Electronic Displays (TVs & computer monitors): policy recommendations

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Summary: Topten's key policy recommendations

Topten welcomes the draft regulations for revised Energy Labelling and Ecodesign regulations for TVs. Topten is in favour and supports many of the changes that are proposed by the draft regulations, such as

- extending the scope to computer displays and digital photo frames,
- shifting from a linear efficiency approach to a progressive one for the Ecodesign energy efficiency requirements,
- removing allowances (extra tuners and integrated hard discs) and not introducing new ones (UHD and 4k),
- setting future-oriented Ecodesign efficiency requirements,
- addressing non-energy environmental issues and
- tightening verification tolerances.

Topten also sees potential for improvement to the proposals:

1. Align the Label and Ecodesign: apply progressive efficiency thresholds for A to G Label classes

Topten strongly recommends to apply progressive efficiency requirements not only for Ecodesign, but also for the Label classes. At the same time the Label classes should be updated to the original A to G scale, which is best understood by consumers.
The formula proposed for Ecodesign can be simplified so that only one formula is needed, the Label class thresholds can be linked to it with EEI percentages as usual, and the Ecodesign tiers should be implemented along the Label classes. For more details, see the Topten example in the Annex.

- If only Ecodesign is changed to a progressive efficiency approach, the market trend toward larger screen sizes cannot be stopped. It is the Energy Label that is driving the market, therefore it is key that the incentive towards ever-larger screens, which is provided by today's linear Label formula, is removed.
- The Label and Ecodesign should be aligned, two (or more) different formulas lead to confusion.
- The Label needs a complete revision to be fit for upcoming new technologies. Class A should be the best class in the future.

2. No exemptions for inefficient technologies

Neither old (Plasma) nor new (OLED, QLED) inefficient technologies should be protected. Instead, the Energy Label and Ecodesign requirements should be technology neutral, applying equally to all technologies and not protecting inefficient ones, for all tiers.

Background

The Ecodesign regulation for TVs has been applying since 2010, the first Energy Label has been on the market since December 2011. When these regulations were adopted, the future market developments were unpredictable – because of the starting market transformation from CRT to flat screen TVs and from analogue to digital TV, but also because of changing measurement standards and declarations. The Commission therefore decided to set cautious efficiency requirements while asking for a pretty near review of the regulations: in 2012.
In fact, several reports have shown that the On mode power Ecodesign requirements were overtaken by the fast market development and were of only minor effect (CSES, 2012; Michel, Attali, Bush, 2014). The Energy Label in contrast still provides an incentive to higher efficiency, with the top class A+++ still not being reached.
The review process was started in 2012 with a Commission discussion paper for a first Consultation Forum meeting. The paper suggested to widen the scope to 'electronic displays' including computer monitors and digital photo frames, and to introduce three different EEI calculation formulas: one for the Label, one for Ecodesign /small screens (< 61cm) and a third one for Ecodesign/large screens. Apart from Standby power requirements, there have been no efficiency measures so far for computer monitors and digital photo frames.
After a long pause to the review process it is now continued with a Consultation Forum meeting on December 10th 2014, where new draft regulations will be discussed. These have been developed by the Commission with support from CLASP (EC, 2014 / CLASP, 2014).

Draft Ecodesign and Energy Label proposals from November 2014

The draft Labelling and Ecodesign regulations cover electronic displays: televisions, computer monitors and digital photo frames.
In its explanatory notes the Commission writes that it "*is willing to correct existing market and regulatory failures and to contribute to realising the cost-effective potential for reducing electricity consumption and consequently GHG emissions and saving natural resource*."
While for the Ecodesign regulation a fundamental change from a linear to a curved efficiency approach is suggested, only minor changes are proposed for the Energy Label.

Energy Label

In its explanatory notes the Commission does acknowledge that the current (EEI) equation is 'not ideal'. Nevertheless the Commission suggests to continue using the same calculation formula until a next revision (probably in 2020), because 'it may be considered disproportionate for the industry to undertake a full reclassification of the energy classes at this moment in time'. Therefore, the main changes to today's Labelling regulation include

- More ambitious class thresholds for A++ (EEI ≤ 0.13 instead of 0.16) and A+++ (≤ 0.05 instead of 0.1)
- Removing of the allowances for integrated hard disc and additional tuners (different Pbasic values)
- Increase of the discount for automatic brightness control (ABC) on the measured On mode power for calculating EEI and annual energy consumption from 5% to 15%. At the same time, the actual power reduction in On mode by the ABC between 3 and 35 lux must be at least 15%.
- Introduction of a 10%-discount for 'enhanced reactivation features' (presence detectors in computer displays with automatic power consumption reduction if no presence is detected)
- Declaration of the networked standby power in the product fiche
- Declaration if an ABC is available and activated
- Inclusion of the EU Ecolabel (if achieved) into the declaration on the product fiche.

