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# Development of European Ecolabel Criteria for Televisions

TECHNICAL REPORT

**Criteria Proposals - Revision**

(Draft) Working Document

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WORKING DOCUMENT

## 1. INTRODUCTION

This document is intended to provide the background information for the revision of the Ecolabel criteria for Televisions. The study has been carried out by the Joint Research Centre's Institute for Prospective Technological Studies (JRC-IPTS) with technical support from the Oeko-Institut. The work is being developed for the European Commission's Directorate General for the Environment.

The main purpose of this document is to evaluate the current criteria and discuss if the criteria are still relevant or should be revised, restructured or removed. This document is complemented and supported by the preliminary report, which consists of a series of task reports<sup>1</sup> addressing:

- Scope and definitions (Task 1 report),
- Market analysis (Task 2 report),
- Technical analysis (Task 3 report),
- Improvement potential (Task 4 report), and
- First criteria proposals (Task 5 report).

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 specific information, views and suggestions arising from questions about the scope, improvement potential and criteria revision were reflected mainly in the Task 1 and Task 4 reports and taken into consideration as far as possible in the proposals for the criteria revision.

The first draft version of the technical report (Task 5) has built the basis for the first Ad-Hoc Working Group (AHWG) meeting taken place in October 2013. The current Task 6 report provides an update of the criteria development process based on new information (stakeholders' discussion at the AHWG meeting, further stakeholder inputs following the meeting, further desk research).

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<sup>1</sup> The previous Task 1-5 reports and further information can be downloaded at <http://susproc.jrc.ec.europa.eu/televisions/stakeholders.html>

For each of the criteria, boxes are provided with the current criteria (grey), the first proposal (yellow) and a second proposal (green) for revised criteria. After each box a discussion of the rationale for the proposed change (or not) to the criterion is made, based on the stakeholder feedback and further research. Proposals for *new* criteria have also been made together with the rationale behind each proposal.

This second version of the technical report will bring together the scientific arguments for the proposed new criteria document to provide input for another stakeholder discussion at the second AHWG meeting taking place in May 2014, before finally being voted upon by the EU Ecolabelling Board.

#### *The current scope of the EU Ecolabel criteria document for Televisions*

As stated in the previous technical reports Task 1 (scope) and Task 4 (improvement potential) of the revision process for the development of EU Ecolabel criteria for televisions, there is a functionality overlap between television sets and computer monitors placed on the EU market. Television sets are increasingly enabled for web browsing and computer monitors are being used to watch content normally only viewed on televisions. Thus, it is becoming more and more difficult to distinguish between the two product categories. In the current review process of the EU Ecodesign and Energy Labelling Regulations for televisions, the discussion paper proposed to change the scope from solely “televisions” to “electronic displays”, including television sets, television monitors, and external computer displays (EU Ecodesign Review TVs 2012). Considering the general desire for harmonised approaches and coherent product policy, the following criteria proposals include this approach using synergies where appropriate.

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) and. They consist of twelve (seven for televisions, respectively) criteria which are listed in Table 1.



**Table 1: Current EU ecolabel criteria for external computer displays and televisions according to Commission Decisions 2011/337/EU and 2009/300/EC**

<b>Current EU ecolabel criteria for <i>Displays</i></b>	<b>Current EU ecolabel criteria for <i>Televisions</i></b>
Criterion 1 – Energy savings (specific for displays)	Criterion 1 – Energy savings
Criterion 2 – Power management	---
<del>Criterion 3 – Internal power supplies</del>	---
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	---
<del>Criterion 8 – Noise</del>	---
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
<del>Criterion 13 – Lifetime extension</del>	Criterion 3 – Life-time extension
Criterion 14 – Packaging	---
Criterion 15 – Information appearing on the Ecolabel	Criterion 7 – Information appearing on the Ecolabel

Crossed out lines: EU ecolabel criteria for personal computers, explicitly not applied to displays

The revised Ecolabel criteria document is proposed to cover both product groups; thus common criteria for both televisions and external computer displays will be developed, differentiating between technical product characteristics where necessary.

*The key environmental impacts associated with the product group*

Based on the LCA review presented in the Task 3 report 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 used amount of chrome steel in the housing and the Printed Circuit Boards used.

One of the reasons is that critical raw materials are concentrated in these components, whose extraction and processing is associated with major material requirements, appropriation of land and consumption of energy, and causes 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 ecolabel criteria on the production of single components of televisions or computer displays is rather limited. However, by improving design (e.g. design for dismantling and recycling) or indirectly by extending the lifetime or by reusing parts, the impacts of the manufacturing phase can be reduced as secondary resources from recycling or extended lifetime can avoid primary production. Thus, the allocation of benefits from re-use and recycling is an area specifically highlighted in Task 4 (improvement potential) and the criteria development.

A number of issues are currently not addressed by the EU Ecolabel criteria although evidence exists for the potential environmental and / or social impacts (e.g. fluorinated greenhouse gases, use of conflict-free metals). Proposals to include them in the revised criteria are provided in this technical report.

#### *The proposed framework for the revision*

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

**Table 2: New proposed criteria cluster and allocation of sub-criteria for the revision of the Ecolabel criteria for televisions and displays**

<b>New proposed criteria cluster</b>	<b>Proposed allocation of sub-criteria</b>
<b>1 Energy consumption</b>	Criterion 1.1 – Energy savings
	Criterion 1.2 – Power management
<b>2 Environmentally hazardous substances</b>	Research and evidence presented in a separate document
<b>3 Life time extension</b>	Criterion 3.1 – Commercial guarantee
	Criterion 3.2 – Repairability
	Criterion 3.3 – Upgradeability
<b>4 End-of-life management: Design and material selection</b>	Criterion 4.1 – Material selection and material information
	Criterion 4.2 – Design for dismantling and recycling
	Criterion 4.3 – Packaging
<b>5 Corporate production / supply chain management</b>	Criterion 5.1 – Social labour conditions during manufacture
	Criterion 5.3 – Use of “conflict-free minerals” during production
<b>6 Further criteria</b>	Criterion 6.1 – Ergonomics
	Criterion 6.2 – Emission of fluorinated GHG during LCD production
<b>7 Information</b>	Criterion 7.1 – User instructions
	Criterion 7.2 – Information appearing on the Ecolabel

The following sections and criteria proposals are provided according to the proposed criteria cluster. Note: The final numeration of the single criteria might change in the course of discussions with stakeholders and the final decisions on the criteria.

## 2. PRODUCT GROUP DEFINITION

### **Present scope, Decisions 2009/300 and 2011/337**

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.'

The product group 'personal computers' shall comprise: desktop computers, integrated desktop computers, thin clients, displays and keyboards (as a stand-alone item) as defined in Article 2. Notebook computers, small-scale servers, workstations, gaming consoles and digital picture frames shall not be considered personal computers for the purpose of this Decision.

### Major proposed changes (first proposal)

#### **Proposed scope (first proposal)**

The product group 'electronic displays' shall comprise: television sets, television monitors, dual-function TV/monitors and external computer displays that can be connected to the mains power source either directly or via an external power supply.

Internal computer displays, tablet PCs, smart phones, gaming consoles, digital photo frames, projectors, signage products and displays intended for and only available to medical and professional markets and providing specified features required by those markets shall not be considered as 'electronic displays' for the purpose of this Decision.

- External computer displays are proposed to be removed from the revised scope of the EU ecolabel for computers to a revised scope of Ecolabel criteria for TVs, combining them under a new title "Electronic Displays", subsuming TV sets, TV monitors, dual-function TV/monitors and external computer displays.
- The new product scope is 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' from August 2012.
- Especially those products excluded from the scope of the discussed Ecodesign and Energy Labelling Regulations for electronic displays are also not included in the scope of the EU Ecolabel for electronic displays as this would otherwise require separate calculation, measurement and verification procedures.
- Deviating from the scope of the discussed Ecodesign and Energy Labelling Regulations for electronic displays, digital photo frames and signage products are proposed to be excluded from the EU Ecolabel for electronic displays.

For more details cf. Task 1 report ("Scope and Definitions").

### Stakeholder feedback on product scope and definition

According to written stakeholder feedback following the AHWG meeting, the proposed broadening of the scope to external computer displays is welcomed explicitly by one of the stakeholders.

### Further evidence and research

The draft Commission Regulation with regard to ecodesign requirements for electronic displays (not published yet) provides the following definitions:

- **‘Electronic display’** means an electronic product with a display screen and associated electronics, that is primarily intended for use in a household and/or in an office, that as its primary function displays visual information and that is connected to a mains power source for its intended continuous use, either directly or via an external power supply; Electronic displays include, but are not limited to, the following products:
  - (a) **‘Television’** means an electronic display that is manufactured with a television tuner, and that is capable of displaying dynamic visual information from wired or wireless sources including but not limited to:
    - (i) broadcast and similar services for terrestrial, cable, satellite, and/or broadband transmission of analogue and/or digital signals;
    - (ii) display-specific connections, such as VGA, DVI, HDMI, DisplayPort;
    - (iii) media storage devices such as a USB flash drive, a memory card, or a DVD/BRD; or
    - (iv) network connections, usually using Internet Protocol, typically carried over Ethernet or WiFi.
  - (b) **‘Computer monitor’** means an electronic display that displays a computer's user interface and open programs, allowing the end-user to interact with the computer, typically using a keyboard and mouse;
  - (c) **‘Digital photo frame’** means an electronic display, whose primary function is to display digital images. It may also feature a programmable timer, occupancy sensor, audio, video, or Bluetooth or wireless connectivity.

- For the following product groups, further definitions are provided, however, the Commission Regulation will not or only partly apply to them:
  - Public displays (also known as commercial signage displays), medical monitors and other medical devices, high performance displays, broadcast monitors, all-in-one video conference systems; security monitors; projectors; displays in notebook computers; displays in integrated desktop computers; mobile computing and communication devices; displays in game consoles; and status displays.

*Second proposal for the product scope of the EU Ecolabel*

It is proposed to align the scope of the EU Ecolabel further to the product groups and their proposed definitions of the draft EU Commission Regulation on ecodesign requirements for electronic displays.

**Proposed scope (second proposal)**

The product group 'electronic displays' shall comprise: televisions and external computer displays that is connected to a mains power source for its intended continuous use, either directly or via an external power supply.

Internal computer displays (i.e. displays in notebook computers; displays in integrated desktop computers; mobile computing and communication devices); displays in game consoles, digital photo frames, projectors, all-in-one video conference systems as well as public displays (also known as commercial signage displays), medical monitors, high performance displays, broadcast monitors, security monitors, and status displays shall not be considered as 'electronic displays' for the purpose of this Decision.

### 3. CURRENT ECOLABEL CRITERIA AND PROPOSED CHANGES

#### 3.1 Cluster 1 – Energy consumption

##### 3.1.1 Criterion 1.1 – Energy savings

Present criteria, Decisions 2009/300 and 2011/337
<p><b>Energy savings for televisions</b></p> <p>(a) <i>Passive Standby</i></p> <p>(i) The passive standby consumption of the television shall be <math>\leq 0.30</math> W except where the condition in part ii is fulfilled.</p> <p>(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 <math>&lt; 0.01</math> W, the passive standby consumption of the television shall be <math>\leq 0.50</math> W.</p> <p>(b) <i>Maximum energy consumption:</i> TVs shall have energy consumption in on-mode of <math>\leq 200</math> W.</p> <p>(c) <i>Energy Efficiency</i></p> <p>Until 31 December 2010, televisions placed on the market bearing the Ecolabel shall have an on-mode power consumption equal to or lower than <math>0,64 \cdot (20 \text{ W} + A \cdot 4,3224 \text{ W/dm}^2)</math>.</p> <p>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 <math>0,51 \cdot (20 \text{ W} + A \cdot 4.3224 \text{ W/dm}^2)</math>.</p> <p>From 1 January 2013, televisions placed on the market bearing the Ecolabel shall have an on-mode power consumption equal to or lower than <math>0,41 \cdot (20 \text{ W} + A \cdot 4,3224 \text{ W/dm}^2)</math>.</p> <p>Where A is the visible screen area <sup>(1)</sup> expressed in <math>\text{dm}^2</math>.</p> <p><b>Assessment and verification:</b> (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).</p> <p>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.</p> <p>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.</p> <p><sup>(1)</sup> <i>Screen Area:</i> This is the area of the screen in <math>\text{dm}^2</math>. It is equal to [screen size <math>\times</math> screen size <math>\times 0,480</math>] for a standard screen (4:3 aspect ratio) and [screen size <math>\times</math> screen size <math>\times 0,427</math>] for a wide screen (16:9 aspect ratio).</p>
<p><b>Energy savings for computer displays</b></p> <p>(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%;</p> <p>(ii) Computer display sleep mode power must not exceed 1 W;</p> <p>(iii) Computer displays shall have an energy consumption in on-mode of <math>\leq 100</math> W measured when set to maximum brightness;</p> <p>(iv) Computer monitor off mode power shall not exceed 0.5 W.</p> <p><b>Assessment and verification:</b> The applicant shall declare compliance of the product with these requirements to the competent body.</p>

### 3.1.1.1 Major proposed changes (first proposal)

#### Proposed revised criteria (first proposal)

##### Energy Efficiency

The electronic display's energy efficiency performance in active mode shall meet the following energy efficiency requirements set out in Regulation [1062/2010/EU]<sup>2</sup>:

(a) *Televisions*:

- (i) Energy efficiency class A for appliances with a visible screen diagonal of up to and including 70 cm (or 27.5 inches);
- (ii) Energy efficiency class A+ for appliances with a visible screen diagonal of 70 cm (or 27.5 inches) to 119 cm (or 47 inches);
- (iii) Energy efficiency class A++ for appliances with a visible screen diagonal of equal or more than 120 cm (or 47.5 inches).

(b) *External computer displays*: Energy efficiency class # (to be discussed)

##### Standby

- (i) The power consumption of the electronic display in any condition providing only a reactivation function, or providing only a reactivation function and a mere indication of enabled reactivation function, shall not exceed 0.5 W.
- (ii) The power consumption of an electronic display in any condition providing only information or status display, or providing only a combination of reactivation function and information or status display, shall not exceed 1 W.

##### Passive Standby

- (i) The power consumption of an electronic display in any off-mode condition shall not exceed 0.3 W, unless the condition in part ii is fulfilled
- (ii) For electronic displays with an easily visible switch, which puts the electronic display in a condition with power consumption not exceeding 0.01 W when operated to the off position, the power consumption of any other off-mode condition of the electronic display shall not exceed 0.50 W.

##### Networked Standby

- (i) If a networked electronic display has the ability to connect to a wireless network, it shall offer the possibility for the user to deactivate the wireless network connection(s). This requirement does not apply to products which rely on a single wireless network connection for intended use and have no wired network connection.
- (ii) A networked electronic display that has one or more standby modes shall comply with the requirements for these standby mode(s) when all network ports are disconnected or, for wireless network ports, the network ports are deactivated.
- (iii) Power consumption in a condition providing networked standby:
  - The power consumption of electronic display with HiNA functionality, in a condition providing networked standby into which the equipment is switched by the power management function, or a similar function, shall not exceed 8 W.
  - The power consumption of electronic display without HiNA functionality in a condition of networked standby into which the equipment is switched by the power management function, or a similar function, shall not exceed 3 W.

##### Maximum energy consumption

- (a) *Televisions*: Televisions shall have maximum power in active mode of  $\leq 64$  W.
- (b) *External computer displays*: tbd.

<sup>2</sup> Shall be adapted to the final revised Energy Labelling Regulation on electronic displays.



- The criteria for energy savings, both for TVs and external computer displays, are proposed to be aligned to the future EU Ecodesign and Energy Labelling Regulations for 'electronic displays' being currently under development.
- Energy efficiency
  - Televisions: depending on the final version of the revised EU Ecodesign and Energy Labelling Regulations for 'electronic displays', it is proposed to apply a progressive approach, developing less strict requirements for small and medium-sized TVs but stricter ones for large TVs<sup>3</sup>. The proposed benchmarks are derived from the selection criteria for TVs of topten.eu<sup>4</sup>.
  - External computer displays: So far, external computer displays are not covered by any EU energy labelling regulation but are proposed to be included in the new ecodesign and energy labelling requirements for 'electronic displays'. First proposals how to calculate the energy efficiency index (EEI) have been developed<sup>5</sup>, however being disagreed by stakeholders requiring different calculation formulae for televisions and computer displays due to different components, utility and energy efficiency (for details, cf. Task 4 report). Depending on the final version of the revised EU Ecodesign and Energy Labelling Regulations for 'electronic displays' currently being under development, and the resulting expected market distribution of energy efficiency classes for external computer displays, the EU ecolabel criteria should set an ambitious benchmark (e.g. class A or better if applicable) to address the 10-20 percent most energy efficient computer displays on the market.

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<sup>3</sup> The current EEI formula and Labelling classification scale allow large TVs to reach a good Energy Efficiency class despite consuming more energy than smaller TVs which can get a worse classification.

<sup>4</sup> Cf. [http://www.topten.eu/english/criteria/selection\\_criteria\\_television\\_sets.html&fromid=](http://www.topten.eu/english/criteria/selection_criteria_television_sets.html&fromid=)

<sup>5</sup> See 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 at 8 October 2012

- Standby / Passive standby: These criteria might become obsolete if they will be covered by the final revised EU Ecodesign Regulation for ‘electronic displays’ being currently under development<sup>6</sup>.
- Networked standby: These criteria are derived from the draft proposal of the new EU Ecodesign Regulation for ‘electronic displays’ being currently under development<sup>6</sup>. They refer to the Tier 2 requirements to be regulatory introduced as of 1 January 2017.
- Maximum energy consumption:
  - Televisions: The benchmark is taken from the selection criteria for televisions of topten.eu<sup>4</sup>, taking into account the rapid market innovations and energy efficiency gains of the past years (for comparison: the Blue Angel ecolabel for Televisions (2012) requires that the maximum power consumption in active mode shall not exceed 100 W).
  - External computer displays: Depending on the final version of the revised EU Ecodesign and Energy Labelling Regulations for ‘electronic displays’, additional maximum values for on mode power might be discussed. For example, the selection criteria for computer monitors of topten.eu<sup>7</sup> apply the following maximum on-mode power values:

Diagonal (inches)	Max. On mode power
$15 \leq d < 17$	13 W
$17 \leq d < 20$	18 W
$20 \leq d < 22$	20 W
$d \geq 22$ inches	22 W

For more details cf. Task 4 report “Improvement Potential”, section 4.2.1.1 “energy efficiency”.

<sup>6</sup> Currently included in the draft proposal of the new ecodesign and energy labelling requirements for diplays, see [www.ebpg.bam.de/de/ebpg\\_medien/tren5/005\\_workd\\_12-08\\_revision.pdf](http://www.ebpg.bam.de/de/ebpg_medien/tren5/005_workd_12-08_revision.pdf), Annex B.

<sup>7</sup> [http://www.topten.eu/english/criteria/selection\\_criteria\\_computer\\_monitors.html&fromid=](http://www.topten.eu/english/criteria/selection_criteria_computer_monitors.html&fromid=)

### Consultation questions

- Should the criterion on energy savings include a dynamic approach to better react on future market developments with regard to energy efficiency gains?
  - (i) Variant: No later than 2 years after the criteria for EU Ecolabel for televisions and external computer displays have entered into force, the Commission shall evaluate the market penetration of these devices meeting the criteria on energy efficiency and, if justified, present to the EUEB and Regulatory Committee an amendment of this criterion.
  - (ii) Variant: “The energy-efficiency performance of televisions and external computer displays shall meet and exceed the appropriate energy-efficiency requirements set out in the Energy Labelling Regulation for electronic displays as follows:
    - At the date of adoption of the Decision: energy efficiency class #
    - Two years from the date of adoption of the Decision: energy efficiency class # minus 20% (tbd)”
- Depending on the final version of the revised EU Ecodesign and Energy Labelling Regulations for ‘electronic displays’ currently being under development, for external computer displays
  - (i) The benchmark to energy efficiency class A, and
  - (ii) Additional maximum on mode power values might be discussed, see above.
- Assessment and verification procedure: It shall be discussed if the on-mode should be measured at a predefined peak luminance value (indicated as lumen, not percentage) which better reflects ‘real-life’ brightness settings<sup>8</sup>.

#### 3.1.1.2 Stakeholder feedback and further evidence

Written stakeholder feedback following the AHWG meeting, states that regarding the definition of the energy consumption criteria, it is supported in general to follow the approach for the revised Ecodesign Regulation in order to ensure a clear level playing field for the different types of devices under the different regulatory instruments.

#### Dynamic approach

- Feedback from one of the stakeholders indicates support for a progressive approach (setting higher efficiency criteria for larger devices combined with a maximum cap for the energy use) in order to set clearly market incentives connected with the overall environmental targets.

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<sup>8</sup> According to topten.eu, ‘power depends on setting; a TV test in 2012 showed that changing settings such as brightness or contrast can lead to a power increase by 30% compared to the test settings. TVs are measured and declared the way they are shipped, which in most cases combines the settings ensuring the lowest possible power in on-mode. Often the brightness is rather low in these factory settings, close to the minimum of 65% of the maximum brightness which is stipulated by the Ecodesign Regulation for Televisions. Still, for many viewers the factory settings will be considered suboptimal, and all changes will most probably lead to an increase in power.’ See [http://www.topten.eu/uploads/File/TV\\_market\\_2007–2012\\_Topten.pdf](http://www.topten.eu/uploads/File/TV_market_2007–2012_Topten.pdf)

- One of the stakeholders explicitly agrees on a dynamic approach, preferring option (i), meaning that no later than 2 years after the criteria for EU Ecolabel for televisions and external computer displays have entered into force, the Commission shall evaluate the market penetration of these devices meeting the criteria on energy efficiency and, if justified, to present to the EUEB and Regulatory Committee an amendment of this criterion.
- Another stakeholder proposes that the level of the EU Ecolabel should be 10-20% below any valid EcoDesign criteria from the beginning.
- In this respect, more than one of the stakeholders stressed the urgent need for up-to-date market data allowing aligning currently available data on TV sets (and efficiency of monitors) with the possible new proposal defining the energy efficiency. A thorough investigation should be done to take into account possible market evolutions. If this is not possible another solution should be provided, e.g. foreseeing a fast revision or flexible criteria that will follow the evolutions within the market.
- Emerging technologies:
  - Opening clauses for emerging technics (like OLED backlights) are not considered as appropriate according to written feedback of a stakeholder, due to the mostly unclear timelines for acceleration of the efficiency of these technologies
  - On the other hand, another stakeholder asks that the current proposal for energy efficiency criterion should include some consideration for upcoming technologies (like UHDTV and OLED) that are inherently less efficient for now. Considering the market trend and additional features provided by such technologies, they should be allowed to qualify for the Ecolabel, through the introduction of some specific factor to the calculation.

### Strictness of energy savings criteria

- One of the stakeholders indicates that at present EU Ecolabel televisions with only an energy label class B are on the market which should be avoided with the next set of criteria. The proposed criteria are seen as ambitious except for the stand-by energy use.
- Further information provided by a stakeholder gives an overview of some parameters of televisions that were available on the Belgian market in May 2013. These data, coming from the energy label of these products, are based on more than 570 models. These numbers indicate that the proposed standby requirements are not strict enough.

Belgian Data	
Number of models	573
Average Energy consumption (W) when on	83.7
Max Energy consumption (W) when on	570.0
Min Energy consumption (W) when on	16.0
<= 64 W	Largest display that could fulfill this requirement is 55 INCH. In total 287 models could fulfill the requirement
Stand-by consumption	0.33 (without 1 outlier that had a value of 23 W)
Standby use < = 0.5	525 models (91% models passed)
Top 20 Percentile energy consumption	42 W
Top 20 Percentile stand-by	0.15 W

- Also another stakeholder requires that standby limits should be lower than mandatory 0.5 W.
- One of the stakeholders understands the need to set Network Standby requirements that go beyond the mandatory Eco-design requirements. However the level of ambition is assessed to be too high, by halving the LoNA requirement to 3 Watt (from 6 Watt at ErP). Therefore it is requested that this requirement is set at a higher threshold.

