

## **Summary of ‘Energy Efficiency Trends of IT Appliances in Households’: an ODYSSEE publication**

### **Introduction**

This article summarises the main findings of a report published by the ODYSSEE project in autumn 2009, entitled ‘Energy Efficiency Trends of IT Appliances in Households’. The ODYSSEE publication details the use and energy efficiency of Information and Communication Technology (ICT) appliances in households within the UK and EU, drawing on energy efficiency indicators from the ODYSSEE database. The full ODYSSEE publication can be found at: [www.odyssee-indicators.org/publications/PDF/ICT\\_households\\_report.pdf](http://www.odyssee-indicators.org/publications/PDF/ICT_households_report.pdf).

A summary of energy efficiency in relation to the UK’s energy and climate change targets, as well as a description of the ODYSSEE database and its main objectives were given in the March 2010 edition of Energy Trends, entitled “Special feature: European Energy Efficiency trends” (page 39), available at: [www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx](http://www.decc.gov.uk/en/content/cms/statistics/publications/trends/trends.aspx).

The combination of increases in the number of households in the UK (up by 19 per cent between 1988 and 2008<sup>1</sup>), higher household disposable income (up by 76 per cent<sup>1</sup> over the same time period) and the introduction of new appliances into the market has resulted in household demand for ICT appliances growing substantially over the last 20 years. This basic trend of rising household consumer demand is reflected in the increasing proportion of electricity consumption that ICT appliances account for in households. In 1988 ICT appliances<sup>2</sup> represented 18 per cent<sup>1</sup> of total electricity consumption from household domestic appliances, increasing to 31 per cent<sup>1</sup> in 2008. To understand the implications of these changes, reliable and detailed data for the EU and individual member states are required, and therefore a good knowledge of the electricity consumption of ICT appliances. Currently data on the electricity consumption for ICT appliances is limited; however new indicators for these appliances are being developed within the ODYSSEE database.

### **Indicators for ICT appliances within the ODYSSEE database**

For the ODYSSEE indicators, the current and future electricity consumption of ICT appliances is calculated by a model. Although ICT appliances in households cover an extensive range, only the most important appliances (in terms of energy consumption) have been included in this model (as shown in Figure 1). Variables that help determine power use are also illustrated in Figure 1, with the most important being: the stock of appliances for each product; the average power input for each product in different operating modes<sup>3</sup>; and the respective time of use.

Data on the number of households, the ownership rates of appliances and the subsequent (calculated) appliance stock have been collected for individual EU countries. However, EU average figures have had to be used for technical and behavioural parameters (including time of use and power input) due to the limited data available for individual countries.

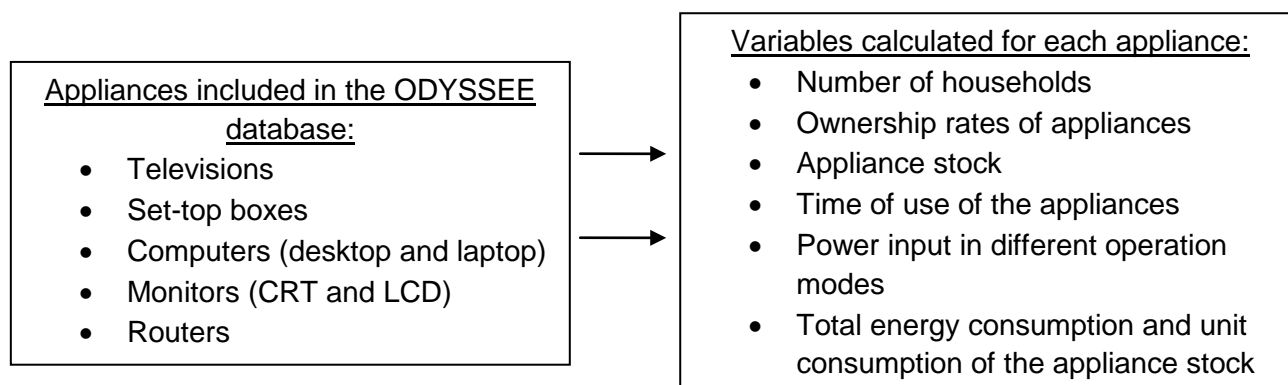
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<sup>1</sup> These data are sourced from the DECC publication ‘Energy Consumption in the UK’ (Table 3.3 and Table 3.10), which is available at: [www.decc.gov.uk/en/content/cms/statistics/publications/ecuk/ecuk.aspx](http://www.decc.gov.uk/en/content/cms/statistics/publications/ecuk/ecuk.aspx).