- Additional data provision requirements to market surveillance authorities in the 'technical documentation'
- Measurement tolerances are tightened from 7% to 5% and the peak luminance ratio is now clarified to have to be at 65%or higher (deletion of the 60% as a verification value).

Ecodesign requirements

Other than for the Energy Label, for the Ecodesign regulation a fundamental revision is suggested. For the energy consumption of displays, the following changes to today's regulation are proposed:

- For the maximum power in On mode, the draft suggests to move away from the linear screen area – power approach to a curved line that would result in more ambitious requirements for large displays compared to smaller displays. For the three tiers, a hyperbolic tangent function is suggested with factors that would change for each tier.
- Plasma, OLED and QLED (Organic / Quantum dot Light Emitting Diode) TVs would be exempted from tier 1 (2016 – 2018).
- For standby, networked standby and Off mode, the suggested max. power values are in line with the minimum requirements.
- For enhanced reactivation functions in displays, allowances of max. 1.2W are proposed. No allowance is foreseen for a 'fast start' mode.
- The Automatic Power Down (APD) has still to be set at 4 hours per default, but it can be deactivated by the user, extended up to 12 hours or shortened to one hour.

Also resource efficiency requirements other than energy related are proposed:

- Information requirements facilitating dismantling of the product and recycling of its parts. Also the recyclability index for plastic parts shall be declared. Logos for 'mercury' and 'bromine free' or their presence shall be visible on the products.

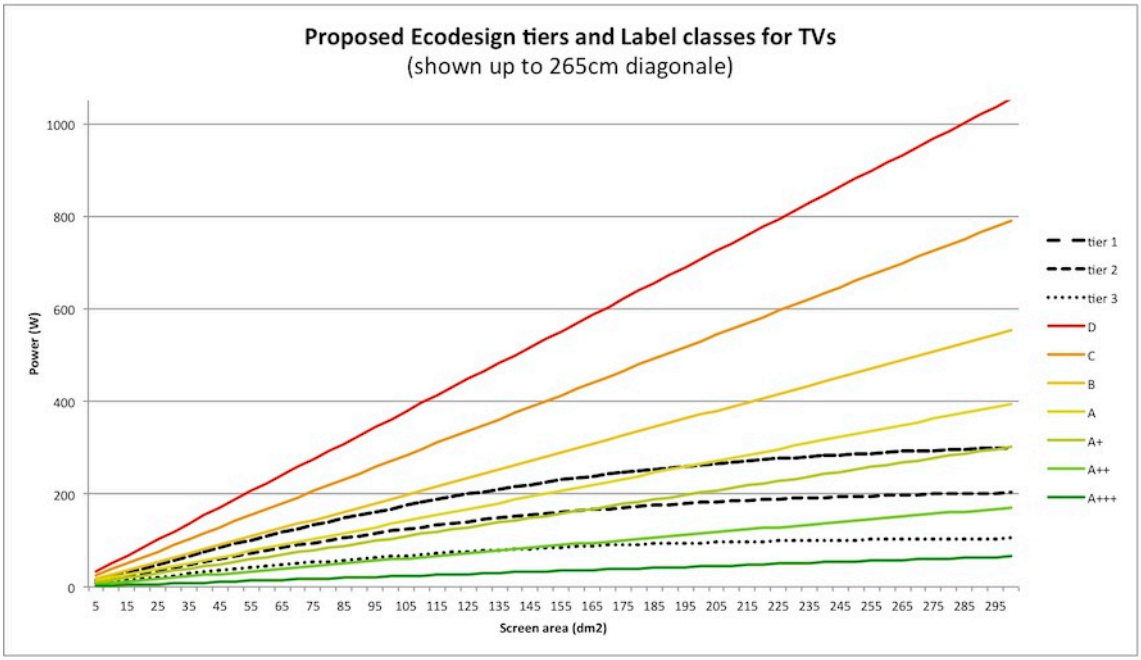

Fig. 1: Proposed Ecodesign tiers and Label classes (Max. Power in On mode; up to 265cm diagonale)

