CONSUMER RELEVANT ECO-DESIGN REQUIREMENTS FOR NON-PROFESSIONAL ELECTRONIC DISPLAYS

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Summary

In the context of the implementation of the Eco-design of Energy-using Products (EuP) Directive, the European Commission is proposing eco-design requirements for non professional electronic displays such as computer monitors and digital photo frames. The requirements are largely based on existing Energy Star criteria for displays.

This paper outlines the main consumer relevant issues related to the possible eco-design requirements for electronic displays and recommends improvement options.

We give specific, technical recommendations to increase the energy efficiency of these products and highlight the need to implement a higher ambition level.

We also ask to set an auto-power-down function for digital photo frames two hours after the last user interaction.

We ask to apply the test procedures of the Energy Star for verification purposes as the current provisions would allow for systematically exceeding the threshold values.

We also stress the importance of providing comparable information to consumers on the energy consumption of displays and to introduce an Energy Label for computer monitors.

Finally, we call to address other environmentally relevant aspects and to investigate possibilities for replacing e.g. mercury in screen backlights with non-mercury containing technologies such as LEDs.

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Introduction

In the context of the implementation of the Eco-design of Energy-using Products (EuP) Directive, the European Commission is proposing eco-design requirements for non professional electronic displays such as computer monitors and digital photo frames. The requirements are largely based on existing Energy Star criteria for displays.

In this paper, based on the Commission working document on implementing measures for ecodesign requirements for non-professional displays, we make recommendations on the consumer needs which should be taken into account when deciding on the final Implementing Measure. Our proposal addresses the scope of the measure, the revision date of the Implementing Measure, the verification procedure and the setting of energy efficiency requirements for computer monitors and digital photo frames (DPFs). In addition, we call for informing consumers about the energy efficiency of displays which allows for easy comparing different products at the point of sale by introducing an EU Energy Label for monitors. We also ask to consider other environmental relevant aspects in the Implementation Measure such as mercury in the lamps for LCD screens.

Scope should be extended to cover large screen sizes

The working document limits the scope of the Implementing Measure to computer monitors from 12 inches (30.5 cm) viewable diagonal screen size to 30 inches (76.2 cm). Although screens over 30 inches are currently a niche market product, the case of TVs showed that consumer preferences changed in the last years towards larger and larger screens. As the energy consumption of large screens in on mode is very high, we ask to apply the same scope than in the Energy Star which covers screens of up to 60 inches.

The inclusion would anticipate possible changes in consumer preferences towards larger screen sizes and would exclude that screens above 30 inches do not have to fulfil any eco-design requirements.

Definition for DPFs with integrated tuner needs to be clarified

The draft Implementing Measure specifies that displays which meet the definition of a “television set” or a “television monitor” as specified in Regulation (EC) No 642/2009 are not included into the scope of this Implementing Measure.

While the distinction is quite clear in the case of computer monitors, it is less clear how DPFs with an integrated tuner will be defined within the scope of this Implementing Measure.

We assume that DPFs with integrated tuners are considered as TVs as this would be in line with the ProdCom statistics.

To clarify, we suggest referring to the definition for displays which is used in the Energy Star V5.0. The Energy Start distinguishes the appliances according to their mode of marketing, i.e. if marketed as display or as TV.

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Definition for computer monitor should not require a single housing

We recommend aligning the definition for computer monitors in the Eco-design measure with the Energy Star as follows:

> "*Computer Monitor" means a commercially-available, electronic product with a display screen and its associated electronics* ***often*** *encased in a single housing that is capable of displaying output information from a computer via one or more inputs, such as VGA, DVI and/or IEEE 1394. The computer monitor must be capable of being powered by a separate AC wall outlet or a battery unit that is sold with an AC adapter. This definition is intended to cover standard monitors designed for use with computers with a viewable diagonal screen size greater than 12 inches but not exceeding 60 inches*".

As it is possible to put the power supply in a box, the video circuits in a second box, and the display head in a third box, the requirement of a single housing seems not to be adequate. Therefore, the ENERGY STARV5.0 definition would be more suitable as it avoids that computer monitors which are not in a single housing would be exempted from the requirements.

Calculation of power consumption needs to be based on screen size

The draft Implementing Measure calculates the threshold values for Tier 1 requirements in on-mode based on the Energy Star V4.1 and applies as main parameter the "screen resolution". However, the preparatory study on computers (Lot 3) found that for many types of monitors the resolution is not linked to the energy consumption[1]. Therefore, research shows that the resolution has very little influence on the power consumption whereas screen size shows an almost linear correlation. In fact, the needed resolution is depending on the intended use of a display. For example, large screens which display information over large distances such as airport information can have a low resolution whereas small screens for photo editing need a high resolution. Therefore the calculation of energy efficiency thresholds needs to consider both, the resolution and the screen size of computer monitors.