<sup>2</sup> ICT appliances include TV, Set-top box, DVD/VCR, Games consoles, Power supply units (consumer electronics), Desktops, Laptops, Monitors, Printers and Multi-Function devices (Home Computing).

<sup>3</sup> Different operational modes include: on or active mode, standby mode (including: network-standby, passive standby) and off-mode.

**Figure 1: Appliances included in the ODYSSEE database and the variables calculated**



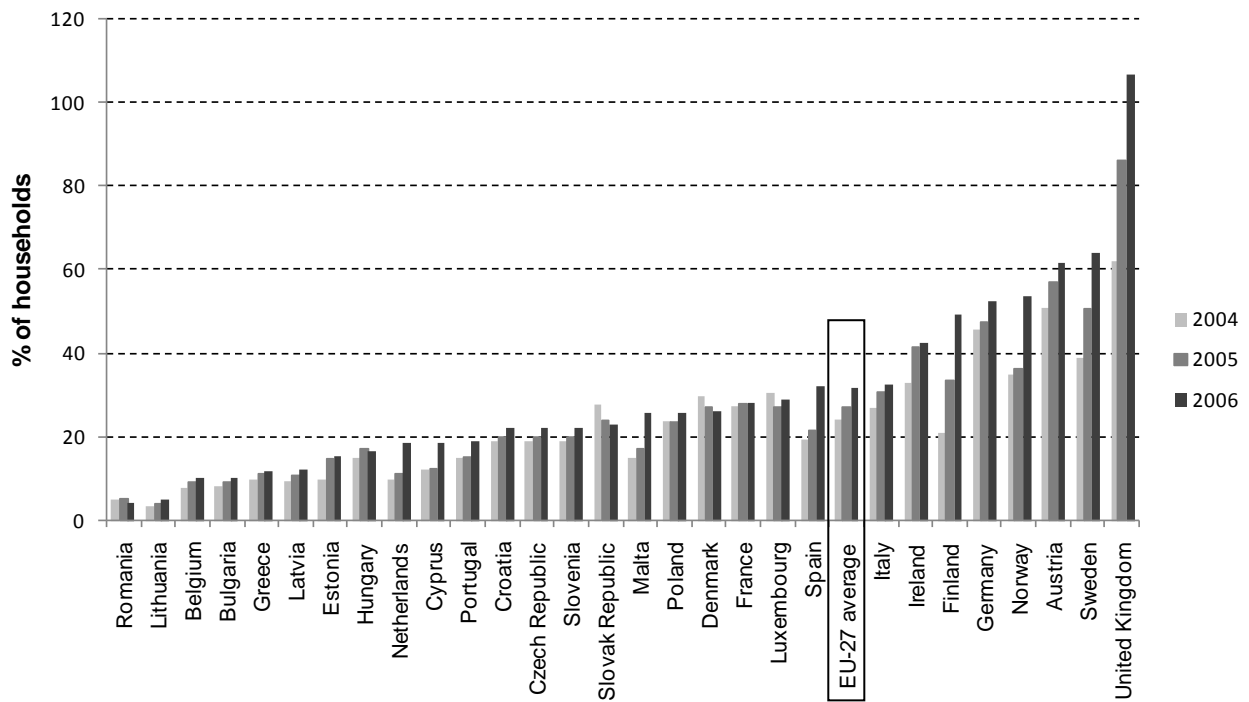
As well as using data directly from the ODYSSEE database, data regarding ownership rates have also been taken from the EUROSTAT statistics on the information society. Other data sources have also been used for the time, such as use and power input variables including the EuP Preparatory studies on appliances included in the ODYSSEE database and two German studies (Fraunhofer ISI 2009 and Fraunhofer ISI *et al.* 2005). For further information on these data sources and their compatibility with the ODYSSEE database, please view the ODYSSEE publication “Energy Efficiency Trends of IT Appliances in Households”, available at: [www.odyssee-indicators.org/publications/PDF/ICT\\_households\\_report.pdf](http://www.odyssee-indicators.org/publications/PDF/ICT_households_report.pdf).