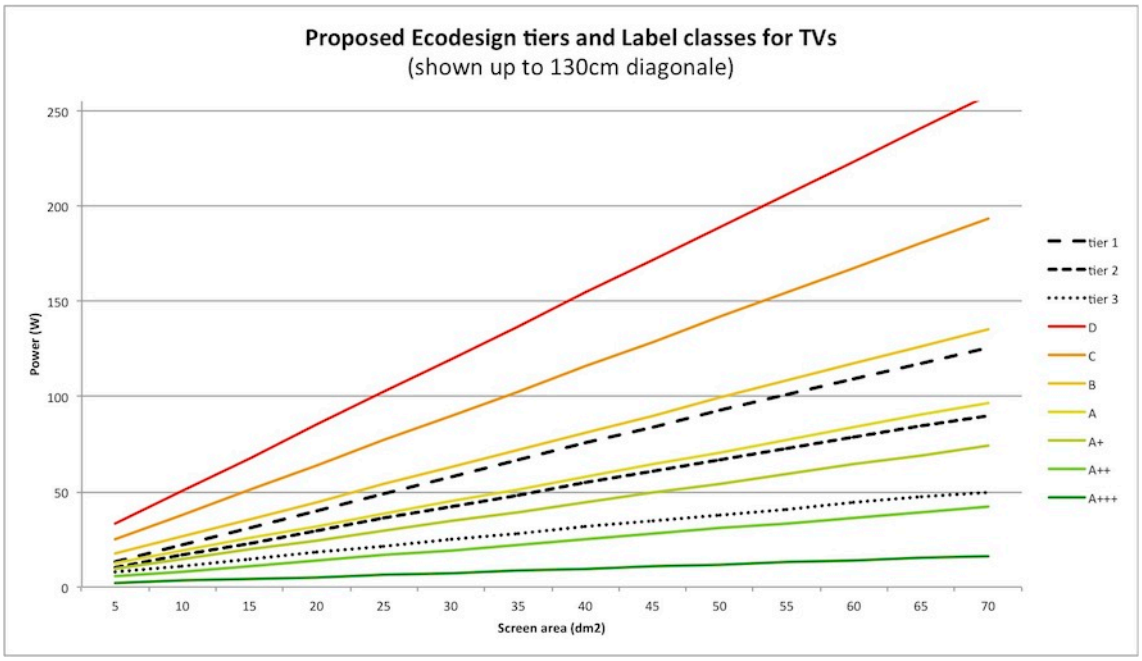

Fig. 2: Proposal, up to 130 cm diagonale

Display market: best available and average technology

Best available technology: Topten TVs

Topten.eu selects and lists the most energy efficient TVs. The graph below, based on Topten data, shows how energy efficient TV models emerged on the market (and on Topten) even before the introduction of the Energy Label and have been improved since.
Table 1 shows the best available technology (BAT) according to www.topten.eu. As the table shows, the best Energy Efficiency Index (EEI) today is 0.11. The top class A+++ (EEI < 0.1) is expected to be reached soon. The table also shows that smaller TVs have more difficulties to reach good efficiency levels: even though the best small TVs are only in class A+, they use clearly less power than larger, more efficient TVs.

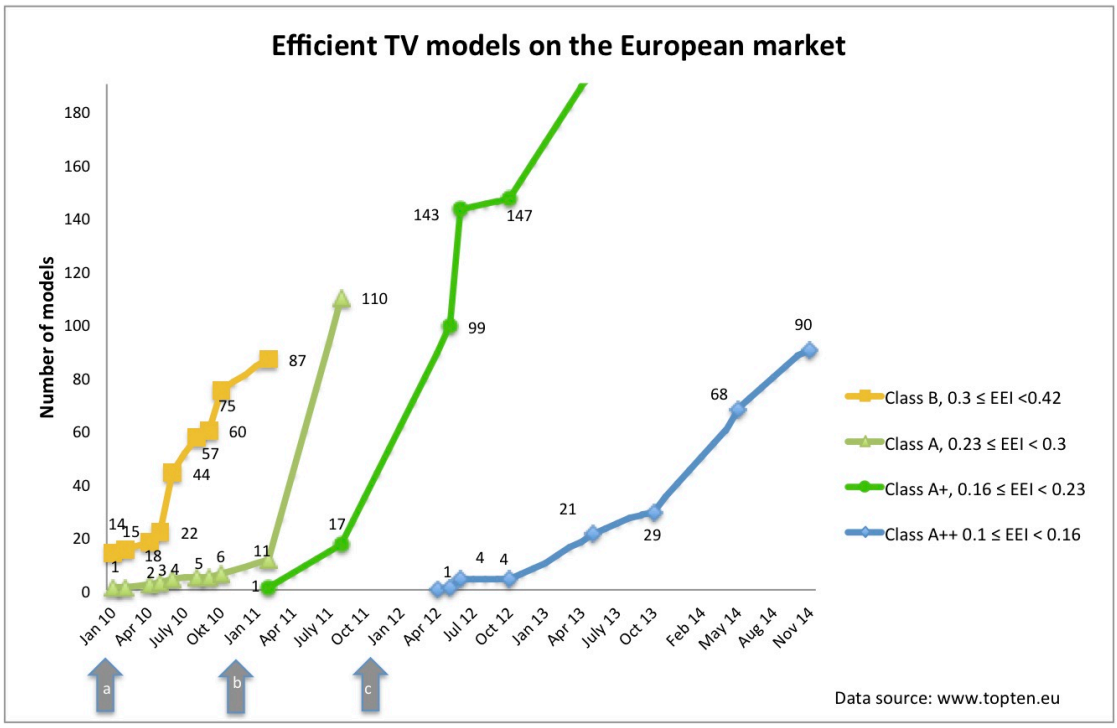

Fig. 3: Number of TV models in the best energy classes. When better models are available, Topten stops listing those of lower efficiency. a) Feb 2010: Discussions on a TV label were resumed, based on the recast of the labelling directive. b) Dec 2010: The Energy Labelling regulation was put into force (transition period). c) Dec 2011: The Energy Label became compulsory

