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Personal & Notebook computers

1st Ad Hoc Working Group Meeting for the revision of Ecolabel and Green Public Procurement criteria

10th October 2013

IE – Petten, The Netherlands
Institute for Energy

IRMM – Geel, Belgium
Institute for Reference Materials and Measurements

ITU – Karlsruhe, Germany
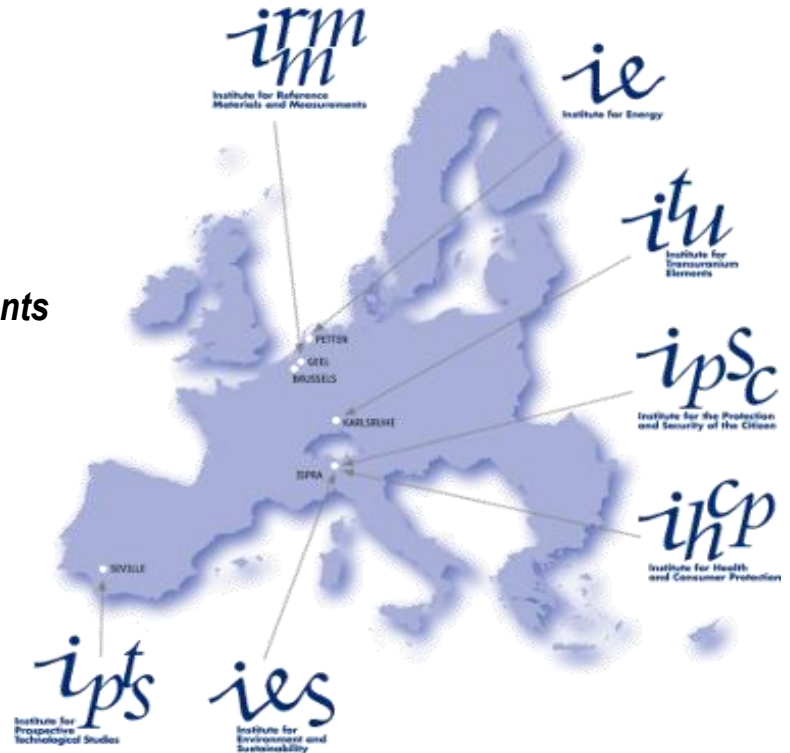*Institute for Transuranium Elements*

IES/ IHCP/ IPSC – Ispra, Italy
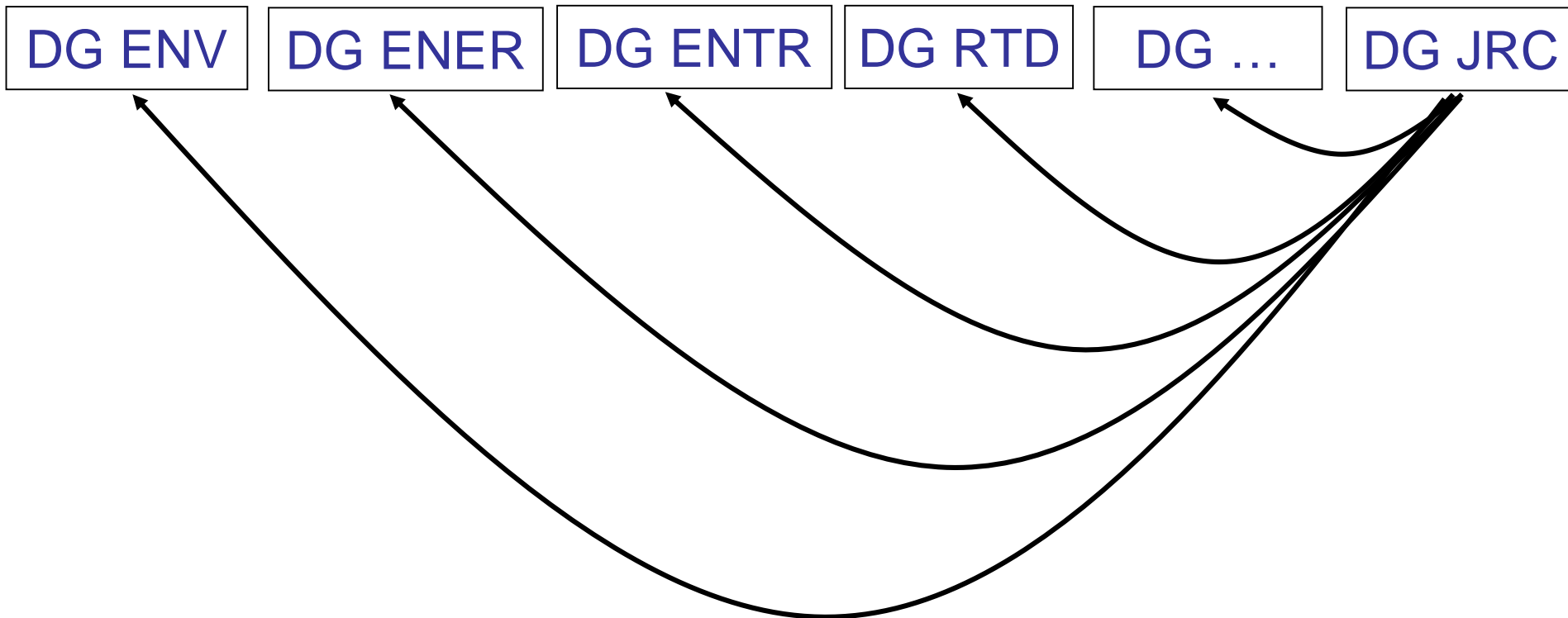*Institute for Environment and Sustainability*

Institute for Health and Consumer Protection

Institute for the Protection and Security of the Citizen

IPTS – Sevilla, Spain
Institute for Prospective Technological Studies

Joint Research Centre in the context of the European Commission:
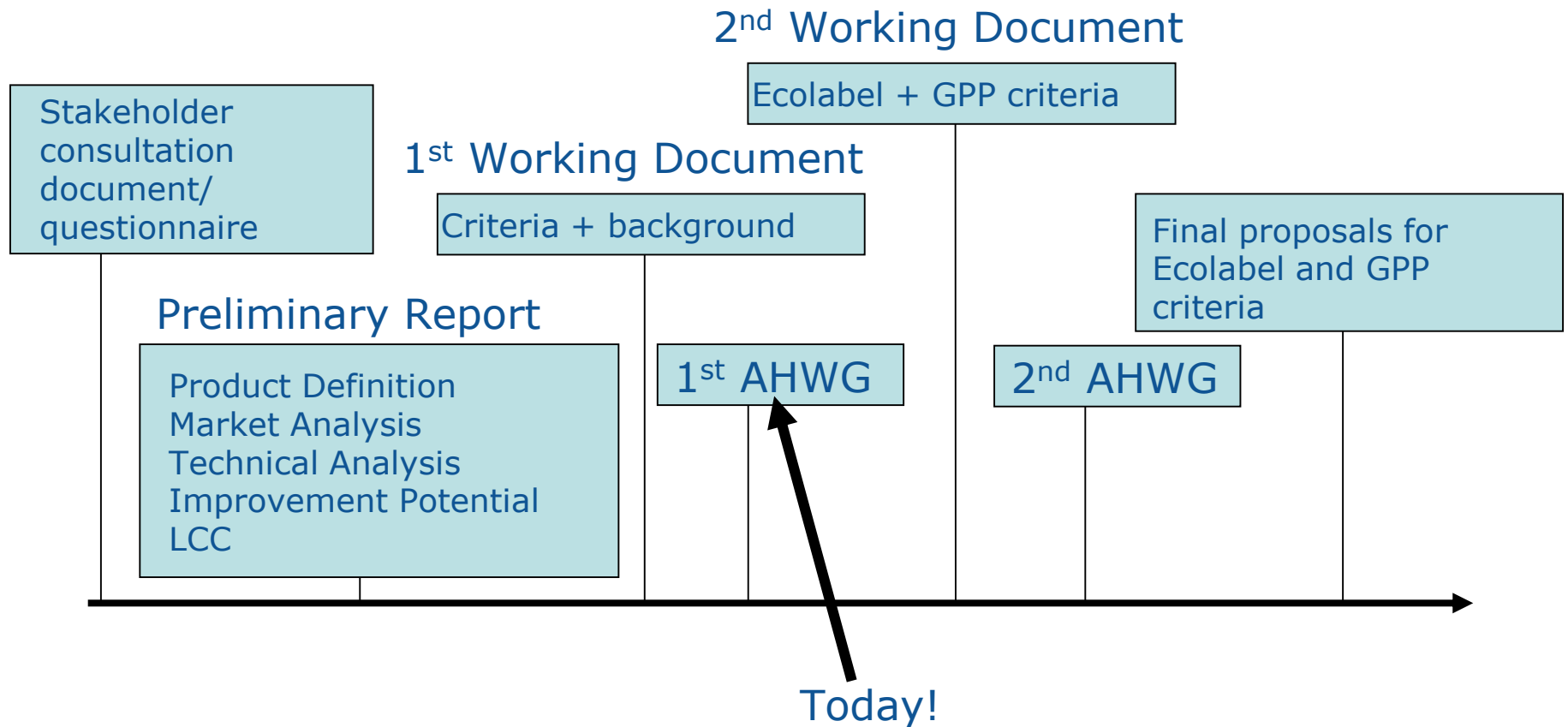
Activities in support of Product Policy

IPTS supports the development and implementation of environmental product policies, amongst them the EU Ecolabel Regulation and the Green Public Procurement Communication.

Analysis of each product group with focus on techno economic and environmental aspects

Alignment with Ecolabel Regulation EC 66/2010

Develop criteria and implementing measures until the stage of voting in committee

Criteria development process

2nd Working Document

Ecolabel + GPP criteria

1st Working Document

Stakeholder consultation document/ questionnaire

Criteria + background

Final proposals for Ecolabel and GPP criteria

Preliminary Report

Product Definition
Market Analysis
Technical Analysis
Improvement Potential
LCC

1st AHWG

2nd AHWG

Today!

Ecolabel and GPP Criteria Development for computers

1. *Stakeholders can provide comments on working document up to 20 days after the meeting (not later than Oct 24th)*

2. *Comments need to be transmitted in BATIS*

3. *Separate draft criteria proposals for EU Ecolabel and Green Public Procurement criteria will be prepared and published 4 weeks ahead of next AHWG*

4. *Second AHWG to take place in May 2014 in Brussels*

5. *Again ~3 weeks to comment after 2nd AHWG*

6. *November 2014 final draft criteria available*

Using the BATIS system

Joint
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Today's 1ˢᵗ AHWG

Overview:

Technical background to the criteria development

Discussion on new and revised criteria

Thank you

10th October 2013

Revision of the EU Ecolabel and GPP criteria for the 'Personal' and 'Notebook' computer product group

Scope and definition

What are the challenges for this product group?

What are the challenges for this product group?

Figure 18: Impacts of the life cycle on climate change ecosystems (cut off 5.4%)
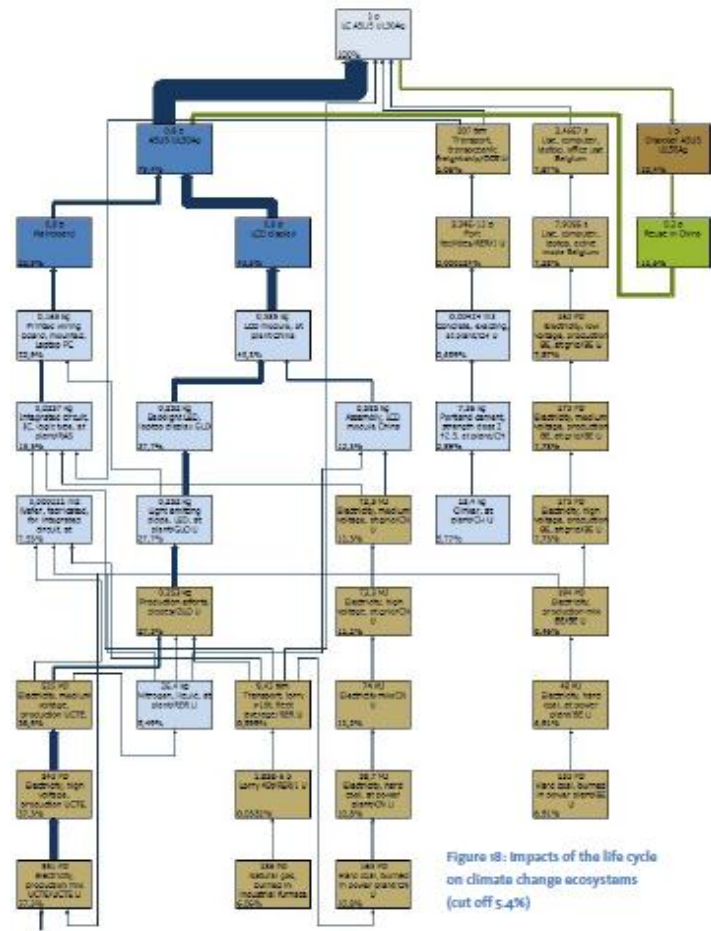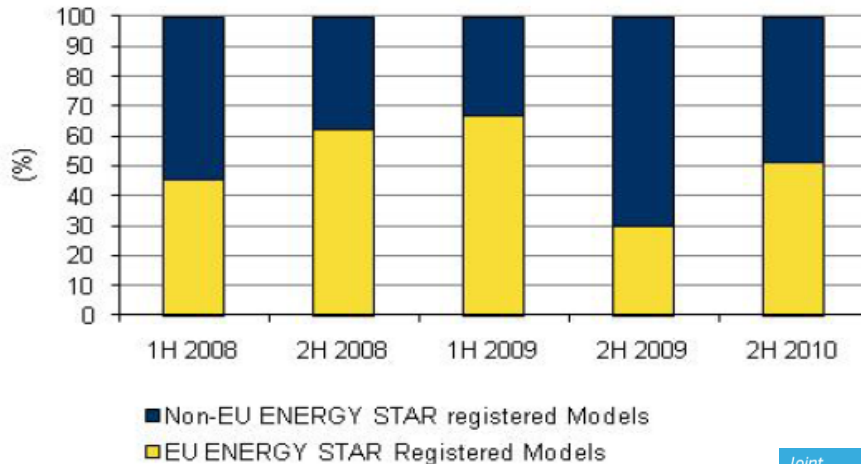
Current scope definition (1)
Personal computers

Article 1

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.

Taken from the Commission Decision of 9th June 2011, C(2011) 3737

Current scope definition (2)
Notebook computers

Article 1

1. The product group 'notebook computers' shall comprise devices which have the following characteristics:

(a) they perform logical operations and process data and are designed specifically for portability and to be operated for extended periods of time either with or without a direct connection to an AC power source;

(b) they utilise an integrated computer display and are capable of operation off an integrated battery or other portable power source. If a notebook computer is delivered with an external power supply this power supply is considered part of the notebook computer.

2. For the purpose of this Decision, <u>tablet personal computers, which may use touch-sensitive screens along with or instead of other input devices shall be considered notebook computers.</u>

Different definitions of 'computers'

Analysis of <u>EU Ecolabel, Energy Star (draft v6.0), TCO, Blue Angel, Nordic Swan, (draft) EU Ecodesign Regulation</u>

- Most eco-labels use the Energy Star criteria for energy related benchmarks
- The definitions of Energy Star, the Blue Angel and Nordic Swan are broadly identical

<u>Key differences</u>:
Blue Angel - separate definition for Netbooks
EU Ecolabel - doesn't include Workstations + Small-Scale servers
'Tablets' are out of scope in the criteria documents of Energy Star

Definitions of 'displays'

A growing number of devices <u>can be used as both, television and computer displays</u>.

- existing EU definitions draw a boundary between computer monitors and televisions - televisions to be 'designed primarily for the display and reception of audio-visual signals'
- It is becoming <u>more and more difficult to distinguish between the two product categories</u>
- Recent definitions use interface specifications, such as HDMI and VGA to create a distinction
- This can create problems around the consistent application of the Regulations to a subset of covered products

Recommendations on scope definition

1. Maintain most established definitions.
2. Widen the scope to all Energy Star sub-groups
3. Clearly differentiate tablet computers within the scope.
4. Omit keyboard definition as a separate product.
5. Improved definition for computer monitors
6. Unified scope options for TV/display criteria

6a. Create a unified criteria set for dual-function computer and
    television monitors.
6b: Consider the potential for a unified scope for all forms of displays
    (computer displays and television displays)

Proposed scope definitions (1)

'Computer' means a device which performs logical operations and processes data.