### Data interpretation

The appliance stock of ICT equipment has been calculated by multiplying the ownership rate of individual appliances with the total number of households. Chart 1 illustrates the percentage of households with set-top-boxes<sup>4</sup> within different EU member countries (plus Norway and Croatia). A considerable increase can be observed between 2004 and 2006 in almost all countries, with the exception of the Slovak Republic, Denmark and Luxembourg, where a decrease in the percentage of households with set-top-boxes is shown. The largest percentage increase over the same time period was seen in Norway, Sweden, Finland and the UK. The percentage of households with set-top-boxes in the UK increased by 45 percentage points between 2004 and 2006. The percentage of households with a set-top-box for the UK is over 100 per cent in 2006 because the total number of set-top-boxes sold in 2006 exceeds the total number of households (i.e. a proportion of households have more than one set-top-box). This increase is noticeably higher than the EU-average, which increased by 8 percentage points from 24 per cent in 2004 to 32 per cent in 2006.

<sup>4</sup> Set-top-boxes are defined as power required for UK ‘Sky’, cable decoding boxes and standalone ‘free-view’ boxes. It excludes power for integrated ‘free-view’ receivers.

**Chart 1: Percentage of households with set-top-boxes by country (2004-2006)**



**Chart 2: Percentage of households with an internet connection (2004-2006)**

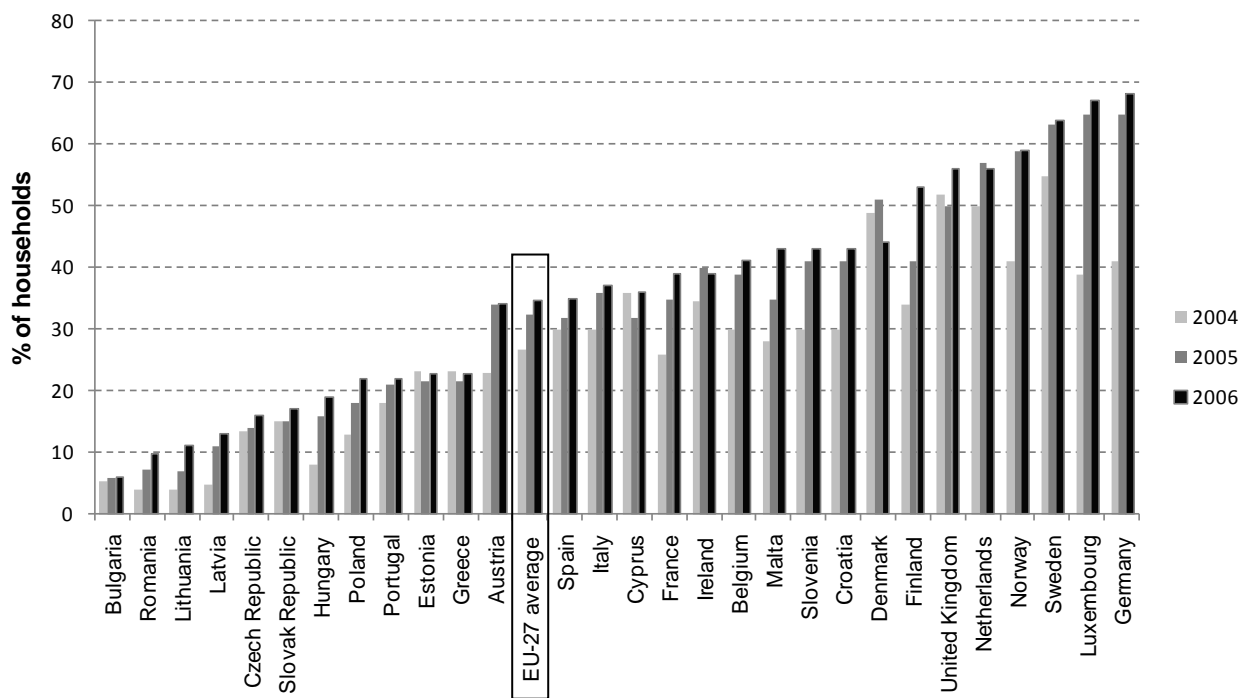
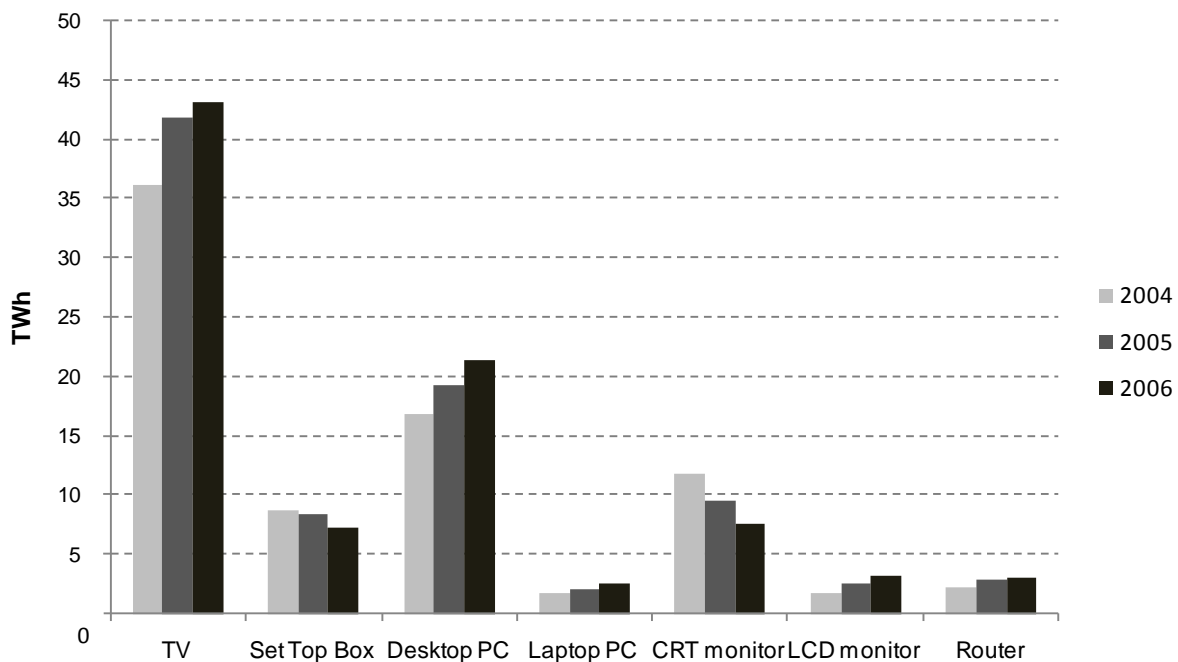


