

JRC SCIENCE FOR POLICY REPORT

Revision finalisation of European Ecolabel Criteria for Televisions

TECHNICAL REPORT UPDATE (for
last open consultation)
Criteria proposal for revision of
ecological criteria

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June 2019



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EUR xxxxx xx

PDF ISBN xxx-xx-xx-xxxxx-x ISSN xxxx-xxxx doi:xx.xxxxx/xxxxxx

Seville: European Union, 2019

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How to cite this report: Author(s), *Title*, EUR, doi

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1 INTRODUCTION

In 2009, EU Ecolabel criteria were developed for televisions.¹ A review study was undertaken in 2013 with a view to updating the 2009 criteria.² The 2013 review study on the EU Ecolabel criteria for televisions was carried out by the Joint Research Centre Directorate B – Growth and Innovation (Institute for Prospective Technological Studies (JRC-IPTS) in 2013) with technical support from the Öko-Institut e.V. (OEKO). The work was developed for the European Commission's Directorate-General for the Environment.

The revision of the EU Ecolabel criteria for televisions was delayed so as to ensure alignment with EU Ecodesign³ and EU Energy Labelling⁴ Regulations that were being revised in parallel to the EU Ecolabel.

The revisions of the EU Ecodesign⁵ and EU Energy Labelling⁶ Regulations for televisions were recently finalised.

In 2013 and 2014, several versions of the technical report including draft criteria proposals were published. All relevant reports can be consulted on the product website². The main purpose of the different versions of the technical report was to provide a summary of the technical background and rationale for each criterion proposal at different stages of the revision process.

Furthermore, during the course of the revision process, two general questionnaires on the scope and improvement potential as well as queries specific to certain criteria were sent out to selected stakeholders. The target groups were industry, Member States, NGOs and research institutions.

The first (T.R1.0) and second draft (T.R2.0) versions of the technical report were the basis for the first and second Ad-Hoc Working Group (AHWG) meetings which took place in October 2013 and May 2014 respectively. A third version of the report and criteria (T.R3.0) was produced after the AHWG2 and was open for stakeholders' consultation during November 2014.

This revised updated version (**TR4.0 - TECHNICAL REPORT UPDATE** (for last open consultation)) provides an update of the criteria development process based on further research on updated legislation, environmental schemes currently in place, updated market figures and relevant technical data. Stakeholders' input received in November 2014 has been taken into consideration. Bilateral communication with stakeholders has been maintained during the update process and reflected where relevant.

The structure of this technical report update has been slightly changed from previous technical reports in line with the technical reports recently published for other product groups. It consists of the following:

¹ 2009/300/EC: Commission Decision of 12 March 2009 establishing the revised ecological criteria for the award of the Community Eco-label to televisions (notified under document number C(2009) 1830) (Text with EEA relevance), available from - <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009D0300>

² JRC, EU Ecolabel and Green Public Procurement criteria revision for televisions, available from - <http://susproc.jrc.ec.europa.eu/televisions/stakeholders.html>

³ COMMISSION REGULATION (EC) No 642/2009 of 22 July 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for televisions

⁴ COMMISSION DELEGATED REGULATION (EU) No 1062/2010 of 28 September 2010 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of televisions

⁵

http://ec.europa.eu/transparency/regcomitology/index.cfm?do=search.documentdetail&Dos_ID=16995&ds_id=59740&version=2&page=1

⁶ [https://eur-lex.europa.eu/legal-content/FR/PIN/?uri=PI_COM:Ares\(2018\)5173937](https://eur-lex.europa.eu/legal-content/FR/PIN/?uri=PI_COM:Ares(2018)5173937)

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- **Introduction:** this section describes the goal and content of the document, the sources of information and the upcoming steps in the project. This section aims to link the information and deliverables already published and the new draft criteria. Among the different sources of information listed and summarised in this section, special attention should be paid to the key environmental aspects of this product group and the criteria proposed. A subsection highlighting the synergies of the revised criteria with the new Ecodesign and Energy Labelling Regulations is included.
 - **Assessment and verification:** this section includes information on the type of documentation required to show compliance with the criteria that shall be provided by applicants and recognised by competent bodies. In addition, the legal prerequisites that applicants shall guarantee are also mentioned in this section.
 - **Criteria proposal:** this section presents the last and most updated EU Ecolabel criteria proposals for the product group 'Televisions'. The proposal is written in a blue box and subsequently a brief rationale is given. **Changes in the criteria text compared to the version published in October 2014 (TR3.0) are marked in blue.** The rationale is based on the most relevant aspects determined over the course of the project. Existing criteria in force are also included in order to allow comparison.
 - **Table of comments:** this section consists of all the stakeholder comments and feedback from the latest open consultation in November 2014 presented in an anonymous way. The section is completed by the assessment of the stakeholders' feedback, further research on the points highlighted by the participants and how they triggered the changes to the criteria leading to the current criteria proposal.

Comments were classified under three categories:

- a) *Accepted:* the comment is fully integrated in the new criterion wording.
- b) *Partially accepted:* this category includes those comments that either raise a good idea which is then integrated in the new criterion wording or suggest some modifications of the criterion wording; even if they are not completely reproduced in the wording, they are partially introduced.
- c) *Rejected:* the comment is not taken on board in the proposal. This can be due to different reasons such as lack of standards to perform the measurement, creation of market restrictions if the idea is integrated, etc.

1.1 Methodology and sources of information

The current EU Ecolabel definition of 'Television' was assessed against a number of sources to determine its suitability. This included an analysis of alternative Ecolabels, existing statistical and technical categories and relevant legislation and standards in order to propose on that basis the scope and definition of the product for the revised criteria.

With regard to the market analysis, the study was mainly based on an analysis of European statistical data and available literature with a focus on televisions / electronic displays.

The main requirement of the EU Ecolabel is that criteria should be based on scientific evidence and should focus on the most significant environmental impacts during the whole

life cycle of products. According to the European Commission Communication 'Building the Single Market for Green Products' (COM(2013)196), in general, better information on the environmental performance of products should be facilitated. This should be done by gradually incorporating the Product Environmental Footprint (PEF) methodology as appropriate *inter alia* in EU Ecolabel policies. This also includes the use of the International Reference Life Cycle Data System (ILCD) Handbook, which provides technical guidance for detailed LCA studies and the technical basis to derive product category-specific criteria. In the current revision process of Ecolabel criteria for televisions, these methods have been taken into account within the Technical Analysis.

Finally, the revision of the EU Ecolabel criteria largely considers the specific information provided by the stakeholders during the two AHWG meetings as well as during bilateral meetings. The information related to the revision of the EU Ecolabel criteria is summarised in the series of technical reports while the information described above is mainly included in the preliminary research (see detailed information on the revision web page²).

1.2 Summary of preliminary report and link to the EU Ecolabel criteria

The preliminary report forms the initial stage of the revision of the criteria for the product group 'televisions'. This includes the update and revision of the scope and definitions of the current criteria, an analysis of the televisions market and the implications for the EU Ecolabel, and a review of the scientific evidence to identify the main environmental impacts of these appliances. The sections below provide a summary of the findings from the preliminary research.

1.2.1 Product group name, scope and definitions

Existing product group name
Televisions
Revised product group name:
Electronic displays

Existing scope and definition
The product group 'televisions' shall comprise: 'Mains powered electronic equipment, the primary purpose and function of which is to receive, decode and display TV transmission signals.'
Revised scope and definition:
<p>Scope:</p> <p>Electronic displays including televisions, monitors and digital signage displays.</p> <p>Definitions:</p> <p>'Electronic display' means a display screen and associated electronics that, as its primary function, displays visual information from wired or wireless sources.</p> <p>'Television' means an electronic display designed primarily for the display and reception of</p>

audiovisual signals and which consists of an electronic display and one or more tuners/receivers.

'Tuner/Receiver' means an electronic circuit that detects television broadcast signal, such as terrestrial digital or satellite, but not internet unicast, and facilitates the selection of a TV channel from a group of network channels.

'Monitor' or 'computer monitor' means an electronic display intended for one person for close viewing such as in a desk-based environment.

'Digital signage display' means an electronic display that is designed primarily to be viewed by multiple people in non-desktop based environments. Its specifications shall include all of the following features:

- (a) unique identifier to enable addressing a specific display screen;
- (b) a function disabling unauthorised access to the display settings and displayed image;
- (c) network connection (encompassing a hard-wired or wireless interface) for controlling, monitoring or receiving the information to display from remote unicast or multicast but not broadcast sources;
- (d) designed to be installed hanging, mounted or fixed to a physical structure for viewing by multiple people;
- (e) does not integrate a tuner to display broadcast signals.

Rationale of proposed name, scope and proposed definitions

As highlighted in the preliminary research and the previous versions of this technical report, technological progress and convergence of different products increasingly blurred the line between television monitors and other display products. There are technical similarities among the different displays and a functionality overlap, with for example the classic television no longer the only way of watching video content⁷ and, because of the enhanced resolution levels now available, televisions sometimes being used as monitors for game consoles. Thus, it is becoming more and more difficult to distinguish between the two product categories. During the revision of the Ecodesign and Energy Labelling for televisions⁸, the scope was modified from solely 'televisions' to 'electronic displays', including television sets, television monitors, and external computer displays. Considering the general desire for harmonised approaches and coherent product policy, at an initial stage of this EU Ecolabel revision process, it was proposed that external computer displays be moved from the revised scope of the EU Ecolabel for computers⁹ to a revised scope of EU Ecolabel criteria for televisions, combining them under a new title 'Electronic Displays', subsuming TV sets, TV monitors, dual-function TV monitors and external computer displays.

Initially, the product scope was basically aligned to the proposals provided in the 'Discussion paper on the review of the Ecodesign and Energy Labelling Regulations for televisions and on the draft Regulation on electronic displays, including computer monitors' of August 2012.

Those products excluded from the scope of the Ecodesign and Energy Labelling Regulations for electronic displays of 2012 were also excluded from the scope of the draft EU Ecolabel

⁷ Laptops, tablets or even smartphones can be used to watch video content, although the displays integrated in these products would be better tackled within the review of the Regulation on computers.

⁸https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/energy-efficient-products/televisions_en

⁹ Commission Decision 2011/337/EU of 6 June 2011 on establishing the ecological criteria or the award of the EU Ecolabel for notebook computers (OJ L 148, 7.6.2011, p. 5).

criteria for electronic displays as this would have otherwise required separate calculation, measurement and verification procedures.

While included in the scope of the aforementioned Ecodesign and Energy Labelling drafts for electronic displays (2012), digital photo frames and signage products were proposed to be excluded from the EU Ecolabel for electronic displays. For more details, see the Task 1 report ('Scope and Definitions') and different versions of this technical report (TR1.0 and TR2.0).

Discussions at the second AHWG meeting and written stakeholder feedback revealed that there was support for aligning the definitions of televisions and computer monitor to draft the Ecodesign proposal. Considering the general support, no relevant changes were included in TR3.0. Consequently, as the EU Ecodesign and EU Energy Labelling Regulations were being revised in parallel to the EU Ecolabel, the revision process was delayed to enable alignment.

The recently finalised measures (EU Ecodesign⁵ and EU Energy Labelling⁶) apply to electronic displays irrespective of the display technology. The scope covers the three main display product categories (televisions, monitors and signage displays). All displays integrated into other products, such as computers, refrigerators, vending machines, etc. are outside the scope of both the Ecodesign and Labelling Regulations, as are displays in means of transport and medical displays. The electronic displays which have been excluded from all requirements in the EU Ecodesign and Energy Labelling Regulations are either specialist displays (e.g. medical and security displays) or displays for which the underlying requirements would not be suitable (e.g. small displays, projectors, medical displays, status displays, certain types of digital signage displays). The revised EU Ecodesign and Energy Labelling Regulations requirements may not be suitable for the excluded displays because they are either too stringent or because they are inappropriate to describe efficiency for the display technology.

In light of the revised EU Ecodesign and EU Energy Labelling Regulations, it is suggested that this technical report update (TR4.0) be as harmonised as possible with these policy tools to ensure coherence and to allow the use of the same measurements and data. It is proposed to align the scope and definitions **to the revised Energy Labelling scope (televisions, monitors and signage displays)**. However, at this stage, there is not a clear picture of the potential compliance of signage displays with the proposed EU Ecolabel criteria, as this type of displays has been proposed to be included at a late stage of the process. **Therefore, the inclusion of signage displays is therefore subject to feedback to be obtained in the final consultation.** In addition, the relevant definitions of products in the EU Ecolabel revised scope have been included as defined in the revised EU Ecodesign and Energy Labelling Regulations.

1.2.2 Summary of key market aspects

The original Task 2 report (see product website² for further details) provided some insights into market and production structures. The following points summarise the key aspects of the market analysis, taking into consideration market figures updated since the publication of Task 2 in 2013.

- According to official European statistics¹⁰ provided by Eurostat concerning production and trade data, the overall demand for televisions has decreased from 2012 and is not expected to increase rapidly in the future. As suggested originally in Task 2, much of this reduced demand is likely due to external factors, such as slowing economic growth, high unemployment rates, the completion of the analogue switch-off process in many western European markets, and saturation of flat panel televisions.
- LCD (liquid crystal display) remains the dominant flat panel display technology but OLED (organic light-emitting diode) displays are beginning to gain a higher market share.
- Virtually all LCDs utilise LED backlighting technology rather than the older CCFL (cold cathode fluorescent lamp) backlights.
- The OLED penetration of the display market is estimated to be about 1.0% in 2017. Competition from QLED (quantum dot light-emitting diode) LCD displays has likely impacted sales of OLED displays.
- The average screen sizes of displays have increased over the past years. Data for the UK shows that almost two thirds of homes have televisions of 40 inches or larger and almost 20% have televisions of 50 inches or more.¹¹
- Features like smart interactive TV, HDR (High Dynamic Range) and UHD (Ultra High Definition), as well as price decreases, will encourage end users to choose larger display sizes.
- Smart TVs are now present in about 50% households in some EU Member State but lower penetration rates are seen in other Member States. Ultra-high-definition (4K) televisions account for around 50% of all European TV sales.¹²
- As of 2018, 8K UHD displays with resolutions of 7 680 x 4 320 pixels (i.e. 33.2 million pixels) are beginning to enter the market. Global sales of 8K televisions are expected to reach around 11 million per annum by 2023.¹³ Shipments of UHD computer monitors have also increased in recent years, especially in the gaming monitor sector.¹⁴ As of December 2018, 8.3% of computer monitors registered with the US ENERGY STAR scheme were UHD.
- The numbers of electronic displays registered with the main environmental initiatives are varied:
 - ENERGY STAR¹⁵: 709 consumer televisions, 220 commercial televisions, 1 058 computer monitors, 283 signage displays.
 - Blue Angel (DE-UZ 145)³⁴ on television sets - No licences.
 - EU Ecolabel¹⁶: 9 licences for televisions.
 - EPEAT¹⁷: 124 televisions and 1 049 computer monitors.
 - Nordic Ecolabelling¹⁸: 85 hospitality televisions and 3 consumer televisions.
 - TCO: 3 060 displays (no further detail) and no televisions.

¹⁰ <http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes>

¹¹ <https://www.statista.com/statistics/438130/tv-sets-usage-in-homes-by-screen-size-in-the-uk/>

¹² <https://www.digitaltveurope.com/2018/04/09/ihs-half-of-tv-sets-shipped-in-western-europe-now-4k/>

¹³ <https://www.statista.com/statistics/950951/worldwide-unit-sales-ultra-hdtv-8k/>

¹⁴ <https://press.trendforce.com/press/20181205-3187.html>

¹⁵ www.energystar.gov/specifications

¹⁶ <http://ec.europa.eu/ecat/category/en/18/televisions>

¹⁷ <https://epeat.sourcemap.com/>

¹⁸ www.svanen.se/en/Buy-Svanenmarkt/Ecolabelled-products/?categoryID=159&p=4

- Front runners in terms of Ecolabelling are LG Electronics, Philips, Samsung, Sharp, Sony and Toshiba, and in terms of EU Energy Labelling Loewe, Panasonic, Philips, Samsung, Sharp,, and Sony.
- According to IHSMarkit¹⁹, a television replacement cycle is between 7 and 10 years. Other sources suggest that a LCD television replacement cycle is around 6 years.²⁰ Identifying the typical replacement cycle for displays is problematic as few data sources exist. A LCA conducted by the US EPA on computer monitors in 2001 estimated lifespans to be around 6.5 years, but those figures were for CRT monitors.²¹ Other studies suggest that LCD monitor replacement cycles are around 8 years.²⁰ Given the wide range of computer monitor user types, from commercial users to domestic users, it is likely that lifespans will vary widely depending on the individual user type and current drivers for replacement.
- Market research organisations suggest that there are a number of drivers for consumers to replace televisions including a move from FHD (Full HD) to UHD, 4K to 8K, smaller to larger televisions, and high-end LCD to high-end OLED.¹⁹ Research has suggested that consumers are willing to pay around EUR 50 more, on average, for an additional label class, and 50% more for an A-grade TV set compared to a G-grade one on the EU Energy Label 'A-G' scale.²²
- Across European countries, the average TV viewing time varies significantly, e.g. from 2.3 hours per day in Sweden to 4.1 hours per day in Italy. In general, average TV viewing times have decreased since 2010 as users switch to viewing media on other electronic displays²³.

1.2.3 Key environmental aspects and relation with the criteria proposal

Based on the LCA review presented in the Task 3 report², the overall findings indicate that the production phase and the use phase are associated with the most significant environmental impacts during the life cycle of computer products.

Within the manufacturing phase of televisions, specific environmental 'hot spots' identified are the assembly process of the LCD module, the amount of chrome steel used in the housing and the printed circuit boards used.

One of the reasons is that critical raw materials are concentrated in these components, the extraction and processing of which are associated with major material requirements, appropriation of land and consumption of energy, and which cause severe environmental impacts: silver, gold and palladium in the motherboard and other printed circuit boards, or indium and gallium in the display and background illumination.

The direct influence of EU Ecolabel criteria on the production of single components, especially if provided by external suppliers, of televisions or computer displays is relatively limited. However, by improving design (e.g. design for dismantling and recycling) or indirectly by

¹⁹ <https://ihsmarkit.com/research-analysis/various-factors-will-influence-tv-panel-pricing-for-the-years-first-half.html>

²⁰ Kalmykova et al., 2015, Waste Management 46 (2015) 511–522, "Out with the old, out with the new – The effect of transitions in TVs and monitors technology on consumption and WEEE generation in Sweden 1996–2014".

²¹ https://www.epa.gov/sites/production/files/2014-01/documents/computer_display_lca.pdf

²² https://ec.europa.eu/info/sites/info/files/impact_of_energy_labels_on_consumer_behaviour_en.pdf

²³ <https://www.statista.com/topics/3871/tv-set-market-in-europe/>

extending the lifetime or by reusing parts, the impacts of the manufacturing phase can be reduced as secondary resources from recycling or an extended lifetime can avoid primary production. Thus, the allocation of benefits from reuse and recycling is an area specifically highlighted in Task 4 (improvement potential) and the criteria development.

Since the publication of the original Task 3 report in 2013 few LCAs have been published on televisions or other electronic displays. One LCA published on computer monitors in 2015²⁴ included similar findings to those of the previously reviewed LCAs. The study found that the use phase of CRT and CFL backlit LCD monitors was the most important impact category, followed by the production phase. The LCA on LED backlit monitors found that improvements in energy efficiency have caused most burdens to shift to the production phase. In exploring the findings, the authors claim that the Printed Wiring Board (PWB) on all types of monitors had the largest share of overall impacts. They also claimed that the manufacturing phase (including pre-manufacturing) was the cause of most ecotoxicity impacts. In summarising, the authors suggest that extending the useful life of LED backlit LCD monitors should be a priority to reduce impacts.

Improvements in the energy efficiency of televisions, through the introduction of technologies such as LED backlights, will also have shifted more burdens to the production impacts.

The following table shows the link between the identified hotspots and the revised EU Ecolabel criteria proposal. The table only provides an indicative reference to the proposal. The details of the proposed criteria and further technical details are addressed in the next section.

²⁴ Bhakar et al., 2015, Procedia CIRP, Volume 29, 2015, Pages 432-437, Procedia CIRP, "Life Cycle Assessment of CRT, LCD and LED Monitors", available from - <https://www.sciencedirect.com/science/article/pii/S2212827115000414>

Table 1. Link between the hotspots identified and the revised EU Ecolabel criteria

Section	Proposed criteria	Environmental hotspot
1 Energy consumption	Criterion 1.1 – Energy savings	Energy consumption and resulting greenhouse gas emissions from production and use. Proposed criteria address energy efficiency at use phase.
	Criterion 1.2 – Power management	
2 Hazardous substances	Criterion 2.1 - Excluded or limited substances	Air, soil and water pollution, bioaccumulation and effects on aquatic organisms due to raw material extraction and processing, and hazardous substances used in products. The proposed criteria reflect products with a restricted amount of hazardous constituents and with a reduced potential for hazardous emissions upon disposal.
	Criterion 2.2 – Activities to reduce supply chain fluorinated GHG emissions	Fluorinated greenhouse gases (F-GHGs) are among the most potent and persistent GHGs contributing to global climate change. These gases are relevant in the manufacture of semiconductors, light-emitting diodes, and liquid crystal display (LCD) flat panel displays, <i>inter alia</i> for televisions, computer monitors or tablet PCs. Over the last decade, major flat panel suppliers as well as the semiconductor industry have taken voluntary steps to reduce their F-GHG emissions. However, the goals and results are published at sectoral not at manufacturer or product level so it is not possible to propose, for example, a certain limit value as a criterion for the EU Ecolabel. The proposed criteria consist of a general requirement focused on the target of setting limits in the future.
3 Lifetime extension	Criterion 3.– Reparability and commercial guarantee	Use of finite resources and critical raw materials in production. The proposed criterion addresses design for durability and reparability and product life extension upon the end of its life.
4 End-of-life management	Criterion 4.1 – Material selection and information to improve recyclability	Generation of potentially hazardous waste electronic equipment upon its final disposal. The proposed criteria address material selection and design at production to ensure easy dismantling and compatibility with recycling in order to improve resource efficiency and to maximise the recovery of resources at the end of life.
	Criterion 4.2 – Design for dismantling and recycling	
5 Corporate production / supply chain management	Criterion 5.1 – Labour conditions during manufacture	Many product groups, also concerning computer products, are associated with both environmental and social impacts in their life cycle. Within this context, it is also suggested that the EU Ecolabel should gradually introduce social requirements into its criteria documents.
	Criterion 5.2 – Sourcing of ‘conflict-free’ minerals	
6 Information	Criterion 6.1 – User instructions	Information provides consumers with options to use the product considering the environmental benefits associated with the different modes of the product. In addition, EU Ecolabel information encourages the purchase of the product.
	Criterion 6.2 – Information appearing on the EU Ecolabel	

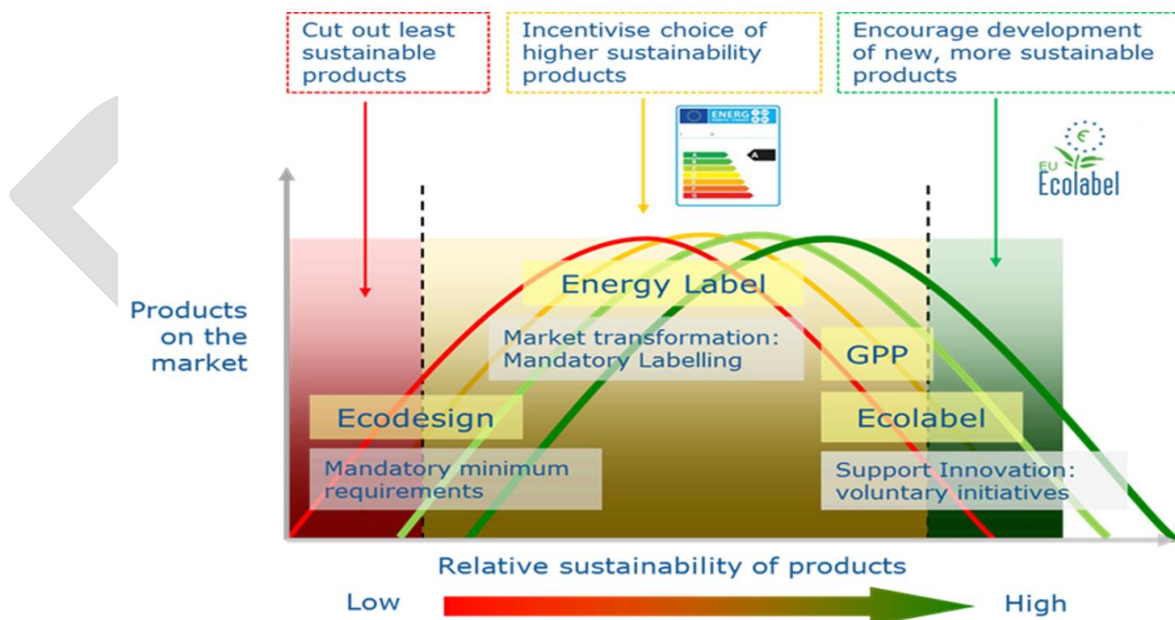
1.3 EU Ecolabel within the new EU policy context for electronic displays: synergies of revised criteria with new Ecodesign and Energy Labelling Regulations

The Ecodesign Framework Directive²⁵ provides a framework that manufacturers of energy-related products are required to use to improve the environmental performance of their products. The framework sets out minimum energy efficiency requirements and other environmental criteria such as water consumption, emission levels or minimum durability of certain components that manufacturers have to fulfil before they can place their products on the market. The aim of the Ecodesign Framework is to cut out the least sustainable products. The new Ecodesign measure⁵ for electronic displays has broadened the scope and includes material efficiency and information availability requirements in addition to the energy efficiency requirements.

The Energy Labelling Framework Regulation²⁶ enables end users to identify the better-performing energy-related products, via an A-G/green-to-red scale (under the old Energy Labelling Framework Directive 2010/30/EU, energy labels were allowed to include A+ to A+++ classes). The new Energy Labelling measure⁶ sets the energy efficiency classes for electronic displays to incentivise the consumer's choice of more energy-efficient products.

In this context, the EU Ecolabelling Regulation²⁹ complements both Ecodesign and Energy Labelling. It is a voluntary scheme that awards products with the best environmental performance throughout their life cycle. EU Ecolabel criteria set higher requirements than those included in Ecodesign (which represent the minimum for market access) and at least as far as the EU GPP (Green Public Procurement) which is aimed at public authorities seeking to procure environmentally friendly goods and services (Communication COM(2008) 400 'Public Procurement for a better Environment').

The legislative framework builds upon the combined effect of the aforementioned pieces of legislation. See the image below for a visualisation of this effect.



²⁵Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products. OJ L OJ L 285, 31.10.2009, p. 10.

²⁶ Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU. OJ L 198, 28.7.2017, p. 1 (Energy Labelling Framework Regulation).

The updated EU Ecolabel criteria for electronic displays are aligned to the updated scope of products under the revised new Ecodesign and Energy Labelling Regulations (televisions, computer monitors and signage displays). In addition, the EU Ecolabel includes stricter energy efficiency requirements and addresses a number of other environmental issues, for instance hazardous substances in line with the EU Ecolabel Regulation or resource efficiency requirements in line with the Circular Economy Strategy²⁷. In addition, the EU Ecolabel Regulation allows the inclusion of social requirements, where relevant. The revision of the EU Ecolabel also includes social aspects in line with other recently voted products.

Furthermore, the requirements included in the EU GPP for computer and monitors²⁸ which covers computer displays reflected the EU Ecolabel criteria (as drafted in 2014) as far as possible in the criteria aiming to promote the use of EU Ecolabel monitors via green procurement and facilitate the verification process of EU GPP criteria.

A synergic approach has been followed in the revision of the EU Ecolabel; harmonisation with the other EU tools has been sought during the whole revision process. The requirements included in the new Ecodesign and Energy Labelling have been used as a baseline to build stricter requirements for the EU Ecolabel. The following table illustrates the coverage of each policy tool in terms of sustainability aspects and reflects the synergies created among the different tools. In this context, the harmonisation will ensure the development of new, more sustainable electronic displays.

²⁷ http://ec.europa.eu/environment/circular-economy/index_en.htm

²⁸ http://ec.europa.eu/environment/gpp/pdf/EU_GPP_criteria_for_computers_and_monitors.pdf

Table 2. Summary of requirements on displays from different EU policies.