Topten.eu TVs	Best class		Most efficient model		
		Indiv. / All models	EEI	Power On	Screen size
<70cm	A+	2 / 2	0.18	17W	60cm
70-90cm	A+	15 / 21	0.16	24W	81cm
90-100cm	A++	1 / 2	0.16	34W	98cm
100-110cm	A++	5 / 7	0.14	34W	107cm
110-120cm	A++	8 / 19	0.13	37W	117cm
120-135cm	A++	10 / 25	0.13	43W	127cm
>135cm	A++	16 / 37	0.11	45W	139cm

Table 1: Overview on the BAT on Topten.eu, 4th December 2014. 'Individual models' are technically unique, while the others ('similar models') can be technically identical.

Best monitors on Topten

For monitors there has been less incentive to optimise their energy efficiency than for TVs. The only official power and efficiency declaration has been based on the voluntary endorsement label Energy Star. Table 2 summarises the BAT values from topten.eu (power declared according to Energy Star), and shows their EEI and class based on today's TV Energy Label. These best products are not much less efficient than TVs, however the data also implies that they are not optimised regarding efficiency, at least not regarding the TV Energy Label (larger monitors can have lower power than smaller ones). The On mode power measurement for Energy Star V. 6.0 is based on the TV test method IEC 62087. The values should thus be comparable with TV power. However, a different test method was applied for the older version 5.1, and it is not clear if the new declarations are indeed based on a different test method.

Topten.eu monitors	Most efficient model			
	Class (TV label)	EEI (TVs)	Power On	Screen size
<50cm (17, 19")	A+	0.20	9W	43.2cm
50-55cm (20, 21.5")	A	0.25	13W	53.3cm
55.9 cm (22")	A+	0.23	12W	55.9cm
58-60cm (23-23.8")	A+	0.22	12W	60.4cm
61cm (24")	A+	0.19	11W	61cm
68.5 cm (27")	B	0.33	19.6W	68.6cm

Table 2: BAT values for computer monitors from topten.eu, December 2014.

General TV market

In July 2014, Topten has published it second TV market monitoring report based on GfK sales data, complemented with 2013 sales data to cover the years 2007 – 2013 (Michel, Attali, Bush, 2014). The report shows the following main results:

- **The Ecodesign requirements for TVs from 2009 were not ambitious enough** and without visible effect on the market. The data, based on which the EC had to decide on the level of the MEPS and the Labelling scale in 2009/2010, was scarce and out-dated. Because the measurement standard was published only in 2008 and because of the fast market transformation from CRT to flat panel TVs, the future development was impossible to be predicted.
- **Today the situation is much better**: there is an obligation to declare according to a certain measurement standard, and there is the Energy Label, strongly facilitating a market monitoring.
- **The average power of TVs has decreased by 65% from 2008 to 2013** (Fig. 5). In 2013, the average TV had an On mode power of 55W. However, before this the new flat screen TVs had brought along a massive power increase, and only in 2012 the level of the old, smaller CRT TVs was reached again after many years of high-power TVs.
- **TV sales peaked in 2010** (50% sales increase!), when TVs were yet of high power, and before the Energy Label became compulsory. This high number of energy-hungry TVs will be in Europe's living or sleeping rooms for many years.
- **In 2013, nearly 70% of the sold TVs were in classes A and better** across the EU (Fig. 4). Class D has disappeared from the market, and with only 3% of the sales in 2013, also class C is probably gone by now. Because LED-LCDs are moving away from class B and the other technologies are soon gone from the market, also class B will not be on the market much longer. This leaves 3 populated classes on the market (A to A++, with A+++ as a potential fourth class).
- **Average screen size has increased by 20% from 2007 to 2013**. The trend towards larger screen size is on-going (Fig. 6) and supported by the current EEI calculation formula used in the Labelling and Ecodesign regulations. TVs consuming the least energy are not in class A++, but in class A. As a consequence, the average power of TVs will soon start to increase, if the trend to ever-larger TVs is not stopped.
- **TV prices are not linked to energy efficiency, but to screen size**. Inspite of higher energy efficiency, TV prices have decreased by between 40% and 62% for specific screen size categories from 2007 to 2013.

