

# Product Definition: Televisions

## *Final: 30<sup>th</sup> July 2009*

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### 1 Matrix Definition

This work covers the basic television set, defined for this purpose as:

*‘A commercially available and mains electricity powered product consisting of a display and one or more tuner(s)/receiver(s) combined in a single housing. It is designed to receive, decode and display audiovisual signals and reproduce sound from analogue sources and/or digital sources that are decoded directly broadcast via satellite, cable or antenna signals. In the case of digital sources, decoding may be via any external adaptor or receiver.’*

Additional definitions for this work that may be useful include:

**Integrated digital:** Where the television set has the capability to decode digital broadcast signals without any external adaptor or receiver.

**Standard resolution/high-definition (HD):** Full HD is when the screen has 1080 pixels or more in the vertical direction, ie 1080 scanning lines. Standard resolution is less than 1080.

Televisions can be broadly categorised by the matrix in Table 1.

#### ***Note on television monitors and computer displays:***

There are already evident trends that the markets for computer displays and television monitors<sup>1</sup> are likely to merge with the television market in the near future. Some forward-looking regulations are already drafted or plan to cover this<sup>2</sup>. However, computer displays and television monitors have been deliberately excluded from the scope of the Television category at this stage. This is because historically, and currently for most products, there are distinct differences in consumption between televisions and computer displays / television monitors<sup>3</sup>, and data would be held in different formats and by different organisations causing collection and analysis challenges. The data gathered in this project is inevitably historical by one, two or maybe more years and so is unlikely to include any television monitors. Computer displays are proposed as a separate product category for the second six-month phase of this project. It is proposed to examine television monitors more closely under the computer displays product area.

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<sup>1</sup> A "television monitor" is defined under draft EU Ecodesign regulations as: "A product designed to display on an integrated screen a video signal from a variety of sources, including television broadcast signals, which optionally controls and reproduces audio signals from an external source device, which is linked through standardised video signal paths including cinch (component, composite), SCART, HDMI, and future wireless standards (but excluding non standardised video signal paths like DVI and SDI), but cannot receive and process broadcast signals."

<sup>2</sup> Television monitors are included in the scope of the EU Eco-design regulation for televisions; the categories will be merged under the ENERGY STAR programme within a few years.

<sup>3</sup> Televisions tend to have higher screen brilliance, less flicker, more complex signal processing circuitry, better image stability and can display smoother motion, much of which leads to higher consumption than computer displays.

**Table 1: Matrix Definition of Television Sub-Categorisation**

		<b>Aspect</b>	<b>Possible Permutations</b>					
A	Technology	Screen technology	CRT (Cathode Ray Tube)	Liquid Crystal Display (LCD)	Plasma Display Panel (PDP)	Rear Projection (RP)	Surface- conduction Electron- emitter Display (SED)	Organic Light Emitting Diode (OLED)
B	Functionality	Functions available	Television set, analogue	Television set, integrated digital			Television/video combination unit (VCR, DVD or PVR)	
C	Other variables	Screen size (diagonal, cm or inches)	Commonly (in inches): 11, 14, 15, 19, 21, 22, 26, 29, 32, 37, 40, 42, 46, 47, 50, 52, 55, 60, 70 inches					
D		Resolution	Standard resolution			1080p full High Definition (full HD)		
E		Aspect ratio of screen	Commonly: 4:3, 16:10, 16:9					

## 2 Product Sub-Category Rationalisation

### 2.1 Technology

#### *Matrix Row A): Screen technology*

On mode energy consumption does vary significantly with screen technology, but this does not change the basic functionality of the television – ie the service rendered is the same for all types. Also, screen technology is unlikely to be of direct interest to policy makers.

However, it is possible that screen technology could be of secondary interest to understand differences in efficiency between markets. Also, emerging technologies such as SED and OLED are forecast to bring significant improvements in energy efficiency and so their presence and penetration could be of future interest. This analysis could be done in follow on work, but is proposed as outside the current mapping and benchmarking project scope.

#### *Proposal:*

- *To carry out the mapping and benchmarking **without** presenting data on screen technologies at this stage.*
- *But to request screen technology data as part of the data sets for possible analysis at a later stage if required. Hence to request data for all screen technologies in the same data format, with a data flag to indicate whether each television is CRT, LCD, PDP, RP, OLED, SED or 'Other'.*

### 2.2 Functionality

#### *Matrix Row B: Functions Available*

The basic television set is the product of most interest.

In addition, the majority of products on sale now already have integrated digital tuners but analogue televisions can still be bought. The integrated digital tuner will result in a few watts additional consumption by the television set, and so its presence should be noted in the data to enable more detailed analysis later if required. It is therefore proposed to request information on whether particular televisions have integrated digital tuners or not, but this will not be part of the analysis for mapping and benchmarking.