### Power cap

- One of the stakeholders proposes to have a general Energy Cap for energy consumption – independent of screen size.
- On the other hand, another stakeholder informed that power is generally needed
  - for the basic functionalities like tuner, decoder,
  - for features like frame rate up-conversion, 3D, 4K,
  - for the luminance (cd/m<sup>2</sup>) of the display (W/m<sup>2</sup>);so that low power limits could limit features and a power cap could exclude bigger screen sizes.
- This requirement is seen as too ambitious by another stakeholder as well having a big impact on larger displays. The current power cap criterion will mean that no TV over 57" will be able to qualify for the Ecolabel, even if it has A++ Energy Class. These larger size displays should not be excluded from the Ecolabel by such a criterion as for example most of R&D investment goes into larger screen products, therefore if newer technologies are not able to meet Ecolabel criteria, this will impact the commitment to the Ecolabel scheme.

### Further energy savings criteria proposed by written stakeholder feedback

- Visible on-/off-switch
  - Regarding (Passive Standby/Off-mode) a visible on/off switch is considered still as an important element by one of the stakeholders.
  - On the other hand, another stakeholder provides additional information There are safety and mechanical stability concerns with power switched carrying mains voltages:
    - The power limit of 0.01 Watts when operated to the off position requires that such a switch must carry mains and must consequently meet the related safety requirements. A minimum pole separation must be allowed in order to avoid arcing/sparking. Physical dimensions of mains

switch design is not expected to reduce due to the safety requirements, while flat panel TV design is trending toward ever thinner designs.

- The mechanical stability of modern, light, flat panel designs could be compromised by the inclusion of a mechanically operated mains switch. TV sets must be designed in such a way that equipment shall not tip over when used (e.g. when operating such a switch).
- Further, the CENELEC TC206 TV harmonised standard working group have produced a “White Paper” for the Commission, meeting the latter’s requirement for a definition of “an easily Visible” TV off-switch. In the white paper, they qualify the practicality of such a switch in the context of current “thin” displays and show that the potential energy saving of such a switch is minimal. This is due to the remarkable downturn in the standby power requirement of the majority of TVs sold in Europe (The white paper shows that Off- switch energy saving, is very small compared with total on-mode energy even if the switch was used on 100% of the installed TVs in Europe. The energy saving is shown to be smaller than the measurement error of the on-mode power testing standard, used for the TV Regulation conformance declaration).
- Finally, one of the stakeholders recommends a criterion not allowing any “fast start” mode, as this feature can consume much more than the usual standby.

#### Further research / evidence

##### **Power demand in on-mode**

At the Consultation Forum meeting in October 2012, the EU Commission presented a first Discussion Paper on the review of the Ecodesign and Energy Labelling Regulation for Televisions and on the draft Regulation on electronic displays, including computer monitors. The Ecodesign proposal included equations for the calculation of the Energy Efficiency Index (EEI) of all electronic displays, distinguishing between smaller and larger displays and basing the EEI of larger displays on a logarithmic regression line so preventing to favour largest displays with high total energy demand.

**Table 3: Ecodesign: Proposed Calculation of Energy Efficiency Index for Displays (2012)**

$EEI = \frac{P_m}{(0.88*A+2.71)*2.10}$	for screen areas where $A \leq 16.5 \text{ dm}^2$
$EEI = \frac{P_m}{(60.645*\ln(A)-152.64)*2.10}$	for screen areas where $A > 16.5 \text{ dm}^2$

Where

- $P_m$  = power demand (W) in on-mode, measured according to the accepted test methodology of determining the average power required by the electronic display when displaying a standardised dynamic broadcast content moving picture test sequence
- $A$  = the visible area of the display screen ( $\text{dm}^2$ )

On the other hand, the existing calculation of EEI within the current Energy Label for televisions is different, not distinguishing between display sizes and based on a linear regression line, i.e. indirectly favouring larger displays.

**Table 4: Current Energy Label: Calculation of Energy Efficiency Index for Televisions (2009)**

$EEI = \frac{P_m}{(4.3224*A+20)}$	for all screen areas
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**Table 5: Current Energy Label: Energy Efficiency Classes for Displays (2009)**

A+++	$EEI < 0.10$
A++	$0.10 \leq EEI < 0.16$
A+	$0.16 \leq EEI < 0.23$
A	$0.23 \leq EEI < 0.30$
B	$0.30 \leq EEI < 0.42$
C	$0.42 \leq EEI < 0.60$
D	$0.60 \leq EEI < 0.80$
E	$0.80 \leq EEI < 0.90$
F	$0.90 \leq EEI < 1.00$

Based on feedback from stakeholders, the Commission revised the proposals for calculation of EEI for Ecodesign and Energy Label and the related Energy Efficiency Classes.



For the **Energy Label**, the discussion paper on the review of the Ecodesign and Energy Labelling Regulation for TVs proposed to apply the different calculations according to display size also to the setting of labelling classes.

However, in order to avoid a full re-classification of displays on the market, for the Energy Label only the EEI values associated with the energy classes from A+ upwards have been adapted and not the underlying equations used to calculate the EEI, see Table 6<sup>9</sup>. This also means that the Energy Labelling classes will still be based on a linear regression line in the future.

**Table 6: Proposed Energy Label: Energy Efficiency Classes for Displays (2014)**

A+++	EEI < 0.05
A++	0.05 ≤ EEI < 0.13
A+	0.13 ≤ EEI < 0.23
A	0.23 ≤ EEI < 0.30
B	0.30 ≤ EEI < 0.42
C	0.42 ≤ EEI < 0.60
D	0.60 ≤ EEI

For **Ecodesign requirements**, the calculations of EEI have been changed compared to the first proposal as follows<sup>10</sup>:

**Table 7: Ecodesign: Proposed Calculation of Energy Efficiency Index for Displays (2014)**

$EEI = \frac{Pm}{(1.10 \cdot A + 9.11) \cdot 2.10}$	for screen areas where $A \leq 15.9 \text{ dm}^2$
$EEI = \frac{Pm}{(42.66 \cdot \ln(A) - 90.68) \cdot 2.10}$	for screen areas where $A > 15.9 \text{ dm}^2$

The screen area has been lowered slightly to distinguish from smaller and larger display sizes. However, the effect seems negligible<sup>11</sup>. The change in the equations shall reflect stakeholders' feedback to the first proposal that the requirements for

<sup>9</sup> Draft Version of Commission Regulation with regard to Energy labelling of electronic displays; not published yet

<sup>10</sup> Source: Draft Version of Commission Regulation with regard to Ecodesign requirements for electronic displays; not published yet

<sup>11</sup> For comparison: screen diagonal 24 inch = 15.88 dm<sup>2</sup> screen area; 25" = 17.23 dm<sup>2</sup>

displays with smaller screens should be relaxed due to their low total energy consumption. The logarithmic regression line (compared to the linear lines in the existing Ecodesign and Energy labelling Regulations on TVs) prevents to favour large displays.

Against this background, the study team proposes to align the EU Ecolabel criteria to the Ecodesign requirements, reflecting less strict requirements for small and medium-sized electronic displays but stricter ones for larger displays. If the EU Ecolabel would be aligned to certain Energy efficiency classes of the Energy Label (e.g. A+ or better), this so called “progressive approach” would not implemented as they are still derived on a linear approach.

The draft version of Commission Regulation with regard to Ecodesign requirements for electronic displays (not published yet) proposes the following tiers for on-mode power demand:

**Table 8: Proposed Ecodesign Requirements and timetable for On-mode power demand (2014)**

Tier	Timetable (after publication of the Regulation)	EEI
I	12 months	≤ 0.60
II	36 months	≤ 0.40
III	60 months	≤ 0.20

Note: The EEI of Ecodesign requirements is not directly comparable and adoptable to the EEI values of the Energy Efficiency Label due to different underlying equations.

The accompanying Explanatory Memorandum to the Commission Regulation with regard to Ecodesign requirements for electronic displays (not yet published) reflects these EEI values against a market dataset of 882 models of televisions (794 models) and computer monitors (88 models) made available to consumers in 2012/2013, representing both small and large screen displays.

The following Table 9 provides an overview about the pass/compliance rate of 775 LED models with the Tier 1 to Tier 3 on-mode power demand requirements laid down in the proposed measure.

**Table 9: Percentages of compliant small, large and all screens with regard to the proposed Ecodesign Requirements for On-mode power demand (2014, not yet published)**

%	Tier 1	Tier 2	Tier 3
<b>Max EEI</b>	<b>≤ 0.60</b>	<b>≤ 0.40</b>	<b>≤ 0.20</b>
Small	71.12%	18.41%	0%
Large	81.53%	44.98%	0%
<b>Total</b>	<b>77.81%</b>	<b>35.48%</b>	<b>0%</b>

As the EU Ecolabel claims to cover the 20% best appliances being on the market, the study team proposes to

- a) align the Ecolabel requirements at least to the EEI values of Ecodesign Tier 2 as the compliance rate of Tier 1 is already quite too high and would become mandatory within the validity period of the EU Ecolabel;
- b) to differentiate Ecolabel requirements between small and large displays as the compliance rate of larger displays seems to be higher;
- c) to include a dynamic approach for taking into consideration future innovations within the four years period of the EU Ecolabel (above data are based on 2012/2013 market data).

**Power demand in standby mode and off mode:** Stakeholder feedback indicated that the firstly proposed requirements for power demand in standby mode were not strict enough for the EU Ecolabel. The proposed values correspond to half of the limit values as applied in the current EU Ecodesign Regulation and would be equivalent to the values of the upcoming proposed revision of the Ecodesign Regulation becoming mandatory 12 months after the publication of the Regulation.

Stakeholder feedback as well as own market research at [www.topten.eu](http://www.topten.eu) show that the power demand of energy efficient computer or television displays in sleep mode or standby mode varies between 0.1 and 0.5 Watts, thus reducing the limit value could be possible in general.

However, the following Table 10 provides an indication about the overall relevance of setting stricter requirements for power demand in standby mode.

**Table 10: 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 result in a range between 0.1 and 7.3 kWh per year. Further reducing the Ecolabel requirements from 0.5 W to 0.3 W, for example, would result in total energy savings of around 0.2 to 1.5 kWh per year and device which seems to be negligible.

Against this background, the study team proposes not to set own EU Ecolabel criteria on power demand in standby mode and off mode at all as the upcoming Ecodesign requirements becoming mandatory 12 months after publication of the Regulation will already halving the permitted power demand (further, for power demand in off mode, the current Ecodesign requirement of 1.0 Watt will be reduced to 0.3 Watt).

### 3.1.1.3 Second proposal for energy savings criteria

Proposed revised criteria (second proposal)
<p><b>Energy savings</b></p> <p><b>Power demand in on-mode</b></p> <p>The on-mode power demand of an electronic display shall not exceed the following Energy Efficiency Index (EEI) determinations in accordance to the equations as set out in Annex II of the <i>Commission Regulation (EU) No. ## of ## implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for electronic displays</i><sup>12</sup>:</p> <p>(a) For electronic displays with a visible area of the screen <math>\leq 15.9 \text{ dm}^2</math>:</p> <p>(i) At the date of adoption of the Decision: <math>\text{EEI} \leq 0.40</math></p> <p>(ii) Two years from the date of adoption of the Decision: <math>\text{EEI} \leq 0.30</math></p> <p>(b) For electronic displays with a visible area of the screen <math>&gt; 15.9 \text{ dm}^2</math>:</p> <p>(i) At the date of adoption of the Decision: <math>\text{EEI} \leq 0.30</math></p> <p>(ii) Two years from the date of adoption of the Decision: <math>\text{EEI} \leq 0.20</math></p> <p><b>Power demand in a condition providing networked standby</b></p>

<sup>12</sup> Not yet published.

- (a) The power demand of electronic display with HiNA functionality, in a condition providing networked standby shall not exceed 8 W.
- (b) The power demand of electronic displays without HiNA functionality in a condition providing networked standby shall not exceed 4 W.

Assessment and verification

The electronic display must be tested according to the measurement methods indicated in Annex III of the *Commission Regulation (EU) No. ## of ## implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for electronic displays*. The test report shall be submitted to the Competent Body with the application.

Major proposed changes

- The requirements on power demand in on-mode have been aligned to the EEL equations of the proposed revised Ecodesign regulation.
- The firstly proposed EU Ecolabel requirements on power demand in standby mode and off mode have been deleted as becoming legally binding 12 months after publication of the revised Ecodesign regulation on electronic displays; the impact of further reducing the requirements seems to be negligible.
- Networked standby:
  - The requirement on offering the possibility for the user to deactivate the wireless network connection(s) has been deleted as these will become legally binding 12 months after publication of proposed revised Ecodesign Regulation on Electronic Displays.
  - The requirements for power demand in a condition providing networked standby have been slightly relaxed for displays without HiNA functionality due to stakeholder feedback (2/3 instead of 1/2 of the 6 Watts becoming legally binding 12 months after publication of proposed revised Ecodesign Regulation on Electronic Displays).
- Power cap: The initial requirement for an absolute power cap has been deleted as due to the logarithmic regression line for the calculation of the EEL of larger displays the energy efficiency requirements are felt to be strict enough also for quite large displays (cf. Table 13).

Justification for requirements on power demand in on-mode:

The following tables provide an overview of the calculated EEI values of current computer and television display models listed at [www.topten.eu](http://www.topten.eu)<sup>14</sup>.

Topten already lists best products currently being available on the market. The following indicative calculations shall assess if there are any products at all which would fulfil the proposed requirements of Ecodesign Tier 2 and beyond today. If more than one model of a certain screen size was listed at topten.eu, the calculations were only made for the products with each the least and the highest power demand in on-mode to show the possible range.

The overview shows that the proposed requirement of  $EEI \leq 0.4$  for smaller displays, as well as  $EEI \leq 0.3$  for larger displays would be applicable.

**Table 11: Overview of EEI values of computer displays**

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Screen diagonal [inch]	15	17	19	19	22	22	23	23	24	24	27
Screen area A [dm <sup>2</sup> ]	6,2	7,97	9,95	9,95	13,34	13,34	14,58	14,58	15,88	15,88	20,1
Power demand on-mode P <sub>m</sub> [W]	13	16	13	18	12	22	14	22	15	21	20
EEI (Ecodesign)	0,39	0,43	0,31	0,43	0,24	0,44	0,27	0,42	0,27	0,38	0,26
EEI (Energy Label)	0,28	0,29	0,21	0,29	0,15	0,28	0,17	0,26	0,17	0,24	0,19
Energy Label classification	A	A	A	A	A+	A	A+	A	A+	A	A+

**Table 12: Overview of EEI values of television displays  $\leq 15.9$  dm<sup>2</sup> (EEI limit  $\leq 0.4$ )**

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Screen diagonal [inch]	19	20	22	22	24	24	24	24
Screen area A [dm <sup>2</sup> ]	9,95	11,03	13,34	13,34	15,88	15,88	15,88	15,88
Power demand on-mode P <sub>m</sub> [W]	17	18	20	22	19	21	23	25
EEI (Ecodesign)	0,40	0,40	0,40	0,44	0,34	0,38	0,41	0,45
EEI (Energy Label)	0,27	0,27	0,26	0,28	0,21	0,24	0,26	0,28
Energy Label classification	A	A	A	A	A+	A	A	A

<sup>13</sup> Topten is a consumer-oriented online search tool, which presents the best appliances in various product categories. Because only the best-performing products are listed, the selection is much narrower than typical labelling systems, making it easier for consumers to choose from among the thousands of products available. The selection is based on existing regulations and international energy measurement standards.

<sup>14</sup> Topten is a consumer-oriented online search tool, which presents the best appliances in various product categories. Because only the best-performing products are listed, the selection is much narrower than typical labelling systems, making it easier for consumers to choose from among the thousands of products available. The selection is based on existing regulations and international energy measurement standards.

**Table 13: Overview of EEI values of television displays > 15.9 dm<sup>2</sup> (EEI limit ≤ 0.3)**

	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
Screen diagonal [inch]	26	26	28	32	32	39	39	40
Screen area A [dm <sup>2</sup> ]	18,4	18,64	21,61	28,23	28,23	41,93	41,93	44,11
Power demand on-mode P <sub>m</sub> [W]	28	30	25	30	34	34	48	40
EEI (Ecodesign)	0,40	0,42	0,29	0,28	0,31	0,24	0,33	0,27
EEI (Energy Label)	0,28	0,30	0,22	0,21	0,24	0,17	0,24	0,19
Energy Label classification	A	A	A+	A+	A	A+	A	A+

	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24
Screen diagonal [inch]	40	42	42	46	46	50	55	55
Screen area A [dm <sup>2</sup> ]	44,11	48,63	48,63	58,34	58,34	68,93	83,4	83,4
Power demand on-mode P <sub>m</sub> [W]	51	43	56	44	64	53	52	64
EEI (Ecodesign)	0,34	0,27	0,36	0,25	0,37	0,28	0,25	0,31
EEI (Energy Label)	0,24	0,19	0,24	0,16	0,24	0,17	0,14	0,17
Energy Label classification	A	A+	A	A+	A	A+	A+	A+

### 3.1.2 Criterion 1.2 – Power management

#### Present criteria, only 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.

#### 3.1.2.1 Major proposed changes (first proposal)

##### Proposed revised criteria (first proposal)

###### Power management

- (a) *Manual Brightness Control:* The electronic display shall allow the user to manually control the backlight intensity.
- (b) *Automatic Brightness Control:* The electronic display shall have a light sensor that automatically adjusts the picture brightness to the ambient light conditions (Automatic Brightness Control, ABC). The ABC shall be enabled by default. In active mode at an ambient light level of 0 Lux the power consumption shall be at least 20 percent lower than in active mode at an ambient light level of 300 Lux. With ABC enabled, the minimum brightness should preferably be manually adjustable.
- (c) For external computer displays: The display shall be shipped with a default setting that automatically puts the device into a low-power mode (sleep or off mode) after an extended period of user inactivity (10 minutes at the most).

Assessment and verification:

The applicant shall provide the competent body with a declaration to certify that the appliance has been shipped in the power management settings stated above or better.

The applicant shall submit a measurement protocol on the power consumption measured according to IEC 62087 at ambient light levels of 0 Lux and 300 Lux as well as their ratio to each other.

- It is proposed to include power management requirements into the revised EU Ecolabel criteria for electronic displays. The proposals are aligned to the current ecolabel criteria of Blue Angel RAL-UZ 145 for Television Sets from July 2012.

For more details cf. Task 4 report “Improvement Potential”, section 4.2.1.2 “power management”.

#### 3.1.2.2 Stakeholder feedback and further evidence

According to written stakeholder feedback following the first AHWG meeting, the proposals for power management are explicitly supported by one of the stakeholders.

Another stakeholder welcomes making ABC mandatory in the criteria, but the need for manual adjustment of minimum brightness should be clarified.



Regarding power management for computer displays, the need is seen but this should be driven by the computer whenever connected. Therefore it should not be a requirement for the product during connection but should only apply whenever the display is disconnected from the computer. It would be preferred if this requirement is aligned with Energy Star criteria, which define power down in 15 minutes.

One of the stakeholders informs that regardless of current legislation, "0 lux" (not even one photon?) is an impractical level to quote as it cannot be reasonably verified. The IEC 62087 revision is quoting " $\leq 1$  lux" for on-mode power measurements and " $\leq 5$  lux" for peak luminance measurements. Further, it is asked that "EN" should be referenced for a European label.

#### Further research and evidence

According to the proposed draft Ecodesign Regulation for electronic displays,

- For an electronic display without forced menu, the peak luminance of on-mode condition of the display as delivered by the manufacturer (home mode/standard mode) shall not be less than 65% of the peak luminance of the brightest on mode condition provided by the electronic display using the picture settings for the brightest on-mode condition declared by the manufacturer.
- For an electronic display with forced menu, the peak luminance of the home mode/standard mode condition shall not be less than 65% of the peak luminance of the brightest on mode condition, in a manufacturer pre-set mode, provided by the electronic display

Such settings are however recommended by the manufacturer and hence leave room for variations. For instance, a display where the manufacturer declares a lower maximum brightness would lead to a darker picture in the home-mode as well, i.e. lower power demand in on mode. However, if a consumer manually adjusts the settings to get a better picture, energy consumption increases due to increasing brightness, which would actually correspond to a higher power demand in on mode. Therefore, a measurement system based on maximum settings defined and declared by the manufacturer might lead to a systematic variation of measurements of On-Mode power consumption, and might lead to displays being classified under better

energy efficiency classes than they would be under real use conditions (see notably tests carried out by Stiftung Warentest (2011)<sup>15</sup>. For this reason, it is recommended conducting On-Mode measurements under a fixed luminance level. An important task would be to analyse the usability of measurement standard IEC 62087 Ed.3 2011 for measuring the On-mode power consumption of televisions considering the measurement at a fixed, predefined luminance level, and not under manufacture-defined settings. This issue is less problematic for computer monitors.

### 3.1.2.3 *Second proposal for power management criteria*

#### **Proposed revised criteria (second proposal)**

##### **Power management**

- (a) *Manual Brightness Control*: The electronic display shall allow the user to manually adjust the backlight intensity.
- (b) *Automatic Brightness Control*: The electronic display shall have a light sensor that automatically adjusts the picture brightness to the ambient light conditions (Automatic Brightness Control, ABC). The ABC shall be enabled by default.  
In on mode at an ambient light level of  $\leq 1$  Lux the power consumption shall be at least 20 percent lower than in on mode at an ambient light level of 300 Lux.  
With ABC enabled, the minimum brightness should preferably be manually adjustable.

##### Assessment and verification:

The applicant shall provide the competent body with a declaration to certify that the appliance has been shipped in the power management settings stated above.

The applicant shall submit a test protocol on the on mode power consumption measured according to EN 62087 at ambient light levels of  $\leq 1$  Lux and 300 Lux as well as their ratio to each other.

##### Major proposed changes

- The requirement on power management for external computer displays (putting the computer display into a low-power mode after 10 minutes of inactivity) has been deleted as this will become mandatory 12 months after publication of proposed revised Ecodesign Regulation on Electronic Displays.
- The term 'active mode' has been adapted to the definition 'on mode' as used in the proposed revised Ecodesign Regulation on Electronic Displays
- The reference for the measurement method has been changed from IEC norm to the according EN norm. The lower ambient light level has been adapted.

<sup>15</sup> In this test, only 3 of 20 televisions provided good picture quality in the pre-set mode.

## 3.2 Cluster 2 – Environmentally hazardous substances

### 3.2.1 Stakeholder feedback and further evidence

The main points arising from the 1st AHWG meetings for Computers and Televisions were as follows:

- Stakeholders understood that the criteria has to be ambitious, but the level of ambition has to stay within the limits of possibility. Even the present, less ambitious Television criteria, are difficult to realise.
- A critical point was the transparency of the supply chain. A computer or a TV is a complex article. Manufacturers are not used to verifying based on hazards but on specific substances.
- Care needs to be taken in looking to other Ecolabels' criteria as they have copied each other 'bad' criteria which are not necessarily implementable or scientific. Verification was also highlighted as an important area to strengthen. Third party verification of the hazardous substance criteria for the US EPA DFE programme and for Green Screen assessments were cited as good models.
- An approach focused on a prioritisation of the main components and functions related to the product was generally supported. Flame retardants and plasticisers, for example, should not be treated in a group but should be studied separately. Safety standards which include the use of FR, such as those for TV housings, have to be considered. Clear guidance would be needed for Competent Bodies on which components they would need to verify.
- Concern was expressed that the Ecolabel Regulation's Article 6(6) and 6(7) has a very broad scope and the scope for flexibility was questioned. For example, there could be over 700 pigments used to colour plastic. DG ENV highlighted the need to consult during the revision process on what is legally possible. Early feedback from Member States indicates a willingness to adopt a more flexible approach for electrical products.
- Substitution is expensive. Leading manufacturers therefore seek to anticipate future regulatory restrictions so as to minimise costs. However, substitutes should have a better hazard profile than those they substitute. The US Design

for the Environment (DFE) programme, for example, has evaluated 32 flame retardants, including halogenated and non-halogenated. Other studies and evaluations could also be referred to.