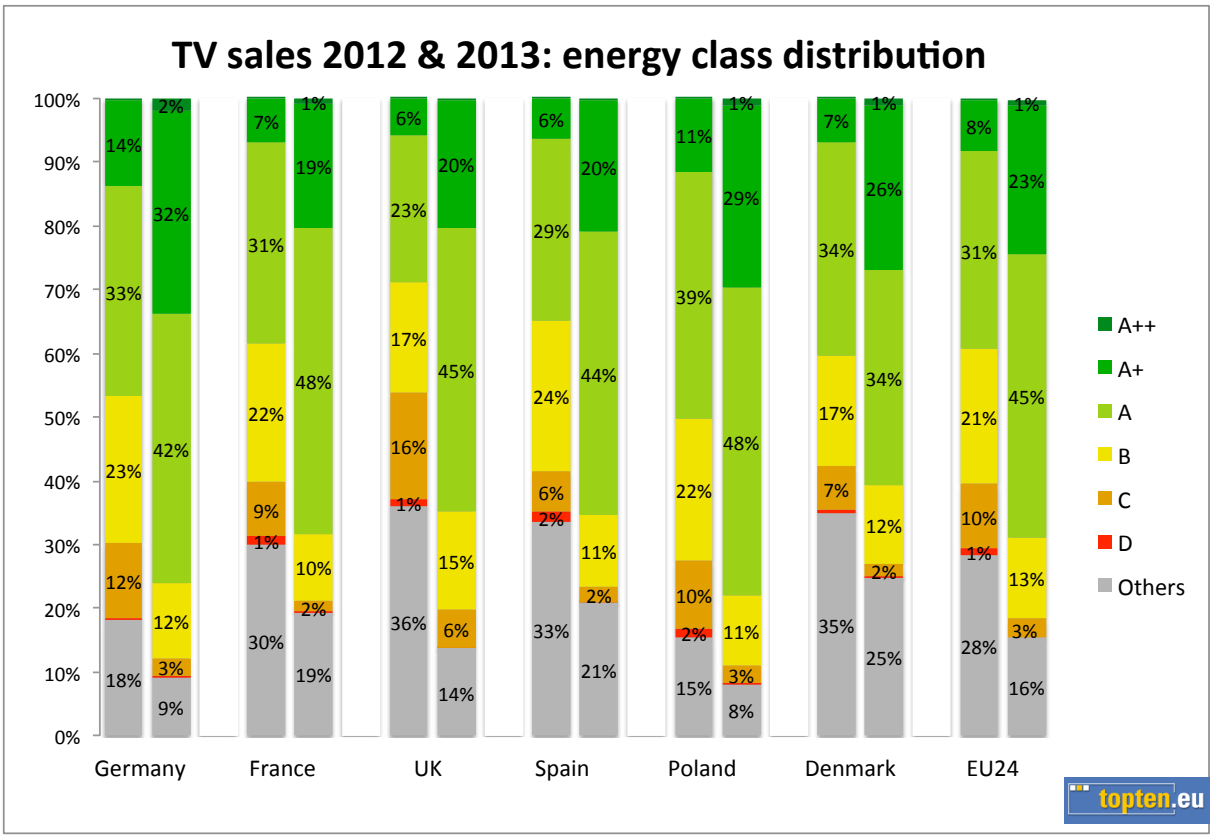

Fig. 4: Distribution of Energy Classes of TV sales in 2012 and 2013. Data: GfK, published in (Michel, Attali, Bush, 2014)

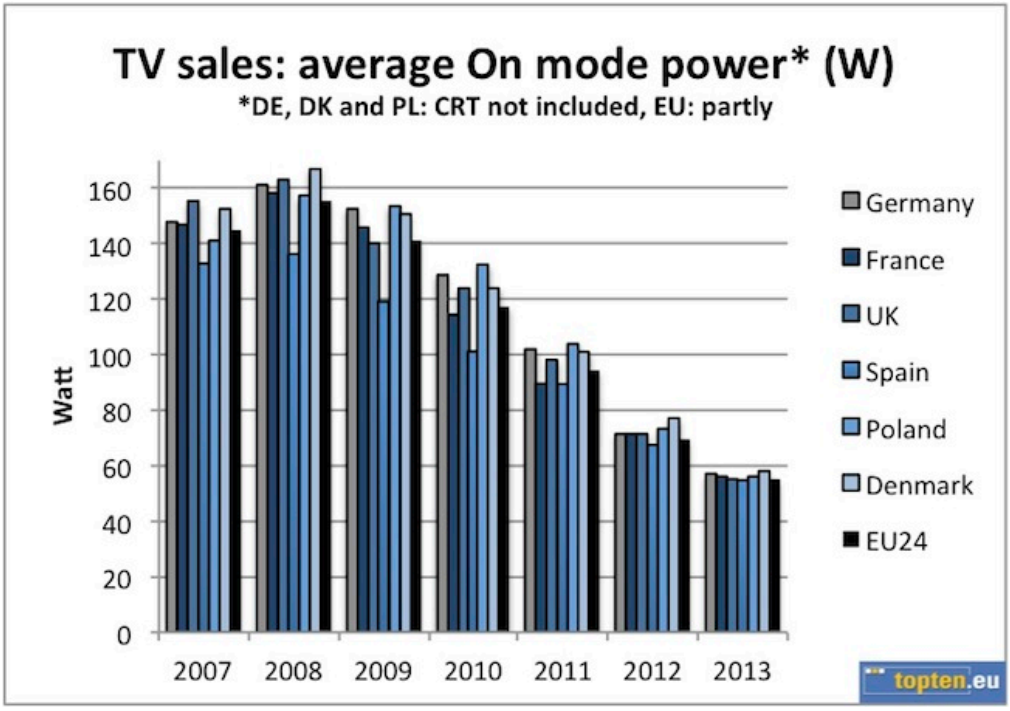

Fig. 5: Average On mode power of TVs. Data: GfK, published in (Michel, Attali, Bush, 2014).