If the proposed formula for Tier one would be applied, the thresholds for on-mode power consumption would be so high that almost all displays would meet the requirements without considerable improvements being necessary. To illustrate the low ambition level, we have outlined an example calculation for the most common screen sizes below:

[1] For Plasma screens the energy consumption correlates to the resolution as each pixel element is and individual light source which is illuminated as needed. LCD screens however have a backlight source which is always on and instead of lighting up pixels, the LCD monitor blocks pixels so that the light does not go through. For the total energy consumption of LCD monitors the number of pixels is almost irrelevant as 90% of the energy consumption is related to the backlight. Therefore screen size is much more important as larger screens will have a higher number of or bigger backlight lamps which use more energy. For CRT monitors the power consumption is also depending on the screen size as the electron beam has to activate a larger area of phosphorous with increasing screen size.

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Example calculation for the effectiveness of Tier 1 requirements:

Based on the formula for Tier one,

- A 17 inches display with a resolution of 1280 x 1024 (= 1.3 Megapixels) would be allowed to consumer 36.68 Watts.

- A 19 inches display with a resolution of 1280 x 1024 (= 1.3 Megapixels) would be allowed to consumer 36.68 Watts

- A 22 inches display with a resolution of 1680 x 1050 (= 1.76 Megapixels) would be allowed to consume 49.28 Watts.

However, looking at the Eco-Top Ten platform[2], efficient displays of

- 17 inches need between 19.3 and 25 Watts in on-mode
- 19 inches need between 22.5 and 26.7 Watts in on-mode and
- 22 inches need less than 40 Watts in on-mode.

In addition, the Energy Star database indicates that the majority of displays with 17 and 19 inches diagonal screen size need below 30 Watts and the majority of displays with 22 inches need below 40 Watts.

We therefore ask to rephrase Tier 1 requirements for on-mode power consumption as follows:

> *12 Months after this Regulation has come into force:*
>
> *"The ON-mode power consumption of a display with resolution MP (megapixels) and viewable screen area A (expressed in dm2) shall not exceed the following limit Po:*
>
> *1. Screen Resolution ≤ 1.1 MP → Po = 6*(MP) + 0.775*(A) + 3*
>
> *2. Screen Resolution > 1.1 MP → Po = 9*(MP) + 0.775*(A) + 3".*

We also ask to develop more ambitious requirements for Tier 2 before the final Implementing Measure enters into force.

Energy efficiency requirements for Digital Photo Frames are needed

We strongly welcome that Digital Photo Frames (DPF) will be included into the scope of the draft Implementing Measure for monitors at this early stage. This step will be useful considering the fast rising sales figures of low-cost DPFs as well as the rapid technological changes which are taking place in the DPF market.

However, the Implementing Measure does currently not contribute to better energy efficiency of DPFs. Basing the energy efficiency requirements for tier 1 on screen

[2] www.ecotopten.de

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resolution does not set energy efficiency requirements for DPFs in practice. For example an average efficient DFP with a resolution of 800 x 600 pixels and a screen area of 16.2 cm x 12.1 cm would consume about 10 Watts in on-mode which is far below the threshold value of 23 Watts (= Tier 1 requirement). Thus, all DPFs on the market would fulfil the requirements without improving energy efficiency.

The German Stiftung Warentest tested 19 DPF models at the end of 2008[3] which revealed that the tested models consumed between 3.2 to 8.7 Watts in on-mode.

Therefore we ask to base the calculation method for tier one requirements for DPFs on screen resolution and screen area as this would bring down the threshold value for maximum on-mode power consumption to 7.4 Watts which seems to be a more reasonable value[4] and would provide for energy efficiency improvements of DPFs.

Power management requirements for DPFs should reflect consumer behaviour

In line with the Regulation on TVs, the draft Implementing Measure proposes an automatic power down of DPFs after four hours of the last user interaction. However, when setting power management requirements for DPFs it has to be taken into account that the user behaviour for TVs and DPFs is different. Consumers may watch TV for several hours per day but do not necessarily watch several hours pictures which are displayed on a DPF. Therefore a time span of 2 hours for auto-power-down seems to be more adequate. We propose making this auto-power down requirement binding one year after the measure enters into force as a transition period of six month might be too short for manufacturers to adapt the production to the new requirements.

We also propose to show a warning message on the display five minutes before the auto-power-down starts as without a warning consumers might assume the device could be defective.