Section	Energy Labelling	Ecodesign	EU Ecolabel
1 Energy consumption	<ul style="list-style-type: none"> - Energy efficiency classes (A to G) based on Energy Efficiency Index (EEI) values. - Allowances reducing the value of $P_{measured}$ for the purposes of calculating the EEI. 	<ul style="list-style-type: none"> - EEI maximum limits that shall not be exceeded by displays. - Allowances reducing the value of $P_{measured}$ for the purposes of calculating the EEI. - Off mode, standby and networked standby mode requirements. - Automatic power down. 	<p>Criterion 1.1 – Energy savings Strict Energy Efficiency classes. Only best displays in the market; ~10% would comply with thresholds.</p> <ul style="list-style-type: none"> • Energy efficiency class \geq E (F for UHD) for televisions • Energy efficiency class \geq D (F for UHD) for monitors • Energy efficiency class \geq F for digital signage displays <p><u>G class has been discarded.</u></p> <p>Criterion 1.2 – Power management - Main allowances of ED/EL have been set as mandatory for the EU Ecolabel. - Requirement on quick start functionality aligned to Blue Angel. - Off mode, standby and networked standby mode requirements are not included as going beyond the ED would only bring small savings.</p>
2 Hazardous substances		<p>Cadmium logo - information of its presence or non-presence.</p> <p>Halogenated flame retardants - The use of halogenated flame retardants is not allowed in the enclosure and stand of electronic displays.</p>	<p>Criterion 2.1 - Excluded or limited substances Prescriptive requirement on restriction of: Sub-criterion 2(a): SVHCs Non-presence at or above 0.1% in the article and agreed subassemblies. Sub-criterion 2(b): Restrictions on the presence of specific hazardous substances Mercury and cadmium restricted among other specific substances (biocides, PAGs or arsenic compounds) Sub-criterion 2(c): Hazard-based restrictions EU Ecolabel hazards restricted with special attention to flame retardants and plasticisers.</p> <p>Criterion 2.2 – Activities to reduce supply chain fluorinated GHG emissions The applicant shall gather information from their LCD display suppliers by which they shall demonstrate their activities to reduce GHG emissions from the production process and the performance of abatement systems they have</p>

<p>3 Lifetime extension</p>		<p>Repair and reuse</p> <p>- Availability of spare parts:</p> <ul style="list-style-type: none"> -7 years availability to professional repairers for Internal power supply; connectors to connect external equipment; capacitors; batteries; accumulators; DVD blue ray module -7 years availability to end users only external power supply and remote control -These parts can be replaced with the use of commonly available tools <p>-Manufacturers shall ensure access to information for repairers. Main aspects to be included in the information:</p> <ul style="list-style-type: none"> - the unequivocal appliance identification; - a disassembly map or exploded view; - list of necessary repair and test equipment; - component and diagnosis information (such as minimum and maximum theoretical values for measurements); - wiring and connection diagrams; - diagnostic fault and error codes (including manufacturer-specific codes); - user manual. 	<p>installed. Proposal in line with EPEAT and Nordic Swan.</p> <p>Criterion 3.– Reparability and commercial guarantee</p> <p>-Design for repair:</p> <ul style="list-style-type: none"> - A number of spare parts (screen assembly and LCD backlight,; stands; power and control circuit boards) which are not covered by Ecodesign, shall be accessible and exchangeable by the use of commercially available tools. - Adhesives shall not be used to fix the back cover of the electronic display. - Casing parts are free of electronic assemblies. - Screw connections for fastening casing parts, chassis and electric/electronic assemblies can be tightened with no more than three tools. <p>-Repair manual: The applicant shall provide clear disassembly and repair instructions (e.g. hard or soft copy, video) and make them publicly available, to enable a non-destructive disassembly of products for the purpose of replacing key components or parts for upgrades or repairs.</p> <p>-Repair service / information.</p> <p>-Availability of spare parts 7 years for a number of spare parts (not covered by Ecodesign).</p> <p>-Commercial guarantee provision (3 years at no extra cost).</p>
<p>4 End-of-life management</p>		<p>Marking of plastic components</p> <p>- Marking of plastic components heavier than 50 g.</p> <p>Design for dismantling, recycling and recovery</p> <p>Manufacturers shall ensure that joining, fastening or sealing techniques do not prevent the safe and</p>	<p>Criterion 4.1 – Material selection and information to improve recyclability</p> <ul style="list-style-type: none"> - Marking of plastic components heavier than 25 g. - Recyclability (EPEAT alignment): <ul style="list-style-type: none"> Use of single polymer or recyclable polymer blend. No use of paint and coatings. Plastic enclosures shall not contain moulded-in or glue-on metal. Casings, enclosures and bezels with flame retardants shall be recyclable. - Recycled content: 10% post-consumer recycled plastic. <p>Criterion 4.2 – Design for dismantling and recycling</p> <p>Efficient dismantling is considered to be an important proxy for cost-effective dismantling/recycling and should be an important factor in product design.</p>

		<p>readily achievable removal of the components indicated in WEEE or in Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators, when present.</p> <p>End-of-life information and documentation The documentation of the sequence of dismantling steps, tools or technologies needed to access the targeted components.</p> <p>Among other relevant information:</p> <ul style="list-style-type: none"> - location of the plastic components containing flame retardants; - location of components containing toxic or ecotoxic substances or their compounds. 	<ul style="list-style-type: none"> - Manual dismantling shall be carried out by one person of target parts (relevant in terms of CRM presence): Printed Wiring Boards >10 cm². Thin Film Transistor (TFT) unit >100 cm² and film conductors. Polymethyl Methacrylate (PMMA) board light guide). + an additional component among: LED backlight units, speaker unit magnets (for display sizes greater than or equal to 25 inches) and HDD drive (if applicable in the case of smart devices). - The time for dismantling the displays for recycling shall be at most 10 minutes for products weighing less than 18kg; and at most 10 minutes plus 1 minute per each additional 2 kg of total product weight. In line with EPEAT. - A test report detailing the dismantling sequence, including a detailed description of the specific steps, tools and procedures for the components listed in (a) and the optional components selected from (b) as a minimum shall be provided for the criteria verification.
<p>5 Corporate production / supply chain management</p>			<p>Criterion 5.1 – Labour conditions during manufacture</p> <p>The proposal to address labour conditions during manufacturing reflects the significance of social issues in the computer/display manufacturing supply chain. This is evidenced by the investment made by industry to address working conditions through an industry Code of Conduct. In this respect, high-level reference is made in both the Act and the Annex criteria to a number of reference documents, namely:</p> <ul style="list-style-type: none"> - the ILO Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy; - the UN Global Compact (Pillar 2); - the UN Guiding Principles on Business and Human Rights; and - the OECD Guidelines for Multi-National Enterprises. <p>Aligned to computers product group.</p> <p>Criterion 5.2 – Sourcing of ‘conflict-free’ minerals</p> <p>The proposed criterion takes a proactive approach to the sourcing of tin, tantalum, tungsten and their ores and gold from conflict-affected and high-risk areas. This reflects the approach already taken by leading manufacturers, which rather than boycotting such areas seeks to support an improvement in working</p>

			conditions. Aligned to computers product group.
6 Information	Product information sheet: <ul style="list-style-type: none"> - Technical information - Energy consumption and different modes - Availability of spare parts/software updates 		<p>Criterion 6.1 – User instructions</p> <ul style="list-style-type: none"> - Information provides consumers with options to use the product considering the environmental benefits associated with the different modes of the product. <p>Criterion 6.2 – Information appearing on the EU Ecolabel</p> <ul style="list-style-type: none"> - EU Ecolabel information encourages the purchase of the product. <p>The optional label with text box shall contain three out of the following texts:</p> <ul style="list-style-type: none"> (a) High energy efficiency. (b) Restriction of hazardous chemicals. (c) Designed to be easy to repair and recycle. (d) Contains xy% post-consumer recycled plastic (only when greater than 25% as a percentage of the total plastic).

DRAFT

1.4 Proposed framework for the revision of the EU Ecolabel criteria and main changes

Currently, two separate sets of EU Ecolabel criteria exist for televisions (Commission Decision 2009/300/EC) and for external computer displays as part of the criteria set for personal computers (Commission Decision 2011/337/EU).

Table 3: Existing EU Ecolabel criteria for external computer displays and televisions according to Commission Decisions 2011/337/EU and 2009/300/EC

Existing EU Ecolabel criteria for external computer displays	Existing EU Ecolabel criteria for televisions
Criterion 1 – Energy savings (specific for displays)	Criterion 1 – Energy savings
Criterion 2 – Power management	---
Criterion 3 – Internal power supplies	---
Criterion 4 – Mercury in fluorescent lamps	Criterion 2 – Mercury content of fluorescent lamps
Criterion 5 – Hazardous substances and mixtures	Criterion 5 – Heavy metals and flame retardants
Criterion 6 – Substances listed in accordance with Art. 59(1) of Regulation (EC) No 1907/2006	---
Criterion 7 – Plastic parts	---
Criterion 8 – Noise	---
Criterion 9 – Recycled content	---
Criterion 10 – User instructions	Criterion 6 – User instructions
Criterion 11 – User reparability	---
Criterion 12 – Design for disassembly	Criterion 4 – Design for disassembly
Criterion 13 – Lifetime extension	Criterion 3 – Lifetime extension
Criterion 14 – Packaging	---
Criterion 15 – Information appearing on the Ecolabel	Criterion 7 – Information appearing on the Ecolabel
NB: Crossed out lines: EU Ecolabel criteria for personal computers, explicitly not applied to external computer displays.	

During this revision, it was proposed to cover both product groups; thus common criteria for both televisions and external computer displays have been developed, differentiating between technical product characteristics where necessary.

The following table provides a proposal for a new system to cluster and allocate the existing criteria as well as new criteria to certain thematic fields following the identified hotspots for televisions and external computer displays.

Table 4: New proposed criteria cluster and allocation of sub-criteria for the revision of the Ecolabel criteria for televisions and displays

New proposed criteria cluster	Proposed allocation of sub-criteria
1 Energy consumption	Criterion 1.1 – Energy savings
	Criterion 1.2 – Power management
2 Hazardous substances	Criterion 2.1 – Excluded or limited substances
	Criterion 2.2 – Activities to reduce supply chain fluorinated GHG emissions
3 Lifetime extension	Criterion 3 – Reparability and commercial guarantee
4 End-of-life management	Criterion 4.1 – Material selection and information to improve recyclability
	Criterion 4.2 – Design for dismantling and recycling
5 Corporate production / supply chain management	Criterion 5.1 – Labour conditions during manufacture
	Criterion 5.2 – Sourcing of 'conflict-free' minerals
6 Information	Criterion 7.1 – User instructions
	Criterion 7.2 – Information appearing on the EU Ecolabel

2 ASSESSMENT AND VERIFICATION

Existing assessment and verification
<p>The specific assessment and verification requirements are indicated within each criterion.</p> <p>Where possible, testing should be performed by appropriately accredited laboratories or laboratories that meet the requirements expressed in standard EN ISO 17025 and are competent to perform the relevant tests.</p> <p>Where appropriate, competent bodies may require supporting documentation and may carry out independent verifications.</p> <p>The competent bodies are recommended to take into account the implementation of recognised environmental management schemes, such as EMAS or ISO 14001, when assessing applications and monitoring compliance with the criteria (note: it is not required to implement such management schemes).</p>
Revised assessment and verification
<p>The specific assessment and verification requirements are indicated within each criterion.</p> <p>Where the applicant is required to provide declarations, documentation, analyses, test reports, or other evidence to show compliance with the criteria, these may originate from the applicant and/or his/her supplier(s) and/or their supplier(s), and/or third party certification and testing bodies, as appropriate.</p> <p>Competent bodies shall preferentially recognise attestations which are issued by bodies accredited in accordance with the relevant harmonised standard for testing and calibration laboratories and verifications by bodies that are accredited in accordance with the relevant harmonised standard for bodies certifying products, processes and services. Accreditation shall be carried out in accordance with Regulation (EC) No 65/2008 of the European Parliament and of the Council (*).</p> <p>Where appropriate, test methods other than those indicated for each criterion may be used if these are described in the user manual of the Ecolabel criteria application and the competent body assessing the application accepts their equivalence.</p> <p>Where appropriate, competent bodies may require supporting documentation and may carry out independent verifications or site visits.</p> <p>Changes in suppliers and production sites pertaining to products to which the Ecolabel has been granted shall be notified to Competent Bodies, together with supporting information to enable verification of continued compliance with the criteria.</p> <p>* Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93 (OJ L 218, 13.8.2008, p. 30).</p>

Rationale and summary of the changes during the revision process:

The assessment and verification text refers to the different types of evidence that are considered relevant as proof of compliance for each criterion. No major changes were introduced during the revision process.

At this stage, several amendments have been included in order to harmonise it, as far as appropriate, with the text included in the most recently adopted EU Ecolabel criteria.

The EU Ecolabel Regulation (EC) No 66/2010²⁹ indicates that competent bodies shall preferentially recognise verifications performed by bodies which are accredited under EN 45011. However, this standard has now been phased out and has been substituted by ISO/IEC 17065:2012: Conformity assessment - Requirements for bodies certifying products, processes and services. For this reason, certification bodies are no longer accredited in accordance with these requirements. A new statement has been included in the text making reference to Regulation (EC) 765/2008 of the European Parliament and of the Council.

In addition, a specific text on notification of changes in suppliers and production sites pertaining to products to which the Ecolabel has been granted has been introduced in line with the text agreed for EU Ecolabel criteria for personal, notebook and tablet computers³⁰.

²⁹ [Regulation \(EC\) No 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel](#). OJ L 27, 30.1.2010, p. 1.

³⁰ <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1475214618620&uri=CELEX:32016D1371>

3 CRITERIA PROPOSAL

The first (T.R1.0) and second draft (T.R2.0) versions of the technical report were the basis for the first and second Ad-Hoc Working Group (AHWG) meetings which took place in October 2013 and May 2014 respectively. A third version of the report and criteria (T.R3.0) was produced after the AHWG2 and was open for stakeholders' consultation during November 2014. This revised version, (T.R4.0- TECHNICAL REPORT UPDATE (for last open consultation)), provides an update of the criteria development process based on further research on updated legislation, environmental schemes currently in place, updated market figures and relevant technical data. Stakeholders' input received in November 2014 has been taken into consideration. Bilateral communication with stakeholders has been maintained during the update process and reflected where relevant.

This section shows the latest proposal for the criteria wording with text that has been added since TR3.0 shown in blue. The new criteria are included in the boxes, followed by a brief rationale which summarises findings and input received over the course of the project and that underpin the criteria. Further information can be found in the previously published preliminary reports and technical reports (TR1.0, TR 2.0 and TR3.0). In addition, Section 5 gathers all comments received in the latest final round of consultation in November 2014 and the JRC responses.

3.1 Criterion 1 – Energy consumption

3.1.1 Criterion 1.1 - Energy savings

Existing criterion 1: Energy savings (Decisions 2009/300 and 2011/337)

Energy savings for televisions

(a) *Passive Standby*

- (i) The passive standby consumption of the television shall be ≤ 0.30 W except where the condition in part ii is fulfilled.
- (ii) For televisions with an easily visible hard off-switch, such that when the switch is operated to the off position, the television's energy consumption is < 0.01 W, the passive standby consumption of the television shall be ≤ 0.50 W.

(b) *Maximum energy consumption*: TVs shall have energy consumption in on-mode of ≤ 200 W.

(c) *Energy Efficiency*

Until 31 December 2010, televisions placed on the market bearing the Ecolabel shall have an on-mode power consumption equal to or lower than $0,64 \cdot (20 \text{ W} + A \cdot 4,3224 \text{ W/dm}^2)$.

From 1 January 2011, until 31 December 2012 televisions placed on the market bearing the Ecolabel shall have an on mode power consumption equal to or lower than $0,51 \cdot (20 \text{ W} + A \cdot 4.3224 \text{ W/dm}^2)$.

From 1 January 2013, televisions placed on the market bearing the Ecolabel shall have an on-mode power consumption equal to or lower than $0,41 \cdot (20 \text{ W} + A \cdot 4,3224 \text{ W/dm}^2)$.

Where A is the visible screen area ⁽¹⁾ expressed in dm².

Assessment and verification: (points a) to c): The television shall be tested for its on-mode power consumption in its condition as delivered to the customer, according to the revised IEC62087 standard, using the dynamic broadcast video signal (Methods of Measurement for the Power Consumption of Audio, Video and Related Equipment). If the television has a forced menu upon initial start-up, the default shall be the setting which is recommended by the manufacturer for normal home use. A test report shall be provided by the applicant to the awarding competent body demonstrating that the television meets the requirements set out in points a) to c).

For meeting the conditions of a) ii), the applicant shall declare that their television complies with the requirement and provide photographic evidence regarding the hard off-switch.

For meeting the conditions of c), the applicant shall demonstrate that any of their Ecolabelled televisions when first placed on the market after the dates shown in the criterion will meet the appropriate energy efficiency criterion. If this cannot be demonstrated the competent body will only issue the Ecolabel licence for the period for which compliance can be demonstrated.

⁽¹⁾ *Screen Area*: This is the area of the screen in dm². It is equal to [screen size × screen size × 0,480] for a standard screen (4:3 aspect ratio) and [screen size × screen size × 0,427] for a wide screen (16:9 aspect ratio).

-----Amendment January 2018-----

In the Annex to Decision 2009/300/EC, criterion 1 (Energy savings) is amended as follows:

- (1) in point b) (Maximum energy consumption), ' ≤ 200 W' is replaced by ' ≤ 100 W';
- (2) all four paragraphs in point c) (Energy Efficiency) are replaced by the following:

'Televisions shall meet the specifications of the Energy Efficiency Index set out in Annex I to Commission Delegated Regulation (EU) No 1062/2010 (*) for the energy efficiency class specified as follows or, alternatively, for a more efficient energy efficiency class:

- i. energy efficiency class A for appliances with a visible screen diagonal ≤ 90 cm (or 35,4 inches);
- ii. energy efficiency class A+ (A for UHD) for appliances with a visible screen diagonal > 90 cm (or 35,4 inches) and < 120 cm (or 47,2 inches);
- iii. Energy efficiency class A++ (A+ for UHD) for appliances with a visible screen diagonal ≥ 120 cm (or 47,2 inches).

In this point, 'UHD' means Ultra High Definition, which is standardised (**) with two resolutions of 3840×2160 (UHD-4K) pixels or 7680×4320 (UHD-8K) pixels.

(*) Commission Delegated Regulation (EU) No 1062/2010 of 28 September 2010 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of televisions (OJ L 314, 30.11.2010, p. 64).

(**) International Telecommunications Union Recommendation (ITU-R) BT.2020.;

(3) in the section headed 'Assessment and verification (points) to c)': (a) the first paragraph is replaced by the following: 'The applicant shall submit a test report for the television model(s) covering the test carried out according to EN 50564 standards for meeting the conditions set out in point a) and the tests carried out using the measurement procedures and methods referred to in paragraphs 1 and 2 of Annex VII to Delegated Regulation (EU) No 1062/2010 for meeting the conditions set out in points b) and c). In addition, the energy efficiency class and the visible screen diagonal shall be indicated in the report.'; (b) the third paragraph is deleted.

Energy savings for computer displays

- (i) The computer display's energy efficiency performance in active mode shall exceed the energy efficiency requirements set out in Energy Star v5.0 by at least 30%;
- (ii) Computer display sleep mode power must not exceed 1 W;
- (iii) Computer displays shall have an energy consumption in on-mode of ≤ 100 W measured when set to maximum brightness;
- (iv) Computer monitor off mode power shall not exceed 0.5 W.

Assessment and verification: The applicant shall declare compliance of the product with these requirements to the competent body.

Updated proposal for criterion 1.1: Energy savings

- (i) The energy efficiency performance in on mode shall meet the following energy efficiency requirements set out in Commission Delegated Regulation (EU) No XX of XX XXXXXXXX 2019 supplementing Regulation 2017/1369/EU of the European Parliament and of the Council with regard to energy labelling of **electronic displays**:
 - i. Energy efficiency class $\geq E$ (F for UHD*) for televisions
 - ii. Energy efficiency class $\geq D$ (F for UHD*) for monitors
 - iii. Energy efficiency class $\geq F$ for digital signage displays
- (ii) The maximum on mode power demand in normal configuration** shall be ≤ 64 W (100 W for digital signage displays and UHD*).

Assessment and verification: For requirement (i), the applicant shall submit a test report for the electronic display model(s) carried out according to the measurement methods indicated in Annex II to Commission Delegated Regulation (EU) No XX of XX XXXXXXXX 2019 supplementing Regulation 2017/1369/EU of the European Parliament and of the Council with regard to energy labelling of

electronic displays.

For requirement (ii), the applicant shall submit a test report for the display model(s) carried out according to the measurement indicated in Annex III to Commission Regulation (EU) No ## of ## laying down eco-design requirements for electronic displays pursuant to Directive 2009/125/EC of the European Parliament and of the Council.

Notes to be placed in ANNEX:

* 'UHD' means 'Ultra-High Definition' and is standardised (International Telecommunications Union Recommendation (ITU-R) BT.2020) with two resolutions of 3 840 × 2 160 (UHD-4K) and 7 680 × 4 320 (UHD-8K) pixels.

** 'Normal configuration' or 'home configuration', 'standard mode', or, for televisions, 'home mode' means a display screen setting which is recommended to the end user by the manufacturer from the initial set-up menu or the factory setting that the electronic display has for the intended product use. It must deliver the optimal quality for the end user in a typical domestic or office environment. The normal configuration is the condition in which the declared values for off, standby, networked standby and on mode are measured.

Rationale and summary of the changes during the revision process

Although the initial proposal for revision was based on the Ecodesign formulas (TR1.0), at a later stage of the revision process it was suggested to align the energy criteria to the energy efficiency classes of the Energy Labelling Regulation which was under revision. Draft formulas used in the 'Discussion paper on the review of the Ecodesign and Energy Labelling Regulations for televisions and on the draft Regulation on electronic displays, including computer monitors' presented and discussed at the Consultation Forum meeting on 8 October 2012 were used as a basis for the proposal.

Distribution of energy classes revealed a higher efficiency for computer monitors. Thus different requirements were established for different display types in the proposal made in TR3.0. Different stringency requirements for small and larger televisions, reflecting the distribution of classes and representing the best products on the market, were proposed. In TR3.0, it was suggested to reintroduce the initially proposed power cap for televisions considering that the draft Energy Labelling classes were still based on a linear regression line (in the draft Energy Labelling Regulation the EEI formula and Labelling classification scale allowed large televisions to achieve a good Energy Efficiency class despite consuming more energy than smaller televisions).

On mode, sleep mode and off mode power requirements for computer monitors were aligned to Energy Star v6.0³¹ for monitors. In TR2.0, it was suggested to delete criteria on power demand in standby mode and off mode for televisions as the impact of further reducing the requirements, compared to the upcoming Ecodesign requirements, seemed to be negligible.

Networked standby power requirements were only addressed to televisions to not create an additional burden for computer monitors which were aligned to Energy Star. A requirement on the power demand of electronic displays with HiNA functionality was deleted as HiNA (high network availability) functionality is rarely found in televisions.

³¹ https://www.energystar.gov/products/spec/displays_specification_version_6_0_pd

During the revision, a dynamic approach, aligned to the EU Ecolabel for computers³⁰, was suggested to be included to provide the possibility to adjust and tighten the criterion during the validity period of the EU Ecolabel in the face of a fast-developing market.

Rationale for updated proposal

In August 2017, the new Energy Labelling Framework Regulation (EU) 2017/1369 of the European Parliament and of the Council entered into force, repealing Directive 2010/30/EU³². Under the repealed Directive, energy labels were allowed to include A+ to A+++ classes to address the overpopulation of the top 'A' class. Over time, due to technological development, the A+ to A+++ classes also became overpopulated, which significantly reduced the effectiveness of the labels. To resolve this, the new Framework Regulation requires a rescaling of existing energy labels, back to the original A to G scale.

The 'Discussion paper on the review of the Ecodesign and Energy Labelling Regulations for televisions and on the draft Regulation on electronic displays, including computer monitors' presented and discussed at the Consultation Forum meeting on 8 October 2012 identified regulatory gaps and market failures preventing full achievement of the identified energy savings potential. For the finalisation of the Energy Labelling Regulation revision, the information collection was extended and data analysis repeated, highlighting the appropriateness of corrective actions. In total, a database of over 3 000 models of electronic displays placed on the EU market was analysed between 2012 and the end of 2017.⁶

The revised energy efficiency classes are as shown below.

Energy efficiency class	New EEI⁶
A	$EEI < 0.30$
B	$0.30 \leq EEI < 0.40$
C	$0.40 \leq EEI < 0.50$
D	$0.50 \leq EEI < 0.60$
E	$0.60 \leq EEI < 0.75$
F	$0.75 \leq EEI < 0.90$
G	$0.90 \leq EEI$

The following figure illustrates a comparison between existing and revised energy classes. However, this comparison can only be approximated, as the formula to set the limits is different (i.e. a linear bar in the existing Regulation, a curve in the new proposal).

³²Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products. (OJ L 153, 18.6.2010, p. 1).

Proposed Energy Label A-G

& existing A+/A++/A+++ reference for 100 dm² display

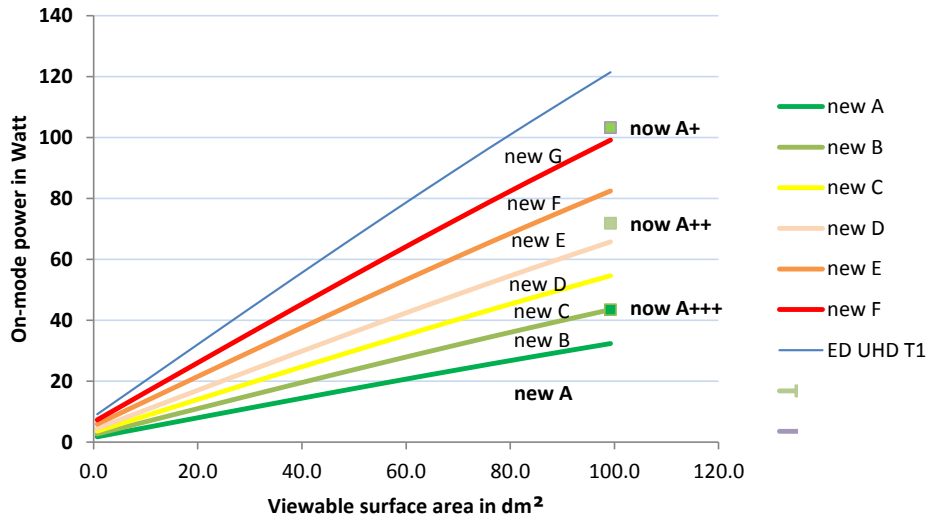


Figure 1: Approximate comparison between old and new energy labelling classes⁶

Figure 2 provides a visual distribution of the electronic displays, which are part of the 2014-2017 dataset used for the revision of the Energy Labelling Regulation (assuming that the same displays will be on the market when rescaling the televisions). All displays above the red curve would be eliminated by the minimum Ecodesign requirements. However, it is extremely unlikely that models on the market in 2014 will still be available on the market in 2021⁶.

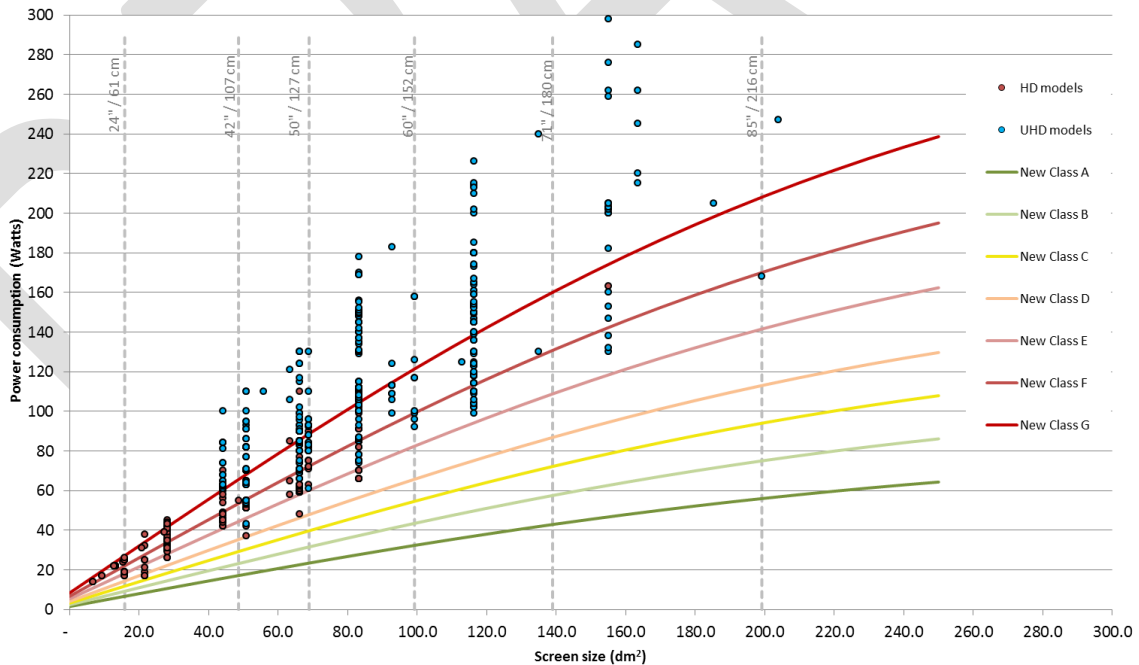


Figure 2: Distribution of displays from the 2018 dataset 'unadjusted' to the new labelling classes⁶

Figure 3 includes an adjustment of the energy efficiency to the same dataset on the basis of average improvements observed when comparing the datasets over the years (from 2012 to 2017).