'Desktop Computer' means a computer whose main unit is designed to be located in a permanent location, often on a desk or the floor.

'Integrated Desktop Computer' means a Desktop Computer in which the computing hardware and display are integrated into a single housing, connected to AC mains power through a single cable

'Notebook Computer' means a computer designed specifically for portability and to be operated for extended periods of time both with and without a direct connection to an AC mains power source

Proposed <u>new</u> scope definitions (2)

'*Tablet Computer'* (often referred to as 'slate computer') means a wireless, portable computer that is primarily for battery mode usage and has a touch screen interface.

'*Small-scale Server'* means a computer that typically uses desktop components in a desktop form factor, but is designed primarily to be a storage host for other computers.

'*Mobile Thin Client'* means a computer meeting the definition of a Thin Client, designed specifically for portability, and also meeting the definition of a Notebook Computer.

Stakeholder questionnaire 1
Product scope

Sent out 22nd March 2013

1. Comments on the existing scope
2. Experience with the current criteria set
3. Comments on specific recommendations
4. Market and technical focus for the revision

Response: 10 in total (18% response rate) consisting of 4 Member States, 5 manufacturers (2 international and 3 EU) and 1 component manufacturer.

Q1. Comments on the existing scope

Scope should be broad to encourage applicants and maintain relevances...

Sub-product related comments:

- Tablets: Slates and docking stations (eg. MS Surface) have <u>different characteristics</u>
- Thin clients: Definition <u>based on CPU being present</u>?
- Small-scale servers: Definition should take account of <u>multi and uni-processors</u>

Is CENELEC working on <u>common definitions</u>?

Q3. Comments on specific recommendations

- General support for <u>harmonisation with Energy Star and Ecodesign</u>
- Some general <u>improvements to definitions</u> e.g. tablets, thin clients
- For workstations <u>function and performance</u> are paramount
- Clarity needed on <u>keyboards</u>, which must have a criteria set

Questions

- Do you agree with workstations and small servers being included?
- Do bundled desktops and monitors require any special treatment?

Adhoc Working Group Meeting

Revision of the EU Ecolabel and GPP criteria for the 'Personal' and 'Notebook' computer product group

Preliminary findings

Overview

Part 1

- Legislation and standards
- Market analysis
- Review of ecolabelling schemes

Part 2

- LCA screening
- Environmental impact 'hot spots'
- Framework and focus for the revision

Legislative framework
Energy consumption

- EU **Ecodesign** Regulation No. 617/2013,
  ecodesign requirements for **computers and computer servers**
  - *Excluded: external computer displays*
  - *Included: specific ecodesign requirements for standby and off mode electric power consumption (Regulation 1275/2008 not applicable to computers)*
  - *Included: specific ecodesign requirements for networked standby*
- EU **Ecodesign** Regulation No. 278/2009,
  ecodesign requirements for **external power supplies**
- EU **Energy label**: No COM Regulation with regard to computers
- EU **Energy Star**: Regulation No. 174/2013 on a Community energy efficiency labelling programme for office equipment.
  Computer specifications, v6.0 shall take effect from April 28, 2014

Legislative framework
Hazardous substances

- EU **REACH** Regulation No. 1907/2006, regulating SVHC (Candidate List => Authorisation List; notification and information requirements)

- EU **CLP** Regulation No. 1272/2008 on the classification and packaging of substances and mixtures; identification of hazardous chemicals and information of users about particular threats with the help of standard symbols and phrases (globally harmonized system, GHS).

- EU **RoHS** Directive 2011/65/EU restricting the use of lead, mercury, cadmium, hexavalent chromium, PBB and PBDE in EEE.
  - *Exemptions for mercury in fluorescent lamps (relevant for CFL-backlight systems)*
  - *On-going study for reviewing of the List of Restricted Substances under RoHS: Priority substances HBCDD, DEHP, BBP, and DBP.*

- EU **F-gas** Regulation No. 842/2006 on certain fluorinated GHG; relevant for SF_6 and NF_3 emissions during LCD screen manufacturing

Legislative framework
Waste

- EU **WEEE** Directive 2012/19/EU regulating the separate collection, treatment and recycling of end-of-life electrical and electronic equipment.

  - *Computers classified under category 3 "IT and telecommunications equipment"*

  - *Annex V: Minimum targets for recovery (75%; from 2015: 80%) and recycling (65%; from 2015: 70%)*

  - *Annex VII: Substances, mixtures and components that have to be removed from collected WEEE for selective treatment:*

    - Mercury containing components (switches, backlight lamps);
    - Batteries;
    - Printed circuit boards > 10 cm²;
    - Plastic containing brominated flame retardants;
    - LCD displays > 100 cm² and those backlighted with gas discharge lamps;
    - External electric cables.

Market analysis
Overall market trends

- The PC market is expected to further rise, mostly driven by the **increasing market share of tablet PCs**.

- Notebook PCs are expected to be overtaken by tablet PCs from 2014.

- **Businesses** accounted for >13% of total sales of media **tablets** (Western Europe).

Forecast for global shipments of tablets, laptops and desktop PCs from 2010 to 2017 (in million units)

| | | Desktop-PCs | Laptops | Tablets |
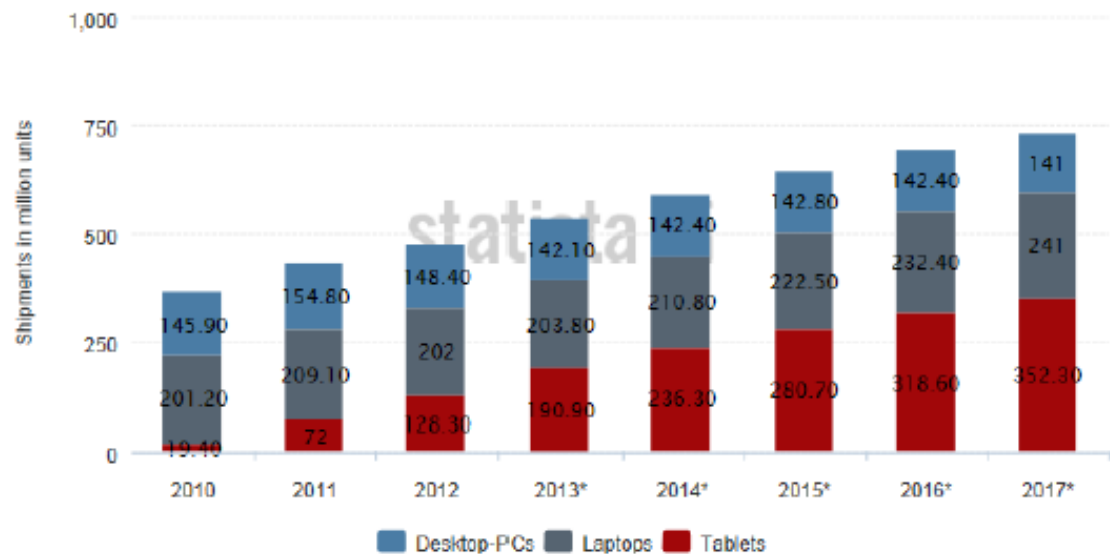
Worldwide; IDC

Source: IDC

© Statista 2013

Market analysis
Niche products

- **All-in-one PCs:** 2-5% of total desktop PC market

- **Ultra-thin notebooks**: Growing consumer interest, but still at low volumes (e.g. France: 9% of total mobile PC shipments).

- **Thin clients**: shipments expected to rise by 6.2% in 2013, but still at low volumes (EMEA: 1.7 million units in 2012).

- **Workstations**: Global shipments approximately 3.5 million units in 2012.

Number of workstation shipments worldwide from 3rd quarter 2008 to 3rd quarter 2012 (in 1,000 units)
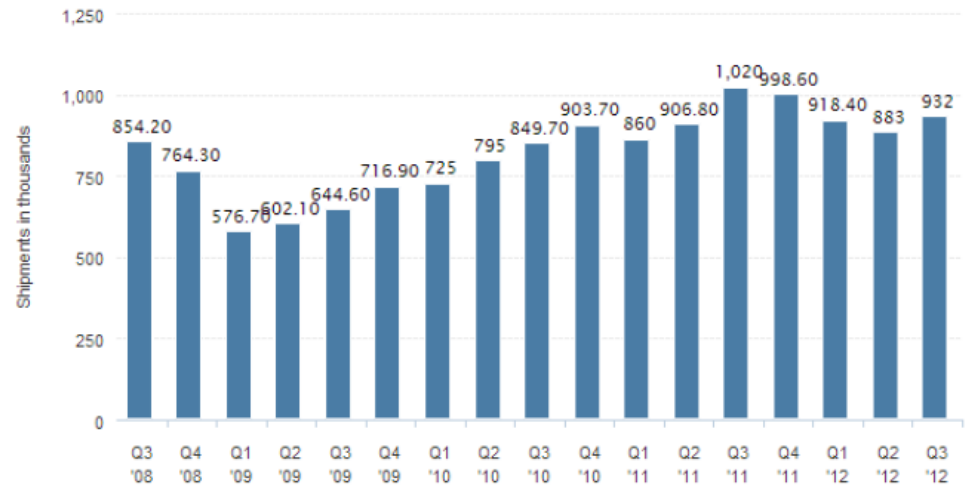
Worldwide; Jon Peddie Research

Source: Jon Peddie Research

© Statista 2013

Market analysis
Drive technology

- **Solid state disks (SSD)** increasingly used in notebooks and netbooks due to enhanced capacity, shorter loading times, silent operating mode, slimmer form factor and better shock tolerance.

- SSD: 6% of total notebook shipments in 2012

Storage Shipments
Total Notebook Shipment - Units (Thousands of Units) by Segment
(Source: IHS 2013)
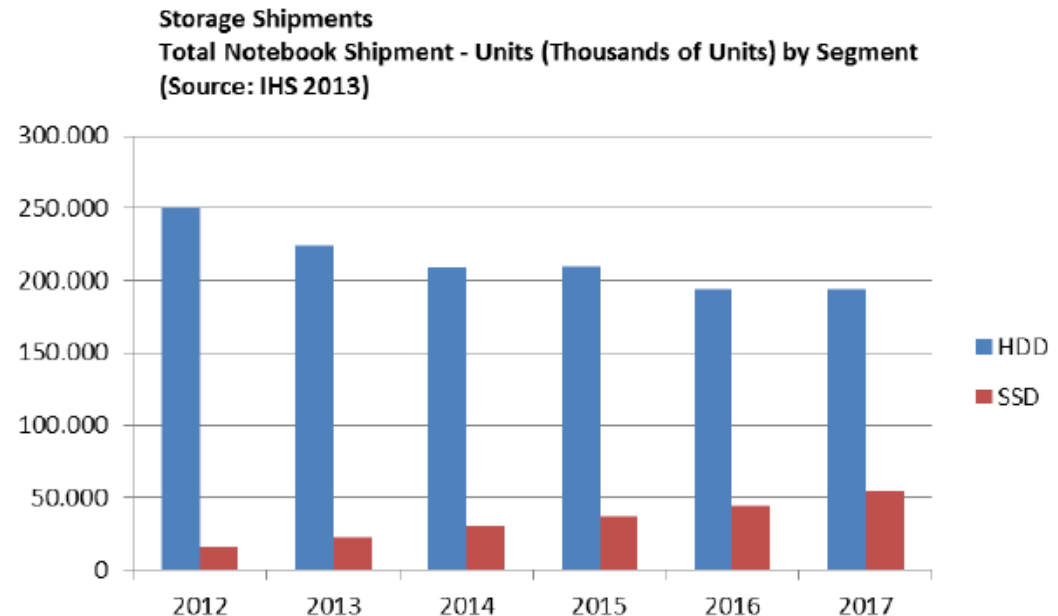
Consumer trends
Short replacement cycles

Item	Cycle	Rationale for replacement
PCs	3 years	• Current technologies can be out of date/ hard drives more unreliable within 3-4 years • Reduced performance with updates and software • User expectation increases • Standard warranties are 3 years
Laptops	2 years	• Laptops more susceptible to wear and tear • Expensive to repair • Lower performance per €
Servers	5 years	• Being left permanently on and heavily used, suffers more stress on core components. • Server software at end of supportable lifecycle. • Server software upgrades may well require new hardware

Market analysis
Leading manufacturers

- Global and EU PC market (without tablet PCs) dominated by five major players: HP, Acer, Asus, Dell, and Lenovo

- 70% of EU notebook sales: HP, Acer, Asus, Dell, Lenovo and Apple

- 80% global tablet sales: Apple, Samsung and Asus

Preliminary worldwide PC vendor unit shipment estimates for 2012 (Source: Gartner January 2013)

16,0%
14,8%
10,7%
10,4%
6,9%
41,3%

- HP
- Lenovo
- Dell
- Acer Group
- ASUS
- Others
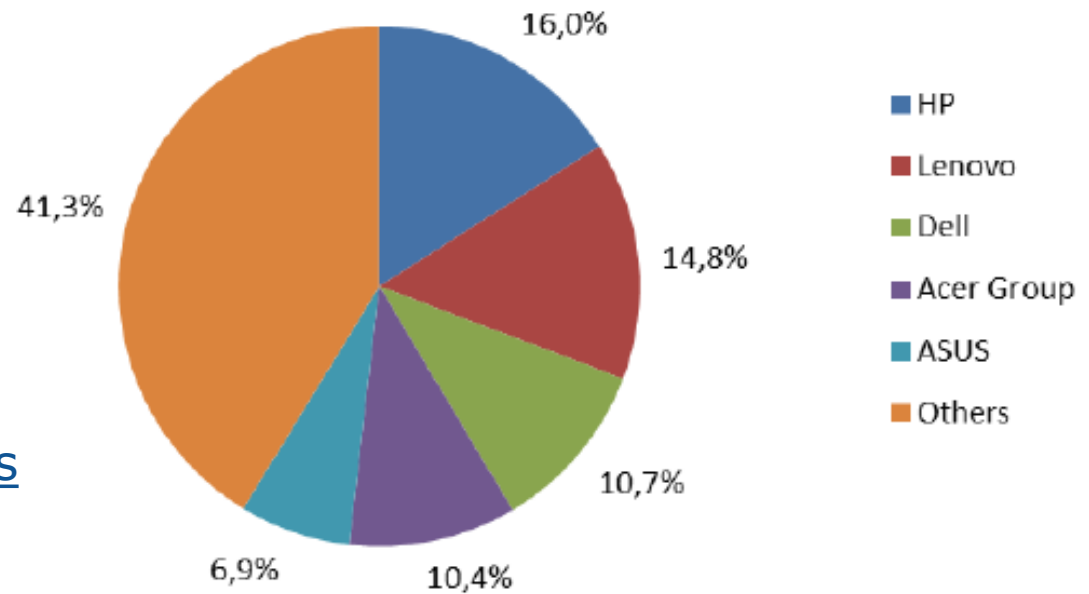
Market analysis
Current energy and ecolabelling schemes

- **Blue Angel**
  - *"Personal Computers" (RAL-UZ 78a, 03/2012)*
  - *"Notebook Computers" (RAL-UZ 78d, 01/2011)*
- **Nordic Swan** (Nordic Ecolabel for Computers, 06/2009)
- **TCO**
  - *Certified Desktops 4.0 (03/2012)*
  - *Certified All-in-One PCs 2.0 (03/2012) / Certified Edge All-in-One PCs 1.0 (05/2010)*
  - *Certified Notebooks 4.0 (03/2012) / Certified Edge Notebooks (02/2011)*
  - *Certified Tablets (11/2012)*
- **EPEAT** Computer and Display Criteria (undated)
- **Energy Star** specification for computers (current v5.2, 07/2009)

Current energy and ecolabelling schemes
Market significance

Ecolabel	Effective Date	Number of models awarded	Licence holders
Blue Angel	2011/2012	15	Fujitsu
Nordic Swan	2009	54	Fujitsu
TCO	2012	29	Asus, Lenovo, Samsung, AOC, HP
EPEAT	*Not dated*	2,337	29 companies
Energy Star	2009	9,972	65 companies

Current energy and ecolabelling schemes
Energy criteria

- Reference to <u>Energy Star</u>, either exceeding version 5.0 or "most current" specification; all

- Requirements for <u>external power supplies</u>; Nordic Swan / Blue Angel / TCO / Energy Star

- Requirements for <u>Slate / Tablet Computers</u> (external power supply); Nordic Swan / TCO

- Visible <u>on-/off switch</u>; Nordic Swan

- <u>Renewable energy accessory</u>; EPEAT optional

Current energy ecolabelling schemes
Design for recycling

- Material recovery: 65- 90% of plastics / metals of chassis

- Post-consumer recyclate material: may be used in case parts and chassis (Blue Angel); declaration of content (EPEAT, required); minimum / higher content of recyclate material (TCO; EPEAT optional)

- Renewable / bio-based plastic material: declaration / minimum content (EPEAT required / optional)

- Rechargeable batteries easy to remove without use of any tools (Blue Angel)

- Disassembly instructions for end-of-life recyclers or treatment facilities (Blue Angel)

Current energy ecolabelling schemes
Lifetime extension / end of life

- Availability of <u>spare parts</u>: 3 or 5 years
- Additional <u>warranty</u> (1 or 3 years) or service agreement
- Special information regarding <u>disposal of batteries</u> (Blue Angel)
- Provision of <u>product take-back</u> service / rechargeable <u>battery take-back</u> service (EPEAT required);
- Auditing of recycling vendors (EPEAT optional)

Current energy ecolabelling schemes
Other criteria areas

- **CSR** (corporate environmental/social responsibility):
Nordic Swan, TCO, EPEAT (required or optional)

  - *For example: code of conduct; corporate environmental policy; environmental management certification for manufacturing plants (self certified / third party certified); corporate report based on GRI*

- **Packaging**: only TCO / EPEAT

  - *For example: Reduction or restriction of hazardous substances in packaging; separable packaging materials; declaration of recycled content in packaging; provision of take-back programme for packaging; 90% of packaging recyclable*

- **Noise**: Nordic Swan, Blue Angel, TCO

- **Ergonomics**: TCO; Nordic Swan (displays, notebooks, tablets) and Blue Angel (netbook displays) refer to TCO

Questions

- Have we presented an accurate overview of market?
- Are there other trends/factors to consider?
- What experience is arising from recent/current ecolabel revisions?