- Stakeholders highlighted the need to cover not only a black list of restricted substances but also a white list of substances which are substituting black substances, which could be a living dynamic list.

The main points arising from written stakeholder feedback received between September and November 2013 were as follows:

- There was concern that fundamentally the approach would not work because manufacturers have not implemented hazard-based restrictions. Concern was raised that Ecolabels have led manufacturers to make 'regrettable substitutions' for which there are major data gaps in their hazard profile.
- From 2011 onwards a major TV manufacturer could not apply for the Ecolabel because it was not possible to use main the flame retardant used in the plastic housings based on hazard restrictions.
- The industry manages well the absence of regulated substances and those of concern but has limited information on all substances in parts e.g. plastics additives and colorants. The scope of the criteria therefore needs to be limited in order to make progress.
- Restricting the use of SVHC in Ecolabel products makes sense. The SVHC restriction should be applicable to component level rather than homogeneous material level. To make the SVHC criteria workable, it is necessary to limit the scope of the 'homogenous' part to a manageable range (e.g. plastic parts over 25 grams, metal parts, etc.). A clear distinction is required between substances in mixtures, and substances in articles/complex articles.
- More information is needed on the inventory of hazardous substances included in TVs/computers. This information is the basis for any debate about substitution possibilities and barriers and respective needs for derogations.

Sources such as ENFIRO, Green Screen, SubSport and the US DfE project were highlighted as being important references.

- Green Screen in particular was highlighted as a means of evaluating, benchmarking and comparing the hazard profile of potential substitutes. Verification should be strengthened, moving away from self-declarations by OEM's to third party verified hazard evaluations and test reports for defined hazard end-points.
- There is the need to avoid the use of substances that will cause health and environmental impacts during the End of Life phase of these products e.g. in third world countries where the goods may be processed in dangerous conditions, harming the health of local people and damaging the environment. An EEA report on the issue was highlighted.

One formal derogation has been received to date - nickel in stainless steel, submitted by Eurofer - together with supporting technical information relating to the use of Antimony, Beryllium and non-halogenated flame retardants. A compilation of information and assessments relating to the Green Screen assessment tool was also provided.

#### Further research and evidence:

In order to analyse and gather further evidence related to hazards that may be present within the product, as well as substitutions and restrictions made by the industry, a sub-group was established as mandated at the first AHWG and two matrices were established as a means of compiling and structuring the information that will underpin the criteria proposal.

#### **Establishment of the sub-group**

An invitation to take part in the sub-group was sent out to registered stakeholders and EUEB members in November. The aim of the hazardous sub-group was defined as being to:

- Steer the overall approach to be taken with regards to the Ecolabel Regulation and the substitution potential of the best performing products on the market;
- Assist in developing a better understanding of the substitution potential for the product group;
- Review substitution information and derogation requests;
- Advise on how verification could work.

Based on the responses to the invitation the sub-group was structured to ensure a balanced representation from product manufacturers, industry specialists, EU member states and NGO's. The sub-group members are listed in Table 14. A first telephone meeting of the sub-group took place on the 26th February 2014 with full attendance and a further meeting is anticipated following the second AHWG. *For transparency the minutes have been made available to stakeholders.*

**Table 14: Computers and Display hazardous substance sub-group members**

Markus Stutz	Dell
Hans Wendschlag	Hewlett Packard
Claudia Albuquerque	LG
Steven Clayton	Samsung
Lein Tange	ICL-IP
Claus Ruediger	Bayer
Dr. Johanna Wurbs	UBA (Germany)
Søren Mørch Andersen	Danish EPA
Dirk Jepsen	Oekopol
Lauren Heine	Clean Production Action (USA)

*Participation as observers:*

Blanca Morales	EEB/BEUC
Bernd Kappenberg	CEFIC
Susanne Stark	VKI (Austria)

## Screening and evaluation of the comments and evidence base

In order to screen and evaluate the existing evidence compiled in the September 2013 background document on hazardous substances and new evidence submitted by stakeholders subsequent to this two matrices have been setup:

1. Candidate List and RoHS screening matrix: The IEC 62474 Declarable substance list for electrotechnical products<sup>16</sup> 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 list is frequently updated by a dedicated team and is therefore understood to be accurate as well as assisting in screening the list. Substances of potential relevance were flagged and colour coded before being circulated to sub-group members to obtain further feedback on their use/non-use in products. The codings were as follows:
  - i. Substances that are already understood to have been eliminated from production;
  - ii. RoHS exemptions that may be relevant to the product group but their current/post-sunset date relevance is to be confirmed;
  - iii. Substances on which little is known about their potential relevance to the product group
  - iv. Substances not deemed relevant to the product group based on the available information.
2. Bill of materials and hazardous substance screening matrix: The evidence gathered to date was structured, firstly, according to substance groups, which can generally be seen to related to functions associated with components of the product, and secondly according to the components/sub-components where hazardous substances are/may be found. A summary of the evidence

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<sup>16</sup> International Electrotechnical Commission, *IEC 62474 - Material Declaration for Products of and for the Electrotechnical Industry*, <http://std.iec.ch/iec62474>

used to compile the matrix can be found in Table 15. This evidence is supplemented by feedback from product group stakeholders and sub-group members, including OEM's. An overview of how the matrix is structured and how it works is summarised in Table 15.

**Table 15: Main evidence base used to compile the screening matrix**

Screening	Evidence base
RoHS (recast) Directive	<ul style="list-style-type: none"> <li>• Relevance of exemptions identified from OEM restriction lists</li> </ul>
RoHS ATP	<ul style="list-style-type: none"> <li>• Oeko-Institut and Austrian EPA reports with recommendations on extended RoHS scope</li> </ul>
ECHA Candidate List	<ul style="list-style-type: none"> <li>• Substances of relevance to the product group using IEC 62474 Declaration List (see colour coded version appended)</li> <li>• ECHA and Member State risk assessments and dossiers (e.g. German BFR - PAHs)</li> </ul>
Substitution analysis	<ul style="list-style-type: none"> <li>• EU ENFIRO study of environment-compatible flame retardants</li> <li>• US EPA Printed Circuit Board and decaBDE evaluations</li> <li>• Green Screen assessments for TV enclosures and plasticisers</li> <li>• COWI and the Danish Technological Institute compilation for plastics</li> </ul>
Industry substitutions and restrictions	<ul style="list-style-type: none"> <li>• OEM chemical restriction lists (with a focus on SG members HP, Samsung, Dell, LG)</li> <li>• International Electronics Manufacturing Initiative (iNEMI)</li> <li>• EFRA and PINFA guides to flame retardant applications in electronic equipment</li> <li>• SubSport Case Story substitution database</li> <li>• OEM product and component specifications</li> </ul>

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 first criteria proposal:

- **Current hazard benchmarks:** *Substances that are currently used or were used until recently in mainstream products.* For each substance the CAS number and, as far as possible, their hazard profile have been identified for comparative purposes.
- **Proposed substitution benchmarks:** *Substitutes for hazardous substances currently used in mainstream products that have been implemented, or are proposed for implementation, by leading manufacturers.* For each substance the CAS number and, as far as possible, hazard profile have been identified for comparative purposes.



- 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. Where a restriction is proposed:
  - The specific substances, how they relate to the product and, where appropriate, a concentration limit are identified.
  - The potential to specify analytical testing of component parts to strengthen verification is flagged for follow-up and, if agreed to be appropriate in terms of the available test methods and burden for applicants, specification.
  - For some special cases possible derogation conditions are briefly flagged.

These outputs from the screening can be found in '*Functional need and substances currently used*' and '*best practices identified*' columns in the main screening matrix.

**Table 16: Indicative schema for the hazardous substance screening matrix**

Component or sub-component	Functional need and substances currently used	Best practice identified	Summary evaluation of evidence to support substitution or restrictions	Questions and information gaps
<b>Substance group x</b>				
Generally supply chain tier 2 or 3 components	Description of the function and its need as well as identification of the substances typically used.  Substances are also identified which may be used as the <u>hazard profile benchmarks for current practices</u> against which the improvement potential of substitutes may be compared.	<u>Substitutions made by industry and/or mandatory and voluntary restrictions</u> that have been implemented in leading products available on the market.  Substances are also identified which may be used as the <u>substitution hazard profile benchmarks</u> to set 'white list' derogations, as well as possible <u>restrictions on specific hazardous substances</u> .	Discussion of background evidence relating to different options for achieving the same function. Comparative evidence relating to substances and substance groups is summarised, in some cases with reference to US EPA and Green Screen assessments..  This evidence may be used to support criteria proposals to derogate the use of substances ( <i>the hazard white list</i> ) and/or restrict the use of substances ( <i>the hazard black list</i> ).	For follow-up with stakeholders in order to address information gaps

## **Grouping of the EU Ecolabel hazard list**

At the March meeting of the EU Ecolabel Board a final version of the Chemicals Horizontal Task Force approach to implementation of the hazardous substance criteria was tabled<sup>17</sup>. The approach was informally mandated for use in product groups.

Importantly the approach included a grouping of the hazard list which forms a reference for the criteria. This grouping is intended to better reflect the different levels of hazard as defined in the CLP classification rules. The Groups have also been designed to facilitate a better read across from the results of US EPA and Green Screen hazard assessments, which form part of the evidence base in the screening matrix.

The Groups are accompanied by a set of rules for the derogation of hazards, with Group 1 being the strictest and Group 3 being the most flexible. These rules can be found in the Horizontal Task Force approach paper. In all cases the emphasis is on the need to demonstrate the functional need for the use of a substance and the availability of substitutes.

*For reference the three groups are listed below:*

### Group 1: Hazards subject to complete restriction

Substances present in mixtures, in an article or in any homogeneous part of a complex article that meet the criteria of Article 57 of Regulation (EC) No 1907/2006 or that are identified according to the procedure described in Article 59(1) of that Regulation. This shall include the hazards listed below, as well as endocrine disruptors, neurotoxins and sensitisers of equivalent concern.

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<sup>17</sup> JRC-IPTS, *Findings of the EU Ecolabel Chemicals Horizontal Task Force – Proposed approach to hazardous substance criteria development*, 24<sup>th</sup> February 2014

<b>Carcinogenic, mutagenic or toxic for reproduction</b>	
<b>CLP Category 1A and 1B</b>	
H340 May cause genetic defects (R46)	
H350 May cause cancer (R45)	
H350i May cause cancer by inhalation (R49)	
H360F May damage fertility (R60)	
H360D May damage the unborn child (R61)	
H360FD May damage fertility. May damage the unborn child (R60, R60/61)	
H360Fd May damage fertility. Suspected of damaging the unborn child (R60/63)	
H360Df May damage the unborn child. Suspected of damaging fertility (R61/62)	

**Group 2: Priority hazards for restriction to which strict conditions shall apply**

Combinations of these hazards that also result in the substance being PBT (Persistent, Bioaccumulative and Toxic), or persistent or bioaccumulative, according to the definitions provided in Annex XIII of the REACH Regulation, shall be treated as Group 1 substances.

<b>Carcinogenic, mutagenic or toxic for reproduction</b>	
	<b>CLP Category 2</b>
	H341 Suspected of causing genetic defects (R68)
	H351 Suspected of causing cancer (R49)
	H361f Suspected of damaging fertility (R62)
	H361d Suspected of damaging the unborn child (R63)
	H361fd Suspected of damaging fertility. Suspected of damaging the unborn child (R62/63)
	H362 May cause harm to breast fed children (R64)

<b>Acute toxicity</b>	
<b>CLP Category 1 and 2</b>	
H300 Fatal if swallowed (R28)	
H310 Fatal in contact with skin (R27)	
H330 Fatal if inhaled (R23/26)	
H304 May be fatal if swallowed and enters airways (R65)	

<b>Specific target organ toxicity (STOT)</b>	
<b>CLP Category 1</b>	
H370 Causes damage to organs (R39/23, R39/24, R39/25, R39/26, R39/27, R39/28)	
H372 Causes damage to organs (R48/25, R48/24, R48/23)	

<b>Hazardous to the aquatic environment</b>	
<b>CLP Category 1 and 2</b>	
H400 Very toxic to aquatic life (R50)	
H410 Very toxic to aquatic life with long-lasting effects (R50/53)	
H411 Toxic to aquatic life with long-lasting effects (R51/53)	
<b>Hazardous to the ozone layer</b>	
H420 Hazardous to the ozone layer (R59)	

<b>Respiratory and skin sensitisation (not proposed for general application to this product group, with limited exceptions)</b>	
<b>CLP Category 1</b>	
H317: May cause allergic skin reaction (R43)	
H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled (R42)	

Group 3: Hazards to which greater flexibility may be applied in derogations

<b>Acute toxicity</b>	
<b>CLP Category 3</b>	
H301 Toxic if swallowed (R25)	
H311 Toxic in contact with skin (R24)	
H331 Toxic if inhaled (R23)	
EUH070 Toxic by eye contact (R39/41)	
<b>Specific target organ toxicity (STOT)</b>	
<b>CLP Category 2</b>	
H371 May cause damage to organs (R68/20, R68/21, R68/22)	
H373 May cause damage to organs (R48/20, R48/21, R48/22)	

<b>Hazardous to the aquatic environment *</b>	
<b>CLP Category 3 and 4</b>	
H412 Harmful to aquatic life with long-lasting effects (R52/53)	
H413 May cause long-lasting effects to aquatic life (R53)	

\* flexibility may be applied only if the fate of the product is not in the aquatic environment

### 3.2.2 First proposal for hazardous substances criteria

#### First criteria proposal

##### **“Substitution of hazardous substances used in the main electronic displays components”**

###### **2(a) Substances of Very High Concern (SVHC’s)**

The product shall not, unless specifically derogated, contain substances that:

- (i) Meet the criteria in Article 57 of Regulation (EC) No 1907/2006,
- (ii) Have been identified according to the procedure described in Article 59(1) of Regulation (EC) No 1907/2006 which establishes the candidate list for substances of very high concern.

These conditions apply to substances that carry out a function to the final product and to substances that may be present as impurities or contaminants. No derogation shall be given concerning substances that meet either of these two conditions, and which are present in an article or in any homogeneous part of a complex article in concentrations greater than 0,1 % (weight by weight).

###### **Assessment and verification**

*Substances that are present in the final product shall be screened against the latest version of the candidate list published by ECHA. The applicant shall compile declarations of compliance from, as a minimum, tier 2 suppliers. Where a derogation has been granted then the applicant shall show that use of the substance is in compliance with the relevant concentration limits and derogation conditions.*

###### **2(b) Restrictions based on hazard classifications**

Hazardous substances that may be present in main components of the electronic display that, in accordance with Regulation (EC) No 1272/2008 of the European Parliament and of the Council<sup>18</sup> or Council Directive 67/548/EC<sup>19</sup>, meet the criteria for classification with the hazard classes or risk phrases listed in table 2.1 shall not be used unless they have been specifically derogated. The main components of a electronic display are defined as comprising:

- Printed Circuit Boards
- Electrical contacts
- Electrical and data connections (internal and external)
- External cables and power packs

<sup>18</sup> 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).

<sup>19</sup> Council Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances (OJ 196, 16.8.1967, p. 1).

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- External housing and enclosure materials
- Peripheral devices
- Liquid Crystal Display unit
- Screen LED backlights

Homogeneous parts with a weight of below 25 g and the metal chassis of the product are excluded from the scope of this criterion.

The hazard classifications in Table 2.1 generally refer to substances. However, if information on substances cannot be obtained, the classification rules for mixtures apply. The most recent classification rules adopted by the European Union shall take precedence over the listed hazard classifications or risk phrases.

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 are exempted from the above requirements. This shall include polymers that have been modified to incorporate a function and additives which become covalently bonded with polymers.

Table 2.1: Restricted hazard classifications and risk phrases and their CLP categorisation

<b>Acute toxicity</b>	
<b>Category 1 and 2</b>	<b>Category 3</b>
H300 Fatal if swallowed (R28)	H301 Toxic if swallowed (R25)
H310 Fatal in contact with skin (R27)	H311 Toxic in contact with skin (R24)
H330 Fatal if inhaled (R23/26)	H331 Toxic if inhaled (R23)
H304 May be fatal if swallowed and enters airways (R65)	EUH070 Toxic by eye contact (R39/41)

<b>Specific target organ toxicity</b>	
<b>Category 1</b>	<b>Category 2</b>
H370 Causes damage to organs (R39/23, R39/24, R39/25, R39/26, R39/27, R39/28)	H371 May cause damage to organs (R68/20, R68/21, R68/22)
H372 Causes damage to organs (R48/25, R48/24, R48/23)	H373 May cause damage to organs (R48/20, R48/21, R48/22)
<b>Carcinogenic, mutagenic or toxic for reproduction</b>	
<b>Category 1A and 1B</b>	<b>Category 2</b>

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H340 May cause genetic defects (R46)	H341 Suspected of causing genetic defects (R68)
H350 May cause cancer (R45)	H351 Suspected of causing cancer (R40)
H350i May cause cancer by inhalation (R49)	
H360F May damage fertility (R60)	H361f Suspected of damaging fertility (R62)
H360D May damage the unborn child (R61)	H361d Suspected of damaging the unborn child (R63)
H360FD May damage fertility. May damage the unborn child (R60, R60/61)	H361fd Suspected of damaging fertility. Suspected of damaging the unborn child (R62/63)
H360Fd May damage fertility. Suspected of damaging the unborn child (R60/63)	H362 May cause harm to breast fed children (R64)
H360Df May damage the unborn child. Suspected of damaging fertility (R61/62)	
<b>Hazardous to the aquatic environment</b>	
<b>Category 1 and 2</b>	<b>Category 3 and 4</b>
H400 Very toxic to aquatic life (R50)	H412 Harmful to aquatic life with long-lasting effects (R52/53)
H410 Very toxic to aquatic life with long-lasting effects (R50/53)	H413 May cause long-lasting effects to aquatic life (R53)
H411 Toxic to aquatic life with long-lasting effects (R51/53)	
<b>Hazardous to the ozone layer</b>	
EUH059 Hazardous to the ozone layer (R59)	

**Assessment and verification:**

*The applicant shall obtain declarations of compliance from, as a minimum tier 2 suppliers. This shall declare that, where used in the listed components, the following substances do not meet the criteria for classification with one or more of the hazard classifications or risk phrases listed in table 2.1:*

- Flame retardants

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- *Plasticisers*
- *Plastic stabilisers*
- *Plastic colorants*
- *Biocides in plastic and rubber*
- *Plastic contaminants*
- *Electrical contacts*
- *Thermal conductors*
- *External metals*
- *Liquid crystals in displays*
- *LED doping and luminescence*

Where substances are derogated in 2(c) or 2(d) then the declaration shall specifically identify those derogated substances and provide supporting evidence showing how the derogation conditions are to be met.

The following technical information shall be provided to support the declaration of classification or non-classification for each substance:

- For substances that have not been registered under Regulation (EC) No 1907/2006 or which do not yet have a harmonised CLP classification: Information meeting the requirements listed in Annex VII to that Regulation;*
- For substances that have been registered under Regulation (EC) No 1907/2006 and which do not meet the requirements for CLP classification: Information based on the REACH registration dossier confirming the non-classified status of the substance;*
- For substances that have a harmonised classification or are self-classified: SDS where available. If these are not available or the substance is self-classified then information shall be provided relevant to the substances hazard classification according to Annex II to Regulation (EC) No 1907/2006;*
- In the case of mixtures: safety data sheets where available. If these are not available then calculation of the mixture classification shall be provided according to the rules under Regulation (EC) No 1272/2008 together with information relevant to the mixtures hazard classification according to Annex II to Regulation (EC) No 1907/2006.*

SDS shall be completed in accordance with the guidance in Section 2,3,9,10, 11 and 12 of Annex II to Regulation (EC) 1907/2006 (requirements for the compilation of SDS).

### **2(c) Derogation of substances with an improved hazard profile**

In accordance with Article 6(7) of Regulation (EC) No 66/2010 the substance groups in table 2.2 are specifically derogated from the requirements set out in Article 2(b) and in accordance with the associated derogation conditions.

*Table 2.2. Derogation of substitutes with an improved hazard profile*



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Substance group	Sub-components	Hazard derogations	Derogation conditions
Flame retardants	Printed Circuit Boards	<i>Not required</i>	Control of associated hazardous reaction products.
	Internal connectors and switches	H413	-
	External power cables	<i>Not required</i>	-
	Plastic enclosures and casings	H412, H413	Control of PFOA emissions from PTFE production
	Recycled plastic in enclosures and casings	FR's and their synergists that are not restricted or identified as SVHC's	Declaration of FR and synergist present obtained from the component supplier.
Plasticisers	External cables	H411	-
	Recycled content (all components)	Substances present in recyclate that are not SVHC's.	-

**2(d) Restriction of substances in specified components**

The final product and, where stipulated, specified components shall not contain the hazardous substances listed in table x at or above the specified concentration limits or according to the specified restrictions. The restrictions in the RSL take precedence over any derogations listed in Criterion 2(C).

Verification and testing requirements are specified in table 2.3. Laboratory testing, where required, shall be carried out for each production model. Testing shall be carried out annually during the license period in order to demonstrate ongoing compliance.

Table 2.3. Restriction of substances within components

Substance group	Restriction	Concentration limit
Plasticisers	DEHP, BBP, DBP, DIBP, DMEP, DIPP, DPP,	A sum total

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	DnPP and DnHP shall not be present in external cables and power packs.	concentration limit of 0.1% is proposed.	
	Medium Chained Chlorinated Paraffins (MCCP's) Alkanes C14-17 shall not be present in external cables and power packs.	A sum total concentration limit of 0.1% is proposed.	
Plastic stabilisers	Lead shall not be present in external cables, wires and connecting cords.	Concentrations at or greater than 300 ppm. <i>A test method is proposed to be specified.</i>	
Plastic colourants	Colourants containing lead, chromium VI and cadmium, including those included in the Candidate List, shall not be used.	<i>The potential to specify testing is to be discussed.</i>	
	Pigments and dyes used to colour ABS shall be colour fast.	<i>A migration test is to be identified.</i>	
Biocides	Biocides intended to provide a hygiene (anti-bacterial) function shall not be added to keyboards and peripherals.	Self-declaration obtained from component suppliers.	
Plastic contaminants	The 18 listed Polycyclic Aromatic Hydrocarbons (PAHs) shall not be present above individual and sum total concentration limits in the external surfaces of notebooks and tablets; peripheral keyboards, mice, stylus and trackpads; external power cables.	The following concentrations shall apply:  Individual concentrations for the eight REACH restricted PAHs shall be 1 ppm  The sum total concentration of the 18 listed PAHs shall	

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		not be greater than 18 ppm
Electrical contacts	RoHS exemption 8b shall not be granted to ecolabelled electronic displays	Declaration by the manufacture detailing the alternative solder specified.
Ceramic heat conductors	Beryllium and its compounds shall not be used in parts at concentrations greater than 0.1%	Self-declaration obtained from component suppliers.
External metal parts	Nickel in stainless steel shall be restricted in-line with REACH where any external part will be in close and prolonged contact with the skin.	Verification shall be by analytical testing for migration.