Chart 2 illustrates the percentage of households in EU member countries (plus Norway and Croatia) with an internet connection requiring a router. In 2004, 52 per cent of households in the UK had this type of internet connection, the second highest in the EU (including Norway and Croatia). However, unlike the substantial increase in the percentage of households with set-top-boxes shown in Chart 1, the percentage of households with an internet connection in the UK only increased by 4 percentage points between 2004 and 2006. Comparatively, the percentage of households with an internet connection in Germany and Luxembourg increased by 27 and 28 percentage points respectively, resulting in Germany having the highest percentage of households with an internet connection in 2006 at 68 per cent and Luxembourg the second highest at 67 per cent. This is noticeably higher than in the EU where the percentage of households with an internet connection increased by 8 percentage points between 2004 and 2006 to 35 per cent in 2006.

Chart 3 illustrates the total electricity consumption of the seven domestic ICT appliances which are included in the ODYSSEE database. The total electricity consumption of these appliances have increased from 79.5 TWh in 2004 to 88.3 TWh in 2006<sup>5</sup>. Individually, the total electricity consumption for desktop PCs and TVs has increased by 26 and 19 per cent respectively over the same time period. However, the total electricity consumption of appliances differ in the three operation modes (i.e. active, standby and off mode). For all seven domestic ICT appliances, energy consumption in active mode illustrates a rising trend, but is decreasing or at least constant in standby or off mode. 92.5 per cent of total electricity consumption for TVs was consumed during active mode in 2004, with 6 and 1.5 per cent being consumed in standby and off mode respectively. However, in 2006 total electricity consumption during active mode increased to 95.5 per cent, with total electricity consumption during standby and off mode decreasing to 4.1 and 0.4 per cent respectively. For detailed graphs relating to individual appliance total electricity consumption in different operation modes, please view the ODYSSEE publication “Energy Efficiency Trends of IT Appliances in Households”, available at:

[www.odyssee-indicators.org/publications/PDF/ICT\\_households\\_report.pdf](http://www.odyssee-indicators.org/publications/PDF/ICT_households_report.pdf).