Television sets with integrated video players/recorders represent a small proportion of total television sales (data quoted in the EuP preparatory study for lot 5 indicates less than 10% in 2004 and this is likely to have shrunk since then). Test methodologies generally require that additional modules such as video recorders within the product are switched off during energy testing, hence this would probably make no difference to declared energy consumption and so data on such products would not add value to the overall data set. It is therefore proposed to exclude combination television and video players / recorders from the data set.

#### *Proposals:*

- *To **exclude** integrated video player / recorder televisions from the data set.*
- *And to request data on integrated digital and analogue televisions in the same data set, but with a data flag to indicate whether each television is digital, analogue or unknown, so that any variations could be investigated in separate work later if necessary.*

## 2.3 Other Variables

### **Matrix Row C: Screen size**

Screen size is an important driver of consumption, and is fundamental to calculation of efficiency (Watts per unit screen area). Total consumption figures could be misinterpreted by policymakers if this factor is not taken into account when analysing the data from any particular market. Hence screen size will be collected and used in analysis as part of the mapping and benchmarking project to calculate efficiency (W/dm<sup>2</sup>, see metrics section). However, data on the very smallest and very largest screen sizes will currently be of little interest to policy makers due to very small sales volumes, so size limits could be suggested to slightly reduce the amount of data processed.

To simplify the data set in *presentation of graphs etc*, screens could be divided into three size ‘bins’ (eg small 11” to 26” ; medium 27” to 39” ; large 40” to 60”)<sup>4</sup>, although data collection and analysis will be based on actual screen sizes.

#### *Proposal:*

- *To request data for televisions between 11 inches and 60 inches in screen diagonal (and to exclude data outside of that range).*
- *To request data specifying screen size in inches or cms, and to use this to calculate television efficiency. Additionally, data for mapping and benchmarking may be presented in three screen size ranges (small, medium, large defined as above), depending upon comparability of efficiency data across screen sizes.*

### **Matrix Row D: Resolution**

Resolution of the television can currently affect energy consumption, but as high-definition becomes better established, improvements in silicon and system design should systematically achieve the levels of consumption more typical now for standard definition televisions. Hence resolution is of limited policy significance and should only affect energy consumption for a couple of years or so. However, as the transition is still being made, and temporary additional power allowances are currently given to HD models under mandatory legislation such as EuP, it is proposed to request this information but not to display it as part of the analysis for mapping and benchmarking.

#### *Proposal:*

- *To record whether each television’s resolution is full HD or standard. Shifts towards full HD and whether or not associated increased energy consumption systematically occur could be explored at a later stage but is not part of currently budgeted analysis.*

### **Matrix Row E: Aspect ratio**

Aspect ratio is the ratio of the width to the height of the screen (ie it dictates its shape). Aspect ratio does not in itself affect energy consumption, and is not of direct interest to policy makers. However, the aspect ratio of the screen is required to calculate the screen area accurately, which is necessary to calculate an efficiency figure in W/dm<sup>2</sup>. If data is not available, assumptions can be made on aspect ratio to allow efficiency calculation (television/data age will be useful clue to indicate likely ratio).

#### *Proposal:*

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<sup>4</sup> Adapted from EU Ecodesign of Energy Using product (EuP) Directive, preparatory study for Lot 5 (televisions), but with a cap at 60” that coincides with the upper ENERGY STAR limit (Programme Requirements for Displays current at July 2009). A fourth ‘extra-large’ size bin is not considered worthwhile for this analysis as sales are currently very low.

- To request data for aspect ratio, but not to present this as part of the mapping and benchmarking. This will, however, enable more accurate calculation of screen area and so efficiency. Aspect ratio will be assumed where not provided.

### 3 Revised Categorisation

Based on the proposals made, Table 2 provides a rationalised Product Definition Matrix. This rationalised matrix may then be rearranged to provide a simplified view of the product categorisations for which data should be sought, see Table 3.

**Table 2: Rationalised Matrix Definition of Television Sub-Categorisation**

		Aspect	Possible Permutations		
A	Technology	Screen technology	Data on all screen technology televisions will be analysed together		
B	Functionality	Functions available	Television set, analogue	Television set, integrated digital	
C	Other variables	Screen size (diagonal, inches or cm)	Commonly (in inches): Between 11” and 60” sizes. (Including: 11, 14, 15, 19, 21, 22, 26, 29, 32, 37, 40, 42, 46, 47, 50, 52, 55, 60 inches) (Categorised for data presentation into Small (11” to 26”); medium (27” to 39”); large (40” to 60”))		
D		Resolution	HD or not		
E		Aspect ratio of screen	4:3	16:10	16:9