Therefore we ask to rephrase the power management requirements for DPFs as follows:

> ***"12 months*** *after this Regulation has come into force:*
>
> *- Displays generating their own content must have a sensor or timer enabled by default to automatically engage sleep or off mode.*
>
> *- Sleep or off mode shall be engaged after a period of* ***2 hours*** *of user inactivity as default.*
>
> *- Power management settings shall be made available in the main display setup menus ~~(where available)~~*
>
> *- An alert appears 5 minutes before sleep or off-mode are activated as a result of user inactivity of 2 hours*".

[3] Stiftung Warentest, test, 11/2008.

[4] If we assume a screen resolution of ≤1.1 Megapixels, the power consumption in on-mode would be 7.4 Watts based on the formula: P_0 = 6* (MP) + 0,775*(A) + 3.

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Requirements on Automatic Brightness Control should be in line with Energy Star

The Energy Star criteria V5.0 for displays emphasise the strong relationship between ambient light and the on mode power consumption of computer monitors. Automatic Brightness Control (ABC) is a feature which allows automatically modifying the luminance of displays under variable ambient lighting conditions[5]. Thus, ABC could have a positive impact on the energy efficiency of monitors.

In line with the Energy Star criteria V5.0 for displays we therefore ask to introduce into the power management requirements (point 5, Annex I) the following provision:

> "*Power Management Enabling for Computers Monitors:*
>
> ***12 months*** *after this Regulation has come into force:*
>
> *- Where computer monitors have Automatic Brightness Control they shall meet the applicable energy efficiency requirements that are set out by Energy Star.*

In case ABC can make a significant contribution to energy savings, the Commission should consider making this feature mandatory when revising the Implementing Measure.

Hard-off switch for monitors and Digital Photo Frames are needed

We ask making a hard-off switch for displays mandatory as switching displays into a zero watt mode neither leads to data losses nor lowers user convenience.

Energy Label for monitors should be introduced

To inform consumers easily about the different energy consumption of monitors, we ask to introduce an EU Energy Label for monitors which should be based on a closed A-G scale. When introducing the label classes, "A" should only reward few of the best appliances on the market.

Consumer information should include environmentally friendly use and waste disposal

The information requirements should ensure that the information will be given in a standardised way which allows for easily comparing different products. The information should be available at the point of sale, in user manuals and online.

In addition, we ask to include information requirements about environmentally friendly use of monitors and recommended end-of-life behaviour.

[5] The higher the ambient light level, the higher the brightness of the screen is needed to be clearly seen by the user. Therefore the energy consumption of monitors is higher in high ambient light conditions than in lower ambient light. Some producers provide sensor technology which allows dimming automatically the screen brightness when ambient light levels decrease.

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Verification procedures should not allow for systematically exceeding threshold values

The verification procedures according to Annex III of the draft Implementing Measure specify that a model should be considered as compliant if it does not exceed the limit values by more than 10%. If the model exceeds the limit value by more than 10%, three more models should be tested. In case the three later models do not exceed the threshold values by 10% on average, the models will be considered as compliant.

This specification would allow manufacturers to systematically exceed the threshold values by 10% with all units which are placed on the market.

We therefore ask to replace the proposed verification procedure with the test methods of the Energy Star Label V5.0.

Revision should take place after three years

Taking into account the rapid development of the technology, such as Light Emitting Diodes (LED) and Organic Light Emitting Diodes (OLED), a revision period of four years seems to be too long. Considering that the energy consumption benchmarks like those of Energy Star are reviewed every two years, we suggest a revision of the Eco-design measure for monitors after 3 years to ensure that the mandatory requirements will not be outdated and inefficient.

Eco-design needs to address other environmental aspects

We are disappointed that the draft Implementing Measure focuses only on energy consumption in the use phase.

In the case of LCD screens and laptops, the mercury content of the backlights is a matter of concern. However, mercury-free technology such as LED already exists and is a viable and available technology.

In addition, flame retardants in plastics are a matter of concern. Although some of the flame retardants such as polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) are nowadays prohibited, the substitute flame-retardants are often quite new and not sufficiently investigated.

Therefore, life-cycle assessment of replacing mercury in the backlights and substituting several hazardous substances should be done.

Associated with the production of LCD monitors, nitrogen trifluoride (NF_3), sulphur hexafluoride (SF_6) and tetrafluoromethane (CF_4) are of concern as they show a very high global warming potential. To determine the overall negative environmental impact of monitors, the impact of these gases would need to be considered. As it is currently difficult to get scientific data on the use and impact of NF_3, SF_6 and CF_4 related to LCD production, we propose that the Commission commissions further research to identify the environmental impacts, e.g. when updating the preparatory study for displays.

End.

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