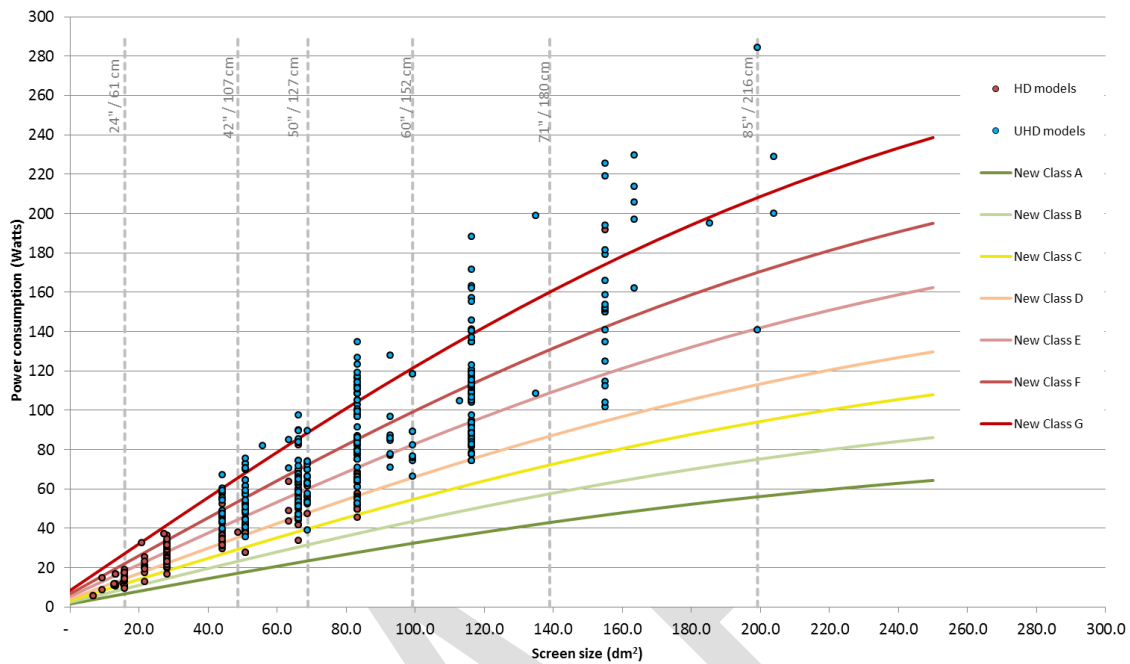


Figure 3: Distribution of displays from the 2018 dataset with projection of expected improvements at entry into force of the rescaled labels⁶

The following graph represents very recent data of best available televisions identified by Topten (www.topten.eu) according to the NEW label classes (May 2019).

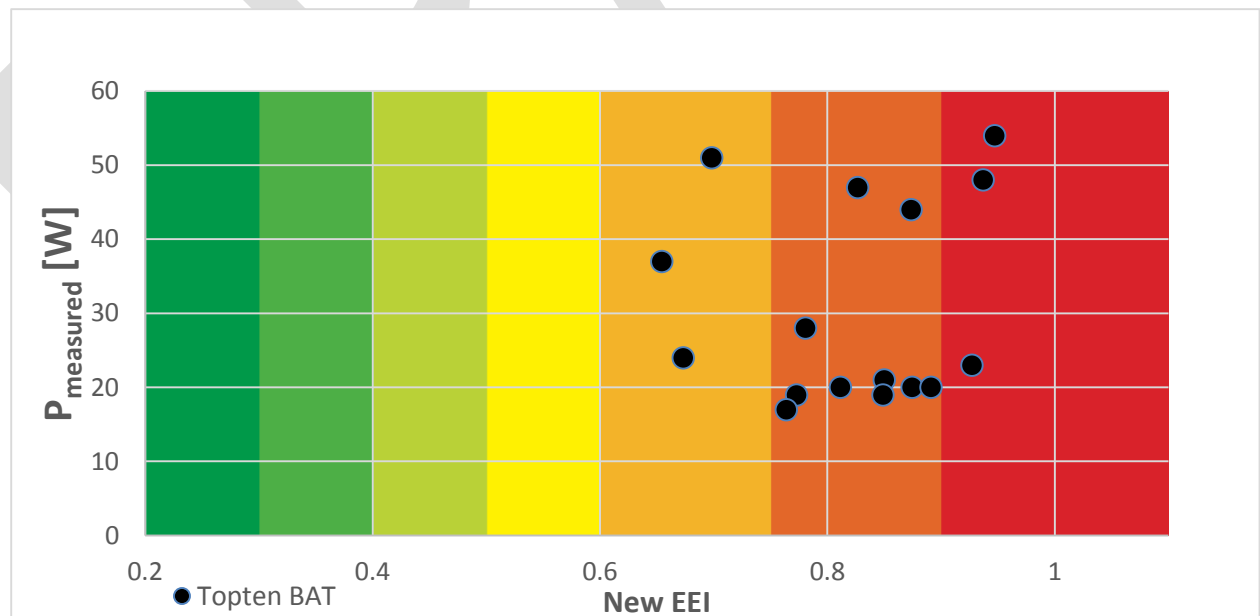


Figure 4 Distribution of full HD televisions, May 2019 (source: Topten.eu)

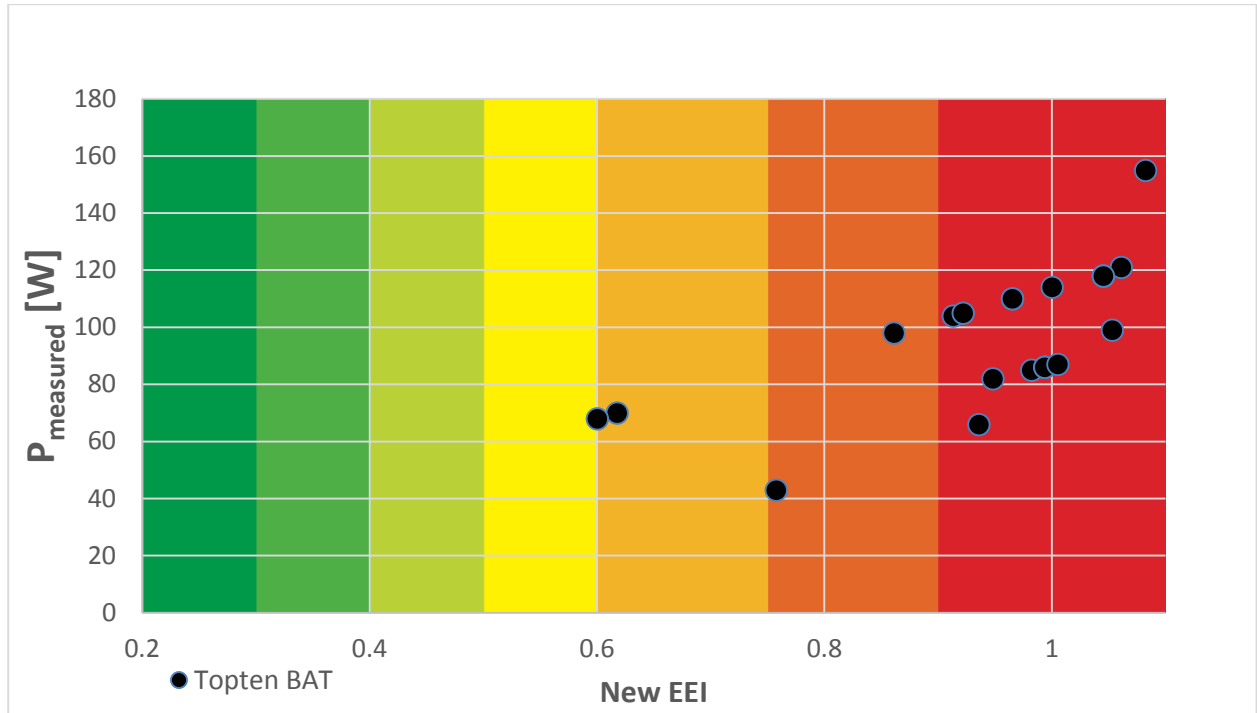


Figure 5 Distribution of UHD televisions, May 2019 (source: Topten.eu)

Most of the models fall under F (orange) and G (red) (especially for UHD). Higher flexibility should therefore be given to UHD.

With regards to a power cap for televisions, Topten sets the following thresholds:

- TV models with HD resolution or lower: Maximum power in on mode, for all screen sizes: 64 W. (This corresponds to the maximum power of a 100cm A-class TV).
- TV models with 4K or UHD resolution: Maximum power in on mode, for all screen sizes: 85 W.

With regards to the sleep mode and off mode power (included in TR3.0 for monitors (aligned to Energy Star)) and networked standby (in TR3.0 for televisions) power requirements, the following values are included in the new Ecodesign (entering into force in March 2021).

Table 5. Ecodesign requirement for off mode, standby mode and networked standby mode⁵

	Off mode	Standby mode	Networked standby mode
Maximum limits	0.30	0.50	2.00
Allowances for additional functions when present and enabled			
Status display	0.0	0.20	0.20
Deactivation using room presence detection	0.0	0.50	0.50

Touch functionality	0.0	1	1
HiNA function	0.0	0.0	4.00
<i>Total maximum power demand with all additional functions when present and enabled</i>	<i>0.30</i>	<i>2.20</i>	<i>7.70</i>

Stakeholder feedback as well as own market research at Topten showed that the power demand of energy-efficient computer or television displays in sleep mode or standby mode varies between 0.1 W and 0.5 W; therefore, reducing the limit value could be possible in general.

Table 6 provides an indication of the overall relevance of setting stricter requirements for power demand in standby mode.

Table 6: Estimation of annual power consumption in standby mode per electronic display

Power demand in standby mode [W]	Annual power consumption in standby mode [kWh/year] (PCs: approx. 3 hours per day)	Annual power consumption in standby mode [kWh/year] (TVs: approx. 20 hours per day)
0.1 W	0.11	0.73
0.3 W	0.33	2.19
0.5 W	0.55	3.65
1.0 W	3.37	7.30

Assuming that computer displays are in standby mode on average 3 hours per day and televisions 20 hours per day, the overall annual power consumption would be in a range between 0.1 kWh and 7.3 kWh per year. Further reducing the EU Ecolabel requirements from 0.5 W to 0.3 W, for example, would result in total energy savings of around 0.2 kWh to 1.5 kWh per year and device, which seems to be negligible.

In this context, new energy-efficient classes have been proposed based on existing data. The EU Ecolabel normally targets the top 10-20% of the market. Distribution of energy classes revealed higher efficiency for computer monitors. Considering the dataset (2014-2017) used in the revision of the Energy Labelling Regulation, the proposed classes would have the following estimated pass rates:

- Televisions (672 models) - 15 % would be compliant with E class (10 % for UHD with F class).

- Monitors (159 models) - 17% would be compliant with D class (there are not enough available UHD model data to show a representative pass rate).

Higher flexibility is given to UHD and signage displays. F class is proposed for these displays. This is especially important for signage displays, for which there is a lack of data. It is considered that G class is not appropriate to be included in the EU Ecolabel.

With regards to the power cap, the cap discussed during the revision (64 W) has been kept. However, for UHD, 100 W is proposed, which is the value introduced in 2017 for the amendment. In 2017, licence-holders were consulted in order to evaluate the impact of the amendment on the existing licences. Considering the information received for 140 models, it is concluded that 68% of the models would be compliant with 100 W. In addition, current data

from the Energy Star database for signage displays³³ reflect that 142 models out of 283 comply with 100 W power cap.

With regards to the sleep mode and off mode (included in TR3.0 for monitors (aligned to Energy Star)) and networked standby (in TR3.0 for televisions) power requirements, these are definitively not included as the upcoming Ecodesign covers both (TVs and monitors).

The impact of further requirements on energy use in off mode, standby mode and networked standby, compared to the new Ecodesign requirements, is expected to be negligible. Therefore, no such requirements are included.

Requests to stakeholders

- Licence-holders are requested to provide the compliance rate of their licences against the proposal
- Data on signage displays would be appreciated

3.1.2 Criterion 1.2 - Power management

Existing criteria, Decision 2011/337

Display sleep: Power management settings for display sleep shall be 10 minutes to screen off.

Assessment and verification: the applicant shall provide the competent body with a declaration to certify that the computer has been shipped in the power management settings stated above or better.

Updated proposal for criterion 1.2: - Power management

(a) Manual Brightness Control: The **electronic display** shall allow the user to manually adjust the backlight intensity.

(b) Automatic Brightness Control (ABC):

- ABC is enabled in the normal configuration of the electronic display and persists in any other standard dynamic range configuration available to the end user;
- if applicable, the value of on mode power measured with ABC disabled shall be equal to or greater than the on mode power measured with ABC enabled in an ambient light condition of 100 lux measured at the ABC sensor;
- with ABC enabled, the measured value of the on mode power must decrease by 20% or more when the ambient light condition, measured at the ABC sensor, is reduced from 100 lux to 12 lux;
- the ABC control of the display screen luminance meets all of the following characteristics when the ambient light condition measured at the ABC sensor changes:

³³https://www.energystar.gov/productfinder/product/certified-displays/results?formId=91b2ade8-f2c9-4a87-b4ab-ba6e06bce0ce&scrollTo=114&search_text=&display_type_filter=Signage+Display&brand_name_isopen=&native_resolution_pixels_isopen=&model_features_isopen=&signal_or_data_interfaces_isopen=&markets_filter=United+States&zip_code_filter=&product_types=Select+a+Product+Category&sort_by=on+mode+power+watts&sort_direction=asc&page_number=7&lastpage=7

- the measured screen luminance at 60 lux is between 65% and 95% of the screen luminance measured at 100 lux;
- the measured screen luminance at 35 lux is between 50% and 80% of the screen luminance measured at 100 lux;
- the measured screen luminance at 12 lux is between 35% and 70% of the screen luminance measured at 100 lux.

(c) Quick start functionality: If the appliance supports the quick start feature:

- (i) The quick start feature shall be disabled by default.
- (ii) After enabling the quick Start feature, the appliance shall automatically switch back to standby or off mode as a default setting 4 hours after the last user activity at the latest.
- (iii) When enabling the quick start feature, a clear written warning shall appear to inform the user that this feature will increase the appliance's power consumption (e.g. warning appears on the menu when activating the quick start feature).
- (iv) The quick start feature and the warning of additional power consumption shall be explained in the product documentation.

Assessment and verification: The applicant shall provide a declaration to certify that the appliance has been shipped with the power management settings stated above.

For requirement b) the applicant shall submit a test report for the display model(s) showing that the conditions described are met (the relevant measurements shall be carried out according to Annex III to Commission Regulation (EU) No ## of ## laying down eco-design requirements for electronic displays pursuant to Directive 2009/125/EC of the European Parliament and of the Council).

For requirement c) the applicant shall submit the relevant pages of the product documentation as well as a screen photo documenting the warning.

Notes to be placed in ANNEX:

'Automatic Brightness Control' ('ABC') means the automatic mechanism that, when enabled, controls the brightness of an electronic display as a function of the ambient light level illuminating the front of the display.

'Luminance' means the photometric measure of the luminous intensity per unit area of light travelling in a given direction, expressed in units of candelas per square metre (cd/m²). The term brightness is often used to subjectively qualify the luminance of a display.

'Fast start' or 'quick start' means an enhanced reactivation function capable of completing the transition into 'on mode' in a shorter time than that of the normal reactivation function.

'default' referring to a specific setting, means the value of a specific feature as set at the factory and available when the customer uses the product for the first time and after performing a 'reset to factory settings' action, if allowed by the product.

Rationale and summary of the changes during the revision process

Initially, it was proposed to include power management requirements in the revised EU Ecolabel criteria for electronic displays in line with Blue Angel RAL-UZ 145 for Television Sets from July

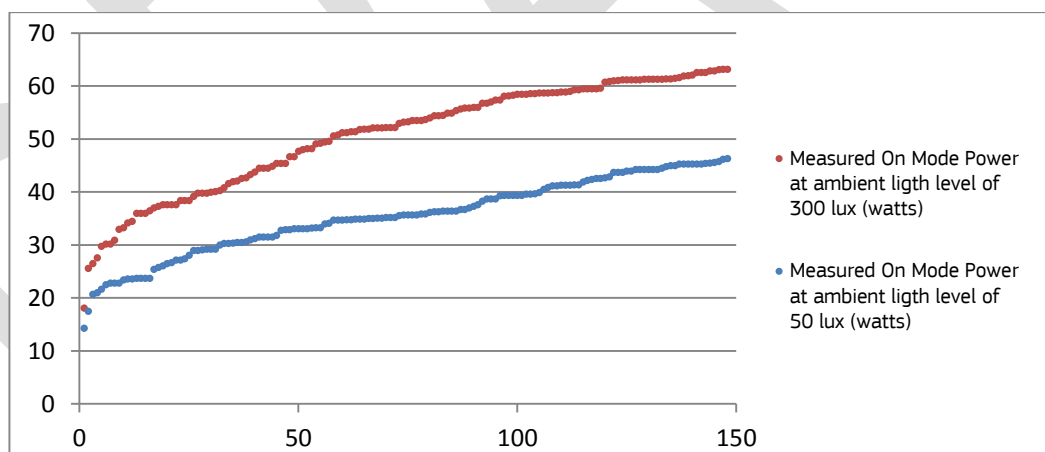
2012³⁴. For more details, see Task 4 report 'Improvement Potential', Section 4.2.1.2 'power management'.²

ABC (Automatic Brightness Control) is an energy-saving feature that uses a built-in light sensor to detect ambient light levels in the room and adjusts screen brightness for viewer comfort. Reduced light levels mean reduced screen brightness and, consequently, energy savings.

An article on ambient light levels during television viewing³⁵ analysed the ambient light levels during television viewing in 60 homes over 7 days. The study revealed that the vast majority of viewing (79.5%) occurred at illuminance levels below 50 lux, while very little viewing (3.6%) occurred at illuminance levels greater than 300 lux. The authors of the study referenced the Energy Star Program Requirements for Televisions Version 5³⁶ test procedures for ABC-enabled televisions, which requires power measurements at 0 lux and 300 lux. They concluded that 0 lux illuminance is unnecessary and that other illuminance levels (10 lux, 50 lux and 100 lux) should be considered for power measurements, to better reflect actual illuminance levels during television viewing in residential applications. The Energy Star v.6.0³⁷ for Televisions requires power measurements to be taken at three different luminance levels: 10 lux, 50 lux and 100 lux.

A study of televisions on the market in 2014 showed that many televisions failed to take advantage of an opportunity to save power at low room light conditions of between 10 lux and 100 lux.³⁸

In order to estimate potential energy savings by using ABC, the Energy Star database was consulted in 2014. Of 1 697 television units certified as Energy Star models, 556 were ABC-enabled. A total of 150 Energy Star models presented a maximum on mode power demand of 64 W and enabled ABC. The results showed an average 25% lower consumption at 50 lux compared to the measured power at 300 lux. (See Figure 6.)



³⁴ <https://produktinfo.blauer-engel.de/uploads/criteriafile/en/DE-UZ%20145-201207-en%20Criteria.pdf>

³⁵ Invited Paper: Ambient Light Levels During Television Viewing. Kyle Sills, Konstantinos Papamichael, Keith Graeber, My Ton and Chris Wold (2014 Society for Information Display, SID Symposium Digest of Technical Papers, San Diego, CA, June 1–6, 2014, Volume 45, Issue 1, pages 599–602, June 2014).

³⁶ https://www.energystar.gov/index.cfm?c=archives.tv_v5_3

³⁷ https://www.energystar.gov/products/spec/television_specification_version_6_0_pd

³⁸ Technical Article How to comply with the Energy Star 6.0 standard for LED TVs: a demonstration of reduced power consumption with improved picture quality. Markus Luidolt and David Gamperl.

Figure 6: Measured on mode power at ambient light at 300 lux and 50 lux for Energy Star television models below 64 W maximum power demand (power cap proposed in EU Ecolabel)

With regards to the quick start functionality, a report created by Defra's Market Transformation Programme in 2011 on televisions³⁹ revealed that in November 2010 this functionality was only present in the high-end models of three manufacturers. High-end products could be estimated to represent around 10% of the total market. However, this feature was expected to become much more prevalent in televisions with a diagonal screen size greater than 32 inches in future. The report showed that additional power consumption requirements (above the 1 W regulatory level) may be around 11 W to 12 W, but could be as high as 30 W to 38 W for high-specification products.

Representative data were not available on the proportion of televisions that currently feature such a function and their power demand to establish a threshold. However the Japanese Eco Mark criteria for Televisions Version 1.0⁴⁰ require that appliances with this function be set to the factory default as OFF. Furthermore, Blue Angel RAL-UZ 145 for Television Sets from July 2012³⁴ also included requirements on quick start (or fast start).

With this in mind, in TR3.0, the following changes were proposed:

- Advanced Brightness Control is a feature which, if calibrated correctly to reflect the real-life lighting conditions that users may experience, has been estimated to have the potential to save 20-30% of display energy use. ABC requirements were aligned to Energy Star v.6.0³⁷ for Televisions.
- A new requirement to disable the 'quick start' functionality by default for televisions offering such a function and to clearly state its major power demand were introduced aligned with the Japanese Eco Mark criteria for Televisions Version 1.0 and the Blue Angel RAL-UZ 145 for Television Sets.
- The criterion was focused on televisions considering that power management requirements for computer monitors were covered by Energy Star for displays originally included in energy-saving criteria.

Rationale for updated proposal

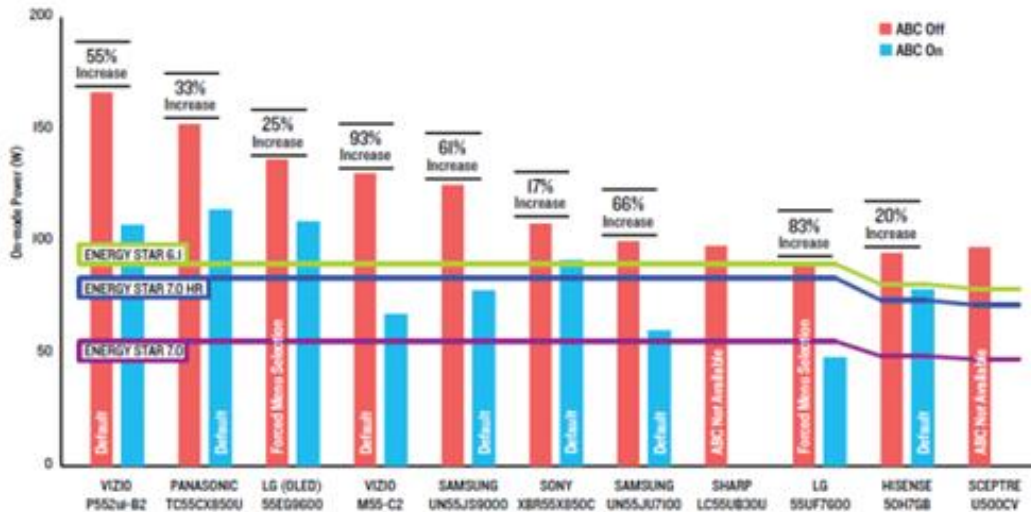
The Impact Assessment⁴¹ accompanying the new Energy Labelling and Ecodesign Regulations provides the following figures supporting the potential for energy savings related to ABC:

The following chart provides an overview of the likely influence on energy use of activation of ABC control in some televisions found on the US market.

³⁹ BNCE TV07: Power Impacts of "Quick Start" Standby Functionality in Televisions.

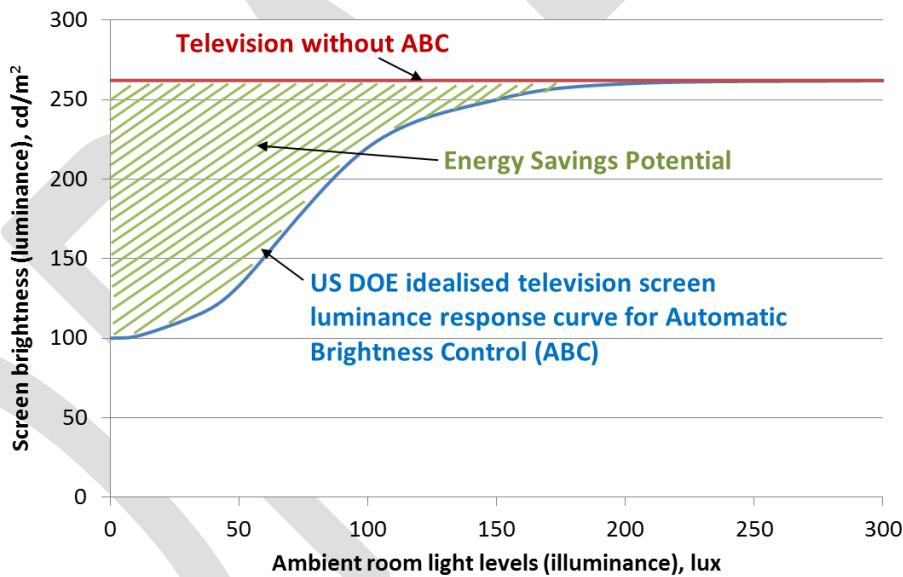
⁴⁰ Eco Mark Product Category No. 152 "TelevisionVersion 1.0" Certification Criteria. (See at: <http://www.ecomark.jp/english/pdf/152eC1.pdf>)

⁴¹ Forthcoming.



Comparison of 4K on-mode power use with ABC ON and OFF (Source: NRDC, <https://www.nrdc.org/sites/default/files/uhd-tv-energy-use-report.pdf>)

The following figure illustrates how a logarithmic response curve can find the ideal relationship between illuminance and luminance for the human eye.



US DOE study (2012) looking at the room illuminance levels and screen luminance

NB: Found a logarithmic response curve of human eye – doubling of brightness perceived the same - 10 : 20 :: 100 : 200 (lux)

ABC implementation in displays, however, can differ greatly from the idealistic curve. An appropriate testing method is consequently deemed necessary.

Against this background, the revised Ecodesign and Energy Labelling Regulations includes allowances and adjustments for the purpose of the EEI calculation (15% reduction in $P_{measured}$ in Ecodesign and 10% reduction in $P_{measured}$ in Energy Labelling) if all the following requirements are met:

Ecodesign and Energy	<i>ABC is enabled in the normal configuration of the electronic display and persists in any other</i>
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Labelling (allowances)	<p><i>standard dynamic range configuration available to the end user;</i></p> <p><i>the value of $P_{measured}$ in the normal configuration, is measured, with ABC disabled or if ABC cannot be disabled, in an ambient light condition of 100 lux measured at the ABC sensor;</i></p> <p><i>if applicable, the value of $P_{measured}$ with ABC disabled shall be equal to or greater than the on mode power measured with ABC enabled in an ambient light condition of 100 lux measured at the ABC sensor;</i></p> <p><i>with ABC enabled, the measured value of the on mode power must decrease by 20% or more when the ambient light condition, measured at the ABC sensor, is reduced from 100 lux to 12 lux;</i></p> <p><i>the ABC control of the display screen luminance meets all of the following characteristics when the ambient light condition measured at the ABC sensor changes:</i></p> <ul style="list-style-type: none"> <i>– the measured screen luminance at 60 lux is between 65% and 95% of the screen luminance measured at 100 lux;</i> <i>– the measured screen luminance at 35 lux is between 50% and 80% of the screen luminance measured at 100 lux;</i> <i>– the measured screen luminance at 12 lux is between 35% and 70% of the screen luminance measured at 100 lux.</i>
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In addition, the new Ecodesign indicates that no allowance shall be provided for ‘fast start’ or for the ‘indication of enabled reactivation function’.

The finally voted EU Ecolabel criteria for personal, notebook and tablet computers³⁰ included criteria requiring that Automatic Brightness Control is installed.