**Assessment and verification:**

*The applicant shall provide a declaration of compliance with the restriction list in table x supported by evidence as applicable to the substances used to manufacture components within the final product. Testing, where required, shall be carried out upon application for each production model licensed and once a year thereafter, with results then communicated to the relevant competent body.*

*Failure of a test result during a license period shall result in retesting for the specific product line. If the second test fails then the license shall be suspended for the specific product line. Remedial action will then be required in order to re-instate the license.*

**Summary of the how the proposal is formulated:**

- The scope of the criteria has been set in order to ensure that it can be complied with the best products on the market, reflects the practical potential for the substitution of hazards and can be verified with a high level of assurance.

- The scope is proposed to be narrowed to specific named components and substance groups that have been identified as being of high concern and which have been addressed by substitution initiatives.
- A lower cut-off limit of 0.1% is set for the consideration of hazards in components parts. In-line with the practice within all other ecolabelling and reporting schemes for computer products a general weight-based cut-off for the scope of the criterion is proposed at 25g.
  - The defined components – mainly understood to be manufactured by Tier 2 or 3 suppliers - are proposed to be recognised as *homogenous parts* for the purpose of applying the 0.1% cut-off limit for hazardous substances, such that verification shall be required for the part as whole in the case that specific restrictions or concentration limits are defined.
- In-line with Articles 6(6) and 6(7) of the Ecolabel Regulation (EC) 66/2010 a restriction is placed on the presence of substances placed on ECHA's Candidate List for authorisation (Substances of Very High Concern) being present in any component of the final product.
  - Provision is only made for the derogation of SVHC's under strict conditions and where a substance is present at concentrations less than 0.1%. It is understood that some OEM's may submit derogations. A strict deadline for derogations to be submitted shall be set at the AHWG2.
- A set of substance restrictions – a black list - have been identified from the hazard restriction lists of the leading OEM's that seek to limit or avoid the presence of substances of concern. The aim is to create a clear and visible control of these substances presented in a form that is familiar to OEM's and their suppliers. Functions that are not essential are also excluded where possible e.g. biocidal treatment of keyboards.
  - These restrictions are proposed to be verified for specific identified components. In some cases the restriction relates to possible exposure of the consumer to hazards. Where limit values are proposed then verification

shall be according to laboratory testing using standardised IEC, EN or ISO test methods.

- Reflecting the practices of leading OEM's random laboratory testing is proposed for selected Candidate List substances (to be identified from the IEC 62474 Declaration List) and/or the Ecolabel's restriction list. This shall take place once a year during the license period.
- The initial findings from an analysis of substitutions made by leading manufacturers in order to minimise hazards present in their products has been used to establish a 'white list' hazard derogation framework. The aim of the framework is to identify from the EU Ecolabel hazard list those hazards that should be derogated in order to permit the hazard profile of the best products on the market to comply with the criterion.
- The framework is structured according to common substance groups that carry out specific and required functions in the product.

### 3.3 Cluster 3 – Lifetime extension

The research results of Task 3 and Task 4 revealed that high 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 continually manufacturing of new products which increases the pressure on the environmentally and socially burdening primary extraction and to reduce the impacts caused by 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”).

**Present criteria,  
Decisions 2009/300 and 2011/337**

**Televisions: “Lifetime extension”**

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.

The availability of compatible electronic replacement parts shall be guaranteed for seven years from the time that production ceases.

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

**External Computer Displays**

No explicit criterion on lifetime extension

**Televisions**

No explicit criterion on user repairability

**External Computer Displays: “User repairability”:**

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.

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.

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

### 3.3.1 Criterion 3.1 – Commercial guarantee

#### 3.3.1.1 Major proposed changes (first proposal)

##### Proposed revised criteria (first proposal)

###### Commercial guarantee:

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.

Assessment and verification: The applicant shall declare the compliance of the product with these requirements and additionally provide a copy of the guarantee document to the competent body.

- It is proposed to change the title “lifetime extension” of the criterion into “commercial guarantee” in case that there will be other sub-criteria to be subsumed under a cluster on “lifetime extension”.
- The availability of replacement parts has been shifted to the new and more elaborated sub-criterion “repairability” (see next section).
- For verification, the provision of a copy of the guarantee document has been added.

##### Consultation questions

- In general: does a commercial guarantee in case of products’ defects facilitate the repair, i.e. lifetime prolongation, or are the defect devices simply being exchanged by new products?

#### 3.3.1.2 Stakeholder feedback and further evidence

According to written stakeholder feedback following the first AHWG meeting, besides an extended commercial guarantee, more criteria should be included addressing “performance quality “of the devices during their lifetime. This shall include maximum failure rates from respective life-time tests as well as avoiding a potential loss of brightness. These quality criteria are especially important for devices used very intensively like those addressed by GPP and other commercial clients.

One of the stakeholders is afraid that the proposed criterion misses the goal of the EU Ecolabel also ensuring that the products are of a good quality next to their environmental performance. There is not seen much added value of this criterion because the DIRECTIVE 1999/44/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 May 1999 on certain aspects of the sale of consumer goods and associated guarantees, gives a minimum guarantee of 2 year. With an additional

Ecolabel criterion, it is worried that we risk that consumers will buy a commercial guarantee with very limited benefits.

Instead, another approach should be considered to ensure that products have a long lifetime. For example a test on average lifetime (like is done for lamps), forbidding built-in obsolescence. The new criteria, such as proposed for the hard disk drive and the battery for desktop and notebook computers, could be more effective than a commercial guarantee.

#### Further research and evidence

Regarding longer product **guarantees**,

- WRAP research (HWP200-301)<sup>20</sup> conducted six qualitative focus groups and a nationally representative survey of 1,104 consumers of household electrical appliances in England and Wales; based on that, the study concluded that the provision of longer standard guarantees or warranties is likely to be central to maximising consumer pull for longer lifetimes. They are seen by consumers as a show of faith by the manufacturer in the lifetime of their product. However, participants in the qualitative focus groups of the study also expressed a strong preference for longer guarantees or warranties that would enable them to have the product in question replaced rather than repaired if it did break down.
- According to the WRAP “Buying Specification Guides for Durability and Repair – LCD Television”<sup>21</sup>, manufacturer warranties are available for 3 years on some mid-cost televisions and 5 years on some high-cost models. However, warranty does not necessarily mean that products are repaired (as products can be disposed of and replaced during warranty). To encourage longer life, WRAP proposes that warranties should include parts and labour.
- The market research carried out within the revision process of the EU Ecolabel criteria<sup>22</sup> revealed that the existing TV being outdated or broken was a strong driver for TV replacement, but not one of the top reasons.

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<sup>20</sup> Source: WRAP GB Report “Electrical and electronic product design: product lifetime”; January 2013; <http://www.wrap.org.uk/sites/files/wrap/WRAP%20longer%20product%20lifetimes.pdf>

<sup>21</sup> Cf. <http://www.wrap.org.uk/sites/files/wrap/Buying%20spec%20-%20LCD%20TV%20AG.pdf>

<sup>22</sup> Cf. <http://susproc.jrc.ec.europa.eu/televisions/stakeholders.html>, Task 2 report



The most critical driver of TV replacement in nearly all countries is a desire to trade up in size, followed by wanting to own a flat panel TV with improved picture quality. These factors, being the reason for currently decreasing lifetimes of TVs cannot be influenced by extended warranties. Further, a warranty of only two years as required in the current EU Ecolabel criteria would basically not facilitate the prolongation of the overall lifetime which is on average around seven years<sup>22</sup>. On the other hand, WRAP indicates that longer warranties are only applied to higher-cost models.

Against this background, the study team decided not to retain the current TV criterion on a commercial guarantee in the revised proposal for electronic displays.

WORKING DOCUMENT

### 3.3.2 Criterion 3.2 – Repairability

To avoid an earlier replacement of the whole television or external computer display in case of defective single components, the repairability of products is a major factor facilitating a lifetime extension. Thus it is proposed to place one focus on the revision of this criterion.

#### 3.3.2.1 Major proposed changes (first proposal)

##### Proposed revised criteria (first proposal)

###### **Repairability:**

For the purpose of undertaking repairs and replacements of worn out parts, or to upgrade older parts and components, the following criteria shall be fulfilled:

- (a) **Design for repair:** All major repairable/replaceable components of televisions and external computer displays, if applicable, such as, screen assembly, backlight, printed circuit board, inverters and speakers shall be easily accessible and exchangeable by the use of universal tools (i.e. widely used commercially available tools).  
*As a minimum the following should be used: The back cover should be one piece and secured by screws to enable multiple access cycles. The backing chassis/PCBs should be removable in one assembly to access the screen components. Screw numbers should be minimised (e.g. by lugs and slots). Screw heads should be standardised with no more than three head sizes. Removable electrical connectors (e.g. clip or screw) should be used rather than soldered or crimped joints where access is required. The following should NOT be used: self-tapping screws, irreversible snap-fits or adhesives where access is required. Tamper-proofing (such as plastic covers or labels) should only be used to ensure authorised repair under warranty and should not inhibit other repairs outside of the warranty period.*
- (b) **Repair manual:** The applicant shall provide clear instructions in form of a repair manual (in hard or soft copy) to enable replacing of these key components.
- (c) **Availability of spare parts:** The applicant shall ensure that spare parts are available for a certain time following the end of the model production.
  - (i) Televisions: at least seven years;
  - (ii) External computer displays: at least five years.
- (d) **Reasonable repair costs:** The applicant shall ensure that the cost of individual spare parts is less than 20% (LCD screen assembly: less than 60%) of the cost of a new device.
- (e) **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 device, including contact details as appropriate.

**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 copy of the repair manual
- A copy of the user instructions
- A list with prices of available spare parts.

- It is proposed to change the title “lifetime extension” of the criterion into “repairability” in case that there will be other sub-criteria to be subsumed under a cluster on “lifetime extension”.

- The link to the end-user has been removed; today's products become increasingly complex and often the right to claim under guarantee becomes invalid, when repairs are executed by persons, who are not authorised.
- Design for repair: Detailed requirements for major components that shall be easily exchangeable have been included. The focus is set on those components that turned out to have a high failure rate. The term "easily accessible and exchangeable" has been illustrated with clear examples.
- A new criterion on reasonable repair costs has been proposed in order to avoid costs of single spare parts being more expensive than the purchase of a whole new product.

For more details cf. Task 4 report "Improvement Potential", section 4.2.3.2 "Repairability / Warranty / Service".

#### 3.3.2.2 *Stakeholder feedback and further evidence*

- According to written stakeholder feedback following the first AHWG meeting, it is difficult to present precise/verifiable information for the comparison between part prices and new TV prices since retail prices vary per country and also over time. It may be more appropriate to require manufacturers to develop and disclose the ways in which they ensure that service part costs do not create a repair barrier (more flexible approach). It needs to be pointed out that it would be impossible to meet the propose criterion for all service parts, if a strict 20% price cap is applied since the prices of LCD screens as a replacement service part are usually more than 50% of the new TV prices.
- Manufacturers often provide a new TV when the LCD screens of an old TV are broken since consumers want to have a quick service. However, the old TVs with broken LCD screens are often retrieved by manufacturers for refurbishment. Since these units get a second life after successful refurbishment, often in other parts of the world. As an alternative criteria for the life-time extension could be to require manufacturers to provide such refurbishment-reuse services for eco-labelled TVs.

- Another stakeholder states that in its current wording the criterion on reasonable repair costs is not practical to implement and does not take into account total cost of repairs.
  - What is meant by “cost”? Recommended retail price? Does this include labour costs, which could be much higher than the cost of the spare parts.
  - Prices fluctuate and in general have been coming down. An equivalent new device may cost much less than the original anyway. An LCD panel for a one year old TV can cost much more than 60% of the original TV price, factor in labour and it is uneconomical to repair.
  - A business model which is in compliance with this requirement could necessitate a higher initial price to the consumer.
- One of the stakeholders prefers information about the manufacturing year on the television instead of setting a requirement on the price of spare parts (reasonable repair costs). Thus the user would have some idea when the availability of spare parts will run out.
- Another stakeholder states that for end- users the availability of professional repair options to fix day to day problems with the devices by reasonable costs is an important fact for a substantial prolongation of the use time. To stimulate such costly services, in addition to the requirements proposed in the current criteria document, a requirement to guarantee easy access to the necessary repair information, diagnostic tools and spare parts to third party reuse or repair shops or organisations is strongly supported.

#### Further research and evidence

A case study by WRAP (2011)<sup>23</sup> of three LCD television models to illustrate and encourage the durability and repair summarizes 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;

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<sup>23</sup> Cf. <http://www.wrap.org.uk/sites/files/wrap/TV%20case%20study%20AG.pdf>

- 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, that exacerbates poorly soldered joints and corrupts chips.

However, other than for computer products (e.g. HDD, rechargeable battery), for electronic displays neither stakeholder feedback nor further research revealed existing quality standards for certain components which the EU Ecolabel could rely on.

### 3.3.2.3 Second proposal for repairability criteria

#### Proposed revised criteria (second proposal)

##### Repairability:

For the purpose of undertaking repairs and replacements of worn out components or parts, the following criteria shall be fulfilled:

- (a) Design for repair: The following components of electronic displays, if applicable, shall be easily accessible and exchangeable by the use of universal tools (i.e. widely used commercially available tools as screwdriver, spatula, plier, or tweezers):
- (i) Screen assembly and LCD backlight,
  - (ii) stands, and
  - (iii) power and control circuit boards.

*Indicatively, the following should be used: The back cover should be one piece and secured by screws to enable multiple access cycles; it should not use irreversible snap-fits. The backing chassis / PCBs should be removable in one assembly to access the screen components. Screw numbers minimised (e.g. by lugs and slots). Screw heads standardised with no more than three head sizes. Detachable electrical connectors (e.g. clip or screw) should be used rather than soldered or crimped joints where access is required. The following should not be used: self-tapping screws, irreversible snap-fits or adhesives where access is required. Tamper-proofing (such as plastic covers or labels) should only be used to ensure authorised repair under warranty and should not inhibit other repairs outside of the warranty period. Special tools include e.g. screwdrivers with special heads (e.g. torx), heat gun, thermal pad, soldering iron.*

- (b) Repair manual: The applicant shall provide clear disassembly and repair instructions (e.g. hard or soft copy, video) being publicly available, to enable a non-destructive disassembly of products for the purpose of replacing key components or parts for 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. Service should not be limited exclusively to applicant's Authorized Service Providers.

(d) Availability of spare parts: The applicant shall ensure that original or backwardly compatible spare parts are publicly available for a certain time following the end of the model production:

- (i) Televisions: at least seven years
- (ii) External computer displays: at least five years

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 copy or online-version of the repair manual and the user instructions.

### Major proposed changes

- The proposed criteria for reasonable repair costs have been deleted.
- The components that have to be exchangeable have been further detailed based on further research and evidence on those parts of electronic displays underlying most common faults and defects.
- The listed joining techniques and connections have been changed from being a 'minimum requirement' in the first criteria proposal to be proposed as 'indicatively'. Further research<sup>24</sup> revealed no verifiable proof that certain joining techniques such as adhesives are destructive to the products or components per se.
- An explicit distinction between repairs that might be undertaken by end-users and others only by professional repair services has not been made. Clarification is often provided in the product manual which repairs might be done by the consumer without affecting the manufacturers' guarantee/warranty.
- However, feedback from stakeholders proposed to support customer's choice for third party reuse or repair shops or organisations. In order to facilitate them easy access to the necessary repair information, diagnostic tools and spare parts, the criteria on spare parts and repair manual have been specified by having to be "publicly available"; the criterion on repair service includes a requirement that it must not be limited exclusively to applicant's Authorized Service Providers.

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<sup>24</sup> For example the study 'Disassembly analysis of slates: Design for repair and recycling evaluation' by Fraunhofer IZM (2013), or iFixit

([www.ifixit.com/Teardown/Asus+Zenbook+UX32VD+Teardown/10120](http://www.ifixit.com/Teardown/Asus+Zenbook+UX32VD+Teardown/10120))

- Repair manual: video demonstration of disassembly has been added as possibility.
- The criteria on availability of spare parts have been further detailed regarding the possibility of being “original or backwardly compatible”. The number of seven years for televisions and five years for computer displays, however, has not been shortened as partly being required. For electronic displays, it seems that the type of models changes every year; in order to facilitate a real lifetime *prolongation*, the availability of spare parts for 3 years (computer display) or 5 years (TV) would only address the average lifetime.

WORKING DOCUMENT

### 3.3.3 Criterion 3.3 – Upgradeability

There is a growing trend of televisions becoming so called “Smart TVs” providing users with integrated internet capabilities to check emails and social networking websites, browse the internet including app stores, or watch programmes via internet. In this context, some manufacturers offer possibilities to upgrade electronics and software of the television in use (for example “Smart Evolution Kit”<sup>25</sup>, “Smart TV Upgrader”<sup>26</sup>). The additional plug-in devices shall provide regular TV owners access to Smart TV functions including premium online content, offering the latest TV features and services, building out app capabilities, or integrating more advanced game/3D functions into the panel.

With hardware enhancements, such as Central Processing Unit (CPU), memory and Graphics Processing Unit (GPU) up to the level of the latest Smart TV, users can use faster speeds for browsing the Internet and using apps while watching TV.

This kind of upgrading possibility addresses specific aspects of televisions, mainly the “smart” functionality.

For more details cf. Task 4 report “Improvement Potential”, section 4.2.3.1 “upgradeability”.

#### Consultation questions

- How do stakeholders expect the outlined upgrade devices to facilitate a prolonged lifetime of television products? How is the overall environmental impact of the additional modular device, initially adding material and energy consumption to the existing television, to be assessed?
- Are there any other upgradeability options (e.g. certain number and kind of interfaces, upgradeable hardware components etc.) applicable to televisions and/or external computer displays?

#### 3.3.3.1 Stakeholder feedback and further evidence

According to written stakeholder feedback following the AHWG meeting, a manufacturer provided information that hardware upgrade of its current TV models is not possible. For new functionalities, however, not necessarily a replacement of a TV-set is required. For newly introduced broadcast standards, set-top-boxes are

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[http://www.samsung.com/us/aboutsamsung/news/newsIrrRead.do?news\\_ctgry=irnewsrelease&news\\_seq=20329](http://www.samsung.com/us/aboutsamsung/news/newsIrrRead.do?news_ctgry=irnewsrelease&news_seq=20329)

<sup>26</sup> <http://www.lg.com/de/tv/lg-ST600-upgrade-box>



available in the market. “SmartTV” functionalities are often included in new BD-players or in audio equipment connected to TVs. Nowadays also the display content of a tablet or Smart Phone could be easily forwarded to TV screen.

By one of the stakeholders, 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 models functionality. However, apart from the general possibility to upgrade TVs, there is no further information provided on the level of interest there has been for this kit or the level of Samsung’s commitment to the future development of this product.

#### 3.3.3.2 *Proposal for upgradeability criteria*

Differently from computers products, where relevant hardware components as HDD, SSD, memory or rechargeable batteries can be upgraded for prolonging the product’s overall lifetime, for televisions and external computer displays this option has not proven to be possible so far. A so called upgrade kit enabling software and hardware upgrades for ensuring compatibility with future ultra-high definition (UHD) standards is only provided by one manufacturer so far and not common on the market. Firmware updates, on the other hand, are common for so called Smart TVs mostly adding a variety of features to the television. They can be carried out either by USB portable memory or via internet.

Further, the most critical driver of TV replacement in nearly all countries is a desire to trade up in size, followed by wanting to own a flat panel TV with improved picture quality according to the market analysis carried out within the Ecolabel criteria revision process<sup>27</sup>. As these factors, being the reason for currently decreasing lifetimes of TVs, cannot be influenced by single product’s upgrades of hardware components, the study team decided not to include a new criterion on upgradeability to the product group televisions / displays at all.

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<sup>27</sup> Cf. <http://susproc.jrc.ec.europa.eu/televisions/stakeholders.html>, Task 2 report

### 3.4 Cluster 4 – End-of-life management: Design and material selection

Similar to the cluster lifetime extension, the research results of Task 3 and Task 4 also revealed that high attention should be paid to the end-of-life (EoL) management of televisions and external computer monitors to reduce the overall environmental impacts since secondary resources from recycling can substitute primary production. In the current criteria documents, requirements affecting the EoL-management are spread across different discontinuous criteria. To illustrate the importance of EoL for televisions and external computer displays, for the revision it is proposed to cluster and rearrange the associated criteria, complementing them by some new proposals.

#### Present 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.

#### Present 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 material information

#### 3.4.1.1 Major proposed changes (first proposal)

Proposed revised criteria (first proposal)
<p><b>“Material selection and information”</b></p> <p>(a) <u>Variety of plastics</u>: Plastic parts shall be of one polymer or be of compatible polymers for recycling if greater than 25 g in mass.</p> <p>(b) <u>Surface coating</u>: All plastic materials used for covers/housing shall have no surface coatings / metal inlays incompatible with recycling or reuse unless such coating is technically required.</p> <p>(c) <u>Content of recyclates</u>: The cover/housing incl. stand of the television or external computer display shall have a content of post-consumer recyclates material of not less than 10% by mass<sup>28</sup>.</p> <p>(d) <u>Material information facilitating recycling</u>:</p> <p>(i) Plastic parts with a mass greater than 25 grams shall be marked in accordance with ISO 11469 and ISO 1043, sections 1-4. For plastic parts &gt; 200 grams, the marking should be enough large and located in a visible position in order to be easy to be identified by workers of specialized recycling firms.</p> <p>(ii) Data on the nature and amount of hazardous substances in the computer shall be gathered and provided in accordance with Council Directive 2006/121/EC and the Globally Harmonised System of Classification and Labelling of Chemicals (GHS).</p> <p><u>Assessment and verification</u>:</p> <p>The applicant shall declare compliance of the product with these requirements to the competent body.</p> <p>The applicant shall provide the competent body with an exploded diagram of the television or external computer display in written or audio-visual format, labelling the main components, especially plastic parts greater than 25 grams in mass, as well as identifying any hazardous substances in components. The information shall include documentation to prove the conformity to the above mentioned ISO standards and additional specifications of the marking (dimension and position).</p> <p>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.</p> <p>The applicant shall provide the competent body with a declaration stating the percentage post-consumer recycled content. In case of surface coating / metal inlays, the applicant shall provide the competent body with a declaration proving the technical demand.</p>

- The different sub-requirements under the current criteria ‘recycled content’ and ‘design for disassembly’ have been rearranged and renamed to the following criteria ‘material selection and material information’ and ‘design for recycling’.
- The criterion ‘content of recyclates’ has been proposed to be valid also to TVs.
- The criterion ‘Material information facilitating recycling’ has been specified regarding marking requirements.
- The assessment and verification requirements have been specified according to the new criteria structure.

<sup>28</sup> This refers to cover/housing and stand together, not each of them.

For more details cf. Task 4 report “Improvement Potential”, section 4.2.4.2 “End-of-life management of computer products”.

#### 3.4.1.2 *Stakeholder feedback and further evidence*

According to written stakeholder feedback following the AHWG meeting, the compliance with harmonized standards is a benchmark to fulfil the essential requirements of the European Low Voltage Directive. For TV-sets, the harmonized safety standard is the EN 60065 Ed7 including the Amendment 11. EN 60065/A11 requires that TV-sets do comply with the external ignition (candle flame) requirements through passing the necessary tests as per TS 62441. According to TS 62441, the candle flame accessible area of TV housing is considered to comply, if it meets the requirements of either:

- 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 min.

This means that for TV plastic housings, compliance is generally achieved by using flame retardants.

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. In this respect, one of the stakeholders explicitly welcomes the proposals included in the current criteria draft, but the need to strengthen the criteria for the following elements is seen:

- Variety of plastics:
  - Like in the proposal for computers the variety of polymer types in the housing of TVs/monitors should be clearly limited. Beyond such a reduction of polymer types as well a limitation of functional additives is a key prerequisite for any closed loop recycling attempt.