Adhoc Working Group Meeting

Revision of the EU Ecolabel and GPP criteria for the 'Personal' and 'Notebook' computer product group

Preliminary findings (2)

LCA analysis
Literature basis

Product	Authors	Title
Desktop PC	Song et al. 2013	Life cycle assessment of desktop PCs in Macau
	Stutz 2011	Product Carbon Footprint (PCF) Assessment of a Dell OptiPlex 780 Desktop – Results and Recommendations
	Duan et al. 2009	Life cycle assessment study of a Chinese desktop personal computer
	IVF 2007	EuP Lot 3 - Personal Computers (desktops and laptops) and Computer Monitors
Notebook PC	St-Laurent et al. 2012	Green Electronics? – An LCA based study of Eco-labeling of laptop computers
	Prakash et al. 2011	Timely replacement of a notebook under consideration of environmental aspects
	Ciroth & Franze 2011	LCA of an Ecolabelled Notebook - Consideration of Social and Environmental Impacts Along the Entire Life Cycle
	IVF 2007	EuP Lot 3 - Personal Computers (desktops and laptops) and Computer Monitors
	Connell & Stutz 2009	Product Carbon Footprint (PCF) Assessment of a Dell OptiPlex 780 Desktop – Results and Recommendations
Thin client	Maga et al. 2012	Comparison of two ICT solutions: desktop PC versus thin client computing
Tablet	Apple 2012a	iPad Environmental Report
	Shuttle 2012	Environmental Product Declaration (EPD): Slate-Tablet PC V08CN01
Small-scale server	Stutz et al. 2012	Carbon Footprint of a Dell Rack Server
Workstation	Apple 2012b	Mac Pro Environmental Report

LCA analysis
Quality assessment of LCA studies

- **Subject of the studies**: Representative product groups, sub-categories, technologies or specifications

- **Time related coverage**: Data less than 4 years old

- **Comprehensiveness**: Broad environmental impact categories; cradle to grave; ideally Product Environmental Footprint (PEF) methodology

- **Robustness**: Scientifically robust considered against the evaluation provided in ILCD handbook

- **Reliability**: Data quality ideally subject to external critical review
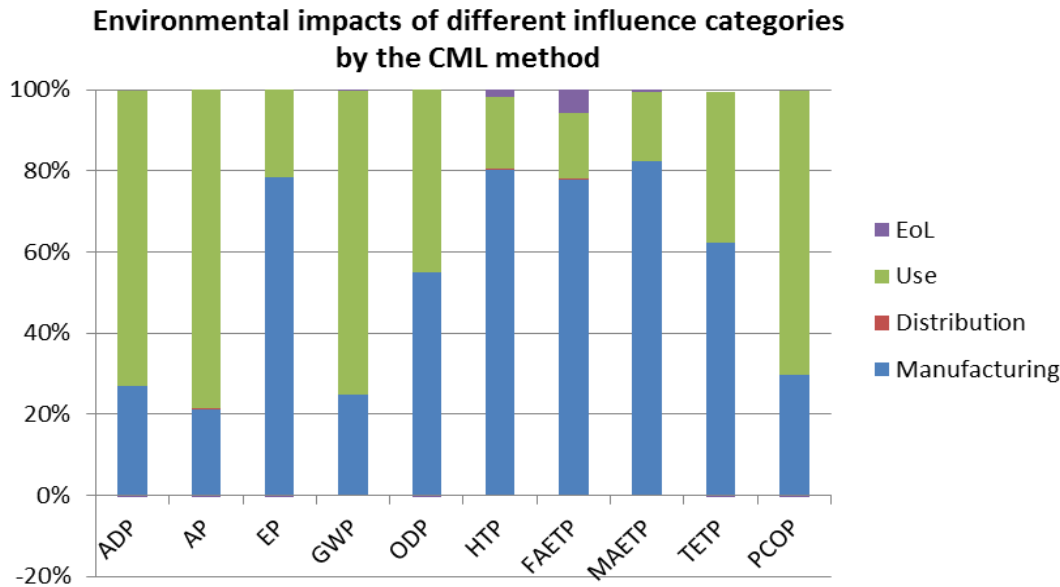
LCA analysis
Identification of comprehensive LCA studies

Product	Authors	Title
Desktop PC	Song et al. 2013	Life cycle assessment of desktop PCs in Macau
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	Duan et al. 2009	Life cycle assessment study of a Chinese desktop personal computer
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LCA analysis
Broad findings from comprehensive LCA studies

Environmental impacts of different influence categories by the CML method

Legend: EoL, Use, Distribution, Manufacturing

Categories: ADP, AP, EP, GWP, ODP, HTP, FAETP, MAETP, TETP, PCOP

<u>Manufacturing and use phase</u> dominate the environmental impacts

LCA analysis
Broad findings from LCA studies

- The **share of manufacturing and use** can vary due to
  - *Product life span*
  - *Electricity grid mixes*
  - *Power consumption in the use phase*
- For **products with a shorter lifetime**, such as notebook PCs, the **production phase has a larger environmental impact**
- **For servers and workstations, the use phase dominates** the total results with regard to GHG emissions
- Environmental impacts of manufacturing phase can be reduced by **sound EoL management** as secondary resources from recycling can avoid primary production.
- *Ecolabel criteria **do not directly improve the manufacturing phase***

LCA analysis
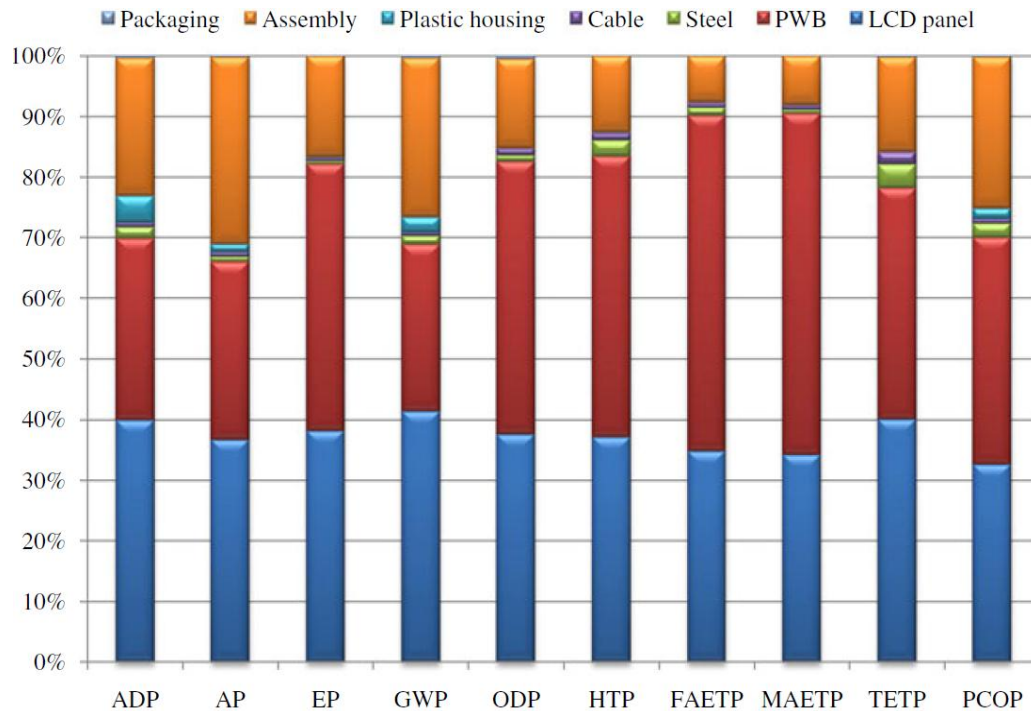## Main contributors at component level: Desktop PC
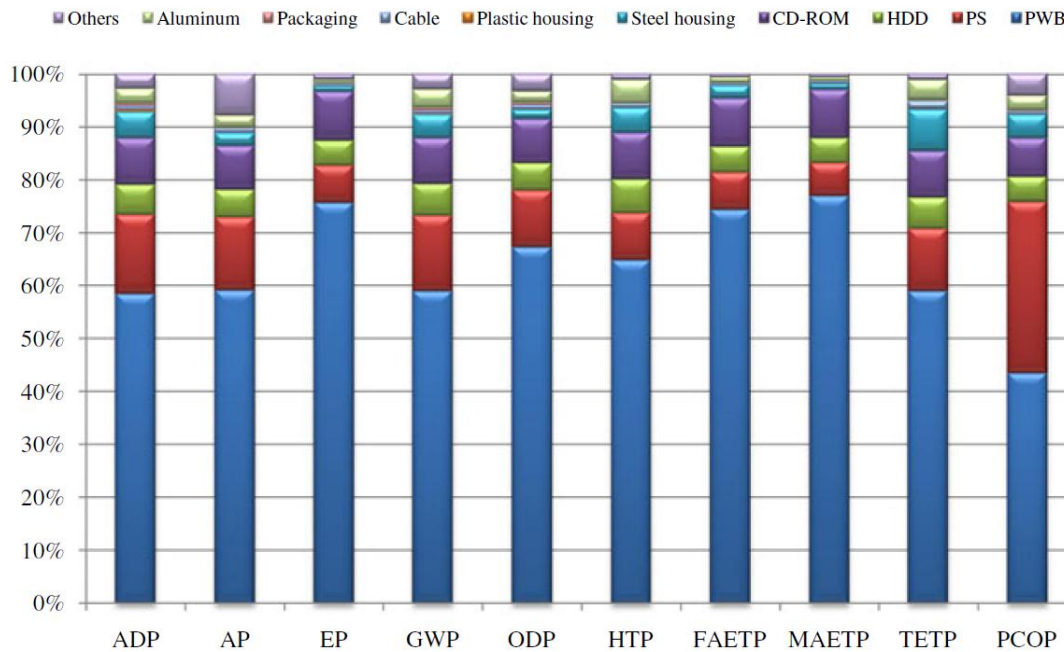
Environmental hot spots during manufacturing phase:
PWB, power supply unit, CD-ROM and **HDD**

Source: xxxx

LCA analysis
Main contributors at component level: LCD screen

Environmental hot spots during manufacturing phase:
PWB, LCD panel and **final assembly process**

LCA analysis
Main results – Notebook computers

- Manufacturing of a notebook PC clearly dominates environmental impacts compared to use phase

- Environmental hot spots during manufacturing phase:
  LCD display, motherboard and **battery production**

- Impacts can be reduced

  - *directly by improving design and production techniques, or*

  - *indirectly by extending notebooks' use life or by reusing parts*

LCA analysis
Main results – Tablet computers

Components	iPad (9.7")		MacBook Pro (13")	
	Gram	%	gram	%
Battery	205	31%	355	17%
Aluminium	135	20%	520	25%
Display	132	20%	290	14%
Glass	112	17%	103	5%
Circuit boards	40	6%	195	9%
Other metals	28	4%	121	6%
Plastics	10	2%	-	-
Hard drive and optical drive	-	-	240	11%
Keyboard and trackpad	-	-	154	7%
Others	-	-	121	6%
Total	662	100%	2099	100%

LCA analysis
Main results – Tablet computers

Material	Weight (g)	Content (%)
LCD	190	18.16
PCBA	44	4.21
Battery	104	9.94
Metal	35.5	3.39
Plastic	103.5	9.89
Touch panel	77.5	7.41
Electronic components	15.5	1.48
Power supply unit	152	14.53
Packaging-PP	80	7.65
Packaging-LDPE	12	1.15
Packaging- paper	232	22.18
Total	1046	100

LCA analysis
Main results – Tablet computers

- Notebook PCs comprise hard drive, optical drive, keyboard and track pad

- Tablet PCs: <u>Battery, aluminium, display and glass account for the main parts</u>

- 67% of GWP emissions during manufacturing, 25% during use phase

- Main contributing components to GWP and primary energy: Display and mainboard

GWP and Primary energy of an Apple iPad 8Gb WIFI 1st Generation in the manufacturing phase (based on Teehan & Kandlikar 2013)

Legend:
- Assembly
- Transport
- Other
- Display
- Battery
- IC's (die)
- IC's (packages)
- Circuit boards (excl. IC's)
- Casing

X-axis: GHG (kg CO2eq), Primary energy (MJ)
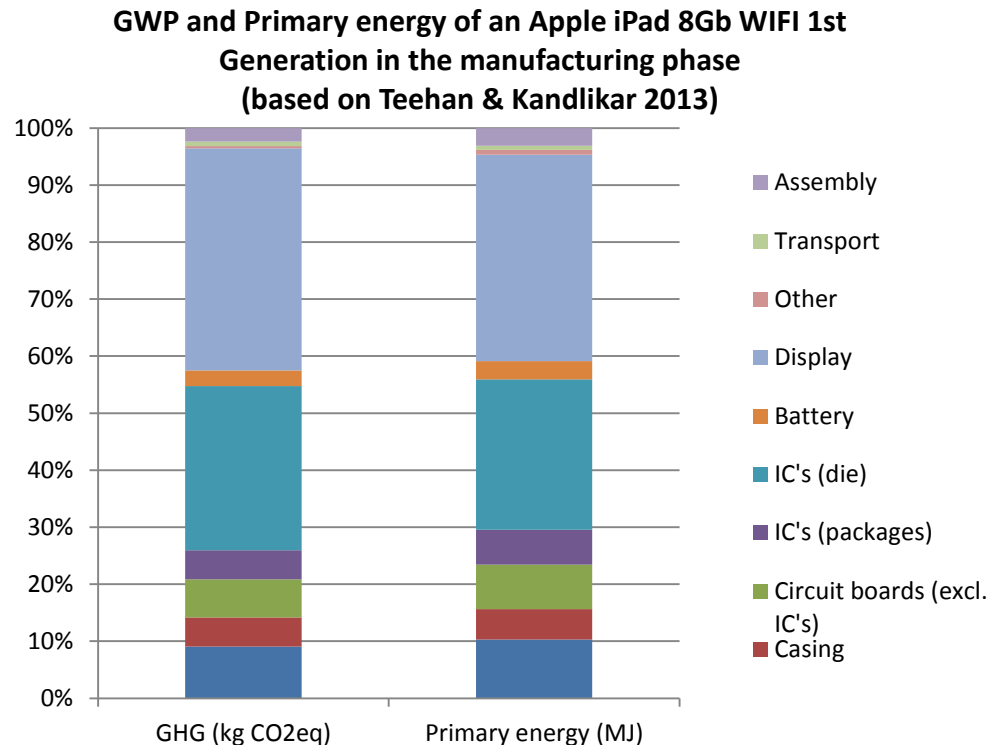
Commission Statement, 21st October 2010
Personal and Notebook computers

- *The 10g weight limit for hazardous substances*
- *Extended commercial warranty*
- *Noise limits for further modes (e.g. accessing optical drives)*
- *Criteria on packaging*
- *Increasing recycled content*
- *Sustainable materials management and resource efficiency*
- *End of life phase regarding halogenated compounds*
- *Social accountability*
- *Consider merging portable computers product group with personal computers product group*

Proposed areas of focus for the revision

Hot spots	Areas of improvement / ecolabel criteria	
Production phase / End-of-life phase		
Motherboard	• Upgradeability of components; • Hazardous substances; • Design for disassembly.	**Lifetime extension** • Expansion capability; • User repairability; • Service (availability of spare parts); • Second-hand usage; • User instructions.
Power supply	• Design for disassembly.	
CD ROM	• Design for durability; • Design for disassembly.	
Display	• Design for disassembly; • Hazardous substances.	
Chassis	• Recycled content; • Hazardous substances; • Design for disassembly; • Material recovery	
Battery	• Prolongation of batteries' lifetime; • Removability of batteries; • User instructions.	
HDD	• Design for durability.	
Use-phase		
	Energy requirements • Energy efficiency; • Power management; • Power supplies; • User instructions.	