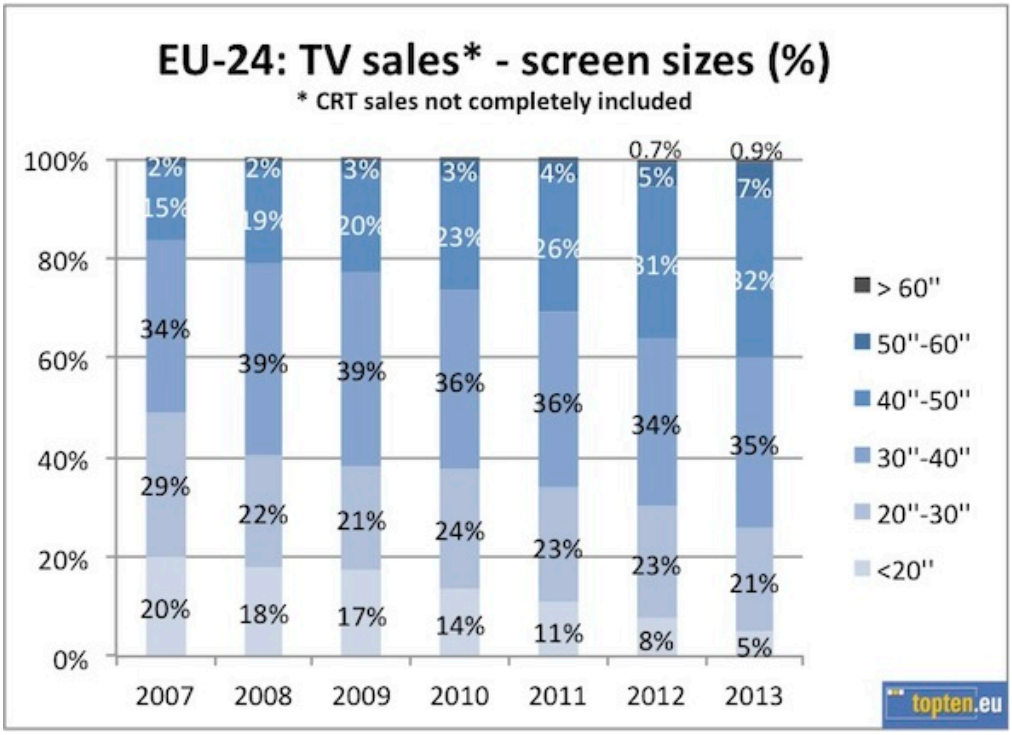

Fig 6: TV sales in the EU-24: percentage of different screen size categories
Data: GfK, published in (Michel, Attali, Bush, 2014). '' = inches

Recommendations for revised Energy Label and Ecodesign regulations

Proposal: many good aspects
Topten welcomes the draft regulations for revised Energy Labelling and Ecodesign regulations. Topten is in favour and supports many of the changes that are proposed by the draft regulations:

- **Extending the scope** to include computer monitors and digital photo frames next to TVs.
- Shifting from a linear to a **curved screen area – power equation** for the minimum efficiency requirements, requiring higher efficiency levels from larger displays and aiming at removing the current incentive towards ever-larger TV screens.
- **Removing the allowances** for integrated hard disc and extra tuners, no addition of new allowances or exemptions for other extra functions such as ultra high definition (UHD) or 4k TVs. Simple formulas without allowances or functional adders make the calculations more transparent and simplify market surveillance.
- **Setting future-oriented minimum efficiency requirements**, avoiding to repeat the mistake of too unambitious requirements from the current Ecodesign regulation.
- Addressing **non-energy environmental issues**.
- **Tightening verification tolerances** and removing the unneeded tolerance for peal luminance ratio. Up to now the regulation has been confusing in this point (65% or 60%?).

Topten's recommendations for improvement
Topten also sees potential for further improvement in the draft regulations.

1. Apply progressive efficiency threshold for A to G Label classes

Topten strongly recommends to apply progressive efficiency requirements not only for Ecodesign, but also for the Label classes. At the same time the Label classes should be updated to the original A to G scale, which is best understood by consumers.