- Feedback by another stakeholder indicates that in principle the criterion could be supported, but it should be noted that different methodologies may be used to determine whether certain polymers are compatible or not. It needs to be researched what methodology provides a scientific and realistic compatibility analysis table for this criterion.
- Surface coating/metal inlays:
  - One of the stakeholders can fully support the metal inlay related restriction, but the scope of surface coating (including also thin film coating? paint? spray?) needs to be better clarified since not all surface coating is incompatible with recycling or reuse.
  - Another stakeholder asks that the opening clauses “incompatible with recycling” and “technical requirements” should be skipped. The first one is not meaningful with respect to the variety of current recycling processes and the second is too imprecise.
- Content of recyclates:
  - One of the manufacturers – while seeing the value of promoting the use of post-consumer recycled material in eco-labelled products – is afraid that the proposed target is too ambitious, especially if it concerns post-consumer recycled plastics. Over the years, they have researched the feasibility of using post-consumer plastics for TVs, but so far they have not managed to apply post-consumer recycled plastics to their products mainly due to the concerns over material reliability and increased economic cost. If the EU Commission should incorporate the use of post-consumer recycled plastic in the eco-label criteria, the targets should be adjusted significantly so that it becomes feasible for manufacturers to start commercial experiments at a smaller scale, focusing on parts that are relatively less critical in terms of material reliability. An alternative could be targeting other materials (metals, paper/cardboard).
  - From an environmental perspective, another stakeholder asks for a much higher recycled content than the current 10% being stimulated. This is

feasible under the current market conditions as the results from independent assessment schemes like the TCO Certified Edge Label shows asking for > 65% post-consumer-recyclate. In 2012 more than 20 screens were labelled by TCO. Another example being provided: “In 2009, Lenovo worked with a Lenovo recycled plastic supplier to develop and qualify a new HB-ABS recycled material with 65% PCC plus 20% PIC for use in producing decorative monitor parts.” (Source: A Lenovo Environmental Success Story “Using Recycled Content Plastics”)<sup>29</sup>. The stakeholder welcomes any proposal allowing real front running companies to communicate in a meaningful way real recycling solutions (e.g. recycled content > 80%).

- Another stakeholder would be in favour of this criterion, maybe lowering it to 5% being an improvement as the present criterion might be a problem for the license holders. It is proposed to involve the recycling sector in the discussion if the focus should be shifted to the recycling of metals, because it is understood that the recycling rate of metals is already very high (for example printed circuit boards can be taken out before shredding).
- Public Waste Agency of Flanders (OVAM) confirmed that recyclates are available on the market.
- Regarding the verification of recycled content a certification scheme QA-CER started in Belgium. The certification distinguishes 3 levels of certification.
- Recyclates could also be screened for the presence of certain hazardous substances.
- Material information: one of the stakeholders proposes that additionally the inclusion of critical raw materials in the components of the products shall be identified with type and amount of such materials in respective documentations (recycling pass) in order to support more target recalling activities in future.

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<sup>29</sup> [http://www.lenovo.com/social\\_responsibility/us/en/GreenPaper\\_Recycled\\_Content.pdf](http://www.lenovo.com/social_responsibility/us/en/GreenPaper_Recycled_Content.pdf)

### Further research and evidence

- The study 'Disassembly analysis of slates: Design for repair and recycling evaluation' by Fraunhofer IZM (2013)<sup>30</sup> indicates on the basis of an interview with a recycler that plastics are separated in 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 plastics parts attached to bulk plastics parts reduce the value of the plastics fractions PC/ABS, white mixed plastics and black mixed plastics from the perspective of the dismantler. Meaning that mono material plastic housing parts without coatings, inserted metal windings, metal shields attached are better to recycle than composite materials.
- On the other hand, according to Köhnlechner (2014)<sup>31</sup>, plastic sorting technologies can increasingly cope with black coloured plastics. Amongst others, sorting based on density separation as well as electrostatic properties of different polymer types can achieve high quality output for ABS and HIPS<sup>32</sup> – independent from the plastic colour.
- In 2013, EFRA finalised a pilot project<sup>33</sup> on the recycling of plastics containing flame retardants (FR) from Liquid Crystal Display (LCD) TVs. Some of the main reasons for the low plastics recycle rate in Europe identified were the lack of information on the polymer type, the FR applied and the huge variety of different plastics types used in E&EE among others.
- Concerns were raised at the first AHWG about the verification of recycled content.

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<sup>30</sup> Cf. [http://www.izm.fraunhofer.de/content/dam/izm/de/documents/News-Events/News/2013/urn\\_nbn\\_de\\_0011-n-255111-18-1.pdf](http://www.izm.fraunhofer.de/content/dam/izm/de/documents/News-Events/News/2013/urn_nbn_de_0011-n-255111-18-1.pdf)

<sup>31</sup> Source: Köhnlechner, R.: Erzeugung sauberer PS- und ABS-Fractionen aus gemischtem Elektronikschrott. In: Thome-Kozmiensky, K.T.; Goldmann, D.: Recycling und Rohstoffe, Volume 7. Munich, 2014.

<sup>32</sup> HIPS: High Impact Polystyrene; ABS: Acrylnitril-Butadien-Styrol

<sup>33</sup> EFRA 2013. Recycling of Plastics from LCD Television Sets. Pilot project on mechanical plastics recycling from post-consumer flat panel display-LCDs.

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 Centre<sup>34</sup>. The system is based on ISO 9001, as well the EN standards EN 15347 relating to the characterisation of waste polymers<sup>35</sup> and EN 15343 relating to the traceability of waste polymers<sup>36</sup>. The standard 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.

- Research by Peeters et al.<sup>37</sup> 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. The study looked at PC/ABS, which is understood to be commonly used in electronic displays housings and enclosures. Problems with the stability of the polycarbonate component arise because of the need to use water-based density separation techniques for shredded black plastics. In the scenario examined an 82% pure PC/ABS could be obtained post shredding, density and optical separation. However, in reality the plastic recovered is required to achieve a V1 fire rating and a so-called 'yellow card' for the recycle certifying its fire rating. The result is a recommended upper limit of recycled content of 10%.

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<sup>34</sup> QA-CER, *QA-CER certification of the quality management system for recycling and production companies*, Version 1, January 2013

<sup>35</sup> CEN, *Recycled plastics – characterisation of plastics wastes*, EN 15347, December 2007.

<sup>36</sup> CEN, *Plastics recycling traceability and assessment of conformity and recycled content*, EN 15343, December 2007.

<sup>37</sup> 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



### 3.4.1.3 Second proposal for material selection criteria

#### Proposed revised criteria (second proposal)

##### “Material selection and information to improve recyclability”

(a) Variety of plastics:

- (i) Plastic parts with a mass greater than 25 grams may consist of a single polymer or a polymer blend compatible for the recycling. The compatibility for recycling shall be verified.
- (ii) Overall in the product there shall be a maximum of 4 types of plastic used of plastic parts with a mass greater than 25 grams.
- (iii) Plastic used for housings and enclosures shall consist of a maximum of two polymers in a form that is compatible with recycling. The compatibility for recycling shall be verified.

(b) Surface coating / metal inlays: All plastic materials used for housings and enclosures shall have no surface coatings or metal inlays.

(c) 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 1-4. For plastic parts greater than 25 grams the CAS number of flame retardants shall additionally be marked “FR(ISO 1043-4 code) - CAS No”. For plastic parts > 200 grams, the marking should be large enough and located in a visible position in order to be easily identified by workers of specialised recycling firms.

Exemptions are made in the following cases:

- (i) Where the marking would impact on performance or functionality of the plastic part, including light guides
- (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

(d) Recycled content: Plastic parts of the housings and enclosures as well as of structural elements with a mass > 25 grams shall have a total content of post-consumer recyclates material of not less than 10% by mass. Where the post-consumer recyclates content is higher than 25% a declaration may be made in Box 2 of the Ecolabel (see Criterion 7.2). Recycled content shall be demonstrated according to the requirements of ISO 15343. Recyclates may contain flame retardants that are specifically derogated in Criterion 2(c).

Printed circuit boards as well as transparent plastics that form part of display units are exempted from this requirement.

(e) Recyclability of plastic containing flame retardants: The potential for closed loop recycling in a new electronic product of plastic required to meet fire protection standards shall be greater than 25%.

(f) Recyclability of metal housings and enclosures: The recyclability of metals and alloys used for casings shall be verified.

##### Assessment and verification:

- The applicant shall declare compliance of the product with these requirements to the Competent Body.
- The applicant shall provide the Competent Body with an exploded diagram of the electronic display in written or audio-visual format, identifying the plastic parts greater than 25 grams in mass, their polymer composition and compatibility for the recycling, as well as associated markings and identifications of flame retardants.

- The information shall include documentation to prove the conformity to the above mentioned ISO standards, specifications of the marking (dimension and position) and, where applicable exemptions. A technical justification shall be provided where an exemption applies.
- The applicant shall provide the Competent Body with documentation verifying traceability for the post-consumer recycled content according to the above mentioned ISO standard.
- The recyclability of the housing and enclosures shall be verified by a declaration from a permitted treatment operation in accordance with Article 23 of Directive 2008/98/EC (the WEEE Directive) that there is an end-market for the materials.

### Major proposed changes

- The heading has been changed from “Material selection and information” to “Material selection and information to improve recyclability”.
- **Variety of plastics:** The requirement has been strengthened limiting at a maximum of 4 types of plastic used of plastic parts with a mass greater than 25 grams in the overall product.
- **Surface coating / metal inlays:** The requirement has been tightened and there are no exemptions considered for the use of coatings and/or metal inlays.
- **Recycled content:** The requirement is not limited to external plastics any more but now applies to all plastic parts and structural elements > 25 grams. The threshold of 10 % remains unchanged because there are still practical problems faced by even front runner manufacturers in consistently meeting a higher requirement. Instead it is proposed that, 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 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.
- **Verification of recycled content:** Concerns were raised at the first AHWG about the verification of recycled content. Given the existence of EN 15343 which provides a system for tracing the original and flows of waste polymers it is proposed that this is introduced as a third party verification required for recycled polymer content. It is to be discussed further with manufacturers whether the information currently collected to verify recycled content claims is sufficient to enable verification according to EN 15343.

- **Material information facilitating recycling:** Although some stakeholder comments claimed that plastic marking has little influence on recycling practices, other stakeholders reported that recyclers do use this information for their sorting activities. As the marking is widely established in practice, it is suggested to retain this requirement. In the new proposal, exemptions are made 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 into the plastic is marked according to the suggested notation.
- **Recyclability of plastic containing flame retardants:** There is the potential for a contradiction between the incentive within the criteria to increase the recycled content of plastics and a predicted future increase in the WEEE derived recyclate on the market containing flame retardants. Depending on the final ambition level of the hazardous substance Criterion 2 (c) this may restrict the use of certain recyclate. However, if a flame retardant is restricted in the Ecolabel because of concerns relating to, for example, incineration in end of life phase then it would seem beneficial to permit continued functional use within recyclate. It is therefore proposed that, subject to the FR not being restricted under REACH, identified as an SVHC on the ECHA Candidate List or restricted under EU End of Waste criteria, they shall be permitted within recyclate.
- **Metal used for enclosures:** It is understood that the certain alloys and associated coatings which may be used instead of plastic for enclosures may present recycling problems. It is proposed that the applicant verify the recyclability of their material choice. Further information is required in this area.

### 3.4.2 Criterion 4.2 – Design for disassembly and recycling

As laid out in the Task 4 report, manual dismantling is an important means to improve 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 current requirements are not very specific regarding the dismantling process and key components being affected. Here, suggestions provided by Ardente & Mathieux (2012) and approaches taken in other ecolabels (in particular Blue Angel RAL-UZ 78a) are quite more specific; although these refer to computers, it is proposed to adapt them for televisions and computer displays accordingly. Thus, it is suggested to introduce more specific requirements for the most relevant components of televisions and computer displays in terms of material recovery of precious and critical metals, which are

- Printed circuit boards > 100 cm<sup>2</sup>
- Displays > 100 cm<sup>2</sup>

This selection is based on the WEEE-Directive, which requires recyclers to separate these components during end-of-life management<sup>38</sup>.

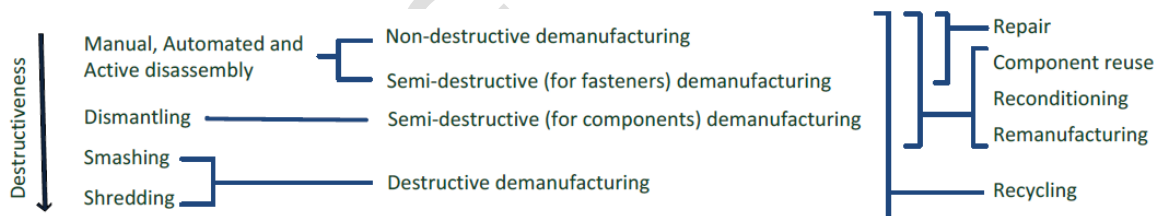
#### 3.4.2.1 Major proposed changes (first proposal)

Proposed revised criteria (first proposal)
<p><b>“Design for disassembly and recycling”</b></p> <p>For recycling purposes computers shall be designed so that</p> <ul style="list-style-type: none"><li>(a) They facilitate easy (manual) disassembly in order to separate display units &gt;100 cm<sup>2</sup> and printed circuit boards &gt;100 cm<sup>2</sup>.</li><li>(b) An efficient (manual) disassembly of display units &gt;100 cm<sup>2</sup> and printed circuit boards &gt;100 cm<sup>2</sup> by a specialized firm can be done by the use of widely used commercially available tools (i.e. pliers, screw-drivers, cutters).</li><li>(c) One person alone can be able to disassemble display units &gt;100 cm<sup>2</sup> and printed circuit boards &gt;100 cm<sup>2</sup>.</li><li>(d) Electrical modules can be easily removed from the case.</li></ul> <p><u>Assessment and verification:</u></p> <p>The applicant shall declare compliance with the requirements to the competent body. The applicant shall provide a ‘test disassembly report’ to the competent body including disassembly procedures, tools needed for the</p>

<sup>38</sup> Although the WEEE-Directive also requires separate treatment of other components (e.g. external electrical cables, plastic containing brominated flame retardants, mercury containing backlights), these fractions are of less relevance for the European Ecolabel as some constitutes are excluded from labelled products (e.g. plastic containing brominated flame retardants, mercury containing backlights) or do not represent any challenge in dismantling processes (e.g. external electric cables).

disassembly and the time (in seconds) needed for the different steps to disassemble the components during the testing. The report shall be submitted either in writing including photo or drawing, or in video format.

- The criterion ‘design for disassembly’ has been renamed into ‘design for disassembly and recycling’; the focus of this criterion has been clearly set to recycling purposes by removing the introduction “...for the purpose of undertaking repairs and replacements of worn out parts, upgrading older or obsolete parts...”. Typically dismantling for repair or upgrade purposes is carried out significantly different from dismantling for recycling: While the first one requires caution to avoid any damages, the latter can widely accept damages to parts as it solely aims at recycling. Thus, the structure of the requirements should clearly distinct between both purposes. For this reason, requirements for the access and exchange of components for repair and/or upgrade are specified under ‘repairability’ (cf. section 0). In that sense, Peeters et al. (2012)<sup>39</sup> provides a very helpful structure of different demanufacturing processes, distinguishing between non-destructive, semi-destructive and destructive demanufacturing, depending on the purpose (repair, reuse, recycling), see Figure 1.



**Figure 1: Overview of different demanufacturing processes and their level of destructiveness**  
(Source: Peeters et al. 2012)

- Some of the sub-requirements under the current criterion ‘design for recycling’ have been removed to the new proposed criterion ‘material selection and information to improve recyclability’.
- The components being relevant in terms of material recovery of precious and critical metals have been specified.

<sup>39</sup> See <https://lirias.kuleuven.be/bitstream/123456789/348771/1/i-sup2012>

- The disassembly process has been specified (specialized firm, one person alone, use of universal tools).
- For the assessment and verification, the provision of a ‘test disassembly report’ has been proposed.

Ideally, as requested by Ardente & Mathieux (2012)<sup>40</sup>, the above listed requirement would also incorporate a threshold for the disassembly time in seconds of the different specified parts and components. However, according to Ardente & Mathieux (2012), the test and verification of such a dismantling-time benchmark would require a detailed standardised test and measurement procedure as the manual dismantling time depends on various factors:

- Minimum working experience of disassembler or operators (e.g. number of years working in the sector);
- Pre-conditions for the measurement (e.g. knowledge of the product’s structure and location of the part to be disassembled, including access to relevant information from manufacturers as videos and exploded diagrams of the product);
- sequence of the steps of the disassembly;
- Tools or machine / equipment to be used for the disassembly (e.g. common tools and machines in use in the recycling plants for dismantling);
- Typology and precision of instruments used for measurement of the time;
- Uncertainty of the measurement and tolerance of the results.

As such test and measurement procedure is not available the above listed criteria have to refer to other means for verification.

For more details cf. Task 4 report “Improvement Potential”, section 4.2.4.2 “End-of-life management of televisions and computer displays”.

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<sup>40</sup> Ardente, F.; Mathieux, F.: Integration of resource efficiency and waste management criteria in European product policies – Second phase. Report no 2, Application of the project’s method to three product groups. Joint Research Centre – Institute for Environment and Sustainability, Ispra, 2012

#### 3.4.2.2 *Stakeholder feedback and further evidence*

According to written stakeholder feedback following the first AHWG meeting, the criteria proposed for (easy) disassembly are explicitly supported by one of the stakeholders, because separate treatment of the respective components allows a much higher efficiency of the following material recycling steps. However, the proposed requirement (d) “Electrical modules shall be easily removed from the case.” needs to be phrased more clearly.

As example, in Screens LED from the backlighting system include a relevant share of critical raw materials. In this respect, the treatment of LEDs in a separate waste/recycling stream should be addressed. Whether an easy manual dismantling is the appropriate requirement to support such separated treatment needs further assessments.

For TV screens and Monitors, it might be appropriate to consider ongoing developments for their targeted treatment (focussing on a quantitative recovering of the included critical raw materials). This would contribute to the formulation of more precise requirements on design for recycling supporting such treatments in further revisions of the Ecolabel.

The criterion is supported by one of the stakeholders, seeing it as a good addition to the existing criteria of disassembly report preparation. However, there is not seen a significant value in the 3rd party (recycler) verification since manufacturers' own disassembly and time measurement would be a rather conservative estimate compared to recyclers' actual operation (considering that recyclers would not be constrained by the need to take the samples apart more carefully to avoid the subsequent damages on part functionality).

#### **Further research / evidence**

Based on the feedback from stakeholders, follow-up research focused on the potential to support the recovery of critical raw materials and other relevant materials. The research aimed at identifying materials and components that should be prioritised for the EoL treatments, reflecting the approach taken by JRC-IES in

support of the draft revision of the Ecodesign Implementing Measure for Televisions (and Displays) EC/642/2009<sup>41</sup>.

### Identifying Critical Raw Materials from an EU perspective

A first step is to define and identify Critical Raw Materials. The availability of Critical Raw materials has been highlighted as a strategic policy issue by the European Commission. Under the EU Raw Materials Initiative a working group has identified and listed the Critical Raw Materials from a geo-political and economic point of view<sup>42</sup>. The list is based on a time horizon of ten years, so geological scarcity was not a central consideration, the increasing demand for products containing CRM's cited instead as an important factor. Recyclability and the potential for substitution were also factors considered in the creating the initial list.

**Table 17: Initial list of critical raw materials at EU level**

Antimony	Indium
Beryllium	Magnesium
Cobalt	Niobium
Fluorspar	PGMs (Platinum Group Metals) <sup>a</sup>
Gallium	Rare earths <sup>b</sup>
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 on the borderline of being identified as CRM. It is understood that in the meantime their economic importance and supply risk may have shifted, bringing them within the definition of 'criticality'.

<sup>41</sup> European Commission, Integration of resource efficiency and waste management criteria in European product policies: Application of the project's methods to three product groups, JRC-IES, November 2012

<sup>42</sup> European Commission, *Critical raw materials for the EU*, Report of the Ad Hoc Working Group on defining critical raw materials, DG Enterprise and Industry, 30<sup>th</sup> July 2010



Of direct relevance to 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.'*

### Identifying metal, CRM and plastic components of life cycle significance

The preliminary background reports for the revision of the EU Ecolabel criteria for electronic displays products published in September 2013 contained a screening of LCA (Life Cycle Assessment) studies for electronic displays<sup>43</sup>. The aim of this screening was to identify comprehensive, quality studies that would support the identification of 'hot spots' of environmental impact in the life cycle of these products. These studies have been screened further in order to identify hot spots relating to specific metals, CRM's or plastics. The results are summarised in Table 18 below.

**Table 18: Screening of LCA evidence for relevant metals or plastics**

Study	Component hot spots	Sub-component hot spots	Metals (including CRM's), and other relevant materials
<b>Plasma Television Displays</b>			
Hischier, R & I, Baudin (2010)	Based on the normalised results for human toxicity and photochemical oxidation at the production phase: <ul style="list-style-type: none"> <li>• PCB</li> <li>• Housing</li> <li>• Plasma display unit (resource depletion)</li> </ul>	<ul style="list-style-type: none"> <li>• Silicon wafer,</li> <li>• PWB Inductors and capacitors</li> <li>• Aluminium parts</li> <li>• Plastic parts</li> <li>• Gas in the filled panel</li> </ul>	<ul style="list-style-type: none"> <li>• Palladium production (SO<sub>2</sub> emissions).</li> <li>• Aluminium production (Vanadium emissions)</li> </ul>

<sup>43</sup> [http://susproc.jrc.ec.europa.eu/televisions/docs/Task3\\_Report\\_Ecolabel\\_Technical\\_Analysis.pdf](http://susproc.jrc.ec.europa.eu/televisions/docs/Task3_Report_Ecolabel_Technical_Analysis.pdf)

Study	Component hot spots	Sub-component hot spots	Metals (including CRM's), and other relevant materials
<b>LCD Television Displays</b>			
Hischier,R & I, Baudin (2010)	Based on the normalised results for human toxicity,freshwater ecotoxicity and other mid-points at production phase: <ul style="list-style-type: none"> <li>• LCD module</li> <li>• PWB</li> </ul>	It was not possible to identify sub-component hot spots from the published study.	<ul style="list-style-type: none"> <li>• Vanadium and Nickel to water.</li> <li>• Chrome steel</li> </ul>
Bakker.C, Ingenegeren.R, Devoldere.T, Tempelman.E, Huisman.J and D, Peck (2012)	Based on ReCiPe indicators. Components with significant impacts in the manufacturing phase: <ul style="list-style-type: none"> <li>• PCB</li> <li>• Aluminium chassis</li> </ul>	It was not possible to identify sub-component hot spots from the published study.	

### Critical metals and raw materials inventory

A number of bills of materials (BOM) for electronic displays products were identified and presented in the background report on Hazardous Substance published in September 2013<sup>44</sup>. Aside from metal and plastic associated with enclosures and the chassis these did not identify CRM occurrence within product sub-components. Literature was therefore reviewed in order to identify a bill of materials for CRM's. Indicative BOM's have been identified for a LED LCD PC monitor and a LED LCD TV based on analysis by Oeko-Institut<sup>45</sup>. It can be seen from the BOM that CRM's are concentrated in a small number of main components, primarily the PCB and contacts and LED backlights. Sub-components can then be identified that would then require extraction in order to recover the CRM's.

<sup>44</sup> [http://susproc.jrc.ec.europa.eu/televisions/docs/Task\\_Special\\_Hazardous\\_Substances\\_docx.pdf](http://susproc.jrc.ec.europa.eu/televisions/docs/Task_Special_Hazardous_Substances_docx.pdf)

<sup>45</sup> Oeko-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

**Table 19: Indicative occurrence of high value metals and CRM's in electronic displays**

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

### Market potential for dismantling and CRM recovery

Whilst it is possible to identify components and sub-components for selective extraction it does not follow that their extraction is currently economically or technically feasible. Relevant market commentary on the potential for their recovery and recycling has therefore been briefly reviewed summarised in order to inform the identification of components and sub-components for which recycling is a realistic prospect either now or within the validity period for the Ecolabel criteria. The three main sources are Oeko-Institut<sup>46</sup>, JRC-IES<sup>47</sup> and WRAP<sup>48</sup>. Other sources are referenced where relevant.