In this context, considering the potential energy savings, for the updated proposal (TR4.0) it is suggested to keep the criterion on ABC. However, changes in the proposal are made in line with the revised Ecodesign and Energy Labelling Regulations. It is proposed that the conditions that permit the manufacturers to get reductions on the $P_{measured}$ for the EEI calculation in the new Energy Labelling and Ecodesign are made mandatory for the EU Ecolabel. Most of these conditions are considered relevant to be included as mandatory for the EU Ecolabel.

The requirements on Manual Brightness Control and ‘quick start’ remain with no major changes. In line with revised regulations, it is suggested that the criterion applies to all electronic displays within the scope (televisions, monitors and electronic signage displays). The previous proposal only applied to televisions as power management was covered in the Energy Star for monitors (initially computer monitors were requested to comply with Energy Star).

3.2 Criterion 2 – Hazardous substances

3.2.1 Criterion 2.1 - Excluded or limited substances

Existing criteria,

Decisions 2011/337 and 2011/330

“Hazardous substances and mixtures”

In accordance with Article 6(6) of Regulation (EC) No 66/2010 the product or any part of it shall not contain substances referred to in Article 57 of Regulation (EC) No 1907/2006 nor substances or mixtures meeting the criteria for classification in the following hazard classes or categories in accordance with Regulation (EC) No 1272/2008 of the European Parliament and of the Council.

List of hazard statements and risk phrases: *see equivalent listing above*

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.

Concentration limits for substances or mixtures meeting the criteria for classification in the hazard classes or categories listed in the table above, 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 Article 10 of Regulation (EC) No 1272/2008. Where specific concentration limits are determined, they should 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 following substances/uses of substances are specifically derogated from this requirement:

Homogenous parts with weight below 10 g: Nickel in stainless steel

Assessment and verification: for each part above 10 g the applicant shall provide a declaration of compliance with this criterion, together with related documentation, such as declarations of compliance signed by the suppliers of substances and copies of relevant Safety Data Sheets 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.

“Substances listed in accordance with Article 59(1) of Regulation (EC) No 1907/2006”

No derogation from the exclusion in Article 6(6) may 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 homogenous part of a complex article in concentrations higher than 0,1 %. Specific concentration limits determined in accordance with Article 10 of Regulation (EC) No 1272/2008 shall apply in case it 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 suppliers of substances and copies of relevant Safety Data Sheets 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.

Updated proposal for criterion 2.1: Excluded or limited substances

The presence in the product, or defined sub-assemblies and component parts, of substances that are identified according to Article 59 (1) of Regulation (EC) No 1907/2006⁴² (the 'REACH Regulation') or substances and mixtures that meet the criteria for classification according to Regulation (EC) No 1272/2008⁴³ (the 'CLP Regulation') for the hazards listed in Table 1 shall be restricted in accordance with sub-criterion 2(a), (b) and (c). For the purpose of this criterion, Candidate List Substances of Very High Concern (SVHCs) and CLP hazard classifications are grouped in Table 1 according to their hazardous properties.

Table 1. Grouping of Candidate List SVHCs and CLP hazards

Group 1 hazards

Hazards that identify a substance or mixture as being within Group 1:

- Substances that appear on the Candidate List for Substances of Very High Concern (SVHCs)
- Carcinogenic, Mutagenic and/or Toxic for Reproduction (CMR) Category 1A or 1B CMR: H340, H350, H350i, H360, H360F, H360D, H360FD, H360Fd, H360Df

Group 2 hazards

Hazards that identify a substance or mixture as being within Group 2:

- Category 2 CMR: H341, H351, H361f, H361d, H361fd, H362
- Category 1 aquatic toxicity: H400, H410
- Category 1 and 2 acute toxicity: H300, H310, H330
- Category 1 aspiration toxicity: H304
- Category 1 Specific Target Organ Toxicity (STOT): H370, H372

Group 3 hazards

Hazards that identify a substance or mixture as being within Group 3:

- Category 2, 3 and 4 aquatic toxicity: H411, H412, H413
- Category 3 acute toxicity: H301, H311, H331, EUH070
- Category 2 STOT: H371, H373

2(a) Restriction of Substances of Very High Concern (SVHCs)

Substances that have been identified according to the procedure described in Article 59 (1) of the 'REACH Regulation' and are included in the Candidate List of SVHCs shall not be **intentionally added to or formed in** the product at concentrations of greater than 0.10% (weight by weight). The same restriction shall apply to the sub-assemblies forming part of the product that are listed in Table 2.

No derogation from this requirement shall be given to Candidate List SVHCs present in the product

⁴² Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC (OJ L 396, 30.12.2006, p.1).

⁴³ Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 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 (OJ L 353, 31.12.2008, p. 1).

or in its sub-assemblies at concentrations greater than 0.10 % (weight by weight).

Table 2. Sub-assemblies and component parts to which Criterion 2(a) shall apply

Printed Circuit Boards (Printed Wiring Boards, populated motherboards, power boards (power supply units) and module boards)>10 cm ²
Electrical wiring/cables (aggregated)
External cables (Power cable (AC and DC power cords), (modem cable and LAN cable if applicable), HDMI cable and RCA cable)
External housing (Back cover , front cover (bezel decoration) and stands)
External housing of remote control
Liquid crystal display panel (crystal black panel)
LED backlights (LED arrays)

In communicating this requirement to suppliers of the listed sub-assemblies/[component parts](#), applicants may pre-screen the REACH Candidate List using the IEC 62474 declarable substance list⁴⁴. The screening shall be based on identification of the potential for presence of substances in the product.

Assessment and verification: The applicant shall compile declarations of the non-presence of SVHCs at or above the specified concentration limit for the product and the sub-assemblies identified in Table 2. Declarations shall be with reference to the latest version of the Candidate List published by ECHA⁴⁵. Where declarations are made based on a pre-screening of the Candidate List using IEC 62474, the screened list given to sub-assembly suppliers shall also be provided by the applicant. The version of the IEC 62474 declarable substance list used shall reflect the latest version of the Candidate List.

[The declarations can also be provided directly to competent bodies by any supplier in the applicant's supply chain.](#)

2(b) Restrictions on the presence of specific hazardous substances

The hazardous substances specified in Table 3 shall not be [intentionally added to or formed](#) in the [specified](#) sub-assemblies and component parts at or above the stipulated concentration limits.

Table 3. Substance restrictions that shall apply to sub-assemblies and component parts

Substance group	Scope of restriction (substances and sub-assemblies/component parts)	Concentration limits (where applicable)
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⁴⁴ International Electrotechnical Commission (IEC), *IEC 62474: Material declaration for products of and for the electrotechnical industry*, <http://std.iec.ch/iec62474>

⁴⁵ ECHA, *Candidate List of substances of very high concern for Authorisation*, <http://www.echa.europa.eu/candidate-list-table>

i) Metal solder and contacts	Exemption 8b in accordance with Directive 2011/65/EU relating to the use of cadmium in electrical contacts shall not be permitted.	0.01% w/w Test method: IEC 62321-5
ii) Polymer stabilisers, colourants and contaminants	<p>The following organotin stabiliser compounds classified with Group 1 and 2 hazards shall not be present in external cables:</p> <ul style="list-style-type: none"> Dibutyltin oxide Dibutyltin diacetate Dibutyltin dilaurate Dibutyltin maleate Diocetyl tin oxide Diocetyl tin dilaurate 	n/a
	<p>External housing of the display shall not contain the following colourants:</p> <p>Azo dyes that may cleave to the carcinogenic aryl amines listed in Appendix 8 of the REACH Regulation, and/or</p> <p>Colourant compounds included in the IEC 62474 declarable substances list.</p>	n/a

	<p>Polycyclic Aromatic Hydrocarbons (PAHs) classified with Group 1 and 2 hazards shall not be present at concentrations greater than or equal to individual and sum total concentration limits in any external plastic or man-made rubber surfaces of:</p> <p><i>External cables</i> <i>External housing of the remote control</i> <i>Rubber parts of the remote control</i></p> <p>The presence and concentration of the following PAHs shall be verified:</p> <p><i>PAHs restricted by the REACH Regulation:</i> Benzo[a]pyrene Benzo[e]pyrene Benzo[a]anthracene Chrysen Benzo[b]fluoranthene Benzo[j]fluoranthene Benzo[k]fluoranthene Dibenzo[a,h]anthracene</p> <p><i>Additional PAHs subject to restriction:</i> Acenaphthene Acenaphthylene Anthracene Benzo[ghi]perylene Fluoranthene Fluorene Indeno[1,2,3-cd]pyrene Naphthalene Phenanthrene Pyrene</p>	<p>The individual concentration limits for PAHs restricted under REACH shall be 1 mg/kg</p> <p>The sum total concentration limit for the 18 listed PAHs shall not be greater than 10 mg/kg</p> <p><i>Test method: AfPS GS 2014:01 PAK.</i></p>
iii) Biocidal products	<p>Biocidal products intended to provide an anti-bacterial function shall not be incorporated into <i>External housing and rubber parts of the remote control.</i></p>	n/a
iv) Mercury in backlights	<p>Exemption 3 in accordance with Directive 2011/65/EU relating to the use of mercury in <i>cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL)</i> shall not be permitted.</p>	n/a
v) Glass fining	<p>Arsenic and its compounds shall not be used in the manufacturing of LCD display unit glass and</p>	0.0050% w/w

agents	screen cover glass.	
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Assessment and verification: The applicant shall provide declarations of compliance and test reports according to the requirements in Table 3. Test reports, where required, shall be valid at the time of application for the relevant production model and all associated suppliers. Where sub-assemblies or component parts with the same technical specifications originate from a number of different suppliers, tests where applicable shall be carried out on parts from each supplier. [The declarations/test reports can also be provided directly to competent bodies by any supplier in the applicant's supply chain.](#)

2(c) Restrictions based on CLP hazard classifications

Flame retardants and plasticisers that meet the criteria for classification with the CLP hazards in Table 2 shall not be [intentionally added to or formed](#) in the sub-assemblies and component parts in Table 4 at or above a concentration limit of 0.10% (weight by weight).

Table 4. Sub-assemblies and component parts to which Criterion 2(c) shall apply

<i>Parts containing flame retardants</i>	
-	Printed Circuit Boards
-	External cables
-	External housing of the display
<i>Parts containing plasticisers</i>	
-	External cables
-	Internal electrical wiring
-	External housing of the display

Derogations for the use of hazardous flame retardants and plasticisers

The use of flame retardants and plasticisers meeting the criteria for classification with CLP hazards listed in Table 1 are derogated from the requirements of criterion 2(c) provided that they meet the conditions specified in Table 5.

Table 5. Derogation conditions that shall apply to the use of flame retardants and plasticisers

Substances and mixtures	Sub-assembly or component part	Scope of derogation
Flame retardants	i) Printed Circuit Boards	Flame retardants classified with a Group 3 hazard and TBBPA (classified with Group 2) are derogated for use.
	ii) External cables	Flame retardant and its synergist classified with Group 3 hazard are derogated for use.
	iii) External housing of the display	Flame retardants and their synergists classified with Group 2 and 3 hazards are derogated for use.

Plasticisers	i) External cables, internal electrical wiring and external housing of the display	Plasticisers classified with Group 3 hazards are derogated for use.

Assessment and verification: The applicant shall provide a declaration of compliance with criterion 2(c). The declaration shall be supported by the list of flame retardants, plasticisers and metal additives and coatings used in the sub-assemblies and component parts listed in Table 4 together with SDS supporting their hazard classification or non-classification.

For the derogated substances and mixtures listed in Tables 5, the applicant shall provide proof that all the derogation conditions are met. Where test reports are required, they shall be valid at the time of application for a production model.

The declarations/test reports can also be provided directly to competent bodies by any supplier in the applicant's supply chain.

Rationale and summary of the changes during the revision process

The Task 3 LCA review identified that, with regard to freshwater aquatic ecotoxicity, marine aquatic ecotoxicity and terrestrial ecotoxicity, the manufacturing phase is more significant than the use phase. The impacts are mainly associated with environmental pollution related to the extraction of raw materials and to the processing of sub-assemblies such as motherboards.

The impact categories listed above are also significant for the more energy-intensive products in their use phase, such as desktops, being associated with electricity generation. Emissions during the end-of-life phase can also be significant if displays are disposed of improperly – for example, by burning cables and printed wiring boards to recover metals.

In general, LCA studies are not able to identify and characterise the hazard inventory of substances that may be present in a final product sold to a consumer. A specific background report was prepared to scope and identify hazards that may be present (Hazardous substances paper)⁴⁶.

Following extensive discussions with stakeholders, a new approach was applied to the computers and televisions product groups. The methodology was based on the findings of the EU Ecolabel's Horizontal Task Force on Chemicals paper)⁴⁷.

- An initial screening of the bill of components/materials (see Section 2.4 of the Hazardous Substances paper) was carried out, followed by an initial identification of substance groups by their function.
- Case studies and OEM (Original Equipment Manufacturers) restricted substance listings were collated that enabled the state-of-the-art in hazard substitution to be identified.
- Additional input was requested from stakeholders in order to identify substitutions that have been made and also, if required, to identify derogations that may be required.

⁴⁶ http://susproc.jrc.ec.europa.eu/televisions/docs/Task_Special_Hazardous_Substances_docx.pdf

⁴⁷ JRC-IPTS, *Findings of the EU Ecolabel Chemicals Horizontal Task Force – Proposed approach to hazardous substance criteria development*, 24th February 2014.

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- A subgroup (SG) consisting of a representative cross-section of stakeholders was formed in order to obtain further information, discuss technical issues in detail and to develop a workable criterion proposal.

In order to screen and evaluate the existing evidence, two matrices were set up:

1. *Candidate List and RoHS screening matrix*: The IEC 62474 Declarable substance list for electrotechnical products⁴⁸ was used as the starting point for identifying substances from the most current ECHA Candidate List that may be relevant to computers and displays. The IEC list is frequently updated by a dedicated team and is therefore understood to be accurate as well as assisting in screening the list.
2. *Hazardous substance screening matrix*⁴⁹: The evidence gathered during the revision was structured, firstly, according to substance groups, which can generally be seen to be related to functions associated with components of the product, and, secondly, according to the components/subcomponents where hazardous substances are/may be found.

The analysis carried out using the matrix was used to derive the following outputs which form the basis for the scope and ambition level of the criteria proposal:

- Hazard benchmarks: Substances that were currently used or were used until recently in mainstream products.
- Proposed substitution benchmarks: Substitutes for hazardous substances currently used in mainstream products that have been implemented, or are proposed for implementation, by leading manufacturers.
- Proposed restrictions: Substance or substance group restrictions that have been identified from OEM restriction lists or from risk assessment exercises by the European Commission, Member State or Intergovernmental bodies.

As a result, criteria with following elements were proposed:

- **Substances of Very High Concern**

In discussions within the SG, there was a general agreement on setting a threshold of 0.10% for the non-presence of Candidate List substances. This is the threshold for notification under the REACH Regulation and, moreover, manufacturers and their suppliers are familiar with having to provide declarations at or above this threshold. Manufacturers' experience was also that there are very limited substances on the Candidate List that may be present above 0.1% at the article level (usually only plasticisers).

A more significant issue raised by manufacturers was whether the threshold should be applied at 'complex article' (the whole product), sub-assembly, component or material level. This would be stricter than current practice because many products are imported as a finished article. Some manufacturers do not assemble their final products, having decided to outsource their design and assembly.

⁴⁸ International Electrotechnical Commission, *IEC 62474 - Material Declaration for Products of and for the Electrotechnical Industry*, <http://std.iec.ch/iec62474>

⁴⁹ http://susproc.jrc.ec.europa.eu/televisions/docs/140429%20EU%20Ecolabel%20Electronic%20Displays_Hazardous%20ubstance%20matrix_AHWG2%20revision-v2.pdf

However, it was agreed to introduce further selectivity in the criterion because *some manufacturers request declarations of compliance at what is termed 'sub-assembly' level.*

In order to arrive at a sub-assembly (components) list, stakeholders were consulted during the revision. A definition of the main subassemblies that might typically be verified was created with the feedback received. A manufacturer from the SG stated that for the level described in table below they might be able to comply with the non-presence of Candidate List substances above 0.10%.

Table 7: Proposed definition of sub-assembly and main components

Original proposed list of components	Agreed with SG	Definitions
Printed Circuit Boards >10 cm ²	Printed Circuit Boards >10 cm ²	Populated motherboard, power board (power supply unit), module board and other PCBs assembly above 10 cm ² .
Electrical solder and metal contacts	----	Not easy to define and localise. Proposed to be removed. Solders form part of cables/wiring or PCBs (will be addressed at these components).
Electrical and data connections (internal and external)	Electrical wiring/cables (aggregated)	All these parts are very light in separate form. It could be proposed to address them in aggregated form.
	----	Data connectors: Tuner, HDMI, USB and data storage device (HDD, SSD) if present. (Normally embedded in PCBs.)
External cables	External cables	Power cable or cord, (modem cable and LAN cable if applicable), HDMI cable, RCA cable.
External housing and enclosure materials	External housing	Back cover, front cover (bezel decoration) and stands.
External casing and surfaces of remote control	External housing of remote control	Housing of remote control.
Display screen glass	-----	The screen glass is normally integrated in the LCD panel. Proposed to be removed as a separate component.
Liquid crystal display unit	Liquid crystal display panel	Crystal black panel (cell).
Screen LED backlights	LED backlights	LED arrays.

It was also noted in SG discussions that not all Candidate List substances are for electronics. The IEC 62474 substance declaration list⁵⁰ is used as a tool to pre-screen the Candidate List for relevance. This list includes notes on what functions substances serve and in which products and/or components they may be present. This is then provided to suppliers who must then provide declarations down to a concentration limit of 0.1%. In general, it was felt by SG members to be relevant and reasonable to carry out such a pre-screening.

⁵⁰ International Electrotechnical Commission (IEC), IEC 62474: Material declaration for products of and for the electrotechnical industry, <http://std.iec.ch/iec62474>

- **Restriction of specific hazardous substances**

In April 2014, an initial criteria proposal was put forward based on the restriction lists of leading manufacturers. These lists are used to communicate to suppliers substances that shall not be present in their products. The different types of restrictions broadly fell into the following categories:

- plastic additives that impart a function that may be physical/mechanical, safety- or design-related e.g. *colourants, stabilisers*;
- restriction of *RoHS exceptions that may sunset*, e.g. lead solder in servers, cadmium in metal switches and relays;
- biocides use for consumer hygiene purposes, e.g. *biocide added to keyboard plastic*;
- contaminants and process residues in plastic and glass, e.g. *Polyaromatic Hydrocarbons in plastic and man-made rubber, arsenic in screen glass*.

Based on further analysis and stakeholder feedback, the criterion was streamlined and the following restrictions removed that were deemed unnecessary:

- phthalates that are already restricted under 2(a) because they are SVHCs;
- cadmium and lead that are already subject to legal requirements under RoHS;
- PFOA residue in PTFE non-dripping agents which may be present at less than 0.1% in plastic sub-assemblies;
- controls on cleaning and degreasing agents such as benzene as there is no evidence that they carry over to the final product at concentrations >0.1%.

Where possible, test methods for assessment and verification were cross-checked based on methods used by manufacturers and/or which are linked to RoHS.

- **Restriction of CLP hazards**

The initial background research highlighted that a complete picture of hazards that may be present in a display product is not available. Moreover, whilst the CAS numbers of colourants that may be used in different types of plastic can be identified from the catalogues of, for example, Clariant⁵¹ and BASF⁵², an overview of the hazard profile of additives such as colourants and their comparative improvement potential is not currently available. Suppliers are also often given flexibility as to how they meet certain specifications, e.g. plastic colour.

It was agreed early on in the AHWG and SG to focus attention on the hazard profile and **substitution of flame retardants and plasticisers**. Flame retardants and plasticisers have been the main focus for planned substitutions of hazardous substances by leading manufacturers. These substance groups are also notable for being the first examples of substitutions by computer and display manufacturers where hazard classifications have formed the basis for decision making.

⁵¹ Clariant (2007) *The coloration of plastics and rubber*, Pigments & Additives Division.

⁵² BASF, *Housing applications*, Accessed 2014, http://www.plasticadditives.basf.com/ev/internet/plastic-additives/en_GB/content/plastic-additives/Industries/Electrical_Electronics/electrical_electronics_applications

This process has been supported by research programmes of the US EPA and assessments using tools such as Green Screen. In TR3.0, indicative results based on a bill of materials of a LCD monitor demonstrated that a large proportion of each product is addressed, in some cases by several elements of the criterion proposal.

Having identified the main substitute flame retardants and plasticisers used by leading manufacturers, their hazard classifications were used to develop derogations reflecting the specific range of substances used in different computer components. Decisions on derogations submitted by stakeholders are summarised in TR3.0.

Member States and manufacturers requested a summary of the flame retardants and plasticisers that indicatively would meet the derogation conditions in proposed criterion. These are summarised in following tables.

Table 8: Flame retardants deemed to meet the derogation conditions

Flame retardant	CAS No	Hazard group
<i>Derogated for use in Printed Circuit Boards and external cables</i>		
TBBPA (only in Printed Circuit Boards)	79-94-7	Group 2: H400, H410
Dihydrooxaphosphaphenanthrene (DOPO) CAS No	35948-25-5	Group 3: H411, H412
Fyrol PMP (Aryl Alkylphosphinate)	63747-58-0	Group 3: H413
Magnesium hydroxide (MDH) with zinc synergist	1309-42-8	Group 3: H413
Ammonium polyphosphate	68333-79-9	Group 3: H413
Aluminium hydroxide (ATH) with zinc synergist	21645-51-2	Group 3: H413
Bisphenol A bis (Diphenyl phosphate)	5945-33-5	Not classified
<i>Derogated for use in plastic external housing of the display</i>		
Triphenyl phosphate	115-86-6	Group 2: H400, H411
Resorcinol bis (Diphenyl phosphate)	125997-21-9	Group 2: B, H400, H410
Phosphoric acid, mixed esters with [1,1"-bisphenol-4,4"-diol] and phenol	1003300-73-9	Group 2: H351, H400, H410
Polyphosphonate	68664-06-2	Group 2: H351, H410
Ethane bis (pentabromophenyl) (EBP)	84852-53-9	Group 2: H351
Antimony trioxide synergist (with EBP)	1309-64-4	Group 2: H351
Poly[phosphonate-co-carbonate]	77226-90-5	Group 3: H413
Bisphenol A bis (Diphenyl phosphate)	5945-33-5	Not classified

Table 9 Plasticisers deemed to meet the derogation conditions

Plasticiser	CAS No	Hazard group
<i>Derogated for use in external cables, internal electrical wiring and external housing of the display</i>		

Trioctyl trimetallate (TOM/TOTM)	3319-31-1	Not classified
Dioctyl terephthalate (DOTP)	6422-86-2	Not classified
Hexamoll DINCH	166412-78-8	Not classified
DIDP	68515-49-1	Not classified
DINP	28553-12-0	Not classified.

A number of stakeholders highlighted the need to address the improper disposal of computers/displays in the end-of-life phase. Concerns relating to the end-of-life phase of electrical products have driven action by computer manufacturers to phase out those materials and flame retardants for which evidence exists of the potential for toxic emissions⁵³. In light of this, the proposal included in TR3.0 reflects several derogations in the event that low emissions were demonstrated. However, these conditions introduced a high degree of complexity to the criterion.

Rationale for updated proposal

The revised Ecodesign regulation includes requirements related to the end-of-life treatment of the displays such as the marking of plastics, in particular if containing flame retardants, and the possible presence of mercury and cadmium (more details in Criterion 4 – End-of-life management).

Nordic Swan for televisions and projectors (Version 5.5 (20 June 2013 - 30 June 2020)⁵⁴) with 88 certified products contains the following criteria with regards to hazardous substances.

Flame retardants in plastic and rubber parts	<p>1. <i>The flame retardants Hexabromocyclohexan (HBCDD), tris(2-chloroethyl)phosphate (TCEP) and high chlorinated short chain and high chlorinated medium chain chloro paraffins must not be added.</i></p> <p>2. <i>The flame retardant Tetrabromobisphenol-A (TBBP-A) must not be added.</i></p> <p>3. <i>Other organic halogenated flame retardants and other flame retardants assigned one or more of the following risk phrases, or combinations, must not be added: H350 (may cause cancer), H350i (may cause cancer by inhalation), H340 (may cause heritable genetic damage), H360F (may damage fertility), H360D (may cause harm to the unborn child), H360Fd (may damage fertility, suspected of damaging the unborn child), H360Df (may cause harm to the unborn child, suspected of damaging fertility)</i></p> <p><i>Exceptions from 2) are made for printed circuit board.</i></p> <p><i>Exceptions from 3) are made for flame retardants:</i></p> <ul style="list-style-type: none"> <i>-In cases where there is demand for safety reason with reference to low voltage Directive 73/23/EG or standard EN 60335-1.</i> <i>-Printed circuit board, PCB.</i> <i>-Plastic and rubber parts that weight less than 25 gram and are parts of electric components.</i>
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⁵³ Chem Sec, *Leading Electronics companies and Environmental organisations urge EU to restrict more hazardous substances in electronic products in 2015 to avoid more global dioxin formation*, 19th May 2010, http://www.chemsec.org/images/stories/publications/ChemSec_publications/RoHS_restrictions_Company__NGO_alliance.pdf

⁵⁴ file:///C:/Users/vidacan/Downloads/071e_5_5_CD_071_TV_och_projektorer_5_Engelska.pdf

	<p>Exceptions are not made for flame retardants in 1) or that are regulated according to the RoHS Directive (2011/65/ EG).</p> <p>Assessment: The manufacturer of the TV or projector must provide a list of plastics and rubber used in plastic parts in the product signed by filling out Appendix 2 – Plastics and rubber in TV and Projector, Manufacturer’s Declaration. The plastic and rubber manufacturer must provide a list with flame retardants used in plastic parts, by filling out Appendix 3 – Flame retardants in plastics and rubber, Plastic and rubber manufacturer’s declaration. The manufacturer of flame retardants, used in plastic and rubber parts, must certify that the requirements are fulfilled by filling out Appendix 4 – Flame retardant manufacturer’s declaration and submit an MSDS for each flame retardant. Confidential information can be sent directly to the Nordic Ecolabel.</p>
Chlorine-based plastics	<p>Plastic parts >25g must not contain chlorinated polymers.</p> <p>Assessment: Declaration from the manufacturer of TV/projector, showing that the requirement is fulfilled.</p>
Phthalates in the external power cable	<p>The external power cable delivered with the product must not contain the following substances: Diethylhexyl phthalate (DEHP), Dibutyl phthalate (DBP/DnBP), Benzyl butyl phthalate (BBP), Dicyclohexyl phthalate (DCHP), Diisobutyl phthalate (DIBP), Diisononyl phthalate (DINP), Diisodecyl phthalate (DIDP), Di-n-octylphthalate (DNOP), Dihexyl phthalate (DHP), Diethyl phthalate (DEP), Diisoheptyl phthalate (DIHP), Bis(2-methoxyethyl) phthalate, Diisopentyl phthalate, N-pentyl-isopentyl phthalate</p> <p>Ingoing substances are defined as all substances in the product – including additives, but not residuals from production. Residuals are defined as residuals, pollutants and contaminants derived from the production, which are present in the final product in amounts less than 1 000 ppm (0.1% by weight, 1 000 mg/kg), but not substances added to the raw materials or product intentionally and with a purpose – regardless of amount. Known substances realised from the raw materials are also regarded as ingoing substances. Declaration is made by the chemical supplier based to the best of his/her knowledge at the given time, also based on information from raw material manufacturers, recipe and available knowledge on the chemical product with reservations for new advances and new knowledge. Should such new knowledge arise, the undersigned is obliged to submit an updated declaration to Nordic Ecolabelling.</p> <p>Assessment: Declaration from the cable manufacturer, Appendix 6, can be used.</p>
Mercury content in background light in LCD displays and projector lamp	<p>The background light in the TV-screen must not have any mercury (Hg) content. The lamp for projectors cannot contain mercury (Hg).</p> <p>A declaration from the manufacturer of the TV/projector showing that the requirement is fulfilled. The manufacturer of the TV/projector shall also describe the technique used.</p>

Several discussions around Tetrabrombisphenol-A (TBBPA) were carried out during the revision. Manufacturers stated that TBBPA is being replaced with halogen-free FRs. However, due to cost and reliability issues, they claimed that TBBPA is still needed for bare PWB board in specific TV parts. Reliability issues include:

- 1) hardness: halogen-free PWB is harder than PWB using halogens; this means that it is easily broken;
- 2) smell test: quality assessment smell test for PWB assembly fails when using halogen-free PCB board.