Restructuring proposal
Current criteria

Current EU ecolabel criteria
Criterion 1 – Energy savings
Criterion 2 – Power management
Criterion 3 – Internal power supplies
Criterion 4 – Mercury in fluorescent lamps
Criterion 5 – Hazardous substances and mixtures
Criterion 6 – Substances listed in accordance with Article 59(1) of Regulation (EC) No 1907/2006
Criterion 7 – Plastic parts
Criterion 8 – Noise
Criterion 9 – Recycled content
Criterion 10 – User instructions
Criterion 11 – User repairability
Criterion 12 – Design for disassembly
Criterion 13 – Lifetime extension
Criterion 14 – Packaging
Criterion 15 – Information appearing on the Ecolabel

Restructuring proposal
Proposed clusters and sub-criteria

New proposed criteria cluster	Proposed allocation of sub-criteria
1 Energy consumption	Criterion 1.1 – Energy savings
	Criterion 1.2 – Power management
	Criterion 1.3 – Internal power supplies
2 Environmentally hazardous substances	Will be presented in a separate document
3 Life time extension	Criterion 3.1 – Capability enhancement / upgradeability
	Criterion 3.2 – Lifetime of batteries
	Criterion 3.3 – HDD reliability
	Criterion 3.4 – Repairability
	Criterion 3.5 – Data deletion enabling second-hand usage
4 End-of-life management: Design and material selection	Criterion 4.1 – Material selection and material information
	Criterion 4.2 – Design for disassembly and recycling
	Criterion 4.3 – Packaging
5 Corporate production / supply chain management	Criterion 5.1 – Social labour conditions during manufacture
	Criterion 5.2 – Emission of fluorinated GHG during LCD production
	Criterion 5.3 – Use of "conflict-free minerals" during production
6 Further criteria	Criterion 6.1 – Noise
	Criterion 6.2 – Ergonomics
7 Information	Criterion 7.1 – User instructions
	Criterion 7.2 – Information appearing on the Ecolabel

Questions

- Are we addressing the right issues?
- Is there additional evidence available?
- To what extent can some of these hot spots be directly addressed – is there work in this area?
- Are there other areas of focus for industry, Member States and Ecolabels that we should consider?
- Do you agree with the proposed restructuring?

1st Ad Hoc Working Group (AHWG) Meeting

Revision of the EU Ecolabel and GPP criteria for the 'Personal' and 'Notebook' computer product group

Energy consumption criteria area

Criterion 1.1: Energy savings
Current criteria, Desktops and thin clients

Present criteria, Decisions 2011/337 and 2011/330

(a) *Energy savings for desktop computers, integrated desktop computers and thin clients*

The energy efficiency performance of desktop and integrated desktop computers shall exceed the appropriate category energy efficiency requirements set out in the Agreement as amended by Energy Star v5.0 by at least the following:

- category A: 40 %,
- category B: 25 %,
- category C: 25 %,
- category D: 30 %.

The energy efficiency performance of thin clients shall meet at least the energy efficiency requirements for thin clients set out by Energy Star v5.0.

Capability adjustments allowed under the Agreement as amended by Energy Star v5.0 may be applied at the same level, except in the case of discrete graphics processing units (GPUs) where no additional allowance shall be given.

(b) *Energy savings for computer displays*

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%; computer display sleep mode power must not exceed 1 W; computer displays shall have an energy consumption in on-mode of ≤ 100 W measured when set to maximum brightness; computer monitor off mode power shall not exceed 0.5 W.

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

Criterion 1.1: Energy savings
Present criteria, Notebook computers

Energy savings for notebook computers

The energy efficiency performance of notebook computers shall exceed the appropriate category energy efficiency requirements set out in the Agreement as amended by Energy Star v5.0 by at least: category A: 25%; category B: 25%; category C: 15%.

Capability adjustments allowed under the Agreement as amended by Energy Star v5.0 may be applied at the same level, except in the case of discrete graphics processing units (GPUs) where no additional allowance shall be given.

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

Criterion 1.1: Energy savings
New Energy Star programme (Draft v.6.0)

Energy Star was used to define the implementing measure under the Ecodesign Directive:

- Tier 1 requirements will enter into force on 1 July 2014
- Tier 2 entering into force on 1 January 2016

Draft Version 6.0 is currently under development, taking effect April 28, 2014:

- Targets top 25% of models currently on the market
- Tablets are not covered, minimal energy use (around 4 kWh/year)

Criterion 1.1: Energy savings
Energy Star programme, Past market penetration trends
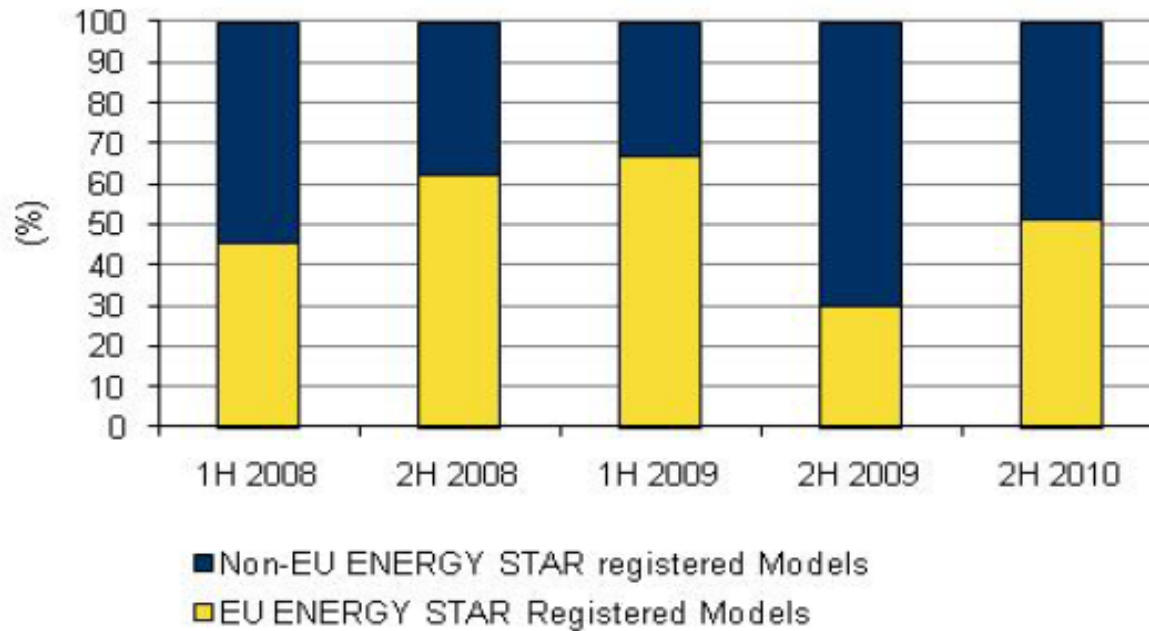
Source: xxxx

Criterion 1.1: Energy savings
Energy Star v.5.2 TEC requirements

Energy Star Product Category	TEC$_{BASE}$ Desktop PCs (kWh)	TEC$_{BASE}$ Notebook PCs (kWh)
A	148	40
B	175	53
C	209	88.5
D	234	n.a.

Source: xxxx

Criterion 1.1: Energy savings
Major proposed changes

o Alignment with the new Energy Star program requirements for computers, version 6.0 effective from 28 April 2014
o Removal of the differences with Energy Star (exclusion of additional allowances for discrete graphics processing units (GPUs))
o Tablet PCs (slate computers) to be exempted as this product sub-group does not consume much electricity (estimated at around 4 kWh/year)

Separate focus on specific components, such as the internal power supply for desktops, in order to make additional efficiency gains

Criterion 1.1: Energy savings
Proposed revised criteria

Proposed revised criteria
The energy-efficiency performance of computers shall meet the appropriate energy-efficiency requirements set out in the Agreement as amended by Energy Star v6.0.
Tablet computers shall be exempted from energy savings requirements.
Assessment and verification: The applicant shall declare compliance of the product with these requirements to the competent body.

Criterion 1.1: Energy savings
Questions

Should the criterion on energy savings <u>include a dynamic approach</u> in order to better react to market developments?

Possible options:

1. Compliance with the most recently published Energy Star standard for computers <u>on the date of application</u>.
2. No later than 2 years after the criteria for EU Ecolabel for Computers have entered into force, <u>the Commission shall evaluate the market penetration of Computers</u>.
3. Performance shall meet and exceed Energy Star v6.0 as follows:
   - <u>One year</u> from the date of adoption of the Decision: +x%
   - <u>Two years</u> from the date of adoption of the Decision: +y%

Criterion 1.2: Power management
Present criteria, Desktop and notebook computers (1)

Notebook computers shall comply with power management requirements ([1]) as follows:

(a) Power management requirements

Notebook computers shall be shipped with the power management system enabled at the time of delivery to the customers. Power management settings shall be:

(i) 10 minutes to screen off (display sleep);

(ii) 30 minutes to computer sleep (system level S3, suspended to RAM).

(b) Network requirements for power management

(i) Notebook computers with Ethernet capability shall have the ability to enable and disable Wake on LAN (WOL) for sleep mode.

(c) Network requirements for power management (applies to notebook computers shipped through enterprise channels only)

(i) Notebook computers with Ethernet capability shall meet one of the following requirements:

— be shipped with Wake On LAN enabled from the sleep mode when operating on AC power, or

— provide control to enable WOL that is sufficiently-accessible from both the client operating system user interface and over the network if notebook computer is shipped to enterprise without WOL enabled.

(ii) Notebook computers with Ethernet capability shall be capable of both remote (via network) and scheduled wake events from Sleep mode (e.g. Real Time Clock). Manufacturers shall ensure, where the manufacturer has control (i.e. configured through hardware settings rather than software settings), that these settings can be managed centrally, as the client wishes, with tools provided by the manufacturer.

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.

Criterion 1.2: Power management
Background to the sub-criteria

Generally, <u>all analysed energy and ecolabels for computers</u> have criteria on power management

- o The <u>draft Commission Regulation</u> on ecodesign requirements for computers and servers has power management criteria
- o Overlap between criteria on power management: System Sleep Mode, Display Sleep Mode, WOL and Wake Management
- o <u>Energy Star Version 6.0</u> has a reference to System Sleep Mode, where "the speed of any active 1 Gb/s Ethernet network links shall be reduced when transitioning to Sleep Mode or Off Mode"

Criterion 1.2: Power management
Major proposed changes

- Alignment of criteria to the forthcoming Energy Star version 6.0 program requirements for computers, effective from 28 April 2014
- Tablet PCs (slate computers) are not covered by Energy Star v6.0
  - *Propose to exempt this product sub-group as it does not consume much electricity (estimated at around 4 kWh/year)*

Criterion 1.2: Power management
Improved guidance on optimisation?

Criterion 1.2: Power management
Proposed revised criteria

Proposed revised criteria
Computers shall comply with power management requirements as defined in Energy Star v6.0 except for display sleep requirement.
Display sleep: Power management settings for display sleep shall be 10 minutes to screen off.
Tablet computers shall be exempted from power management requirements.
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.

European Commission

Joint Research Centre

Criterion 1.2: Power management
Questions

- Should the <u>current, stricter power management settings for display sleep</u> (after 10 minutes instead of 15 minutes as in Energy Star) be kept in the revised criteria?

- Are there any additional <u>software solutions</u> that can be pre-installed/promoted that provide more advanced guidance for users, particularly for notebook users?

Efficiency of power supplies
External power supplies (EPS)

o Covered by the horizontal Ecodesign Regulation (EC) 278/2009.
o Current TCO Criteria for Desktops, All-in-One PCs, Notebooks and Tablets (each from 2012) require Level V
o The Ecodesign Regulation (EC) 278/2009 on External Power Supplies is currently under revision
o This will follow the voluntary EU Code of Conduct (CoC) on the energy efficiency of external power supplies:

- 52% of models require redesign to meet tier 1
(from January 2014)
- 93% of models require redesign to meet tier 2
(from January 2016)

Criterion 1.3: Internal power supplies
Current criteria, Desktop and notebook computers

Present criteria, Decisions 2011/337 and 2011/330
Internal power supplies shall meet at least the energy efficiency requirements for internal power supplies set out by Energy Star v5.0.
Assessment and verification: The applicant shall declare the compliance of the product with these requirements to the competent body.

Criterion 1.3: Internal power supplies
Reference points for the sub-criteria

- Draft Commission Regulation has requirements for computers and computer servers (EU Ecodesign, Draft 2013)
- 80plus voluntary global label certifies internal power supplies, of:

  - 115 V (power supplies for desktop, workstations and non-redundant server applications)
  - 230 V (power supplies for redundant data centre applications).

- Available in five classes (bronze, silver, gold, platinum, titanium) with different efficiency requirements.

Criterion 1.3: Internal power supplies
Comparison of efficiency requirements

Minimum efficiency at:	115 V Input power			230 V Input power			
	20 % of rated output	50 % of rated output	100 % of rated output	10 % of rated output	20 % of rated output	50 % of rated output	100 % of rated output
80plus bronze	82 %	85 %	82 %	-	81 %	85 %	81 %
80plus silver	85 %	88 %	85 %	-	85 %	89 %	85 %
80plus gold	87 %	90 %	87 %	-	88 %	92 %	88 %
80plus platinum	90 %	92 %	89 %	-	90 %	94 %	91 %
80plus titanium	-	-	-	90 %	94 %	96 %	91 %
Energy Star v5.2 / v6.0	82 %	85 %	82 %	-	82 %	85 %	82 %
Blue Angel	82 %	85 %	82 %		82 %	85 %	82 %
Ecodesign for Computers	82 %	85 %	82 %	90 %	82 %	85 %	82 %

Criterion 1.3: Internal power supplies
Models certified to 80Plus by benchmark

80plus class / Number of certified models	Standard	Bronze	Silver	Gold	Platinum	Titanium	Total
115 V Internal	1,266	1,625	319	759	200	---	4,169
230 V Internal	---	34	104	175	166	8	468

Criterion 1.3: Internal power supplies
Major proposed changes

o Exceed draft Energy Star version 6.0 program (effective from 28 April 2014)
o This would correspond mostly to the 80plus-label, class bronze.
o Align with 80plus-label, class silver, or possibly gold
  - Data suggests sufficient certified power supplies
  - Improvement potential of <u>5-7% in efficiency</u>

Criterion 1.3: Internal power supplies
Proposed revised criteria

Proposed revised criteria

Internal power supplies of desktop PCs, integrated desktop PCs, desktop-thin clients, workstations and small-scale server shall meet at least the energy efficiency requirements of

(a) 88% efficiency at 50% of rated output power;

(b) 85% efficiency at 20% and 100% of rated output power;

(c) Power factor = 0.9 at 100% of rated output power.

Internal power supplies with a maximum rated output power of less than 75W are exempted from the power factor requirement.

Assessment and verification: The applicant shall declare the compliance of the product with these requirements to the competent body. Additionally, a test protocol on the basis of the document "Generalized Test Protocol for Calculating the Energy Efficiency of Internal Ac-Dc and Dc-Dc Power Supplies, Revision 6.5" shall be provided to the competent body.

Charging tablet computers
Using notebooks to charge tablets

o Tablet computers are designed to be operated in <u>non-stationary, battery powered mode</u>

o Energy consumption determined by the charger and the way consumers charge…

o Tablets can also be charged <u>via the USB-interface of another computer</u>, potentially in idle-mode for the sole reason of charging the tablet

o Idle-mode power consumption of notebooks 10 W – 50 W (7.5 W with an external supply)

Charging tablet computers
Proposed approach

Idle-mode charging of a tablet is <u>very inefficient</u>.