**Chart 3: Total electricity consumption of IT appliances in EU countries (plus Norway and Croatia)**

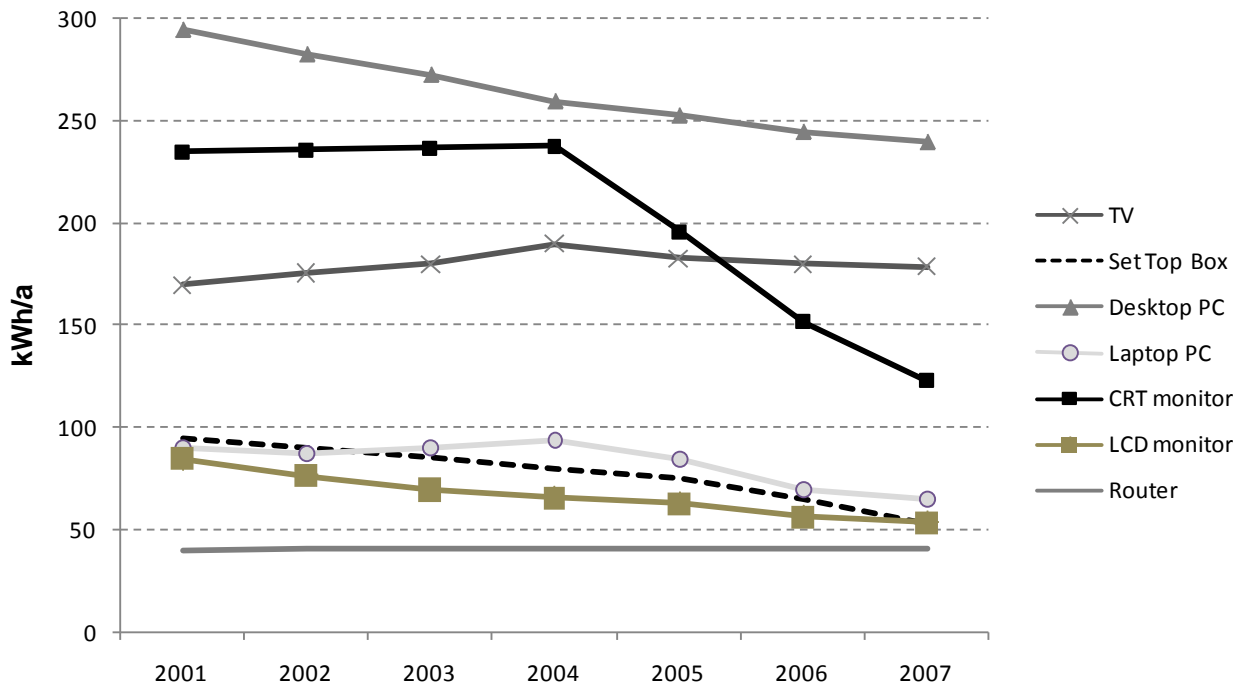


<sup>5</sup> Data for some countries could not be calculated due to data gaps in the ODYSSEE database or the EUROSTAT ICT database.

## Special feature – UK and European Trends of IT Appliances in Households

Chart 4 illustrates the total unit consumption of seven domestic ICT appliances in all operational modes between 2001 and 2007. The majority of the appliances show a slightly decreasing trend in unit consumption since 2004, suggesting a general improvement in the energy efficiency of these appliances, with a more prominent trend for CRT monitors. An improvement in energy efficiency of TVs has occurred since 2004 due to the use of more energy-efficient LCD technology. However, an increase in total TV electricity consumption (as a result of more power being required due to increasing screen size) has restricted the total unit consumption of TVs to decrease in line with other appliances.

**Chart 4: Total unit consumption by appliance (all operation modes) 2001-2007**



### Further information

This article is a brief review of information on energy efficiency drawn from the ODYSSEE dataset. The full database can be found on the ODYSSEE website, at: [www.odyssee-indicators.org](http://www.odyssee-indicators.org). Furthermore, the ODYSSEE report, entitled “Energy Efficiency Trends of IT Appliances in Households” is also available at: [www.odyssee-indicators.org/publications/PDF/ICT\\_households\\_report.pdf](http://www.odyssee-indicators.org/publications/PDF/ICT_households_report.pdf).

#### Harriet Addison

Energy Consumption Statistics  
Tel: 0300 068 5037  
E-mail: [Harriet.Addison@decc.gsi.gov.uk](mailto:Harriet.Addison@decc.gsi.gov.uk)

#### Julian Prime

Energy Consumption Statistics  
Tel: 0300 068 5054  
E-mail: [Julian.Prime@decc.gsi.gov.uk](mailto:Julian.Prime@decc.gsi.gov.uk)