The existing hazardous criterion in force for EU Ecolabel criteria for personal, notebook and tablet computers³⁰ seems to be very complex and stakeholders claim that, as a result, no licences are registered for this product group to date. In this context, it is proposed to maintain the proposal on hazardous substances but to simplify it where possible in order to make it workable and to not impact considerably on existing licences for televisions. The general wording of this requirement and in particular the assessment and verification sections have been modified to seek better alignment with recently voted product groups.

Sub-criterion 2(a): SVHCs

- Manufacturers obtain declarations for the presence/non-presence of Candidate List substances to meet the legal obligation for notification at concentrations >0.1% under the REACH system. This is generally obtained for the whole imported article as most electronic displays are assembled outside the EU. However, some manufacturers additionally seek notifications for sub-assemblies and components.
- It is therefore proposed that in sub-criterion 2(a) SVHC declarations are required for the product as a whole and a defined set of 'sub-assemblies'. The additional declaration for sub-assemblies would introduce an additional level of strictness, differentiating those manufacturers who require more information from their suppliers.
- It is additionally proposed in sub-criterion 2(a) that, reflecting current practices, the process of screening the Candidate List for relevant substances is made easier for applicants by allowing use of the IEC 62474 declarable substance list.
- Minor changes have been introduced in the wording in line with recently voted product groups.

Sub-criterion 2(b): Restrictions on the presence of specific hazardous substances

- The industry is more accustomed to communicating requirements for the non-presence of specific substances to suppliers than hazard restrictions. A sample of manufacturers' substance restriction lists were therefore analysed and a list compiled for the EU Ecolabel criterion, with a focus on restrictions that restrict Group 1 and 2 hazards.
- For each restriction, specific substances have been identified, together with their hazard classification and a specification for how they shall be restricted. Combinations of laboratory tests and declarations are requested for verification. Reflecting current best practice, testing is proposed as being required for each supplier of identical components or sub-assemblies.
- Minor changes have been introduced in the wording in line with recently voted product groups.

Sub-criterion 2(c): Hazard-based restrictions

- Leading manufacturers have started to identify, screen and request the substitution of hazardous flame retardants and plasticisers based on their hazard classifications. This is not yet the case for other types of hazardous substances that may be present in a display product. It was agreed early on in the AHWG and SG to focus attention on the hazard profile and substitution of flame retardants and plasticisers.

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- Hazards have been restricted for flame retardants and plasticisers in a way that reflects substitutions of hazardous substances made by leading manufacturers. Safer substances have been identified and their hazard profile determined. (See Table 8 and Table 9.)
 - Derogations discussed during the revision are kept with changes in order to simplify and make it workable. For instance, references to emission tests have been deleted due to the high complexity of the requirement and restrictions on metallic parts have been deleted due the low relevance in the product. As reflected in the table above, Nordic Swan includes an exception for TBBPA use in PCBs. In line with this requirement, it is suggested that TBBPA is derogated exclusively for use in PCBs.

DRAFT

3.2.2 Criterion 2.2 – Activities to reduce supply chain fluorinated greenhouse gas (GHG) emissions

Existing criterion
No requirements
Updated proposal for criterion 2.2 – Activities to reduce supply chain fluorinated greenhouse gas (GHG) emissions
<p>The applicant shall gather the following information from their LCD display suppliers by which they shall demonstrate their activities to reduce GHG emissions from the production process, including the performance of abatement systems they have installed:</p> <ul style="list-style-type: none">(a) Specification of which of the F-GHGs are used and which are being reduced.(b) Estimated annual F-GHG emissions intensity (in kg CO_{2eq} per m² of flat panel displays (array glass) produced) across manufacturing sites for the most recent year.(c) Indication of the destruction or removal efficiencies (DREs) of installed abatement systems for each of the F-GHGs used. <p>Assessment and verification: <i>The applicant shall provide the supporting documentation containing the information above from their display suppliers to the competent body. The documentation can also be provided directly to competent bodies by any supplier in the applicant's supply chain.</i></p>

Rationale and summary of the changes during the revision process

Fluorinated greenhouse gases (GHG) are among the most potent and persistent GHGs contributing to global climate change; they are relevant in the manufacture of semiconductors, light-emitting diodes and LCD flat panel displays. It was difficult to set product-related criteria (difficulties to compare panel suppliers' F-GHG emissions due to a lack of consistency in estimating emissions, estimating emissions reductions, and monitoring the efficacy of installed abatement systems). Therefore, initially, within the EU Ecolabel revision, a process-oriented approach was proposed, based on the revision proposal of Nordic Ecolabelling criteria for television displays. For more details, see the Task 4 report 'Improvement Potential', Section 4.2.5.2.2 'Minimising the use of F-gases in the production'.

Generally, LCD panel manufacturers have used the following F-gases:

- NF₃, being used in chamber cleaning of the deposition process;
- SF₆, being used in LCD surface treatment of the dry etching process;
- CF₄ and c-C₄F₈, being used for OLED panel manufacturing.

A consideration could be changing SF₆ to NF₃, since the latter has a lower GWP (GWP - SF₆: 23,900, NF₃: 17,200).

In theory, there is the possibility that F₂ and COF₂ may replace NF₃, but in practice these two gases have scarcely been used. The reasons are that F₂ lacks stability and COF₂ has a lack of usage and manufacturing records. For these reasons, it is inevitable that F-gases have to be used in LCD manufacturing processes.

The efforts below are known to improve the emissions from flat panel display manufacturing:

- Participation in WLICC (World LCD Industry Cooperation Committee) with Korean, Japanese, Chinese and Taiwanese LCD manufacturing companies making several efforts to reduce F-gas emission voluntarily. WLICC was organised in July 2001 for a new industrial mechanism aimed at contributing to the promotion of global LCD industry cooperation to work on environmental issues. WLICC has made efforts to reduce PFC emission through a fair and equitable burden among members, and active information exchanges, adopting effective approaches toward implementation of global warming countermeasures.
- Being designated as one of the companies that are managed and controlled by the Korean GHG gas Regulation, i.e. having plans for prolonged investment in treatment facilities to reduce F-gas emission.

One of the stakeholders considered this new criteria proposal to be interesting and important but asked to verify the feasibility in order to avoid no one being able to apply for the EU Ecolabel due to too stringent or too ambitious criteria.

One of the manufacturers argued that they cannot interfere with suppliers' manufacturing processes that do not have direct impacts on the parts they supply to manufacturers. The criterion, if maintained, was requested to be a general information requirement rather than a prescriptive requirement. In addition, a confidentiality issue relating to actual F-gas abatement programmes implemented by display manufacturers was mentioned, so NDA may be required in submitting relevant information to the competent body.

It is difficult to compare panel suppliers' F-GHG emissions due to a lack of consistency in estimating emissions, estimating emissions reductions, and monitoring the efficacy of installed abatement systems. Also, stakeholder feedback did not provide enough information to establish a prescriptive criterion on abating fluorinated GHG emissions during LCD production.

US EPA (2013)⁵⁵ has developed sets of questions that are intended to be a starting point to help panel purchasers and retailers to understand how their suppliers are reducing their F-GHG emissions and identify opportunities for discussions to target and implement further mitigation efforts.

The second criterion proposal (see TR2.0) was based on these questions. Based on the discussions at the second AHWG meeting, the criterion was redrafted.

- It was clarified that the applicant shall gather the GHG emissions information from suppliers and provide it to competent bodies.
- The information to be collected was reduced, showing a few bullet points with a focus on gathering information to set the basis for the future setting of limits (e.g. amount and type of GHGs used per display/abated amount ratio).

⁵⁵ http://www.epa.gov/climateleadership/documents/questions_for_suppliers.pdf

Rationale for updated proposal

IEEE Std. 1680.3™ -2012 includes the following optional requirement.

<p>4.1.8.1 Optional— Reduce fluorinated gas emissions resulting from flat panel display manufacturing</p>	<p><i>Product criterion: The manufacturer shall declare that the supplier of flat panel displays used in products declared to conform to this criterion has installed, operated, and maintained control technology designed specifically to recover or destroy fluorinated greenhouse gases (F-GHGs) used in the production of flat panel displays. The intent of this criterion is to enable recovery, destruction, or removal of at least 90% of the F-GHGs used across all flat panel display manufacturing facilities. This declaration shall be supported with a letter provided by the flat panel display supplier. F-GHGs include CF₄, C₂F₆, C₃F₈, C-C₄F₈, C₄F₈O, CHF₃, NF₃, and SF₆.</i></p> <p><i>The letter shall assure the following:</i></p> <ul style="list-style-type: none"><i>–That the supplier has installed control technology covering at least 90% of the equipment used in each and every type of operation that uses F-GHGs in the production of flat panel displays. This includes equipment used in all manufacturing and ancillary operations related to flat panel displays, such as dry etching and chamber cleaning.</i><i>–That the supplier installs, operates, and maintains the control technology in accordance with the control technology supplier’s specifications.</i> <p><i>Manufacturers shall declare “Not applicable” for this criterion on the MSE Registry for products that do not contain flat panel displays manufactured with F-GHGs.</i></p>
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Nordic Swan for televisions and projectors (Version 5.5 (20 June 2013 - 30 June 2020)⁵⁶) with 88 certified products contains the following criteria with regards to greenhouse gases.

<p>Declaration of nitrogen trifluoride (NF₃) and sulphur hexafluoride (SF₆) emission during LCD production</p>	<p><i>The LCD panel must be produced in such a way that the greenhouse gases NF₃ and SF₆, if part of the production process, are abated by a system that is an integrated part of the production process. It is the responsibility of the manufacturing company to ensure that the abatement system is installed, operated and maintained in accordance with the manufacturers (of the abatement system) specifications. The manufacturer of the LCD shall declare the amount of NF₃ and SF₆ purchased in relation to amount of LCD (m²) produced over one year.</i></p> <p><i>Assessment: Description of the abatement system for NF₃ and SF₆ gases used in the production of the LCD modules that are used in the TV. Declaration from the manufacturer(s) of the LCD, declared by production site. The manufacturer of the TFT-cell shall declare the amount of NF₃ and SF₆ purchased in relation to amount of TFT-cell (m²) produced over one year. Confidential information can be sent directly to the Nordic Ecolabel.</i></p>
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Minor wording changes have been introduced in this criterion in order to make it clearer and to allow suppliers to provide the relevant information directly to competent bodies, due to the confidentiality issues raised during the revision and in line with the Nordic Swan text.

⁵⁶ file:///C:/Users/vidacan/Downloads/071e_5_5_CD_071_TV_och_projektorer_5_Engelska.pdf

3.3 Criterion 3 – Reparability and commercial guarantee

The research results of Task 3 and Task 4 revealed that close attention should be paid to the extension of the lifetime of televisions and external computer displays to reduce the overall environmental impacts caused by ever shorter lifecycles and continual manufacturing of new products which increases the environmental and social burdens of primary extraction and to reduce the impacts caused by the manufacturing processes.

In the current criteria documents, requirements affecting the lifetime of televisions and external computer displays are subsumed under different criteria titles (televisions: 'lifetime extension'; external computer displays: 'user reparability').

To illustrate the importance of lifetime extension for televisions and external computer displays, for the revision it was proposed to cluster the associated criteria, and complement them with some new proposals.

Existing criteria, Decisions 2009/300 and 2011/337
<p>Televisions: "Lifetime extension"</p> <p>The manufacturer shall offer a commercial guarantee to ensure that the television will function for at least two years. This guarantee shall be valid from the date of delivery to the customer.</p> <p>The availability of compatible electronic replacement parts shall be guaranteed for seven years from the time that production ceases.</p> <p>Assessment and verification: The applicant shall declare the compliance of the product with these requirements.</p>
<p>External Computer Displays</p> <p>No explicit criterion on lifetime extension</p>
<p>Televisions</p> <p>No explicit criterion on user reparability</p>
<p>External Computer Displays: "User reparability":</p> <p>The applicant shall provide clear instructions to the end-user in the form of a manual (in hard or soft copy) to enable basic repairs to be undertaken. The applicant shall also ensure that spare parts are available for at least five years from the end of production of the computer monitor.</p> <p>Assessment and verification: The applicant shall declare the product's compliance with these requirements to the competent body together with a copy of the repair manual.</p>
Updated proposal for criterion 3: - Reparability and commercial guarantee
<p>(a) Design for repair:</p> <p>(i) The following spare parts(**) of electronic displays shall be accessible and exchangeable by the use of commercially available tools (i.e. all tools except proprietary tools[*], e.g. screwdriver, spatula, pliers, or tweezers):</p> <ul style="list-style-type: none"> -screen assembly and LCD backlight, -stands, and -power and control circuit boards. <p>(ii) Adhesives shall not be used to fix the back cover of the electronic display.</p>

(iii) Casing parts are free of electronic assemblies.

(iv) Screw connections for fastening casing parts, chassis and electric/electronic assemblies can be tightened with no more than three tools.

- (b) Repair manual: The applicant shall provide clear disassembly and repair instructions (e.g. hard or soft copy, video) and make them publicly available, to enable a non-destructive disassembly of products for the purpose of replacing key components or parts for upgrades or repairs.
- (c) Repair Service / Information: Information should be included in the user instructions or the manufacturer's website to let the user know where to go to obtain professional repairs and servicing of the electronic display, including contact details as appropriate. During the guarantee period referred to in (e) this may be limited to the applicant's Authorized Service Providers.
- (d) Availability of spare parts: The applicant shall ensure that original or backwardly compatible spare parts (those mentioned in (i) as a minimum) are publicly available for at least 7 years following the end of the model production.
- (e) Commercial guarantee: without prejudice to the legal obligations of the seller under national law on legal and commercial guarantees, the applicant shall provide at no additional cost a minimum of a 3 year commercial guarantee during which time they shall ensure the goods are in conformity with the contract of sale. This guarantee shall include a service agreement with pick-up and return.

Assessment and verification: The applicant shall declare the compliance of the product with these requirements to the competent body. Additionally, the applicant shall provide:

(a) An exploded diagram showing how casing parts, chassis and electric/electronic assemblies are assembled in the product.

(b) A copy of the commercial guarantee.

(c) A copy of the repair manual.

(d) A copy of the user instructions.

(*) Proprietary tools are tools that are not available for purchase by the general public or for which any applicable patents are not available to license under fair, reasonable, and non-discriminatory terms.

(**) Spare parts are all components or assemblies that can potentially fail and/or that are expected to need replacement within the service life of the product. Other parts which have a lifetime usually exceeding the typical life span of the product are not spare parts.

Rationale and summary of the changes during the revision process

To avoid an earlier replacement of the whole television or external computer display in the case of defective single components, the reparability of products is a major factor facilitating a lifetime extension.

A case study by WRAP (2011)⁵⁷ of three LCD television models to illustrate and encourage the durability and repair summarises the following most common faults that cause failure and shorten the product's lifetime:

- screen faults – due to damage, sometimes caused by impact;
- power circuit board faults;
- main circuit board faults – including hardware and microchip software;
- damage to connections – often between circuit boards; and
- damage to television stands.

Assemblies such as the screen that are fragile and critical to use are particularly susceptible to damage. Damage occurs through strains on connectors and PCBs (printed circuit boards) that are subject to flexing, causing strain on soldered joints. Electronic components and solder can also become damaged by variations in temperature and humidity, for example, which exacerbate poorly soldered joints and corrupt chips.

The following aspects have been addressed during the revision of this criterion:

- **Design for repair:** the criterion aims to ensure that the consumer is able to easily repair an EU Ecolabel computer product. A list of key components with significant potential for failure and a reference to universal tools have been included. The importance of reparability criteria was remarked on by a consumer organisation stakeholder.
- **Repair manual:** provision of clear instructions in the form of a repair manual to enable replacement of the key components.
- **Repair service/information:** provision of information to let the user know where to go to obtain professional repairs and servicing of the device.
- **Availability of spare parts:** availability of spare parts for a certain period of time after ceasing production. From the industry side, manufacturers claimed that 7 and 5 years seem too high to be realistic values and they remarked that producers say that consumers tend not to repair televisions and monitors since it is not convenient for them.
- **Extended commercial guarantee:** the relevance of an extended guarantee was questioned during the revision. On one hand, some stakeholders mentioned that the main failures on displays normally lead to TV replacement while, on the other hand, others expressed the opinion that an extended legal guarantee contributes to the quality and durability of the product. Finally, a requirement was included on an extended guarantee (aligned to the computer product group). The Consumer Sales Directive (1999/44/EC) regulates aspects of the sale of consumer goods and associated legal guarantees. According to Directive 1999/44/EC, the term guarantee shall mean any undertaking by a seller or producer to the consumer, given without extra charge, to reimburse the price paid or to replace, repair or handle consumer goods in any way if they do not meet the specifications set out in the guarantee statement or in the relevant advertising. In addition, Directive 2011/83/EU on consumer rights defines the concept of 'commercial guarantee' (also known as 'warranty'), which can be offered by sellers or

⁵⁷ Cf. <http://www.wrap.org.uk/sites/files/wrap/TV%20case%20study%20AG.pdf>

producers in addition to the legal guarantee obligation. This can either be included in the price of the product or at an extra cost.

- **Upgradability:** during the revision, the example of Samsung's upgrade kit (Evolution Kit) for their high-end Smart TVs was provided. The consumer can fit it into a slot at the rear of the TV to upgrade the main processor, RAM, graphics processor and perhaps other components. A new style remote control is also provided. TVs with this upgradeability can be updated to the current model functionality. However, apart from the general possibility to upgrade TVs, there is no further information provided on the level of interest there has been in this kit or the level of Samsung's commitment to the future development of this product. A criterion on upgradeability for the product group televisions/displays was not proposed during the revision.

Rationale for updated proposal

The Joint Research Centre Directorate B's Circular Economy & Industrial Leadership unit has compiled multi-level approaches for assessing the reparability and upgradability of products. In April 2019, a draft report was published describing the application of such approaches to televisions⁵⁸.

The study identifies the following priority parts of relevance for the repair/upgrade of a television and their correspondent priority weight (1 to 3) taking into consideration the likelihood of failure and the functional relevance:

- Main board (3)
- T-con board (3)
- Sound board (3)
- Power board (3)
- Inverter board (sometimes combined with power board) (3)
- Internal/external power supply (2)
- Transistor column (3)
- Speakers (3)
- LVDS cable (3)
- Lamps (3)
- TV stand (2)
- Remote control (2)
- Connectors for external equipment (2)
- Capacitors, batteries and accumulators (3)
- DVD/Blue ray module (when applicable) (1)
- HD/SSD (when applicable) (1)

However, according to the input of stakeholders involved in the development of the study, among the typical repair operations, the most expensive part to replace in a TV is the screen (LCD module). The most common and cheaper repair operations are instead related to the remote

⁵⁸ <http://susproc.jrc.ec.europa.eu/E4C/documents.html>

control and power supplies (capacitors). Repair of the main board, power board or sound board can be found in a middle position. Repair of speakers can be expected to be relatively cheaper when the problem is not related to the board. Faults in the main board or the display module can be fixed by either replacing or repairing these parts.

In addition, the study identifies the following technical barriers to repair:

- Difficulties in the identification of parts. In some cases it can be hard to identify parts, for instance when marking has become illegible due to overheating. In such cases, the availability of diagrams and lists of parts is important to facilitate their identification. However, this information is not always available to independent repairers.
- Use of adhesives. Some manufacturers use adhesives to fix the back cover of TVs which makes disassembly difficult with common tools.
- Use of specific tools. The use of specific tools for the disassembly of TVs should be avoided, or at least limited.
- Difficulties in the identification of the problem.
- Spare parts. Some parts of the circuit boards are difficult to find on the public market as spare parts.
- Lack of standardisation of LCD screens.

The revised Ecodesign measure⁵ includes the following relevant requirements.

Information requirements under the Section D. material efficiency requirements:	
<i>From 1 March 2021, electronic displays shall meet the requirements indicated below.</i>	
5. Design for repair and reuse	<p>(a) <i>Availability of spare parts:</i></p> <p>(1) <i>manufacturers, importers or authorised representatives of electronic displays shall make available to professional repairers at least the following spare parts: internal power supply, connectors to connect external equipment (cable, antenna, USB, DVD and Blue-Ray), capacitors, batteries and accumulators, DVD/Blue-Ray module if applicable and HD/SSD module if applicable for a minimum period of seven years after placing the last unit of the model on the market;</i></p> <p>(2) <i>manufacturers, importers or authorised representatives of electronic displays shall make available to professional repairers and end-users at least the following spare parts: external power supply and remote control for a minimum period of seven years after placing the last unit of the model on the market;</i></p> <p>(3) <i>manufacturers shall ensure that these spare parts can be replaced with the use of commonly available tools and without permanent damage to the appliance;</i></p> <p>(4) <i>the list of spare parts concerned by point 1 and the procedure for ordering them shall be publicly available on the free access website of the manufacturer, importer or authorised representative, at the latest two years after the placing on the market of the first unit of a model and until the end of the period of availability of these spare parts; and</i></p> <p>(5) <i>the list of spare parts concerned by point 2 and the procedure for ordering them and the repair instructions shall be publicly available on the manufacturer's, the importer's or authorised representative's free access website, at the moment of the placing on the market of the first unit of a model and until the end of the period of</i></p>

Information requirements under the Section D. material efficiency requirements:

From 1 March 2021, electronic displays shall meet the requirements indicated below.

	<p style="text-align: center;"><i>availability of these spare parts.</i></p> <p>(b) <i>Access to repair and maintenance information</i></p> <p><i>After a period of two years after the placing on the market of the first unit of a model or of an equivalent model, and until the end of the period mentioned under (a), the manufacturer, importer or authorised representative shall provide access to the appliance repair and maintenance information to professional repairers in the following conditions:</i></p> <p>(1) <i>the manufacturer's, importer's or authorised representative's website shall indicate the process for professional repairers to register for access to information; to accept such a request, manufacturers, importers or authorised representative may require the professional repairer to demonstrate that:</i></p> <p>(i) <i>the professional repairer has the technical competence to repair electronic displays and complies with the applicable regulations for repairers of electrical equipment in the Member States where it operates. Reference to an official registration system as professional repairer, where such system exists in the Member States concerned, shall be accepted as proof of compliance with this point;</i></p> <p>(ii) <i>the professional repairer is covered by insurance covering liabilities resulting from its activity, regardless of whether this is required by the Member State;</i></p> <p>(2) <i>the manufacturers, importers or authorised representatives shall accept or refuse the registration within 5 working days from the date of request by the professional repairer;</i></p> <p>(3) <i>manufacturers, importers or authorised representatives may charge reasonable and proportionate fees for access to the repair and maintenance information or for receiving regular updates. A fee is reasonable if it does not discourage access by failing to take into account the extent to which the professional repairer uses the information;</i></p> <p><i>Once registered, a professional repairer shall have access, within one working day after requesting it, to the requested repair and maintenance information. The available repair and maintenance information shall include:</i></p> <ul style="list-style-type: none"><i>– the unequivocal appliance identification;</i><i>– a disassembly map or exploded view;</i><i>– list of necessary repair and test equipment;</i><i>– component and diagnosis information (such as minimum and maximum theoretical values for measurements);</i><i>– wiring and connection diagrams;</i><i>– diagnostic fault and error codes (including manufacturer-specific codes, where applicable); and</i><i>– data records of reported failure incidents stored on the electronic display (where applicable).</i>
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Information requirements under the Section D. material efficiency requirements:	
<i>From 1 March 2021, electronic displays shall meet the requirements indicated below.</i>	
	<p>(c) <i>Maximum delivery time of spare parts</i></p> <p>(1) <i>during the period mentioned under point 5(a)(1) and point 5(a)(2), the manufacturer, importer or authorised representatives shall ensure the delivery of the spare parts for electronic displays within 15 working days after having received the order;</i></p> <p>(2) <i>in the case of spare parts available only to professional repairers, this availability may be limited to professional repairers registered in accordance with point (b).</i></p>
<p><i>From 1 March 2021, the information set out below shall be available when placing on the market the first unit of a model or of an equivalent model. The same information can be provided for any equivalent model or model of the same family, if applicable.</i></p> <p><i>The information shall be provided free of charge to third parties dealing with professional repair and reuse of electronic displays (including third party maintenance actors, brokers and spare parts providers).</i></p>	
<p>1. 1. Availability of software and firmware updates</p>	<p>(a) <i>The latest available version of the firmware shall be made available for a minimum period of eight years after the placing on the market of the last unit of a certain product model, free of charge or at a fair, transparent and non-discriminatory cost. The latest available security update to the firmware shall be made available until at least eight years after the placing on the market of the last product of a certain product model, free of charge.</i></p> <p>(b) <i>Information on the minimum guaranteed availability of software and firmware updates, availability of spare parts and product support has to be indicated in the Product Information Sheet as from Annex V of Regulation (EU) (Energy Labelling Regulation).</i></p>

With regards to other Ecolabelling schemes, the majority of them request the availability of spare parts for a certain period of time after ceasing production.

The EU GPP requirements for Imaging Equipment (still draft) also include relevant requirements to facilitate repair.

<p>TS8 (b) Design for disassembly and repair</p> <p>Imaging equipment shall be designed to facilitate disassembly and repair. The following requirements shall be met:</p> <ul style="list-style-type: none"> • Casing parts, chassis, electric/electronic assemblies and cartridges/containers are separable or connected by separation aids^[1] • Electric/electronic assemblies and components such as batteries and condensers which have a risk of containing constituents bearing hazardous substances, as well as fluorescent lamps containing mercury are easy to find and to remove • Disassembly of casing, chassis and electric/electronic assemblies can be undertaken with commercially available tools (i.e. all tools except of proprietary tools^[2]) • Screw connections for fastening casing parts, chassis and electric/electronic assemblies can be tightened with no more than three tools
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- Disassembly of the entire unit can be performed by a single person (i.e. not more than one snap-on connection have to be loosened at the same time).
- Casing parts are free of electronic assemblies
- Manufacturer has carried out a trial disassembly, with reference to the above design features, and recorded it with focus on weak spots
- Repair manual with enough information to support repair operations (e.g. illustrating the parts that can be accessed and replaced, the tools required and how the repair process should be conducted, etc.) must be available to the procuring authority and to repairers.

Verification:

The tenderer must provide a declaration of compliance with above requirements together with the repair manual (physical document or a link where the document is available).

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

Note [1]: The term “separation aids” refers to predetermined breaking points, for example.

Note [2]: Proprietary tools are tools that are not available for purchase by the general public or for which any applicable patents are not available to license under fair, reasonable, and non-discriminatory terms.

In this context, it is suggested to keep the proposed criterion with the following changes:

- Minor changes have been introduced in the wording in order to simplify/clarify.
- Notes have been introduced on ‘spare parts’ and ‘proprietary tools’ aiming to a better explains the criterion. Number of years have been harmonised for all type of displays.
- Additional requirements on easy disassembly of casing parts, chassis and electric/electronic assemblies have been included based on the technical barriers for repair identified by the JRC⁵⁸ and the requirements included in the EU GPP for Imaging Equipment. The assessment and verification wording has been amended accordingly.
- Reference to national law included in the commercial guarantee as the NGO stakeholder suggested in the table of comments (Section 5). The additional guarantee provided by the applicant under the Ecolabel could in some elements overlap with the legal guarantee affecting the seller; it should be clearly stated that the consumer’s legal rights established in the national laws are not affected by the additional guarantee.

The revised EU Ecodesign Regulation sets the focus on provision of information and spare parts for repairers. However the proposed EU Ecolabel goes beyond setting additional requirements on the design of the display in order to be easily repaired and on the availability of relevant spare parts that are not covered by Ecodesign, in addition to the availability of information and offer of commercial guarantees at no additional cost. Furthermore, the proposed requirements are in line with requirements included in the EU GPP for computers and monitors on ‘design for reparability’ and ‘continued availability of spare parts’, therefore monitors bearing the EU Ecolabel could be used as a means of proof for these EU GPP requirements.

Request to stakeholders

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- Stakeholders are requested to provide information about the availability of spare parts for signage displays.

DRAFT

3.4 Criterion 4 – End-of-life management

The research results of Task 3 and Task 4 also revealed that close attention should be paid to the end-of-life (EoL) management of televisions and external computer monitors to reduce the overall environmental impacts as secondary resources from recycling can substitute primary production.

In the existing criteria, requirements affecting the EoL management are spread across different discontinuous criteria. To illustrate the importance of EoL for external computer displays, for the revision it is proposed to cluster and rearrange the associated criteria, complementing them with some new proposals.

The different sub-requirements under the existing criteria ‘recycled content’ and ‘design for disassembly’ were rearranged and renamed as criteria ‘material selection and material information to improve recyclability’ and ‘design for recycling’.

Existing criteria, only Decision 2011/337

“Recycled content”:

The external plastic case of the monitor shall have a post-consumer recycled content of not less than 10% by mass.