It is recommended to add inefficient charging via USB-port of notebook computers to the criterion "user instructions".

1st Ad Hoc Working Group (AHWG) Meeting

Revision of the EU Ecolabel criteria for the 'Personal and Notebook Computers' product group

Lifetime extension criteria area

Lifetime extension
Current criteria 'Lifetime extension'

Present criteria,
Decisions 2011/337 and 2011/330

"Lifetime extension":

Personal computers shall have facilities that enable the following:

    (i)   Exchangeable and upgradeable memory and graphic cards;

    (ii)   Expansion capability: presence of at least four USB interfaces

Notebook computers shall have facilities that enable the following:

    (i)   Exchangeable and upgradeable memory

    (ii)   Expansion capability: presence of at least three USB interfaces as well as a connection for an external monitor.

The computer shall also be designed so that major components (including memory drives, CPUs and cards) can be exchanged and/or upgraded easily by the end-user. For example using snap, slide in/slide out or cartridge-style housing for components.

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

Lifetime extension
New evidence and proposed areas of focus

- According to results of the Technical Analysis / Improvement Potential, a strong focus should be paid on lifetime extension of computers to reduce the overall environmental impacts
- In the current criteria documents, requirements influencing the lifetime of computers are spread across different criteria
- For the revision it is proposed to cluster the associated criteria, complementing them with some new proposals
- The focus should be on components identified as hotspots (enhancing reliability, repairability or requirements for minimum quality, consumer information)

Lifetime extension
Initial stakeholder feedback

- **Quality of components**: Obligation for notebook manufacturers to provide batteries with longer capacity
- **Upgradeability**: many of the "new" products, e.g. tablets, are very hard to upgrade (memory, disk space, battery).
- **Warranty/guarantee**:
    - Guarantee to specific parts (e.g. non-exchangeable batteries in a 3-year period).
    - A consumer guarantee (of 1-2 year) besides the general warranty period of two years.
- **Spare parts**:
    - Obligation for notebook manufacturers to release spare parts **at lower prices**, possibly using remanufactured parts to facilitate recycling companies).
    - Oblige manufacturers **to maintain spare parts for up to 3 years**.
- **Avoiding software-induced replacement**

Joint Research Centre

Proposed approach
Cluster 'Lifetime extension'

1. Capability enhancement / upgradeability
2. *Lifetime of batteries*
3. *HDD reliability*
4. Repairability
5. Data deletion enabling second-hand usage
(). Consumer information on lifetime extension possibilities

3.1 Capability enhancement/upgradeability
Major proposed changes

Components shall be defined more clearly to take into account major technical developments (currently, certain components are not separately exchangeable any more).

New: Inclusion of specific requirements for tablet computers.

New: Notebooks shall provide a modular bay for an extra battery as this provides potential advantages in terms of lifetime extension and material efficiency (additional battery capacity, availability of battery spare parts, modular bay also usable for other applications, e.g. optical drives).

3.1 Capability enhancement/upgradeability
Draft proposed criteria text

Proposed revised criteria

Capability enhancement / upgradeability

Computers shall have the following facilities to enable easy exchange to upgrade major components without the use of special tools by the end-user:

  (i) Desktop PCs:

- Presence of at least 4 USB interfaces.
- Installation and/or exchange of memory (for thin clients only applicable if equipped with a processor), storage capacity (not applicable to thin clients) and optical drives (not applicable to thin clients).

  (ii) Notebook PCs:

- Presence of at least 3 USB interfaces as well as a connection for an external monitor
- The memory shall be exchangeable or upgradeable.
- Presence of a modular bay for an extra battery.

  (iii) Tablet PCs:

- Presence of at least 1 USB interface.
- Support for external monitor, keyboard and mouse.
- The memory shall be exchangeable or upgradeable.

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

Questions

- Are there any <u>other technical solutions</u> (USB host, hub, thunderbolt etc.) <u>instead of</u> a certain number of <u>standard USB interfaces</u> fulfilling the same requirement and therefore justifying a different formulation of the criterion?

- Is there any <u>possibility for upgrading graphic cards, CPUs or other significant components?</u> Are there differences between Desktop and Notebook PCs?

3.2 Lifetime of batteries
Major proposed changes
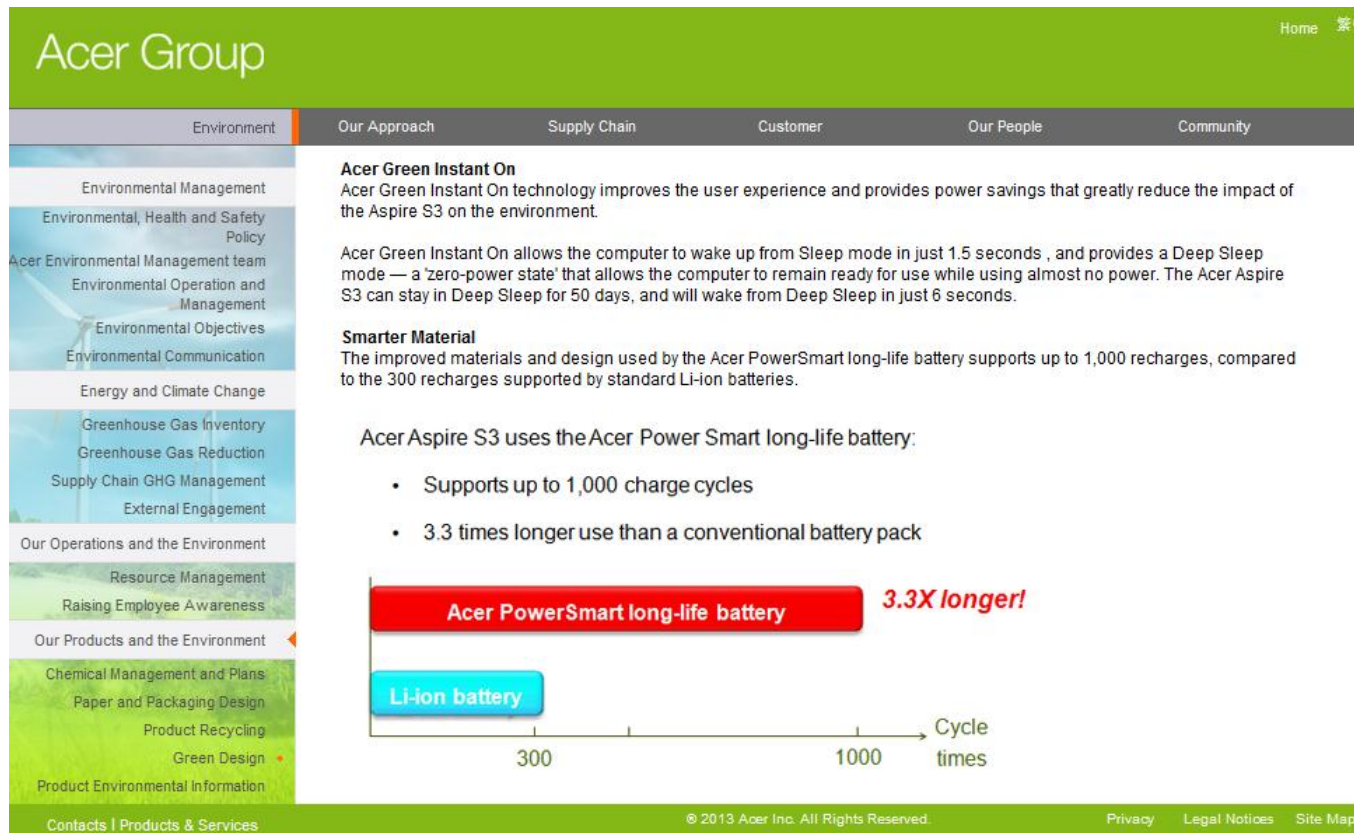
Lifetime of the rechargeable battery is a potential limiting factor to the overall lifetime of the whole product

New: underline obligatory user instructions on factors influencing the lifetime of batteries

To be discussed: Application of a test method to ensure a minimum battery capacity for ecolabelled computer products.

3.2 Lifetime of batteries
How are claims to be verified?

Minimum battery capacity
Proposed test method (I)

Four different batteries per size and type shall be tested. All four tested batteries shall meet the requirements of the following test method.

Test Method:

C is the rated capacity given on the battery in ampere hours (Ah) as maximum capacity. The test starts (quasi the 'zeroth' cycle) with a discharge at 0.2 C until the cut-off voltage is reached (according to IEC/EN 61960: specified voltage under load where the discharge of one cell or battery is completed). The subsequent repeated charge and discharge shall be done in accordance with the specifications listed in the following tables. Different requirements are set for different applications.

Test Specifications for Rechargeable Lithium Batteries:

Cycle No.	Charge	Rest period after charge	Discharge	Rest period after discharge
1-399	Manufacturer specification	30 minutes	1.0 C to cut-off voltage	30 minutes
400	Manufacturer specification	1 hour	0.2 C to cut-off voltage	

The minimum discharge time for cycle 400 shall be 3.5 hours and the capacity delivered during cycle 400 shall be equal to 70 % of the rated capacity.

Minimum battery capacity
Proposed test method (II)

Applied Test Specification for Rechargeable Lithium Batteries in Blue Angel ecolabel requirements for Mobile Phones:

Cycle No.	Charge	Rest period after charge	Discharge	Rest period after discharge
1-149	Manufacturer specification	30 minutes	1.0 C to cut-off voltage	30 minutes
150	Manufacturer specification	1 hour	0.2 C to cut-off voltage	

The minimum discharge time for cycle 150 shall be 3.5 hours and the capacity delivered during cycle 150 shall be equal to 90 % of the rated capacity.

3.2 Lifetime of batteries
Draft proposed criteria text

Proposed new criteria
Lifetime of batteries
Notebook computers and tablet computers shall have the following facilities to enable lifetime extension of rechargeable batteries:
(i) Information should be included in the user instructions and the manufacturer's website to let the user know the factors influencing the lifetime of batteries as well as instructions for the user facilitating its prolongation.
Assessment and verification: The applicant shall declare the compliance of the product with these requirements and shall provide a copy of the instruction manual to the competent body. These user instructions should then be preloaded onto the notebook or tablet computer for the user to read and available for access on the manufacturer's website.

Questions

- Could the test specifications outlined also be applied to the EU Ecolabel for notebook / tablet PCs?

- How many test cycles would be applicable for mobile computers?

3.3 Hard Disk Drive (HDD) reliability
Proposed new sub-criteria

- Hard disk drives (HDD): One of the computer components where the <u>most common faults</u> are reported by several studies and product surveys

- This is <u>particularly significant to notebooks</u> where the HDD would benefit from being more reliable and resilient

- It is also understood that there can be <u>significant variations in the reliability of HDD products.</u>

- Several HDD products reviewed, as well as examples of OEM procurement procedures for HDD, specify the reliability of HDD using <u>metrics such as 'Mean Time Between Failures' and 'Operating Shock'.</u>

Questions

- What is the feasibility of an Ecolabel criterion requiring a standardised test method for HDD reliability?

- Which indicator(s) should be used?
  e.g. 'Mean time between failures (MTBF)' or simulated environmental stresses such as 'operating shock'.

3.4 Repairability
Current criteria

Present criteria, Decisions 2011/337 and 2011/330

"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 personal computer and/or computer monitor / notebook computer.

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.

3.4 Repairability
Major proposed changes

- The <u>link to the end-user has been removed</u>; 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
- <u>Design for repair</u>: <u>Focus on those components with high failure rates</u>. The term '<u>easily accessible and exchangeable</u>' has been illustrated with <u>clear examples</u>
- A new criterion on <u>reasonable repair costs</u> has been proposed in order to avoid costs of single spare parts being more expensive than the purchase of a whole new computer product

3.4 Repairability
Draft proposed criteria text (1)

Proposed revised criteria

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) <u>Design for repair</u>: All major repairable/replaceable components of computers, if applicable, such as hard drive, CD/DVD and Blue-ray drive, printed circuit board, memory, screen assembly, LCD backlight, keyboard, mouse pad, rechargeable battery, cooling fan, catches and hinges 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: simple access panels provided for key components and screw numbers minimised (e.g. by lugs and slots). Screw heads 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.

3.4 Repairability
Draft proposed criteria text (2)

Proposed revised criteria

(b) <u>Repair manual</u>: 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) <u>Availability of spare parts</u>: The applicant shall ensure that spare parts, including rechargeable batteries (if applicable), are available for at least five years following the end of the computer model production.

(d) <u>Reasonable repair costs</u>: The applicant shall ensure that the cost of individual spare parts is less than 20% (LCD assembly: less than 60%) of the cost of a new machine.

(e) <u>Repair Service / Information</u>: 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, 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.

Questions

With regards to commercial guarantees:

- In general: does a commercial guarantee in case of products' defects <u>result in a repair</u>, i.e. lifetime prolongation, or <u>are they simply exchanged for new products</u>?
- Should an additional commercial guarantee by the brand owner be required (e.g. TCO: 1 year, EPEAT: 3 years)?

Criteria 3.5 Data deletion
Draft proposed criteria text

Proposed new criteria

Data deletion:

- To allow a second use of the computer, the device shall be designed so as to allow the user to completely and safely delete all personal data by himself without the help of fee-required software or special tools. This can be achieved by either physically removing the data storage (e.g. memory card, Hard Disk Drive) or with the help of software provided by the manufacturer or a third party free of charge. When using software, the deletion process shall at least include an overwriting of all the data stored with a random pattern. Software solutions from the manufacturer or a third party must be available free of charge for at least five years following the end of the computer model production.

- The applicant shall provide clear instructions to the end-user in form of a manual (in hard or soft copy) to enable personal data deletion.

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

Rationale: end-users' concern on possible misuse of private data still stored in devices is a barrier for second hand usage of IT devices

Current criteria 'User information'

Present criteria, Decisions 2011/337 and 2011/330

(...)

(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 [personal computer and/or computer display] / [notebook computer], including contact details as appropriate;

(e) End-of-life instructions for the proper disposal of [personal computers and/or computer displays] / [notebook computers] 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.

(...)

User information
Draft proposed criteria text

(…)

(d) Information that extension of the computer's lifetime reduces the overall environmental impacts.

(e) The following indications on how to prolong the lifetime of the computer[7]:

    (i) Information to let the user know the factors influencing the lifetime of batteries as well as instructions for the user facilitating its prolongation (only applicable to mobile computers powered with rechargeable batteries).

    (ii) Clear instructions in form of a repair manual to enable replacing of key components for upgrades or repair.

    (iii) A list of available spare parts with current prices.

    (iv) Information to let the user know where to go to obtain professional repairs and servicing of the computer, including contact details as appropriate;

    (v) Clear instructions to enable a permanent deletion of personal data from the computer to facilitate a possible second hand usage.

(f) End-of-life instructions for the proper disposal of computers, including separate instructions for the proper disposal of rechargeable batteries, 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.

(…)

User information
Major proposed changes

- Inclusion of information requirements including <u>detailed instructions for the extension of the computer's lifetime</u>
- Inclusion of information requirements regarding the <u>proper disposal of rechargeable batteries</u>

Hazardous substances and mixtures
Minimum producer requirements under REACH

REACH regulation (EC) No 1907/2006.
o Notification by of products or components containing a 'Candidate List' SVHC in a concentration above 0.1 % (w/w) or above 1 tonne/year
o Verification of SVHC's is a major focus for manufacturers, reflected by component suppliers compliance initiatives.

RoHS 2 Directive 2011/65/ EG
o EEE placed on the market, including cables and spare parts for its repair, its reuse, updating of its functionalities or upgrading of its capacity:
o Lead (Pb), mercury (Hg), Cadmium (Cd), hexavalent chromium (Cr VI), polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE).

Hazardous substances and mixtures
Possible future EU substance restrictions (1)

Intentions to submit Annex XV dossiers
- Notification to ECHA who lists all activities in a public registry
- Current SVHC intentions: 13 different substances (August 2013).

EU Strategy for Endocrine disrupters
- A priority list established within the EU-Strategy for Endocrine Disruptors.
- From a total of 564 chemicals reduced to 66 Category 1 and 52 Category 2
- either persistent in the environment or produced at high volumes

Hazardous substances and mixtures
Possible future EU substance restrictions (2)

Category 1: Humans likely to be exposed to 60 substances
In-depth evaluation of 12 Category 1 substances:

- o 2,2-bis(4-(2,3-epoxypropyl)phenyl)propane (BADGE),
- o carbon disulphide,
- o 4-chloro-3-methylphenol,
- o 2,4-dichlorophenol,
- o 4-nitrotoluene,
- o o-phenylphenol,
- o resorcinol,
- o 4-tert octylphenol,
- o tetra BDE.

