international standards".

5.3 Information for removal of Mercury from fluorescent lamps[28]

Currently there are two methods for removing mercury from fluorescent lamps. One method is to cut the end off the tube and remove the mercury and phosphor powder, and the second is to shred the light bulb completely and then mechanically separate out the powder.

An established technique for re-processing fluorescent tubes involves breaking the tube into waste fractions and then extracting the mercury. The process is done in two stages:

1. The fluorescent tubes are crushed, sieved and separated producing a fluorescent powder, glass and metal. The powder is heated under vacuum while simultaneously supplying oxygen to the afterburner. Through varying the vacuum pressure mercury can be extracted from the powder and collected in condensers. Approximately 99 % of the mercury can be recovered,

2. Alternatively size reduction equipment techniques can be used. These operate by crushing the tubes, while a filter traps the mercury vapour that can then be either disposed of or sent for recycling. The mercury can be sold back into industry for use in products such as barometers, thermometers etc. The glass is used to make other glass products such as containers and the end pieces (normally consisting of either brass or aluminium) of the tubes are sold on to scrap metal merchants to be reprocessed.

28 Huisman, Jaco, Delgado Clara, Magalini Federico, Kuehr Ruediger, Maurer, Claudia Artim, Eniko Szlezak, Josef Ogilvie, Poll Jim, Steve Abs, final Report for DG ENV, 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE), United Nations University, 2008.

5.4 Information for footprint life cycle assessment of cartridges

Below the relevant DE Europe feedback is presented:

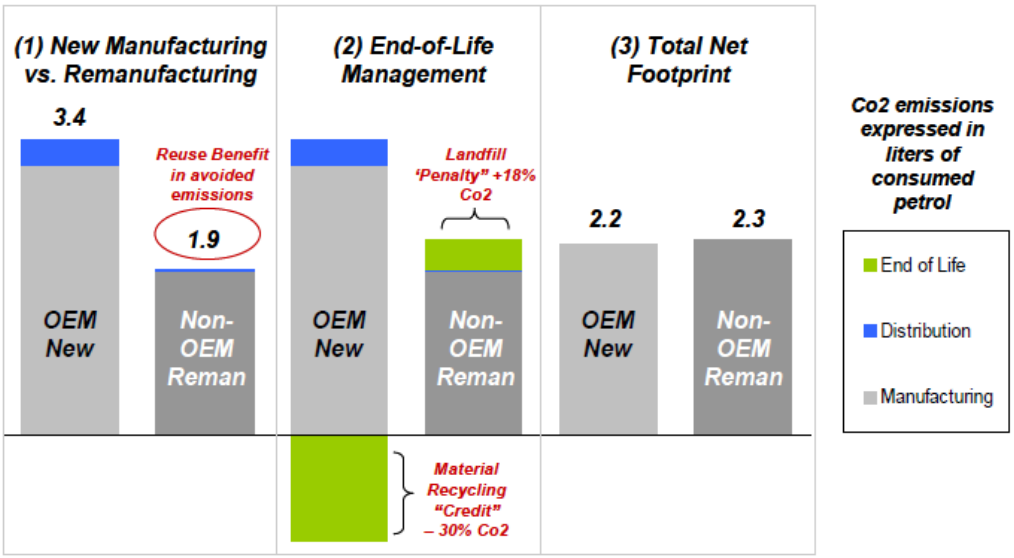
Industry data shows 80 % of aftermarket remanufactured toner cartridges are discarded after use due to non-OEM remanufacturers preference for virgin empties. [InfoTrends 2007 Supplies Recycling Report, pg 16].

Reuse and Remanufacturing can, under certain conditions offer the greatest carbon avoidance potential. In contrast to material recycling, however, the reuse of a toner cartridge does not end the product's life cycle. Quality and reliability during use of the remanufactured cartridge and its ultimate end-of-life management are crucial factors that shape the full life cycle footprint of the cartridge. Poor quality or irresponsible end-of-life handling can quickly offset the benefits of materials reuse. The following sections illustrate these factors using carbon footprint measurements of new and remanufactured cartridges.

To demonstrate the significant impact of proper end-of-life management, the chart below compares the carbon footprint of a new OEM cartridge (with material recycling after use) and a remanufactured cartridge without an end-of-life recycling program[29] (i.e. assuming the cartridge ends up in a landfill[30]):

29 Examples based on a toner cartridge Life Cycle Assessment by WSP Environment and Energy for Lexmark, 7/2009, represents a T64X 21,000 page toner cartridge. Conducted in accordance with ISO 14044 guidelines for Life Cycle Assessment. Expressed in liters of petrol consumed from EPA Greenhouse Gas Equivalencies Calculator http://www.epa.gov/RDEE/energy-resources/calculator.html. Converted from gallons.

30 “InfoTrends" research found that the chance of a remanufactured cartridge ending up in a landfill after the first remanufacturing cycle is high. In the U.S. and Europe, 80% of remanufactured toner cartridges and 86% of remanufactured inkjet cartridges are thrown away. This is because remanufacturers have such a strong preference for virgin empties” (InfoTrends 2007 Supplies Recycling Report, pg 16)



1. Here we see the initial benefit of remanufacturing vs. new manufacturing: Reuse of the cartridge materials through remanufacturing has a carbon footprint equivalent to burning 1.9 liters of petrol vs. 3.4 liters petrol equivalent for manufacturing a new cartridge.

2. Impact of End-of Life management: Assuming the empty new cartridge is collected and fully recycled (providing a 30% 'credit' to the footprint for returning those materials back to the materials stream), the remanufactured cartridge by weight (75 %) goes to landfill[31]. This gives the remanufactured cartridge an incremental +15 % footprint 'penalty'.

3. The net footprints of both the new cartridge (with material recycling at end-of-life) and the remanufactured cartridge (in landfill) are about equal, with the remanufactured version having a slightly larger environmental impact overall.

Without end-of-life material recycling, the reuse on an empty toner cartridge does not deliver an overall environmental benefit versus a new OEM cartridge material recycled at end-of-life.

Ultimately, the vendor of a remanufactured cartridge must collect and material recycle the product at its ultimate end-of-life in order to avoid offsetting the benefits of reuse. This is also the case for cartridges the vendor collects but does not reuse.

31 Of the unusable cartridges collected by U.S. and European remanufacturers, we estimate that about 25% of the material is recycled." (2007 Supplies Recycling in US and Europe. InfoTrends. May, 2007. Page 10).