Assessment and verification: The applicant shall provide the competent body with a declaration stating the percentage post-consumer recycled content.

Existing criteria, Decisions 2009/300 and 2011/337

“Design for disassembly”:

The manufacturer shall demonstrate that the [television/monitor] can be easily dismantled by professionally trained personnel/recyclers using the tools usually available to them, for the purpose of undertaking repairs and replacements of worn out parts, upgrading older or obsolete parts, and separating parts and materials, ultimately for recycling [or reuse]. To facilitate dismantling:

- (a) Fixtures within the [television/computer monitor] shall allow for its disassembly, e.g. screws, snap-fixes, especially for parts containing hazardous substances;
- (b) [Only computer criteria:] Circuit boards, and/or other precious metal-containing components, shall be easily removable using manual separation methods both from the product as a whole and from specific components (such as drives) that contain such boards to enhance recovery of high value material;
- (c) [Only computer criteria:] All plastic materials in covers/housing shall have no surface coatings incompatible with recycling or reuse;
- (d) Plastic parts shall be of one polymer or be of compatible polymers for recycling and have the relevant ISO 11469 marking if greater than 25 g in mass;
- (e) Metal inlays that cannot be separated shall not be used;
- (f) Data on the nature and amount of hazardous substances in the [television / computer monitor] shall be gathered in accordance with Council Directive 2006/121/EC and the Globally Harmonised System of Classification and Labelling of Chemicals (GHS).

Assessment and verification: A test report shall be submitted with the application detailing the dismantling of the [television/computer monitor]. It shall include an exploded diagram of the [television/computer monitor] labelling the main components as well as identifying any hazardous substances in components. It can be in written or audio-visual format. Information regarding hazardous substances shall be provided to the

competent body in the form of a list of materials identifying material type, quantity used and location.

3.4.1 Criterion 4.1 – Material selection and information

Updated proposal for criterion 4.1 Material selection and information to improve recyclability

- (a) Recyclability of plastics:
- (i) Parts with a weight greater than 25 grams shall consist of a single polymer or a polymer blend or alloy that are recyclable;
 - (ii) Parts with a weight greater than 25 grams shall not be painted or coated in such a form that it means they are not recyclable;
 - (iii) Plastic enclosures shall not contain moulded-in or glue-on metal unless the metal inserts can be removed with **commercially** available tools.
 - (iv) Casings, enclosures and bezels incorporating flame retardants shall be recyclable.
- (b) Material information to facilitate recycling: Plastic parts with a mass greater than 25 grams shall be marked in accordance with ISO 11469 and ISO 1043, Sections 1 and 4. For plastic parts > 100 grams, the markings should be large enough and located in a visible position in order to be easily identified.

Exemptions are made in the following cases:

- (i) Where the marking would impact on performance or functionality of the plastic part including optical plastics;
 - (ii) Where parts cannot be marked because there is not enough available appropriate surface area for the marking to be of a legible size to be identified by a recycling operator;
 - (iii) Where marking is technically not possible due to the moulding method; or
 - (iv) Where the addition or location of marking causes unacceptable defect rates under quality inspection, leading to unnecessary wastage of materials
- (c) Recycled content: The product shall contain on average a minimum 10% post-consumer recycled plastic, measured as a percentage of total plastic (by weight) in the product excluding Printed Wiring Boards. Where the recycled content is greater than 25% a declaration may be made in the text box accompanying the Ecolabel (see Criterion 6(b)). Products with a metal casing are exempt from this sub-criterion.

Assessment and verification:

The applicant shall provide an exploded diagram of the electronic display in written or audio-visual format. This shall identify the plastic parts greater than 25 grams by their weight, their polymer composition, and their ISO 11469 and 1043 markings. The dimensions and positions of the marking shall be illustrated and, where exemptions apply, technical justifications provided.

The applicant shall verify recyclability by providing evidence that the plastics either individually or combined do not impact the technical properties of the resulting recycled plastics in such a way that they cannot be used again in electronic products. This could include:

- *A declaration from an experienced plastics recycler or permitted treatment operation in accordance with Article 23 of Directive 2008/98/EC ('the Waste Framework Directive');*
 - *Test results from an independent laboratory or an experienced plastics recycler;*
 - *Peer and industry reviewed technical literature applicable to Europe.*
-

The applicant shall provide third party verification and traceability for post-consumer recycled content.

Rationale and summary of the changes during the revision process

Consideration of the environmental effects from the (pre-)production stage and possible barriers for high-level recycling is crucial for any requirements for material selection, in line with the aim of the roadmap for a resource-efficient Europe. Meaningful criteria are needed to address these issues.

The criteria discussed during the revision covered the following main aspects:

Recyclability of plastics:

The study 'Disassembly analysis of slates: Design for repair and recycling evaluation' by Fraunhofer IZM (2013)⁵⁹ indicates on the basis of an interview with a recycler that plastics are separated into white (including light grey) plastics, which are of significantly higher recycling value, and black plastics. Metal foils attached to plastic parts reduce the value of the plastics fraction, and might be given to an additional shredding process for separation. Coating and plastic parts attached to bulk plastic parts reduce the value of the plastic fractions PC/ABS, white mixed plastics and black mixed plastics from the perspective of the dismantler. This means that mono-material plastic housing parts without coatings, inserted metal windings, and metal shields attached are better to recycle than composite materials.

Initially, the requirement on a variety of plastics was proposed to limit the use of a maximum of four types of plastics used in plastic parts with a mass greater than 25 grams in the overall product. With regards to coatings, it was proposed to limit the use of coatings and/or metal inlays.

With regards to the use of flame retardants, EN 60065/A11 requires that TV sets comply with the external ignition (candle flame) requirements by passing the necessary tests as per TS 62441. According to TS 62441, the candle flame accessible area of television housing is considered to comply if it meets any of the requirements below:

- a) The total mass of the combustible materials located at the outer surface does not exceed 300 g.
- b) The combustible material used in candle flame accessible areas is made of V-1 class material.
- c) The combustible materials used in candle flame accessible areas do not exhibit flaming for more than 3 minutes.

This means that, for televisions' plastic housings, compliance is generally achieved by using flame retardants (FRs). Research by Peeters et al.⁶⁰ has highlighted the importance of considering the flame retardants incorporated into plastic components, particularly casings and enclosures, as these are added to the polymer to provide fire protection.

⁵⁹ Cf. http://www.izm.fraunhofer.de/content/dam/izm/de/documents/News-Events/News/2013/urn_nbn_de_0011-n-255111-18-1.pdf

⁶⁰ Peeters.J.R, Vanegas.P, Tange.L, Van Houwelingen.J and J.R.Duflou, *Closed loop recycling of plastics containing Flame Retardants*, Journal of Resources, Conservation and Recycling, 84 (2014) p-35-43.

The JRC-IES developed a report on material efficiency for product policy support focused on computers and television product groups⁶¹. With regard to recyclability of plastic parts, they mentioned that the scientific literature largely discussed the relevance of considering the recyclability of plastic parts in WEEE. They highlighted Peeters et al. (2014)⁶⁰ where the authors discussed the compatibility for the recycling of different mixtures of plastics in televisions (including flame retardants and different enclosures). According to the authors, plastic fractions with high purity are needed to obtain high-quality recyclates, so efforts to improve identification and separation such as labelling will improve recycling rates.

The report remarked that compatibility for recycling should also be extended to other materials assembled/attached to plastic parts. The use of materials with distinct physical properties could facilitate their separation. For example, replacing stainless steel inserts in aluminium components with aluminium inserts or with steel inserts (separable by high-efficiency magnetic separators) could improve their recyclability.

The ENFIRO project highlighted the importance of retaining the functional value of FRs by increasing recycling. A further issue highlighted by the US EPA's study of flame retardants in Printed Circuit Boards⁶² relates to aluminium oxide arising from aluminium FR additives. Their high loading in PCB materials together with their insolubility in furnace slag means that if they arose in larger quantities in waste PCBs smelters would need to use more energy. The potential for this trade-off to occur was confirmed from discussions with an FR specialist involved with the ENFIRO project.

The successful US ecolabel EPEAT (IEEE 1680.1 standard for the environmental assessment of computer products⁶³) includes:

- *a requirement relating to the avoidance of paints or coatings that are incompatible with recycling;*
- *an optional criterion that plastic enclosures shall not contain moulded-in or glue-on metal unless the metal inserts can be easily removed;*
- *only one plastic material shall be used in each plastic enclosure part greater than 100 g.*

'Paints and coatings on plastic parts are proven to be compatible with recycling processes if they do not significantly impact the physical/mechanical properties of the recycled resin. Significant impact is defined as >25g reduction in notched Izod impact at room temperature as measured using ASTM D256-05.'

Alternatively, the term 'recyclable' is also used in relation to materials and components and is defined as:

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

⁶¹[http://publications.jrc.ec.europa.eu/repository/bitstream/JRC100785/lb-na-27793-en-n%20\(final\).pdf](http://publications.jrc.ec.europa.eu/repository/bitstream/JRC100785/lb-na-27793-en-n%20(final).pdf)

⁶² Chem Sec, *Leading Electronics companies and Environmental organisations urge EU to restrict more hazardous substances in electronic products in 2015 to avoid more global dioxin formation*, 19th May 2010, http://www.chemsec.org/images/stories/publications/ChemSec_publications/RoHS_restrictions_Company__NGO_alliance.pdf

⁶³ IEEE Computer Society, *Standard for Environmental Assessment of personal computer products*, IEEE Std 1680.1-2009, 5th March 2010.

With this in mind, it was proposed to reflect the EPEAT criterion that addresses the compatibility for recycling of plastics with coatings/paints and the ease of removal of moulded-in or glued-on metal inserts.

The recyclability of casings, enclosures and bezels that incorporate flame retardants was suggested to be verified and, furthermore, the use of aluminium-based FRs with a high loading in PCB base materials was proposed not to be permitted because more energy is required to smelt them in the end-of-life phase.

In order to address concerns relating to the definitions of 'compatibility with recycling' or 'recyclable', greater flexibility was proposed in the assessment and verification, again reflecting EPEAT, with three different options based on (i) declarations from recyclers, (ii) test results and/or (iii) technical literature relevant to the EU market.

Material information to facilitate recycling:

Although some stakeholders claimed during the revision that plastic marking has little influence on recycling practices, other stakeholders reported that recyclers do use this information for their sorting activities.

In 2013, EFRA finalised a pilot project⁶⁴ on the recycling of plastics containing flame retardants from LCD televisions. Some of the main reasons for the low plastics recycling rate in Europe identified were the lack of information on the polymer type, the FR applied and the huge variety of different plastic types used, among others.

As marking is widely established in practice, it was suggested to include a requirement on marking. Exemptions were included for cases where technical limitations result in marking not being feasible. A technical justification shall be provided where an exemption applies. In addition, it is proposed that the CAS number of any flame retardant incorporated in the plastic is marked according to the suggested notation.

Reference to following standards was included:

- ISO 11469 Plastics -- Generic identification and marking of plastics products;
- ISO 1043-1 Plastics -- Symbols and abbreviated terms -- Part 1: Basic polymers and their special characteristics;
- ISO 1043-4 Plastics -- Symbols and abbreviated terms -- Part 4: Flame retardants.

Recycled content:

The suggested requirement applies to all plastic parts and structural elements > 25 grams. A threshold of 10% was included because there are still practical problems, even for front-runner manufacturers, in consistently meeting a higher requirement. Instead it was proposed, following the example of cotton content claims in the textile product group, where a higher content can be demonstrated, that there is an option to display this in Box 2 next to the EU Ecolabel. This would

⁶⁴ EFRA 2013. Recycling of Plastics from LCD Television Sets. Pilot project on mechanical plastics recycling from post-consumer flat panel display-LCDs.

provide a benefit to manufacturers wishing to work towards a high recycled content, without placing an overall burden which could reduce the selectivity of the EU Ecolabel.

Concerns were raised at the first AHWG about the verification of recycled content. An example of a traceability system was provided by the Belgian competent body. The QA-CER system is a third-party-verified quality management system developed by a Belgian certification body and the Flemish Plastics Centre⁶⁵. The system is based on ISO 9001, as well as the EN standards EN 15347 relating to the characterisation of waste polymers⁶⁶ and EN 15343 relating to the traceability of waste polymers⁶⁷. EN 15343 is of particular interest as an underlying reference for QA-CER as it described a system for tracing polymer waste flows recognising that a system for analytical testing to verify recycled content does not exist.

It was proposed that third party verification is required for recycled polymer content.

Products with metal casings are excluded from the recycled content requirement because the quantity of plastic remaining would be too low for the sub-criterion to be practical.

Rationale for updated proposal

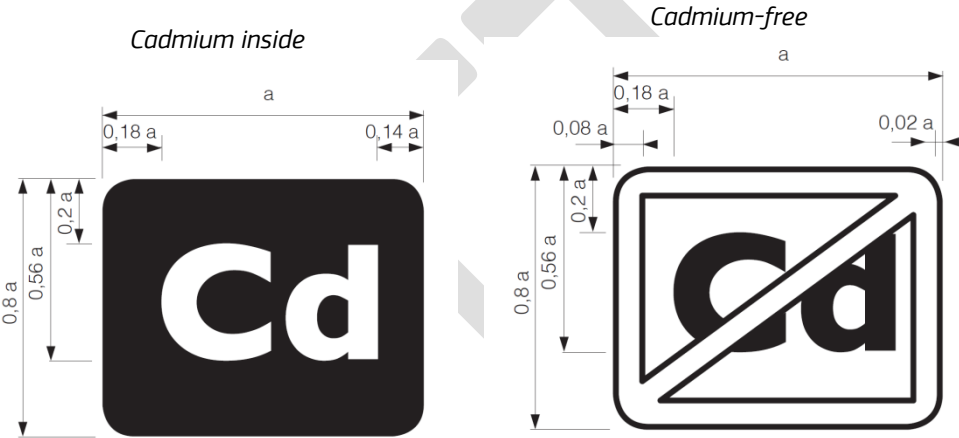
The revised Ecodesign⁵ includes the following relevant requirements.

Requirements under the Section D. Material Efficiency Requirements:	
<i>From 1 March 2021, electronic displays shall meet the requirements indicated below.</i>	
2 Marking of plastic components	<p><i>Plastic components heavier than 50 g:</i></p> <ol style="list-style-type: none"> 1. <i>Shall be marked by specifying the type of polymer with the appropriate standard symbols or abbreviated terms set between the punctuation marks ">" and "<" as specified in available standards. The marking shall be legible.</i> <p><i>Plastic components are exempt from marking requirements in the following circumstances:</i></p> <ol style="list-style-type: none"> i. <i>the marking is not possible because of the shape or size;</i> ii. <i>the marking would impact on the performance or functionality of the plastic component;</i> iii. <i>marking is technically not possible because of the moulding method.</i> <p><i>For the following plastic components no marking is required:</i></p> <ol style="list-style-type: none"> i. <i>packaging, tape, labels and stretch wraps;</i> ii. <i>wiring, cables and connectors, rubber parts and where not enough appropriate surface area is available for the marking to be of a legible size;</i> iii. <i>PCB assemblies, PMMA boards, optical components, electrostatic discharge components, electromagnetic interference components, speakers;</i> iv. <i>transparent parts where the marking would obstruct the function of the part in question.</i>

⁶⁵ QA-CER, QA-CER certification of the quality management system for recycling and production companies, Version 1, January 2013.

⁶⁶ CEN, Recycled plastics – characterisation of plastics wastes, EN 15347, December 2007.

⁶⁷ CEN, Plastics recycling traceability and assessment of conformity and recycled content, EN 15343, December 2007.

	<p>2. Components containing flame retardants shall additionally be marked with the abbreviated term of the polymer followed by hyphen, then the symbol "FR" followed by the code number of the flame retardant in parentheses. The marking on the enclosure and stand components shall be clearly visible and readable.</p>
<p>3 Cadmium logo</p>	<p>Electronic displays with a screen panel in which concentration values of Cadmium (Cd) by weight in homogeneous materials exceed 0.01 % as defined in Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment with a be labelled with the "Cadmium inside" logo. The logo shall be clearly visible without the removal of a cover, durable, legible and indelible. The logo shall be in the form of the following graphic:</p> <div style="text-align: center;">  <p>The diagram shows two logos. The 'Cadmium inside' logo is a black square with rounded corners containing the white text 'Cd'. Its dimensions are: total width 'a', left margin 0.18a, right margin 0.14a, total height 0.8a, and inner height 0.56a. The 'Cadmium-free' logo is a square with a double border containing the text 'Cd' with a diagonal slash through it. Its dimensions are: total width 'a', left margin 0.18a, right margin 0.02a, total height 0.8a, and inner height 0.56a.</p> </div> <p>The dimension of "a" shall be greater than 9 mm and the typeface to be used is 'Gill Sans'. The "Cadmium inside" logo shall be firmly attached also internally on the display panel in a position clearly visible by workers once the external back cover bearing the external logo is removed. A "Cadmium free" logo shall be used if concentration values of Cadmium (Cd) by weight in any homogeneous material part of the display do not exceed 0,01 % as defined in Directive 2011/65/EU.</p>
<p>4 Halogenated flame retardants</p>	<p>The use of halogenated flame retardants is not allowed in the enclosure and stand of electronic displays.</p>

Nordic Swan¹⁸ includes the following requirements.

<p>Dismantling</p>	<p>The manufacturer shall demonstrate that the product can be easily dismantled by professionally trained recyclers, using the tools usually available to them, for the purpose of:</p> <ul style="list-style-type: none"> • undertaking of repairs and replacements of worn-out parts • upgrading older or obsolete parts • separating parts and materials, ultimately for re-cycling <p>To facilitate the dismantling:</p>
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	<ul style="list-style-type: none"> • <i>Fixtures within the products shall allow for this disassembly, e.g. screws, snap-fixes, especially of parts containing hazardous substances.</i> • <i>Plastic parts shall be of one polymer or be of compatible polymers for recycling and have the relevant ISO11469 marking if >25g in mass. Exception is made for extruded plastic materials and for light emitters in flat screens.</i> • <i>Metal inlays that cannot be separated shall not be used.</i> • <i>Data on the nature and amount of hazardous substances in the television will be gathered in accordance with the directive of classification, packaging and labelling of dangerous substances (67/548/EEC) and directive 2006/121/EEC about changes in directive 67/548/EC.</i> <p><i>Assessment: An exploded diagram of the product labelling the main components as well as identifying any hazardous substances in components. This can be in written or audiovisual format. Information regarding hazardous substances shall be provided in the form of a bill of materials identifying material type, quantity used and location, by filling out Appendix 5.</i></p>
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On 28 February 2018, producers of electrical and electronic equipment (EEE) launched a platform named “Information for Recyclers- I4R”⁶⁸ to allow producers to provide information about preparation for re-use and treatment in respect of each type of new EEE placed for the first time on the Union market within one year after the equipment is placed on the market. In line with the requirements of Directive 2012/19/EU (Article 15(1)), this information shall identify, as far as it is needed by centres which prepare for re-use and treatment and recycling facilities, in order to comply with the provisions of this Directive, the different EEE components and materials, as well as the location of dangerous substances and mixtures in EEE

Against this background, it is proposed to retain the criterion with minor modifications.

The proposal included during the revision on prohibition of aluminium-based FRs with a high loading in PCB base materials because they require more energy to smelt in the end-of-life phase has been removed. This sub-requirement adds complexity to the criteria set; stakeholders mentioned that such a requirement seems to block the substitution of halogen-free FRs and the evidence behind the proposal was not considered solid enough. In addition, this requirement is not reflected in other available schemes for displays.

Material information to facilitate recycling (marking) is kept as it is considered to be more stringent than the revised Ecodesign which applies to parts above 50 g while the EU Ecolabel proposal applies to parts above 25 g.

3.4.2 Criterion 4.2 – Design for dismantling and recycling

Updated proposal for criterion 4.2. - Design for dismantling and recycling

(a) For the following target parts, as relevant to the product, a manual dismantling shall be carried out by

⁶⁸ <https://i4r-platform.eu/about/>

one person (i.e. not more than one snap-on connection has to be loosened at the same time) using widely used commercially available tools (i.e. pliers, screw-drivers, cutters and hammers as defined by ISO 5742, ISO 1174, ISO 15601):

- (i) Printed Wiring Boards >10 cm²
 - (ii) Thin Film Transistor (TFT) unit >100 cm² and film conductors
 - (iii) Polymethyl Methacrylate (PMMA) board light guide
- (b) At least *one* of the following optional components shall also be possible to manually disassemble using common commercially available tools:
- (i) LED backlight units
 - (ii) Speaker unit magnets (for display sizes greater than or equal to 25 inches)
 - (iii) HDD drive (if applicable in the case of smart devices)
- (c) The time for dismantling the display for recycling shall be at most 10 minutes for products weighing less than 18 kg; and at most 10 minutes plus 1 minute per each additional 2 kg of total product weight.

Assessment and verification:

The applicant shall provide:

A test report detailing the dismantling sequence, including a detailed description of the specific steps, tools and procedures, for the components listed in (a) and the optional components selected from (b) as a minimum.*

For requirement (c) the applicant shall provide supporting documentation (e.g. video) of the dismantling process where the total time is reflected.

Note:

* Dismantling step: An operation that finishes with the removal of a part or with a change of tool.

Rationale and summary of the changes during the revision process

As laid out in the Task 4 report, manual dismantling is an important means of improving material recovery of precious and critical metals and thus reducing the overall impacts of televisions and external computer displays. This can be facilitated by appropriate design. Nevertheless, the existing requirements are not very specific regarding the dismantling process and key components being affected.

Identifying critical raw materials from an EU perspective

Under the EU Raw Materials Initiative, a working group has identified and listed the critical raw materials from a geopolitical and economic point of view⁶⁹. The list is based on a time horizon of 10 years, so geological scarcity was not a central consideration; the increasing demand for products containing CRMs was cited instead as an important factor. Recyclability and the potential for substitution were also factors considered in the creation of the initial list.

⁶⁹ European Commission, *Critical raw materials for the EU*, Report of the Ad Hoc Working Group on defining critical raw materials, DG Enterprise and Industry, 30th July 2010.

Table 10: Initial list of critical raw materials at EU level

Antimony	Indium
Beryllium	Magnesium
Cobalt	Niobium
Fluorspar	PGMs (Platinum Group Metals) ^a
Gallium	Rare earths ^b
Germanium	Tantalum
Graphite	Tungsten

Notes:

- a) Platinum, palladium, iridium, rhodium, ruthenium and osmium.
b) Yttrium, scandium, and the 'lanthanides' - lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium and lutetium.

Lithium and chromium were at the time of the initiative on the borderline of being identified as CRMs. It is understood that in the meantime their economic importance and supply risk may have shifted, bringing them within the definition of 'critical'.

Of direct relevance to the development of this EU Ecolabel criterion is the recommendation made within the 2010 report that policy actions are undertaken to 'make recycling of raw materials-containing products more efficient' including 'mobilising end of life products with critical raw materials for proper collection'. A specific recommendation is also made that:

'...overall material efficiency of critical raw materials should be achieved by...minimising raw material losses into residues from where they cannot be economically-recovered.'

A number of bills of materials (BOMs) for electronic display products were identified and presented in the background report on Hazardous Substances published in September 2013⁷⁰. Aside from metal and plastic associated with enclosures and the chassis, these did not identify CRM occurrence within product subcomponents. Literature was therefore reviewed in order to identify a bill of materials for CRMs. Indicative BOMs have been identified for a LED LCD PC monitor and a LED LCD TV based on analysis by Öko-Institut⁷¹. It can be seen from the BOM that CRMs are concentrated in a small number of main components, primarily the PCB and contacts and LED backlights.

Table 11: Indicative occurrence of high-value metals and CRMs in electronic displays

Metal	Content per LCD (LED backlit) [mg]		LCA hotspot	EU CRM	Occurrence in the product
	TV	Monitor			
Silver	580	520			PCB and contacts (100%)
Indium	260	82		☒	Internal coating on display (100%)

⁷⁰ http://susproc.jrc.ec.europa.eu/televisions/docs/Task_Special_Hazardous_Substances_docx.pdf

⁷¹ Öko-Institut, Recycling critical raw materials from waste electronic equipment, Commissioned by the North Rhine-Westphalia State Agency for Nature, Environment and Consumer Protection, 24th February 2012

Gold	140	200			PCB and contacts (100%)
Yttrium	4.8	3.20		☒	Background illumination (100%)
Palladium	44	40	☒	☒	PCB and contacts (100%)
Europium	0.09	0.06		☒	Background illumination (100%)
Cerium	0.30	0.2		☒	Background illumination (100%)
Gallium	4.90	3.30		☒	Background illumination (100%)
Gadolinium	2.30	1.50		☒	Background illumination (100%)

An industry survey conducted by WRAP suggested that, to a great extent, removal by manual treatment of circuit boards (88-94%), plastics incorporating brominated flame retardants (82%) and LCD displays (88%) already takes place, although it is not clear to what extent this can be taken to be representative of the picture across the EU.

Printed Circuit Boards (PCBs) - The main economic aim of recovering PCBs is to recover the copper, gold, silver and palladium. Currently, CRMs are primarily recovered from circuit boards at large metal refining facilities designed to handle complex streams of metal-containing wastes⁷². They can then be refined from copper alloys.

LCD/LED display units - Displays are usually recycled thermally in waste incineration plants or in the Waelz kiln process for steel mill dust. The organic components (liquid crystals, polarisation filters, resins) are generally shredded and may then be incinerated, and the glass along with the oxidised metals remains bound in an inert slag. The indium contained in the displays is generally lost through dissipation⁷³.

Several pilot and laboratory technologies have been already developed for indium⁷⁴ and rare earths⁷⁵ recovery. However, there are currently no large-scale recycling facilities for the separation and refining of indium from the display units and the rare earths from the background illumination. The very low indium content and lack of another significant metal to recover in each LCD unit makes the economics of recovery very challenging. However, with indium supplies being dependent on lead or tin extraction, there is the potential for exposure of the electronics sector to price volatility.

In view of the need to protect future supplies of indium, Germany is understood to be considering storage of dismantled display units for recycling at a later date. It has been postulated that some form of chemical leaching process might in the future be more promising than a smelting process. The rare earth elements contained in the luminescent materials are currently not recycled. Up until now the luminescent materials and rare earth elements contained in display units, e.g. yttrium, europium, terbium, were sent to landfill following shredding. However, several mobile pilot plants are being developed to recover metals like copper, manganese, zinc, yttrium and indium from WEEE by hydrometallurgical processes.

⁷² Van Kamp.M and A, Vasseur, *Raw materials sustainability: Collaborating towards a better world*, Presentation to the Future Circular Materials Expo, Sweden, 2013

⁷³ See Öko-Institut (2012).

⁷⁴ Kye-Sung Park, Wakao Sato, Guido Grause, Tomohito Kameda, Toshiaki Yoshioka. *Recovery of indium from In₂O₃ and liquid crystal display powder via a chloride volatilization process using polyvinyl chloride*. *Thermochimica Acta* 2009.

⁷⁵ See HydroWEEE projects.

LED backlights - The CRMs and rare earth metals used in the manufacture of LED backlight units are related to doping and luminescence. They can include indium, gallium, cerium, europium, yttrium and gadolinium. The weight per substance typically amounts to only μg 's per LED. There is no current reliable information on the potential to recycle LED chips.

PMMA display light guide -The plastic light guides within a LCD display constitute a large proportion of the plastic used in a TFT display. In particular, the PMMA light guide has been identified as a subcomponent that is readily identified and which is readily recyclable according to IEC 62635. The JRC-IES identified that, without prior manual separation, the PMMA light guide would be dispersed among other shredded fractions. This would cause the contamination and consequent downcycling of the recyclates. On the other hand, PMMA sorted from other fractions before shredding can be recycled for the production of new boards with the same quality.

During 2013, the JRC-IES carried out an analysis of electronic displays to provide scientific support to help assess the benefits of the extraction of key components from electronic displays, and to assess their benefits and environmental impacts. Further analysis was carried out including a literature review of related studies, a campaign of measurement of the time for the dismantling of electronic displays carried out in an Italian electronic equipment waste recycling plant and identification and assessment of suitable thresholds for the time taken to extract key components. The analysis identified several possible thresholds for the total time taken to extract key components, differentiated according to the sizes of the devices. The analysis focused on two types of key components in displays: Printed Circuit Boards (PCBs) and Thin Film Transistor (TFT) units. The extraction of the PCB and TFT units has some common steps. Therefore, the setting of a single time threshold for the extraction of both of these components was considered to introduce less uncertainty. Moreover, a requirement on the combined extraction of PCB and TFT panels would lead to greater flexibility as regards the design of products that are compliant within the expected thresholds.