Case study
Joint Industry Guide (JIG)

o An initiative of the Consumer Electronics Association.
o A material composition declaration guide: Intentionally used substance
   or thresholds for impurities

Criteria 1 – R (Regulated) 54 different substances/substances groups
Criteria 2 – A (Assessment) C.I. Basic Violet 3
Criteria 3 – I (Information) 4 different substances/substance groups:

  - Beryllium oxide (BeO)
  - Brominated flame retardants (other than PBBs, PBDEs or HBCDD)
  both in plastic materials and printed wiring board laminates
  - Chlorinated flame retardants both in plastic materials and printed
  wiring board laminates
  - PVC (in plastic materials except printed wiring board laminates)

Case study
Pro-active substitution timeline, Hewlett Packard
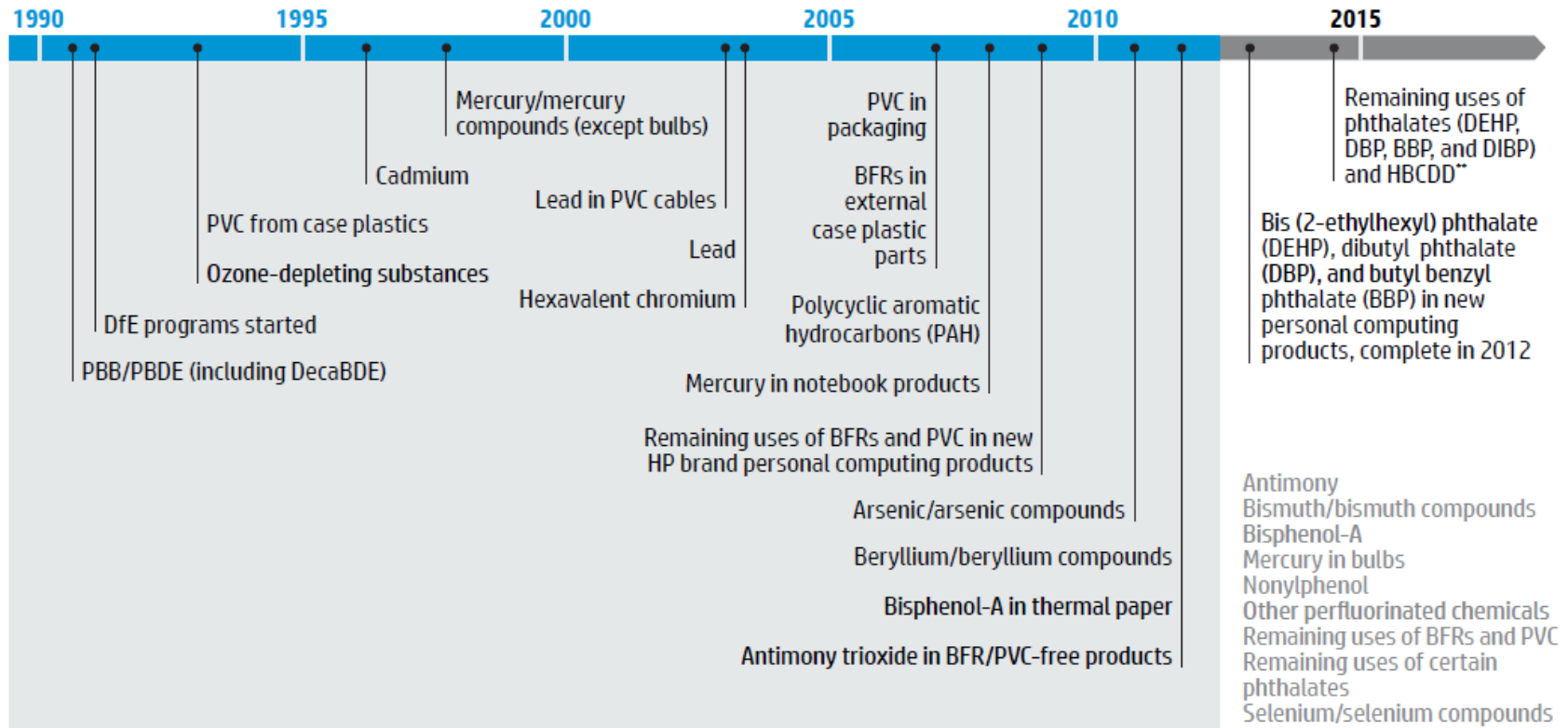
Source: Hewlett Packard (2011)

Hazardous substances and mixtures
Supply chain compliance?

Only generally available if collected for:
o RoHS and REACH compliance
o Company or sectoral substance restrictions or declaration initiatives (e.g. JIG)

Material questionnaires require suppliers to disclose information about their products:
o *The supplier must certify are not present in the product or sub-part.*
o *For commodity articles producers low/no influence on design or chemical composition e.g. wires, screws and printed circuit boards*

Hazardous substances and mixtures
Sectoral eco-innovation and green chemistry

Evidenced by the leading products on the market Product design, This shall be used to define the ambition level and framework for the criteria

- Product design and material selection
- Hazard substitution potential
- Supply chain management systems
- Balanced approach to evidence collation: Government, Industry, Ecolabel and NGO initiatives.

Further examples of initiatives relevant to computer and television products are requested from stakeholders.

Case study
Market leading computer manufacturers (1)

Review of HP, Asus, Acer, Dell, Lenovo, Apple Samsung and Toshiba

o Voluntary activities on the phase-out of hazardous substances beyond RoHS and REACH
o Products certified with ecolabels may have had to screen their products for hazard classifications

Case study
Market leading computer manufacturers (2)

Manufacturer	HP	Acer	Asus	Dell	Lenovo	Apple	Samsung	Toshiba
Voluntary phase-out substances (beyond legal requirements such as RoHS and REACH)	Restriction of certain ortho-phthalates; Phase out of halogens including BFRs and PVC, where technically feasible in new products (e.g. 96% of HP Compaq business PCs and HP notebooks launched since 2011 are low-halogen as defined by the iNEMI [a]; Arsenic-free display glass;	BFRs (all products; 2009); PVC (all products; 2009); Certain phthalates [b] in all products by 2009 and finally all phthalates by 2012; Beryllium and its compounds (all products; 2012); Antimony and its compounds (all products; 2012)	Restriction of halogenated compounds such as BFRs and CFRs as well as antimony and beryllium and their compounds by the end of 2012	Arsenic-free display glass in laptops (2009); BFR and PVC in external case plastics (2004),	PVC/BFR in all mechanical plastic parts	Restriction of brominated and chlorinated compounds at the elemental level in all homogeneous materials; Arsenic-free display glass; Mercury-free LED-backlit display	TBBP-A (all products, 2008); BFRs, PVC, Phthalates, Antimony trioxide and Beryllium in different applications[22]	No information on voluntary phase-out substances
Further activities	Integrated assessment approach to analysing potential materials replacement based on the GreenScreen for Safer Chemicals; Member of iNEMI (see section 3.2.1) Joint statement to ban the use of BFR and PVC (see section 3.3.4)	Joint statement to ban the use of BFR and PVC (see section 3.3.4)		Phase out of further phthalates. Member of iNEMI (see section 3.2.1) Joint statement to ban the use of BFR and PVC (see section 3.3.4)	Member of iNEMI (see section 3.2.1)		Member of iNEMI (see section 3.2.1)	

Case study
Market leading computer manufacturers (3)

Manufacturer	HP	Acer	Asus	Dell	Lenovo	Apple	Samsung	Toshiba
Verification data for the material information by supplier		Each supplier must submit an appropriate product test report. Audits to ensure that production complies with Acer's environmental protection standards.		Supplier Declaration of Conformity (SDoC); Supplier RoHS audit; Third-party analytical testing (see also section 3.3.3.2)		Full material declaration by suppliers. In-house testing; Third-party analytical testing for RoHS and REACH compliance (see also section 3.3.3.1)		
References	HP Standard 011 General Specification for the Environment[23]	Acer Restricted Chemical Substances Management[24] Guidance of Restricted Substances in Products (2006)	ASUSTek Corporate Sustainability Report 2012[25]	Dell's Chemical Use Policy[26]			Samsung Policy on Target Substances[27]	

Case study
Hazardous substances ecolabel criteria (1)

Most ecolabels <u>contain substances or hazard related restrictions</u>
Brands and the number of licenses as an indication of ambition level?

- *Nordic Swan:* Fujitsu
- *TCO:* ASUS, Lenovo, Samsung, AOC, and HP Compaq
- *EPEAT:* 29 brands

Case study
Hazardous substances ecolabel criteria (2)

EU Ecolabel	Nordic Swan	TCO	EPEAT
PBB and PBDE shall not be used (according to RoHS)	**Flame retardants in plastic and rubber parts** • The flame retardants HBCDD, TCEP and SCCP/MCCP must not be added. • The flame retardant TBBP-A must not be added except in PWB • Other **organic halogenated flame retardants** and other flame retardants assigned one or more of the following risk phrases, or combinations, must not be added [b]: – H350, H350i, H340, H360F, H360D, H360Fd, H360Df	**Halogenated substances** • **Plastic parts weighing more than 25 grams shall not contain flame retardants or plasticizers that contain organically bound bromine or chlorine.** The requirement applies to plastic parts in all assemblies and sub-assemblies. Exempted are printed wiring board laminates, electronic components and all kinds of cable insulation. The product shall not contain **PBB, PBDE and HBCDD.** The requirements apply to components, parts and raw materials in all assemblies and sub-assemblies of the product e.g. batteries, paint, surface treatment, plastics and electronic components.	**Flame retardants and plasticizers** - Elimination of intentionally added SCCP flame retardants and plasticizers in certain applications - Large plastic parts free of certain flame retardants classified under European Council Directive 67/548/EEC
Plastic parts shall not contain a chlorine content greater than 50 % by weight. Only biocidal products containing biocidal active substances included in Annex IA to Directive 98/8/EC of the European Parliament and of the Council (1), and authorised for use in computers, shall be allowed for use.	**Plastic parts** >25g must not contain chlorinated polymers such as PVC	• **Plastic parts** in the product weighing more than 25 grams shall not contain **chlorine or bromine as a part of the polymer (e.g. PVC).** • Printed wiring board laminates, and all kinds of internal and external cable insulation are not considered to be part of plastic parts and are therefore not included in the mandate.	Large plastic parts free of PVC

Case study
Hazardous substances ecolabel criteria (3)

Mercury or its compounds shall not intentionally be added to the backlights of the computer display.	• The **background light** in the TV-screen must not have any mercury (Hg) content. • The lamp for projectors cannot contain mercury (Hg)	• Notebooks/Tablets: The product shall not contain mercury. [c)] • Displays: The maximum level of mercury in **background lighting** systems allowed is 3,5 mg Hg/lamp.	Reporting/low threshold/elimination of intentionally added Hg in light sources
RoHS substances (i.e. Cd, Pb, Hg, Cr (VI), PBB, PBDE) shall not be used.	See [d)]	The product shall not contain Cd, Pb and Cr VI. This applies to components, parts, and raw materials in all assemblies and subassemblies of the product e.g. paint, surface treatment, plastics and electronic components.	RoHS compliance; Elimination of intentionally added Cd, Pb (in certain applications) and Cr VI
Product or any part of it shall not contain substances referred to in Article 57 of Regulation (EC) No 1907/2006 of the European Parliament and of the Council (1) nor substances or mixtures meeting the criteria for classification in given hazard classes or categories in accordance with Regulation (EC) No 1272/2008	-	<u>Non-halogenated substances</u> Substances that have been assigned one of the following hazardous statement and where there are less hazardous commercially available alternatives are restricted: • H340, H341, H350, H350i,H351, H360F, H360D, H361d, H361f, H362, H372, H373, H400 and H410, H411 The following **non halogenated flame retardants** shall not be used in **plastic parts weighing more than 25 grams**: • - Antimony(III) oxide (Sb2O3), CAS: 1309-64-4 • - Tri-o-cresyl phosphate, CAS: 78-30-8	-

Case study
Flame retardants in PCB's, USA EPA (1)

o Environmental and human health impacts of new and current materials
o Evaluated eight commercially available flame retardants for FR-4 laminate materials:
o TBBPA, DOPO, Fyrol PMP, aluminum hydroxide, Exolit OP 930, Melapur 200, silicon dioxide, and magnesium hydroxide.
o Evaluation of reaction products of epoxy resin with TBBPA, DOPO, and Fyrol PMP.

Findings: *No single best flame retardant or ranking. Chemical profiles of environmental and human health impacts.*

Other factors: *Effectiveness, electrical and mechanical performance, reliability, combinations and impacts on end-of-life emissions.*

Case study
Flame retardants in PCB's, USA EPA (2)

L = Low hazard   M[1] = Moderate hazard   H = High hazard — Endpoints in colored text (L, M, and H) were assigned based on experimental data.
Endpoints in black italics (*L, M,* and *H*) were assigned using estimated values and professional judgment (Structure Activity Relationships).
◊ Hazard designations, which are based on the presence of epoxy groups, arise from the analysis of low molecular weight oligomers (molecular weight <1,000) that may be present in varying amounts. The estimated human health hazards for higher molecular weight (>1,000) components, which contain epoxy groups, are low for these endpoints.
‡ Concern based on potential inhalation of small particles less than 10 microns in diameter that may be present in varying amounts.
§ Concern linked to direct lung effects associated with the inhalation of poorly soluble particles less than 10 microns in diameter.
▽ Persistent degradation products expected (none found in this report).
R Recalcitrant: substance is or contains inorganics, such as metal ions or elemental oxides, that are expected to be found in the environment >60 days after release.
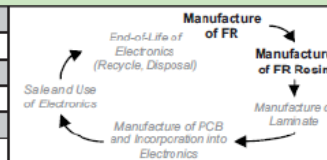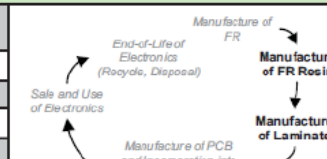
Chemical	CASRN	Acute Toxicity	Skin Sensitizer	Cancer Hazard	Immunotoxicity	Reproductive	Developmental	Neurological	Systemic	Genotoxicity	Acute	Chronic	Persistence	Bioaccumulation	Availability of FRs throughout the lifecycle for reactive and additive FR chemicals and resins[2]
		Human Health Effects									Aquatic Toxicity		Environ-mental		Exposure Considerations
Reactive Flame-Retardant Chemicals[2]															
Tetrabromobisphenol A (TBBPA) (Albemarle, Chemtura, and others)[3]															
TBBPA	79-94-7	L	L	*L*	*L*	L	L	M	L	L	L	H	*H*	M	L
DOPO (6H-Dibenz[c,e][1,2] oxaphosphorin, 6-oxide) (Sanko Co., Ltd. and others)															
DOPO	35948-25-5	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*M*	*M*	*L*	*L*	
Fyrol PMP (Aryl alkylphosphonate) (Supresta)															
Fyrol PMP	Proprietary	*L*	L	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*L*	*H*	*L*	
Reactive Flame-Retardant Resins[2]															
Reaction product of TBBPA - D.E.R. 538 (Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo-, polymer with (chloromethyl)oxirane and 4,4'-(1-methylethylidene)bis[phenol]) (Dow Chemical)															
D.E.R. 538	26265-08-7	*L*	*M*	*M*◊	*L*	*M*◊	*M*◊	*L*	*L*	*M*	*L*	*L*	*M*	*L*	
Reaction Product of DOPO – Dow XZ-92547 (reaction product of an epoxy phenyl novolak with DOPO) (Dow Chemical)															
Dow XZ-92547	Proprietary	*L*	*M*	*M*◊	*L*	*M*◊	*M*◊	*L*	*L*	*M*◊	*L*	*L*	*H*	*L*	
Reaction product of Fyrol PMP with bisphenol A, polymer with epichlorohydrin (Representative Resin)															
Representative Fyrol PCB Resin	Unknown	*L*	*L*	*M*◊	*L*	*M*◊	*M*◊	*L*	*L*	*M*◊	*L*	*L*	*H*	*L*	

[1] The moderate designation captures a broad range of concerns for hazard, further described in Table 4-3.
[2] Reactive FR chemicals and resins may not completely react, and small amounts may be available during other parts of the lifecycle.
[3] The EU has published a comprehensive risk assessment for TBBPA in reactive applications. This risk assessment is a valuable source of information when choosing flame retardants for printed circuit board applications.