- The Energy Label is driving the market, therefore it is key that the incentive towards ever-larger screens, which is provided by today's Label formula, is removed. If only Ecodesign is changed to a progressive efficiency approach, the market trend toward larger screen sizes cannot be stopped.
- Alignment between the Energy Label and Ecodesign requirements facilitates communication towards consumers and market surveillance. Different formulas for the two regulations lead to confusion.
- Today, only three to four classes are populated, and the Energy Label's effect is limited. With OLED, a new technology is in the starting blocks, promising to reach even higher efficiency levels in the future. The Energy Label that is designed now must be ready for more efficient technologies.

With the extension of the scope to monitors and digital photo frames, the revision of the Energy Label is substantial. The chance for a full revision, which does remove counterproductive incentives and restore the Energy Label's capacity to contribute to market transformation to more efficient displays must not be missed now.

On page three of the explanatory notes the will of the Commission to correct sub-optimal incentives created by the current regulations, which run contrary to the aim of these regulations to reduce the environmental impact of TVs:
The Commission is willing to correct existing market and regulatory failures and to contribute to realising the cost-effective potential for reducing electricity consumption and consequently GHG emissions and saving natural resource.
If the revised regulations are to lead to energy savings, the incentive to ever-larger screens that is created by today's linear reference line for the Energy Efficiency Index (EEI)

calculation formula must be removed from the Energy Label to slow down or stop the trend to larger screens.

- Suggestion: The formula proposed for Ecodesign can be simplified so that only one formula is needed, the Label class thresholds can be linked to it, and the Ecodesign tiers should be implemented along the Label classes. What this approach could look like is shown in figure 7. Details on this example can be found in the Annex.

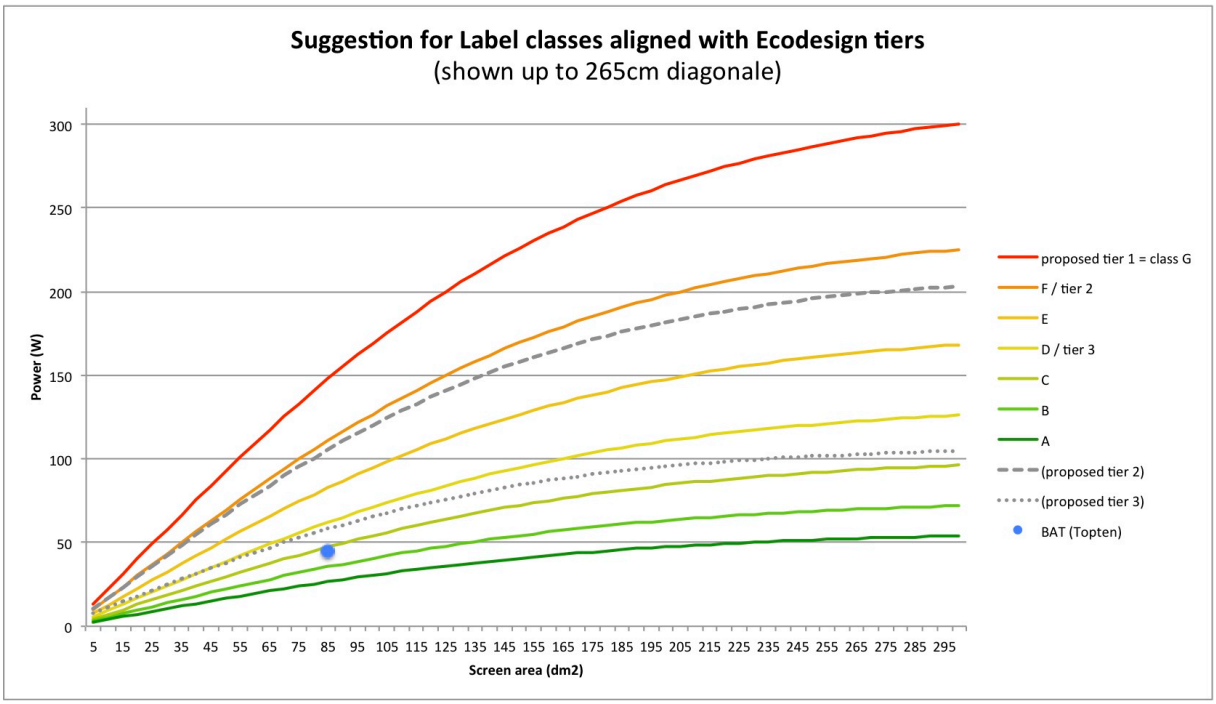

Fig. 7: Example: Topten suggestion for Label classes aligned with Ecodesign tier and vice versa. The blue dot shows today's BAT (EEI=0.11) from Topten.