The collection of WEEE in Europe has grown rapidly since the introduction of the WEEE Directive in 2003 and this is set to increase further as the recast WEEE Directive is transposed at a European level. Treatment centres tend to be a mixture of large processing centres handling a wide range of different types of WEEE and

<sup>46</sup> Oeko-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

<sup>47</sup> European Commission, *Report n° 2. Application of the project's methods to three product groups (final)*, JRC-IES, November 2 01 2

<sup>48</sup> WRAP, *Strategic raw materials, recovery capacity and technologies*, Final report, 26<sup>th</sup> March 2012, UK.

niche operators concentrating on a few or even single streams. Centres may consist of a combination of manual dismantling and sorting of components with bulk shredding and detoxification (e.g. mercury removal from LCD screens)<sup>49</sup>. Selected components may then be sent to specialist smelters (e.g. PCB's) or be subject to automatic or manual separation (e.g. plastics).

The main plastics fraction (e.g. PC/ABS casing), steel and aluminium chassis, alloy casings (painted or unpainted), external power cables and Printed Circuit Board's larger than 10 cm<sup>2</sup> are generally extracted and passed on to the relevant markets for materials recycling.

From a resource point of view, leading actors in the specialist metals and CRM market claim that some manual pre-treatment, including complete removal of PCBs and other components followed by subsequent recovery of the precious metals would enable a significantly more efficient recovery of various metals, CRM's and REE's<sup>50</sup>. Taking silver, gold and palladium as examples the recovery rate could be increased in selected scenarios from 12-26% to 90%.

A recent 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 the extent to which this can be taken to be representative of the picture across the EU.

### **Plastic casings**

The market value of a plastic casing containing flame retardants that meet a specified fire protection standard is not currently clear. JRC-IES states in their Ecodesign case study that plastics containing flame retardants are generally not recyclable after shredding, as evidenced by IEC 62635. A recent study on industry

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<sup>49</sup> Meskers.C.E.M and C.Hagelüken, *The impact of different pre-processing routes on the metal recovery from PC's*, Conference paper *Resource management and technology for material and energy efficiency*, EMPA Materials Science and Technology, September 2009.

<sup>50</sup> C. Hagelüken and C. E. M. Meskers, *Complex life cycles of precious and special metals*, Chapter 10 from *Linkages of Sustainability* (2010) Strüngmann Forum Report, Edited by Thomas E. Graedel and Ester van der Voet.

trials suggested that a purity rate up to 82% can be achieved for the separation of some plastics, as PC/ABS containing phosphorus FR's<sup>51</sup>. This result is based on optical and density-based sorting treatments of plastics after shredding.

Technically there is not understood to be a barrier to use of this recyclate, although the plastic and the incorporated FR must first be identified, and such separation for recycling is not yet commonplace. Despite the prevalence of shredding the recent REWARD/EFRA pilot study highlights the importance of plastics marking and the provision of information about the FR's used as being important to facilitate recovery and recycling<sup>52</sup>.

### **Printed Circuit Boards (PCB's)**

The main economic aim of recovering PCB's 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 wastes<sup>53</sup>.

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 oxidized metals remains bound in an inert slag. The indium contained in the displays is generally lost through dissipation<sup>54</sup>.

Several pilot and laboratory technologies have been already developed for Indium<sup>55</sup> and rare earths<sup>56</sup> recovery. However there are currently no large scale recycling

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<sup>51</sup> Peeters et al. (2013)

<sup>52</sup> EFRA (2013) *Recycling of plastics from LCD television sets*

<sup>53</sup> Van Kamp.M and A, Vasseur, *Raw materials sustainability: Collaborating towards a better world*, Presentation to the Future Circular Materials Expo, Sweden, 2013

<sup>54</sup> See Oeko Institut (2012)

<sup>55</sup> Kye-Sung Park, Wakao Sato, Guido Grause, Tomohito Kameda, Toshiaki Yoshioka. *Recovery of indium from  $In_2O_3$  and liquid crystal display powder via a chloride volatilization process using polyvinyl chloride*. *Thermochimica Acta* 2009

<sup>56</sup> See HydroWEEE projects

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 dependant 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, indium from WEEE by hydrometallurgical processes.

### **LED backlights**

The CRM's 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  $\mu\text{g}$ '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 an 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 sub-component that is readily identified and which is readily recyclable according to IEC 62635. 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.

### **Potential benefits of manual dismantling and time threshold for extraction of key components**

During 2013 JRC-IES carried out further 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 has been 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. JRC-IES's 2012 analysis together with the new analysis refers to electronic displays (TVs and monitor) with Liquid Crystal Display (LCD) currently at their end of life (EoL) but that have been designed in the past 5-8 years. According to manufacturing associations, modern displays have a significant lower mass and also their design for dismantling purposes has been improved.

The analysis has identified several possible thresholds for the total time taken to extract key components, differentiated according to different sizes of devices. The analysis focused on two types of key components in displays: Printed Circuit Boards (PCB) 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 is considered to introduce less uncertainty. Moreover, a requirement on the combined extraction of PCB and TFT panel 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. JRC-IES highlight that both types of backlight units can be configured as back-lit or side-lit units in the

screens<sup>57</sup>. Even though there is a large variety in their design<sup>58</sup>, LEDs are often mounted in 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.

### 3.4.2.3 Second proposal for disassembly and recycling criteria

Proposed revised criteria
<p><b>“Design for dismantling and recycling”</b></p> <p>For recycling purposes electronic displays shall be designed so that:</p> <p>(a) For the following components an efficient manual disassembly by one person in a specialised company shall be possible to carry out using common commercially available tools (i.e. pliers, screw-drivers, cutters and hammers as defined by ISO 5742, ISO 1174, ISO 15601):</p> <ul style="list-style-type: none"> <li>(i) Printed Circuit Boards &gt;10 cm<sup>2</sup></li> <li>(ii) Thin Film Transistor (TFT) unit &gt;100 cm<sup>2</sup> and film conductors</li> <li>(iii) Polymethyl Methacrylate (PMMA) board light guide</li> </ul> <p>(b) The time required for extract these components shall not exceed the following:</p> <ul style="list-style-type: none"> <li>(i) 220 seconds for display with a size smaller than 25 inches (diagonal screen size);</li> <li>(ii) 320 seconds for displays with a size greater than or equal to 25 inches and smaller than 40 inches (diagonal screen size);</li> <li>(iii) 480 seconds for displays with a size greater than or equal to 40 inches and smaller than 55 inches (diagonal screen size).</li> </ul> <p>(c) At least one of the following optional components shall also be efficiently manually disassembled with reporting of the additional time requirement based on the fastest identified sequence following on from (b):</p> <ul style="list-style-type: none"> <li>(i) LED backlight units</li> <li>(ii) Speaker unit magnets (for display sizes greater than or equal to 25 inches)</li> <li>(iii) HDD drive (if applicable in the case of smart devices)</li> </ul> <p><u>Assessment and verification:</u></p> <p>The applicant shall declare compliance with the requirements to the competent body.</p> <p>The applicant shall provide a ‘test disassembly report’ to the competent body including the adopted disassembly sequence (steps and procedures), identification of the optional components selected, the reported timings and the tools needed for the disassembly. Reference shall be made to the extraction timing method outlined in the user manual.</p> <p>The report may be submitted either in writing or in digital format, supported by photos, drawings and/or videos.</p> <p>The reported timings for disassembly and the related disassembly sequence shall be provided for verification by either:</p>

<sup>57</sup> European Commission, Joint Research Centre – Institute for Environment and Sustainability. Analysis of dismantlability draft 2014.

<sup>58</sup> 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.



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|------|---|
| (i)  | A third party, testing body.  |
| (ii) | A specialised recycling firm that is a permitted treatment operation in accordance with Article 23 of Directive 2008/98/EC. |

Major proposed changes:

- The heading has been changed from “design for disassembly and recycling” to “design for dismantling and recycling”.
- The threshold for the extraction of printed circuit boards has been lowered from 100 cm<sup>2</sup> to 10 cm<sup>2</sup> as this is in line with the relevant threshold of the current WEEE-Directive.
- The identification of components has been expanded and made more specific in order to reflect the LCA hot spots, CRM/REE occurrence and market potential identified by the follow-up research.
- A requirement on measuring the dismantling time is proposed. This criteria is currently analysed for its introduction into EU product policies, being an important proxy for the design for dismantling of EEEE and for the economic viability of manual dismantling processes. The threshold values proposed are estimated to be feasible for 20% of the products analysed by JRC-IES in a dismantling plant, subdivided into 3 screen size ranges. For TVs greater than 55” it was not possible to gather evidence to support timing. These TVs are therefore not considered for the thresholds of the time for dismantling (sub-criteria b), but still considered for the other sub-criteria a) and c).
- A separate list of components and, where relevant, sub-components that are more challenging to extract are also identified. It is proposed that in order to draw attention to their importance applicants shall demonstrate a timed extraction for a minimum number of these components or sub-components, which in some cases are specific to certain product form factors.
- Verification for the timed extraction of components is proposed to be flexible, with two alternative options presented - a third party option and a ‘real-life’ option in a WEEE treatment facility. It is proposed that the manufacturer establishes a suitable dismantling sequence for its product, and then uses this

as the basis for commissioning the testing/measurement of the timing (to verify compliance to the criteria). The testing would therefore be carried out by a third party knowing in advance the sequence suggested by the manufacturer.

- The potential for a manufacturer to self-verify in their own labs is not felt to be appropriate because it would represent optimised conditions whereas in real-life a dismantler may have to deal with a wide variety of models without the benefit of an OEM's familiarity with their own product.
- It is under analysis and discussion to develop a standardized method for the measurement of the timing of dismantling. The timing for this process is likely to extend beyond the programme for adoption of the new Ecolabel criteria for displays. In the interim a comparable method would therefore need to be outlined in the User Manual based on the work to date by JRC-IES<sup>59</sup>. Outline steps for the method are for example described in Box 1.

**Box 1: Outline steps for the measurement of the time for the extraction of certain target parts in electronic displays**

**Terms and definitions**

- *Target parts*: Parts and/or components that are targeted for the extraction process.

**Operating conditions for the extraction**

- *Extraction sequence to be followed*: The Extraction sequence to be followed has to be set out prior to the measurement. The sequence shall be documented and provided to the third party carrying out the extraction.
- *Tools for extraction*: The extraction operations should be performed using manual or power-driven standard tools.

**Extraction time measurement**

- *Measurement sample*: The sample of EEE to be used for the measurement shall be undamaged.
- *Measurement*: The extraction time measurement consists of the measurement with an instrument of the time elapsed between the starting of the first operation listed in the extraction sequence documentation and the end of the last one.

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<sup>59</sup> Joint Research Centre – Institute for Environment and Sustainability - “Analysis of dismantlability” - draft 2014

### 3.4.3 Criterion 4.3 – Packaging

#### Present criteria, only Decision 2011/337

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

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

*Assessment and verification:* a sample of the product packaging shall be provided on application, together with a corresponding declaration of compliance with this criterion. Only primary packaging, as defined in European Parliament and Council Directive 94/62/EC, is subject to the criterion.

#### Consultation questions

- The technical analysis and literature review of LCA studies (see Task 3) clearly shows that the packaging of computers and displays is of negligible relevance with regard to environmental impacts. Against this background it shall be discussed if this criterion should be retained?

#### 3.4.3.1 Stakeholder feedback and further evidence

According to written stakeholder feedback following the AHWG meeting on Televisions, one of the stakeholders states that the requirements set out should remain unchanged in order to ensure consistency with other EU policies.

Another stakeholder points out that this criterion is important because the consumer who buys the product could be very disappointed in the EU Ecolabel when the product is not packed in an environmentally sound way.

Further, written stakeholder feedback following the first AHWG meeting of *Computers* has been provided being also valid for the packaging of external computer displays and televisions:

- If it is decided to include packaging, a complete harmonization with EPEAT, the IEEE1680.2 standard is recommended.
- One of the MS stakeholders proposed to keep the criterion if it is feasible for the applicants. Given the amount of packaging from all computers sold the impact is not negligible (however insignificant). In order to ensure consistency with other EU policies, the requirements set out should remain unchanged.
- The requirements on plastic packaging in the different EU Ecolabel product groups are confusing, both quantitatively and qualitatively. The percentages vary from zero to 100 % of a variety of materials such as recycled material,

recyclable material, renewable material, biodegradable material, compostable material, etc.

- It should be proven that packaging has a major influence on the sustainability impact of the whole system (content + packaging) if criteria should be set. For computers, as for many other energy using products, the impact of the packaging over the full life cycle is usually marginal. The technical analysis and literature review of LCA studies clearly shows that the packaging of computers<sup>60</sup> is of negligible relevance with regard to environmental impacts. If this is true and the EU Ecolabel criteria should address main environmental impacts, then there should not be criteria on packaging.
- There are strong doubts on the feasibility of this requirement regarding a minimum percentage of recycled material for packaging. The proposed percentage is definitely too high for plastics and for many other packaging materials. A fixed minimum percentage of recycled material for the different plastics used in packaging is neither feasible nor acceptable for the industry, because it does not allow guaranteeing the required level of quality and performance. A lower performance of the packaging will result in increased likelihood of damaging the packed product, and hence will increase the amount of waste. Such a criterion would discriminate/exclude most plastics from being used as packaging materials for this product group.
- The use of recycled material is environmentally beneficial only if: material losses in the recycling loop are limited; the substitution ratio is higher than about 0.7 (i.e. 1 part of recycled material replacing about 0.7 parts of virgin material). When the virgin material performance is improved in such a way that the thickness can be reduced, then the use of recycled material may become environmentally more damaging. We are very sceptical about using recycled content as a criterion for plastic packaging in EU Ecolabel criteria. Also for

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<sup>60</sup> Explanatory note of the study team: This fact is also valid for external computer displays and televisions, see Task 3 report on Technical analysis;  
<http://susproc.jrc.ec.europa.eu/televisions/stakeholders.html>

packaging, a life-cycle benefit from used recycled materials cannot automatically be assumed, but would be dependent on the plastics type and the impacts of the collection/recycling process. Besides, computers<sup>61</sup> are not packaged on 'plastic bags'. They may be protected by a plastic film which must ensure effective protection from humidity, dust, etc. Using recycled material in such relatively thin, but very protective, films may not be possible. Since we do not see any comparative life cycle analysis showing that the requirement of "at least, 75% recycled material", is beneficial for the environment, we ask to remove this requirement.

- Comments on "biodegradable or compostable" plastic bags for packaging: Biodegradability or compostability, according to EN 13432, is not a guarantee of superior environmental performance. It only guarantees that the material, if discarded in the right waste fraction, collected and adequately managed, will disappear as water and CO<sub>2</sub>, which means no resource saving. The inadequately managed fraction that will end in landfill will generate methane. Methane is a greenhouse gas more than 20 times more powerful than CO<sub>2</sub>. We advise using for packaging the most sustainable packaging material as proven by a life-cycle analysis for the respective application. Recycling content or biodegradability can be part of a life-cycle analysis, but per se they are no indicators for a more sustainable or "greener" packaging. It is questionable whether biodegradable packaging for computers brings any environmental advantage. We wonder where the life cycle assessments are, guaranteeing that these two criteria will reduce the impact on the environment. Again, by lack of scientific proof, we ask to remove the requirements for biodegradable and compostable material.

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<sup>61</sup> Explanatory note of the study team: This fact is also valid for external computer displays and televisions.

### Further research and evidence

#### **Compostable plastics**

The term “biodegradable” is not equivalent to “compostable”. Whereas biodegradability is an inherent property that is independent of time and space, compostability is specifically related to the conditions in a composting plant. Compostability is the capability of biological degradation in a defined time under controlled conditions in a composting plant. The European standard (EN 13432 standard for bioplastic packagings and EN 14995 for plastic waste) requires 90% degradation within 90 days.

According to UBA (2012) there was criticism because typical rotting times in reality are often shorter than 12 weeks, the period for which biodegradability was tested. In these cases it was possible that packaging components were not fully degraded thus decreasing the value of the compost. Even if biodegradable plastics are fully degraded they do not have an added value from ecological perspective as they disintegrate into water and CO<sub>2</sub> and do not provide any nutrients to the compost<sup>62</sup>. Relating to the energy balance composting is not effective as no energy is recovered as long as it does not go into biogas production systems where energy can partly be recovered. However, according to an interview with an expert from the German Federal Environment Agency (UBA)<sup>63</sup>, the separation techniques of composting plants are not so elaborated that they can distinguish between conventional and biodegradable plastics. Plastics are generally disturbing and thus sorted out.

#### **Biodegradable plastics**

A current study commissioned by the German Federal Environment Agency “Analysis of the environmental impact of biodegradable plastic packaging” evaluated

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<sup>62</sup> Source: Interview with Franziska Krüger, expert for plastic recycling at German Federal Environment Agency (UBA); cf. [http://www.planet-wissen.de/alltag\\_gesundheit/werkstoffe/kunststoff/biokunststoffe.jsp](http://www.planet-wissen.de/alltag_gesundheit/werkstoffe/kunststoff/biokunststoffe.jsp)

<sup>63</sup> Source: [http://www.deutschlandfunk.de/mogelpackung-bioplastiktuete.697.de.html?dram:article\\_id=78835](http://www.deutschlandfunk.de/mogelpackung-bioplastiktuete.697.de.html?dram:article_id=78835)

a total of 85 life cycle assessments, studies and professional articles with a view to all of the environmental pros and cons of every type of packaging (UBA 2012)<sup>64</sup>.

The study resulted that biodegradable plastics used in packaging, which are made from renewable biomass sources, do not prove to offer an overall ecological advantage. Whereas their CO<sub>2</sub> emissions and consumption of petroleum of bioplastics are lower, they are negative in a number of other environmental areas particularly through the use of fertilisers: The farming and processing of the plants used in packaging cause more severe acidification of soil and eutrophication of water bodies than the production of common plastic packaging. Moreover, they cause higher levels of particulate emissions.

Further, the study revealed that packaging made of biodegradable plastics was also unsuccessful in retail. During the 2009 period covered in the study, the market share of bioplastics packaging was a maximum of 0.5 per cent. Germany consumed a total of 2,645 million tonnes of plastic packaging in 2009.

The study was commissioned to determine whether the special provisions for biodegradable plastic packaging introduced by the German Packaging Ordinance are still defensible from an ecological viewpoint. The overall conclusion of the study was that bioplastic bags have no ecological advantages over common plastic bags. Reusable bags made of fabrics and other durable materials are in fact the real ecological alternative.

#### 3.4.3.2 *Second proposal for packaging criteria*

##### **Proposed revised criteria (second proposal)**

###### **“Packaging”**

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

Where plastics are used for the final outer packaging, they shall be made of at least 75 % recycled material. Plastics used for protectively covering the product within the outer packaging are exempted from this requirement.

*Assessment and verification:* A sample of the product packaging shall be provided on application, together with a corresponding declaration of compliance with this criterion. Only primary packaging, as defined in European Parliament and Council Directive 94/62/EC, is subject to the criterion.

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<sup>64</sup> Cf. <http://www.umweltbundesamt.de/en/press/pressinformation/bioplastics-not-superior>; study: <http://www.umweltbundesamt.de/sites/default/files/medien/461/publikationen/4446.pdf>

Major proposed changes

- According to stakeholder feedback and further evidence, it is proposed to delete the requirement concerning biodegradable or compostable plastic materials as they did not prove to be of environmental benefit.
- Regarding the requirement of using recycled plastic materials, an exemption has been added for plastic materials that are used for protecting the electronic display against damage (e.g. shock absorbance).

WORKING DOCUMENT



### 3.5 Cluster 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 shall be discussed if the revision of the EU ecolabel for electronic displays shall also introduce new requirements on corporate responsibility, meaning that they cannot be implemented and verified at product level but need to be implemented already at production level, possibly already during production stages not carried out by the applicant himself.

#### 3.5.1 Criterion 5.1 – Labour conditions during manufacture

##### Proposed options for a new criterion (first proposal)

###### Option (a): No social criteria at all

###### Option (b): Social labour conditions during manufacture

The applicant must have a code of conduct or a comparable policy that requires adherence to the core labour standards of the International Labour Organisation (ILO Core Labour Standards). This code of conduct and/or policy must also address the assembly-stage of the production even in cases the assembly is not carried out by the applicant. The applicant must ensure that the code of conduct is communicated to all suppliers / subcontractors (up to the level of product assembly) together with a requirement that these shall also comply with a code of conduct that follows the ILO Core Labour Standards.

Assessment and verification: The applicant shall declare the compliance with these requirements and shall provide a copy of the code of conduct and a description of the implementation process at suppliers/sub-contractors (up until assembly) to the competent body.

###### Option (c): Social labour conditions during manufacture

Fundamental principles and rights with respect to the universal human rights, as specified in the applicable core labour standards of the International Labour Organisation (ILO Core Labour Standards) shall be complied with during manufacture (assembly) of the European eco-labelled products.

Assessment and verification:

Option (1): The applicant shall declare the compliance with these requirements to the competent body.

Option (2): The applicant shall declare the compliance with these requirements to the competent body and provide evidence by third-party verified certification of the production sites (up until assembly), e.g. by SA8000.

Note: Requirements regarding the social labour conditions during manufacturing are difficult to integrate in ecolabel criteria, especially in terms of assessment and verification. Examples from the past show that the reputation of the overall Ecolabel might be at risk if breaches of social labour conditions of ecolabelled products become known.

For more details cf. Task 4 report “Improvement Potential”, section 4.2.5.1 “General CSR criteria: Challenges for the implementation into ecolabels”.

#### Consultation questions

- Should a criterion addressing labour conditions be included?
- Which further social aspects might be required beyond the ILO Core Labour Standards (e.g. wages, working time, occupational health & safety)?
- Are there specific hot spots in the supply chain that might provide for a more focused criterion? (see also proposed criteria 5.3)
- Which verification mechanisms shall apply in order to best ensure compliance with the required criteria?

#### 3.5.1.1 Stakeholder feedback and further evidence

According to written stakeholder feedback following the AHWG meeting, the inclusion of such a criterion is explicitly supported by more than one of the stakeholders.

One of the stakeholders prefers a step by step approach and therefore starting with option b). It is asked to verify the costs of these certifications suspected to be very expensive with “SA8000 certifications of 10,000 € per production site for three years”. This is supported by another stakeholder preferring to rely on EICC audits for 3rd party certification scheme rather than SA 8000 mentioned in the proposed criterion. It would be good for EICC audits to be also mentioned as an example considering they are highly effective and widely used in the electronics industry.

In general, one of the stakeholders asks to have a uniform approach how to write the social criteria in different criteria documents.

Finally, the criterion is asked to be aligned with the result from the horizontal task force on social aspects when they have a result.

Further, written stakeholder feedback following the first AHWG meeting of *Computers* has been provided being also valid for labour conditions during the manufacture of external computer displays and televisions:

- The inclusion of a criterion on labour conditions seems to be generally supported by the stakeholders.
- It is asked to have a uniform approach how to write the social criteria in different criteria documents.