Case study
Supplier Declaration of Conformity

Dell requires suppliers to sign a Supplier Declaration of Conformity (SDoC)

o Component meets the Dell Materials Restricted for Use specification
o Parts are selected at random and submitted for third-party analytical testing, a quarterly basis
o Screening of samples in-house using X-Ray Fluorescence (XRF) equipment

Process not indifferent from that used by the <u>*EPEAT ecolabel?*</u>

Questions

o Are there other screening studies and/or examples of (implemented) substitution projects?

o What can be learnt from the experience of applicants/competent bodies for other ecolabels which have similar criteria? e.g. EPEAT, TCO, Nordic Swan, Blue Angel

Hazardous substances and mixtures
Current main criteria text (1)

**Present criteria,
Decisions 2011/337 and 2011/330**

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

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

The use of substances or mixtures which change their properties upon processing (e.g. become no longer bioavailable, undergo chemical modification) so that the identified hazard no longer applies is exempted from the above requirement.

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

Hazardous substances and mixtures
Current main criteria text (2)

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

The following substances/uses of substances are specifically derogated from this requirement:

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

Assessment and verification: for each part above 10 g the applicant shall provide a declaration of compliance with this criterion, together with related documentation, such as declarations of compliance signed by the suppliers of substances and copies of relevant Safety Data Sheets in accordance with Annex II to Regulation (EC) No 1907/2006 for substances or mixtures. Concentration limits shall be specified in the Safety Data Sheets in accordance with Article 31 of Regulation (EC) No 1907/2006 for substances and mixtures.

Hazardous substances and mixtures
Substances listed in accordance with Article 59 (Candidate List SVHC's)

"Substances listed in accordance with Article 59(1) of Regulation (EC) No 1907/2006"
No derogation from the exclusion in Article 6(6) may be given concerning substances identified as substances of very high concern and included in the list foreseen in Article 59 of Regulation (EC) No 1907/2006, present in mixtures, in an article or in any homogenous part of a complex article in concentrations higher than 0,1 %. Specific concentration limits determined in accordance with Article 10 of Regulation (EC) No 1272/2008 shall apply in case it is lower than 0,1 %.

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

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

Reference to the list shall be made on the date of application.

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

European Commission

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Hazardous substances and mixtures
Hazard classifications and risk phrases

H300 Fatal if swallowed R28

H301 Toxic if swallowed R25

H304 May be fatal if swallowed and enters airways R65

H310 Fatal in contact with skin R27

H311 Toxic in contact with skin R24

H330 Fatal if inhaled R23/26

H331 Toxic if inhaled R23

H340 May cause genetic defects R46

H341 Suspected of causing genetic defects R68

H350 May cause cancer R45

H350i May cause cancer by inhalation R49

H351 Suspected of causing cancer R40

H360F May damage fertility R60

H360D May damage the unborn child R61

H360FD May damage fertility. May damage the unborn child R60/61/60-61

H360Fd May damage fertility. Suspected of damaging the unborn child R60/63

H360Df May damage the unborn child. Suspected of damaging fertility R61/62

H361f Suspected of damaging fertility R62

H361d Suspected of damaging the unborn child R63

H361fd Suspected of damaging fertility. Suspected of damaging the unborn child. R62-63

H362 May cause harm to breast fed children R64

H370 Causes damage to organs R39/23/24/25/26/27/28

H371 May cause damage to organs R68/20/21/22

H372 Causes damage to organs R48/25/24/23

H373 May cause damage to organs R48/20/21/22

H400 Very toxic to aquatic life R50

H410 Very toxic to aquatic life with long-lasting effects R50-53

H411 Toxic to aquatic life with long-lasting effects R51-53

H412 Harmful to aquatic life with long-lasting effects R52-53

H413 May cause long-lasting effects to aquatic life R53

EUH059 Hazardous to the ozone layer R59

EUH029 Contact with water liberates toxic gas R29

EUH031 Contact with acids liberates toxic gas R31

EUH032 Contact with acids liberates very toxic gas R32

EUH070 Toxic by eye contact R39-41

Hazardous substances and mixtures
Typical composition of parts, components and materials in a desktop computer (1)

Parts	Components	Materials
Optical Drive	Cable	Cu-wire
	Screw	Steel tube
	Casing	Steel sheet
	PWB	PBW/Solder
	Switch	Steel Sheet
	Plastic arm	ABS
	Disc tray	ABS
Hard disk drive (HDD)	PWB	PWB, slots, solder
	Screws	Steel tube
	Magnet arm	Steel tube
	Plate	Cu winding wire, steel tube
	Motor Body	Cast iron
Power supply unit (PSU)	Casing	Steel sheet
	Screws	Steel tube

Hazardous substances and mixtures
Typical composition of parts, components and materials in a desktop computer (2)

Parts	Components	Materials
	Power supply	PET
	Transformer	Cast iron/Cu winding wire
	Cables	Cu wire
	Fan	PET/solder
Motherboard	Rubber pins	PVC
	CPU heatpipe	PC
	Screws	Steel tube
	Lens	PC
	Battery	
	Plugs	PET, steel tube
Housing	Metal	Steel sheet
	Bezel	ABS
	HDD trays	PC/ABS
	Screws	Steel tube
	Chassis	Steel sheet, ABS

Source: Jepsen et al 2009

Hazardous substances and mixtures
The structure of the electronics supply chain (1)

Component	Company	Site
Mainboard	confidential	Shanghai, China
HDD	Seagate	Suzhou, China
Processor*#	Intel	unknown
RAM	Hynix	Icheon, South Korea
Display		
LCD panel	AU Optronics	Produced in Taiwan, assembled in China
Bezel*	confidential	China
Case*	unknown	unknown
Keyboard*	confidential	China
Touchpad*	ELan Microelectronics	China
Battery pack		
Assembly	Simplo Technology Inc.	Changshu, China
Plastics*	unknown	unknown
Circuit board*	unknown	unknown
Cells	unknown	Made in Korea
Drive	SEPHIL	Calamba City, Philippines
Fan	Delta Electronics Inc.	Wujiang, China
Speakers*#	unknown	unknown
Camera*#	unknown	unknown
Graphic card*	Intel	unknown
W-Lan card*	AzureWave	Shanghai, China
Power supply	Lite-On Technology Corp	Dongguang, China

*not considered in the S-LCA   #not considered in the E-LCA

Source: Ciroth and Franze (2011)
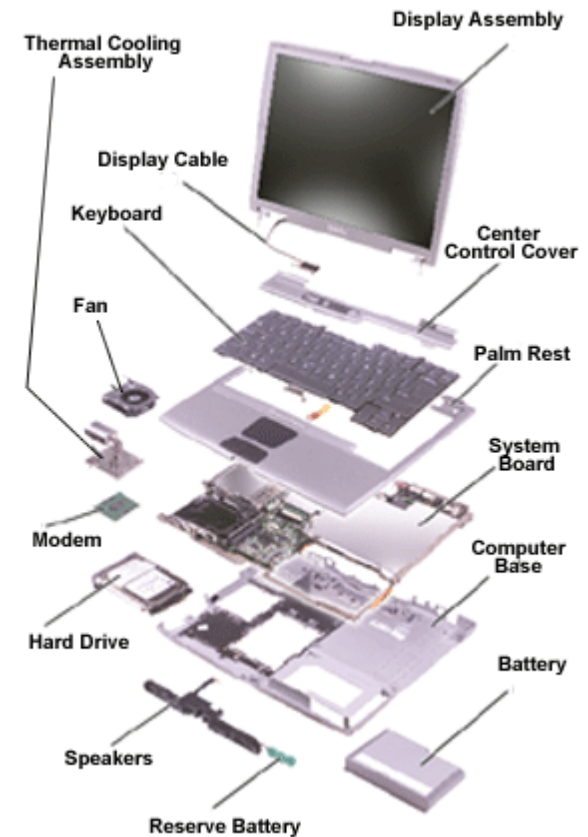
Hazardous substances and mixtures
The structure of the electronics supply chain (2)
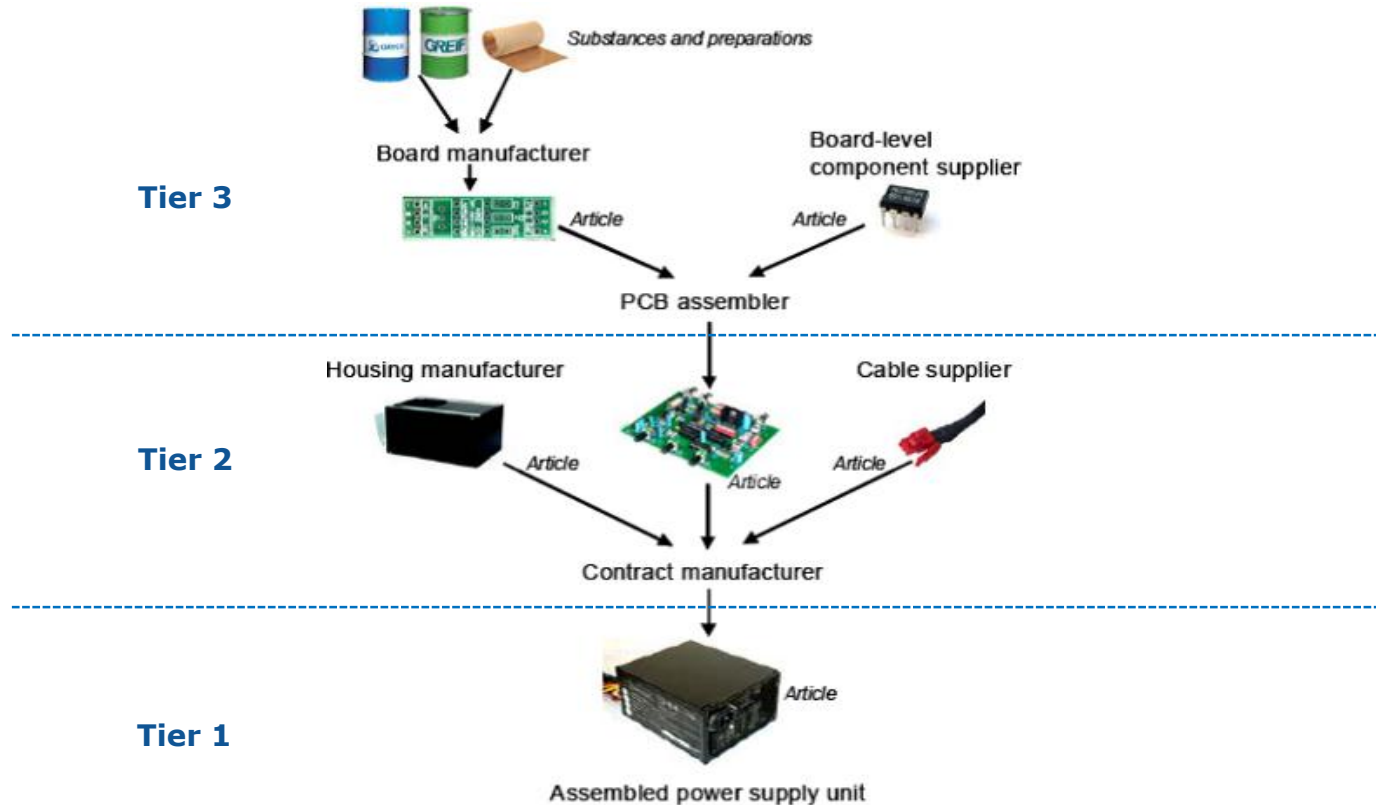
Hazardous substances and mixtures
How to address such a complex product? (1)

- A computer comprises different types of components
  - Primary components made of homogenous materials e.g. plastic casing
  - System components that are themselves complex devices e.g. HDD
  - Functional components that contain chemical mixtures e.g. batteries
- Component devices or homogenous materials may also be treated with or incorporate chemical mixtures or additives that impart specific functions

Hazardous substances and mixtures
How to address such a complex product? (2)

Initial screening and identification of substance groups by their function:

- Circuit boards and plastic housings may be required to have flame retardant properties;
- Plastic housings may contain colorants such as pigments;
- Power cables may contain plasticizers such as phthalates;
- Solder may contain metals such antimony and beryllium;
- Lithium ion batteries contain hazardous electrolyte

Hazardous substances and mixtures
Draft substance group matrix

Substance groups	Where in product? *To be completed by means of stakeholder input*	Substances (examples)
Flame retardants	PWB, plastic casing, housing, connectors	• TBBP-A • Hexabromocyklododekan (HBCDD), • tris(2-chloroethyl)phosphate (TCEP) • Short and medium chain chlorinated paraffins (SCCP and MCCP)
Colorants / dye / pigments	Plastic casing	• Antimony and its compounds; • Lead/lead compounds • Azo dyes • Lead chromate molybdate sulfate red (C.I. Pigment Red 104) • Lead sulfochromate yellow (C.I. Pigment Yellow 34)
Solder		• Antimony or bismuth and its compounds • Cadmium/cadmium compounds
Catalysts : a) flame retardant catalyst b) curing catalyst for silicone		a) • Antimony or beryllium and its compounds b)
resin and urethane resin		• Dibutyltin (DBT) • Dioctyltin (DOT)
Plastizicer		• Phthalates (including DEHP, BBP, DINP, DIDP, DNOP, DHNUP, DIHP) • Short Chain Chlorinated Paraffins (SCCPs)

Substance groups	Where in product? *To be completed by means of stakeholder input*	Substances (examples)
Additives (e.g. in metal, glass and plastics)		• Phthalates (plastizicers in plastics) • Arsenic compounds (in glass)
Adhesives		• Phthalates
Anti-corrosion surface treatments		• Cadmium/cadmium compounds
Lubricants / Surfactant		• Phthalates • Nonylphenol • Nonylphenolethoxylates
Anti-microbial agents/coatings		• Selenium and its compounds, • Triclosan • Organotins Tributyl tin oxide (TBTO) Dibutyltin dichloride (DBTC) Dibutyltin (DBT) Dioctyltin (DOT)
Ceramics		• Beryllium oxide (BeO)
Electrolytes (in batteries)		• Bis(2-methoxyethyl) ether
Stabilizer	PVC cables	• Cadmium/cadmium compounds • Lead/lead compounds • Dibutyltin (DBT) for PVC • Dioctyltin (DOT) for PVC
Surface finish/treatment: Ink, paint, plating[12]; anti-corrosion layer		• Cadmium/cadmium compounds
Fluorescence		• Cadmium/cadmium compounds

Hazardous substances and mixtures
Proposed approach to screening the products (1)

1. Identification of:
   a. The <u>principal homogenous materials</u> within the bill of materials i.e. metals, alloys, polymers, glass, ceramics
   b. The <u>principal system components</u> i.e. LCD unit, motherboard, HDD, capacitors, cooling unit, power unit
   c. Components containing <u>chemical mixtures</u> i.e. batteries

2. Identification of <u>functional additives, coatings and treatments</u> that are related to a) or b) to be screened for hazards and/or risk of potential release

3. The identification of relevant <u>Candidate List/Article 57 substances</u> and <u>precautionary references</u> to industry declaration lists, European Commission initiatives (e.g. Endocrine disruptors) and registered Member State intentions

Hazardous substances and mixtures
Proposed approach to screening the products (2)

3. <u>Alloys and polymers may be exempted</u>, with reference to Article 23 of CLP Regulation (EC) No 1272/2008 and Annex I point 1.3.4

4. Check that the alloys and/or polymers to which hazardous additives or treatments have been applied <u>pass design for recycling/dismantling requirements</u> (with reference to EU end-of-waste criteria)

5. Separate screening of hazards associated with the chemistry of <u>batteries</u>;

Hazardous substances and mixtures
Call for evidence: Substitutions and derogations

Case studies and substance declaration listings have been collated

o Identification of the state-of-the-art in hazard substitution by substance groups
o Additional input will also be required from stakeholders in order to identify substitutions
o Identification/requests for derogations that may also be required:

''in the event that it is not technically feasible to substitute them as such, or via the use of alternative materials or designs, or in the case of products which have a significantly higher overall environment performance compared with other goods of the same category,''

Hazardous substances and mixtures
Proposed structure for the revised criteria (1)

The following structure is proposed for the criteria:

a) <u>Restricted substances in computers</u>: A list to be compiled based on best practice by manufacturers and, as far as possible:

- Article 57 substances that have already been/are in the process of being substituted by leading manufacturers.
- The listing would be appended as an appendix of the Ecolabel Decision.
- The listing would include the Article 6(6)/6(7) requirement to exclude Candidate List SVHC's and Article 57 substances.

Hazardous substances and mixtures
Proposed structure for the revised criteria (2)

b) <u>Derogation framework</u>: If the need for derogations is identified then these will, as far as possible, be structured by function and/or the relationship of the substance to a specific sub-component.