2. No exemptions for inefficient technologies

The draft Ecodesign regulation proposed to exempt Plasma, OLED and QLED TVs from tier one. Instead, the Energy Label and Ecodesign requirements should be technology neutral, applying equally to all technologies and not protecting inefficient ones.
Plasma TVs seem to be about to disappear from the market (only a decreasing 3% of the sales in 2013 (Michel, Attali, Bush, 2014)), and yet new, more efficient Plasma TVs even reach class A (Michel, Attali, Bush, 2014). An exemption is a completely wrong signal.
The same accounts for emerging technologies OLED and QLED. New display technologies should meet minimum efficiency requirements from the beginning of their market entry. In the past, the market shift from CRT to flat screen TVs has led to a huge sales peak of inefficient, energy-hungry TVs before the Ecodesign and Energy Labelling regulations applied. Similar mistakes must absolutely be avoided now.

References

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Annex:

Example for class thresholds aligned with Ecodesign tiers
Suggestion: The formula proposed for Ecodesign can be simplified so that only one formula is needed, the Label class thresholds can be linked to it, and the Ecodesign tiers should be implemented along the Label classes. What this approach could look like is shown in figure xy. Details on this example can be found in the Annex.

The formula suggested for tier 1 could be the basic formula:
P_{max} = 3 x (100 x tanh (0.02 x 0.006 x (A -11)) + 4) + 6

This would be implemented as tier 1 and at the same time be the class G threshold. The above formula can be multiplied with EEI percentages for the class thresholds (as usually) and tier 2 and 3 be implemented along the class thresholds.

The formula for the class thresholds would thus be:
P_{max} = **EEI x** 3 x (100 x tanh (0.02 x 0.006 x (A -11)) + 4) + 6

EEI values for the class thresholds could e.g. retain steps of 25% improvement, and Ecodesign tiers could be fitted to the Label classes, in our example to class F for tier 2 and D for tier 3:

Class	EEI
A	0.18
B	0.24
C	0.32
D	0.42 (tier 3)
E	0.56
F	0.75 (tier 2)
G	1.0 (tier 1)

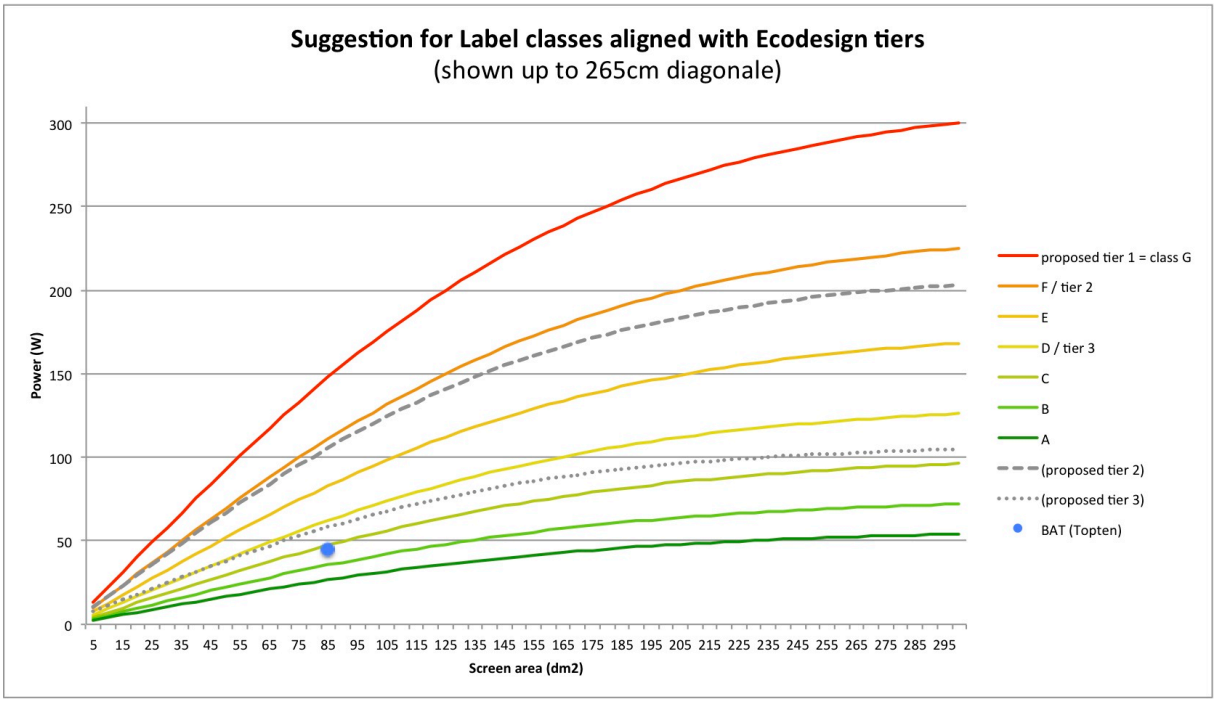

Fig. 7: Example: Topten suggestion for Label classes aligned with Ecodesign tier and vice versa (calculation: Topten). The blue dot shows today's BAT (EEI=0.11) from Topten.