**Table 3: Simplified Product Categorisation Matrix**

Television sets, defined as:  <i>‘A commercially available and mains electricity powered product consisting of a display and one or more tuner(s)/receiver(s) combined in a single housing. It is designed to receive, decode and display audiovisual signals and reproduce sound from analogue sources and/or digital sources that are decoded directly broadcast via satellite, cable or antenna signals. In the case of digital sources, decoding may be via any external adaptor or receiver.’</i>		
Data will be analysed based upon actual screen size, but may be presented if necessary in three size ‘bins’:		
Screen size category Small (11” to 26”)	Screen size category Medium (27” to 39”)	Screen size category Large (40” to 60”)
For which segregation and analysis will done through data requested on:		
<ul style="list-style-type: none"> <li>• Screen size</li> <li>• Aspect ratio (used to calculate screen area and so consumption per unit screen area)</li> </ul>		
And for which additional later analysis may be planned using data requested on:		
<ul style="list-style-type: none"> <li>• Screen technology</li> <li>• Analogue or integrated digital</li> <li>• HD or not</li> </ul>		
Exclude:		
<ul style="list-style-type: none"> <li>• Combination products (ie with integrated DVD player, VCR player / recorder, hard drive).</li> <li>• Screen sizes over 60” and under 11”</li> <li>• Television monitors and computer displays (see note at beginning of the document)</li> </ul>		

## 4 Participating Country Requirements

All participating countries that responded indicated high levels of interest in mapping and benchmarking information for televisions in the basic way proposed. No specific additional requirements were noted, but some useful refinements of the definition document have been incorporated.

## 5 Metrics

The key metrics to be used are:

*Unit energy consumption:*

- *On mode consumption in Watts, (then used to calculate Watts per year).*
- *Standby consumption in Watts.*

In order to provide an annual consumption figure, on mode will be multiplied by the typical number of hours per year that a television is used for in that country, where such data is provided. In the absence of specific country usage data, a figure of 4 hours per day, 365 days per year will be assumed.

*Unit Energy Efficiency:*       $W/dm^2$

Efficiency will be requested in this format, or calculated from screen size provided and aspect ratio.

### **Additional notes on metrics:**

#### **On mode**

There are a small number of test methodologies in existence. The test standard IEC 62087:2008 has been adopted for performance in Europe, and determines on mode power consumption based on a dynamic test-loop of television programme clips at a defined luminance level. Data will be requested about which test standard has been used.

#### **Standby**

Standby mode consumption (also called passive standby) has historically been significant although the majority of televisions achieve close to or less than 1W in standby now. Standby consumption may, however, be of interest in some markets and a global trend could be confirmed. A suitable test methodology is EN/IEC 62301 Edition 1.0 2004/2005 *Household Electrical Appliances, Measurement of Standby Power*, available at [www.iec.ch](http://www.iec.ch). Others will be identified for different regions. Standby power consumption will be requested for analysis under mapping and benchmarking.

## 6 Data requirements

To enable the most effective analysis of data and comparison between countries, we would like to collect the following data:

### ***Information on new products on sale***

For all years available between 1996 and 2008 and for all categories as defined in Figure 3,

1. Ideally this will be in the form of **individual model information** including (in approximate order of priority):
  - a. Efficiency in  $W/dm^2$

- b. On mode consumption (W) (used to calculate or cross-check the efficiency figure)
  - c. Screen size (diagonal in inches or cm)
  - d. Aspect ratio (4:3, 16:9, 16:10)
  - e. Screen technology (CRT, LCD, PDP, RP, OLED, SED)
  - f. Standby consumption (W)
  - g. Annual sales volume for that model
  - h. Any information on models that are anticipated to enter the local market within two years that are more efficient than anything currently on the market
  - i. Whether full HD or not
  - j. Whether integrated digital or analogue capability
2. Where this is not possible, other information that allows the identification of best, worst and sales weighted average consumption of products available on the local market.

### ***Information on stock and sales***

For all years available between 1996 and 2008,

3. The country / regional stock of televisions in use at that time<sup>5</sup>:
  - a. Overall number of products installed in homes (or average number per household)
  - b. Indicative average screen size
  - c. Indicative breakdown of screen technologies in use
  - d. Average product lifetime
4. Where this is not possible, other available information on stock, eg overall average energy consumption, number in stock, etc.
5. Annual sales volume by screen technology (and by size if available)

### ***Additional Information Required for Data Processing***

6. Test methodology(ies) used for on mode, and standby, and their relationship to known international standards (e.g. clone, clone with amendments X Y and Z, etc.)
7. Average time spent watching televisions and/or left on (hours/day, Also broken down between primary and secondary televisions when known). If not available, assumptions will be made to calculate total consumption (eg adopting the 4 hours per day per television as used for EU Energy Label calculations).
8. Local regulations that define products (eg regulations that define product groups that influence the data sets supplied)
9. Total number of households in country/region
10. Local electrical supply information (voltage and frequency)

### ***Additional Information Required for Other Planned Analysis***

11. Summary of all major policy actions affecting televisions over the period data is available including the times when policy were first considered, the time of formal announcement of the policy plans and the date when policy came into force
12. Summary of major cultural issues that are thought to affect this product at the local level.

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<sup>5</sup> Also useful would be any local assumptions of stock figures for primary televisions (ie the television watched by the family and/or in the main viewing area of the home), compared to secondary televisions (in kitchen / bedrooms) and so with reduced viewing hours. This could facilitate some indicative analysis of total consumption based on assumed viewing hours for each type.