Electronic displays can use cold cathode fluorescent lamps (CCFL) or, in newer models, light-emitting diodes (LED) as backlighting systems. The JRC-IES highlights that both types of backlight units can be configured as backlit or side-lit units in the screens⁷⁶. Even though they vary significantly in their design⁷⁷, LEDs are often mounted on rails and strings, similarly to CCFL, thus their extraction is analogous to that of CCFL tubes. Therefore, both types of backlight units have a similar dismantling sequence and analogous times for extraction.

Against this background, during the revision three main requirements were proposed (see TR3.0 for further details):

- 1) Manual dismantling with commercially available tools of most relevant components in terms of LCA hotspots, CRM/REE occurrence and market potential identified:
 - Printed Wiring Boards >10 cm²;

⁷⁶ European Commission, Joint Research Centre – Institute for Environment and Sustainability. Analysis of dismantlability draft 2014.

⁷⁷ Veit H., Juchneski N. C. F., Scherer J. and I. H. Grochau (2013). "Disassembly and characterization of liquid crystal screens." *Waste Management & Research* 31(6): 549-558.

- Thin Film Transistor (TFT) unit >100 cm² and film conductors;
- Polymethyl methacrylate (PMMA) board light guide.

2) Time threshold for dismantling based on the JRC IES studies and data (targeting the 30% compliance).

3) Manual dismantling with commercially available tools of *one* additional component among ((i) LED backlight units, (ii) speaker unit magnets (for display sizes greater than or equal to 25 inches) or (iii) HDD drive (if applicable in the case of smart devices)), which have been identified as more challenging to extract.

During the different consultation rounds, several stakeholders expressed concern with regards to time thresholds. They saw the proposal as very ambitious; they claimed there is a lack of standardised testing and measurement procedures and disagreed with third party verification.

Rationale for updated proposal

The revised Ecodesign⁵ includes the following relevant requirements.

Requirements under the Section D. Material Efficiency Requirements:	
<i>From 1 March 2021, electronic displays shall meet the requirements indicated below.</i>	
1. Design for dismantling, recycling and recovery	<p><i>Manufacturers shall ensure that joining, fastening or sealing techniques do not prevent the safe and readily achievable removal of the components indicated in point 1 of Annex VII of Directive 2012/19/EU on WEEE or in Article 11 of Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators, when present. The sequence of dismantling steps, tools or technologies needed to access the targeted components shall be documented as foreseen in point E including, for each necessary operation, the type of joining, fastening or sealing techniques to be unlocked and the tools required. The sequence of steps suggested shall assure the safety of workers, if to be performed manually.</i></p> <p><i>Exemptions apply to products listed in Article 2, point 2 of Directive 2006/66/EC. Exemptions shall be documented as foreseen in point E.</i></p>
Information requirements under the section E. Information availability Requirements:	
<i>From 1 March 2021, the information set out below shall be available when placing on the market the first unit of a model or of an equivalent model. The same information can be provided for any equivalent model or model of the same family, if applicable.</i>	
3 End of life information and documentation	<p>The product manufacturer or importer shall make available to professional operators of the waste sector, in a website and free of charge, information relevant for dismantling, recycling and recovery at end-of-life of the electronic displays, as provided in Article 15 of Directive (EU) 2012/19 on WEEE and Article 9 of Directive (EU) 2018/851 on waste. This should include at least the following:</p> <ul style="list-style-type: none"> v. a diagram of the product showing the location of the plastic components containing flame retardants vi. the location of components containing the toxic or ecotoxic substances

or their compounds and of the critical raw materials listed in Table 3 hereafter.

Table 3: Toxic, ecotoxic substances or compounds, critical raw materials

Substance	Indicative quantity (X,X mg)
Arsenic	
Cadmium	
Lead	
Mercury	
Compounds of above substances	
Indium	

- vii. for each type of joining, fastening or sealing technique to be unlocked, the instructions on the sequence of steps needed to remove these components and tools required;
- viii. optionally, for substances listed in point (b), the advised recycling techniques to be applied;
- ix. the reason why certain, if any, components are not removable as per exemption set out in point D(1);
- x. the reason why certain, if any, plastic parts are not marked as per the exemption set out in point D(2);
- xi. if plastic components larger than 50 grams containing flame retardants are used, documentation in the format of Table 4.

Table 4: Flame retardant in plastic components larger than 50 grams index calculation table

Brand name and Product family:			
Component reference (with flame retardant)	Polymer *	Flame retardant**	Mass (g)
Reference (1)
Reference (2)
...
Reference (j)
Component reference (without flame retardant)	Polymer *		Mass (g)
Reference (1)	...		
Reference (2)	...		
...	...		
Reference (j)	...		
A) Total mass of plastic components*** incorporated in the electronic display containing flame retardants			
B) Total mass of plastic components***incorporated in the electronic display not containing flame retardants			

	C) Total mass of the product (g)	
<p>* standard abbreviated term for the polymer(s) in the plastic component, according to EN ISO 1043 series.</p> <p>** standard code number of the flame retardant(s) in the plastic component, according to EN ISO 1043 series.</p> <p>All masses shall be expressed in grams (g).</p>		

The only environmental scheme including a requirement on time for dismantling is EPEAT (IEEE for televisions):

<p>IEEE Std. 1680.3™ -2012</p>	<p><i>The time for dismantling the television for recycling shall be “at most 10 minutes for products weighting less than 50 pounds (18.7 kg); and at most 10 min plus 1 min per each additional 5 pounds (1.87 kg) of total product weight, for products weighting 50 pounds or more:</i></p> <p><i>1) Enclosures and sub-enclosures containing materials with special handling needs shall be removable with tools commonly available to recyclers.</i></p> <p><i>2) Materials that require special handling shall be easy to find and remove.</i></p>
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The criterion is proposed to be maintained. Changes have been introduced with regards to ‘time for dismantling’. Considering the feedback from stakeholders during the revision, it is suggested that the revised version aligns with IEEE. This approach is considered workable as it is already in place and is more flexible than the previous proposal. In addition, this will serve as a basis to gather relevant data for stringent and more component-specific time thresholds in future revisions.

3.5 Criterion 5 – Corporate responsibility

Within the hotspot analysis for televisions and external computer displays, some additional issues concerning environmental as well as social impacts were identified. Within this context it has been discussed whether the revision of the EU Ecolabel for electronic displays should also introduce new requirements on corporate responsibility, meaning that they cannot be implemented and verified at product level but need to be implemented instead at production level, possibly already during production stages not carried out by the applicant him/herself.

3.5.1 Criterion 5.1 – Labour conditions during manufacture

Existing criterion
No requirements
Updated proposal for criterion 5.1 – Labour conditions during manufacture
<p>Having regard to the International Labour Organisation's (ILO) Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy, the UN Global Compact (Pillar 2), the UN Guiding Principles on Business and Human Rights and the OECD Guidelines for Multi-National Enterprises, the applicant shall obtain third party verification supported by site audits that the applicable principles included in the ILO fundamental conventions and in the instruments identified in the supplementary provisions below have been respected at the final assembly plant for the product.</p> <p>Fundamental conventions of the ILO:</p> <p>a) Child Labour:</p> <ul style="list-style-type: none">i. ILO Core Convention "Minimum Age" (No. 138)ii. ILO Core Convention "Worst Forms of Child Labour" (No. 182) <p>b) Forced and Compulsory Labour:</p> <ul style="list-style-type: none">i. ILO Core Convention "Forced Labour" (No. 29) and 2014 Protocol to the Forced Labour Conventionii. ILO Core Convention "Abolition of Forced Labour" (No. 105) <p>c) Freedom of Association and Right to Collective Bargaining:</p> <ul style="list-style-type: none">i. ILO Core Convention "Freedom of Association and Protection of the Right to Organise" (No. 87)ii. ILO Core Convention "Right to Organise and Collective Bargaining" (No. 98) <p>d) Discrimination:</p> <ul style="list-style-type: none">i. ILO Core Convention "Equal Remuneration" (No. 100)ii. ILO Core Convention "Discrimination (Employment and Occupation)" (No. 111) <p>Supplementary provisions:</p> <p>a) Working Hours:</p> <ul style="list-style-type: none">i. ILO Convention "Hours of Work (Industry)" (No. 1) <p>b) Remuneration:</p> <ul style="list-style-type: none">i. ILO Convention "Minimum Wage Fixing" (No. 131)ii. Living wage: The applicant shall ensure that wages paid for a normal work week shall always meet at least legal or industry minimum standards and shall be sufficient to meet the basic needs of personnel and to provide some discretionary income. Implementation should be audited with reference to

SA8000⁷⁸ guidance on “Remuneration”.

c) **Health & Safety:**

- i. ILO Safety in the use of chemicals at work Convention, 1981 (No.170)
- ii. ILO Occupational Safety and Health Convention, 1990 (No.155)

In locations where the right to freedom of association and collective bargaining are restricted under law, the company shall recognise legitimate employee associations with whom it can enter into dialogue about workplace issues.

The audit process shall include consultation with external stakeholders in local areas around sites, including trade unions, community organisations, NGOs and labour experts. The applicant shall publish aggregated results and key findings from the audits online in order to provide evidence of their supplier's performance to interested consumers.

Assessment and verification: the applicant shall certify compliance with these requirements by providing copies of certificates of compliance and supporting audit reports for each final product assembly plant for the model(s) to be ecolabelled.

Third party site audits shall be carried out by auditors qualified to assess the compliance of the electronics industry supply chain with social standards or codes of conduct. Valid certifications from schemes or processes that audit compliance with the applicable principles of the listed fundamental ILO Conventions, together with the supplementary provisions on working hours, remuneration and health & safety, shall be accepted. .

Rationale and summary of the changes during the revision process

There are no social requirements under the existing criteria in force. However, the EU Ecolabel Regulation allows the inclusion of social requirements, where relevant. In TR1.0, stakeholders were asked about the possibility of including labour condition requirements based on ILO core conventions. There was a certain level of agreement on the inclusion of social criteria based on the fundamental principles of ILO conventions but a general concern with regards to the criterion formulation and its verification was expressed. The initial proposal was further defined in TR2.0 and TR3.0.

The following information summarises the main discussions and rationale behind the final revised proposal for EU Ecolabel criteria for the personal, notebook and tablet computers product group.

Addressing key social hot spots and providing the right level of assurance

According to expert judgement, a basic linkage to the underlying principles of the eight fundamental ILO labour conventions and (often weaker) national labour laws would not be sufficient enough to address the social hotspots specific to computer and display manufacturing processes. Thus, as minimum criteria, the underlying principles of the eight ILO fundamental conventions should be supplemented by provisions in the underlying principles of further ILO conventions addressing working hours, remuneration and health and safety.

Reference to the underlying principles is important to emphasise in the criterion text, because ILO conventions are intended to be ratified at national level, whereas for social auditing they are used as a reference at factory or company level.

In terms of remuneration, ILO's Minimum Wage Fixing Convention 131 (1970) specifies in Article 3 (a) and (b) that the following two elements are taken into consideration in determining the minimum wage:

⁷⁸ Social Accountability International, *Social Accountability 8000 International Standard*, <http://www.sa-intl.org>

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- the needs of workers and their families taking into account the general level of wages in the country, the cost of living, social security benefits, and the relative living standards of other social groups;
 - economic factors, including the requirements of economic development, levels of productivity, and the desirability of attaining and maintaining a high level of employment.

According to SA8000⁷⁹, in most countries these two considerations are at odds and may not be weighted equally in the determination of the minimum wage. These wages also frequently do not reflect inflation and other factors that affect actual standards of living.

Lack of enforcement of even these minimal rates of pay is common, forcing workers to work excessive overtime just to earn the legal minimum wage. For this reason, the proposed EU Ecolabel criteria include an additional requirement on the 'living wage' being sufficient to meet the basic needs of personnel and to provide some discretionary income. For a definition of 'living wages', interpretations, implementation, auditing and evidence of compliance, reference is made to the SA8000 Consolidated Guidance on Remuneration⁸⁰.

Defining the scope of the criteria proposal

The social requirements are proposed only to address first-tier suppliers (final product assembly). This is due to the fact that first-tier suppliers (contract manufacturers) increasingly act vertically within the supply chain from purchase to final assembly. Moreover, social aspects regarding hotspots of raw materials extraction will be addressed more specifically by criterion 5(a) 'Use of conflict-free minerals'.

For most manufacturers, the final assembly of their ICT products takes place at a limited number of contract manufacturers. Providing a list of first-tier suppliers summing up to at least 90% of procurement expenditure for final assembly (see for example Apple's information on suppliers⁸¹) would help the competent bodies to cross-check with the availability of independent audit reports as also being required for verification. Online publication of audit reports would improve the overall transparency of the ICT supply chain.

Addressing perceived weaknesses with the industry Code of Conduct

Feedback from industry stakeholders requested alignment with the Electronic Industry Citizenship Coalition's (EICC) Code of Conduct. Although the EICC CoC provides a positive framework for action on social issues by manufacturers, it raises a number of concerns:

- The labour standards are not based on the fundamental ILO labour conventions but rather on the national laws which might be weaker in some countries.
 - The Freedom of Association and Right to Collective Bargaining requirements fall behind the Core ILO and SA8000 standards.
 - Moreover, the CoC only implies regional minimum wages and not wages sufficient to meet basic needs ('living wages').
 - Rights relating to employment security are not addressed.
- Monitoring is mainly based on self-evaluation and, in the monitoring process, no independent trade unions or labour rights organisations are included. Controls of the self-evaluation of suppliers only take place on a random basis. Although the EICC has a 'Validated Audit Process' (VAP), it is not a requirement.

Whilst it is not proposed to explicitly refer to labour conditions in the assessment and verification text, as all qualified social auditors should be encouraged in order to support implementation of the Ecolabel, the intention is

⁷⁹ Source: http://www.sa-intl.org/_data/n_0001/resources/live/SA8000Remuneration.pdf

⁸⁰ See http://www.sa-intl.org/_data/n_0001/resources/live/SA8000Remuneration.pdf

⁸¹ Cf. <http://www.apple.com/supplier-responsibility/our-suppliers/> and http://images.apple.com/supplier-responsibility/pdf/Apple_Supplier_List_2014.pdf

to recognise third party auditing by accredited SAAS (SA8000) and EICC VAP auditors. This is considered to provide greater scope for applicants who are members of the EICC to comply with the criterion, albeit with stricter additional requirements relating to the audit process, ILO coverage and minimum/living wages.

Although the SA8000 audit process focuses in a similar way to the EICC VAP audit process on interviews with the employer and workforce, it also identifies consultation with external stakeholders as being important. The SA8000 audit guidance describes how stakeholders shall be involved prior to the audit process⁸²:

'The interested stakeholders to be consulted include: workers, trade unions, research institutions, NGOs, community organisations, and labor experts. The groups being consulted may be asked if any facility in the area has particular problems and/or for comments on a list of facilities including the audited facility, but auditors should not identify the applicant facility prior to certification.'

This wider engagement is intended to assist auditors to 'build up a picture of working conditions at the enterprises in advance of the verification process'. The guidance specifically refers to the convening of meetings of local groups.

Cross-checking the provisions and safeguards against 'scandals'

Early in the revision process a case cited of a social criterion 'scandal' involved Samsung, who in May 2013 were awarded TCO certification for a Galaxy S4 smartphone model⁸³. The scandal appears from NGO announcements to have related to the handling of chemicals (occupational health and safety) and workers' rights (Freedom of Association).

A cross-check of the provisions within the criterion proposal was made with the aim of ensuring that the issues raised in the cited Samsung case are addressed. The industry EICC code of conduct, TCO and SA8000 were also checked. This exercise highlighted that health and safety issues were not directly addressed within the criterion proposal, with chemical handling having been identified as a specific issue in the case of Samsung.

ILO Conventions 'Occupational Safety and Health' (No 155) and 'Safety in the use of chemicals at work' (No 170) were identified as being relevant for the purposes of auditing. Convention No 155 has already been adopted for the EU Ecolabel for Textiles. Convention No 170 specifically addresses chemical handling and risk assessment in the workplace. Both provisions are specifically referenced in the consolidated guidance for the SA8000 standard⁸⁴.

How to address countries where collective bargaining is illegal

A cross-check of the TCO criterion also highlighted a point raised in early discussions relating to countries where the right to freedom of association and collective bargaining via unions is restricted or banned, such as in China. The TCO social audit requirement 'Mandate A.7.1' states that *'in situations where the right to freedom of association and collective bargaining are restricted under law, workers shall be permitted to freely elect their own representatives.'* The alternative text proposed originates from UN guidance on implementation of the Global Compact⁸⁵, which states that *'the company shall recognise legitimate employee associations with whom it can enter into dialogue about workplace issues'*.

The proposal to address labour conditions during manufacturing reflects the significance of social issues in the computer/display manufacturing supply chain. This is evidenced by the investment made by industry to address

⁸² Social Accountability International (2004) *Guidance document for Social Accountability 8000*.

⁸³ Uncited press release, *Global health and justice groups demand that TCO withdraw its sustainability certification award for Samsung's S4 smartphone*.

<http://www.amrc.org.hk/system/files/Global%20health%20and%20justice%20groups%20demand%20that%20TCO%20withdraw%20Samsung%20certification.pdf>

⁸⁴ Social Accountability International, *Social Accountability 8000 International Standard*, <http://www.sa-intl.org>

⁸⁵ Castan Centre for Human Rights Law and the International Business Leaders Forum (2008) *Human rights translated: A business reference guide*, Office of the United Nations High Commissioner for Human Rights.

working conditions through an industry Code of Conduct. In this respect, high-level reference is made in both the Act and the Annex criteria to a number of reference documents, namely:

- the ILO Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy;
- the UN Global Compact (Pillar 2);
- the UN Guiding Principles on Business and Human Rights; and
- the OECD Guidelines for Multinational Enterprises.

The proposal seeks to provide a minimum acceptable level of assurance based on third party auditing of final assembly sites. Auditing would be carried out against the underlying principles of ILO fundamental conventions, which are commonly used as a reference for social auditing. Specific additional ILO conventions and points for verification relating to working hours, remuneration and health and safety have been added, reflecting ‘hotspot’ social issues for computer manufacturing. A clause has also been included recognising that in some countries, such as China, some flexibility is required because of laws restricting unions.

The form of verification addresses two key identified weaknesses of the industry Code of Conduct. Firstly, third party auditing is a requirement so as to ensure impartiality. Secondly, the stakeholders involved in the audit process have been expanded beyond the workforce so as to better detect possible breaches of the requirements, reflecting best practice from SA8000.

The use of auditors qualified to assess compliance of the electronics supply chain is promoted, with the intention to recognise accreditations such as those provided by SAAS (the accreditation body for SA8000) and the EICC. It is considered important to support the industry’s EICC initiative within the frame of the criterion proposal.

Rationale for updated proposal

The revised Nordic Swan¹⁸ for televisions includes the following relevant requirements.

Code of conduct	<i>The license holder must have a code of conduct that shows how the license holder works to ensure that human rights, labour rights, environmental protection and anticorruption measures follow international guidelines, such as the principles of the United Nations Global Compact, read more at http://www.unglobalcompact.org. The licensee shall ensure that all suppliers / subcontractors are aware of the code of conduct, and urging that these apply a code of conduct. If the license holder violates the code of conduct the Nordic Ecolabel license can be revoked. No documentation is required, but Nordic Ecolabelling may revoke the license if the requirement is not fulfilled.</i>
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The final revised proposal has been fully aligned to the finally voted EU Ecolabel criteria for the personal, notebook and tablet computers product group.

Request to stakeholders

- Stakeholders are requested to provide information about the feasibility of the proposed criterion.

3.5.2 Criterion 5.2 – Use of ‘conflict-free minerals’ during production

Existing criterion

No requirements

Updated proposal for criterion 5.2 – Sourcing of ‘conflict-free’ minerals

The applicant shall support the responsible sourcing of tin, tantalum, tungsten and their ores and gold from conflict-affected and high-risk areas by:

- (i) conducting due diligence in line with the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas; and
- (ii) promoting responsible mineral production and trade for the [identified minerals used in components of the product](#) in accordance with OECD and EU guidance within conflict-affected and high-risk areas.

Assessment and verification: *The applicant shall declare the compliance with these requirements together with the following supporting information:*

- *A report describing their due diligence activities along the supply chain for the four minerals identified. Supporting documents such as certifications of conformity issued by the European Union's scheme shall also be accepted.*
- *Identification of component(s) which contain the identified minerals, and their supplier(s), as well as the supply chain system or project used for responsible sourcing.*

Rationale and summary of the changes during the revision process

Displays contain a wide range of scarce resources which are largely mined in the Democratic Republic of the Congo, a conflict region, and according to sources under dangerous conditions, without sufficient maintenance of health and safety standards, and in some cases by children.

However, instead of a criterion to exclude the use of conflict minerals, bearing in mind the potential impact of a de facto embargo of minerals from a whole region that is economically and socially dependent on the mining industry, for the EU Ecolabel revision a process-oriented approach has been proposed to stimulate sustainable sourcing.

Responsible sourcing projects can be specified geographically by defining activities carried out within or on the fringes of the resource-conflict hotspot (the eastern parts of the Democratic Republic of the Congo) and by their compliance with the *OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas*, which was specifically tailored to the responsible sourcing of tin, tantalum, tungsten and gold.

The activity in this area was stimulated by the US Dodd-Frank Act which requires disclosure of the source of metals. Example projects on the ground include those working to establish traceability systems at a general level, such as the Public-Private Alliance for a responsible minerals trade and Solutions for Hope, the Responsible Mineral Initiative⁸⁶ and those focused on specific minerals, such as the Conflict-free tin initiative, the Tin Source Initiative and the Tantalum Initiative. Front-runner companies are amongst the active members of these projects.

Towards an integrated EU approach

At the AHWG2, DG Trade outlined work by the Commission to address the conflict-free sourcing of materials for end-products containing tin, tantalum, tungsten and gold. The proposed approach is outlined in Joint Communication JOIN(2014)8⁸⁷ which includes proposals for public procurement guidance.

Although the Communication highlights the significance of the OECD's Due Diligence guidance as a framework for action it cites fragmented compliance efforts, including a wide range of public and private initiatives, as well as the limited incentives to act, as barriers to further progress. Moreover, membership of existing projects supposes a substantial investment of time and resources which may be a barrier to smaller manufacturers.

⁸⁶ <http://www.responsiblemineralsinitiative.org/>

⁸⁷ Joint Communication to the European Parliament and the Council on *Responsible sourcing of minerals originating in conflict-affected and high-risk areas: Towards an integrated EU approach*, JOIN(2014)8

A draft Regulation is proposed which would introduce a requirement for due diligence along the supply chain for EU importers, reflecting the approach promoted by the OECD. It describes a responsible importer due diligence self-certification requirement linked to the establishment of a list of responsible smelters and refiners. However, implementation will take some time so any Ecolabel criteria must therefore be pragmatic in the form of assessment and verification.

The Commission also proposed to broaden the geographical scope of conflict areas adopted under the Dodd-Frank Act to any *'areas in a state of armed conflict, fragile post-conflict as well as areas witnessing weak or non-existing governance and security, such as failed states, and widespread and systematic violations of international law, including human rights abuses.'*

The proposed criterion takes a proactive approach to the sourcing of tin, tantalum, tungsten and their ores and gold from conflict-affected and high-risk areas. This reflects the approach already taken by leading manufacturers, which rather than boycotting such areas seeks to support an improvement in working conditions.

The requirements and verification have been aligned with the OECD's guidance on due diligence, with anticipation of the EU's certification scheme for conflict-free smelters which will introduce a third party verified supply chain conformity scheme. They also require applicants to demonstrate how they promote the sourcing of conflict-free minerals by providing verification of action for at least one mineral related to at least one component. This is deliberately flexible as it does not require applicants to join traceability projects. They can verify compliance at either:

- final product level, as members of traceability projects;
- by contracting final assemblers that are members of traceability projects; or
- by specifying sub-assemblies or components manufacture by suppliers who are members of traceability projects.

In this way, supply chain activity in conflict-affected and high-risk areas will be supported, helping the development of traceability to improvement initiatives on the ground and demand for conflict-free minerals.

Rationale for updated proposal

Additional evidence of manufacturers/suppliers that are part of conflict-free sourcing initiatives is given below:

- LG Electronics⁸⁸ is a member of the Responsible Minerals Initiative (RMI). The RMI provides its members with the most up-to-date information on conflict-free smelters and refiners, and tools for conducting due diligence. The RMI also operates the Responsible Minerals Assurance Process (RMAP), a programme that uses third party independent auditors to verify that participating smelters and refiners have adequate policies and due diligence processes in place to trace the origins of the minerals that they process and assess whether they were obtained from conflict-free sources.
- Samsung Electronics⁸⁹ has banned the use of conflict minerals that are mined unethically in conflict areas in 10 African countries, including the Democratic Republic of the Congo. To establish a conflict-free system, it has implemented a process of due diligence for conflict minerals in line with the 'OECD Due Diligence Guidance'. Additionally, it encourages suppliers to partner with smelters certified by the RMAP (Responsible Minerals Assurance Process), and require uncertified smelters in its supply chain to become certified by the RMAP.

⁸⁸ <https://www.lg.com/global/sustainability/business-partner/conflict-minerals>

⁸⁹ <https://www.samsung.com/levant/aboutsamsung/sustainability/supply-chain/>

NVIDIA⁹⁰ is committed to operating in a socially responsible manner and to implementing due diligence practices designed to determine whether minerals from the Democratic Republic of the Congo (DRC) and adjoining countries, including gold, tantalum, tungsten and tin (3TG), used in its products are 'conflict-free'. NVIDIA's due diligence process aligns with the Organisation for Economic Co-operation and Development (OECD) framework. NVIDIA established an internal management system, centered around a conflict minerals team with representatives from operations, legal, sales and marketing, and requested all 3TG suppliers to complete the Conflict Minerals Reporting Template (CMRT). To improve the collection, validation and analysis of its conflict minerals programme, it leverages a third party supplier management solution. It is an active member of the Conflict-Free Sourcing Initiative (CFSI) and the Public Private Alliance (PPA) for Responsible Minerals Trade to support initiatives targeted at improving the traceability of conflict minerals in the DRC.

Against this backdrop, it is considered that the proposed criterion is achievable. Changes have been introduced in this criterion in order to fully align it to the finally voted EU Ecolabel criteria for the personal, notebook and tablet computers product group; in particular, the assessment and verification section has been further clarified.

Request to stakeholders

- Stakeholders are requested to provide information about the feasibility of the proposed criterion.

⁹⁰ <https://www.nvidia.com/object/conflict-minerals-program.html>

3.6 Criterion 6 – Information criteria

3.6.1 Criterion 6.1 – User instructions

Existing criteria,

Decisions 2009/300 and 2011/337

Televisions:

The television shall be sold with relevant user information that provides advice on its proper environmental use. The information shall be located in a single, easy-to-find place in the user instructions as well as on the manufacturer's website. The information will include in particular:

- (a) The television's power consumption in the various modes: on, off, passive standby, including information on energy savings possible in different modes.
- (b) The television's average annual energy consumption expressed in kWh, calculated on the basis of the on-mode power consumption, operating 4 hours a day and 365 days a year.
- (c) Information that energy efficiency cuts energy consumption and thus saves money by reducing electricity bills.
- (d) The following indications on how to reduce power consumption when the television is not being watched:
 - turning the television off at its mains supply, or un-plugging it, will cut energy use to zero for all televisions, and is recommended when the television is not being used for a long time, e.g. when on holiday,
 - using the hard off-switch will reduce energy use to near zero (where one is fitted),
 - putting the television into standby mode, will reduce energy consumption, but will still draw some power,
 - reducing the brightness of the screen will reduce energy use.
- (e) The position of the hard off-switch (where one is fitted).
- (f) Repair information regarding who is qualified to repair televisions, including contact details as appropriate.
- (g) End-of-life instructions for the proper disposal of televisions at civic amenity sites or through retailer take-back schemes as applicable, which shall comply with Directive 2002/96/EC of the European Parliament and of the Council (1).
- (h) Information that the product has been awarded the flower (the EU Ecolabel) with a brief explanation as to what this means together with an indication that more information on the Ecolabel can be found at the website address <http://www.ecolabel.eu>

Assessment and verification: The applicant shall declare compliance of the product with these requirements and shall provide a copy of the instruction manual to the competent body assessing the application.