- The criterion is welcomed by one of the CBs preferring either option b) or c) with sub-option 1. Also from the outcomes of the “Horizontal Task Force on social and ethical criteria for the EU Ecolabel- March 2013”, it is understood that third-party verification can be way too expensive (“SA 8000: 10,000 € per production site for three years”).
- One of the MS stakeholders is in favour of option (b) as it sets a standard but doesn't put an excessive burden on the applicant to prove compliance with it. Verification by a third party is proposed to be demanded perhaps in the next revision period.
- According to feedback from a manufacturer it should be further discussed if one incident related to one applicant for the TCO ecolabel should lead to the conclusion not to require social criteria for computers at all. The positive side of the TCO social criteria is that there are now 15 companies that have certified displays for which compliance to these social criteria is a condition (criteria version 6.0). All of these companies have worked hard to demonstrate compliance to these requirements by annually showing an independent external audit report. Thus the inclusion of social criteria into the EU Ecolabel is supported. If included, a complete harmonization with TCO is recommended.
- CSR criteria should at least be in line with public and private procurement demands and for credibility be 3rd party verified. CSR is either a progressive approach such as EICC code of conduct and validated audit process for members or SA8000 certification of factories (not headquarters) where a certain standard is reached before certification is issued. Global compact and GRI do not guarantee a level of implementation at factory level without factory audits. EICC membership does not assure a level of implementation at factory level that is controlled by a 3rd party. If the progressive improvement methodology is chosen then to move forward from adopting principles, an agreement should be entered where the brand follows a code of conduct that is based on labour standards and principles that includes social and ethical production and where also exists a structured CSR policy of control routines for monitoring their

production facilities. CSR demands as these create a tool for brands and facilitate the sharing of information between the supplier, purchaser and a 3rd party (“3 way interest group”). At a stage of setting a minimum level of verified social commitment, progressive improvement is not a proof of good working conditions but it should be seen as a phase of ambitious 3rd party follow-up audits that communicates to stakeholders that social issues are important.

- To not push the industry into CSR for the reason of avoiding criticism is seen as sending the wrong signal to stakeholders.
- TCO Certified is 3rd party verified. If compliance is questioned (as one incident has been at TCO) then it in part is often dependent on a misunderstanding that can lead to a productive dialogue and perhaps future criteria improvements. TCO Development, as part of a watchdog system, is dependent on external information and will open a dialogue with informants and - if there are causes - start an investigation into the claims.
- It is recommended to avoid the phrase ‘guarantee compliance’ as this cannot be done without progressive improvement. It should be worked from the base up to know where to bring about positive change in the facilities where the certified products are manufactured.
- It has to be clearly communicated, to which tier of the supply chain the criteria are addressed to bring progressive improvement and where reasonable efforts are accepted. A network of approved 3rd party expert CSR verifiers will be needed to control the quality of the 3rd party audits are in line with demands and can review corrective action plans (CAPs) for their corrective effectiveness.
- The suggestion of being involved in other initiatives which more target the most relevant social hot spots could be a good approach, however brands may be unwilling to accept yet another initiative involvement, so there is the need to assess those where they are already involved in. Perhaps this is an option that should be included as a complementary option to conducting audits, such as the proposed tier (optional) scheme.

- There is no mention of the advancements created by the new TCO Certified CSR criteria: It is communicated to the stakeholders that social issues are important by setting a minimum level of verifying social commitment. It is communicated that TCO Development is primarily verifying the brand owner's procedures for promoting legal and human labour standards throughout the supply chain as specified in the mandate, but control audits for now are limited to the final production (1st tier). Here a brand shall conduct independent audits and address all findings (violations to the TCO mandate) with a corrective action plan (CAP). To date TCO Development cannot guarantee that violations don't occur but they are verifying a structured CSR policy and control routines toward production facilities. By entering in an agreement with TCO Development the brand agrees to annual 3rd party audits at supply factories and the sharing of audit reports, findings and corrective actions plans between the buyer, supplier and 3rd party (TCO Development and approved assessors) and also spot checks. It has taken some brands over 1.5 years to implement the necessary changes to their Code of Conducts and production control routines to be in-line with TCO Certified (even though brands have been involved with more established CSR initiatives for a long time). To date there are 17 brands TCO Development works with and requires that they annually demonstrate their commitment toward improving working conditions for socially responsible production at supplier level.

#### Further research and evidence

The international **standard SA8000**<sup>65</sup> is an auditable certification standard. Based on international workplace norms of International Labour Organisation (ILO) conventions, the Universal Declaration of Human Rights and the UN Convention on the Rights of the Child, it entails nine elements to measure social compliance (cf. Table 20). The third party accredited certification scheme foresees audits being conducted by approved SA8000 auditors.

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<sup>65</sup> See <http://www.sa-intl.org/index.cfm?fuseaction=Page.ViewPage&PageID=937>

**Table 20: SA8000 standard and their basis of ILO fundamental and further labour conventions**

SA8000	8 ILO fundamental labour conventions	Further ILO labour conventions relevant to SA8000 implementation and auditing
<p><b>Child Labour:</b> No use or support of child labour; policies and written procedures for remediation of children found to be working in situation; provide adequate financial and other support to enable such children to attend school; and employment of young workers conditional.</p>	<ul style="list-style-type: none"> <li>• <b>Minimum Age</b> Convention (No. 138)</li> <li>• <b>Worst Forms of Child Labour</b> Convention (No. 182)</li> </ul>	
<p><b>Forced and Compulsory Labour:</b> No use or support for forced or compulsory labour; no required 'deposits' - financial or otherwise; no withholding salary, benefits, property or documents to force personnel to continue work; personnel right to leave premises after workday; personnel free to terminate their employment; and no use nor support for human trafficking.</p>	<ul style="list-style-type: none"> <li>• <b>Forced Labour</b> Convention (No. 29)</li> <li>• <b>Abolition of Forced Labour</b> Convention (No. 105)</li> </ul>	
<p><b>Health and Safety:</b> Provide a safe and healthy workplace; prevent potential occupational accidents; appoint senior manager to ensure OSH; instruction on OSH for all personnel; system to detect, avoid, respond to risks; record all accidents; provide personal protection equipment and medical attention in event of work-related injury; remove, reduce risks to new and expectant mothers; hygiene- toilet, potable water, sanitary food storage; decent dormitories- clean, safe, meet basic needs; and worker right to remove from imminent danger.</p>		<ul style="list-style-type: none"> <li>• Occupational Safety and Health Convention (No. 155)</li> <li>• Occupational Health Services Convention (No. 161)</li> <li>• Safety in the Use of Chemicals at Work Convention (No. 170); Prevention of Major Industrial Accidents Convention (No. 174)</li> <li>• Asbestos Convention (No. 162); White Lead (Painting) Convention (No. 13); Radiation Protection Convention (No. 115); Benzene Convention (No. 136)</li> <li>• Occupational Cancer Conv. (No. 139); Guarding of Machinery Conv. (No. 119); Maximum Weight Conv. (No. 127); Maternity Protection Conv. (No. 183 rev.); Medical Examination of Young Persons (Industry) Conv. (No. 77)</li> </ul>
<p><b>Freedom of Association and Right to Collective Bargaining:</b> Respect the right to form and join trade unions and bargain collectively. All person-</p>	<ul style="list-style-type: none"> <li>• <b>Freedom of Association</b> and</li> </ul>	<ul style="list-style-type: none"> <li>• Workers' Representatives Convention (No. 135)</li> </ul>

SA8000	8 ILO fundamental labour conventions	Further ILO labour conventions relevant to SA8000 implementation and auditing
<p>nel are free to: organize trade unions of their choice; and bargain collectively with their employer. A company shall: respect right to organize unions &amp; bargain collectively; not interfere in workers' organizations or collective bargaining; inform personnel of these rights &amp; freedom from retaliation; where law restricts rights, allow workers freely elect representatives; ensure no discrimination against personnel engaged in worker organizations; and ensure representatives access to workers at the workplace.</p>	<p>Protection of the Right to Organise Convention (No. 87)</p> <ul style="list-style-type: none"> <li>• Right to Organise and <b>Collective Bargaining</b> Convention (No. 98)</li> </ul>	<ul style="list-style-type: none"> <li>• Collective Bargaining (No. 154)</li> </ul>
<p><b>Discrimination:</b> No discrimination based on race, national or social origin, caste, birth, religion, disability, gender, sexual orientation, union membership, political opinions and age. No discrimination in hiring, remuneration, access to training, promotion, termination, and retirement. No interference with exercise of personnel tenets or practices; prohibition of threatening, abusive, exploitative, coercive behaviour at workplace or company facilities; no pregnancy or virginity tests under any circumstances.</p>	<ul style="list-style-type: none"> <li>• <b>Discrimination</b> (Employment and Occupation) Convention (No. 111)</li> <li>• <b>Equal Remuneration</b> Convention (No. 100)</li> </ul>	<ul style="list-style-type: none"> <li>• Workers with Family Responsibilities Conv. (No. 156); Vocational Rehabilitation and Employment (Disabled Persons) Conv. (No. 159); Indigenous and Tribal Peoples Conv. (No. 169); Maternity Protection Conv. (No. 183); Migration for Employment Conv. (No. 97 rev.); Night Work (Women) Convention (Nr. 89 rev.)</li> </ul>
<p><b>Disciplinary Practices:</b> Treat all personnel with dignity and respect; zero tolerance of corporal punishment, mental or physical abuse of personnel; no harsh or inhumane treatment.</p>		
<p><b>Working Hours:</b> Compliance with laws &amp; industry standards; normal work-week, not including overtime, shall not exceed 48 hours; 1 day off following every 6 consecutive work days, with some exceptions; overtime voluntary, not regular, not &gt; 12 h/w; required overtime only if negotiated in CBA.</p>		<ul style="list-style-type: none"> <li>• Hours of Work (Industry) Convention (No. 1)</li> </ul>
<p><b>Remuneration:</b> Respect right of personnel to living wage; all workers paid at least legal minimum wage; wages sufficient to meet basic needs &amp; provide discretionary income; deductions not for disciplinary purposes, with some exceptions; wages and benefits clearly communicated to workers; paid in convenient manner – cash or check form; overtime paid at premium rate; prohibited use of labour-only contracting, short-term contracts, false apprenticeship schemes to avoid legal obligations to personnel.</p>		<ul style="list-style-type: none"> <li>• Minimum Wage Fixing Convention (No. 131)</li> </ul>
<p><b>Management Systems:</b> Facilities seeking to gain&amp;maintain certification must go beyond simple compliance to integrate the standard into their management systems &amp; practices.</p>		

The SA8000 standard includes the **eight fundamental labour conventions but goes far beyond them** including also principles on health and safety, disciplinary practices, working hours, remuneration (by especially addressing “living wages” and “overtime payment” linking to some major hot spots of the ICT manufacturing industry) and management systems.

Further, the standard strives towards **feasible implementation** of; for example, the Principle on Freedom of Association and Right to Collective Bargaining. In situations where the Right to freedom of association and collective bargaining are restricted under law, SA8000 standard still requires companies to allow workers to freely elect their own representatives. Furthermore, in cases where above mentioned fundamental rights are restricted under law SA8000 still requires that employers, as to the actions of their companies and suppliers, have the responsibility to allow the workplace to be one where workers can fully and without fear of retaliation exercise their right to unimpeded collective representation<sup>66</sup>. No discrimination against personnel being engaged in worker organizations shall be ensured; and representatives’ access to workers at the workplace shall be ensured. With these specific additions and amendments to the ILO Core Labour standards, being able to be applied to any company, of any size, anywhere in the world, the SA8000 standard is viewed as the most globally accepted independent workplace standard<sup>67</sup>.

According to EICC (2012)<sup>68</sup>, the industry initiative Electronic Industry Citizenship Coalition’s **(EICC) code of conduct** is applied by 60 manufacturers which voluntarily committed to ensure that working conditions in the electronics industry supply chain are safe, that workers are treated with respect and dignity, and that business operations are environmentally responsible and conducted ethically. However, WSI (2012)<sup>69</sup> identified some significant weaknesses of the EICC code of conduct:

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<sup>66</sup> SA8000 © Consolidated Guidance – Freedom of Association and Right to Collective Bargaining

<sup>67</sup> Cf. [www.sgs.com/~media/Global/Documents/Brochures/SGS\\_SSC\\_NG\\_SA\\_8000\\_web\\_LR.pdf](http://www.sgs.com/~media/Global/Documents/Brochures/SGS_SSC_NG_SA_8000_web_LR.pdf)

<sup>68</sup> Cf. <http://www.eicc.info/documents/EICCCodeofConductEnglish.pdf>

<sup>69</sup> WSI (2012): Wirtschafts- und Sozialwissenschaftliches Institut (WSI) in der Hans-Böckler-Stiftung: Öffentliche Beschaffung von IT-Mitteln (PCs) unter Berücksichtigung sozialer Kriterien; WSI-Diskussionspapier Nr. 183. Düsseldorf, 2012. Cf. [http://www.boeckler.de/index\\_wsi.htm](http://www.boeckler.de/index_wsi.htm)



- 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.
  - Especially regarding the Freedom of Association and Right to Collective Bargaining, the EICC codex falls behind the ILO and the SA8000 standards.
  - Further, the codex only implies regional minimum wages and not wages sufficient to meet basic needs (“living wages”).
  - The right on employment security is not included at all.
- The monitoring is mainly based on self-evaluation; a systematic independent external audit is not part of the codex. In the monitoring process, no independent trade unions or labour rights organisations are included. Controls of the self-evaluation of suppliers are only taking place on a random basis.

The current **CSR criteria of TCO Development** include ILOs eight core conventions 29, 87, 98, 100, 105, 111, 138, and 182, the UN Convention on the Rights of the Child, Article 32, the health and safety legislation in force in the country of manufacture, and the labour law, including rules on minimum wage and the social security protection in the manufacturing country. 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 verification mechanism is based on four different options (a) to (d):

- (a) The Brand owner is a member of EICC and provides documented proof of third party audits conducted at production facilities of TCO certified products.
- (b) The Brand owner is SA8000 certified **or** carrying out the production at SA8000 certified facilities and provides documented proof of third party audits conducted at production facilities of TCO certified products.
- (c) The Brand owner shall complete the self-documentation according to a questionnaire provided by TCO Development and provide documented proof of third party audits conducted at production facilities of TCO certified products.
- (d) The Brand owner applies for a 12 month grace period by sub-mitting a signed declaration stating which option above (a, b or c) shall be implemented by them and an estimation of when all the necessary documented proof will be available.

According to WSI (2012)<sup>69</sup>, the linkage to the eight ILO core conventions, the explicit addressing of options in cases where freedom of association and collective bargaining are restricted under law, as well as the more explicitly regulated monitoring approach go far beyond that of EICC. However, WSI (2013) sees optimization potential with regard to the following aspects:

- In case of weaker national laws, the TCO standards are hardly going beyond the ILO core conventions as for example aspects as living wages or social security are not addressed.
- Option (b) allows the interpretation or possibility that a headquarter of a brand company, situated in a Western developed country, could be SA8000 certified to fulfil the criteria on verification.

From perspective of Germanwatch, an independent development and environmental organization in Germany with focus and deep expertise on CSR activities in the supply chain, which has been interviewed by the study team on 19 March 2014, membership in EICC and self-declaration would not be a sufficient option as verification mechanism.

### 3.5.1.2 *Second proposal for social supply chain criteria*

<b>Proposed new criterion (second proposal, Option A)</b>
<p><b>'Labour conditions during manufacturing' (required)</b></p> <p>The applicant shall demonstrate that the product is manufactured under working practices that promote good labour relations and working conditions by proving that more than 90% of the first-tier suppliers (final product assembly) comply with the following ILO Conventions:</p> <p>a) <b>Child Labour:</b></p> <ul style="list-style-type: none"> <li>i. ILO Core Convention "Minimum Age" (No. 138)</li> <li>ii. ILO Core Convention "Worst Forms of Child Labour" (No. 182)</li> </ul> <p>b) <b>Forced and Compulsory Labour:</b></p> <ul style="list-style-type: none"> <li>i. ILO Core Convention "Forced Labour" (No. 29)</li> <li>ii. ILO Core Convention "Abolition of Forced Labour" (No. 105)</li> </ul> <p>c) <b>Freedom of Association and Right to Collective Bargaining:</b></p> <ul style="list-style-type: none"> <li>i. ILO Core Convention "Freedom of Association and Protection of the Right to Organise" (No. 87)</li> <li>ii. ILO Core Convention "Right to Organise and Collective Bargaining" (No. 98)</li> </ul> <p>d) <b>Discrimination:</b></p> <ul style="list-style-type: none"> <li>i. ILO Core Convention "Discrimination (Employment and Occupation)" (No. 111)</li> <li>ii. ILO Core Convention "Equal Remuneration" (No. 100)</li> </ul> <p>e) <b>Working Hours:</b></p> <ul style="list-style-type: none"> <li>i. ILO Convention "Hours of Work (Industry)" (No. 1)</li> </ul>

f) **Remuneration:**

- 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; with reference to SA8000 Consolidated Guidance “Remuneration” regarding definition, implementation, auditing and evidence of compliance

Assessment and verification:

The applicant shall declare compliance with these requirements to the Competent Body providing the copies of the certificates of Accredited Certification Bodies (CBs) accredited by Social Accountability Accreditation Services (SAAS) showing the compliance with the above requirements in more than 90% of the first-tier suppliers (final product assembly).

Additionally, the applicant shall provide to the Competent Body

- A list of first-tier suppliers representing at least 90% of procurement expenditure for final product assembly of computers.
- The independent social audit reports to verify that he is fulfilling its obligations according to this mandate.

Additionally, the applicant shall publish the independent social audit reports of the first-tier suppliers online to provide evidence to interested consumers.

Major proposed changes

- Despite feedback from manufacturers asking for a “slight” version not putting an excessive burden on the applicant to prove compliance with the criteria (i.e. code of conduct, self-declaration), the study team recommends – when implementing criteria on labour conditions during manufacturing into the EU Ecolabel at all – these should be adequate, effective and verifiable.
- According to expert judgement, a basic linkage to the 8 fundamental ILO labour conventions and the (often weaker) national labour laws would not be sufficient enough to address the social hot spots being specific to computers’ manufacturing processes, especially those on working hours and remuneration.
- Thus, as minimum criteria the 8 ILO core conventions are proposed, added by two further ILO conventions on working hours and remuneration, together with an independent third-party auditing scheme.
- 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:

- 1. “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;
- 2. 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 SA8000<sup>70</sup>, they experienced that in most countries these two considerations are odds and may not be weighted equally in the determination of the minimum wage. To attract foreign investment and international buyers, countries may emphasize economic growth and development. Minimum wages are often set to compete with low cost suppliers in other countries and not to promote workers’ interests. Therefore, many countries have minimum wage levels that do not meet the basic needs of workers and their families. 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. Due to this reason, the proposed EU Ecolabel criteria include an additional requirement on “living wage” being sufficient to meet the basic needs of personnel and to provide some discretionary income. For definition of “living wages”, interpretations, implementation, auditing and evidence of compliance, reference is made to the SA8000 Consolidated Guidance on Remuneration<sup>71</sup>.

- Regarding assessment and verification, the fulfilment of requirements shall be verified by providing certificates of independent accredited certification bodies.
- The social requirements are proposed not to address the whole supply chain but only first-tier suppliers (final product assembly). This is due to the fact that first-tier suppliers (contract manufacturers) more and more act vertically within the supply chain from purchasing to final assembly (cf. WKI 2012). Further,

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<sup>70</sup> Source: [http://www.sa-intl.org/\\_data/n\\_0001/resources/live/SA8000Remuneration.pdf](http://www.sa-intl.org/_data/n_0001/resources/live/SA8000Remuneration.pdf)

<sup>71</sup> See [http://www.sa-intl.org/\\_data/n\\_0001/resources/live/SA8000Remuneration.pdf](http://www.sa-intl.org/_data/n_0001/resources/live/SA8000Remuneration.pdf)

social aspects regarding hotspots of raw materials extraction will be addressed more specifically by criterion 5.2 '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 suppliers<sup>72</sup>) would facilitate 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.

**Proposed new criterion (second proposal, Option B)**

**'Labour conditions during manufacturing' (optional)**

The applicant shall demonstrate that the product is manufactured under working practices that promote good labour relations and working conditions by proving that more than 90% of the first-tier suppliers (final product assembly) comply with the following principles (derived from SA8000, including ILO all fundamental as well as further relevant labour conventions):

- a) **Child Labour:** No use or support of child labour; policies and written procedures for remediation of children found to be working in situation; provide adequate financial and other support to enable such children to attend school; and employment of young workers conditional.
- b) **Forced and Compulsory Labour:** No use or support for forced or compulsory labour; no required 'deposits' - financial or otherwise; no withholding salary, benefits, property or documents to force personnel to continue work; personnel right to leave premises after workday; personnel free to terminate their employment; and no use nor support for human trafficking.
- c) **Health and Safety:** Provide a safe and healthy workplace; prevent potential occupational accidents; appoint senior manager to ensure OSH; instruction on OSH for all personnel; system to detect, avoid, respond to risks; record all accidents; provide personal protection equipment and medical attention in event of work-related injury; remove, reduce risks to new and expectant mothers; hygiene- toilet, potable water, sanitary food storage; decent dormitories- clean, safe, meet basic needs; and worker right to remove from imminent danger.
- d) **Freedom of Association and Right to Collective Bargaining:** Respect the right to form and join trade unions and bargain collectively. All personnel are free to: organize trade unions of their choice; and bargain collectively with their employer. A company shall: respect right to organize unions & bargain collectively; not interfere in workers' organizations or collective bargaining; inform personnel of these rights & freedom from retaliation; where law restricts rights, allow workers freely elect representatives; ensure no discrimination against personnel engaged in worker organizations; and ensure representatives access to workers at the workplace.
- e) **Discrimination:** No discrimination based on race, national or social origin, caste, birth, religion, disability, gender, sexual orientation, union membership, political opinions and age. No discrimination in hiring, remuneration, access to training, promotion, termination, and retirement. No interference with exercise of personnel tenets or practices; prohibition of threatening, abusive, exploitative, coercive behaviour at workplace or company facilities; no pregnancy or virginity tests

<sup>72</sup> Cf. <http://www.apple.com/supplier-responsibility/our-suppliers/> and [http://images.apple.com/supplier-responsibility/pdf/Apple\\_Supplier\\_List\\_2014.pdf](http://images.apple.com/supplier-responsibility/pdf/Apple_Supplier_List_2014.pdf)

under any circumstances.

- f) **Disciplinary Practices:** Treat all personnel with dignity and respect; zero tolerance of corporal punishment, mental or physical abuse of personnel; no harsh or inhumane treatment.
- g) **Working Hours:** Compliance with laws & industry standards; normal work-week, not including overtime, shall not exceed 48 hours; 1 day off following every 6 consecutive work days, with some exceptions; overtime voluntary, not regular, not > 12 h/w; required overtime only if negotiated in CBA.
- h) **Remuneration:** Respect right of personnel to living wage; all workers paid at least legal minimum wage; wages sufficient to meet basic needs & provide discretionary income; deductions not for disciplinary purposes, with some exceptions; wages and benefits clearly communicated to workers; paid in convenient manner – cash or check form; overtime paid at premium rate; prohibited use of labour-only contracting, short-term contracts, false apprenticeship schemes to avoid legal obligations to personnel.
- i) **Management Systems:** Facilities seeking to gain and maintain certification must go beyond simple compliance to integrate the standard into their management systems & practices.

Assessment and verification:

The applicant shall declare compliance with these requirements to the Competent Body providing the copies of the certificates of Accredited Certification Bodies (CBs) accredited by Social Accountability Accreditation Services (SAAS) showing the compliance with the above requirements in more than 90% of the first-tier suppliers (final product assembly).

Additionally, the applicant shall provide to the Competent Body

- A list of first-tier suppliers representing at least 90% of procurement expenditure for final product assembly of computers.
- The independent social audit reports to verify that he is fulfilling its obligations according to this mandate.

Additionally, the applicant shall publish the independent social audit reports of the first-tier suppliers online to provide evidence to interested consumers.