- Derogations will only be permitted for specific hazards if, after a screening of substance group substitutions, are required.
- The hazards derogated would be defined by the hazard profile and market status of substitution options.

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Hazardous substances and mixtures
Proposed structure for the revised criteria (3)

c) Assessment and verification: This would be specified for the restricted substance listing and for the derogation framework (if required). It is to be discussed:

- if a restriction list could be verified by random analytical testing and if so the frequency of this testing.
- the tiers in the supply chain at which verification of the classification/non-classification of substance groups within products could be workable.
- One possibility is for declarations to be obtained from tier 1 component suppliers.

Questions

o What level of flexibility should be used in interpreting the requirement for this product group?

o Based on the experience of industry and existing ecolabels could the overall approach be workable?

o How might it be improved or amended?

o How can criteria development best be taken forward between now and the next AHWG?

Hazardous substances and mixtures
Possible next steps?

1. Further substitution evidence
2. Draft overview of substitution framework and restrictions
3. First meeting of sub-group
4. Circulation of proposed substance framework and restrictions
5. Request for derogations

1ˢᵗ Ad Hoc Working Group (AHWG) Meeting

Revision of the EU Ecolabel criteria for the 'Personal and Notebook Computers' product group

Design & material selection,
end-of-life (EoL) criteria area

Current criteria 'Design & material selection' (1)

Present criteria, Decisions 2011/337 and 2011/330

"Recycled content":

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

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

Present criteria, Decisions 2011/337 and 2011/330

"Design for disassembly":

The manufacturer shall demonstrate that the personal computer/monitor can be easily dismantled by professionally trained personnel 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:

(…)

Current criteria 'Design & material selection' (2)

Present criteria,
Decisions 2011/337 and 2011/330

"Design for disassembly":

(...)

(a) Fixtures within the personal computer shall allow for its disassembly, e.g. screws, snap-fixes, especially for parts containing hazardous substances;

(b) 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) 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 personal computer 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 personal computer. It shall include an exploded diagram of the personal computer 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.

Current criteria 'Design & material selection' (3)

Present criteria, Decisions 2011/337 and 2011/330
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.

End-of-life management
New evidence and areas of focus

- According to results of the Technical Analysis / Improvement Potential, <u>strong focus should be paid on end-of-life (EoL) management</u> of computers to reduce the overall environmental impacts

- In the <u>current</u> criteria documents, <u>requirements</u> regarding material selection and end-of-life management <u>are spread across different criteria</u> (recycled content, design for disassembly, packaging)

- For the revision it is proposed to <u>cluster and rearrange the associated criteria</u>, complementing them by <u>some new proposals</u>

- <u>Focus should be laid on components identified as hotspots</u>

- Design for disassembly: <u>Clear difference</u> should be made between <u>disassembly for repair/lifetime prolongation</u> and <u>disassembly for recycling purposes.</u>

Stakeholder feedback to date

- **Re-used parts:**
  - *Use of <u>secondary material should be encouraged </u>(if relevant), but, in general, must meet the same requirements as other material.*
  - *<u>Surface coating can be positive </u>when increasing the volume of recycled plastic.*
  - *Create a separate category with lesser performance requirements for <u>computers using re-used parts and components</u>, in recognition of their lesser environmental impact over the life-cycle of the product.*

- **Design for disassembly:**
  - *Focus on requirements <u>regulating the time needed to dismantle </u>the PCBs.*
  - *Tests and verification of <u>easy and effective disassembly </u>by independent dismantling and E-waste companies.*

- **Packaging:**
  - *The economic benefit of packaging bag's recycling is lower, thus a <u>revision of the criterion on packaging is needed</u>.*

Proposed approach
Cluster 'End-of-life management: Design and material selection'

1. Material selection and information

2. Design for disassembly and recycling

3. Packaging

(). Consumer information on product's end-of-life

4.1 Material selection and information
Major proposed changes

- <u>Different sub-requirements</u> under current criteria 'recycled content' and 'design for disassembly' have been <u>rearranged and renamed</u> 'material selection and information' and 'design for recycling'.

- 'Variety of plastics': detailed, taking the current Blue Angel criteria for desktop and notebook PCs as basis.

- 'Surface coating': <u>derogation for notebook PCs</u> when legal requirements technically necessitate surface coating (e.g. EMC).

- 'Content of recyclates': current separate criterion included

- 'Material information facilitating recycling': sub-criteria restructured, <u>addition of reference to ISO 1043 series</u>

4.1 Material selection and information
Draft proposed criteria text (1)

Proposed revised criteria

"**Material selection and information**"

(a) <u>Variety of plastics</u>: Plastic parts with a mass greater than 25 grams shall consist of a single polymer or a polymer blend compatible with recycling. A maximum of 4 types of plastic may be used for these parts. Plastic cases may consist of two separable polymers or polymer blends at the most.

(b) <u>Surface coating / metal inlays</u>:

    (i) Personal computers: All plastic materials used for covers/housing shall have no surface coatings / metal inlays incompatible with recycling or reuse;

    (ii) Notebook computers: It shall be allowed to apply a metal coating to plastic case parts if such a coating is technically required. However, no electroplating shall be allowed.

(c) <u>Content of recyclates</u>: The external plastic case of the system unit, monitor and keyboard shall have a content of post-consumer recyclates material of not less than 10% by mass.

(d) <u>Material information facilitating recycling</u>:

    (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 > 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.

4.1 Material selection and information
Draft proposed criteria text (2)

Proposed revised criteria
"Material selection and information" **(…)**

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 computer 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).

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.

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.

4.2 Design for disassembly and recycling
Major proposed changes

- Criterion renamed, <u>clear focus on design for recycling purposes</u>:
  - *Removing introduction "…for the purpose of undertaking repairs and replacements of worn out parts, upgrading older or obsolete parts…".*
  - *Requirements for the access and exchange of components for repair and/or upgrade are specified under 'repairability'.*
- Criterion restructured, sub-criteria moved to "material selection and information"
- Components specified and focused according to relevance (i.e. LCA hotspots, material recovery)
- <u>Disassembly process</u>
  - *Specified (specialised firm, one person alone, use of universal tools).*
  - *Assessment and verification: provision of a "test disassembly report" required with options for third-party verification. JRC-IES study on "Integration of resource efficiency and waste management criteria in European product policies" as basis.*

4.2 Design for disassembly and recycling
Draft proposed criteria text (1)

Proposed revised criteria
"Design for disassembly and recycling" For recycling purposes computers shall be designed so that (a) They shall facilitate easy (manual) disassembly in order to separate rechargeable batteries (if applicable), display units >100 cm² (if applicable) and printed circuit boards >100 cm². (b) An efficient (manual) disassembly of display units >100 cm² (if applicable), rechargeable batteries (if applicable) and printed circuit boards >100 cm² by a specialised firm can be carried out using widely used commercially available tools (i.e. pliers, screw-drivers, cutters). (c) One person alone shall be able to disassemble display units >100 cm² (if applicable), rechargeable batteries (if applicable) and printed circuit boards >100 cm². (d) Electrical modules shall be easily removed from the case.

4.2 Design for disassembly and recycling
Draft proposed criteria text (2)

Proposed revised criteria
"Design for disassembly and recycling"

(…)

Assessment and verification:

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 and tools needed for the disassembly supported by either:

(i)   Test results verifying the time (in seconds) required for the different steps to disassemble the components during the testing. The timing shall be verified by a third party, which can include specialised recycling firms or testing bodies.

(ii)   Verification by a specialised recycling firm that the requirements of the criteria can be fulfilled. Firms shall be a permitted treatment operation in accordance with Article 23 of Directive 2008/98/EC.

The report may be submitted either in writing or by photo, drawing or in video format.

Questions

- Have <u>similar testing procedures based on timed dismantling or verification by dismantlers</u> been developed in other countries or regions?

- Could the proposal for <u>verification by specialised dismantlers</u> be workable and if so, would any supporting requirements or procedures be needed?

- Are there alternative verification procedures for this type of criteria that may be relevant?

4.3 Packaging
Current criteria

Present criteria,
Decisions 2011/337 and 2011/330

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.

Questions

The technical analysis and literature review of LCA studies clearly shows that the packaging of computers is of <u>negligible relevance with regard to environmental impacts</u>.

Against this background it shall be discussed <u>*if this criterion should be retained?*</u>

1ˢᵗ Ad Hoc Working Group (AHWG) meeting

Revision of the EU Ecolabel and GPP criteria for the 'Personal and Notebook Computers' product group

Further criteria areas
Fluorinated GHG, CSR, conflict-free minerals
Noise, Ergonomics

5.2 Fluorinated GHG's in LCD production
Rationale behind this new criterion

- Fluorinated greenhouse gases (GHG) are among the most potent and persistent GHG contributing to global climate change; relevant in the <u>manufacture of semiconductors, LED/LCD flat panel displays</u>.

- <u>Difficult to set product-related criteria</u> addressing F-gases (lack of consistency in estimating emissions, estimating emissions reductions, and in monitoring the efficacy of installed abatement systems)

Proposal: A <u>process oriented approach</u>, based on a proposal in the current revision of the Nordic Ecolabelling criteria for TV displays

5.2 Fluorinated GHG's
Draft proposed criteria text

Proposed new criterion
Fluorinated GHG emission during LCD production Computers with integrated LCD panel must be produced in a way that the fluorinated greenhouse gases NF_3 and SF6, 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.

Questions

- Should the EU ecolabel for computers include <u>process-oriented</u> criteria for fluorinated greenhouse gases?

- What could be the approach to verification?

5.1 Labour conditions during manufacturing
Rationale behind this new criterion (1)

- Computer products are associated with both, environmental and social impacts in their life-cycle.

- The EU Ecolabel's Social Task Force initiated a discussion whether social requirements shall be introduced into the criteria documents.

- However, implementation and verification are challenging:

  - *Compliance with social standards is generally <u>process-based</u> and has to be formulated <u>at company level</u>*

  - *<u>Verification mechanisms (and their real impact on the social criteria) vary</u> – depending on the type of hotspot, level of supply chain and existence of approaches and initiatives: Self-declaration, industry code of conduct (CoC), international CoC, membership in industry initiatives, self-audits, third-party verifications*

5.1 Labour conditions during manufacturing
Rationale behind this new criterion (2)

- A guarantee of compliance with social criteria throughout the supply chain seems very difficult.

- Possible breaches of social requirements (e.g. discovery of poor health/safety conditions at specific manufacturing sites) might have strong impacts on the overall reputation of the Ecolabel.

Option 1: Social criteria as option only for licensees that are able to guarantee site compliance by third-party verification.

Option 2: Social criteria as process-oriented approach: awarding companies working with their suppliers on continuous improvement

5.1 Labour conditions during manufacturing
Draft proposed criteria text (1)

Proposed options for a new criterion

Option (a): No social criteria at all

Option (b): Labour conditions during manufacturing

The applicant shall 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 shall also address the assembly-stage of the production even in cases the assembly is not carried out by the applicant. The applicant shall 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 compliance with these requirements (for example implementation of OECD Guidelines for Multi-National Enterprises "Recommendations on human rights and on employment and industrial relations" or of the United Nations Global Compact: "Principles on Human rights and Labour") and shall provide a copy of the code of conduct and a description of the implementation process at tier 1 suppliers/sub-contractor level (up until assembly).

(…)

5.1 Labour conditions during manufacturing
Draft proposed criteria text (2)

Proposed options for a new criterion

(...)

Option (c): Labour conditions during manufacturing

Fundamental principles and rights with respect to 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 manufacturing (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 tier 1 production sites (up until assembly), e.g. by SA8000 or other standards that contain the ILO Core Labour Standards. This shall include site visits by auditors for all tier 1 production sites in the supply chain (up until assembly) for the licensed products. Site visits shall take place upon application and subsequently during the license period if new production sites are introduced.

Questions

- Should a criterion addressing <u>labour conditions</u> be included?

- Which <u>further social aspects</u> might be required beyond the ILO *Core* Labour Standards (e.g. wages, working time, occupational health & safety)?

- Are there <u>specific hot spots</u> in the supply chain that might provide for a more focused criterion (e.g. conflict-minerals)?

- Which <u>verification mechanisms</u> shall apply in order to best ensure compliance with the required criteria?

5.3 Use of 'conflict-free minerals'
Rationale behind this new criterion

- Computers contain a <u>wide range of scarce resources</u>

- They are largely mined in the Democratic Republic of Congo, a conflict region, and according to sources <u>under dangerous conditions, without sufficient maintenance of health and safety standards</u> and in some cases by children.

- A criterion to <u>exclude</u> the use of conflict minerals would imply a <u>de facto embargo of minerals from a whole region</u> that is economically and socially dependent on the mining industry.

- For the EU ecolabel revision, a <u>process oriented approach</u> has been proposed <u>to stimulate sustainable sourcing</u>.

5.3 Use of 'conflict-free minerals'
Draft proposed criteria text

Proposed new criterion

'Conflict-free minerals' in electronics

The applicant shall support the responsible sourcing of "conflict-free minerals" from the African Great Lakes Region for use in their computer products.

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.

Questions

- Should the EU ecolabel for computers include <u>process-oriented</u> criteria to support sustainable mining?

- What form of verification could apply?

6.2 Noise
Current criteria

Present criteria,
Decisions 2011/337 and 2011/330

The 'Declared A weighted Sound Power Level' (re I pW) of the personal computer, in accordance with paragraph 3.2.5 of ISO 9296, shall not exceed

    (1) 40 dB (A) in the idle operating mode,

    (2) 45 dB (A) when accessing a hard disk drive.

The 'Declared A weighted Sound Power Level' (re I pW) of the notebook computer system unit, in accordance with paragraph 3.2.5 of ISO 9296, shall not exceed

    (1) 32 dB (A) in the idle operating mode,

    (2) 36 dB (A) when accessing a hard disk drive.

Assessment and verification: the applicant shall provide the competent body with a report, certifying that the levels of noise emissions have been measured in accordance with ISO 7779 and declared in accordance with ISO 9296. The report shall state the measured levels of noise emissions in both idle operating mode and when accessing a disk drive, which shall be declared in accordance with paragraph 3.2.5 of ISO 9296.

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6.1 Noise
Major proposed changes

- <u>Desktop PCs: slightly stricter limit values</u> have been proposed (based on most current Blue Angel criteria)

- Desktop and notebook PCs: <u>limit values for optical drive enabled.</u>

- <u>Exemptions for measurements</u> in cases where fans, mechanical hard disk drives or optical drives are not installed.

- *Assessment and verification:* In case of different configurations of identically constructed units the measurements shall be allowed to be performed on the loudest individual components to avoid measurements for each individual configuration ("<u>family certification</u>"; proposal based on stakeholder feedback).

6.1 Noise
Draft proposed criteria text (1)

Proposed revised criteria

The 'Declared A weighted Sound Power Level' (re I pW) of the computer, in accordance with paragraph 3.2.5 of ISO 9296, shall not exceed

(1) in the idle operating mode (the measurement can be dropped if no fans are installed, e.g. CPU fans, power supply fans, computer system fans):

    a. 38 dB (A) for desktop computers,

    b. 32 dB (A) for notebook computers;

(2) when accessing a hard disk drive (the measurement can be dropped if no mechanical hard disk drive is installed):

    a. 42 dB (A) for desktop computers,

    b. 36 dB (A) for notebook computers;

(3) when optical drive enabled (the measurement can be dropped if no optical drive is installed):

    a. 50 dB (A) for desktop computers,

    b. 48 dB (A) for notebook computers.

(…)

6.1 Noise
Draft proposed criteria text (2)

Proposed revised criteria

(…)

Assessment and verification: the applicant shall provide the competent body with a report, certifying that the levels of noise emissions have been measured in accordance with ISO 7779 and declared in accordance with ISO 9296. The report shall state the measured levels of noise emissions in idle operating mode, when accessing a disk drive and when optical drive enabled (if applicable), which shall be declared in accordance with paragraph 3.2.5 of ISO 9296. In case of different configurations of identically constructed units the measurements have to be performed on the loudest individual components.

6.2 Ergonomics
Should this issue be addressed?

Should the EU ecolabel for computers include criteria for <u>visuable and/or workload ergonomics</u>, e.g. aligning them to the TCO criteria?

- Visual ergonomics: image detail, luminance, luminance contrast, reflection, screen colour, display resolution
- Workload ergonomics:
  - Accessible connections (USB)
  - Notebooks: separate display, keyboard and input device; keyboard requirement
  - AiO-PCs: vertical tilt, vertical height adjustment

Thank you for your attention

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