External computer displays:

The computer display shall be sold with relevant user information that provides advice on its proper environmental use. The information shall be located in a single, easy-to-find place in the user instructions as well as on the manufacturer's website. The information shall include in particular:

- (a) Energy consumption: TEC value in accordance with Energy Star v5.0, as well as the maximum power demand in each operating mode. In addition, instructions must be provided on how to use the devices energy-saving mode;
- (b) Information that energy efficiency cuts energy consumption and thus saves money by reducing electricity bills and that unplugging your computer display reduces energy consumption to zero;
- (c) The following indications on how to reduce power consumption when the computer display is not being used:
 - (i) Putting the computer display into off mode will reduce energy consumption but will still draw some power;
 - (ii) Reducing the brightness of the screen will reduce energy use;
 - (iii) Screen savers can stop [personal computer monitors] / [notebook displays] from powering down into a lower power mode when not in use. Ensuring that screen savers are not activated on [computer monitors] / [notebook computers] can therefore reduce energy use;
- (d) Information should be included in the user instructions or the manufacturer's website to let the user know where to go to obtain professional repairs and servicing of the computer display, including contact details as appropriate;
- (e) End-of-life instructions for the proper disposal of computer displays at civic amenity sites or through retailer take-back

schemes as applicable, which shall comply with Directive 2002/96/EC of the European Parliament and of the Council.

- (f) Information that the product has been awarded the EU Ecolabel with a brief explanation as to what this means together with an indication that more information on the Ecolabel can be found at the website address <http://www.ecolabel.eu>
- (g) Any instruction/repair manual(s) should contain recycled content and should not contain chlorine bleached paper.

Assessment and verification: the applicants shall declare the compliance of the product with these requirements to the competent body.

Updated proposal for criterion 6.1 – User instructions

The electronic display shall be sold with relevant user information that provides advice on its proper environmental use. The information shall be located in a single, easy-to-find place in the user instructions as well as on the manufacturer's website. The information shall include, **as a minimum, the following information (when applicable):**

- (a) Energy consumption: **Energy Efficiency Class according to Energy Labelling of electronic displays(*)**. The maximum power demand in each operating mode. In addition, instructions shall be provided on how to use the device's energy saving mode and Information that energy efficiency cuts energy consumption and thus saves money by reducing electricity bills.
- (b) The following indications on how to reduce power consumption:
 - (i) Turning the product off at its mains supply, un-plugging it, or using the hard off-switch (where one is fitted) will cut energy use to (near) zero;
 - (ii) Putting the product into standby mode will reduce energy consumption, but will still draw some power;
 - (iii) Note that screen savers (computer monitors) can stop displays from powering down into a lower power mode when not in use. Ensuring that screen savers are not activated on displays can therefore reduce energy use;
 - (iv) Note that a Quick Start Function might cause increased power consumption;
 - (v) Note that integrated functions, such as a receiver for digital signals (e.g. DVB-T) or hard disk recorders may help reducing power consumption if, as a result, an external device becomes redundant.
- (c) Network connectivity: Information on how to deactivate networking functions
- (d) The position of the hard off-switch.
- (e) Information that extension of the product's lifetime reduces the overall environmental impacts.
- (f) The following indications on how to prolong the lifetime of the product:
 - (i) Clear disassembly and repair to enable a non-destructive disassembly of products for the purpose of replacing key components or parts for repairs.
 - (ii) Information to let the user know where to go to obtain professional repairs and servicing of the product, including contact details as appropriate.
- (g) End-of-life instructions for the proper disposal of the product at civic amenity sites or through retailer take-back schemes as applicable, which shall comply with Directive 2012/19/EU of the European Parliament and of the Council.
- (h) Information that the product has been awarded the EU Ecolabel with a brief explanation as to what this means together with an indication that more information on the Ecolabel can be found at the website address <http://www.ecolabel.eu>
- (i) Any print-versions of instruction/repair manual(s) should contain recycled content and should not contain chlorine bleached paper. To save resources, online versions should be preferred.

Assessment and verification: *The applicants shall declare the compliance of the product with these requirements to the competent body and shall provide a link to the online-version or a copy of the user instructions / repair manual to the Competent Body.*

*Commission Delegated Regulation (EU) No XX of XX XXXXXXXX 2019 supplementing Regulation 2017/1369/EU

Rationale and summary of the changes during the revision process

Initially, both existing consumer information for televisions and external computer displays were integrated into one criterion. In addition, information on newer functions and modes (manual/automatic brightness control, quick start mode, active standby for networked products) was included.

During the revision:

- the product group was changed to 'electronic display';
- a requirement on network connectivity was added;
- the provision of a list of available spare parts with current prices was deleted as this was not seen as practicable by stakeholders;
- a sub-criterion on repair manuals was specified regarding print versions with additional advice to prefer online versions of to save resources;
- the assessment/verification was amended by the provision of a copy and/or link to the user instructions.

Minor wording changes have been introduced in this criterion in order to make it clearer and to fully align it to the finally voted EU Ecolabel criteria for the personal, notebook and tablet computers product group. The information requirements on energy consumption have been adapted to align it with the new Energy Labelling Regulation.

3.6.2 Criterion 6.2 – Information appearing on the Ecolabel

Existing criteria,

Decisions 2009/300 and 2011/337

Televisions:

Box 2 of the Ecolabel shall include the following text:

- ‘- High energy efficiency,
- Reduced CO₂ emissions,
- Designed to facilitate repair and recycling.’

Assessment and Verification: The applicant shall declare the compliance of the product with this requirement, and shall provide a copy of the Ecolabel as it appears on the packaging and/or product and/or accompanying documentation to the awarding competent body.

External computer displays:

Optional label with text box shall contain the following text:

- ‘- high energy efficiency
- designed to facilitate recycling, repair and upgrading
- mercury-free backlights (if computer displays)’.

Assessment and verification: the applicant shall declare the compliance of the product with this requirement, and shall provide a copy of the Ecolabel as it will appear on the packaging and/or product and/or accompanying documentation to the competent body.

Updated proposal for criterion 6.2 – Information appearing on the Ecolabel

The optional label with text box shall contain **three of** the following texts:

- (a) High energy efficiency
- (b) **Restriction** of hazardous chemicals
- (c) Designed to be easy to **repair and** recycle
- (d) Contains xy% post-consumer recycled plastic (only when greater than 25% **as a percentage of the total plastic**)

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

http://ec.europa.eu/environment/ecolabel/documents/logo_guidelines.pdf

Assessment and verification: *The applicant shall provide a sample of the product label or an artwork of the packaging where the EU Ecolabel is placed, together with a declaration of compliance with this criterion.*

Rationale and summary of the changes during the revision process

Initially, changes were made to existing criteria in force:

- To have an explicit focus on extended lifetime (formerly repair and upgrading).
- For televisions: addition of mercury-free backlights.

During the revision, the major proposed changes were:

- The 'mercury-free' claim has been deleted and a more general claim in accordance with criteria on hazardous substances has been introduced.
- Inclusion of criteria addressing plastic recycled content claims. Following the example of cotton content claims in the textile product group, where a higher content can be demonstrated there is an option to display this in Box 2 next to the Ecolabel. This would provide a benefit to manufacturers wishing to work towards a high recycled content, without placing an overall burden which could reduce the selectivity of the Ecolabel.

Minor changes have been introduced in line with the final criteria for the EU Ecolabel for the personal, notebook and tablet computers product group.

DRAFT

4 IMPACT OF CHANGES TO CRITERIA

This section consists of a summary of the main general changes proposed for the revised criteria and potential implications for current licence-holders and possible applicants. In relation to the scope, it is suggested to align it with the revised Ecodesign and Energy Labelling Regulations and broaden the range of products covered. It is proposed to move from solely televisions to electronic displays, which include televisions, computer monitors and signage displays.

In relation to the criteria, there is a general increase in the level of ambition proposed, based mainly on the available technical evidence and information from other labelling schemes. Relating to the energy criteria, more efficient energy classes have been defined and a stricter power cap. Power management requirements have been extended compared to existing criteria in force.

Regarding the criteria dealing with hazardous substances, the requirements have been modified taking into consideration changes in legislation and new evidence. In addition, following the example of other labelling schemes, a new requirement on activities to reduce supply chain fluorinated greenhouse gas (GHG) emissions has been included.

With regard to criteria on reparability, the requirements have been widened. The existing requirements in force set the focus on the guarantee and availability of spare parts and the reference to easy disassembly is considered imprecise. The revised text includes additional requirements on the provision of information. With regards to the sub-requirement on design for reparability, this has been further defined.

End-of-life management has been revised and extended. In addition to the marking of parts, the target parts have been further defined and the dismantling time has been included in line with EPEAT. In addition, manufacturers wishing to work towards a high recycled content are allowed to claim this (if above 25%) in the label.

Finally, the EU Ecolabel Regulation allows the inclusion of social requirements, where relevant. The revised criteria of the EU Ecolabel also includes new criteria on labour conditions and on conflict-free mineral sourcing.

In conclusion, the revised criteria set a higher ambition level, reflecting front runners' performance, and allow a broader spectrum of displays to be awarded the EU Ecolabel as a result of the changes in the scope.

5 TABLE OF COMMENTS: Stakeholder comments on TR3.0 and responses during and after the last open consultation (November 2014)

Criteria/subject	Summary of comments November consultation	JRC response
Ecodesign/Energy labelling alignment and progressive approach	<i>A stakeholder claimed that it is key that the new efficiency criteria are aligned with the Energy Label classes and in general welcomes the suggested criteria regarding energy efficiency and consumption for TVs and computer monitors. They only suggested more ambitious criteria (technically feasible) for: A+ for TVs < 90cm, and A++ for TVs ≥ 90cm. The criteria proposed by the JRC would have been met by 34% of the sold TVs in 2013 already.</i>	Comments acknowledge The criterion has been modified in the light of recently finished Energy labelling.
Ecodesign/Energy labelling alignment and progressive approach	<i>While industry sees the proposal is too strict. They claimed that no computer monitors would qualify with the current A++ limit, even more so with a proposed revised stricter A++ values and that televisions limit for large displays (>=139 cm) is too strict and they proposed to use A+ limit instead. Other industry stakeholder claimed that the difference between the EEI level required for displays smaller than 139cm and larger than 139cm is very large. The allowed power drops from approx. 64W to approx. 34W. As currently proposed, the EEI criteria is not quite what we would call a level playing field for different screen sizes.</i>	
Power cap	<i>Industry stakeholders are not supportive of a power cap since this would not incentivise better design for large displays. It would simply exclude them from the Ecolabel. Power consumption criteria is excluding current 4K TVs and all >55" TVs and most of the 32" TVs.</i>	Partially accepted A power cap is maintained as criteria have to be selective. Market data revealed that 93% of sales in 2013 were below 50". Concerning 32" televisions, best models listed in Topten achieved 64W power cap. In order to not exclude UHD a higher power cap is included (100W) in line with the latest EU Ecolabel amendment.
Power management	<i>An industry stakeholder stated that it is not clear the text: "the quick start functionality shall not increase the "appliance's power consumption" with more than 5% of the On mode power consumption" as the quick start functionality will not influence any of the defined power consumption measurements. They claimed that current draft ecodesign regulation does not allow any power uplift for a quick start up mode. The Ecolabel and the Ecodesign regulation shall be aligned on this point.</i>	Accepted The requirement has been modified to align to BA.
Power management	<i>An industry stakeholder proposed to use the same ABC implementation as provided by the draft Energy Label regulation but make it mandatory to implement. They claimed that when a set consumes for instance 60W as P100 value and the value of 5 shall be reached, then P50 needs be equal 10W and P10 needs to equal 1.6W. This is completely unrealistic. If the implementation of the ABC is too severe (picture becomes too dark in function of a more dark ambient condition) the consumer will definitely turn off the ABC</i>	Partially accepted Allowances with regards ABC included in new Ecodesign and Energy Labelling have been made mandatory for EU Ecolabel. new

	<i>and all targeted power savings will be lost.</i>	
Definition of articles and homogenous parts	<i>Can the definition of an article be flexibly applied to specific components or the whole product? The principle of 'once an article, always an article' was cited. A definition of 'homogenous parts' was requested.</i>	Clarification provided Under REACH a whole imported finished product and separate imported parts then used to fabricate a finished product (or to be sold as spare parts) would be defined as 'articles'. This term has no legal definition in EU legislation and it is proposed that 'subassemblies and component parts' has the same intended meaning for the purpose of the criterion proposal.
Overall complexity and strictness of the criterion proposal	<i>The proposal has become too complex and might put applicants off applying for the ecolabel. The proposal comprises a number of different parts and it appears difficult to read and interpret all of them. The move to control hazards at component level raised concern that it was a stricter interpretation of the Ecolabel Regulation. The relevance of each restriction to the presence of hazards at >0.1% in the product as a whole should be checked.</i>	Accepted The proposal has been checked and streamlined where possible. The proposal has been tailored (as far as possible) to reflect the approach taken by leading manufacturers. The structure of the criteria and wording has been further aligned to recently voted product groups.
Ability to verify Article 57 criteria	<i>The ability to verify the REACH Article 57 criteria in Group 1 was questioned, especially PBT and vPvB.</i>	Accepted The direct reference to Article 57 criteria has been replaced in Group 1 by reference to Candidate List SVHCs.
Verification of hazardous substances criteria	<i>Modification to hazard groupings. H410 might be moved to Group 1 as it may indicate PBT classification.</i>	Rejected Moving H410 to Group 1 as a precautionary means of identifying PBT or vPvB substances would be make Group 1 stricter than Green Screen Benchmark 1 and would leave verification open ended, because further investigation/data collection would be required.
Verification of hazardous substances criteria	<i>Proposal to accept REACH joint submissions as being more authoritative. A proposal was made that joint submission dossiers in the ECHA C&L Inventory be taken as being more authoritative than single notifications or aggregated notifications.</i>	Clarification provided The assessment and verification sections have been simplified and aligned to recently voted product groups. Applicants are requested to provide SDSs of substances used. This decisions is based on the concern expressed during the development of Chemical Task Force 2, about the capacity/expertise of applicants and Competent Bodies to use/check additional data (further to SDSs) in order to determine the hazard profile of substances.
Verification of hazardous substances criteria	<i>Proposal to require third party verification of hazard classifications. In other products there is an almost complete reliance on self-declarations – why should this product group be different? What value would this add, how would it work and in what situation? Good arguments would be needed to introduce this additional new step.</i>	
Verification of hazardous substances criteria	<i>Use of non-EU hazard assessment studies. The use of non-EU studies such as the US EPA's assessment of alternatives to DecaBDE was questioned. This study was not intended for use in a regulatory environment. The criteria used in these studies to determine the hazards are not consistent with REACH or EPA processes.</i>	

Clause exempting substances that are no longer bioavailable	<i>It was queried what evidence this would need to be based on (e.g. EU risk assessment reports) and if the burden of proof would be on the manufacturer to demonstrate that it would not be bioavailable along the products lifecycle.</i>	Clarification provided The clause has been eliminated from recently voted products due to difficulties on the assessment. The Chemical Task Force 2 concluded that bioaccessibility is a good and practical way forward in evaluating the bioavailability of hazardous substances in EU Ecolabel articles. Experience is growing but still limited to mainly metals. A harmonised approach to testing would help a lot but even before then, bioelution data should be able to be considered as part of potential derogation conditions.
Clause exempting substances that are no longer bioavailable	<i>This exemption precludes addressing the lifecycle of the product and certain substances and, moreover, would give a freedom to use any substances bonded to polymers. On this basis brominated flame retardants and PVC may not be addressed, whereas at the very least consumers should be informed if they are used.</i>	
Clause exempting substances that are no longer bioavailable	<i>There is the need for a stronger focus on breakdown products which may arise. Assumptions are currently being made about the stability of substances over time which require reviewing. All additives (e.g. FRs, plasticisers) should be treated as bioavailable unless proven stable over time.</i>	
Clause exempting substances that are no longer bioavailable	<i>The clause exempting substances that are no longer bioavailable or which have been reacted into a material should be re-instated. Functional substances such as TBBPA FR that are reacted into resins are permitted in other ecolabels.</i>	
Potential to make halogen-free product claims	<i>Whether or not the EU Ecolabel excludes use of PVC and halogenated FRs, it should allow manufacturers who succeed in making halogen-free substances to make such claims in association with the label.</i>	Rejected It is not proposed to allow halogen-free claims to be made because the followed approach is technology neutral. Instead performance based on hazard profiles is proposed.
Substance-specific issues raised	<i>It was requested to remove a number of the substance restrictions that mirror requirements in the RoHS Directive Recast i.e. lead, cadmium, chromium VI.</i>	Accepted The restrictions have been removed, with the exception of those referring to RoHS exemptions.
Substance-specific issues raised	<i>The classification results for a number of flame retardants were queried by manufacturers. These included DINCH and DIDP. New evidence was submitted to fill data gaps.</i>	Accepted The DINCH result has been amended to remove H413. The classification from the REACH system shall take precedence. The data gap for acute toxicity (inhalation) has been addressed by new testing. Jayflex (DIDP) was registered under another CAS number. The REACH register suggests that it is currently unclassified.
Substance-specific issues raised	<i>A stakeholder stated that H413 is not warranted for DINCH and that there is no data gap for DINCH regarding the acute toxicity: They claimed that they have tested the acute toxicity on the oral and the dermal route, therefore the REACH data requirements are satisfied and there is no justification to flag a data gap.</i>	
Substance-specific issues raised	<i>An industry stakeholder said that they have followed the decision tree on page 95 of technical report and they got following results for plasticisers: ii. For DINP Joint submission for REACH registration says not classified so I guess we can use it iii. For DIDP and DNOP because there are no registrations, and not harmonized classifications we would need to check other points from the decision tree but at this moment we don't have additional information so we wonder if these can be derogated or not.</i>	

Substance-specific issues raised	<i>Concerning Flame retardants derogation for PWB, Industry stakeholder claimed that they don't have yet test reports on PAH but they expect some difficulties on this one. In addition, when is TBBPA free they don't have always the CAS number. Further, they asked that if the supplier says that TBBPA is reactive is it really necessary to have a derogation limited to certain PWB? Should the use of reactive TTPA be allowed?</i>	Partially accepted Considering that industry stakeholders, several of them current licence holders mentioned the difficulties on phasing out TBBPA from PCBs a derogation for its use exclusively in PCBs has been granted. This approach is also followed by Nordic Swan.
Substance-specific issues raised	<i>An association stakeholder claimed that the restriction on Beryllium and its compounds should be removed on the basis that it is rarely used and if so the concentration would be lower than 0.1%. Only beryllium oxide ceramics would be used in this application for computers and beryllium oxide ceramic is only rarely used as a heat conductor in modern computers due the relatively high cost of beryllium oxide ceramics and the use of alternative thermal management methods (i.e. fans). They also said that the statement "With regard to the use of beryllium in computer/television products it was stated that it was not used in connectors..." is incorrect and should be removed from the document.</i>	Accepted
Derogation decisions	<i>The rejection of derogation requests for beryllium was queried. The use of copper beryllium alloys was highlighted as supporting more durable and higher performance products.</i>	Rejected The derogation decision is unchanged because copper beryllium alloys are used at concentrations much below 0.1% (for example, 0.005%)
Addressing improper WEEE disposal	<i>The flame retardant fire safety test was considered by industry stakeholders to be difficult to meet. It was questioned whether this was routinely carried out. It was queried whether the flame retardant is always the source of dioxin, furan or PAHs emissions. The role of the Ecolabel in addressing illegal waste treatment was also questioned. It was proposed to instead require applicants to provide take back schemes.</i>	Accepted In order to have a workable criterion the emission conditions proposed during the revision aligned to computers product group have been removed.
Design for repair	<i>Concerning extended guarantee, Industry do not support this point due to unacceptable increase of service cost for the manufacturer, which cannot be absorbed within current retail prices. 3 year guarantees would force selling prices for Ecolabel models to become uncompetitive. Extended guarantee packages (3, 5 years) are available for additional cost.</i>	Rejected Commercial guarantee has been included in line with computers product group. The evidence included in TR3.0 showed that a number of frontrunners offer this commercial guarantees.
Design for repair	<i>From NGO side, it was suggested to introduce in the draft proposal a paragraph saying: "This guarantee is without prejudice to the legal obligations of the seller under national law on legal and commercial guarantees" As the additional guarantee provided by the applicant under the eco-label could in some elements overlap with the legal guarantee affecting the seller, it should be clearly stated that the consumer legal rights established in the national laws are not affected by the additional guarantee.</i>	Accepted
Design for repair	<i>Clarity was requested on the meaning of the 3 year warranty proposal. Does it provide the same rights that the legal guarantee period or does it refer to the commercial guarantee?</i>	Clarification provided It has also been clarified that the three year commercial guarantee period referred to is inclusive of the minimum two year period of conformity, and

		that the same service shall be provided as a commercial guarantee, including pick-up and return, at no cost to the consumer.
Availability of spare parts	<i>An industry stakeholder claimed that they cannot guarantee spare parts for 7 years. They said that they will strive to provide the most cost-efficient solution to end users, while at the same time minimizing the impact on the environment.</i>	Rejected 7 years are requested in current EU Ecolabel for TVs. Current licence holders comply with this figure. For monitors the proposal has been aligned with EPEAT/IEEE requirements, which relate to 5 years from production of a model ceasing.
Variety of plastics/ compatibility for recycling.	<i>Industry welcome the proposed flexibility but they expressed concern on what level of technical evidence would be acceptable. The verification method needs to be more clearly defined. How plastics will be recycled at end of life cannot be known with certainty at the time of design.</i>	Clarification provided It is proposed to reflect EPEAT criterion that address the compatibility for recycling of plastics with coatings/paints and the ease of removal of moulded-in or glued-on metal inserts. The recyclability of casings, enclosures and bezels that incorporate flame retardants shall be verified and, furthermore, the use of aluminium-based FR's with a high loading in PCB base materials shall not be permitted because they require more energy to smelt in the end-of-life phase. In order to address concerns relating to the definitions of 'compatibility with recycling' or 'recyclable' greater flexibility is proposed in the assessment and verification, again reflecting EPEAT, with three different options based on (i) declarations from recyclers, (ii) test results and/or (iii) technical literature relevant to the EU market.
	<i>Reducing the use of plastics to a single polymer and discriminating laminates and composite plastics may be counterproductive from the environmental point of view. The criterion on material selection looks more like a criterion on plastics deselection than on a "material selection". When it comes to plastics, the criteria become very prescriptive. No other substance is discriminated in this way. Plastics are discriminated at numerous places. Many criteria do not address main environmental impacts required by the Regulation and should be removed.'</i>	
Variety of plastics/ compatibility for recycling	Concerning the requirement "Printed Wiring Boards greater than 10 cm ² shall not contain aluminium based flame retardants or additives" A stakeholder claimed <i>"It needs more argumentation, especially, how much energy is needed. The potential for this trade-off is not justified in numbers, and as other manufacturers are going in a non-halogenated direction, it should not be the EU Ecolabel to "safe" PCB (Printed Circuit Boards) recycling from higher energy use. As aluminium based FR is used as substitution for halogenated flame retardants, such a criterion seems to block for this substitution, however, only in EU Ecolabelled articles. Moreover, the anonymous FR specialist must be unveiled, by name and organization."</i>	Accepted It is suggested to be removed. This sub-requirement adds complexity to the criteria and is not reflected in other available schemes for displays.
Material information to facilitate recycling	<i>A stakeholder claimed that marking of plastic parts does not facilitate the dismantling, does not help automatic identification and automatic separation of waste and does not help recycling. Labelling of plastics is another requirement that doesn't serve any purpose.</i>	Rejected The sub-criterion requiring plastic marking is proposed to be retained and to go further than the revised Ecodesign.
Material information to facilitate recycling	<i>An industry stakeholder welcomes that the concerns expressed in the last consultation round have been absorbed related with the marking of CAS number of flame retardants. However, their previous comments on fillers and plasticizers remain valid: 'Regarding ISO 1043 section 2 and 3, TV manufacturers may not have the information at their disposal on fillers and plasticizers due to contractual restriction with plastic suppliers.'</i>	Accepted Marking of plastic polymer type and the flame retardants is requested in line with Eco-design.

Recycled content	<p>On "Recycled content":</p> <p>An industry stakeholder doesn't support this requirement for Televisions. If this requirement remains unchanged, they will not be able to apply for Ecolabel in the future. At this moment and for the near future, they can't commit with a % since internally we will not be able to meet our current quality/design standards for TV line-up with the current available PCR plastic recycles. Another industry stakeholder proposed to reduce the requirement to 5% or to exclude optical plastics from the calculation.</p>	<p>Rejected</p> <p>The sub-criterion requiring a minimum 10% post-consumer recycled plastic content is proposed to be retained, but has been reworded to allow for an average recycled content for each model and to exclude Printed Wiring Boards. Aligned to EPEAT.</p>
Recycled content	<p>An industry association stakeholder claimed that strangely enough, only plastics, which only contribute for 2 to 10 % of the weight of an electronic display, have a criterion on minimum "Recycled content". No other material has such requirements. This clearly fails to address a main environmental impact, as EU Ecolabel criteria are meant to do.</p>	<p>Rejected</p> <p>Evidence showed that plastics represent a higher percentage of the displays. LCD TVs contain on average 31 wt% plastics (Huisman et al., 2008; Salhofer et al., 2011).</p>
Design for dismantling and recycling	<p>A disassembly test report to be provided. In the test procedure a real life test is required. An industry stakeholder questions the objectivity of such test especially if a maximum dismantling time needs to be proven. Many parameters such as experience of the operator, tools available, pre-knowledge and motivation are determining this time.</p> <p>The stakeholder therefore proposes to define a theoretic dismantling time per TV based on a described measuring method using agreed times to per connection. It should also be made more specific up to which level of detail the dismantling is required.</p>	<p>Partially accepted</p> <p>Design for efficient dismantling is considered to be an important proxy for cost effective dismantling/recycling and should be an important factor in product design.</p> <p>The criterion is therefore proposed to be retained. However, the time required for extract the components have been adapted. It is suggested that the revised version aligns with IEEE. This proposal is considered workable as it is already in place and is more flexible than previous proposal. This proposal will serve as a basis to gather relevant data for stringent time thresholds in future revisions.</p>
Design for dismantling and recycling	<p>Internally we have noticed that without a "standard", the values obtained by different people disassembling the same model differed significantly. For this reason, we can't propose an objective time limit at this point. A way to solve this issue could be the development and use of a simulation tool to provide indicative timing according to certain design parameters. In the absence of a standardized simulation tool and sufficient review/testing of such a tool, the stakeholder cannot propose or commit to any time limit.</p> <p>More fundamentally, we would like to point out that the manual disassembly of display products using conventional tools such as screw drivers may not play an important role in actual recycling of the products in the future. From our contacts with key EU recyclers, we have learned that new technologies and processes are being developed, which allow semi-automatic dismantling of products and key components without conventional manual disassembly methods. These new methods will be not only cost-effective compared to manual disassembly but also can be competitive in terms of resource recovery rates.</p>	

<p>Conflict free minerals</p>	<p>1. We agree with (i) to conduct due diligence in line with the OECD Due Diligence Guidance. You may need to be more specific on your assessment/verification as the guidance is still quite broad. However, depending which timeline you have in mind for the implementation, note that we are planning to set up a certification of conformity scheme in line with Regulation (EC) 765/2008 to operationalize the OECD guidance for COM public procurement for operators. This certificate could be useful for you as well when ready. We will ask a consultant to set up such scheme.</p> <p>2. We fully support the second element (ii) to promote sourcing from conflict-affected and high-risk areas. Alignment on the definition of conflict-affected and high-risk areas with the draft EU Regulation is indeed important and we intend to offer operators a handbook to help identifying such areas. We support the idea of operators self-reporting on such projects. Would you however be able to prescribe a certain proportion of total sourcing to originate from conflict-affected and high risk areas?</p> <p>An industry stakeholder claimed proposes that point (i) remains mandatory and that point (ii) becomes optional.</p>	<p>Partially accepted</p> <p>Changes have been introduced in this criterion in order to fully align to final criteria version for computers product group, especially assessment and verification section has been further clarified.</p>
<p>Labour conditions</p>	<p>With regards to ILO criteria! Denmark is in favour of such criteria, however, with respect to green public procurement, it would be interesting if the Commission could provide guidance on how a CSR criterion will be judge in ecolabel criteria and green public procurement. If CSR criteria are not allowed, it could be relevant to wait for this product group to have a higher uptake.</p>	<p>Accepted</p> <p>Minor changes have been introduced in this criterion in order to fully align to final criteria version for computers product group.</p>
<p>Labour conditions</p>	<p>An industry stakeholder claimed that their company is committed to conducting its operations in a socially and environmentally responsible manner and to sourcing from suppliers that share its values. Accordingly, in order to enable positive change in its supply chain, the stakeholder works closely with its suppliers and subcontractors to address human rights, labour, health and safety, and environmental protection issues related to the procurement of raw materials and components. In 2005 Sony established the Sony Supplier Code of Conduct, based on industry best practices as highlighted in the EICC Code of Conduct. Please refer to: www.sony.net/SonyInfo/csr_report/sourcing/supplychain/supplier.pdf.</p>	

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