Major proposed changes

- Despite feedback from manufacturers asking for a “slight” version not putting an excessive burden on the applicant to prove compliance with the criteria (i.e. code of conduct, self-declaration), the study team recommends – when implementing criteria on labour conditions during manufacturing into the EU Ecolabel at all – these should be adequate, effective and verifiable.
- According to expert judgement, a basic linkage to the 8 fundamental ILO labour conventions and the (often weaker) national labour laws would not be sufficient enough to address the social hot spots being specific to computers’ manufacturing processes.
- On the other hand, the nine elements of the SA8000 standard, based on the 8 ILO core conventions but adding further relevant requirements and providing modified options for cases where the national law restricts those rights, together

with an independent third-party auditing scheme, are seen as best practicable option to date. Thus, a general linkage to the nine principles as used by the SA8000 standard builds the basis for this criterion, however not referencing to SA8000 directly.

- Regarding assessment and verification, the fulfilment of requirements shall be verified by providing certificates of independent accredited certification bodies.
- The social requirements are proposed not to address the whole supply chain but only first-tier suppliers (final product assembly). This is due to the fact that first-tier suppliers (contract manufacturers) more and more act vertically within the supply chain from purchasing to final assembly (cf. WKI 2012). Further, social aspects regarding hotspots of raw materials extraction will be addressed more specifically by criterion 5.2 '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 suppliers<sup>73</sup>) would facilitate 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.

Complying with the principles of SA8000 is proposed not to be defined as minimum requirement / exclusion criteria but as option for complying manufacturers to highlight this fact besides the label.

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<sup>73</sup> Cf. <http://www.apple.com/supplier-responsibility/our-suppliers/> and [http://images.apple.com/supplier-responsibility/pdf/Apple\\_Supplier\\_List\\_2014.pdf](http://images.apple.com/supplier-responsibility/pdf/Apple_Supplier_List_2014.pdf)

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

#### 3.5.2.1 *First proposal for conflict-free minerals criteria*

##### **Proposed new criterion (first proposal)**

###### **‘Conflict-free minerals’ in electronics**

The applicant must make efforts to support the responsible sourcing of “conflict-free minerals” from the African Great Lakes Region for the use in the electronics of his electronic displays.

*Assessment and verification:* The applicant shall declare the compliance with these requirements and shall provide additionally a description of the way he engages in responsible sourcing projects in the African Great Lakes Region (e.g. membership in a voluntary industry initiative, e.g. the Public Private Alliance, the Conflict-Free Tin Initiative or the Solutions for Hope Project) to the competent body.

Electronic displays like televisions and external computer displays contain a whole range of scarce resources which are largely mined in the Democratic Republic of Congo, a conflict region, under dangerous conditions, without sufficient maintenance of health and safety standards and often by children. However, instead of a criterion to exclude of the use of conflict minerals, bearing the potential for a de facto embargo of minerals from a whole region being economically and socially dependent from the mining industry, for the EU ecolabel revision a process oriented approach has been proposed to stimulate sustainable sourcing.

For more details cf. Task 4 report “Improvement Potential”, section 4.2.5.2.1 “Minimizing the risk of using ‘conflict metals’ in electronics”.

#### 3.5.2.2 *Stakeholder feedback and further evidence*

According to written stakeholder feedback following the AHWG meeting, the inclusion of such a criterion is explicitly supported by one of the stakeholders.

Another stakeholder supports this criterion since they have put in place due-diligence mechanisms to avoid the purchase of minerals illegally sourced from conflict regions.

However, it is proposed that the EU Commission rewords this criterion since manufacturers cannot legally guarantee or certify 100% conflict free mineral sourcing. Due to the inherent issues in complex supply chain management, what manufacturers can offer is to put in place a good due-diligence mechanism, but cannot fully control or verify the initial sourcing of the minerals by their upstream suppliers.



Further research and evidence show that the requirement needs to specify the materials in scope, which is mostly defined as tin, tantalum, tungsten and their ores and gold. Responsible sourcing projects can be specified geographically by defining activities carried out within on the fringes of the resource-conflict hot spot (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.

*Second proposal for conflict-free minerals criteria*

**Proposed new criterion (second proposal)**

**‘Conflict-free minerals’ in electronics**

The applicant shall support the responsible sourcing of “conflict-free minerals” from the African Great Lakes Region. In this context, the material scope encompasses tin, tantalum, tungsten and their ores and gold.

Assessment and verification: The applicant shall declare the compliance with these requirements and shall provide additionally a description of the way he engages in responsible sourcing projects in the African Great Lakes Region for at least one of the above listed conflict minerals to the Competent Body. As responsible sourcing projects, all activities carried out within the Democratic Republic of the Congo that aim to source minerals in accordance with the *OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas* are eligible (e.g. the Public Private Alliance for Responsible Minerals Trade, the Conflict-Free Tin Initiative, and the Solutions for Hope Project).

Major proposed changes

- The section “[...] for use in their computer products” *has been* removed as this significantly limits the possibilities of companies (e.g. activities in the great Lakes Region that lead to responsible sourcing did not yet yield material output should also be able to qualify for this requirement).
- The scope is further specified (tin, tantalum, tungsten and their ores and gold).
- It is specified that applicants have to engage in activities that address at least one of the above listed materials.
- The definition ‘responsible sourcing projects’ was further specified and encompasses projects carried out within the Democratic Republic of the Congo being in accordance with the widely recognised OECD Due Diligence Guidance for

Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas.

- The focus on the Democratic Republic of the Congo is justified by the fact that it is the primary conflict region and the region where mineral mining and trading are closely linked to conflict. Although the other countries of the Great Lakes Region are covered by relevant policy instruments (e.g. Dodd-Frank Act Section 1502), this has to do with fact that these countries might act as transit countries for smuggled ores from the DR Congo. Generally, it is widely recognised that a focus on the DR Congo has the highest development priority.

### 3.6 Cluster 6 – Further criteria

#### 3.6.1 Criterion 6.1 – Ergonomics

So far, no ecolabel explicitly for televisions include criteria on visuable ergonomics, however, for external computer displays, TCO Certified Displays 2012, contain criteria regarding visual ergonomics (image detail, luminance, luminance contrast, reflection and screen colour) and work load ergonomics (vertical tilt, and vertical height); the Blue Angel ecolabel for computer monitors (2012) as well as Nordic Swan align to TCO Certified Displays with regard to ergonomics.

#### Consultation questions

- Should the EU ecolabel for electronic displays, especially for the external computer displays, include criteria for (visuable and/or workload) ergonomics, e.g. aligning them to the TCO criteria?

#### 3.6.1.1 Stakeholder feedback and further evidence

According to written stakeholder feedback following the AHWG meeting, one of the stakeholders states that ergonomics criteria can be introduced but if an impulse should be given to this EU Ecolabel product group, it is proposed not to align too much to other private labels which are more known and widespread than the Ecolabel in this sector and that could, at the end, be preferred by the applicants instead of the Ecolabel just because being better known on the market and maybe because they require less number of criteria to comply with.

Further research and evidence

The label TCO Certified Displays 6.0 defines a broad range of requirements for visual and workload ergonomics:

Visual ergonomics		Workload ergonomics
Image detail characteristics	<ul style="list-style-type: none"> <li>• Native display resolution requirement</li> </ul>	Vertical tilt
Luminance characteristics	<ul style="list-style-type: none"> <li>• Luminance level</li> <li>• Luminance uniformity</li> <li>• Black level</li> <li>• Luminance uniformity – angular dependence</li> <li>• Greyscale gamma curve</li> </ul>	Vertical height
Luminance contrast characters	<ul style="list-style-type: none"> <li>• Luminance contrast – characters</li> <li>• Luminance contrast – angular dependence</li> </ul>	
Reflection characteristics	<ul style="list-style-type: none"> <li>• Front frame gloss</li> </ul>	
Screen colour characteristics	<ul style="list-style-type: none"> <li>• Correlated colour temperature, CCT, variation</li> <li>• Colour uniformity</li> <li>• RGB settings</li> <li>• Colour uniformity – angular dependence</li> <li>• Colour greyscale linearity</li> </ul>	

The German Ecolabel Blue Angel for Computer Monitors (RAL UZ 78c, edition January 2012)<sup>74</sup> includes the following criterion regarding ergonomics (however, no ergonomics criteria are in place for Televisions, RAL UZ 145):

*The ergonomic properties of flat-panel monitors for personal computers shall be tested according to DIN EN ISO 9241-307 and at least meet the requirements of pixel error class 2. This requirement shall be considered met if the product is certified under TCO Certified Displays 5.2.*

Compliance Verification

*The applicant shall evidence compliance with the ergonomics requirements by submission of the test protocol prepared by an independent testing laboratory accredited under DIN EN ISO/IEC 17025. Alternatively, the applicant shall provide evidence (Annex 3) that the product has been certified under TCO Certified Displays 5.2.*

Also, the ECMA-370 standard<sup>75</sup>, specifying environmental attributes and measurement methods for ICT and CE products, defines an ergonomics criterion for computer products:

*For computing products it shall be declared if the monitor/display meets the ergonomic requirements of ISO 9241-307.*

<sup>74</sup> Cf. [http://www.blauer-engel.de/en/products\\_brands/search\\_products/produkttyp.php?id=619](http://www.blauer-engel.de/en/products_brands/search_products/produkttyp.php?id=619)

<sup>75</sup> Cf. <http://www.ecma-international.org/publications/standards/Ecma-370.htm>

### Pixel error class

According to Fujitsu<sup>76</sup>, TFT monitors are made up of a set number of pixels with each three sub-pixels being red, green and blue. They each consist of their own transistors that control whether or not it lights up. Due to the way in which panels are made, defects can appear resulting in 'dead pixels' which cannot be repaired neither can it be predicted when the failure may occur. The monitor can be working at 100% however can consist of pixels or sub-pixels which are either:

- a) Permanently dark or light which is not always evident, OR
- b) A constant flash which is more noticeable.

The standard ISO 9241-307 Class II defines the LCD specific ergonomics standards. One of the quality criteria of the ISO standard is the pixel error tolerance. The standard ISO 9241-307 Class II provides transparency and gives the customer and the manufacturer a clearly defined and thus comparable warranty claim definition, in which the pixel fault classes are given. An overview of the pixel fault classes and types is shown in the following excerpt from the standard ISO 9241-307 Class II<sup>77</sup>. The table defines the maximal permissible number and kind of pixel faults per 1 million pixel.

**Table 21: Overview of pixel fault classes and types (Source: Edge10)**

Pixel defect category	The number of pixel defects is defined per 1 million pixel.		
	Defect Typ 1 (constantly bright pixel)	Defect Typ 2 (constantly dark pixel)	Defect Typ 3 (defect subpixel, either constantly bright red, green, blue or constantly dark)
I	0	0	0
II	2	2	5
III	5	15	50
IV	50	150	500

Class I monitors are guaranteed products which do not have any defects at all however it is rare to find a manufacturer offering such high quality products.

<sup>76</sup> Source: [http://uk.ts.fujitsu.com/rl/servicesupport/techsupport/monitors/iso\\_13406-2.htm](http://uk.ts.fujitsu.com/rl/servicesupport/techsupport/monitors/iso_13406-2.htm)

<sup>77</sup> Source: <http://www.edge10.com/en/support-5/pixel-policy.html>

### 3.6.1.2 *First proposal for ergonomics criteria*

Following stakeholder feedback, it is proposed not to align the total ergonomics requirements of the label TCO Certified Displays to the EU Ecolabel criteria as this is a well-established label on the market especially known for ergonomics of display products.

Thus, it is proposed to set a minimum quality criterion on the pixel error class as defect pixels might lead to shorter lifetime of the overall display product. For this reason, it could be discussed if this criterion should be moved to Cluster 3 on Lifetime extension criteria.

#### **Proposed new criterion (first proposal)**

##### **'Ergonomics'**

The ergonomic properties of electronic displays shall be tested according to EN ISO 9241-307 and at least meet the requirements of pixel error class 2.

##### Assessment and verification

The applicant shall evidence compliance with the ergonomics requirements by submission of the test protocol prepared by a testing laboratory accredited under EN ISO/IEC 17025.

### 3.6.2 Criterion 6.2 – Emission of fluorinated GHG during LCD production

#### 3.6.2.1 *First proposal for fluorinated GHG criteria*

##### **Proposed new criterion (first proposal)**

###### **Fluorinated GHG emission during LCD production**

Electronic displays with integrated LCD panel must be produced in a way that the fluorinated greenhouse gases  $\text{NF}_3$  and  $\text{SF}_6$ , if part of the production process, are abated by a system that is an integrated part of the production process.

*Assessment and verification:* The applicant shall declare the compliance with these requirements and shall additionally provide a description of the implementation process at suppliers/sub-contractors (i.e. LCD panel makers) to the competent body.

Fluorinated greenhouse gases (GHG) are among the most potent and persistent GHG contributing to global climate change; they are relevant in the manufacture of semiconductors, light emitting diodes and LCD flat panel displays. As it is currently difficult 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), within the EU ecolabel revision a process oriented approach has been proposed, based on a proposal in the current revision of Nordic Ecolabelling criteria for television displays. For more details cf. Task 4 report "Improvement Potential", section 4.2.5.2.2 "Minimizing the use of F-gases in the production".

#### 3.6.2.2 *Stakeholder feedback and further evidence*

According to written stakeholder feedback following the AHWG meeting, one of the stakeholders confirms this new criteria proposal to be interesting and important but asks to verify the feasibility in order to prevent that no one could apply for Ecolabel Criteria with too stringent or too ambitious criteria.

Another stakeholder explicitly supports the inclusion of such a criterion.

On the other hand, concerns are raised by one of the manufacturers arguing that they cannot interfere with suppliers' manufacturing processes that do not have direct impacts on the parts they supply to manufactures. For this reason, there is a limitation in TV manufacturers requiring display manufacturers to implement certain Fluorinated GHG (F-gas) abatement programs; however they could encourage them to address the F-gas abatement issue as part of their environmental management.

The criterion, if maintained, needs to be a general information requirement rather than a prescriptive requirement. It should be noted that there may be a confidentiality issue relating to actual F-gas abatement programs implemented by display manufacturers, so NDA may be required in submitting relevant information to the competent body.

#### Further research and evidence

The overall consensus of stakeholder opinion following the 1st Ad-Hoc Working Group (AHWG) meeting in October 2013 was to explore further the feasibility of such a criterion. In order to do this further technical information was required from manufacturers of electronic displays and their LCD panel suppliers by a short questionnaire.

- Feedback was given that the manufacturer of a television is not a manufacturer of flat panel displays. Thus, improving the emissions from flat panel display manufacturing would have to take place at their suppliers.
- Specific requirements concerning the reduction of fluorinated GHGs to LCD suppliers are seen as difficult as the manufacturer cannot interfere with suppliers' manufacturing processes that do not have direct impacts on the parts they supply to manufacturers. Thus, there is a limitation in TV manufacturers requiring display manufacturers to implement certain Fluorinated GHG (F-gas) abatement programs.
- It is seen as possible from manufacturer's view to encourage/support their display suppliers to address the F-gas abatement issue as part of their environmental management.
- According to a display supplier there are technical limitations effecting it currently being inevitable that F-Gases have to be used in LCD manufacturing processes.
- Further, there might be a confidentiality issue relating to actual F-gas abatement programs implemented by display manufacturers.
- Following efforts are known for improving the emissions from flat panel display manufacturing:

- Participation in WLICC (World LCD Industry Cooperation Committee) with Korean, Japanese, Chinese and Taiwanese LCD manufacturers companies making several efforts to reduce F-gas emission voluntarily. WLICC has been organized 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 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.
- Generally, LCD panel manufacturers have used the following F-Gases:
  - $\text{NF}_3$ , being used in chamber cleaning of the deposition process;
  - $\text{SF}_6$ , being used in LCD surface treatment of dry etching process;
  - $\text{CF}_4$  and  $\text{c-C}_4\text{F}_8$ , being used for OLED Panel manufacturing.
- A consideration could be changing  $\text{SF}_6$  to  $\text{NF}_3$ , since the last has a lower GWP (GWP -  $\text{SF}_6$ : 23,900,  $\text{NF}_3$ : 17,200).
- In theory there is the possibility that  $\text{F}_2$  and  $\text{COF}_2$  may replace  $\text{NF}_3$ , but in practice these two gases have been scarcely used. The reasons are that  $\text{F}_2$  has lack of stability and  $\text{COF}_2$  has lack of usage record and manufacturing. Because of these reasons, it is inevitable that F-Gases have to be used in LCD manufacturing processes.

### 3.6.2.3 *Second proposal for fluorinated GHG criteria*

Currently 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.



Thus, it is proposed to introduce a general requirement of information and manufacturers' encourage to LCD suppliers to use abatement systems. US EPA (2013)<sup>78</sup> 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 following criterion is based on these questions and the US EPA document could be provided as indicative reference to the questionnaire format to be established.

**Proposed new criterion (second proposal)**

**Fluorinated GHG emission during LCD production**

The applicant shall encourage their display suppliers to abate fluorinated greenhouse gases  $\text{NF}_3$  and  $\text{SF}_6$ , if part of the production process, by a system that is an integrated part of the production process. For this reason, the applicant shall gather following information from their display suppliers:

- (a) Description of goals in place and steps taken to reduce F-GHG emissions, for example process optimization, use of alternative chemistries, capture / recycling, and / or abatement technologies.
- (b) Specification which of the used F-GHGs (i.e.  $\text{SF}_6$ ,  $\text{NF}_3$ , PFCs, and HFCs) are being reduced.
- (c) Information if the supplier participates in any national or international consensus-based or voluntary efforts to reduce F-GHG emissions from flat panel display manufacturing.
- (d) Information about the methods applied to estimate aggregate annual F-GHG emissions
- (e) Estimated annual F-GHG emissions intensity (if possible, in  $\text{kg CO}_{2e}$  per  $\text{m}^2$  of flat panel displays (array glass) produced) across manufacturing fabs for the most recent year.
- (f) Indication of the destruction or removal efficiencies (DREs) of the installed abatement systems for each of the F-GHGs used.

*Assessment and verification:* The applicant shall declare the compliance with these requirements and shall additionally provide the information sheets of their display suppliers to the Competent Body.

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<sup>78</sup> [http://www.epa.gov/climateleadership/documents/questions\\_for\\_suppliers.pdf](http://www.epa.gov/climateleadership/documents/questions_for_suppliers.pdf)

### 3.7 Cluster 7 – Information

#### 3.7.1 Criterion 7.1 – User instructions

##### **Present 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.

### 3.7.1.1 Major proposed changes (first proposal)

#### **Proposed revised criteria (first proposal)**

The television and external 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 will include in particular:

- (a) The power consumption of the product in the various modes, expressed in Watts:
  - (i) Televisions / external computer displays: on, off, passive standby;
  - (ii) Televisions: quick start mode; active standby (low) for networked television sets.
- (b) Televisions: The 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:

- (i) Information on the product's settings that facilitate energy savings in different modes;
  - (ii) 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;
  - (iii) Putting the product into standby mode will reduce energy consumption, but will still draw some power;
  - (iv) Increasing the brightness of the screen will increase energy use; using manual and/or automatic brightness control (ABC) facilitates energy savings;
  - (v) External computer displays:
    - Note that screen savers 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;
  - (vi) Televisions:
    - Note that the Quick Start Function causes increased power consumption;
    - 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.
  - (e) The position of the hard off-switch (where one is fitted).
  - (f) Information that extension of the product's lifetime reduces the overall environmental impacts.
  - (g) The following indications on how to prolong the lifetime of the product<sup>79</sup>:
    - (i) Clear instructions in form of a repair manual to enable replacing of key components for upgrades or repair.
    - (ii) A list of available spare parts with current prices.
    - (iii) Information to let the user know where to go to obtain professional repairs and servicing of the product, including contact details as appropriate;
  - (h) 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.
  - (i) 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>
  - (j) 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.

- Integration of both consumer information for televisions and external computer displays into one criterion;
- Inclusion of information on newer functions and modes (manual/automatic brightness control, quick start mode, active standby for networked products).
- Inclusion of more detailed instructions for the extension of the product's lifetime.

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<sup>79</sup> Depending on the final decision on sub-criteria in section 0

### 3.7.1.2 Stakeholder feedback and further evidence

The requirement for recycled content in instruction/repair manuals may have unintended consequences (e.g. prevent the use of an alternative media than paper)

### 3.7.1.3 Second proposal for user instructions criteria

#### Proposed revised criteria (second proposal)

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 in particular:

- (a) Energy consumption:
  - (i) The maximum power demand in each operating mode, expressed in Watts.
  - (ii) Instructions must be provided on how to use the device's energy saving mode (e.g. Automatic Power Down).
  - (iii) The annual energy consumption in kWh per year, based on the power demand of the electronic display operating 4 hours per day for 365 days. Additional note that the actual energy consumption will depend on how the display is used.
- (b) Information that energy efficiency cuts energy consumption and thus saves money by reducing electricity bills;
- (c) 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) Reducing the brightness of the screen will reduce energy use; using manual and/or automatic brightness control (ABC) facilitates energy savings;
  - (iv) External computer displays: Note that screen savers 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;
- (v) Televisions:
  - Note that a Quick Start Function might cause increased power consumption;
  - 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.
- (d) Network connectivity (if applicable): Information on how to deactivate networking functions
- (e) The position of the hard off-switch (where one is fitted).
- (f) Information that extension of the product's lifetime reduces the overall environmental impacts.
- (g) The following indications on how to prolong the lifetime of the product<sup>80</sup>:
  - (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; service should not be limited exclusively to applicant's Authorized Service Providers.
- (h) 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.

<sup>80</sup> Depending on the final decision on sub-criteria in section 0

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|--|
| <p>(i) 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 <a href="http://www.ecolabel.eu">http://www.ecolabel.eu</a></p> <p>(j) 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.</p> <p><i>Assessment and verification:</i> 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.</p> |
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### Major proposed changes

- Product group changed into “electronic display”
- The information requirements on energy consumption have been adapted to align better with the Draft Ecodesign Regulation on Electronic Displays.
- A requirement on network connectivity has been added.
- The provision of a list of available spare parts with current prices has been deleted as this has not been seen as practicable by stakeholders (cf. 0)
- Sub-criterion (j) has been specified regarding print-versions with additional advice to prefer online versions of repair manuals to save resources.

The assessment / verification have been amended by the provision of a copy and/or link to the user instructions.

### 3.7.2 Criterion 7.2 – Information appearing on the Ecolabel

<b>Present criteria, Decisions 2009/300 and 2011/337</b>
<p>Televisions: Box 2 of the Ecolabel shall include the following text: ' - High energy efficiency, - Reduced CO<sub>2</sub> emissions, - Designed to facilitate repair and recycling.'</p> <p><u>Assessment and Verification:</u> 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.</p>
<p>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).'</p> <p><u>Assessment and verification:</u> 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.</p>

#### 3.7.2.1 Major proposed changes (first proposal)

<b>Proposed revised criterion (first proposal)</b>
<p>Optional label with text box shall contain the following text: ' - high energy efficiency - mercury-free backlights - designed to facilitate extended lifetime - designed to facilitate recycling.'</p> <p><u>Assessment and verification:</u> 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.</p>

- Explicit focus on extended lifetime (formerly repair and upgrading) and distinguishing between the aspects on lifetime and recycling.
- For televisions: addition of mercury-free backlights.

#### 3.7.2.2 Stakeholder feedback and further evidence

Written stakeholder feedback following the first AHWG meeting proposes that responsible sourcing (related to 5.2) and social responsibility (related to 5.1) could also be mentioned in the optional statements.

### 3.7.2.3 Second proposal for information appearing on the Ecolabel

#### Proposed revised criterion (second proposal)

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

- high energy efficiency
- mercury-free backlights (if the product contains an LED display)
- designed to facilitate longer lifetime
- designed to facilitate recycling
- contains xy% post-consumer recyclates (only when being higher than 25%)

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](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 signed declaration of compliance.